

 पी डी आई एल <b>PDIL</b>	<b>PROJECTS AND DEVELOPMENT INDIA LTD.</b>	PNPM/PC-217/E/001/ P-II/Sec.-6.0		
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## SECTION – 6.0

### PROJECT EXECUTION PLAN

PROJECT: COAL BASED SYNTHETIC NATURAL GAS  
(SNG) PROJECT AT BARDHAMAN WEST  
BENGAL, INDIA



PLANT : COAL GASIFICATION PLANT FOR GENERATING  
SYN GAS (CO+H<sub>2</sub>) FOR PRODUCTION OF  
SYNTHETIC NATURAL GAS (SNG)

P	16.05.2025	16.05.2025	DRAFT TENDER FOR OWNER's COMMENTS	VS	SK	AK
REV	REV DATE	EFF DATE	PURPOSE	PREPD	REVWD	APPD

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## 1.0. INTRODUCTION

M/s GAIL India Limited (GAIL), is a leading Natural Gas company with diversified interest across the Natural gas value chain of trading. Transmission, LPG production & transmission, LNG re-gasification, petrochemicals, City Gas, E&P, etc. GAIL owns & operates a network of around 16421 km of Natural Gas pipeline spread across the length & breadth of Country.

Coal India Limited (CIL), a Maharatna central public sector enterprise ("CPSE"), was incorporated on 01<sup>st</sup> November 1975 with nationalization of private coal mines by Govt. of India. With a modest production of 79 MT at the year of its inception, CIL today is the single largest coal producer in the world having produced nearly 607 MT. and in pursuance of initiatives towards the development of Clean Coal Technology and alternate use of coal, CIL is exploring the possibilities to venture into the coal- to-chemicals sector.



Eastern Coalfields Limited (ECL), fully owned subsidiaries of Coal India Limited was founded in 1975 after Nationalisation of Coal Mines in India. It operates Coal Mines in Jharkhand and West Bengal states of India. The company has its headquarters at Sanctoria, in West Bengal.

India has a reserve of 307 Billion tonne of thermal coal and about 80% of coal produced is used in thermal power plants. With environment concerns and development of renewable energy, diversification of coal for its sustainable use is inevitable. Coal gasification is considered as cleaner option compared to burning of coal. Gasification facilitates utilization of the chemical properties of coal. Syn Gas produced from Coal gasification can be usable in producing Synthetic Natural Gas (SNG), energy fuel (methanol & ethanol), ammonia for fertilizers and petro-chemicals. These products will help move towards self-sufficiency under 'Atmanirbhar Bharat Abhiyaan'. In line with the above objective, Ministry of Coal has taken initiative for utilizing coal through coal gasification and achieve 100 MT coal gasification by year 2030.

To implement the coal gasification project, it is planned to establish a gasification plant utilizing the low-ash coal available from Eastern Coalfields Limited (ECL), a subsidiary of Coal India. CGIL will take care for coal mining and product marketing, while the gasification and product conversion facilities will be developed on an LSTK (Lump Sum Turnkey) basis.

## 2.0. LOCATION

The proposed project site is located at Bahadurpur in the eastern part of Raniganj Coalfield in Asansol sub-division of Paschim-Bardhaman district of West Bengal. The proposed area lies within the latitude 23°41' 32" N to latitude 23°42'13"N & longitude 87°09'05"E to longitude 87°09'38"E. The proposed site is at a distance of 30 Kms from Asansol and 35 Kms from Durgapur Township, both of which are well-connected with Eastern Railwaylines (Howrah-Delhi) of Indian Railways, as well as by the Howrah-Delhi Grand Trunk Road (N.H.-2) which is 10 kms away from the proposed site. Raniganj-Suri Road (N.H.-60) which

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is around 2.5 Kms away from the proposed site is the closest major roadway. KaziNazrul Islam (Andal) Airport, the closest airport, is 26.5 kms away. Nearest port is the Dr.Shyama Prasad Mukherjee Port Trust (Kolkata Port Trust) which is 209 kms away.

### 3.0. BRIEF SCOPE OF WORK

Scope of work of the CONTRACTOR shall include Supply of Basic Design and Detailed Engineering, Procurement, Supply, Fabrication, Inspection by Third Party Inspection Agency (TPI) as applicable, Expediting, Route survey for Over Dimensional Consignments (ODCs), Insurance, Transportation of all equipment / materials to work site, Storage, construction and erection of all civil, mechanical, electrical and instrumentation works, assembly and Installation, obtaining all necessary statutory approvals, Testing, Mechanical Completion, Pre-Commissioning, Commissioning, Sustained Load Test Run, Performance Guarantee Test Run (PGTR), Owners Operator training, including Total Project Management and handing over of the plants and facilities under contractor's scope of work duly completed on single point responsibility basis for **COAL GASIFICATION PLANT FOR GENERATING SYN GAS (CO+H<sub>2</sub>)** for setting up "COAL BASED SYNTHETIC NATURAL GAS (SNG) PROJECT AT BARDHAMAN, WEST BENGAL, INDIA".

### 4.0. PURPOSE



This procedure has been prepared with the objective of:

- Defining systematic and orderly administrative relationship amongst related parties during the execution and the operation of the plant.
- Progress reporting and review of progress of work

### 5.0. COMMUNICATION AND GENERAL CORRESPONDENCE

PROJECT MANAGER of OWNER/CONSULTANT is the sole contact for all activities of the PROJECT. Therefore all the correspondence between the OWNER/CONSULTANT and CONTRACTOR shall be directly done with/ by the PROJECT Manager or by his authorized representative. The Name, Address, Telephone no, Fax, and email ID shall be intimated during the kick-off meeting and the same shall be included in the contract.

### 6.0. PROJECT MANAGEMENT & EXECUTION

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### 6.1. KICK-OFF MEETING:



Immediately after the award of job but not later than 2 weeks, a kick-off meeting will be held to finalize and establish the modalities and procedures to be adopted for execution of the contract based on the enquiry document, commitments made by CONTRACTOR and subsequent agreements reached between OWNER /CONSULTANT and CONTRACTOR during negotiations. The Kick-Off Meeting will be attended by key members of OWNER /CONSULTANT and CONTRACTOR. These will address the following details between OWNER /CONSULTANT and CONTRACTOR:

- i) Execution Methodology/ Philosophy, in the line with PROJECT requirement.
- ii) PROJECT execution schedule
- iii) Progress Reporting
- iv) Weekly Review Meetings
- v) PROJECT Co-ordination Procedures.
- vi) Organization Chart
- vii) Construction Site related issues.

### 6.2. PROJECT PROCEDURES AND METHODOLOGY

Detailed Technical Requirements along with the Detailed Scope of Work and overall proposed implementation schedule shall be prepared by CONTRACTOR. These will form the basis for formulation of the Overall PROJECT schedule of the plant by CONTRACTOR. CONTRACTOR is required to organize his services in a systematic manner to ensure execution and completion of the unit as per the schedule. CONTRACTOR is required to submit along with his bid the methodology/procedure proposed by him for this unit together with the organizational set up proposed and bio-data of Key-personnel.

In order to achieve uniformity in execution of various activities of the PROJECT, CONTRACTOR shall develop Engineering Design Basis and PROJECT Procedures/ Methodologies to be adopted by the executing agency. CONTRACTOR is required to carry-out his supply of Know-How, Process Package, Detailed Engineering, Procurement, Tendering, Construction Supervision and Management, Planning Scheduling, Monitoring, Reviewing, Reporting, and Overall PROJECT Management activities in accordance with

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the job specifications / procedures developed by CONTRACTOR based on the methodologies / procedures. All activities to be performed/services to be rendered by CONTRACTOR under this contract shall be monitored by OWNER/CONSULTANT and will be subject to weekly / monthly reviews by the OWNER /CONSULTANT. CONTRACTOR shall facilitate such reviews/monitoring by OWNER / CONSULTANT.

- 6.2.1. CONTRACTOR's service for Engineering, Procurement, Tendering, Construction, Supervision and Management, Planning, Scheduling, Monitoring, Reporting, and Overall PROJECT Management shall meet the requirements given in this section.
- 6.2.2. English language and Metric Units shall be used in all Documents, Drawings, Reports, and Correspondences etc. under this Contract.
- 6.2.3. All the drawings/documents prepared by CONTRACTOR/ Sub-contractors /Vendors shall be submitted to OWNER /CONSULTANT for review/ information purpose. Such review by OWNER /CONSULTANT shall, however, not relieve CONTRACTOR of his responsibilities.
- 6.2.4. For achieving the PROJECT schedule it may be necessary in some cases to prepare the drawings in stages and release it for construction so as to take up simultaneous execution of detail engineering and construction. Any revisions involved for the above is included in the scope of work of CONTRACTOR. Also any change required to meet the siteconditions/statutory requirements shall have to be carried by CONTRACTOR at no extra cost.

### 6.3. DETAILED ENGINEERING SERVICES

The CONTRACTOR shall provide the Detailed Engineering Services for PROJECT as mentioned in this bid document furnished by the OWNER /CONSULTANT. The services shall cover the detailed engineering required for execution and completion of the PROJECT along with the utilities to be provided inside the battery limit of the Plant as specified in the tender.

All critical drawings / documents to be prepared by CONTRACTOR / Sub-contractors / Vendors as per given in the bid document for review and approval by OWNER / CONSULTANT. Obtaining all such approvals shall be the responsibility of the CONTRACTOR and the same is included in his scope of work. Such review and approval

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by OWNER /CONSULTANT shall, however, not relieve the CONTRACTOR of his responsibilities.

The CONTRACTOR is required to organize a Task Force of dedicated and experienced specialists from each discipline under a Project Engineering Manager who will be assisted by Engineering Coordinator. An engineering schedule will be prepared and submitted to OWNER /CONSULTANT for approval. This approved schedule shall be used for all engineering activities. The engineering coordinator shall coordinate all design and engineering activities and interact with purchase, inspection, expediting, clearance and transportation, tendering, planning, construction and PROJECT groups. His responsibilities shall include.



a) Engineering Coordination for Procurement involving:

- Preparation of Material Requisitions (MRs).
- Technical evaluation of offers received (which may involve technical discussions with vendors and concerned specialists may have to be deputed to vendors works or to OWNER/CONSULTANT's offices as per requirements) and preparation of recommendations.
- Preparation of Technical Purchase Requisition (PRs) on selection of vendor and submit all PRs to OWNER/CONSULTANT for review / reference.
- Review/approval of vendor drawings/documents. (This may call for arranging specialist visits to vendor's works for timely approvals of critical items.)

b) Engineering Coordination for Sub-contractors involving:

- Preparation of schedule of quantities and specifications for various contracts.
- Technical evaluation and recommendation of offers received. This may involve arranging technical discussions with Bidders at OWNER/CONSULTANT's office if called for due to job requirements.
- Preparation of technical-agreed variations for incorporation in contracts for the selected Contractor.

In any case, CONTRACTOR has to take OWNER approval for Sub-contractors list prior to scrutiny and award.

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c) Engineering Coordination for Construction involving:

- Timely issue of approved construction drawings including drawings duly approved by OWNER/CONSULTANT as per requirements.
- Providing/arranging clarification on drawings and specifications wherever called for including specialists visits to site.
- Making regular periodic visits to PROJECT site for review of site requirements in respect of engineering activities.
- Attending/arranging for discussions with statutory authorities such as Chief Electrical Inspector, Chief Inspector of Boiler, Tariff Advisory Committee, etc. to arrive at design basis/documents acceptable to them wherever required for obtaining statutory approvals and any other local approvals.

d) Monitoring progress of engineering activities and advising PROJECT Manager on shortfalls and corrective actions needed. He will also attend the review meetings.

Detailed engineering and construction shall be based on sound engineering practices. List of applicable codes, standards and mandatory rules to be used in design is also mentioned in bid document.



Drawings/Documents/MRs etc., which are to be generated by CONTRACTOR shall be numbered as per the Documents Numbering Procedure of OWNER/CONSULTANT or mutually agreed procedure.

Head Office engineering support of CONTRACTOR shall be provided to site during construction including deployment of engineering specialists for field engineering as and when required by Contractor.

## 6.4. PROCUREMENT

- 6.4.1.** The procurement services to be provided by CONTRACTOR shall cover the purchasing, inspection, expediting, custom clearance and transportation activities & transportation activities and demurrage charges if any.



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- 6.4.2.** Purchase: The Purchase activities will cover all equipments and materials required for completion of the PROJECT.
- 6.4.3.** Inspection and Expediting: CONTRACTOR is required to organize a proper inspection and expediting system so as to ensure timely delivery of all the items/equipment meeting the specified quality criteria. This function has to be carried out by appropriate deployment of qualified personnel who have wide experience in their respective fields. OWNER/CONSULTANT will reserve the right to inspect items deemed necessary by them without any additional cost to CONTRACTOR /Sub-contractor / Vendor.
- 6.4.4.** Customs Clearance and Transportation: CONTRACTOR is required to organize a custom clearance and transportation (C&T) system to ensure prompt clearance of imported equipments from customs and transportation of equipments/materials to PROJECT site from Ports/Vendors works.

## **7.0. PROJECT PLANNING, SCHEDULING & MONITORING SYSTEM**

CONTRACTOR is required to institute and maintain a proper Planning, Scheduling and Monitoringsystem and employ professionally qualified and experienced Planning Engineer(s) for the PROJECT. The system shall have latest state-of-the-art technique; to this effect. CONTRACTOR shall implement this system through the Primavera PROJECT Planner.

The system developed should be capable to support and enforce proper control Mechanism in the PROJECT. It should be based on hierarchical breakdown of works with elaborate level of detailing and control. The levels of controls should be such that it supports and foster controls at activity level, function level and management level with greater emphasis on target, scope and commitment at various stages of contract for accountability and action planning. Such multi-level/multi-tier system of Planning, Scheduling and Monitoring, Supports, Effective Information Generation, Assimilation, Summarization and Reporting in proper and adequate manner.

The system shall be predictive type and should constitute pre-warning mechanism to diagnose and anticipate the problem well in advance and provide preventive features/measures. It is required that work breakdown structure should consist of details of

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systems, work packages, functions, work items and activities from monitoring point of view at micro level and summarization at higher levels. It is expected that the work breakdown structure coding system / methodology to be followed shall be informed / discussed with the successful CONTRACTOR during the kick-off Meeting.



The system is designed to carry out comprehensive functions for timely completion of PROJECT. The following shall be detailed under above mentioned procedure:

- Development of time schedules for execution of PROJECT, consistent with the overall requirement of the PROJECT and execution philosophy reflecting the latest scope of work agreed with OWNER / CONSULTANT&CONTRACTOR. Schedules also include number of intermediate checkpoints based on CONTRACTOR experience on similar PROJECTs.
- Establishment of PROJECT Progress Measurement System.
- Establishment of PROJECT Material Management System.
- Establishment of monitoring system, which regularly compares the actual performance with the planned one and suggests preventive and corrective measures to ensure timely completion of the PROJECT.
- Development of Billing Schedule
- Monthly measurement certification and invoicing

Following schedules documents/reports shall be prepared and submitted by CONTRACTOR for OWNER/CONSULTANT review at various stages of the PROJECT:

- List of critical drawings.
- Breakdown of work packages to work items level.
- Input requirements of each work item/activities
- Schedule start and finish dates of all milestone/activities in line with overall schedule of the PROJECT.
- Overall system-wise, discipline-wise weightages / Progress Measurement Benchmarks for each item/activity.
- 3 month front end schedule / 90 days look ahead Schedule within a week of award.

In this kick-off meeting, it will be endeavored to reach complete understanding with CONTRACTOR on activities, inputs and logic to establish Planning Documents for

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Monitoring. Venue of the Kick-off Meeting to be held between the successful CONTRACTOR, CONSULTANT&OWNER, shall be either at CONSULTANT's Office or OWNER's Office preferably at Noida / Site Office and the same would be informed subsequently.

### 7.1. OVERALL PROJECT SCHEDULE

CONTRACTOR shall submit within 30 days of Fax of Acceptance (FOA)/ Letter of Intent (LOI)/ Work Order (WO) / Letter of Award (LOA), the work breakdown structure showing PROJECT work load i.e. preparation of Process Package, tenders, Material Requisitions, Construction Drawings equipments etc. along with a sufficiently detailed overall Project Schedule in the activity network form, clearly indicating the major milestones, inter relationship / interdependencies between various activities such as process, engineering, procurement tendering, manufacture / delivery, construction etc. together with a computer analysis of critical path and floats as well as quantum of work for major activities.



The schedule will be reviewed by OWNER/CONSULTANT and the comments if any shall be incorporated in the network issued for implementation within 2 weeks from receipt of comments. The network thus finalized shall form part of the Contract and will become the basis for developing further detailed activity Network. This schedule shall not be revised without the prior permission from OWNER/CONSULTANT during the entire period of contract. The changes made during revision of the contract shall be approved by OWNER/CONSULTANT in writing.

### 7.2. DETAILED ACTIVITY NETWORK

CONTRACTOR should develop detailed activity networks (Level 4 / Micro level) for various systems/plant/ unit of the PROJECT, based on approved Overall Project Schedule within 2 months of Fax of Acceptance (FOA) / Letter of Intent (LOI)/ Work Order (WO) / Letter of Award (LOA). Such networks would be computerized for further monitoring and reporting.

### 7.3. PROGRESS MEASUREMENT METHODOLOGY

CONTRACTOR is required to submit during the kick-off meeting, the detail methodology / Progress Measurement Benchmarks of engineering, procurement, manufacturing / delivery, computation of total service/physical progress at the unit-wise level and on the overall

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basis. The progress basis shall be physical realization of work such as in terms of deliverables and construction quantity/volume accomplished. The amalgamation of such output across the PROJECT to compute overall progress shall be suitably established with proper rational and norms and maintained throughout the PROJECT. OWNER/CONSULTANT reserves the right to modify the methodology in part or in full.

#### **7.4. VENDOR SCHEDULING AND MONITORING**

CONTRACTOR shall establish schedules for pre-ordering and post ordering for follow up. The vendor monitoring preferably should be on logical networks and commitments at least on critical items in order to monitor them on regular basis for effective control. OWNER/CONSULTANT may demand such follow up procedure and logical networks for the various critical equipment at any time during the course of order execution. The manufacturing schedule shall be established and agreed with the vendors and acceptance shall be brought to the notice of OWNER/CONSULTANT in time.

#### **7.5. CONSTRUCTION NETWORK**



CONTRACTOR shall prepare and submit a detailed construction network with full consideration of logistics, construction studies and method for OWNER/CONSULTANT. CONTRACTOR shall describe the resources required and special construction equipments, Tools & Tackles to be mobilized. The network shall be developed subsequent of substantial progress of engineering and ordering with fairly known construction workload and quantities.

#### **7.6. PROJECT SCHEDULE SOFTWARE**

As indicated elsewhere, Project Schedules as above shall be developed/evolved using the latest version of the Primavera Project Planner Software Package.

#### **7.7. PROGRESS REPORTING**

CONTRACTOR shall submit the following progress reports on a regular basis for OWNER/CONSULTANT information/review.

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### 7.7.1. Monthly Progress Report



This report shall be submitted on a monthly basis within 7 calendar days from cutoff date, or as agreed upon, covering overall scenario of the PROJECT. The report shall include, but not limited, to the following:

- Executive summary - Summary of major events/activities.
- Schedule v/s actual percentage progress and progress curves for detailed Engineering, sub-ordering, manufacturing/delivery, contracting, construction commissioning and overall.
- Areas of concern/problem/hold-ups, impact and recovery action plans/catch-up plan.
- Activities executed achievements during the months and targets for the following month.
- Analysis of critical activities and impact on overall completion.
- Chronological achievements of key events indicating schedules and actual occurrence date.
- Annexure giving status summary for drawings material requisitions, equipment and materials delivery, contracting & construction, Resource requirement & deployment status.
- Resource requirement deployment status.
- Statutory requirements / compliance status
- Change order status.
- Invoice status.
- Construction photographs.
- Updated Project Schedule

### 7.7.2. Weekly Reports

This report will be prepared for Head Office and construction site in summarized fashion and submitted on every Tuesday taking status as of Sunday by the Contractor on weekly basis and will cover following items:

- Activities completed (engineering, procurement, contracting, construction. etc.)
- Program for subsequent week.
- Resource deployed - man and machine.

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- Quantities and productivity achieved in key areas of work.
- Progress on procurement activities including material requisition status reports.
- Constraints, if any.

The report/information may be transmitted preferably through mail to OWNER/CONSULTANT.

### 7.7.3. Daily Reports (Site Construction Report)

- Important activities for the day at site.
- Site Safety / HSE Report
- Material/equipments receipts for the day.
- Labor deployment report.
- Next Day Plan Activities

## 8.0. PROJECT TIME CONTROL METHODOLOGY



### 8.1. PROJECT TIME COMPLETION

The time for completion of the complete scope of work shall be strictly as per the time Schedule given in the tender document.

### 8.2. DOCUMENTS REQUIRED ALONG WITH BID

CONTRACTOR shall furnish the following documents along with the bid.

- 8.2.1.** An overall schedule in the form of Network, clearly indicating all important milestones in design, engineering, fabrication, procurement construction, testing and commissioning for the plant commensurate with the overall time schedule.
- 8.2.2.** Resource deployment schedule indicating mobilization of all critical resources including manpower and machinery for the smooth execution of the job at engineering offices, fabrication shops & construction site. The resource schedule shall also contain various construction aids envisaged to be deployed for execution.

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**8.2.3.** Organization structure for effective project management and control, clearly indicating the responsibility center as well as bio-data of the key personnel, who are permanent employees of CONTRACTOR, shall be identified for the PROJECT.

**8.2.4.** CONTRACTOR has to submit Transportation plan for Over Dimensional Consignment (ODC) and heavy weight equipment.

**8.2.5.** CONTRACTOR has to submit procurement& supply plan for Long Lead / Critical Items within the stipulated time frame

### **8.3. DOCUMENTS REQUIRED AFTER AWARD**

#### **8.3.1. Early Planning Document / Look Ahead Schedule**



Immediately after the award of the contract, and while the overall project schedule, detailed activity plan, network, and functional schedules are being finalized, the CONTRACTOR, in consultation with the CONSULTANT / OWNER, shall prepare a **look-ahead schedule**. This schedule will serve as a guideline for activities to be carried out during the relevant periods.

Within **30 days** from the issuance of the **Fax of Acceptance (FOA) / Letter of Intent (LOI) / Work Order (WO) / Letter of Award (LOA)**, the CONTRACTOR shall, in coordination with the OWNER / CONSULTANT, finalize the following:

##### **8.3.1.1 Overall Project Schedule**

Overall Project Schedule in line with the agreed milestone and detailed to adequate work breakdown structure level covering all phases of the work such as supply of know-how, process package, design engineering, procurement manufacturing, shipment, tendering & field erection. This schedule shall also include the interface activities to be provided by OWNER/CONSULTANT and the dates by which such facilities are needed. CONTRACTOR shall get the scheduled submitted & reviewed by OWNER/CONSULTANT and the agreed schedule shall form part of the Contract monitoring document based on which performance would be reported and evaluated. This document shall be signed by both the parties. OWNER/CONSULTANT shall also review the weightage allotted to



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various activities and method of reporting to be adopted by CONTRACTOR. During the progress of the contract if in the opinion of OWNER/CONSULTANT, desired progress as physically/sequentially is not maintained, it would be obligatory on CONTRACTOR to re-program the work schedule in order to accommodate the backlog and/or provide work front to other agency, without any obligation to OWNER / CONSULTANT.

#### **8.3.1.2 Detailed Activity Network**

The CONTRACTOR should develop detailed activity networks for various systems of the PROJECT, based on approved overall project schedule within two months of Fax of Acceptance (FOA) / Letter of Intent (LOI)/ Work Order (WO) / Letter of Award (LOA). Such networks would be computerized for further monitoring and reporting.

#### **8.3.1.3 Functional Schedules**

The CONTRACTOR should prepare resource-based detailed functional schedules in line with detailed activity networks for functional monitoring, scheduling and control. This should clearly reflect strategies and philosophy of execution. OWNER/CONSULTANT reserves the right to check the functional schedule and status of activities at anytime and at any location of performance/execution. Further, the functional schedules shall be submitted by the CONTRACTOR on demand by the OWNER/CONSULTANT.

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#### **8.3.1.4 Progress Measurement Methodology**

The CONTRACTOR is required to submit during the kick-off meeting, the detail methodology of progress measurement of engineering, procurement, manufacturing, delivery, computation of total service/physical progress at the unit-wise level and on the overall basis. The progress basis shall be physical realization of work such as in terms of deliverables and construction quantity/volume accomplished. The amalgamation of such output across the PROJECT to compute overall progress shall be suitably established with proper rational and norms and maintained throughout the PROJECT. OWNER/CONSULTANT reserves the right to modify the methodology in part or in full.

#### **8.3.1.5 Vendor Scheduling and Monitoring**

The CONTRACTOR shall establish schedules for pre-ordering and post ordering for follow up. The vendor monitoring preferably should be on logical networks and commitments at



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least on critical items in order to monitor them on regular basis for effective control. OWNER/CONSULTANT may demand such follow up procedure and logical networks for various critical equipment at any time during the course of order execution. The manufacturing schedule shall be established and agreed with the vendors and acceptance shall be brought to the notice of OWNER/CONSULTANT in time.

#### 8.3.1.6 Construction Network

The CONTRACTOR shall prepare and submit a detailed construction network with full consideration of logistics, construction studies and method for OWNER/CONSULTANT approval. The CONTRACTOR shall describe the resources required and special construction equipments, Tools and tackles to be mobilized. The network shall be developed subsequent of substantial progress of engineering and ordering with fairly known construction workload and quantities.



#### 8.3.1.7 Construction Worksheets

The CONTRACTOR shall further detail out the construction network into area-wise details in terms of work, quantity and schedule, to firm up basis for area control. The construction schedule should be worked out based on work front generation criteria which will call for availability of input like drawings, materials and access for each/group of activity to be performed. It may be in the form of resource loaded bar chart with 'S' curve. OWNER/CONSULTANT reserves the right to access the same.

#### 8.3.1.8 Construction Contractor Schedule

The CONTRACTOR shall agree upon the construction schedules with sub-contractors for proper mobilization, monitoring and control. OWNER/CONSULTANT reserves the right to ask for such program and status of any time as may be required.

- 8.3.2.** CONTRACTOR at any point of time of operating would be permitted to revise the accepted schedule/control documents with OWNER/CONSULTANT without changing the contractual completion date, subject to prior approval by OWNER/CONSULTANT in writing.



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- 8.3.3.** The review of the performance of work would be made at different levels of management and CONTRACTOR is expected to ensure proper participation for effective reviewing and action plan.s
- 8.3.4.** CONTRACTOR should ensure availability of professionally qualified Planning Engineer both at Head Office and site deemed adequate by OWNER/CONSULTANT.
- 8.3.5.** CONTRACTOR at his own cost should maintain a control room at site highlighting all the features, schedule and achievements of the PROJECT.
- 8.3.6.** Weighted percentage (Progress Measurement Benchmark) of each discipline/group of work shall be mutually agreed to between CONTRACTOR and OWNER/CONSULTANT after the award of contract to facilitate compilation of progress.

#### **ABBREVIATION**

S. No.	Abbreviation	Description
1.	MR	Material Requisition
2.	C&T	Custom Clearance and Transportation
3.	PR	Purchase Requisition
4.	HSE	Health Safety & Environment
5.	KOM	Kick-Off Meeting
6.	ODC	Over Dimensional Consignment



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## SECTION –7.0

### CONSTRUCTION/ERECTION, PRE-COMMISSIONING, COMMISSIONING AND START-UP

**PLANT:** COAL GASIFICATION PLANT FOR GENERATING SYN GAS (CO+H<sub>2</sub>)  
FOR PRODUCTION OF SYNTHETIC NATURAL GAS (SNG)

**PROJECT:** COAL BASED SYNTHETIC NATURAL GAS (SNG) PROJECT AT  
BARDHAMAN, WEST BENGAL, INDIA

1	26.09.25	Issued for tender	JKY	JKY	RRK
REV	REV ATE	PURPOSE	PREPD	REVWD	APPD



	<b>COAL GASIFICATION PLANT FOR Proposed COAL TO SYNTHETIC NATURAL GAS</b>  <b>OWNER: JV OF GAIL AND CIL</b>  <b>CONSTRUCTION/ERECTION, PRE-COMMISSIONING, COMMISSIONING AND START-UP</b>	PC217/E/001/P-II/7.0	1	
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SI. No.	DESCRIPTION	NUMBER OF SHEETS
1	General Scope of Works and Services-Construction / Erection	
2	General Scope of Works and Services -Pre-commissioning	
3	Basic Plan for Temporary Services	
4	Mechanical completion	
5	Commissioning	
6	Start up	

### LIST OF ANNEXURES



ANNEXURE NUMBER	DESCRIPTION	NUMBER OF SHEETS
ANNEXURE-7-1	LSTK Contractor's Work Definition	
ANNEXURE-7-2	Detail Technical Scope	
ANNEXURE-7-3	Quality Control Procedures and Inspection Requirement	
ANNEXURE-7-4	Schedule Progress Evaluation and Progress Reporting	
ANNEXURE-7-5	Execution Plan	
ANNEXURE-7-6	Minimum Qualification & Exp. Of Key Supervisory Construction Personnel	
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## 1 General scope of Work and services - Construction/Erection

LSTK CONTRACTOR shall be responsible for construction and erection of the Plant/ Unit including but not limited to the following:

- 1.1 Construction and erection of Plant/Unit and perform all other activities required to be performed for implementation of the WORK.
- 1.2 Provide and supply in due course all construction Equipment and Materials, tools, and temporary facilities necessary for implementation of the WORK.
- 1.3 Establish and operate adequate material control system in site for receipt, unloading, inspection, maintenance, handling, storage and utilization to ensure all Equipment and Materials are preserved and available as necessary for completion of the Plant/Unit.
- 1.4 Provide and supply all staff, tradesmen and labours for implementation of the WORK.
- 1.5 Establishment of overall construction policy and procedures for the Plant/Unit.
- 1.6 Provision of overall management and control of construction phase of the Plant/Unit.
- 1.7 Ensuring that all parts of the Plant/Unit are constructed and tested strictly in accordance with the specifications and applicable codes and standards set forth in the contract.
- 1.8 Ensuring that construction is accomplished in accordance with the schedules.
- 1.9 Provide transportation of all Equipment and Materials to be provided and supplied by LSTK CONTRACTOR under the CONTRACT either from inside or outside to Site.
- 1.10 Construct, operate and maintain all temporary facilities required for its personnel involved in the WORK.
- 1.11 Provide transportation in the area of the Site and between Site and temporary facilities for all its personnel involved in the implementation of the WORK, including field labour, administrative staff, etc.
- 1.12 LSTK CONTRACTOR manage and supervise its Sub Contractors and field labour for the WORK.
- 1.13 Provide liaison with OWNER/PMC, Sub Contractors, Licensors and Vendors to ensure that the Plant/Unit is constructed in accordance with the respective standard and specifications, set forth in the CONTRACT.
- 1.14 Establish with OWNER adequate procedures, control and reporting systems to provide close control of the progress of the WORK.

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- 1.15 Provision of labour and facilities for loading, unloading and transportation of the Equipment within the site area.
- 1.16 Performance and/or provision of all other works and/or services required for performance of the WORK.
- 1.17 Execution of the whole civil, structural and building works of the Plant/Unit and/or utilities and off-site facilities.
- 1.18 Prefabrication of piping spools in a shop on the Site.
- 1.19 Erection and installation of EQUIPMENT and auxiliary facilities associated with the Plant/Unit.
- 1.20 Erection and field fabrication of structural steelwork, cladding ladders, handrails, stairs and platform of the Plant/Unit and/or utilities and off-site facilities.
- 1.21 Installation of pipe work including field fabrication at site.
- 1.22 Installation and testing of all instrumentation network and equipment of the Plant/Unit.
- 1.23 Installation and testing of electrical system and equipment of the Plant/Unit.
- 1.24 Installation of rubber lining, refractory brick lining & C-Brick lining, FRP/PVC/HDPE lining, as required for the Plant/Unit.
- 1.25 Painting of steelworks, piping, Equipment and building of the Plant/Unit.
- 1.26 Maintenance of construction equipment, vehicles and tackles of the Plant/Unit, during construction and erection period.
- 1.27 Pre-commissioning, Commissioning and Start-up of the Plant/Unit.
- 1.28 Carrying out Mechanical Completion.
- 1.29 Perform all material identification as per application codes and standards.
- 1.30 Provide winterization during construction.
- 1.31 Provide drawings and documents as required.
- 1.32 Supply to OWNER complete test records within three (3) days after completion of actual testing.
- 1.33 Installation and testing of all underground piping, if any.

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## 2.0 General scope of WORK and Services- Pre-commissioning

LSTK CONTRACTOR shall be responsible for the pre-commissioning phase of the Plant.



LSTK CONTRACTOR shall provide at SITE an adequate number of qualified pre-commissioning engineers to direct and control pre-commissioning activities.

LSTK CONTRACTOR shall also ensure that all special tools and test equipment required for pre-commissioning are to be arranged at its own cost.

LSTK CONTRACTOR shall provide adequate construction labour, construction tools and equipment for pre-commissioning.

Pre-commissioning which shall be performed by LSTK CONTRACTOR shall include, but not limited to the following:

- 2.1 Cleaning, flushing, draining blowing out, steaming out, drying and purging of Equipment and their linings and piping systems, including the installation and removal of temporary blinds, strainers, screens etc., and the replacement of all permanent items removed while the WORK is in progress.
- 2.2 Chemical cleaning wherever required, including but not limited to compressor suction piping and lube and seal oil piping, heaters, supply of chemical and disposal of wastes.
- 2.3. Chemical cleaning of feed water systems, and steam systems. Supply of chemical and disposal of wastes.
- 2.4 Chemical cleaning of any other parts, which have corroded to an extent, which, will detrimentally affect Plant/Unit performance or run length for such reasons as increased fouling due to rust. Supply of chemical and disposal of wastes.
- 2.5 Checking, Testing, calibration simulation test and adjustment of instruments, equipment and systems including control valves and safety devices, installation and checking of orifices plates and other sensor devices in so far as this can be done before actual operation of the item concerns of complete system and loops.
- 2.6 Function test and checking out of electrical systems including substations, transformers, cables and switchgear, checking of all interlocks and setting of all relays. This shall include drying out operations, filtering of oil if required.
- 2.7 For motor driven equipment, amperage checking of motors and removal of temporary safety screens.
- 2.8 Cleaning of screens and filters replacement and adjustment of packing and seals and tightening of flanges.

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- 2.9 Introduction of fuels.
- 2.10 Introduction of lubricants and oil flushing for machinery.
- 2.11 Introduction of chemical into and initial operation of treatment plant.
- 2.12 Boiling out, bringing up to pressure and performing all required code tests on steam generation facilities and associated instrumentation.
- 2.13 Drying out of stacks and all refractory lined equipment.
- 2.14 For all piping systems, installation and removal of temporary blinds as required, circulation and commissioning of systems including process systems, services, effluent and drainage, utilities distribution, relief and blow down and interconnecting lines.
- 2.15 Test running of all other rotating equipment for 24 hours wherever possible.
- 2.16 Adjustment of all piping expansion and support devices.
- 2.17 Air-drying of Plant/Unit, which is required to be water-free.
- 2.18 Testing (including running, tightness and vacuum) of systems, as necessary to ensure that the sections and components of Plant/Unit are ready for operation.
- 2.19 All such further works which LSTK CONTRACTOR judges to be necessary or in the reasonable opinion of OWNER is necessary to bring the Plant/Unit to a state of readiness for the introduction of feedstock into Process Plant/Unit for processing requirements and for safe commencement of operation.



### 3.0 Basic Plan for Temporary Services

#### Temporary Construction Facilities

The LSTK CONTRACTOR shall arrange following facilities at his own cost for Construction/Erection purpose. Demolition and cleaning of temporary facilities developed for construction purpose shall also be under LSTK Contractor's scope.

1. 1 No. 11 kV Feeder depending upon temporary load requirement at Existing Substation shall be made available. Tapping of Construction Power Cost from this feeder (including supply & erection of all required materials like structural supports for cable tray, cable trays, power cables, control cables, protection & metering, cable termination etc. as well as underground cabling work) and further distribution shall be in LSTK Contractor's scope.
2. Construction Water shall be made available at single point on chargeable basis.
3. Construction sheds



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4. Construction offices
5. Temporary Communication facilities
6. Office furniture
7. Labour colony during construction outside OWNER premise.

### 3.1 Sewage & Refuse Disposal

All temporary building like site office, canteen etc. shall be provided with individual septic tanks and soak pits for treatment and disposal of sanitary sewers. Construction site shall be provided with a network of temporary drain for disposal of rain water.

### 4.0 Mechanical Completion

Mechanical Completion means the time when all construction, erection & installation work per finally approved P&ID after HAZOP study and pre-commissioning related to the Plant is completed in accordance with the Project drawings and specifications, and all mechanical and pressure tests, including but not limited to hydro-testing, non-operating adjustments, cold alignment checks, final cleanup, hot bolting, refractory drying, field calibration of safety valves, calibration of all instruments, instrument loop checking and testing, monitoring / control / safety systems checking and testing, and all pre-commissioning activities have been completed, all incoming & outgoing services and utilities have been connected to each unit of the PLANT, interconnections of process lines and interconnection are completed and the Plant/Unit is ready in every respect for commissioning and for the first introduction of feed materials.

When OWNER is satisfied that Mechanical Completion of the plant has been achieved, OWNER shall issue certificate of Mechanical Completion to LSTK CONTRACTOR in accordance with the CONTRACT for Owner's Approval.



In order to meet this, LSTK CONTRACTOR shall perform all necessary mechanical works, tests and checks.

### 5.0 COMMISSIONING

#### 5.1 Schedule for Commissioning

LSTK CONTRACTOR shall prepare a schedule for commissioning, start-up, and performance testing and initial operation in conjunction with OWNER. This shall be issued at least three months before pre commissioning of the first facility.

This schedule shall include all activities as detailed herein and any other special activities, which require to be performed during commissioning.

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## 5.2 Commissioning



LSTK CONTRACTOR shall be responsible to perform commissioning of the Plants and to provide necessary facilities during commissioning of the Plant including the Performance Tests. LSTK CONTRACTOR shall provide commissioning engineers and supporting staff and adequate commissioning labour. LSTK Contractor shall associate OWNER's engineers and operating staff with the commissioning work.

## 6.0 START UP

LSTK CONTRACTOR shall be responsible to perform start-up of the Plant/Unit. LSTK CONTRACTOR shall provide necessary facilities and for Start Up of the PLANT.

### NOTE:

Detail CONTRACTOR scope of work in relation with the construction / erection, pre-commissioning, commissioning and start-up from the point of scope of execution as well as performing way are described in detail in the following Sub-Annexes of Section-7.0.

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### **Sub-Annexure:**

Annex 7 - 1 : LSTK Contractor's Work Definition



Annex 7 - 2 : Detail Technical Scope

Annex 7 - 3 : Quality Control Procedures and Inspection  
Requirement

Annex 7 - 4 : Schedule Progress Evaluation and Progress  
Reporting

Annex 7 - 5 : General Notes

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## **ANNEXURE-7-1**

### **LSTK CONTRACTOR'S WORK DEFINITION**



**LSTK CONTRACTOR shall perform/provide the following activities but not limited to:**

1. LSTK CONTRACTOR scope of work shall broadly consist of construction / erection, refurbishing, pre-commissioning, commissioning and Start Up of the Plant under the management of commissioning team it includes but not limited to civil works, fabrication & erection of structural steelwork, field assembly, mechanical erection and / or assembly and installation of all equipment and machinery, piping, electrical systems and network, instrumentation, insulation, painting, etc., except in so far as "Contract" otherwise provides, the provision of all temporary facilities, staff, tradesmen, labour, tools, tackle, construction equipment and materials, insurance, consumables and everything whether of temporary or permanent nature necessary and required in and for the work, so far as the necessity for providing the same is specified or reasonably inferred in or from the contract.
  2. Perform all civil and building works as per Annex 7 - 2A, titled civil and building works.
  3. Perform all structural steel works as per Annex 7 - 2B, titled structural steelwork.
  4. Perform all piping fabrication and erection works as per Annex7 - 2C, titled piping fabrication and erection work.
  5. Perform all equipment erection works as per Annex 7 - 2D, titled equipment erection work.
  6. Perform all electrical works as per Annex7 - 2E, titled electrical work.
  7. Perform all instrumentation works as per Annex 7 - 2F, titled instrumentation works.
  8. Perform all insulation works as per Annex 7 - 2G, titled insulation works.
  9. Perform all painting works as per Annex 7 - 2H, titled painting Specification/work.
- Supply the materials in order to execute WORK as per CONTRACT.
10. LSTK CONTRACTOR shall be responsible for providing services and materials for construction of all temporary facilities, which are essential for successful completion of construction and erection.



The LSTK CONTRACTOR shall establish, operate and maintain all temporary facilities, such as, but not limits to:

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- a) Labour camp/officers camps
  - b) Fabrication shops/yard
  - c) Workshop for maintenance of construction/testing equipment.
  - d) Field drawing office
  - e) Temporary warehouses, including open storage yards.
  - f) Construction offices (including facilities for photocopying, drawing reproduction, etc.)
  - g) First aid.
  - h) Lab facilities, including NDT, for testing calibration, etc.
  - i) All temporary or approach roads for carrying out the WORK including temporary approach roads for access to LSTK CONTRACTOR'S site office/workshop/camp, etc. ground preparation for heavy lifts including approaches to cranes for heavy lifts. OWNER does not take any responsibility for making temporary roads.
  - j) Canteen & catering facilities for all LSTK CONTRACTOR'S work force.
  - k) All drainage around the facilities created for his WORK, and sewage disposal arrangements for labour camps/officers camps, site offices, etc.
  - l) Necessary transport for movement of its personnel, construction Equipment and Materials, consumables, etc.
  - n) Watering of roads through water tankers for dust suppression.
  - o) All temporary lighting for working during night.
  - p) All temporary hutments, sanitary & potable water and domestic sewerage requirements of LSTK Contractor's work force.
11. Supply to OWNER complete survey report within three (3) working days after completion of any survey.
  12. All excess soil shall be disposed of by LSTK CONTRACTOR outside the premises in a location designated by OWNER representative.
  13. Perform all nondestructive, hydrostatic and pre commissioning testing required.
  14. Supply to OWNER complete test records within three (3) days after completion of actual

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- testing.
15. Perform all welding including radiography required.
  16. Provide drawings and documents as required.
  17. Provide mobilization and demobilization, temporary material and temporary facilities and utilities required for executing work.
  18. Provide winterization during construction, if required.
  19. Provide scheduling, planning and reporting as per CONTRACT.
  20. Keep complete administration and control of work, specified in CONTRACT.
  21. Provide maintenance on all construction and permanent plant material as required during the CONTRACT period.
  22. Perform all material identifications as per CONTRACT.
  23. Perform all transportations as required.
  24. Perform quality assurance, control and supply quality control documentation.
  25. Perform all pre-commissioning activities as defined in the CONTRACT.
  26. Provide and supply all procedures for execution of the work in accordance with drawings specifications, and applicable codes and standards.
  27. Perform all other works and activities and supply all other materials which are required for completeness of the Work either mentioned in the CONTRACT or they are necessary for completeness of the Work, in compliance with highest available standards and good quality.



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## **ANNEXURE- 7 - 2**

### **DETAIL TECHNICAL SCOPE**

See accompanying by discipline

Annexure-7 - 2A	Civil and Building work
Annexure-7 - 2B	Structural steel work
Annexure-7 - 2C	Pipe prefabrication and Erection
Annexure-7 - 2D	Equipment erection
Annexure-7 - 2E	Electrical work
Annexure-7 - 2F	Instrumentation work
Annexure-7 - 2G	Insulation work
Annexure-7 - 2H	Painting work (For detail refer <b>TS-2001</b> )

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## **ANNEXURE- 7 - 2A**

### **CIVIL AND BUILDING WORK**

#### **1.0 SURVEYING**

- 1.1 Base line and base elevation will be furnished to LSTK CONTRACTOR. LSTK CONTRACTOR will furnish all surveys from this base line and elevation.
- 1.2 OWNER shall have the authority at anytime to determine, in accordance with the drawings or written directives, the correctness on completeness of the lines in use by LSTK CONTRACTOR.

- 1.3 Any erroneous WORK shall be corrected to OWNER'S satisfaction at LSTK CONTRACTOR'S expense.

#### **2.0 SITE**

Finish grading elevation to be as shown on drawing.  
LSTK CONTRACTOR'S access to the WORK areas shall be via existing roads.  
Any other roads required by LSTK CONTRACTOR are to be developed by LSTK CONTRACTOR.

#### **3.0 EXCAVATION AND BACKFILL**

##### **3.1 Excavation**

- Provide all excavation by machine or by hand according to the specifications.
- Excavation is to be executed by LSTK CONTRACTOR in a manner that will provide adequate space for performance, inspection and timely completion of the WORK. Supply dewatering as required. The method of dewatering shall be subject to Approval by OWNER.
- Temporary water drainage routing requires prior Approval by OWNER.

##### **3.2 Backfill**



All backfills shall be according to the specifications.

All excavations shall be kept dry and workable prior to and during backfiring and compacting.

Material that LSTK CONTRACTOR excavates in the course of WORK and which can be used for backfill, must be approved by OWNER prior to use. All other backfill material as required in this scope of work, drawings and specifications, shall be supplied by LSTK CONTRACTOR.

Back filling shall be to ground level as shown on drawing. The placing of backfill may only



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start after approval by OWNER.

LSTK CONTRACTOR will inform OWNER to arrange for the required proctor tests. Tests shall be done by OWNER on his account.

#### 4.0 **PILES AND CONCRETE FOUNDATIONS**

4.1 Install Piles and major and minor concrete foundations in accordance with the specification and drawings.

#### 4.2 **Blinding to Underside Foundation Work**

Prior to placing a blinding layer of concrete, LSTK CONTRACTOR shall supply, place, compact and prepare the surface of excavated area. After this LSTK CONTRACTOR shall supply a blinding layer of concrete. Blinding layer to be in accordance with specifications and / or drawings.

#### 4.3 **Reinforcement of Concrete**

Cut and bend to bar bending schedules, all type of reinforcing bars.

Store and protect all reinforcing bars against corrosion and any other deleterious effects prior to placing.

Installation of reinforcement including installation of spacers, supports, tying, wire in accordance with the specifications and drawings.

#### 4.4 **Anchor Bolts**

Install all anchor bolts, in accordance with the specifications and drawings.



The following WORK is included but not limited to LSTK CONTRACTOR'S scope for installation of anchor bolts:

- Deliver of all templates.
- Store and protect against corrosion and any other deleterious effects.
- Place anchor bolts accurately in formwork or by templates, if required, or in pockets.
- Clean and grease anchor bolts threads after Concrete pour and protect bolts after greasing with plastic covers.

#### 4.5 **Inserted and Embedded Item**

Install all concrete inserts and embedded items, including but not limited to the following items in accordance with the specifications and to the detail drawings to be furnished by LSTK CONTRACTOR.

- Cement - In sockets.
- Cinch anchors.

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- Steel sleeves, various size angle.
- Channel shapes with anchors. Curb angles and steel plates.
- Anchor rails.
- Pipe sleeves of heavy duty PVC pipe.



The WORK shall include but not limited to:

Store and protect against corrosion and damage place accurately in Formwork or by templates, if required, or by temporary bars for proper positioning.

4.6 The following WORK is included but not limited to LSTK CONTRACTOR'S scope for installation of major and minor foundations:

- All excavation, including sheet piling, if required, backfill, compacting and the transportation of surplus material, neatly stockpiled at a location, chosen by LSTK CONTRACTOR and approved by OWNER. The supply, installation and maintenance of a complete concrete batch plant, including concrete testing laboratory. Installation of selected backfill material, if required. Supply and delivery and installation of all formwork, assembly and disassembly of all reusable formwork, inclusive if any and all required supporting, bracing, pockets, cutouts, recesses, etc.
- Bending and installation of concrete reinforcement bars to the requirements and supply of items as defined in 4.3 above.
- Installation of all anchor bolts (including fabrication of templates), to the requirements and supply of items as defined in 4.4 above.
- Installation of embedded and inserted items, to the requirements and supply of items as defined in 4.5 above.
- Installation of construction and expansion joints where required.
- Mixing, delivery and pouring of concrete in accordance with specifications. Stripping of formwork and removal of all surplus material to LSTK CONTRACTOR'S yard or locations designated by OWNER.
- All temporary storage of formwork at SITE shall be of an orderly nature. In case storage does not comply with the above-mentioned rule, OWNER shall have the right to remove formwork from SITE within forty eight (48) hours after first warning and back charge LSTK CONTRACTOR for all related costs. OWNER shall not be held responsible for any of LSTK CONTRACTOR'S losses.
- The finishing of concrete, where required to a finish in compliance with the specifications.

A copy of all-concrete mix truck delivery slips if applicable.

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Concrete composition analysis of the concrete batch plant.

All scaffolding required.

All required dewatering to keep the excavations / backfill dry for the WORK.

## 5.0 CONCRETE STRUCTURES AND ELEVATED SLABS

Install concrete structures, in accordance with the specifications and drawings.

6.0 The following work is included but not limited to LSTK CONTRACTOR'S scope for installation of concrete elevated slabs:

See 4.6; however with -following exceptions: No-excavation, no backfill and- no dewater

## 7.0 YARD PAVING AND FINAL SURFACING



### 7.1 Excavation

Setting out and grading by machine and/or by hand for yard paving to the shape and depth in accordance with the specifications and drawings.

Disposal of all excavated material and neatly stock piling to a location chosen by LSTK CONTRACTOR and approved by OWNER.

### 7.2 Concrete Yard Paving

- Mix and install concrete for heavy duty paving areas, in accordance with the specifications and drawings.
- Mix and install concrete for light and medium duty paving areas in accordance with the specifications and drawings.
- The following work is included but not limited to LSTK CONTRACTORS scope for installation of concrete yard paving: See 4.6 above
- Surface preparation, including the supply and placing of waterproof building paper or similar waterproof material, well lapped at joints, laid on top of the well compacted sand layer and before pouring concrete.
- Reinforcement for heavy duty paving at top and bottom face and for light duty paving at top face only, with square mesh fabric reinforcement including protection against corrosion, the cutting, the bending and placement.
- Mixing and pouring of concrete in accordance with specifications, sufficient vibrating. Stopping clear from bases, plinths and piers and forming around surface and lay to give levels and falls.
- Installation of construction / expansion joints.

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### 7.3 Unpaved Areas

Install gravel, tiles or crushed stone on leveled unpaved areas, all in accordance with the specifications and drawings.

### 7.4 Concrete Tiles for Walkways

Install well compacted sub-base layer and install the tiles on the sub-base all in accordance with specifications and drawings.

### 8.0 CONCRETE PIPE SLEEPERS

Fabricate and install reinforced concrete sleepers for pipe, complete with foundations in accordance with the specifications and drawings.

### 9.0 MANHOLES AND CATCH BASINS, TRENCHES

9.1 Fabricate and install pre-cast or formed and poured in situ concrete manholes and catch basins and trenches in accordance with the specifications and drawings.

9.2 The following work is included but not limited to LSTK CONTRACTOR'S scope for installation of manholes and catch basins. All excavation including sheet piling of required, backfill, compacting and the transportation of surplus material, neatly stockpiled at a location, designated by LSTK CONTRACTOR and approved by OWNER.



#### For Poured in Site

- Delivery and installation of all formwork, inclusive if any and all required supporting, bracings, pockets, cutouts recesses etc.
- Bending and installation of concrete reinforcement bars to the requirements and supply of items as defined in 4.3 above.
- Fabrication and installation of embedded and inserted items, if any, to the requirements and supply of items as defined in 4.5 above.
- Mixing and pouring of concrete in accordance with specifications.
- Stripping of formwork and removal of all surplus material to LSTK CONTRACTOR'S yard or locations designated by OWNER.
- All required dewatering to keep the excavations / backfill dry for installation work.
- Install cast - iron manhole frames and solid cover and fabricate and install steelwork catch basin grating and frames in accordance with specifications.

### 10.0 COLLECTION BASINS, PITS, SUMPS, RETAINING WALLS AND CULVERTS

10.1 Fabricate and install concrete collecting basins in accordance with the specifications and drawings.

10.2 Fabricate and install concrete sumps and pits in accordance with the specifications and drawings.

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10.3 Fabricate and install concrete walls around tanks and other retaining walls in accordance with the specifications and drawings.

10.4 Fabricate and install concrete pipe and bridge culverts including head walls in accordance with the specifications and drawings.

#### 11.0 **DITCHES AND TRENCHES**

11.1 Fabricate and install earthen and concrete ditches and trenches including connection pipes and boxes in accordance with the specifications and drawings.

#### 12.0 **STEEL SLIDING PLATES AND PTFE SLIDING PLATES**

##### 12.1 **Steel Sliding Plates**

- Fabricate and install steel sliding plates in accordance with specifications and drawings.
- The following work is included, but not limited to LSTK CONTRACTOR'S scope for fabrication and installation of steel sliding plates
- Pick up materials, storage and protection against corrosion and any other deleterious effects.
- Fabricate, place in pockets, level and grout, protect against possible damage and corrosion.

##### 12.2 **PTFE Sliding Plates**

- Install sliding plates, in accordance with the specification and drawings.

The following work is included but not limited to LSTK CONTRACTOR'S scope for installation of sliding plates pick up materials, transport, store and protect

- Place in pockets, level and grout, protect against possible damage.



#### 13.0 **GROUTING**

13.1 Mix and install grouting in accordance with the specifications and drawings.

13.2 LSTK CONTRACTOR shall grout under all structural steel columns and under all equipments, as specified.

13.3 The following work is included but not limited to LSTK CONTRACTOR'S scope for installation of grouting:

- Prepare top surface of base and /or plinth, pockets, sleeves etc., prior to placing grout.
- Mix and install grout mortar in accordance with specifications.

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- Grout mortar shall be used between steel base plate and concrete foundations.
- Mix and install non-shrink grout between reciprocating rotary equipment base frame including the filling of the equipment steel frame, if required, and concrete foundation in accordance with manufacturer specifications and project specifications.

13.4 Grouting of equipment shall proceed only when equipment setting has been accepted by OWNER.

#### 14.0 **ASPHALT PAVING**

14.1 Mix and install asphalt paving over base courses installed by LSTK CONTRACTOR, in accordance with the specifications and drawings.

- Roads/ Driveways/ Parking areas/ Sidewalks/ Tank pads



14.2 The following work is included but not limited CONTRACOR'S scope for installation of asphalt paving to.

- Installation of all materials necessary to make a complete installation.
- Installation of sub-grade, sub-base and base courses all properly compacted.
- Delivery and installation of all formwork, inclusive if any and all required supporting, bracing, pockets, cutouts, recesses, etc.
- Installation of expansion joints where required and/or construction joints
- Stripping of formwork and removal of all surplus material to LSTK CONTRACTOR'S yard or locations designated by OWNER.
- Mixing, delivery, installation, spreading and compaction of asphalt paving mixture in accordance with specifications.
- Any and all measures for proper asphalt paving installation and curing.

#### 15.0 **ROAD REPAIR AND MAINTENANCE**

15.1 Supply and deliver necessary materials, equipments and labour to repair and maintain all plant roads, as necessary.

- Repair work shall be in accordance with the specifications.
- LSTK CONTRACTOR shall be responsible for repair of roads, all on the indication of OWNER due to the damage to the roads, caused by LSTK CONTRACTOR'S activities and construction operations, or due to faulty construction by LSTK CONTRACTOR. LSTK

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CONTRACTOR is not entitled for compensation for such repair work.

#### 16.0 REPAIR OF DYKES, SLOPES AND DITCHES

16.1 Supply and deliver necessary materials, equipment and labour to effect repairs on dykes, slopes and ditches as necessary.

- Repair WORK shall be in accordance with the specifications.
- LSTK CONTRACTOR shall be responsible for repair of dykes, slopes and ditches all on the indication of OWNER'S representative, due to damage to the dykes, slopes and ditches caused by LSTK CONTRACTOR'S activities and construction operations, or due to faulty construction by LSTK CONTRACTOR.
- LSTK CONTRACTOR is not entitled for compensation for such repair work.



#### 17.0 UNDERGROUND SEWERS AND PIPING SYSTEMS

17.1 Install the underground piping systems, in accordance with the specifications and drawings.

17.2 The following work is included but not limited to LSTK CONTRACTOR'S scope for installation of underground piping systems.

- Excavation including sheet piling, if required, backfill, compacting and the transportation of surplus material, neatly stockpiled at a location designated by LSTK CONTRACTOR and approved by OWNER.
- Installation of sand backfill if required
- Receiving unload, inspect and transport LSTK CONTRACTOR'S supplied materials and store and protect.
- Installation of piping materials necessary for a complete installation.
- The installation of above ground fire hydrants, fire monitors and standpipe as well as the underground firewater system.
- The fabrication and installation of supports and thrust blocks for the piping as required.
- Surface preparations and installation of coating and wrapping of the underground piping, if required as per Technical specification Mentioned in **Annexure- 7 - 2C**
- Installation of glass fiber reinforced epoxy piping in accordance with manufacturer's instructions as well as the specifications.
- Hydrostatic pressure testing of the underground piping systems including test apparatus,



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test piping, test blinds, bolts and gaskets in accordance with the specifications.

### 17.3 **Hydro Testing of Sewers and Underground Lines**



- Tests all sewers and underground piping systems as per test instructions. Testing is to be witnessed and approved by OWNER. A test schedule by test system shall be prepared by LSTK CONTRACTOR. Testing and completion shall be in accordance with project system priorities.
- Piping systems shall be tested with suitable water.
- Develop test system procedures and follow priorities established by OWNER. LSTK CONTRACTOR shall prepare detailed schedules based on this data for submittal to OWNER for his approval.
- The water for testing purposes is to be provided by LSTK CONTRACTOR.
- Inexpensive temporary gaskets shall be used in place of permanent gaskets where test blinds are located for hydrostatic testing. On successful completion of a test, the permanent gasket shall be installed when the blinds are removed.
- After hydro testing, LSTK CONTRACTOR shall perform the following activities:
  - Flushing
  - Remove temporary blinds
  - Install permanent gaskets.
  - Flange connection bolts tightened.
  - Coat and wrap welds.
  - Holiday testing and coating repairs.
  - Backfill and compaction.

### 18.0 **CIVIL PART FOR UNDERGROUND ELECTRICAL GROUNDING SYSTEM**



- 18.1 Excavation of the routing for the direct buried cables, for the road crossing and for the branch conduit and sleeves in accordance with layout and detail drawings.
- 18.2 Transport of the excavated soil, neatly stockpiled to location chosen by LSTK CONTRACTOR and approved by OWNER.
- 18.3 Installation of all protection conduits and installation materials in accordance with the specification, and design and detail drawings.
- 18.4 Transport of excavated soil and backfill including compacting of the round up to finished plant level.

### 19.0 **CIVIL PART FOR UNDERGROUND CABLE TRENCHES (AND CABLE) CIVIL PART**



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- 19.1 Excavation of the routing for the concrete cable trenches for the direct buried cables, for the crossings and for the branch conduit and pipe sleeves by machine or by hand as dictated by local conditions.
- 19.2 Transport the excavated soil, properly stockpiled to a location off chosen by LSTK CONTRACTOR and approved by OWNER.
- 19.3 Installation of the concrete cable trenches in accordance with the specification and the design and detail drawings.
- 19.4 For scope of installation of concrete cable trenches see item 11.
- 19.5 Installation of the road culverts, protection sleeves and cable ducts at road crossing in accordance with layout and detail drawings. For scope of installation see item 10
- 19.6 Transport of the excavated soil and backfill of the surrounding area of the concrete trenches up to finished plant level.
- 19.7 Transport of the excavated soil and backfill of road crossing up to road including the supply and installation of the repair of the paving and / or asphalt road covering.
- 19.8 Transport and backfill of the trenches with a layer of clean sand, free from stones equalized up to the bottom level of the first (bottom) cable layer.
- 19.9 Transport and backfill of the layer of clean sand between cable. Layers and above top cable layer.
- 19.10 Transport of excavated soil and backfill including compacting of the ground up to the layer of concrete tiles or trench covers.
- 19.11 Installation of the cable protection covers and/or trench covers and /or cable routing colored marking tape.
- 19.12 Transport of the excavated soil and backfill including compacting of the ground above the layer of concrete tiles up to finished plant level.
- 19.13 Installation of the cable route designated, trench markers.
- 20.0 **STORAGE TANK PADS AND DYKES**
- 20.1 Install tank pads as specified and as quantified on the specifications and drawings.
- 20.2 Install tank dykes and ramps as specified and as quantified on the specifications and drawings.

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20.3 Install impervious clay layer inside the dyked tankage areas in accordance with specifications and drawings.

## 21.0 **PERMANENT PLANT FENCING**

21.1 Install permanent plant fencing as per LSTK-1 contractor tender scope, including personnel gates and truck gates as located, specified and quantified in the specifications and drawings.

## 22.0 **SCAFFOLDING**

22.1 Supply and erect all scaffolding for WORK.

22.2 Scaffolding shall be supplied, erected and maintained in strict accordance with local and governmental regulations as well as OWNER'S safety requirements. If there are conflicts, the more stringent shall prevail.

LSTK CONTRACTOR shall dismantle all its scaffolding at the completion of its WORK.

## 23.0 **TESTING**

23.1 All necessary tests in order to control the quality of the field works shall be done and all such test certificates should be kept in record, such as but not limited to

- Soil compaction tests.
- Concrete testing
- Asphalt testing
- Reinforcing bars testing

23.2 If any test fails LSTK CONTRACTOR shall replace those items, which do not meet the requirements.

All costs for replacements shall be borne by LSTK CONTRACTOR.



## 24.0 **WELDING PROCEDURES SPECIFICATIONS AND WELDING PROCEDURE QUALIFICATION RECORDS**

24.1 Provide within two months before starting the construction execution, its welding procedures (for A.G, U.G piping and any structural steel) for comment and approval. Approval of welding procedures by OWNER is required before the start of welding.

24.2 Prior to start of filed welding LSTK CONTRACTOR shall submit one (1) copy of all welders' qualification paper and applicable welding procedures approved and stamped by regulating authorities to OWNER.

## 25.0 **DRAWINGS AND DOCUMENTS**

25.1 LSTK CONTRACTOR will carry out all construction activities directly from the AFC construction drawings and specifications.

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25.2 LSTK CONTRACTOR shall submit reports of each test or inspection within three (3) days after actual test or inspection. Failure to comply with the above rule may result in OWNER arranging for additional tests or inspections. Costs of which will be back charged to LSTK CONTRACTOR.

25.3 LSTK CONTRACTOR shall submit material certificates and quality records of the materials, as specified in previous sections and the applicable engineering specifications and standards.

25.4 LSTK CONTRACTOR shall also furnish a concrete installation record within two (2) weeks after completion of the WORK indicating, date of installation and quantity of concrete of each foundations, floor slab, elevated slab, frames, columns, etc.

This concrete installation record shall also show a reference with the concrete compression test certificates of the respective concrete pours and the concrete delivery slip numbers.

Failure to comply with the above time may result in the preparation of the documents by OWNER in which case all related costs will be back charged to LSTK CONTRACTOR.

## 26.0 MISCELLANEOUS

26.1 LSTK CONTRACTOR shall be fully responsible for the correct and accurate setting out of all elevations, positions, dimensions, alignments, profiles. etc, of all parts of the WORK and for the provision of all necessary instruments, appliances and labour in connection therewith The checking of any such matter by OWNER shall not relieve LSTK CONTRACTOR of its responsibility for the correctness thereof.

26.2 If during the construction or maintenance of WORK, any error is discovered in WORK, LSTK CONTRACTOR shall at its own cost rectify such error to the satisfaction of OWNER. LSTK CONTRACTOR shall in such case take all necessary actions such as overtime, etc. in order not to endanger the agreed upon time schedule.



26.3 All dimensions shown on the plans and drawings are given in the SI system, unless otherwise stated.

26.4 All costs for setting out the earthwork and for assisting OWNER in checking the various points, lines, levels, profiles, etc. shall be deemed to be included in the price.

26.5 LSTK CONTRACTOR shall under no circumstances extend its operations outside the limits of the area appropriated for WORK. LSTK CONTRACTOR will ensure that its operations shall not interfere in any way with properties of others.



26.6 No excavation work shall be started before the exact positions of the WORK have been marked by means of stakes controlled and approved by OWNER.

26.7 OWNER shall notify LSTK CONTRACTOR of all known existing underground pipes, cables,

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drains, manholes, etc, in current use, together with the approximate locations and hazards involved and LSTK CONTRACTOR shall ensure that they will not be broken or damaged in any way by the execution of WORK. Hand labour shall be used for excavation within a horizontal distance of 1.5 meters from existing utilities.

- 26.8 Any damage as referred to above AT 26.7 shall be reported by LSTK CONTRACTOR. LSTK CONTRACTOR shall repair the damage.
- 26.9 The discovery of any unregistered pipes, drains, cables, etc., shall be promptly reported to and dealt with as directed by OWNER. Excavation, as required to determine the exact location of existing underground pipes, drains, cables etc. shall be considered as a part of WORK.
- 26.10 LSTK CONTRACTOR shall take precautions i.e. mats, lining with timber, etc. not to cause damage to permanent plant roads curbing and sidewalks with its construction equipment.
- 26.11 LSTK CONTRACTOR shall provide and be responsible for the construction of all temporary dewatering. Drainage, sheet piling, timbering etc. to ensure the stability of slopes, trenches, embankments, etc. during excavation work and that all areas are adequately drained to the satisfaction of OWNER.
- 26.12 LSTK CONTRACTOR is responsible for all soil slides that may occur during the execution of the WORK and for any detrimental effect of the same. LSTK CONTRACTOR shall as directed by OWNER either correct or repair the damage to the satisfaction of OWNER at its own expense or pay for the cost of repair by others of all damage caused to the WORK or adjacent property. No additional payments shall be made to LSTK CONTRACTOR to compensate the financial consequences of soil slides.
- 26.13 Collapse, cave-in, or movement of excavations, trenches, or the like shall be the responsibility of LSTK CONTRACTOR. LSTK CONTRACTOR acknowledges this responsibility and instructions of the OWNER.
- 26.14 Trenches, excavations, and the like shall be maintained in strict accordance with the requirements of the applicable national and local regulations.
- 26.15 LSTK CONTRACTOR shall be held entirely responsible for any effect or damage, which the execution of any of the earthwork may have upon, or which may be caused to any portion of WORK or any of the surrounding property.
- 26.16 Excavation will proceed until all unsuitable material is removed.
- 26.17 LSTK CONTRACTOR is responsible for the excavation required to installing bottom of footings at elevations as shown on drawings. The removal of a poor soil below the intended bottom of excavation is included in the CONTRACT. Any unnecessary over excavation will be in LSTK CONTRACTOR'S account.
- 26.18 Backfill shall be to the elevation shown on the approved drawings or as directed in writing

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by OWNER.

- 26.19 Special care must be taken in compaction operations over underground pipelines.
- 26.20 LSTK CONTRACTOR shall furnish all field engineering, surveying, layout, and checking to properly install all foundations to meet all requirements of the drawings and specifications, on completion of each foundation LSTK CONTRACTOR shall mark all foundations with a clear center line, locating both North, South, East and West and a bench elevation mark. LSTK CONTRACTOR shall stencil or by other means, paint equipment and column designation and coordinates, to all foundations installed by LSTK CONTRACTOR. All markings shall be located above high point of paving. These markings shall be preserved for use by others.
- 26.21 LSTK CONTRACTOR shall design concrete mix specification and furnish by means of reports from OWNER'S laboratory, proof that the materials and mixes for concrete conform to the specifications and codes prior to pouring the first concrete on SITE. LSTK CONTRACTOR shall furnish all field labour to make concrete tests and fill cubes quality of concrete aggregates and mix design will be checked by OWNER'S laboratory regularly.
- 26.22 All aboveground concrete for supports for steel structures must be smooth finished, and exposed edges of concrete to have a chamfer.
- The top of the foundations shall be poured so as to ensure true surfaces and designated slopes in all cases. LSTK CONTRACTOR is to avoid damage or movement of already installed reinforcement and/or other structures, formwork, etc., when pouring concrete.
- 26.23 All concrete pours for a given element must be monolithic, except where noted on the drawing or approved by OWNER.
- 25.24 If pouring cannot be finished within normal working hours, necessary actions shall be taken, sufficiently in advance for requesting permits for overtime. All pouring must be continued until the element is complete. OWNER shall be informed at least twenty-four (24) hours in advance.
- 26.25 Damaged formwork must be repaired in such a way as not to mark the concrete finish. All formwork must be braced adequately and be of a rigid construction. Gravel nests, surfaces crack, honeycombs, etc., and shall be repaired to the satisfaction of OWNER.
- 26.26 LSTK CONTRACTOR shall use immersion-vibrating equipment but it needs to be of a type approved by OWNER prior and also during use. Vibration of formwork and fresh concrete WORK is not allowed. OWNER will have the right to require replacement of inadequate during all phases of the WORK. A must condition shall be maintained after pouring as set forth in specifications. The WORK involved in this is to be included in the pricing.
- 26.27 OWNER reserve the rights to reject any WORK already poured which is not in accordance with drawing and specifications and of adequate quality.

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Serious inclusions appearing in concrete shall be reason for the rejection of WORK and LSTK CONTRACTOR requested to repair or replace at his own expense.

- 26.28 All costs involved in demolition, removal and replacement of rejected WORKS shall be the responsibility of LSTK CONTRACTOR all materials, equipment or auxiliaries not accepted by OWNER shall be removed immediately from the OWNER'S property.
- 26.29 Ready - mixed concrete shall be delivered without segregation. The concrete batch plant has to be approved by OWNER. Small quantities of concrete may be made at SITE after approval of OWNER.
- 26.30 The pouring of any reinforced concrete may only start after having obtained Approval of OWNER.
- 26.31 LSTK CONTRACTOR shall provide, during the period of this CONTRACT, temporary drainage ditches in WORK so that water will not be ponded and so that all areas are adequately drained to the satisfaction of OWNER.
- 26.32 LSTK CONTRACTOR shall provide, during the period of this WORK, systems for the dewatering of all its WORK areas as required to properly execute the WORK. All dewatering methods shall be subject to the approval of OWNER.
- 26.33 All excavated boulders will be removed from SITE by LSTK CONTRACTOR.
- 26.34 Manholes are to be marked with M.H. Number.
- 26.35 Underground service lines have to be marked at their installation limits to aboveground piping, indicating line size, and service and line number.
- 26.36 Prefabricated concrete -items are to - be marked with date of fabrication, size, Length, identification code and installation north arrow.
- 27.0 **BUILDINGS**
- 27.1 LSTK CONTRACTOR shall do the construction of the buildings, including all activities and installations as specified, in drawing and specifications including the fabrication of all items that are not standard hardware components.
- 28.0 Quality of all civil and building materials shall be approved by OWNER before usage in the PLANT.

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## **ANNEXURE- 7-2B**

### **STRUCTURAL STEELWORK**

1. Delivery of all materials and fabricated structural steel to SITE, including all required transport, storage, intermediate storage, etc., including loading and unloading of materials.
2. LSTK CONTRACTOR will carry out all construction from the AFC construction / erection drawings and specifications.
3. LSTK CONTRACTOR shall be held entirely responsible for any effect or damage, which the erection of the structural steel may have upon, or which may be caused to any portion of WORK or any of the surrounding property.



#### **4. Erect Structural Steel-Structure Frames**

This item covers all activities required to erect prefabricated structural steel framing for single and multilevel structures.

It includes, but is not limited to, the following:

- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Shimming of foundations and joints.
- ◆ Erecting.
- ◆ Cutting, drilling, welding and bolting to achieve fitment.
- ◆ Rectification required, if any.
- ◆ Final levelling, aligning and bolting (including torquing).
- ◆ Grouting of components and areas supplied unpainted or requiring finish coats, as per specifications.
- ◆ Touch up painting of damaged areas.
- ◆ Also included in this item are all clips plates, stiffeners, gussets, and connection material supplied loose for field installation.



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## 5. **Fabricate and Erect Structural Steel-Structure**

This item covers all activities required to fabricate and erect structural steel framing for single and multilevel structures, from raw steel, if any, sections, plates, rounds, etc. It including, but is not limited to the following:

- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Preparation of detailed fabrication drawings and getting them approved from Owner.
- ◆ Shimming of foundations and joints.
- ◆ Measuring, cutting, bending, bolting and / or welding.
- ◆ Erecting.
- ◆ Cutting, drilling, welding and bolting to achieve fitment.
- ◆ Final levelling, aligning, bolting and /or welding (including torquing )
- ◆ Grouting of support piers.
- ◆ Painting as per specifications.

## 6. **Fabricate and Erect Ladder and Safety Cages**

This item covers all activities required to fabricate, assemble and erect ladders and safety cages in steel structures, from raw steel (unpainted) sections, plates rounds, etc.

It includes, but is not limited to, the following:

- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Preparation of detailed fabrication drawings and getting them approved from Owner.
- ◆ Measuring, cutting, bending, bolting and / or welding.
- ◆ Assembly and erecting including cutting, drilling, bolting, welding to achieve fitment.
- ◆ Cutting, drilling, welding and bolting to achieve fitment.
- ◆ Final Bolting and / or welding in position.
- ◆ Fabrication and installation of safety barrier rail and gate.
- ◆ Installation of raw bolts and forming of concrete pads, or connecting to a lower platform.
- ◆ Painting as per specifications.



## 7. **Fabricate and Erect Platform and Walkways**

This item covers all operations required to fabricate erect platforms and walkways on vessels, towers, structures, etc or on the ground from raw steel (unpainted ) sections, plates, rounds, etc.

It includes, but is not limited to, the following :

- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Preparation of detailed fabrication drawings and getting them approved from Owner.
- ◆ Measuring, cutting, bending, bolting and / or welding.
- ◆ Erecting including any, cutting, drilling, welding for fitment.



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- ◆ Final levelling, bolting and / or welding.
- ◆ Installing anchor bolts and grouting.
- ◆ Painting as per specifications.

Not including is the installation of flooring or the erection of handrail.

8. **Fabricate and Erect Welded Handrail**

This item covers all operations required to fabricate and erect double rail handrail and tope plate of all welded construction, from raw steel (unpainted) sections, plates rounds, etc.

It includes, but is not limited to, the following :

- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Preparation of detailed fabrication drawings and getting them approved from Owner.
- ◆ Fabrication including cutting, bending, welding, etc.
- ◆ Erecting of posts, top and middle rails toe plate including any cutting, trimming for figment and welding.
- ◆ Grinding smooth of all cut edges and welds.
- ◆ Painting as per specifications.



9. **Fabricate and Erect Galvanized Tubular Handrails**

This item covers all operations required to fabricate and erect double rail tubular galvanized hand railing including all standards, fittings, bends, etc., from raw steel (unpainted) sections, plates, tubes, etc.

It includes, but is not limited to, the following :

- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Fabrication including cutting, trimming edge stripping to required size & shape.
- ◆ Erecting into position.
- ◆ Bolting and/or welding.
- ◆ Trimming to suit platform structure and providing openings for pipe or cable, etc.
- ◆ Making good edges, and touch up painting including cold galvanizing of cut or welded parts.
- ◆ Painting of unpainted steel sections

10. **Fabricate and Install Floor Grating**

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This item covers all activities required to fabricate and install galvanized floor grating from large sheets ready for cutting, trimming, etc., to platform shapes.

It includes, but is not limited to, the following :

- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Fabrication including cutting, trimming, edge stripping to required size & shape.
- ◆ Erecting into position.
- ◆ Bolting and/or welding.
- ◆ Trimming to suit platform structure and providing openings for pipe or cable, etc.
- ◆ Making good edges, and touch up painting including cold galvanizing of cut or welded parts.

#### 11. **Fabricate and Install Chequer Plate Flooring**

This item covers all activities required to fabricate and erect chequer plate flooring, from sheets.

It includes, but is not limited to, the following:

- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Fabrication including cutting, trimming edge stripping to required size & shape.
- ◆ Erecting into position.
- ◆ Bolting and/or welding.
- ◆ Cutting to suit platform structure and providing opening for pipe or cable, <etc.

#### 12. **Erect Davits**

This item covers all activities required to erect fabricated davits on exchangers, vessels or in structures.

It includes, but is not limited to, the following :



- ◆ Delivery of davits and all other materials.
- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Erecting up painting of damaged areas.

#### 13. **Roof and Wall Sheeting**

This item covers all activities required to erect by bolting of roof and wall sheeting.

It includes, but is not limited to, the following :

- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Cutting and fitting of sheeting including all shrilling, trimming and notching to facilitate openings.
- ◆ All flashing of ridges, corners gables, door jambs, etc.

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#### 14. Down pipes and Gutters

This item covers all activities required to install metal downpipes and gutters.

It includes, but is not limited to, the following :

- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Erecting including fitting, trimming supporting and jointing.

#### 15. Roof or Ridge Ventilator

This item covers all activities required for the erection of roof or ridge ventilators on a steel clouded building.

It includes, but is not limited to, the following:

- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Erecting on roof including any trimming or figment.

#### 16. Install Gantry Crane Rails

This item covers all activities required to install rails.

It includes, but is not limited to, the following:

- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Erecting jointing levelling, aligning, and bolting or welding in passion.

#### 17. Install Gantry/Overhead Travelling Crane

This item covers all activities required to erect and complete the installation of overhead cranes.



It includes, but is not limited to, the following:

- ◆ Provision of all tools, equipment and consumables used in the course of the work.
- ◆ Erecting into rails.
- ◆ Installing all controls, both mechanical and electrical.
- ◆ Testing and running of crane.

#### 18. Install Travelling Trolleys

This item covers all activities required for the installation of beam mounted travelling trolley.



It includes, but is not limited to, the following:

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- ◆ provision of all tools, equipment and consumables used in the course of the work.
- ◆ Erecting into position.
- ◆ All levelling and shimming of trolley beam as required.
- ◆ Marking of all beams and trolley with safe Working Load.
- ◆ All testing and running as required.

#### 19. **Inspection and Testing**

- ◆ Inspection of steel structure shall be in accordance with the codes and standards.
- ◆ LSTK CONTRACTOR shall provide NDE services acceptable to OWNER. NDE inspection shall be carried out in accordance with standards, codes and specifications .
- ◆ LSTK CONTRACTOR shall be responsible for the repair of faulty welds and for all required extra radiography and inspection of the faulty welding work. In case of a faulty weld, 100% radiography on LSTK CONTRACTOR'S account can be done as per code.

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## **ANNEXURE- 7 – 2C**

### **PIPE PREFABRICATION AND ERECTION**

#### **1.0 PIPING**

##### **1.1 Magnitude of Piping**

LSTK CONTRACTOR shall prefabricate, install and test all piping as shown on the plan drawings and isometrics.

#### **2.0 PIPING FABRICATION AND ERECTION**

2.1 Piping systems and pipe supports shall be designed, fabricated, inspected, and tested in accordance with rules, codes, specifications and drawings.

2.2 Miscellaneous piping materials for vents, drains, instrument connections, etc. on equipment shall be installed using P & ID'S and equipment drawings.

2.3 The fabrication and erection of piping includes field welds. It is LSTK CONTRACTOR'S responsibility to choose the number and location of field welds to ensure efficient transportation and handling during erection. Furthermore LSTK CONTRACTOR shall locate the field welds in such a way that final adjustment for fit-up purposes will be possible.



For alloy piping that has to be stress relieved after welding the number of filed welds shall be kept to a bare minimum. LSTK CONTRACTOR shall thoroughly evaluate the need for each field weld in alloy piping he deems necessary.

2.4 LSTK CONTRACTOR will furnish OWNER with a marked up set of isometrics identifying all spool pieces, and weld numbers. All piping spools shall be clearly identified, per isometric by means of stainless steel tags affixed with wire.

2.5 LSTK CONTRACTOR shall erect all prefabricated and straight run piping as required by the drawings and specifications.

The erection and installation of the piping shall include but not be limited to the following

- Control valves.
- Safety valves
- Rapture disks.
- Level instrument and gauges.
- External level displacers.
- Special fittings.
- Breaching of vents, drains, instrument connections, etc.
- Rota meters.

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- Orifice flanges.
- Orifice plates.
- In - line instruments.
- Steam tracing.
- Steam traps.
- Extension stems. Valve operators.
- Bellows, expansion joints and similar specialty items.
- Thermo wells (flanged, screwed and weld Ins.).
- Sample coolers.
- Instrument connections (up to and including the first block valve).
- Spring hangers and spring supports.
- Installation of miscellaneous piping and instrumentation supplied by equipment vendor.
- Temporary piping for drying, flushing and hydrostatic testing if necessary.
- Connection of piping to equipment.
- Connection of aboveground piping to underground piping.
- Pipe supports.

This shall include any necessary work to the piping to correct equipment misalignment.

2.6 Fastening of floor supports on concrete will be done with expansion type foundation bolts, if no anchor bolts are provided.



2.7 LSTK CONTRACTOR is responsible for the installation of steam tracing of piping, valves fittings and instruments where required, in accordance with the specifications and drawings. In general steam and condensate headers will be indicated on the piping plans. Lines to the traced will be indicated on P& ID'S and lines lists. Details of steam and condensate headers will be shown on separate drawings. Identification of steam tracers shall be by aluminum tag noting circuit number. Each end of system should be tagged.

A method of identification and tagging of the other various systems shall be established, subject to approval by OWNER and is for account of LSTK CONTRACTOR.

2.8 LSTK CONTRACTOR is responsible for the fabrication and erection of pipe supports, hangers, anchors and guides, as required by the drawings and specifications.

Spring pots and spring hangers, which shall be provided by LSTK CONTRACTOR as will be assembled, installed, adjusted and unlocked by LSTK CONTRACTOR after hydrostatic testing of the line. The required angle iron, will be decided in the field and supplied by LSTK CONTRACTOR.

2.9 LSTK CONTRACTOR shall install and remove all temporary strainers required for WORK defined herein. The removal of these items will be directed by OWNER. OWNER may decide to leave temporary strainers in during commissioning.

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- 2.10 LSTK CONTRACTOR shall be responsible for the fabrication, installation and dismantling of temporary spool pieces and blinds required for control valves, safety valves and in - line instruments during testing and cleaning. Requirements for these shall be minimized. Requirements for these will be prescribed by OWNER.

In general, in-line instruments, safety valves and control valves may be installed for fit-up purposes if available to avoid the use of temporary spool pieces. They shall be removed for flushing and testing and reinstalled as directed by OWNER. In the case of safety valves these must be installed for fit - up, taken down for calibration by LSTK CONTRACTOR, and reinstalled before mechanical completion. All open flanges and valves shall be blinded or plugged off.

- 2.11 LSTK CONTRACTOR is responsible for the installation and testing of all piping and steam, electrical tracing and all materials including all items necessary to completely close the systems in strict accordance with the established test system procedures and priorities as directed by OWNER.

- 2.12 **Wrapping & Coating:-** Surface preparations and installation of Wrapping & Coating of the underground piping with Cold tape (Materials for line coating and wrapping shall be of Tape coating system (Polyethylene backed tape with butyl rubber based adhesive system), if required

- 2.12.1 Protective coating shall consist of a coating system employing Primer, Inner Wrap and Outer Wrap.
- 2.12.2 The coating system shall be mechanically applied by an approved type of wrapping machine utilizing constant tension brakes except at tie-in welds, repair patches and at other locations where mechanical application is not practicable..
- 2.12.3 Coating and wrapping materials shall be handled, transported, stored and applied strictly in accordance with the manufacturer's instruction.
- 2.12.4 Wrapping Coating material is Cold tape type from **Polyken/Denso/Atla** shall be used.



## 2.13 **Flushing and Cleaning Of Piping Systems**

- i) Sections fabricated in LSTK CONTRACTOR'S workshop shall be fitted with plastic end caps to seal pipe ends, and jointing surfaces shall be suitably protected.

These caps shall not be removed until sections are in the course of erection after delivery at SITE and then shall be removed for refuse.

- ii) During fabrication and erection the sections shall be inspected or internal cleanliness.
- iii) The water which will be used for testing and flushing of the piping system shall be recollected per instruction given by OWNER.

- v) Piping systems shall be flushed with suitable water as supplied by LSTK Contractor

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unless designated for nitrogen or air testing or otherwise specified by licensor. OWNER'S approval is required before start of flushing.

- v) LSTK CONTRACTOR shall supply all equipment, pumps, gauges, etc. required for flushing and testing of the piping systems.
- vi) For hydro testing and flushing the piping LSTK CONTRACTOR shall weld and caps and install drain plugs; remove end caps after successful hydro test.

### 3.0 **HYDRO TESTING**

3.1 Inspection and hydro testing of the piping systems shall be in accordance with the drawings and specifications and in strict witness by OWNER representatives.

3.2 Atmospheric pressure systems shall be:

- Visually inspected that all joints are properly made.
- Filled with water for a 24 hours leakage test under atmospheric conditions.
- If any leakage occurs in the system during testing, repairs must be made without extra costs to OWNER.

3.3 LSTK CONTRACTOR shall test all piping systems as per the project test diagrams. Testing is to be witnessed and approved by OWNER and where applicable by the appointed (independent inspection authority) filed inspector. A test schedule by test system shall be prepared by LSTK CONTRACTOR and shall be submitted to OWNER for Approval.

3.4 Testing and completion shall be in accordance with project system priorities.

3.5 All equipment, pumps, gauges, pressure recorders temporary piping and fittings, test gaskets and bolting, required for testing of the piping systems and part of LSTK CONTRACTOR'S supply. Before testing LSTK CONTRACTOR shall calibrate its testing equipment.

3.6 LSTK CONTRACTOR shall supply and install blind flanges when required to enable testing of the lines.



3.7 Inexpensive temporary gaskets supplied by LSTK CONTRACTOR, shall be used instead of permanent gaskets where test blinds are located for hydrostatic testing. On successful completion of a test the permanent gasket shall be installed when the blinds are removed.

3.8 Piping systems shall be tested with suitable water. Extreme care shall be taken that suitable water is used for stainless steel systems. For stainless steel the water must be approved by OWNER and shall have a content of chlorides  $\leq 50$  mg/L

3.9 The water for testing purposes will be furnished by LSTK CONTRACTOR.

3.10 LSTK CONTRACTOR is to perform the testing in a sequence so as to allow sufficient time for





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insulation and/or painting to complete within the time frame of the project schedule.

- 3.11 A formal system of documentation will be developed by LSTK CONTRACTOR and approved by OWNER for use by LSTK CONTRACTOR to certify this testing phase of the piping erection. This system will also include a section for supplying OWNER'S "But list" comments.
- 3.12 Erected piping shall be hydrostatically tested in test systems, but not through equipment, control valves etc. except where piping is welded to equipment.
- 3.13 LSTK CONTRACTOR remains responsible for ensuring that no item of equipment, or instrument, is damaged by the test pressure or the test fluid. Suitability of test fluid to be Approved prior to testing by the OWNER.
- 3.14 It is emphasized that the installation of temporary strainers prior to testing shall be part of WORK. OWNER shall be contacted concerning installation of temporary strainers.
- 3.15 When lines are pressure tested, valves at the end of the lines must be covered with a test blank for safety reasons. A record, preferably on the test diagrams, shall be kept by LSTK CONTRACTOR indicating which sections have been completed.

Note : Testing against closed valves is not allowed (spades to be used)

- 3.16 All material damaged during tests shall be replaced on LSTK CONTRACTOR'S account. All joints broken after testing for installation of strainers, orifice flanges, safety valves, etc. must be remade tightly; labour is for LSTK CONTRACTOR'S account.
- 3.17 After testing the piping systems, they shall be completely flushed and drained. OWNER will approve when a line is considered flushed and drained by LSTK CONTRACTOR.
- 3.18 When each section or circuit has been pressure tested and passed, a certificate prepared by LSTK CONTRACTOR on LSTK CONTRACTOR'S furnished forms showing details must be signed by LSTK CONTRACTOR and OWNER, when the test has been completed and the system drained, test blanks must be removed by LSTK CONTRACTOR.
- 3.19 The following activities by LSTK CONTRACTOR are included for the reinstatement of piping after hydro testing:
- LSTK CONTRACTOR installed temporary testing blinds to be pulled.
  - Temporary spool pieces taken out.
  - Gaskets renewed, temporary replaced with permanent.
  - Flange connection bolts tightened.
  - Post hydro punch list items corrected.

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- Temporary strainers installed.
- Chemical cleaning performed.
- Supports and hangers checked if in final position.
- Rotating equipment cold alignment checked.
- Reinstallation of control and safety valves and in - line instruments which LSTK CONTRACTOR has removed for hydro-testing.

3.20 Nondestructive testing of welds and systems is to be performed in accordance with standards, codes and specifications prior to perform any hydro-test.

#### 4.0 **PIPING MATERIAL IDENTIFICATION AND PAINTING**

4.1 All piping materials are supplied by LSTK CONTRACTOR and shall be properly stamped and color-coded to ensure that the correct materials are used as required by the drawings, specifications, codes and regulations.

4.2 All materials will be adequately marked as to its specifications. Should LSTK CONTRACTOR be required to cut same or otherwise render piece(s) to have no marking, LSTK CONTRACTOR'S transfer or replacement of proper identification marking to the pieces involved, must be done according to approved stamping method and to be counter stamped by LSTK CONTRACTOR. Paint alone is unacceptable.



4.3 The governing principle shall be that in the installed piping systems, all components can be identified and their origin and complete specifications can be determined. The method for identification and stamping or tagging of the various components of the system shall be worked out in coordination with OWNER and only be implemented after approval.

LSTK CONTRACTOR shall be held responsible for this requirement as a minimum, and any other requirements of local codes and regulations as to identification and documentation of materials.

4.4 Surface preparation and paint application of piping system by LSTK CONTRACTOR, shall be per paint specification.

4.5 LSTK CONTRACTOR shall assure that no welds are covered by prime coats prior to acceptance of hydro test.

4.6 LSTK CONTRACTOR must ensure that all stamping such as code stamps, registration spool identification, charge numbers etc. shall be visible after paintwork.

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## 5.0 WELDING

5.1 All welding shall be carried out according to codes and specifications.

5.2 Welder's qualification

5.2.1 All welders including those with valid qualifications will be required to submit a test conducted by OWNER prior to start of welding.

Welders that have a certificate which is still valid for the type of material and in accordance with ASME IX will not be tested by OWNER.

5.2.2 A current list of qualified welders must be maintained by LSTK CONTRACTOR and a copy furnished to OWNER each time a revision is made.

5.3 Welders' identification stamps shall be provided by LSTK CONTRACTOR. Each weld shall be clearly stamped with welders identification. All welding including tack welding shall be carried out by qualified welders. Unstamped welds shall be removed and replaced at LSTK CONTRACTOR'S expense.

5.4 Job SITE fabrication shall be carried out under cover where possible.

5.5 Weld spatter shall be knocked off around all welds leaving a smooth clean surface.

5.6 Where openings for branches are cut in run of pipe, all material, which may drop inside the pipe, shall be completely removed before the branch line is welded in place.

6.7 The interior welds of orifice flanges shall be ground smooth.

## 5.8 Electrodes, Rods, Wires and Fluxes

Electrodes shall be stored in the makers' airtight containers until required for use. Electrode heaters shall be used on Job SITE, for low hydrogen types of electrodes.



Electrodes and filler wires to be used at site in this job shall be procured from the approved vendors only. Electrodes and filter wires shall be **D&H, Advani Orlikon or ESAB, Mailam and Bohler group make only**

## 5.9 Open Air Welding

Where welding in the open air is unavoidable, WORK must be discontinued where the quality of the weld may be impaired by weather conditions. Including but not limited to airborne moisture, sand or high winds. After rain the metal surfaces shall be dried. For metal temperature below 5 °C joints to be preheated.

## 5.10 Welding Procedure Qualification

LSTK CONTRACTOR shall supply welding procedure specifications and qualification in

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accordance with the rules as set by OWNER.

- 5.11 Fees for inspection required for welding procedure and welders qualifications, supply of equipment required for the qualification test of welders and welding procedures are for account of LSTK CONTRACTOR.

#### 5.12 **Inspection and Testing**

- 5.12.1 Inspection of welds shall be in accordance with the instructions of OWNER and/or the requirements of codes and standards.

- 5.12.2 LSTK CONTRACTOR shall be responsible for the repair of faulty welds and for all the required extra radiography and inspection of the faulty welding work. In case of a faulty weld, 100% radiography, on LSTK CONTRACTOR'S account, shall be done on the weld performed as per code.

OWNER shall have absolute discretion in the selection of the welds, which are to be radio graphed.

- 5.12.3 LSTK CONTRACTOR shall provide NDE service, acceptable to OWNER.

NDT inspection shall be carried out in accordance with codes for all lines as indicated in the piping specification.

#### 6.0 **STRESS RELIEVING**



- 6.1 LSTK CONTRACTOR shall provide stress-relieving service acceptable to OWNER. Spool pieces shall be stress relived in an approved furnace equipped with thermostatic control and temperature recorder. Field welds to be stress relieved with electric resistance heaters. Temperature cycles to be monitored with portable temperature recorder.

- 6.2 Stress relieved welds shall be hardness tested by approved procedure and must meet criteria spelled out in specifications.

#### 7.0 **TRANSPORTATION**

The following various categories of transportation of pipe, pipe fittings and prefabricated pipe spools will be performed by LSTK CONTRACTOR. All categories include loading and unloading materials. Categories will consist of but not limited to:

- From LSTK CONTRACTOR'S warehouse to LSTK CONTRACTOR'S pipe prefab shop.
- From LSTK CONTRACTOR'S pipe prefab shop to LSTK CONTRACTOR'S painting shop.
- From LSTK CONTRACTOR'S pipe prefab or painting shop to LSTK CONTRACTOR'S storage area or working area located on site or any other location on SITE.

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- All transportation required performing nondestructive testing of prefabricated pipe spools.

## 8.0 LIFTING, LIFTING EQUIPMENT AND GEAR

8.1 Rigging and hoisting shall be executed as per construction specification and local requirements and safety rules, as manufacturer's instructions. If there are stringent one shall prevail.

### 8.2 Testing And Certification

All LSTK CONTRACTOR furnished cranes, lifting appliances and lifting gear must be properly tested, examined and/or inspected before being used on SITE, and at the intervals specified in the applicable regulations. Copies of the relevant certificates must always be available on SITE for inspection on request by OWNER or other authorities.

### 8.3 Operation

8.3.1 LSTK CONTRACTOR shall not permit a lifting appliance to be operated otherwise than by a person trained and competent to do so.

8.3.2 LSTK CONTRACTOR shall take express steps to ensure that all personnel employed by LSTK CONTRACTOR are competent and experienced for their assigned tasks.

## 9.0 DRAWINGS AND DOCUMENTS

LSTK CONTRACTOR shall fill in checklists as required by OWNER.

## 10.0 MISCELLANEOUS



10.1 LSTK CONTRACTOR shall furnish all field engineering surveying layout, and checking to properly install all above ground piping to meet all requirements of the drawings and specification. OWNER is authorized to reject any WORK already installed, which is not in accordance with drawing and specifications and of adequate quality.

10.2 All costs involved in demolition, removal and replacement of rejected works shall be the responsibility of LSTK CONTRACTOR. All materials equipment or auxiliaries not accepted by OWNER shall be removed immediately from SITE.

10.3 Underground service lines are marked at their installation limits to above ground piping, indicating line size, service and line number.



10.4 During storage, fabrication and erection, care must be taken to ensure that sand, scrap materials, welding rods, items of clothing and other foreign bodies are not allowed to enter piping.

10.5 All connections which are left open by LSTK CONTRACTOR shall be well protected, so that

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no sand, dirt or any foreign object come into the system.

- 10.6 In certain instances special bolting torques might be required on critical connections. LSTK CONTRACTOR will arrange WORK in accordance with these requirements.
- 10.7 Flanged piping connections to vessels or equipment shall be aligned and shall be properly fitted before bolting up. Piping may be heated to bring it into alignment only when approved by OWNER. Extreme care should be exercised to avoid damage. Heating, welding and flame cutting on equipment will not be permitted.
- 10.8 No cold springing or pre- stressing of piping will be allowed other than indicated on piping drawings, isometrics and manufacturer's instructions (e.g. for expansion joints).
- 10.9 Flange faces shall be clean and free from foreign matter before assembly. Damaged flange faces may be dressed with a medium cut file only if the damage does not require new facing. This shall be decided by OWNER.
- 10.10 During erection care shall be taken to remove all dirt, seals, sand and foreign matters from inside the pipe.
- 10.11 Since LSTK CONTRACTOR is responsible for both the prefabrication and the erection of all the piping, it is LSTK CONTRACTOR'S sole responsibility to ensure that all piping to be installed fits properly prior to lifting. LSTK CONTRACTOR is to check all equipment and underground piping to be piped to, for proper location and orientation. OWNER will not entertain any claims for extra work for :
- i. Taking piping down for rework after it is lifted
  - ii. Re-lifting piping after it is reworked.
- 10.12 Final hookup of piping to equipment such as pumps and compressors shall be done together with the final alignment of this equipment and shall include checking of dimensions. Piping must fill these flanges without inducing any strain on equipment.
- 10.13 In all cases, all designated support and hangers should be in unlocked / cold position before final alignment. LSTK CONTRACTOR will be expected to expedite this critical phase of construction.
- 10.14 Certain small vessels will be considered to be piping items and shall be fabricated as such by LSTK CONTRACTOR.

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## **ANNEXEURE- 7 -2D**

### **EQUIPMENT ERECTION**

#### **1.0 SURVEYING**

- 1.1 Baseline and base elevation will be furnished to the LSTK CONTRACTOR. LSTK CONTRACTOR will furnish all surveying from this baseline and elevation.
- 1.2 OWNER shall have the authority at any time to determine in accordance with the drawings or written directives, the correctness or completeness of the lines in use by LSTK CONTRACTOR.
- 1.3 Any erroneous WORK shall be corrected to OWNER'S satisfaction at LSTK CONTRACTOR'S expense.

#### **2.0 RIGGING STUDIES AND PLANS**

- 2.1 LSTK CONTRACTOR shall supply rigging studies and plans as specified.

#### **3.0 EQUIPMENT HANDLING**

- 3.1 The handling of all equipment shall include, but not limited to the following activities by LSTK CONTRACTOR:
- 3.1.1 Submittal to OWNER of detailed rigging studies and plans for lifting, transporting and setting of equipment 4 weeks in advance of work for OWNER to review and approval. Complicated lifts shall be started in the morning and completed the same day.

The transportation plans are to include as a minimum:

Type of equipment to be used to transport each piece.



The planned route of the movement.

The estimated duration of the movement.

The obstructions to the route to be temporarily removed.

- 3.1.2 Receive, inspect, store, protect and perform preventative maintenance on all equipment in accordance with the specifications and drawings and/or equipment manufacturer's instructions.
- 3.1.3 Prepare foundations, pipe sleeves, paving, concrete structures and steel structures for setting equipment.



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3.1.4 Transport form warehouse or point of unloading and install equipment on foundations, paving or structures.

3.1.5 Plumb level and align equipment with coordinates in accordance with the specifications and drawings.

#### 3.1.5.1 **GENERAL**



All of the equipment must be plumbed, leveled and aligned with the coordinates specified on the drawings both in plan and elevation and to the tolerances called out in the specifications, specific manufacturer's instructions or recommended manufacture's practices.

- LSTK CONTRACTOR will be required to verify field conditions and will be responsible for final alignment of mechanical items for this project. LSTK CONTRACTOR will check the anchor bolt locations against the equipment. Any deviation must be reported to OWNER in writing.
- LSTK CONTRACTOR will be required to supply and install shims required for all equipment erection. All cinch anchors required for equipment and supports will be supplied and erected by LSTK CONTRACTOR.

Prior to the placement of the equipment on a foundation, the surfaces of the foundation shall be cleaned of oil, grease, excess concrete and foreign matters by LSTK CONTRACTOR.

- Prior to setting the equipment on the foundations, the underside of the equipment base plate or supports will be cleaned free of oil, grease and other loose materials by LSTK CONTRACTOR.
- Anchor bolts shall be checked for damage to the thread and the threaded part shall be properly greased.
- Damaged anchor bolts must be replaced by LSTK CONTRACTOR and brought to the attention of OWNER.
- The openings between the anchor bolts and sleeves have to be cleaned of foreign materials to full depth of the opening by LSTK CONTRACTOR.
- All steel wear plates and guide keys shall be coated by CONTRACT with proper lubrication, prior to setting the equipment.
- Equipment shall be set true to line. at correct elevation and in proper orientation as shown and noted on the drawings.





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- Maximum allowable setting tolerances shall be in accordance with manufacturer's requirements or with the specifications, whichever is more stringent.
- All equipment, unless otherwise specified, shall be leveled with shims at each anchor bolt (shim on both sides of each anchor bolt) and at intermediate points as required to prevent distortion of the equipment. Shims shall have square cut edges (not trimmed or sheared) and shall be of various thicknesses to minimize the number of shims required. Shims shall be supplied by LSTK CONTRACTOR.
- The equipment shall be set, leveled, aligned and inspected with precision tools (steel straight edge, graduated machinist levels, dial indicators, theodolites, water level instruments, turbine levels, etc.). Setting, leveling and alignment shall be according to manufacturer's recommended tolerances and specifications.
- There may be a number of items not installed by the manufacturer, i.e. seals, packing, lubricators, gauges, miscellaneous piping and tubing, thermometers, etc. that will come separately packed from the equipment itself that must be identified, stored, preferably inside in accordance with project criteria, and finally installed. LSTK CONTRACTOR is responsible for these activities.
- LSTK CONTRACTOR shall remove all temporary shipping supports or erection materials.
- LSTK CONTRACTOR shall do surface preparation for, and apply coating and wrapping on buried vessels before installation.

Equipment supported on legs or on saddles shall be set to the tolerances specified in specifications of the required elevation measured on the flange of the largest diameter pipe-connecting nozzle.

- For equipment with sliding type supports, LSTK CONTRACTOR will remove dirt, grease or other foreign matter and will coat with graphite grease supplied by LSTK CONTRACTOR on the support.
- The anchor bolt nuts will be placed so as not to restrict the longitudinal movement of the sliding end.
- Vessels, drums, etc. shall be aligned, where applicable and leveled per shown or drawing.
- Shims shall be placed approximately evenly spaced under the support ring of vessels, drums, tanks.
- Towers with two or more pieces shall be assembled and welded at site by LSTK CONTRACTOR.

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- LSTK CONTRACTOR is responsible to check and inspect at these equipments in the vendor's shop.
- All costs are included in the lump sum price.

### 3.1.5.2 Rotating Equipment

- Rotating equipment will be installed in accordance with manufacturer's instructions.

Align drivers with all rotating equipment.

- LSTK CONTRACTOR shall install all ancillary equipment such as, but not limited to, drivers, guards, harness piping and all other interconnecting piping, casing drains, base plate drains and all necessary supports.
- The measurements for the positioning and leveling of mechanical equipment will be made on the suction flange.
- LSTK CONTRACTOR to install permanent packing, seals lubricating oils, greases and circulated oil systems.
- Services of manufacturer's technical representative by LSTK CONTRACTOR shall be used to the fullest extent.
- Rotating equipment base plates will be supported for positioning and leveling on shims located as follows.
- For bases with four (4) anchor bolts. one set of shims will be placed adjacent to each anchor bolt.
- For bases with six (6) or more anchor bolts, two (2) sets of shims will be placed adjacent to each anchor bolt, one on each side of the anchor bolt.
- In addition shims shall also be placed directly under those parts of the base plate carrying the greatest weight and shall be placed closely enough to give uniform support.
- When the base plate is level in all directions as indicated by an accurate instrument on the machined pads, the anchor bolt nuts shall be brought down evenly, but not too firmly. The unit is now ready for grouting. After the grout has adequately set, pull the anchor bolt nuts down tight and recheck the base for levelness.
- Release for grouting of base plates must be approved by OWNER.
- After completion of the electric installation to the motor, the direction of rotation of the motor will be determined. Prior to checking the direction of rotation, the coupling between

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the motor and the equipment will be disconnected for the test run of motor by LSTK CONTRACTOR.

- Rough aligning of the centrifugal units and their respective drivers shall take place after the equipment has been put on the foundation.
- Coupling alignment
- Dial indicators shall be used and where possible optical alignment equipment.

Peripheral alignment shall be checked by using one dial reading peripheral differences between coupling halves as they are rotated together.

Face alignment shall be checked using two dials reading face-to-face differences between coupling halves.

- Tolerances shall be in accordance with manufacturer's instructions with and without pipe work connected.
- Manufacturer's representative shall check that the final alignment of equipment is satisfactory before any running takes place. For small equipment. Where it is agreed by OWNER that the services of a manufacturer's representative are not required, manufacturer's written instructions shall be followed.
- The final checks will be supervised by LSTK CONTRACTOR and the results recorded by LSTK CONTRACTOR and signed by OWNER and LSTK CONTRACTOR.

Final alignment shall be carried out in two stages.



- After piping is complete with all bolts removed from the flange connections.
- Final alignment with piping assemblies 100% complete and all flanges bolted up to ensure that no unforeseen vertical or horizontal pipe loading is imposed on the unit.
- The final aligning supervised by OWNER to make sure that the detailed instructions furnished by the equipment suppliers are carried out to the full satisfaction.

LSTK CONTRACTOR to supply qualified personnel in the final alignment activities.

- Prior to putting pumps, etc. into operation, loose equipment such as guards and gauges shall be installed by LSTK CONTRACTOR.

3.1.6 Mount the drivers to the rotating equipment in case of turbines and any large motors that are shipped separately.

3.1.6.1 In case electric motors have to be installed in the field, this shall be done after leveling of



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base plate, but prior to grouting.

Chrome / nickel shim material, supplied by LSTK CONTRACTOR shall be used for alignment of drivers and pumps and shall be installed under the entire footing of the driver.

- 3.1.6.2 Equipment and drivers shall be doweled to bed plate if required by manufacturer's instructions.
- 3.1.7 Assembly whenever required for the items / package unit like Auxiliary Boilers, Waste Heat Boilers, Air - cooled exchangers, furnaces , compressors ,Turbo generators etc. units as part of the scope of WORK of installation by LSTK CONTRACTOR.
- 3.1.7.1 Compressor seal oil and lube oil systems and control panels are included in LSTK CONTRACTOR'S installation of compressors.
- 3.1.7.2 When equipment is delivered in two or more sections for site welding the weld preparation must match accurately on mating sections before assembling.
- 3.1.7.3 LSTK CONTRACTOR shall assemble and erect items, whether skid mounted or supplied in individual components as specified in the requisition or indicated on drawings in order to make a completed unit.
- 3.1.7.4 Installation, assembly and alignment of the various components shall be done by LSTK CONTRACTOR.
- 3.1.7.5 Installation of air - cooled exchangers includes the erection of structural steel on the pipe rack, which will support the tube bundles must be done by LSTK CONTRACTOR.
- 3.1.7.6 Walkways, platforms, stairs, ladders shall be installed for the items / package unit like Auxiliary Boilers, Waste Heat Boilers, Air - cooled exchangers, furnaces, compressors, Turbo generators etc. by LSTK CONTRACTOR.
- 3.1.7.7 Drying out systems, refractory and linings is included in LSTK CONTRACTOR scope of work.
- 3.1.8 Install ladders, platforms, davits, pipe supports and pipe guides in accordance with drawings and specifications.
- 3.1.9 Open man ways. Inspect. clean and close man ways of all tanks, towers. vessels and other equipment as directed by specification or manufacturer.
- 3.1.10 Install all trays and vessel internals and support for same shipped loose. in accordance with drawings, specifications and manufacturer's recommended installation instruction.
- 3.1.11 Under the supervision of OWNER and respective manufacturer's representative LSTK CONTRACTOR shall load the first loading of chemicals.

- a) There will be certain items of equipment such as filters and package equipment

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that come with cartridges filled with -desiccants, resins, etc. Their items will be installed by LSTK CONTRACTOR if they are shipped separately from the equipment.

- b) Installations include the pick-up of these chemicals from the place of storage and transportation to point of installation.

3.1.12 Under the supervision of OWNER, LSTK CONTRACTOR install the first loading of catalysts. Installations include the pick-up of these catalysts from the place of storage and transportation to point of installation.

3.1.13 Touch - up of painting on new equipment after erection.

3.2 LSTK CONTRACTOR shall install grout under all equipment as required.

3.3 Grouting will be as per the specification per the equipment manufacturer's recommendation, whichever is more stringent.

3.4 The following work is included but not limited to LSTK CONTRACTOR'S scope for installation of grouting:

3.4.1 Prepare top surface of base and/or plinth, pockets, sleeves etc., prior to placing grout.



3.4.2 Install grout mortar consisting of one part Portland cement and one part of clean sand and sufficient clean water for workability.

This grout mortar shall be used between steel base plate and concrete foundations.

3.4.3 Wherever non-shrinkage grout is specified on the drawings, the same shall be supplied by LSTK CONTRACTOR and installed in accordance with manufacturer's instructing.

3.5 Install non-shrink grout between reciprocating / rotary equipment base frame including the filling of the equipment steel frame if required, and concrete foundation in accordance with manufacturer specifications and project specifications. Type of non-shrink grout to be approved by OWNER. After grouting, shims used in leveling equipment will not be removed except where removal is specifically required by manufacturer's instructions.

3.6 Unless indicated otherwise on drawings vessels supported on skirts and support rings will be grouted using a stiff mix under the support ring so as to obtain full bearing, Grout will be placed within the area of the skirt the high point of ground at the vertical axis of the tower (or vessel), sloping downward to the support ring with four (4) weep holes under the support ring sufficiently large to ensure drainage.

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## 4.0 MATERIAL HANDLING SYSTEM

### 4.1 ERECTION & COMMISSIONING

- 4.1.1 The complete material handling system including its all equipment shall erected at site and commissioned in accordance with the best engineering practice.
- 4.1.2 Packing, forwarding, transportation, unloading and storage at site, safety and protection of various components at site, insurance etc. shall be the responsibility of the LSTK Contractor / supplier.
- 4.1.3 All men, material and tools required shall be arranged by the LSTK Contractor at his own cost. The LSTK Contractor shall also arrange for the safe handling, storage, protection and security of his good at site.
- 4.1.4 The purchaser shall be responsible for supplying his part of material only as covered by the clause pertaining to the work to be excluded from LSTK Contractor's scope of supply.
- 4.1.5 After erection at site, the belt conveyors and related equipment shall be tested for satisfactory operation for mechanical completion and full-load performance run. The LSTK Contractor shall carry out performance test as per mutually agreed procedure. The details of the procedure shall be submitted by the LSTK Contractor for purchaser's approval.



### 4.2 MECHANICAL COMPLETION

- 4.2.1 Mechanical completion shall be considered as achieved when the system is mechanically complete along with the pre-commissioning activities and is ready for feeding. This shall include but not limited to the following:
1. The installation as per FINAL PROPOSAL is complete in all respects in accordance with the drawings, specifications including any approved changes thereto and in accordance with all applicable codes and laws.
  2. The machinery, conveyors and all drives are aligned and run or cycled under no-load conditions.
  3. The electrical system is installed and tested in accordance with applicable codes and specifications. All wiring is checked for correct hook-up. Motor rotation is checked and power system protective devices are set.
  4. Painting is completed to the extent that the incomplete work does not prevent plant start-up and commissioning.
  5. Successful completion of no-load test of all the equipment and the complete system.
  6. Temporary construction facilities are removed to the extent necessary to permit the plant start-up and commissioning.

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- 4.2.2 The OWNER shall inspect and certify that the LSTK Contractor executed the job in accordance with drawings and specifications.
- 4.2.3 When the complete belt conveyors and related equipment have been fully erected at site, LSTK CONTRACTOR shall request OWNER for his agreement to start the No-load Test Run. Owner shall, within 72 hours of receipt of such request, issue his agreement or advise LSTK Contractor in writing of any deficiencies noticed in the equipment.
- 4.2.4 Omissions / rectifications of minor items, if any, not affecting commissioning shall not withhold MECHANICAL COMPLETION as long as the LSTK Contractor agrees to supply / rectify the same within the specified period. The decision of the OWNER is final in this regard.
- 4.3 **COMMISSIONING AND GUARANTEE TEST** (As per section–8.0 performance & guarantee tests)
- 4.3.1 After issue of Mechanical completion certificates by Owner, LSTK CONTRACTOR & OWNER shall mutually decide the date of commissioning of the equipment. From the date of commissioning, the equipment shall be gradually brought up to full load or any other load at the discretion of OWNER, and thereafter the equipment shall be run for a minimum period of 5 days. OWNER shall have the right to reduce this period where deemed necessary because of OWNER's difficulties. During this period of 5 days of operation or the reduced period, the system shall run at an average of 90% of rated capacity. If the LSTK CONTRACTOR is not able to bring the load to 90% of the rated capacity as mentioned above within 2 (two) months, OWNER shall, without prejudice to any of his rights under the contract, has the right to take over the equipment and to proceed with modifications / rectifications / additions as he considers necessary at LSTK CONTRACTOR's cost and risk to achieve this sustained load run.
- 5.0 **PREPARE EQUIPMENT FOR OPERATION**
- 5.1 Immediately prior to turnover, LSTK CONTRACTOR will make all the equipment ready for operation. This includes, but is not limited to such activities as:
- 5.1.1 Removal of preservatives and rust preventatives.
- 5.1.2 Installation of seals or removal of steel covers.
- 5.1.3 Removal of moisture absorbing materials.
- 5.1.4 Draining of oil reservoirs and the flushing and filling of the initial charge.
- 5.1.5 If required by OWNER for the final inspection the opening and closing of man ways of vessels and tanks.



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- 5.1.6 Assisting equipment manufacturer's representatives by final checkout of equipment.
- 5.1.7 Remove all temporary supports, bracing, or other foreign objects that were installed in vessels rotating equipment or other equipment to prevent damage during shipping, storage, transport and erection.
- 5.1.8 Conduct all flushing, blowing and chemical cleaning required by the specifications.
- 5.1.9 Check and run in all rotating equipment, i.e. compressors, pumps.
- 6.0 Scaffolding Sufficient amount of scaffolding required for good performance of the WORK shall be supplied by LSTK CONTRACTOR.



## 7.0 DRAWINGS AND DOCUMENTS

- 7.1 LSTK CONTRACTOR will carry out all construction and any required procurement activities directly from the AFC construction drawings and specifications and forming part of the CONTRACT. No additional design work or development e.g. completion of drawings will be required from LSTK CONTRACTOR.**

However, the plan type drawings called out to be supplied by LSTK CONTRACTOR in previous subsections of this section are included in LSTK CONTRACTOR'S scope of WORK.

- 7.2 All of LSTK CONTRACTOR'S drawings, calculations, documents, test reports, and test certificates are to be submitted to OWNER for approval in 6-fold. After receiving approval LSTK CONTRACTOR to submit for final approval all of the above and one (1) soft copy in CF format. LSTK CONTRACTOR drawings receiving "Approved as Noted" stamp may be worked on provided all notes are incorporated. It is understood that OWNER'S approval shall not receive in no way LSTK CONTRACTOR from any of his obligations and further more shall not relieve LSTK CONTRACTOR from his obligations to timely complete the WORK according to approved project schedule by OWNER.
- 7.3 LSTK CONTRACTOR'S drawings shall be clearly marked with titles, equipment numbers or other item identification.
- 7.4 Approval of drawings and calculations by OWNER in no way absolves LSTK CONTRACTOR from its responsibility for the accuracy or for the design, construction and timely performance of the WORK.
- 7.5 LSTK CONTRACTOR shall promptly submit reports of each and every. test or inspection.
- 7.6 LSTK CONTRACTOR shall submit quality records of the materials, as specified in previous sections and the applicable engineering specifications.
- 7.7 LSTK CONTRACTOR shall furnish an equipment installation record indicating date of installation and tag number of each piece of equipment.
- 7.8 LSTK CONTRACTOR shall furnish an equipment maintenance record indicating date and type or maintenance of each piece of equipment during the LSTK CONTRACTOR period.



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7.9 LSTK CONTRACTOR shall fill out checklists as required by OWNER.

## 8.0 **LIFTING, LIFTING EQUIPMENT AND GEAR**

8.1 Rigging and hoisting shall be executed in accordance with construction specification local and governmental requirements and safety manuals, as well as specific equipment manufacturer's instructions. If there are conflicts then more stringent shall prevail.

8.2 LSTK CONTRACTOR shall only perform the lifts and movements in accordance with approved LSTK CONTRACTOR submitted rigging studies and plans.

8.3 Preferably, equipment will be lifted in accordance with manufacturer's instructions, if include, using lifting trunnions, lifting lugs if provided, or by slings attached to or around the equipment, with adequate protective measures to prevent damage to equipment. No temporary lifting lugs shall be used without the written approval of OWNER.

8.4 No nozzles or other appurtenances not intended for lifting shall be used for attachment of slings.

8.5 Equipment shall be handled with sufficient care to prevent damage. Slings shall have adequate protection to prevent marring the surface of equipment. Where necessary, sling spreaders shall be used to prevent crushing or other damage to the equipment.

## 8.6 **Testing And Certification**

All LSTK CONTRACTOR furnished cranes, lifting appliances and lifting gear must be properly tested, examined and /or inspected before being used on site and at the intervals specified in the applicable regulations. Copies of the relevant certificates must always be available on site for inspection on request by OWNER or proper authorities.

## 8.7 **Operation**

8.7.1 LSTK CONTRACTOR shall not permit a lifting appliance to be operated otherwise than by a person trained and competent to do so.



8.7.2 LSTK CONTRACTOR shall take express steps to ensure that all personnel employed by LSTK CONTRACTOR are competent and experienced for their assigned tasks.

## 9.0 **WELDING**

Welding of or on equipment shall only be permitted with the approval of OWNER.

## 10.0 **EQUIPMENT PAINTING & INSULATION TOUCH**

Rotating and special equipment to be erected by LSTK CONTRACTOR will be delivered to SITE finished painted. LSTK CONTRACTOR is responsible to apply remedial / touch up painting for any damages to paint, or protective coatings on equipment handled by it in connection. With any aspect of this operations such as unloading, transport, handling and erection as per Annexure mention in ITB Section.

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## **ANNEXURE- 7 - 2E**

### **ELECTRICAL WORK**

#### **1.0 SCOPE: ELECTRICAL WORK COVERS**

- 1.1 Installation and erection of the following equipment (items) consists of the preparation for installation, connection, testing and pre-commissioning etc. as per specifications and as per drawings.
- 1.2 Provision of all tools, equipment and consumables used in the course of the work.
- 1.3 The installation of the following systems (items) shall consist of the connection, testing and pre-commissioning etc., so that the systems are ready for use as per specifications and as per drawings.
- 1.4 Transport, store and protect supplied materials to the construction location.

#### **2.0 ELECTRICAL ITEMS**

- 2.1 Generators / Motors
- 2.2 Control panels
- 2.3 Transformer

**Note :** Installation of all accessories, tanks, levelling and fixing in place are also considered.

#### **2.4 Switch Gears**

**Note :** Bolting together sections where supplied separately and installation of panels, levelling and fixing in place are also considered.

#### **2.5 Bus Ducting**



**Note :** Jointing and securing the associated switch boards / transformers are also considered.

#### **2.6 Battery charger, battery sets and UPS unit.**

#### **2.7 Cables in trench / conduit / tray / Rack.**

**Note :** Following items are also necessary .



- a) Measuring and cutting of cable and protection of cut ends.
- b) Identification of cables
- c) Fixing of cable to tray / rack

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- 2.8 Cable Glands
- 2.9 Cable terminations
- 2.10 Earthing cable in trench / conduit / tape on tray / Rack
- 2.11 Earth cable tape terminations
- 2.12 Lightening protection
- 2.13 Lighting/ fittings / supports
- 2.14 Earth Rod PRT and cover
- 2.15 Cable tiles
- 2.16 Trench marker posts
- 2.17 Air craft warning
- 2.18 Underground electrical grounding system

**Note :** All bellow items are also considered :

- a) Pulling of grounding cable in trenches, through culverts, protection sleeves and cable ducts as per grounding cable supplier installation instruction, project specifications and layout and detail drawings.
- b) Coil up and clearly designate the final destination of the cable ends, especially if cables have to be continued their routing underground or overhead via cable tray or otherwise to their final destination at a later date.
- c) Install, including the provision of the required tools, the required through branch and end connections.
- d) Installation of all grounding electrodes including inspection pits as per specification and the layout and detail drawings.
- e) Return of the cable drums to the storage area including a clear make up of cable lengthleft on the reels of drums that are not empty.
- f) Measure cable resistance for grounding continuity and grounding resistance of ground rods, record data and submit the rest result reports to OWNER prior to commissioning of the installation.
- g) Check cables are in proper trenches and ground rods at their location.

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h) Perform all test; witnessed by OWNER'S REPRESENTATIVES of the founding installation including the provision of all OWNER approved testing equipment and measuring devices.

2.19 Miscellaneous Electrical equipment

2.20 Earth resistance testing including earth resistance rods for grounding, continuity of grounding, installation resistance testing for electrical cables and HL-POT testing for electrical cables.

2.21 Elevator

2.22 LSTK CONTRACTOR shall install the fire alarm including sensors, cabling, local panels, mimic panels and host system. In accordance with:

- Project engineering specification and codes and standards.
- Cabling between panel and detectors, alarms, switches etc. as described above.
- Installation of all junction / terminal boxes, cable terminations and connections, supporting brackets for cabling as described above.

### 3.0 TESTING AND COMMISSIONING

Testing and commissioning consist of the complete testing prior to commissioning, including provision of required testing apparatus and testing documents as requested and as specified in the testing specifications.



- All test results shall be recorded on the test form and submitted to OWNER. Each test record shall include. date of test, ambient temperature, climatic conditions, instruments used with serial numbers, names of test personnel and witnesses, identifications of equipment, ground electrode or circuit tested.
- Testing shall be scheduled at least 24 hours in advance and OWNER is to be notified by LSTK CONTRACTOR. LSTK CONTRACTOR will notify all necessary interested parties including manufacturer's representatives.

High potential tests shall not be repeated without authorization by OWNER.



### 4.0 DRAWINGS AND DOCUMENTS

4.1 LSTK CONTRACTOR will carry out all construction and any required erection activities directly from the AFC construction drawings and specifications.

4.2 LSTK CONTRACTOR shall promptly submit reports of each and every test or inspection.

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- 4.3 For more details LSTK CONTRACTOR shall follow **Electrical design philosophy elsewhere mentioned in ITB.**

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## **ANNEXURE- 7 – 2F**

### **INSTRUMENTATION WORK**



#### **1.0 GENERAL**

- 1.1 Instrumentation symbols and identification of functions shall be based on the current edition of ISA S5.1.
- 1.2 Specifications for instruments and items of control equipment are shown on data sheets to be issued as they become available.
- 1.3 All materials and connections for control valves, relief valves, level controllers and similar equipment shall comply with applicable requirements for valves and fittings as noted in the piping specification.
- 1.4 LSTK CONTRACTOR shall install all shim plates, fixing material such as but not limited to anchors, red heads, etc.
- 1.5 LSTK CONTRACTOR shall install all instrument equipment tag plates.

#### **2.0 FIELD INSTRUMENT INSPECTION AND CALIBRATION AND INSTALLATION**

- 2.1.1 This item covers all activities and supply of all materials to import calibration of instruments. It includes, but is not limited to, the following:
  - 2.1.1 Provision of all tools, equipment and consumables used in the course of the work.
    - Calibration of instruments and provision of all necessary test equipment gauges, materials and ancillary items. All necessary testing instruments to be used must be certified by Govt. recognized testing laboratories.
    - Check orifice plates and control valves.
    - Protection of instruments to maintain cleanliness at all times.
    - Mark instrument to indicate status of calibration.
    - Return instruments, after calibration and checking to lay-down areas and / or stores including all packaging.
    - Pressure and leak test including the provision of all necessary test equipment gauges materials and ancillary items.

Note : The calibration of all instruments within the packages is also the responsibility of LSTK

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Contractor.

2.1.2 LSTK CONTRACTOR shall install all instruments as listed in the instrument index and further per the relevant installation specifications, documents and drawings.

2.1.3 Field instrument installation includes, but is not limited to:



Mounting of instruments and related equipment, supports protection boxes, manifolds, junction boxes, nameplates, etc.

Installation of measuring elements (probes, sensors, detectors, etc) including their auxiliaries as required (thermo wells, supports, valves, etc.) unless done by others

Installation of on-line instruments (by piping)

The following is a typical list of on-line instruments:

- Safety blow down valves.
- Control valves (all types)
- Motor - operated valves.
- Safety shut - down valves (including solenoid valves).
- Safety / relief valves.
- Pressure / vacuum relief valves.
- Self - regulating valves.
- Level gauges.
- Level displacer chambers.
- Orifice assemblies.
- Orifice plates.
- Venturies.
- Turbine meters, annubars, magnetic flow meter.
- Positive displacement meters.
- Variable area meters (rotameters)

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- Stilling Wells.
- Thermo wells and etc.
- Installation of process connections, impulse lines and capillaries.
- Installation of purge and flushing supply tubing, filter blocks and rotameters.
- Installation of air supply lines.
- Supply and installation of instrument nameplates for field instruments.

## 2.2 Cable, Supports and Fixing Wire pins, Conduit



LSTK CONTRACTOR shall use for cable installation for indoor and outdoor use the materials such as tubing, cable trays, etc. as called in the specifications.

- 2.2.1 Cable tray ladder rack and tubing systems shall be installed to ensure electrical continuity throughout the run and such that water cannot collect or remain in any part of the system. Cable tray shall be laid as per cable tray lay out drawing and as required to install cables. Required supporting shall be in LSTK CONTRACTOR. No cable or cable portion shall be laid without cable tray.
- 2.2.2 Pulling of the cables into the trenches, through culverts, protection sleeves and cable ducts as per cable supplier installation instructions and layout drawings, cable lists, trench sections and reel schedules.
- 2.2.3 Installation of the cable separation tiles, if specified.
- 2.2.4 Coil up and clearly designate the final destination of the cable ends, especially if cables have to be continued their routing underground or overhead via cable tray or otherwise to their final destination at a later date.
- 2.2.5 Installation of the sealing shrouds to avoid water ingress after cable cutting.
- 2.2.6 Installation of the cable markers stamped with cable number by LSTK CONTRACTOR as per cable list.
- 2.2.7 Installation of cable splicing if required.
- 2.2.8 Return of the cable drums to the storage area including clear markup of the cable length left on the reels of cable drums that are not empty.
- 2.2.9 Check if cables are spaced as specified.
- 2.2.10 Measure cable resistance and cable insulation, record data and submit the test result reports prior to commissioning of installation.



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- 2.2.11 Check whether all cables are installed in the proper trenches/ cable trays.
- 2.2.12 Perform all tests, witnessed by OWNER of the underground cable installation including the provision of the OWNER'S approved testing equipment and measuring devices. However, it is recommended to use only overhead cable tray for instrumentation cable installation.
- 2.2.13 Record of actual installed cable lengths and location of cable splices.
- 2.2.14 where cables required to be installed through or across the edges of tray or other metal work the edge of the lips shall be smoothed painted and lined with a protective sleeving to avoid cable damage.
- 2.2.15 Supporting steelwork shall be fabricated and installed by LSTK CONTRACTOR. The material shall be primed in accordance with the painting specification by LSTK CONTRACTOR.
- 2.2.16 Storage and handling of cable before and during installation shall be carried out with due regard to manufacturer's recommendations. Cable drums shall be rotated only in the direction indicated by drum markings, and open ends of cables are to be effectively sealed immediately after cutting to prevent the ingress of moisture.
- 2.2.17 At all times, the utmost care shall be exercised to avoid damaging the protective sheathing to cable or of causing excessive bending or twisting which may result in damage to core insulation, sheaths armor and so on.
- 2.2.18 The bending radius of a cable either during or after installation shall not be less than manufacturer's recommended minimum.
- 2.2.19 Cables shall be run in continuous unbroken lengths and joints shall not be permitted.
- 2.2.20 Cables installed above ground shall be routed to avoid high-risk areas, e.g. high fire risk areas, and those areas where accidental leakage or spillage may occur and cause damage to cables and supports.
- 2.2.21 During installation, the ends of cables shall temporarily be protected using compound, tape, heat shrink seals or similar approved methods to avoid damage or entry or moisture until they are permanently terminated.
- 2.2.22 Pre-cast concrete members should not be drilled for any reason. Fixing shall always be by means of clamping brackets in the most efficient way and in consultation with OWNER.
- 2.2.23 Under no circumstances shall welding be carried out to any process plant equipment, vessels, pipelines, or structures or to any protected surface unless specifically indicated on the drawings and documentation and then in strict accordance with a procedure subject to Approval of OWNER.

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2.2.24 Fixings to the above shall normally be made where brackets and so on, have already been provided or when agreed by the use of purpose built clamps.

2.2.25 On trays horizontal cable runs shall be fastened with aluminum strip at every 1200 mm, vertical cable runs every 600 mm.

#### 2.2.26 **Grouping**

The cables employed to convey electricity shall be grouped according to the signal kinds. The main group kinds are but not limited to the followings

- Intrinsically safe signals.
- Signal cables not intrinsically safe.
- Instruments power supply cables.
- Coaxial cables or telephone cables used as serial data buses.
- Analog input/output signals, Digital input signals
- Digital output signals
- Inter-Panel cable between electrical MCC room and instrumentation system

2.2.27 All cable trays, ladders, tubing and supports and fixing material for indoor and outdoor use shall be installed by LSTK CONTRACTOR.

2.2.28 All cables shall always be installed and connected in such a way that no forces can act on terminals. Further, all instrument and power supply cables inside and outside buildings shall be installed in accordance with both cable lists and drawings by LSTK CONTRACTOR.

Carbon steel coated cable stub ups shall be installed by LSTK CONTRACTOR for all cables from sand trenches to 500 mm above ground, in accordance with electrical connection detail drawings.



#### 2.2.29 **Conduit system**

Single pair cables shall be used to connect field mounted instruments to local junction boxes. Single cables shall be armoured type laid laid open cable trays, However any unarmoured type cable shall be laid in galvanized carbon steel / aluminium pipes with open ends or on closed cable trays. In order not to damage the cable, a plastic annular cap shall cover the pipe end.

Multipair cables shall be used to connect above said local junction boxes to the control room. Multipair cables shall be armoured type and shall run over head in closed cable trays / ladders supported on the pipe racks.

#### 2.2.30 **Wire Pins**

All stranded cable conductors shall be fitted with crimped taper pins (bootless type), amp (or equivalent) and all screens with lugs. Installation of all amp wire pins and screen lugs by LSTK CONTRACTOR.

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Further, in general, all standby conductors shall be wired to terminals.

#### 2.2.31 **Cable Marking**

All instrument cables, conductors and the instrument screen/earth wires shall be tagged on both sides in accordance with the instrument connection list for local and central control room signals by LSTK CONTRACTOR.

2.2.31a Cross ferruling shall be used for wire termination at each end.

#### 2.2.32 **Cable Entry Sealing**

##### - **General**

After installation of all cables and on direction of OWNER, LSTK CONTRACTOR shall seal off all cable entries and passages.

##### - **Outside walls**

All cable entries in outside walls and below grade level shall be watertight sealed. Method of sealing shall be supplied by LSTK CONTRACTOR.

##### - **Separation walls**

All cable entries in separation walls of buildings shall be sealed with a fire resistant sealing as described hereafter.

##### - **Control Room Floors**

All cable and cabinet entries in floors shall be sealed with polyurethane foam.

##### - **Fire - resistant sealing**



All fire resistant sealing shall be class H-30.

Small openings in walls shall be sealed with CSD –F (or equal) in luminescent foam.

Large openings in walls and between computer floor and cable basement shall be sealed by inserting CSD-F (or equal) in luminescent plates under between and above the cables. The remaining openings shall be sealed with CSD-F (or equal) in luminescent foam.

#### 2.3 **Alarm Systems**

2.3.1 LSTK CONTRACTOR shall install the fire alarm including sensors, cabling, local panels, mimic panels and host system. In accordance with:

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- Project engineering specification and codes and standards.
- Cabling between panel and detectors, alarms, switches etc. as described above.
- Installation of all junction/ terminal boxes, cable terminations and connections, supporting brackets for cabling as described above.

2.3.2 All work related to the fire and gas system, including overall test / loop check as per specifications and drawings, among which the installation, placing and connection of all cables of the fire and gas panel located in the control building and panel in the firehouse shall be done by LSTK CONTRACTOR.

## 2.4 Analyzers Installation



LSTK CONTRACTOR shall install all analyzers and sampling conditioning systems in the analyzer house (analyzer house shall be air conditioner and shall be design and constructed by LSTK Contractor) as well as in the field consisting of, but not limited to:

- Installation of all vents and drains from analyzers.
- Installation of calibration gas bottles as well as regulators and connecting tubing, as required.
- Installation of required tubing and cabling in cable tray from analyzer house to tapping point.
- Cable installation between Analyzer panel to DCS/ESD/other control system panel for hardwire signal communication.

## 3.0 LOCAL PANELS

LSTK CONTRACTOR shall install local panels, consisting of, but not limited to:

- Mounting, aligning and fixing to the foundation or steelwork. Uncoil, install and terminate underground cable ends. Install and terminate all aboveground cable to / from panels.
- Install and connect air supply and air signal piping and tubing to 'from panels.
- Install cabling and connect alarm horns.
- Identification / tagging of all equipment, terminals, cables and tubing which is not installed by panel vendor. Tag plates to be installed by LSTK CONTRACTOR.
- Installation of brackets / supports for cable, etc. and installation material as required to complete the installation.
- Cable installation between Local panel to DCS/ESD/other control system panel for hardwire signal communication.

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#### 4.0 **TERMINATION OF CONTROL CABLES FROM THE LV SWITCH ROOM**

The control cables running from the switch room shall be installed and connected in the marshaling cabinet by LSTK CONTRACTOR.

#### 5.0 **CONTROL BUILDING INSTRUMENT INSTALLATION**

5.1 LSTK CONTRACTOR shall install all control building instrumentation in accordance with the relevant installation specifications and drawings.

#### 6.0 **CABINETS AND CONSOLES**

6.1.1 LSTK CONTRACTOR shall install align and anchor all equipment cabinets and consoles in accordance with design drawings and seller's installation instructions.

6.1.2 The false floor shall be completely installed by LSTK CONTRACTOR.

All panels, cabinets, tables, boxes, computers etc. located on the instrument equipment layout shall be place and installed by LSTK CONTRACTOR.

6.1.3 Where cable passage is required according to installation drawings, LSTK CONTRACTOR to indicate locations of holes and passages.

6.1.4 FCS/ESD/PLC cabinets and data base unit:

These groups / cabinets shall be installed in place and bolted together by LSTK CONTRACTOR.

Internal wiring / cabling and / or connections between these groups of cabinets shall be done by LSTK CONTRACTOR in accordance with the instructions of the system vendor's representative.



#### 6.1.5 **FCS Consoles**

The consoles shall be installed in place and bolted together by LSTK CONTRACTOR, including installation of special table with peripherals.

Internal wiring and cabling and/or connections between consoles shall be done by LSTK CONTRACTOR in accordance with the instructions of the system vendor's representative who will be present during these operations.

6.1.6 Communication racks with the same work description as specified elsewhere in Tender documents.

6.1.7 Main processor cabinets (data base units) with the same work description as as specified elsewhere in Tender documents.

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#### 6.1.8 Marshaling Cabinets

Cabinets shall be installed in place and bolted together by LSTK CONTRACTOR.

Cross wiring between these assembled sections shall be done by LSTK CONTRACTOR.

#### 6.1.9 Fire Panel Cabinets

Cabinets shall be installed in place by LSTK CONTRACTOR.

- 6.2 Handling and installation. Termination and Connection of Cabling.  
Cables entering instrument room are installed under false floor and laid in cable tray. These cable shall be handled, cut to length, stripped and after installation of the cabinets be terminated and connected by LSTK CONTRACTOR.

LSTK CONTRACTOR shall leave slack in the cables and provide markings.

#### 6.3 Installation of System Cables

LSTK CONTRACTOR shall install, plug in and support all system cables. Cable supporting rail in cabinets is installed by cabinet / console vendors, but in any case LSTK CONTRACTOR is responsible.

- System cable shall be installed by LSTK CONTRACTOR under false floor in auxiliary room. System cables are covered by instrument cable list.

#### 6.4 Conduits Cable Tray / Trucking. Support Frames and Brackets

All cable trays, cable trucking, supports / brackets, etc. if required , shall be installed by LSTK CONTRACTOR. For cable tray installation see respective part.

#### 6.5 Auxiliary Cable Installation and Termination.



LSTK CONTRACTOR shall install, terminate, support and connect all auxiliary cables.

Auxiliary cables are all cables covered by instrument cable list and instrument cable layout for control room.

LSTK CONTRACTOR shall open / remove and close parts of the false floor as required for cable installation.

#### 6.6 Communication Cables

LSTK CONTRACTOR shall install and support communication cables. The connection of the cables in the consoles and cabinets shall be done by LSTK CONTRACTOR, under direct

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supervision of system vendor. LSTK CONTRACTOR shall open / remove and close parts of the false floor as required for cable installation. Communication cables are listed on instrument cable layout for control room and the system cable list.

## 6.7 **Power Supply Cabling**

LSTK CONTRACTOR shall install. Terminate and connect all power supply cables between power distribution boards and cabinets, consoles, printers and other instrument equipment when listed on the power supply list

## 6.8 **Earthing System**

LSTK CONTRACTOR shall install and connect the insulated earthing cabling / wiring from the earth buses to the cabinets, consoles and all other instrument equipment.

All cabinets and consoles shall be fitted with earthing bus bars and earthing connection bolts by the vendors and under supervision of LSTK CONTRACTOR.

LSTK CONTRACTOR shall install utility, shield and dedicated earth (clean earth) cabling and connections including tags at both ends.

LSTK CONTRACTOR shall check and test earthing system in accordance with relevant documents.

LSTK CONTRACTOR shall be provide required nos. of earth pit. Earth pit shall be separate for electrical and instrument requirement.

## 7.0 **LIFTING**

7.1 Major instrument equipment shall be rigged from points designated or suitable to accept rigging. When available, LSTK CONTRACTOR shall utilize lugs on equipment.

7.2 When establishing hoisting loads, riggings plans and crane capacities, LSTK CONTRACTOR shall adhere to the requirements and instructions as defined in the specifications and as instructed by OWNER. Any equipment handling machine i.e Hydra, cranes etc. required at that time, same shall be provided by LSTK contractor.



## 8.0 **TESTING AND PRECOMMISSIONING (FUNCTION TEST)**

8.1 Testing and pre-commissioning consist of the complete testing and pre-commissioning prior to commissioning, including provision of required testing apparatus and testing documents, comprising, but not limited to:

8.1.1 Check for completion and conformance to specifications.

8.1.2 Check the accessibility of all instruments and components for field adjustments, routine





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maintenance and removal for overhaul, and relocate as necessary.

- 8.1.3 Perform pressure test on all air sub headers as required by the line specifications.
- 8.1.4 Clean all instrument air sub headers, transmission tubing and control tubing by blowing with dry, filtered air prior to connection of instrument components
- 8.1.5 Leak test pneumatic transmission and control tubing, using an approved method acceptable to OWNER
- 8.1.6 Perform hydrostatic or, where appropriate, pneumatic pressure tests on all instrument process piping, as required by the respective line specifications. Drain and below free of water, as necessary after test.
- 8.1.7 Check continuity and identification of transmission and control systems for each instrument to ensure proper hookup. Perform megger and continuity tests for instrument electrical wiring. Check correct source of power, polarity and earthing (take into account intrinsically safe technology of this procedure).
- 8.1.8 Check the bore of the orifice plates and flow direction during and after installation.
- 8.1.9 Check (on/off valve and) control valves for direction of flow and proper operation, e.g. travel, action with air failure, etc.
- 8.1.10 Calibrate all instruments (including the instruments in the fire and gas system) and synchronize transmitter and receiver readings for each instrument loop. Check the orifice plates and flow nozzles. Set air pressure regulators.
- 8.1.11 Install pressure and temperature gauges after line flushing.
- 8.2 Check fuses, perform voltage checks and energize all electrically powered instruments, alarm and shutdown system, etc. Maintain power supply.
- 8.3 Set pneumatic and electronic type switches and local control by simulation of input signals.
- 8.4 Check thermocouples and resistance thermometer circuits from element to measuring instrument by simulation.
- 8.5 Check and adjust calibration of all other field and panel mounted instruments.
- 8.6 Complete loop functional test of all instruments, including the instruments in all package units and in the fire and gas system. Functionally test complete control loops alarm and shutdown systems and partial process sequence, etc., to verify capability to measure, operate and stroke final control elements in the direction and manner required by the process application. All test results shall be recorded and submitted to OWNER. Each test record shall include date of test, ambient temperature, climatic conditions, instruments used with serial numbers, names of test personnel and witnesses, identification of equipment, ground electrode or circuit tested.



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Testing shall be scheduled at least 24 hours in advance and OWNER is to be notified by LSTK CONTRACTOR. LSTK CONTRACTOR shall advise OWNER prior to testing, of make, type and accuracy of test equipment used for above-mentioned items. All required test certificates should be of a recent date not exceeding 6 months.

#### 9.0 **PAINTING**

Surface preparation and application of all required paint layers shall be executed in accordance with paint specifications and related standards.

#### 10.0 **WELDING**

LSTK CONTRACTOR shall perform welding in accordance with the normal accepted industrial standards.

#### 11.0 **MECHANICAL COMPLETION**

LSTK CONTRACTOR shall advise OWNER in writing when erection is completed.

Mechanical completion date shall be the date when the activities have been accomplished by LSTK CONTRACTOR as dictated by the construction schedule, which shall be submitted by LSTK CONTRACTOR and approved by OWNER on due time.

#### 12.0 **QUALITY ASSURANCE, QUALITY CONTROL, INSPECTION, CALIBRATION TEST AND MATERIAL CERTIFICATES**

12.1 LSTK CONTRACTOR shall perform quality control, inspect, calibrate required testing, pre-commissioning and supply certificates.

12.2 LSTK CONTRACTOR shall submit reports of each and every test or inspection within three (3) days after actual test or inspection is made.



12.3 Calibration and Testing.

12.3.1 Calibration and testing to be executed by LSTK CONTRACTOR in accordance with respective specifications.

Local instruments such as transmitters, converters, receivers and so on, will be preset by bench testing by LSTK CONTRACTOR in accordance with the specifications before installation on the process, so that no new settings will be necessary for loop acceptance tests.

12.3.2 LSTK CONTRACTOR shall inspect all materials up on receipt for damage and completeness. In case of damage incomplete material, LSTK CONTRACTOR shall modify/replace with new one and immediately inform OWNER.

12.3.3 LSTK CONTRACTOR shall carry out all tests included in this paragraph shall fill out the installation checklists and shall submit all required test certificates and documentation as required.



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- 12.3.4 All tools and test gear necessary to carry out described tests shall be provided by LSTK CONTRACTOR.
- 12.3.5 Inspection and testing shall be phased with construction and installation in such a manner as to involve the minimum necessary concentration of effort and manpower and the minimum loss of time in reaching the pre-commissioning stage.
- 12.3.6 All inspection and testing shall be witnessed and approved by OWNER / authorized representative.
- 12.3.7 LSTK CONTRACTOR shall be responsible for the complete loop continuity check of the field and control room installation, including the parts of the package units, which have been connected by others.
- 12.3.8 OWNER reserves the rights whenever distinguished package Plant(s)/Unit(s) vendor's representative to be present at site LSTK CONTRACTOR shall be responsible to arrange this WORK.
- 12.3.9 LSTK CONTRACTOR shall be responsible for the loop continuity checks from the marshaling cabinets or direct connected cabinet cables in the control room (termination point of underground multi core cable). The loop continuity checks shall be performed on a complete loop, including all parts of the loop as indicated on the instrument loop diagrams (ILD'S).
- 12.3.10 The communication equipment between field and control room building and/ or other buildings shall be the responsibility of LSTK CONTRACTOR.
- 12.3.11 Only complete loops shall be accepted, signed by OWNER after all calibration / function checks have been demonstrated successfully completed and recorded.
- 12.3.12 For all package units and systems supplied by LSTK CONTRACTOR, installed or partly installed and connected by LSTK CONTRACTOR.

LSTK CONTRACTOR shall perform a normal wiring and loop check of signals and supplies to and from these systems.

The following systems apply:

- Analyzer system
- Bentley Nevada system
- Flow metering system
- Fire, smoke and gas detection system
- Tank gauging
- FCS / ESD / PIC system, etc.
- Machine monitoring system
- Public address system (PA system)

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For more details LSTK CONTRACTOR shall follow **Instrument design philosophy elsewhere mentioned in ITB.**

### 13.0 **Miscellaneous**

LSTK CONTRACTOR shall remove all waste and debris from the SITE.

## **ANNEXURE- 7 - 2G**

### **INSULATION WORK**

#### 1.0 **GENERAL**



##### 1.1 **SCOPE**

This standard covers the requirement for supply and application of materials for thermal insulation of equipment, piping and other items.

##### 1.2 **REFERENCE STANDARDS**

The design shall be in accordance with established codes, sound engineering practices and shall conform to the statutory regulations applicable to the country. The main codes, standards and statutory regulations considered as minimum requirements are as follows:- (Latest revision of these shall be followed)

IS 14164	Code of Practice for Industrial Application and finishing of thermal insulation material at temperature -80 <sup>0</sup> C and up to 750 <sup>0</sup> C.
IS 737	Wrought aluminum and aluminum alloys, sheet, strip
IS 1254	Specification for corrugated aluminum sheet
IS 1322	Bitumen felts for waterproofing and damp proofing
IS 3069	Glossary of terms, symbols and units relating to thermal insulation materials.
IS 8183	Specifications for bonded mineral wool.
IS 9743	Thermal insulation finishing cements
IS 12436	Specification for Preformed Rigid Poly-urethane (PUF) and Poly-isocyanurate (PIR) Foams for Thermal Insulation
IS 13205	Code of practice for the application of polyurethane insulation by the in-situ pouring method.
ASTM C921	Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
ASTM C1029	Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation

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ASTM C1696-16 Standard Guide for Industrial Thermal Insulation Systems

ASTM C411 Standard Test Method for Hot-Surface Performance of High - Temperature Thermal Insulation

ASTM C450 Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging

ASTM C871 Test Methods for Chemical Analysis of Thermal Insulation Materials for Leachable Chloride, Fluoride, Silicate, and Sodium Ions

ASTM C1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.

ASTM C1055 Guide for Heated System Surface Conditions that Produce Contact Burn Injuries

ASTM C1139 Specification for Fibrous Glass Thermal Insulation and Sound Absorbing Blanket and Board

ASTM D1622 Test Method for Apparent Density of Rigid Cellular Plastics

ASTM C680 Standard Practice for Heat Loss or Gain and Surface Temp.

### 1.3 **Deviations:**

Should unforeseen difficulties arise to comply with requirements of this standard.

Alternative material and application techniques superior to the requirements of this standard be submitted with complete details for approval of owner.

In case of any conflict / deviations amongst various documents, the order of precedence shall be as follows:



1. Statutory regulations.
2. Job specifications.
3. Engineering design basis.
4. Standard specification.

### 1.4 **LIMITATIONS**

#### **Temperature Limits.**

This standard deals with insulation applied externally on piping equipments etc. as per the table below:-

<b>Maximum Operating Temperature</b>	<b>Type of Insulation</b>
60°C to 750°C for C.S., A.S. & S.S.	HOT
- 180°C to 20°C	COLD

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## 1.5 THICKNESS DESIGN BASIS

Thickness calculation method as per procedure given in ASTM C-680

### 1. Hot Insulation

Design Ambient Temperature	: 35°C
Design Surface Temperature	: 45°C
Permissible Heat Loss	: 100 kcal./m <sup>2</sup> hr.
Permissible Wind Velocity Outside	: 1 m/sec
Permissible Wind Velocity Inside	: 0.25 m/sec

### 2. Cold Insulation

Design Ambient Temperature	: 35°C
Design Surface Temperature	: 2 °C below ambient/ 0.5 Deg C above the Dew Point
Permissible Heat Gain	: 10-12 kcal/m <sup>2</sup> hr
Relative Humidity	: 85%
Permissible Wind Velocity Outside	: 1 m/sec.
Permissible Wind Velocity Inside	: 0.25 m/sec.

## 1.6 GENERAL REQUIREMENTS

### 1.6.1 Information to be supplied

- Material of construction / dimension of equipments / pipes required to be insulated.
- Temperature
- Location of equipment (Indoor/Outdoor/Elevation)
- Requirement of removable box type insulation if any
- Special requirements if any regarding type of insulation material and other properties.
- These information shall be supplied in form of insulation schedule.
- Design calculations, drawings and insulation material schedule.
- Material Test certificate's.
- Insulation works execution schedule.
- Detailed procedure for all types of execution works.
- Bill of Quantities, Initial material take-off, final material take off and material requisition.
- QA/QC plan.



### 1.6.2 STORAGE OF MATERIAL

Insulation material shall at no time be stacked directly on the ground; instead it will be stored at a level higher than ground level. It should not only be covered by tarpaulin but other effective protections against weather are also to be provided. The contractor shall provide a properly covered storage to the satisfaction of engineer-in-charge (Refer IS: 10556).

### 1.6.3 HYDROSTATIC TEST FOR PIPES

Before taking up insulation job on piping or vessels it shall be ensured that hydrostatic test of the concerned equipment / piping is completed. Where it is felt necessary to take up the insulation job before such testing are performed all welded and mechanical joints shall be left un-insulated for a length of at least 150mm on either side of the joint.

### 1.6.4 PROTECTION OF INCOMPLETE JOBS

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Any part of insulation job which is not provided with final weather proofing will be adequately protected by means of tarpaulins and other aids. After the day's work similar protection should be provided for the partially completed jobs to be continued the next day to avoid any absorption of rain / moisture during the night.

## 2.0 INSULATION SUPPORTS (CLEATS) TO BE PROVIDED BY EQUIPMENT SUPPLIER

Suitable supports (cleats) in the form of rings, lugs, studs or pins shall be provided on equipment by equipment supplier, however should any additional supports or anchorage be felt necessary for insulation works, the same shall be also considered in LTSK's scope, including all allied work necessary for the same. These will be installed by the contractor free of any extra cost. Owner shall be informed about the same in advance, so also design/drawings shall be updated accordingly.

## 3.0 MATERIAL REQUIREMENTS

### 3.1 INSULATION MATERIALS

#### 3.1.1 General

Whenever reference to any Standard is made it is presumed that the latest revision as on date should be considered unless otherwise specified.

#### 3.1.2 Specification and other requirements



Specification and other requirements will be as per below mentioned table:-

#### Hot Insulation:

For operating temperature Upto 400 deg.C,	Rockwool Mattress of density 120 kg/m <sup>3</sup> conforming to IS:8183.
For operating temperature 401-450 deg.C,	Rockwool Mattress of density 150 kg/m <sup>3</sup> conforming to IS:8183.
For operating temperature 451-500 deg.C,	1 <sup>st</sup> layer insulation shall be 25mm Ceramic Fibre Blanket of density 128 kg/m <sup>3</sup> conforming to IS :15402 and balance layers with Rockwool Mattress of density 150 kg/m <sup>3</sup> conforming to IS:8183.
For operating temperature 501-550 deg.C	1 <sup>st</sup> layer insulation shall be 50mm Ceramic Fibre Blanket of density 128 kg/m <sup>3</sup> conforming to IS :15402 and balance layers with Rockwool Mattress of density 150 kg/m <sup>3</sup> conforming to IS:8183.
For operating temperature 551-600 deg.C,	1 <sup>st</sup> layer insulation shall be 75mm Ceramic Fibre Blanket of density 128 kg/m <sup>3</sup> conforming to IS :15402 and balance layers with Rockwool Mattress of density 150 kg/m <sup>3</sup> conforming to IS:8183.

Bands/Wires for securing insulation shall be of ASTM 8209 Alloy 3003 H16 or 18-737 designation 31000 (old NS3) condition H3 or 18/8 Stainless steel.

For securing cladding on insulation on piping, aluminium band 12mm (min) X 24 SWG thick shall be used. For securing cladding on insulation on equipment, aluminium band 20mm wide X 24 SWG shall be used.

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Other insulating materials may be used provided they have the same or better properties and durability aspects.

Insulation thickness of insulating materials shall be based on design calculation of thermal conductivity, insulation class, etc. Same shall be submitted to the Owner with necessary design calculations, drawings, test certificates and durability parameters.

### For Valves, Turbines & Compressors Insulation

Prefabricated factory made Ceramic Fibre pad to be used made out of Ceramic Fibre Blanket of density 128 kg/m<sup>3</sup> encased in high temperature resistant cloth. The minimum thickness of the pad shall be –



- |    |           |    |           |        |
|----|-----------|----|-----------|--------|
| 1. | 0 Deg.C   | to | 300 Deg.C | = 25mm |
| 2. | 301 Deg.C | to | 400 Deg.C | = 50mm |
| 3. | 401 Deg.C | to | 500 Deg.C | = 75mm |

Removable insulation for flanges and valves, like tailor made jackets or pre formed insulation boxes, shall be suitable for quick removal and reinstallation. All tailor made jackets shall fit the actual valve/flange/equipment and secure adequate overlap to incoming insulated pipes.

Technical data sheet of the Ceramic Fibre Pad is as below:

A.	Purpose/Application This Engineering specification is for Fabric jacketed supercera ceramic Fibre insulated flexible reusable covers/pad for application on pipes: pipe fittings, valves, flanges etc vessels & equipments, tubes etc in hot services.				
01	Dimension (mm)	As per drawing/sketch provided by OEM.			
02	Thickness (mm)	25-100			
1. Specification of Protective jacketed material					
i	Vest Cover	Liner Fibre Glass Fabric			
ii	External Top Cover Fabric (for cold face)	Polymer Coated Fibre Glass fabric Temp. resistance 300 Deg. C, oil & water resistant			
iii	External Bottom Cover fabric (for hot face)	High silica cloth for Temp Resistance up to 900 Deg C			
2.	Specification of insulation Material	Ceramic Fibre Blanket (As per IS 15402)			
i	Classification Temperature	1260 degree Celsius			
ii	Thickness	25 – 100mm			
iii	Bulk Density	128kg/m3			
iv	Shot content on 70 mesh (%)	<30			
v	Tensile strength (KPa)	>40			
vi	Mean Fibre Dia (Micron)	2-4			
vii	Linear Shrinkage (%) At 1200 Deg. C for 24 Hrs	3.5			
viii	Thermal Conductivity (W/mK) Max.	1000C	2000C	3000C	5000C
		0.046	0.072	0.078	0.150
ix	Chemical composition	SiO2%		49-58	
		Al2O3%		41-48	
		ZrO2%		0-7	



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		FeO3%	<0.1
3	Hardware & Non Metal fastening		
i)	Buckle/Draw Stings	Stainless steel (min SS 316), High Temp Braided Chord of fibre glass	
ii)	Stic Pins	Stainless Steel (min SS 316), Pins to prevent the insulation from movement inside the cover	
iii)	Stitching	Double sewn with Teflon coated Fibre glass wrapped stainless thread. The sewing thread shall not resolve or decompose in typical chemical plant environment.	
iv)	Belting	High Temp Fabric same as used in hot face cover	
4	Other Properties		
i	Fire Resistance (As per BS 476 Part-4)	Non-Combustible	
ii	Chemical Stability/Resistance of Corrosion/water	Good	
iv	Shock Resistance	Excellent	

Rockwool Insulation shall be of water Repellent Grade and tested as per BS: 2972 for Water Absorption. Maximum water absorption is 0.5 kg/m<sup>2</sup> in 48 hours duration.

Precautions must be implemented in the design and fabrication of the insulation jackets to avoid the insulation material from sagging causing reduction of the insulation properties of the jackets.

#### **Cold Insulation:**

Insulation material and specifications for cold insulation for operating temperatures up to (-) 180°C and dual temperature (cold/hot) service where, upper temperature limit is 125°C shall be as given below for all sizes of piping/equipment:

#### **- Polyurethane Foam**



Preformed pipe section's and radial lags (for higher diameter pipe) of polyurethane foam of self-extinguishing type shall be in accordance with ASTM C591 TYPE-II Grade 2. The physical requirement of bulk density, chloride content, thermal conductivity and PH value of the material shall be as follows:

Temp. Limit Bulk density:	Upto (-)180°C & 120°C (max) 35.0 to 39.9kg/m <sup>3</sup>
Chloride content :	20 ppm (max)
Thermal conductivity :	0.221 mw/cm°C at mean temp. 10 deg C
PH Value :	Neutral.
Closed cell content :	95% (min)

High density polyurethane foam block of bulk density more than 300 Kg/m<sup>3</sup> shall be used for supports.

#### **- Polyurethane Foam Cast-in-Situ**



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Cast-in-Situ Polyurethane Foam of density  $42 \pm 2$  kg/m<sup>3</sup> conforming to IS: 13205 shall be used. High density polyurethane foam block of bulk density more than 300 Kg/m<sup>3</sup> shall be used for supports.

Temp. Limit : Up to (-) 45°C and 120°C (max.)

**- Polyisocynaurate**

Temp. Limit : Up to (-) 180°C and 125°C (max.)

Other insulating materials may be used provided they have the same or better properties and durability aspects.

Insulation material specification/ thickness/application mentioned in this document are the minimum requirements. Insulation specification/ thickness/ application shall be based on design calculation of thermal conductivity, insulation class, relevant IS/ ASTM codes etc. Same shall be submitted to the Owner with necessary design calculations, drawings, test certificates and durability parameters. LSTK shall submit detailed material specifications, durability parameters assured, test certificates and application procedure to OWNER/ PMC approval.

### 3.2 AUXILIARY MATERIALS FOR CLADDING

**a) Aluminium Cladding**

**- Horizontal Vessels**



Aluminium sheet as per IS-737 (designation 31000, condition H3 for flat sheet & 31500/51300, H4 for corrugated sheets)) shall be used for cladding. Insulation on overall piping, vessel and equipment, cladding will be coated on the side in contact with insulation with 3 mil thick polysurlyn film.

Specifications for aluminium Cladding material shall be as follows:

Material	Reference Code / Standard	Thickness	Application
Aluminium sheet with applied moisture barrier of 3 mil thick Polysurlyn coating	IS : 737 / ASTM C-653	22 SWG (0.71mm)	For all piping, tanks, vessels, heat exchanger, flanges, valves, equipments etc. upto 24" outside dia
		20 SWG (0.91mm)	For piping, tanks, vessels, heat exchanger, flanges, valves etc. above 24" outside dia
Removable cover for flanges, valves etc. shall be made out of minimum 18 SWG thickness Aluminium Sheets.			

**- Vertical Vessels**

Cladding material for vessels with insulation O.D. 900 mm and less shall be same as for pipes. For vessels above 900 mm insulation O.D. 22 SWG corrugated aluminium sheet as per IS-1254 or ribbed aluminium sheet 32 mm x 5 mm deep corrugations may be used.

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Aluminium Foil to protect stainless surfaces in Temperature below 0 deg c shall be 0.1 mm (42 SWG) thick per ASTM 8209 alloy 3003 H16 or IS-737 designation 31000 (OldNS3) condition H3. For securing aluminium foil on stainless steel surface 24 SWG thick x 20mm wide aluminium bands shall be used.



- b) **Screws**  
Screws used with aluminium sheeting shall be of self tapping type, A No.8x12mm long cadmium plated / SS of high quality at intervals of 150mm.
- c) **S-Clips.**  
Aluminium, 20x1.5mm or 25mm wide stainless steel banding bent to form a shape of "S" provide a minimum lap of 50mm.
- d) **Bands for securing cladding.**  
Aluminium of dimensions 12mm width x 0.56 mm thick (24 SWG) for pipes. Stainless Steel bands Type 304, 0.4mm thick x 13mm wide for large dia pipes (above 24") and cylindrical equipment up to outside dia 900mm, 0.5mm thick x 19mm wide for cylindrical equipment above 900mm outside dia meter.
- e) **Quick release clips for removable covers.**  
Suitable quick release clips will be made as shown in fig. 7 from 20Cm width x 20 SWG aluminium sheet and some fig.7 from 20mm width x 20 SWG aluminium sheet and some suitable rectangular ring.
- f) Sealant for cladding joints with Foster 95-44 /TIKI F9544.
- g) The vapour barrier mastic shall be Foster 60-38/39 /TIKI M6038/39
- h) Adhesive for cold insulation shall be Foster 81-33 /TIKI P8133
- i) Vapour Stops at pipe support location shall be Foster 90-66 /TIKI F9066
- j) **Rivets:** Aluminium 'POP' blind eye type / Stainless Steel 9.5mm long x 5mm dia meter.
- k) Filler material shall be PUF dust or mineral wool mixed with specified adhesive shall be placed lightly so as to fill irregular voids and sealant shall be Foster Foam Seal Sealer 30-45. Glass cloth to be used for vapour barrier reinforcement shall be open weave 10 mesh having glass fibre thickness of 5 mils.

Galvanised steel sheets/ Annealed galvanised steel sheets/ Galvanised colour coated sheet are strictly **PROHIBITED** for use in cladding works. Other cladding materials (except G.I.) may be used provided they have the same or better properties and durability aspects, after prior approval from Owner/PMC.

Cladding material / auxiliary material specification/ thickness/ application mentioned in this document are the minimum requirements. Cladding material/ auxiliary material specification/ thickness/ application shall be based on design calculation of thermal conductivity, insulation class, corrosion aspects, durability, relevant IS/ ASTM codes, etc. Same shall be submitted to the Owner with necessary design calculations, drawings, test certificates and durability parameters.

LSTK shall submit material specifications, durability parameters assured, test certificates and application procedure to OWNER/PMC approval.

#### 4.0 **INSPECTION.**

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#### 4.1 General

All insulation material shall be subject to inspection by owner before application. In case of doubt, Owner's representative will have the liberty to get the material tested by the contractor at any approved test laboratory. Any material not meeting specified requirement will be rejected and the rejected material shall have to be replaced by the contractor with material of specified type and quality. Insulation found to be improperly installed shall be removed and reinstalled properly by the contractor.

Contractor shall maintain detailed log of various insulation works and same shall be updated on daily basis. QA/QC checks of work done and materials shall be also registered in the daily logs. Owner will have the liberty to check the logs.

#### 4.2 Inspection

Inspection of materials and / or installation by owner shall not relieve the contractor of his responsibility to ensure that finished insulation conform to specified requirements and is free from defects, contractor shall correct any defects due to poor workmanship. Contractor shall maintain test certificates and other relevant data from manufacturer.

#### 4.3 Test for thickness

Test for thickness shall be carried out after application. Thickness at any point shall not be less than 2mm than the indicated designed thickness and excess thickness up to 115% of the designed thickness is permissible. .

#### 4.4 Testing for bulk density

Testing of bulk density of the insulating materials shall be carried out before the application of insulation. This should be within  $\pm 15\%$  of the specified value. Test location shall be selected by owner and its repair shall be done by contractor.

### 5.0 APPLICATION

#### 5.1 General

Insulation thickness shall be as per design calculations as specified in the drawings/ insulation schedule/ specification/isometric drawings prepared for equipments/piping.

Contractor shall submit detailed calculations and procedure for different insulation works based on relevant IS / ASTM codes.



#### 5.2 No. of Layers

When insulation thickness exceeds 75 mm, the insulation shall be applied in multi-layers with all joints staggered. Each layer will be separately secured with metallic bands/wires.

No. of layers shall be as follows:

**Insulation Thickness**  
Up to 75mm

**No. of Layers (Min.)**  
1 Layer

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76 to 150 mm  
151 and above

2 Layers  
3 Layers or more.

### 5.3 GENERAL REQUIREMENTS

#### 5.3.1 Surface preparation

- Surface to be insulated shall be cleaned of all dirt. Oil loose scale etc. by wire brushing. Insulation works shall commence only after necessary clearance from QA/QC for painting works as per painting specification. All insulation shall be applied at ambient temperature and both the metal surface and insulation material shall be dry prior to application of insulation.
- The surface for cold insulation shall be then coated with a bitumen emulsion or a mastic coating.
- If the vessel is made of stainless steel, it shall be wire-brushed. with stainless steel wire brush.

#### 5.3.2 Expansion / contraction joint

Depending on the type of insulation used the operating temperatures and nature of the material it may be necessary to provide expansion/contraction joints on vessels or pipes to prevent the insulation from rupturing/buckling when the surface expands/contracts. Joints are to be designed as per relevant IS / ASTM codes.

#### 5.3.3 Filling of Voids

All voids, irregularities and joints shall be packed with loose insulation material/insulation cement trowelled smooth whichever is applicable.

### 6.0 MEASUREMENT OF INSULATION WORK.

6.1 Measurement of insulation works shall be as per IS: 14164.

### 7.0 GUARANTEE

- There shall be a surface temperature recording as mentioned in the Design Parameter to be performed with the help of Thermography Camera, post the line/ equipment is charged in operating conditions. The same shall be in LSTK's scope and LSTK shall give a detailed report of the same.



-The guarantee test shall be carried out when plant is fully operative.

-The surface temperature, reading shall be taken at six points per pipe line and at each point it shall be taken on all four sides in top, bottom, left side and right side.

-The above reading shall be taken at 2 hours intervals and shall be taken for 18 hours starting from 11 a.m. in the morning.

- Simultaneously ambient temperature shall be taken as per IS: 14164



- A graph shall be plotted between ambient and surface temperature reading

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- From this graph the surface temperature against ambient temperature shall be found out
- The ambient and surface temperature shall be measured by the instrument provided by the contractor. The instrument shall be calibrated to the satisfaction of owner/consultant.
- The contractor is required to guarantee the surface temperature of 60°C (max.) for equipments and piping in case of Hot Insulation. For cold insulation of equipments and piping, the difference between skin temperature and ambient temperature shall not exceed 2 °C.
- Ambient temperature and surface temperature shall be measured by duly calibrated instruments provided by CONTRACTOR.
- The CONTRACTOR shall undertake immediate replacement of insulation material damaged in transit, storage or application, at no additional cost to Owner.
- LSTK shall produce required number of copies of test certificates as per relevant IS/ASTM Standard. LSTK shall certify/ensure that Test to be done are from NABL approved laboratory, approved by Owner.
- All materials are new and unused and are as per specifications called for in this standard.
- The operating thermal conductivity shall be as specified
- The workmanship shall be in accordance with good practice.
- **Other terms & conditions of the guarantee clause shall be as per NIT / purchase order / Commercial documents of ITB.**

**Insulation Contractor shall be as per given List**

M/s Lloyd Insulations (India) Limited, New Delhi
M/s Poiner Insulation ,Ghaziabad
M/s Insulrifef, Mumbai
M/s Polybond Insulation Pvt Ltd, Chhattisgarh (India)
M/s Minwool Rockfibers Ltd, Hyderabad
M/s Murugappa Morgan Thermal Ceramics Ltd, Chennai
M/s Associate Insulation Co.
M/s HIL, Hyderabad

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## **ANNEXURE- 7 - 2H**

### **PAINTING SPECIFICATION (TS-2001)**

#### **1.0 GENERAL**

##### **1.1 Scope**

This specification covers the technical requirements for shop and site application of paint and protective coatings and includes; the surface preparation, priming, application, testing and quality assurance for protective coatings of mechanical equipment, structural steelwork, plate work, tankage, guards, pipe work, handrails and associated metal surfaces, which will be exposed to atmospheric for the Project.

##### **1.2 Definitions**

C.S	-	Carbon steel and low chrome (1- <sup>1</sup> / <sub>4</sub> Cr through 9 Cr) alloys
S.S	-	Stainless steel, such as 304, 316, 321, 347,
Non-ferrous	-	copper, aluminium and their alloys.
High Alloy	-	Monel, Inconel, Incoloy, Alloy 20, Hastelloy, etc.
DFT	-	Dry Film thickness, the thickness of the dried or cured paint or coating film.

##### **1.3 Safety Regulations**

Protective coatings and their application shall comply with all national, state, and local codes and regulations on surface preparation, coating application, storage, handling, safety, and environmental recommendations.

Sand or other materials producing silica dust shall NOT be used for any open-air blasting operations.



##### **1.4 Material Safety Data Sheets**

The latest issue of the coating manufacturer's product datasheet, application instructions, and Material safety data Sheets shall be available prior to starting the work and shall be complied with during all preparation and painting / coating operations.

##### **1.5 Materials**

All paints and paint materials shall be obtained from the company's approved manufacturer's list. All materials shall be supplied in the manufacturer's containers, durably and legibly marked as follows.

Specification number  
Colour reference number  
Method of application  
Batch number  
Date of Manufacture  
Shelf life expiry date  
Manufacturer's name or recognised trade mark.

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## 2.0 CODE AND STANDARDS:

Without prejudice to the provision of Clause 1.1 above and the detailed specifications of the contract, the following codes & standards shall be followed. Wherever reference to any code is made, it shall correspond to the latest edition of the code.

### 2.1 Indian Standards:

IS-5: 1994	Colors for ready mixed paints and enamels.
IS-2379: 1990	Color codes for identification of pipe lines.
IS-2629: 1985	Recommended practice for hot-dip galvanizing on iron and steel.
IS-2633: 1986	Methods for testing uniformity of coating of zinc-coated articles.
IS-8629: 1977	Code of practice for protection of iron and steel structures from atmospheric corrosion.
IS:110	Specification for Ready Mixed Paint, Brushing, Grey Filler, for Enamels, for Over Primers
IS:101	Methods of test for ready mixed paints & enamels.

### 2.2 Other Standards:

#### 2.2.1 Swedish Standard: SIS-05 5900-1967 / ISO-8501-1-1988

(Surface preparations standards for Painting Steel Surface).



This standard contains photographs of the various standards on four different degrees of rusted steel and as such is preferable for inspection purpose by the Engineer-in-charge.

#### 2.2.2 DIN: 53151 Standards for Adhesion test.

### 2.3 The paint manufacturer's, instructions shall be followed as far as practicable at all times. Particular attention shall be paid to the following:

- Instructions for storage to avoid exposure as well as extremes of temperature.
- Surface preparation prior to painting.
- Mixing and thinning.
- Application of paints and the recommended limit on time intervals between coats.



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### 3.0 SURFACE PREPARATION

#### 3.1 Metal Surface Preparation

##### 3.1.1 Safety

All work in adjacent areas, which may negatively affect the quality of blast cleaning, and/or impose safety hazards, must be completed or stopped before the blasting operation starts.

##### 3.1.2 Pre-cleaning

Prior to surface preparation all weld spatter shall be removed from the surface, all sharp edges ground down and all surfaces cleaned free of contaminants including chalked paint, dust, grease, oil, chemicals and salt. All shop primed surfaces shall be water washed by means of suitable solvent, by steam cleaning, with an alkaline cleaning agent if necessary or by high-pressure water, to remove contaminants prior to top-coating

##### 3.1.3 Surface Decontamination

Surface decontamination shall be performed prior to paint application when uncoated surface is exposed to a corrosive environment or existing paint work is to be repaired.

Existing coatings shall be removed by abrasive blast cleaning, and then high pressure potable water shall be used to clean steel surfaces.

Prior to application of coatings, the surface shall be chemically checked for the presence of contaminants. A surface contamination analysis test kit shall be used to measure the levels of chlorides, iron salts and pH in accordance with the kit manufacturer's recommendations.

Swabs taken from the steel surface, using cotton wool test swabs soaked in distilled water shall not be less than one swab for every 25m<sup>2</sup> of surface area to be painted.

Maximum allowable contaminant levels and pH range is as follows:

Sodium chloride, less than 50 microgram / cm<sup>2</sup>;



Soluble iron salts, less than 7 microgram / cm<sup>2</sup>; and

If the results of the contamination test fall outside the acceptable limits, then the wash water process shall be repeated over the entire surface to be painted, until the contaminant test is within the specified levels.

##### 3.1.4 Abrasive Blasting

All C.S. materials shall be abrasive blast cleaned in accordance with Codes (Ref. Clause 2.0). To reduce the possibility of contaminating S.S., blasting is not usually specified. However, for coatings which require a blast-cleaned surface for proper adhesion, S.S. may be blast cleaned using clean aluminium oxide or garnet abrasives (Free from any chloride or Iron / Steel contamination). When hand or power tool cleaning is required on S.S., only S.S. wire-brushes (including 410 S.S.) which have not been previously used on C.S. surfaces may be used.



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The surface profile of steel surfaces after blasting shall be of preparation grade Sa 2-1/2 of Swedish Standards SIS-05-5900 (Latest Revision) or better according to ISO 8501-1 and shall be measured using the replica tape method or the comparator method.

The roughness (profile) of blast-cleaned surfaces shall be Medium (G) according to ISO 8503-2: 1988 (appendix 1) unless otherwise specified. Medium defines a surface profile with a maximum peak-to-valley height of 60-100 microns, and G indicates that the surface profile is obtained by grit blasting. For the evaluation of surface roughness Comparator G shall be used.

Abrasive blast cleaning shall NOT be performed when the ambient or the substrate temperatures are less than 3° C above the dew point temperature. The relative humidity should preferably be below 50% during cold weather and shall never be higher than 60% in any case.

Abrasive blast cleaning shall be performed with a clean, sharp grade of abrasive. Grain size shall be suitable for producing the specified roughness. Abrasives shall be free from oil, grease, moisture and salts, and shall contain no more than 50ppm chloride. The use of silica sand, copper slag and other potentially silica containing materials shall not be allowed

The blasting compressor shall be capable of maintaining a minimum air pressure of 7 kPa at the nozzle to obtain the acceptable surface cleanliness and profile.

The blast cleaning air compressor shall be equipped with adequately sized and properly maintained oil and water separators. The air supply shall be checked to ensure no oil and water contamination at the beginning of each work shift.

Blast cleaning abrasive shall be stored in a clean, dry environment at all times. Recycling of used abrasive is prohibited.

After blast cleaning, the surfaces shall be cleaned by washing with clean water (Pressure 7kg/Cm<sup>2</sup> using suitable nozzles. During washing broom corn brushes shall be used to remove foreign matter.

Assessment of the blast cleaned surfaces shall be carried out in accordance with reference code.

Blast cleaned surfaces which show evidence of rust bloom or that have been left uncoated overnight shall be re-cleaned to the specified degree of cleanliness prior to coating.



All grit and dust shall be removed after blasting and before coating application. Removal shall be by a combination of blowing clean with compressed air, followed by a thorough vacuum cleaning with an industrial grade, heavy duty vacuum cleaner.

All cleaned surfaces shall have protection from atmospheric corrosion as per IS8629:1977

### 3.1.5 Alternate Methods of Surface Preparation

When open air blasting is not permitted on site, or when space limitations or surface configurations preclude blasting, the alternate cleaning methods listed below may be used with prior approval. Alternate cleaning methods shall consider the degree of surface cleanliness and roughness profile required by the specified coating system.

- Vacuum or suction head abrasive blast-cleaning,
- Wet jet abrasive blast-cleaning,

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- Compressed-air wet abrasive blast cleaning,
- Pressurized liquid blast-cleaning,
- Power tool cleaning,
- Hand or power tool cleaning,

Hand and/or power tool cleaning shall only be used for spot repair where abrasive blasting is not permitted or is impractical, and on items which could be damaged by abrasive blasting. Power tool cleaning shall not be carried out with tools which polish the surface, e.g. power wire brushes.

The surfaces of equipments and prefabricated piping etc. which are received at site Primerised or with finish paints, depending upon their conditions, shall be touched up and painted at site. For these surfaces sand blasting is not envisaged and these surfaces shall be prepared using power brushes, buffing or scraping, so as to achieve a surface finish to St-3 as per SIS-05-5900 . After wash-up the area to be touched up shall be jointly marked, measured and recorded for payment purposes. The type of system & nos. of coat (primer and/or finish paint) to be applied after touch up, which shall be decided by OWNER/CONSULTANT in writing before taking up the job.

When paint is to be applied on damaged painted surfaces of equipments all loose and flaking paint work should be removed to a firm feathered edge. Rusted spots should be cleaned by one of the methods specified in the clauses 4.4.1 & 4.4.2 above. In case the previous paint work is not compatible to the specified one the entire coating must be removed.

It shall be ensured that sand blasted surface/machine cleaned surface is not contaminated with oil and grease. Water shall also not be allowed to come in contact with sand blasted surface.

## 4.0 APPLICATION

### 4.1 General

The final specification of paint systems to be used to suit the exposure conditions of equipment and steelwork, shall be as specified on the scope of work, equipment data sheets or the drawings.

All coatings shall be in accordance with Indian / International Standards, the coating manufacturer's product data sheets and application instructions and the requirements contained in this specification.



#### 4.1.1 General Requirements for Shop Application

All work areas which facilitates shop paint application shall be surface prepared for painting and have the paint system applied before installation.

Equipments assembled at site shall only receive primer coat in the shop and finish coatings will be applied at site.

In all cases, where surfaces will be inaccessible after shop assembly, they shall be prepared and have the paint system applied before assembly is carried out. Drying times between successive coats shall be at least those recommended by the manufacturer.

All known field weld areas shall be given the specified abrasive blast surface preparation but left uncoated for a distance of 50mm from the weld line. Such areas shall be given the appropriate touch-up treatment after installation.

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The manufacturer's directions for preparation and application of coatings shall be followed to ensure that the durability of the coating system is not impaired.

The Contractor shall submit the full details of the proposed surface preparation and paint systems prior to the commencement of any surface preparation.

#### 4.1.2 General Requirements for Site Application

Paint shall be stored only in accordance with the manufacturer's instructions.

All materials used for the specific system being applied shall be products supplied by one manufacturer and details of such product shall be submitted for approval before commencement of work.

The contents of cans shall be thoroughly stirred before being poured into paint pots and shall be thinned only in the specified proportions in accordance with the manufacturer's instructions.

Finish coats may be applied by spraying except where any over spray is likely to affect finished surfaces or where spraying constitutes a health hazard to workmen in the other areas. Brush and roller application will require multiple coats to achieve the specified dry film thickness.

Brush application may be used only with the approval of the company.

Roller application shall only be used on relatively large surface areas ( i.e. > 50m<sup>2</sup>) and only if spraying is not an option.

The Contractor shall complete the application of any one type of paint or each coat thereof, before beginning the next coat on that section.

In cases nominated as critical, the application of each coat shall be approved before application of the next coat can proceed, in accordance with 'hold' points nominated in the Inspection and Test Plans (ITPs)



All fittings within any given area are to be painted with the same system as the area unless otherwise specified.

Where 2 coat of finish paint are indicated they shall be applied in two different shades to ensure that two coat are applied.

Paint shall not be applied in rain, snow, fog or mist or when the relative humidity is such as to cause condensation on metal surface.

The CONTRACTOR must ensure the availability of a specialist from the paint manufacturer, at SITE during pendency of CONTRACT within his quoted rates to ensure the quality of painting & procedure. Addition of drying agents, pigments or other substances is not allowed unless specifically prescribed or approved by paint manufacturer's specialist.

Name plates/tags attached to the equipments/machineries shall not be painted or removed during painting job. Failing to comply with above, the CONTRACTOR may be required to replace name plates/tags at his cost.

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#### 4.1.3 Qualifications and Materials

All surface preparation, coatings application and inspection, shall be carried out by personnel experienced in that particular field. Contractors shall submit the names of subcontractors to be employed for the specific work together with the brand names of coating materials for approval prior to commencement of application.

#### 4.1.4 Handling and Transport

All pipe work, steelwork and equipment that have been finish coated shall be handled with care to preserve the coating in the best practical condition.

Painted materials shall not be handled until the coating has completely cured and dried hard. Supports in contact with coated steel during transport and storage shall be covered with a soft material to prevent damage to the coating. Appropriate materials shall be used during transportation between coated steelwork and holding down chains to prevent damage to the coating.

### 4.2 Application of Coatings

#### 4.2.1 General

The application method and type of equipment to be used shall be suitable for the paint specified and the surface being painted.

Paints and thinners shall be brought to the point of usage in unopened original containers bearing the manufacturer's brand name and colour designation and ready-mixed unless otherwise specified. Two-pack systems shall be mixed at the site of application to the paint manufacturer's recommendations. The mixed amount prepared shall be no more than the amount that can be applied during the stated pot life.

Paint shall be applied so that an even film of uniform thickness, tint and consistency covers the entire surface and is free of pin holes, runs, sags or excessive brush marks. Film finish shall be equal to that of first class brushwork.

Unless it is practical to do so colour shades for primer, intermediate coat and finish coat must be different to identify each coat without any ambiguity.



Paint ingredients shall be kept properly mixed during paint application.

Equipment shall be kept clean to ensure dirt, dried paint and other foreign materials are not deposited in the paint film. Any cleaning solvents left in the equipment shall be completely removed before painting.

To ensure the required film thickness is achieved on angles, welds, sharp external edges, nuts and bolts, a coat shall be applied to such items/locations immediately prior to the application of each coating to the whole area.

Care shall be taken to ensure paint application into all joints and crevices.

The contact surfaces between steelwork to be fastened by means of friction grip bolting shall be abrasive blast cleaned and prime coated only, prior to erection.

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#### 4.2.2 Atmospheric conditions

Surface preparation and coating shall not be carried out in inclement weather and shall be carried out such that the surface being coated is free of moisture, wind-borne or blast cleaning dust.

Coatings shall not be applied if:

- The relative humidity exceeds 85%.
- The ambient temperature is less than 5<sup>0</sup>C (depending on local condition)
- The metal temperature is less than 3<sup>0</sup>C above the dew point.
- There is likely hood of an unfavourable change in weather conditions within two hours after painting.

As a general rule, sufficient ventilation, dehumidification and heating capacity to cope with local climatic conditions must be secured before any coating – related work is started.

In any case, humidity, ambient and surface temperature conditions at the time of paint application, and curing and drying time before application of the next coat, shall be in accordance with the paint manufacturer's recommendations. These conditions shall be recorded in the Inspection Test Record (ITR) by the Contractor and be available for review.

#### 4.2.3 Conventional or Airless Spray

Spray equipment shall be equipped with accurate pressure regulators and gauges. Spray gun nozzles and needles shall be those recommended by the paint manufacturer.

Air from the spray gun shall be clean and dry with no traces of oil or moisture.

Coatings shall be wet on contacting the painted surface. Areas of dry spray shall be removed and the correct system re-applied.

#### 4.2.4 Brush Application

The method of "laying-off" shall be suited to the paint specified and shall ensure minimum brush marking.



#### 4.2.5 Roller Application

A uniform method of application shall be adopted when painting large areas. The rolling direction shall minimise paint joint build up. Edges and areas subject to possible roller damage shall be brush-painted prior to rolling.

#### 4.2.6 Thickness of Coatings

The maximum thickness DFT in any one application shall not exceed that specified in Technical specifications/ recommended by the paint manufacturer.

Wet film thickness gauges shall be used to make frequent checks on the applied wet film. The Contractor shall maintain at the site of painting operations, a dry film thickness tester of an approved type with a valid current calibration.

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Coating thickness checks in accordance with reference code shall be performed, and the Contractor shall undertake remedial action if the measured thickness is less than specified.

Build up of each material to required thickness shall be made prior to the application of the subsequent coat; final film build shall be the minimum specified.

#### 4.2.7 Multiple Coat Applications (Except Wet-On-Wet)

Before successive paint coats are applied, intermediate coats shall be inspected for surface contamination. The presence of any grease or oil, shall be removed by a suitable solvent, and any salt and dirt adhering to the surface shall be removed by scrubbing with a solution of non-toxic detergent (except those prescribed by the manufacturer as "wet-on-wet"). Removal of contaminants shall only be performed after an intermediate coat has had sufficient time to cure.

The surface shall then be pressure hosed or dusted down by brush to disturb and remove deposits not apparent on visual inspection.

Coatings shall be applied only under the following conditions:

- The surface has been cleaned and is dry;
- The manufacturer's stated minimum time for re-coat has elapsed;
- The manufacturer's stated maximum time for re-coat has not elapsed. If the maximum time has elapsed then pre-treatment shall be in accordance with the paint manufacturer's recommendations; and  
Damaged areas in preceding coat have been made good in accordance with this Specification.

When multiple coat of finish paint are indicated, they shall be applied in different shades to ensure that multiple coats have been applied.

#### 4.2.8 Protective Coatings for Fasteners

Black and galvanised erection bolts/nuts and galvanised holding down bolts/nuts shall be prepared and painted in accordance with Section 4.4 of this Specification.

Black high tensile bolts/nuts shall be painted after erection to the same paint system specification as the surrounding structural steel.

#### 4.3 Hot Dip Galvanising



All galvanising shall be carried out by the hot dipping process and conform to the requirements of IS-2629:1985 and uniformity of coating shall conform to IS 2633:1986.

All welding slag shall be removed by chipping, wire brushing, flame cleaning or abrasive blast cleaning where necessary prior to galvanising

For temporary identification, either water-soluble marking paints or detachable metal labels shall be used. For permanent identification, figures/labels shall be heavily punched or embossed by the fabricator.

For galvanised items after pickling, the work shall be inspected and any defects that render the work unsuitable for galvanising shall be repaired. After such repairs, the work shall again be cleaned by pickling.



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The coating mass of zinc shall be as specified on equipment data sheets and the Drawings. Galvanised coatings shall be tested by the methods described in referred code.

After galvanising all material shall be cooled to air temperature in such a manner that no embrittlement occurs.

Galvanised coatings shall be smooth, uniform, adherent and free from stains, surface imperfections and inclusions.

All gratings and fixtures including nuts, bolts and washers that are required to be galvanised, shall be hot dipped galvanised and all nut threads shall be re-tapped after galvanising and a lubricant applied on Cold working of galvanised steelwork shall be avoided.

#### 4.4 Damaged or Inaccessible Surfaces

##### 4.4.1 Damaged Paint Surface

Repair of damaged painted surfaces, as well as painting of galvanised and black bolts, and galvanised holding down bolts after erection shall comply with this Clause. The treatment shall be:

- Pre-clean the damaged or unpainted areas in accordance with Section 4.2.1 of this Specification;
  - Disc or hand sand to clean bright metal;
- Inorganic zinc primers subject to mechanical damage or weld etc shall be power tool cleaned
- Feather backs by sandpapering or whip blasting the original coatings surrounding the damaged area over a 50mm distance. A rough surface shall be obtained on epoxy coatings;
  - Clean surface to remove all dust;
- Conduct surface contaminant test in accordance with Section 4.2.2 of this document; and
 

Build up a new paint system over the affected area with paints equal to those originally used and having the same dry film thickness for each coat. As an exception, damaged inorganic zinc primers shall be repaired with epoxy organic zinc rich paint and shall be applied within four hours of blast cleaning.

The new coatings shall overlap the original coating over the 50mm prepared distance and shall be colour matched to the specified colour of the original coating.

##### 4.4.2 Damaged Galvanised Surfaces



Damaged areas caused by oxy-cutting, welding or physical impact shall be treated as follows:

- Prepare the surface by removing any weld slag followed by vigorous power wire brushing of the coating surrounding the damaged area over a 50mm distance;
  - Clean surface to remove all dust; and
- Apply two coats of organic zinc-rich primer to a minimum DFT of 100 microns.

The area to be reinstated shall be colour matched to the surrounding finish colour with 40 microns of aluminium paint to the manufacturer's **written instructions**.

##### 4.4.3 Inaccessible Surfaces

Surfaces that will be inaccessible after erection of other elements of the structure, shall be fully painted prior to the installation of the obstructing item.

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#### 4.5 Surfaces Not To Be Coated

The following surfaces shall not be blasted or coated unless specifically directed:

Machined surfaces, bearings, seals, grease fittings, adjusting screws and name plates, and identification tags.

- Valve stems;
  - Raised faces on pipe and equipment flanges;
  - Electrical cabling;
  - Instrumentation, gauges and sight glasses;
  - Titanium, stainless steel and non-metallic surfaces; and
- Field weld margins, 50mm either side of weld, on tankage and piping, prior welding.

The rear face of piping flanges shall be shop prime coated only. Flange holes for fasteners shall be fully coated.

#### 4.6 Wash-Up

All surface of equipments/prefabricated piping etc. Primerised / painted at Vendor shop and received at site if required shall be washed up as follow:

- a) Washing with clean water (Pressure 7 Kg/cm<sup>2</sup>) using suitable nozzles. During washing, broomcorn brushes shall be used to remove foreign matter.
- b) Solvent washing, if required, to remove traces of wash up as per above procedure of all surfaces of equipment, piping, structure etc. completely painted at contractor's shop shall be included in the quoted rates of oil, grease etc. Wash up as per above procedure of all surfaces of equipment, piping, structure etc. completely painted at contractor's shop shall be included in the quoted rates.

#### 4.7 Touch-Up Painting

Prior to the application of any coat, all damage to the previous coat(s) shall be touched-up. Damage to finished work shall be thoroughly cleaned and re-coated.

Surface preparation shall be done as per clause no. 3.0 given in NIT.



Items supplied with the manufacturer's standard coating system shall be touched-up with the same generic coating system or recoated.

#### 4.8 Paint Storage

The following must be ensured:

- a) All paints and painting material shall be stored only in such rooms assigned for the purpose. All necessary precaution shall be taken to prevent fire. The Storage building shall preferably be separate from adjacent buildings. A sign-board bearing the Words



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"PAINT STORAGE- NO NAKED LIGHT" shall be clearly displayed outside. The building shall be properly ventilated and shall be adequately protected with fire fighting equipment.

- b) Storage shall be far away from heated surface open flames, sparks & well protected from sun rays.
- c) Ambient temperature at which paints are stored shall be intimated to paint manufacturer & their advice sought regarding precautions to be taken if any, regarding flammability, explosiveness & toxicity.
- d) Maximum allowed storage time for various paint materials shall be clearly indicated on individual containers. Materials which have passed expiry date shall not be used.
- e) Paints in non-original containers and/or in containers without seals, shall not be used.



## 5.0 COATING SYSTEM SELECTION

### Coating Systems for Structures Piping and Equipment



The following Table 1 shall be used as a general guide for the selection of a paint system suitable for a particular plant area application. Paint systems specified on equipment data sheets and the Drawings shall take precedence over the general paint system area applications listed in Table 1.

**TABLE - 1**



Ref No.	Application	Surface Preparation	Generic Coating System	Minimum DFT	Remarks	
01	Structural Steel work with operating temp. Up to 90 <sup>o</sup> C (Steel structures, Piping support, uninsulated CS piping, flanges, valves, stairways, walkways etc. except grating).	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	P2 : ONE coat of two pack zinc rich epoxy Primer meeting SSPC Paint 20 level 1  F1 : One coat of two packs. Polyamide Cured Epoxy.  F5 : One coat of two pack aliphatic acrylic polyurethane	P2 : 60 microns  F1 : 120 – 200 microns  F5 : 60 microns	Total dry film thickness of paint system: 240 microns as per C4 – High durability	Total dry film thickness of paint system: 320 microns as per C5 – Very High durability
02	Uninsulated CS piping, flanges, valves with operating temp. From Above 90 <sup>o</sup> C to 200 <sup>o</sup> C.	Blast cleaning to near white metal grade Sa-2½, of Swedish Standards SIS-05-5900 (Latest)	P1 : One coat of Ethyl Silicate zinc rich with solvent Primer meeting SSPC Paint 20 level 1  F3 : Two coats of single pack special Oleo resinous based heat resistant ready mixed Aluminium Paint.	P1 : 75 microns  F3 : 2 x 25 microns for each coat Total - 125 microns.	Total dry film thickness of paint system: 125 microns.	
03	Uninsulated CS	Blast cleaning	P1 : One coat of Ethyl	P1 : 75	Total dry film	

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Ref No.	Application	Surface Preparation	Generic Coating System	Minimum DFT	Remarks	
	pipng, flanges, valves with operating temp. Over 200° C.	to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	Silicate zinc rich with solvent Primer meeting SSPC Paint 20 level 1  F4 : Two coats of Heat Resisting Silicon Aluminium Paint.	microns  F4 : 2 x 25 microns for each coat Total - 50 microns.	thickness of paint system: 125 microns.	
04	Insulated CS piping flanges, valves with operating temp up to 90° C	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	F8 : One coat of high temperature epoxy phenolic	F8 : 2 x 125 microns	Total dry film thickness of paint system: 250 microns.	
05	Insulated CS piping, flanges, valves with operating temp. From 90° C to 200° C.	Blast cleaning to near white metal grade Sa-2½, of Swedish Standards SIS-05-5900	F8 : Two coats of high temperature epoxy phenolic (novolac)	F8 : 2 x 125 microns	Total dry film thickness of paint system: 250 microns	
06	Insulated CS piping, flanges, valves with operating temp. Over 200° C.	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	F9 : Two coats of Inorganic Co-polymer based coating With an Inert Multipolymer Matrix.	F9 : 2 x 150 microns	Total dry film thickness of paint system: 300 microns.	
07	Uninsulated CS equipment with operating temp. Up to 90° C, to be treated at Manufacturer's shop.	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	P2 : ONE coat of two pack zinc rich epoxy Primer meeting SSPC Paint 20 level 1  F1 : One coat of two packs. Polyamide Cured Epoxy.  F5 : One coat of two pack aliphatic acrylic polyurethane	P2 : 60 microns  F1 : 120 – 200 microns  F5 : 60 microns	Total dry film thickness of paint system: 240 microns as per C4 – High Durability	Total dry film thickness of paint system: 320 microns as per C5 – High Durability
08	Uninsulated CS equipment with operating temp. From 91° C to 200°C, to be treated at	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900	P1 : One coat of Ethyl Silicate zinc rich with solvent Primer meeting SSPC Paint 20 level 1 F3 : Two coats of	P1 : 75 microns  F3 : 2 x 25 microns for each	Total dry film thickness of paint system: 125 microns.	

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Ref No.	Application	Surface Preparation	Generic Coating System	Minimum DFT	Remarks
	Manufacturer's shop.	(Latest).	single pack special Oleouresinous based heat resistant ready mixed Aluminium Paint.	coat	
09	Uninsulated CS equipment with operating temp. Over 200°C, to be treated at Manufacturer's shop.	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	P1 : One coat of Ethyl Silicate zinc rich with solvent Primer meeting SSPC Paint 20 level 1 F4 : Two coats of Heat Resisting Silicon Aluminium Paint.	P1 : 75 microns  F4 : 2 x 25 microns for each coat Total - 50 microns.	Total dry film thickness of paint system: 125 microns.
10	Insulated CS equipment with operating temp. Up to 90°C, to be treated at Manufacturer's shop.	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	F8 : Two coats of high temperature epoxy phenolic (novolac)	F8 : 2 x 125 microns	Total dry film thickness of paint system: 250 microns
11	Insulated CS equipment with operating temp. From 91°C to 200°C, to be treated at Manufacturer's shop.	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	F8 : Two coats of high temperature epoxy phenolic (novolac)	F8 : 2 x 125 microns	Total dry film thickness of paint system: 250 microns
12	Insulated CS equipment with operating temp. Over 200°C, to be treated at Manufacturer's shop.	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	F9 : Two coats of Inorganic Co-polymer based coating With an Inert Multipolymer Matrix.	F9 : 2 x 150 microns	Total dry film thickness of paint system: 300 microns.
13	Surface of structural steel for furnaces, external surface of furnaces, external surface of flue duct, metal stacks and	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	P1 : One coat of Ethyl Silicate zinc rich with solvent Primer meeting SSPC Paint 20 level 1  F3 : Two coats of single pack special	P1 : 75 microns  F3 : 2 x 25 microns for each coat	Total dry film thickness of paint system: 125 microns.

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Ref No.	Application	Surface Preparation	Generic Coating System	Minimum DFT	Remarks	
	similar with operating temp. Up to 200°C. (With exclusion of stair ways, walk ways etc.).		Oleo resinous based heat resistant ready mixed Aluminium Paint.			
14	For external surfaces of flue ducts, metal stacks, and similar with operating temp. Above 200°C.	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	P1 : One coat of Ethyl Silicate zinc rich with solvent Primer meeting SSPC Paint 20 level 1  F4 : Two coats of Heat Resisting Silicon Aluminium Paint.	P1 : 75 microns  F4 : 2 x 25 microns for each coat Total - 50 microns.	Total dry film thickness of paint system: 125 microns.	
15	For surfaces of air cooler heads not galvanized with operating temperature up to 90° C, treated at manufacturer's shop.	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	P2 : ONE coat of two pack zinc rich epoxy Primer meeting SSPC Paint 20 level 1  F1 : One coat of two packs. Polyamide Cured Epoxy.  F5 : One coat of two pack aliphatic acrylic polyurethane	P2 : 60 microns  F1 : 120 – 200 microns  F5 : 60 microns	Total dry film thickness of paint system: 240 microns as per C4 – High Durability	Total dry film thickness of paint system: 320 microns as per C5 – High Durability
		NOTE: All surfaces shall be galvanized at manufacturer's shop with exception of the end header of air cooled heat exchangers that shall be treated as described above at Manufacturer's shop. In case the same surfaces shall not be treated at shop, they shall be treated at site according to environmental and operating conditions.				
16	For surfaces of air cooler heads not galvanized with operating temperature up to 91° C TO 200°C, treated at manufacturer's shop.	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	P1 : One coat of Ethyl Silicate zinc rich with solvent Primer meeting SSPC Paint 20 level 1 F3 : Two coats of single pack special Oleouresinous based heat resistant ready mixed Aluminium Paint.	P1 : 75 microns  F3 : 2 x 25 microns for each coat	Total dry film thickness of paint system: 125 microns.	



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Ref No.	Application	Surface Preparation	Generic Coating System	Minimum DFT	Remarks
		NOTE: All surfaces shall be galvanized at manufacturer's shop with exception of the end header of air cooled heat exchangers that shall be treated as described above at Manufacturer's shop. In case the same surfaces shall not be treated at shop, they shall be treated at site according to environmental and operating conditions.			
18	STORAGE TANKS				
a)	Acid / Alkali CS Storage Tank (External Surface including all stair ways)	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	P2 : ONE coat of two pack zinc rich epoxy Primer meeting SSPC Paint 20 level 1  F1 : One coat of two packs. Polyamide Cured Epoxy.  F5 : One coat of two pack aliphatic acrylic polyurethane	P2 : 60 microns  F1 : 120 – 200 microns  F5 : 60 microns	Total dry film thickness of paint system: 240 microns as per C4 – High Durability  Total dry film thickness of paint system: 320 microns as per C5 – High Durability
b)	CS Storage Tanks, Excluding indicated in Sl. No. (a)	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	P1 : One coat of Ethyl Silicate zinc rich with solvent Primer meeting SSPC Paint 20 level 1  F1 : One coat of two pack Polyamide Cured Epoxy.  F5 : Two-pack aliphatic Isocyanate cured acrylic finish paint	P1 : 60 microns  F1 : 120 - 200 microns  F5 : 60 microns	Total dry film thickness of paint system: 240 microns as per C4 – High Durability  Total dry film thickness of paint system: 320 microns as per C5 – High Durability
19	Cold Insulated Carbon Steel and low alloy Steel (1-¼ Cr through 9 Cr) Piping and Equipment. (Upto 60 Deg. C)	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	F7 : Two coats of Tar Free Epoxy paint suitably pigmented	F7 : 2 x 125 microns	Total dry film thickness of paint system: 250 microns.
20	Cold Insulated high alloy Steel piping and Equipment (Upto 200 Deg. C)	Lightly Blast cleaned as per Sa 1.0 Swedish Standards SIS-05-5900 (Latest).	F8 : Two coats of high temperature epoxy phenolic (novolac)	F8 : 2 x 125 microns	Total dry film thickness of paint system: 250 microns



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Ref No.	Application	Surface Preparation	Generic Coating System	Minimum DFT	Remarks	
21	DELETED					
22	Surface (CS) with Equipment with temp. Indicating paint from 220°C to 240°C treated at Manufacturer's shop	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	P1 : One coat of Ethyl Silicate zinc rich with solvent Primer meeting SSPC Paint 20 level 1 F6 : Temperature indicating paint	P1 : 75 microns  F6 : 2 x 25 microns for each coat Total - 50 microns.	Total dry film thickness of paint system: 125 microns.	
23	PACKAGE:					
a)	Surface(CS) with operating temperature upto 90°C treated at Manufacturer's shop	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	P2 : ONE coat of two pack zinc rich epoxy Primer meeting SSPC Paint 20 level 1  F1 : One coat of two packs. Polyamide Cured Epoxy.  F5 : One coat of two pack aliphatic acrylic polyurethane	P2 : 60 microns  F1 : 120 – 200 microns  F5 : 60 microns	Total dry film thickness of paint system: 240 microns as per C4 – High Durability	Total dry film thickness of paint system: 320 microns as per C5 – High Durability
b)	Surfaces (CS) with operating temperature upto 91° C TO 200°C, treated at manufacturer's shop.	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	P1 : One coat of Ethyl Silicate zinc rich with solvent Primer meeting SSPC Paint 20 level 1 F3 : Two coats of single pack special Oleouresinous based heat resistant ready mixed Aluminium Paint.	P1 : 75 microns  F3 : 2 x 25 microns for each coat	Total dry film thickness of paint system: 125 microns.	
c)	Surface (CS) with operating temp. Over 200°C, treated at manufacturer's shop.	Blast cleaning to near white metal grade 2 ½, of Swedish Standards SIS-05-5900 (Latest).	P1 : One coat of Ethyl Silicate zinc rich with solvent Primer meeting SSPC Paint 20 level 1 F4 : Two coats of Heat Resisting Silicon Aluminium Paint.	P1 : 75 microns  F4 : 2 x 25 microns for each coat Total - 50 microns.	Total dry film thickness of paint system: 125 microns.	
d)	Package in Carbon Steel	Blast cleaning to near white	F7 : Two coats of Tar Free Epoxy paint	F7 : 2 x 125	Total dry film thickness of paint	



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Ref No.	Application	Surface Preparation	Generic Coating System	Minimum DFT	Remarks
	and low Alloy Steel (1-1/4 Cr through 9 Cr) with cold insulated surface treated at manufacturer's shop (Upto 60 Deg. C)	metal grade 2 1/2, of Swedish Standards SIS-05-5900 (Latest).	suitably pigmented	microns	system: 250 microns.
e)	Package in Cold Insulated high alloy Steel. (Upto 200 Deg. C)	Lightly Blast cleaned as per Sa 1.0 Swedish Standards SIS-05-5900 (Latest).	F8 : Two coats of high temperature epoxy phenolic (novolac)	F8 : 2 x 125 microns	Total dry film thickness of paint system: 250 microns
f)	DELETED				
24	For internal surface of shell, roof of CS tanks, with operating temp. Upto 110°C	Blast cleaning to near white metal grade 2 1/2, of Swedish Standards SIS-05-5900 (Latest).	F2 : Two coats of two pack amine adduct cured Phenolic (Novolac) epoxy (immersion grade)	F2 : 2 x 150 microns for each coat	Total dry film thickness of paint system: 300 microns.
25	For underside (soil side) of the tank bottom (CS) below only of the fixed tanks, bottom & shell shall be treated as follows:	Blast cleaning to near white metal grade 2 1/2, of Swedish Standards SIS-05-5900 (Latest).	F7 : Two coats of Tar Free Epoxy paint suitably pigmented  OR  F8 : Two coats of high temperature epoxy phenolic (novolac)	F7 : 2 x 200 microns  OR  F8 : 2 x 150 microns	Total dry film thickness of paint system: 400 microns.  OR  Total dry film thickness of paint system: 300 microns.
26	CS Equipment and associated piping subject to cyclic, intermittent or regeneration operating condition (e.g. Molecular Sieve Driers) subjected to very severe corrosion with wide operating	Blast cleaning to near white metal grade 3, of Swedish Standards SIS-05-5900 (Latest).	Primer: One coat of Thermal spray Aluminium paint and sealed with a Silicon Aluminium seal Finish Coat: One coat of Thermal spray Aluminium paint and sealed with a Silicon Aluminium seal.	Primer: 125 microns  Finish: 125 microns	Total dry film thickness of paint system 250 microns.

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Ref No.	Application	Surface Preparation	Generic Coating System	Minimum DFT	Remarks
	temperature range.				

## **NOTES:**

### **Primers**

#### **ZINC ETHYL SILICATE PRIMER – P1**

The zinc ethyl silicate consists of two packs. One pack contains the ethyl silicate binder with suitable solvents. The other pack contains zinc dust (NOT Paste). Zinc dust shall be ASTM D 520 Type II. They have to be mixed in suitable proportions before application as recommended by manufacturer.

<b>Volume solids</b>	:	Min.64% ±2
<b>DFT Range</b>	:	50 – 75 microns
<b>Theoretical Spreading Rate</b>	:	12.8 – 8.53 sqm/litre
<b>Colour</b>	:	Grey
<b>Application</b>	:	Spray (airless/air)
<b>Drying time ( dry to handle )</b>	:	< 45 mins. @ 30 Deg. C and 65% RH
<b>Curing</b>	:	<16 hrs @ 30 Deg. C and 65% RH
<b>% of total metallic zinc in dry film (As per the ASTM D520 – Spherical size)</b>	:	<b>(SSPC SP 20 Level 1) &gt;85% by wt.</b>
<b>Specific Gravity</b>	:	<b>2.5 Kg/Litre min.</b>
<b>Storage life</b>	:	6 months under sealed conditions



Zinc silicate Material curing shall be checked using ASTM D 4752, minimum Acceptable value is 4.

#### **ZINC RICH EPOXY PRIMER – P2**

The zinc rich epoxy consists of two packs. One pack contains the epoxy binder with suitable solvents. The other pack contains zinc dust as per ASTM D520 Type II. They have to be mixed in suitable proportions before application as recommended by manufacturer.

<b>Volume solids</b>	:	65% min. ±2
<b>DFT</b>	:	50 – 100 microns
<b>Theoretical Spreading Rate</b>	:	13 – 6.5 sqm/litre
<b>Colour</b>	:	Grey
<b>Application</b>	:	Airless spray/air spray/brush
<b>Drying time ( dry to handle )</b>	:	<10 min. @ 30 Deg C
<b>Hared Dry</b>	:	< 1.5 hrs @ 30 Deg C
<b>% of total metallic zinc in dry film (As per the ASTM D520 – Spherical size)</b>	:	<b>(SSPC SP 20 Level 2) 81% by wt. min.</b>
<b>Specific Gravity</b>	:	<b>2.3 Kg/Litre min.</b>
<b>Storage life</b>	:	12 months under sealed conditions



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### Finish Paints

#### HIGH BUILD EPOXY FINISH – F1

This finish paint is fast drying, high build, Two-pack polyamide cured epoxy resin

<b>Volume solids</b>	:	85% min. ±2
<b>DFT Range</b>	:	100 – 200 microns
<b>Theoretical Spreading Rate</b>	:	7.6 – 3.8 sqm/litre
<b>Colour</b>	:	As per Manufacturer List
<b>Binder</b>	:	Polyamide cured epoxy resin, Lead & Chrome Free
<b>Application</b>	:	Brush or spray
<b>Drying time</b>	:	< 2 hrs @ 30 Deg C
<b>Over coating time</b>	:	< 2 hrs @ 30 Deg C
<b>Storage life</b>	:	24 months under sealed conditions

#### HIGH BUILD EPOXY FINISH (Immersion Grade) – F2



This finish paint is high build, Two-pack phenolic (novolac) epoxy

<b>Volume solids</b>	:	68% min. ±2
<b>DFT Range</b>	:	100 – 150 microns
<b>Theoretical Spreading Rate</b>	:	6.8 – 4.5 sqm/litre
<b>Colour</b>	:	As per Manufacturer List
<b>Binder</b>	:	Amine adduct cured epoxy resin
<b>Application</b>	:	Brush or spray
<b>Drying time</b>	:	< 1.5 hrs @ 30 Deg C
<b>Over coating time</b>	:	< 6.5 hrs @ 30 Deg C
<b>Storage life</b>	:	24 months under sealed conditions

#### HEAT RESISTANT ALUMINIUM FINISH PAINT : F3

It is a single pack system based on oleo resinous general purpose aluminium paint with good heat resistance upto 250 Deg. C. and light reflection.

<b>Volume solids</b>	:	25% min. ±2
<b>DFT Range</b>	:	25 microns
<b>Theoretical Spreading Rate</b>	:	10 sqm/litre
<b>Main pigment</b>	:	Aluminium (ASTM 962), Lead & Chrome Free
<b>Colour</b>	:	Metallic Aluminium
<b>Pigment Volume Concentration</b>	:	15 – 20%
<b>Application</b>	:	Brush or spray

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Drying time	:	Surface dry <1hr. @ 30 Deg. C
		Hard dry < 3 hrs. @ 30 Deg. C
Storage life	:	24 months under sealed conditions

#### **HEAT RESISTANT SILICON ALUMINIUM FINISH PAINT : F4**



It is a single pack system based on ambient curing silicone aluminium pigmented polysiloxane paint with maximum heat resistance of upto 600 Deg. C.

Volume solids	:	25% min. ±2
DFT Range	:	25 microns
Theoretical Spreading Rate	:	10 sqm/litre
Main pigment	:	Aluminium (ASTM 962), Lead & Chrome Free
Colour	:	Metallic Aluminium
Pigment Volume Concentration	:	15 – 20%
Application	:	Brush or spray
Drying time	:	Surface dry < 1hr. at 30 Deg. C
		Hard dry < 3 hrs. at 30 Deg. C
Storage life	:	12 months under sealed conditions

#### **TWO PACK ALIPHATIC ACRYLIC POLYURETHANE FINISH PAINT – F5**

It Consists of Acrylic Resin in Part A. Part B consists of an aliphatic poly-isocyanate with appropriate solvents and additives.

Volume solids	:	51% min. ±2
DFT range	:	50 – 100 microns
Theoretical Spreading Rate	:	10.2 – 5.1 sqm/litre
Main pigment	:	Suitable pigments to get the desired colour, <b>Lead &amp; Chrome Free</b>
Colour	:	Metallic Aluminium
Binder	:	Shall not contain any binder other than

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	:	acrylic resin; should not contain any <b>alkyd / acrylate alkyds / esters.</b>
<b>Application</b>	:	Brush or spray
<b>Drying time</b>	:	Surface dry < 1hr. @ 30 Deg. C
	:	Hard dry < 8 hrs. @ 30 Deg. C
<b>ISO 11507/ASTM G 154, QUV A - Accelerated weathering</b>	:	<b>Gloss retention: approx. 80 % and colour change approx. DE 1.2 after 3000 hours exposure</b>
<b>Storage life</b>	:	24 months under sealed conditions

#### **TEMPERATURE INDICATING PAINT : F6**



It is a single pack temperature indicating system based on silicone binder. Pigments change colour by heating. The colour change of the coating is permanent. At approximately 200°C, the colour changes from green to blue, above 310°C, the colour changes from blue to greyish white. Maximum service temperature is 400°C.

<b>Volume solids</b>	:	40% min.
<b>DFT</b>	:	25 microns
<b>Theoretical Spreading Rate</b>	:	16 sqm/litre
<b>Main pigment</b>	:	As per shade requirement, Lead & Chrome free
<b>Colour</b>	:	As per manufacturer
<b>Binder</b>	:	Based in silicone Resins
<b>Application</b>	:	Brush or spray
<b>Drying time</b>	:	Surface dry < 1hr. @ 30 Deg. C
	:	Hard dry < 4 hrs. @ 30 Deg. C
<b>Storage life</b>	:	12 months under sealed conditions

#### **TAR FREE EPOXY – F7 (Coal Tar is Banned Globally being Carcenogenic)**

A high build two component abrasion resistant, pure epoxy with anti-corrosive properties meant for excellent performance.

<b>Volume solids</b>	:	Minimum 72%
<b>DFT Range</b>	:	150 – 200
<b>Theoretical Spreading Rate</b>	:	4.8 – 3.6 sqm/litre
<b>Application</b>	:	By brush or airless spray

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<b>Drying time</b>	:	Touch Dry within 4 hrs. @ 30 Deg C
		Hard dry < 9 hours @ 30 Deg. C
<b>Storage life</b>	:	12 months under sealed conditions

### **EPOXY PHENOLIC (NOVOLAC) – F8**

Two Pack epoxy-phenolic (novolac) cured with amine adduct used as an External coating for the protection of insulated (CUI) equipment.

<b>Volume solids</b>	:	68% min.
<b>DFT Range</b>	:	100 – 150 microns
<b>Theoretical Spreading Rate</b>	:	6.8 – 4.5 sqm/litre
<b>Binder</b>	:	Epoxy phenolic (novolac)
<b>Dry Temp. Service</b>	:	Min. -196 to max. 205 Deg. C.
<b>Application</b>	:	Airless Spray / Brush Touch up
<b>Drying Time</b>	:	Surface dry < 1.5hr. @ 30 Deg. C
		Hard dry < 6 hours @ 30 Deg. C
<b>Storage life</b>	:	12 months under sealed conditions

### **INORGANIC CO-POLYMER COATING – F9**

MIO pigmented single component inorganic copolymer coating which cures to form an in polymer matrix able to resist temperatures up to 650°C/1202°F and thermal shock/cycling dry or dry/wet service.

<b>Volume solids</b>	:	74% min.
<b>DFT Range</b>	:	150 microns
<b>Theoretical Spreading Rate</b>	:	5 sqm/litre
<b>Binder</b>	:	Inorganic copolymer coating
<b>Dry Temp. Service</b>	:	Min. -196 to max. 650 Deg. C.
<b>Application</b>	:	Airless Spray / Brush Touch up
<b>Drying Time</b>	:	Surface dry < 0.5hr. @ 30 Deg. C
		Hard dry < 1.5 hours @ 30 Deg. C
<b>Storage life</b>	:	12 months under sealed conditions



## **6.0 MACHINERY, ELECTRICAL AND INSTRUMENT EQUIPMENT:**

### **6.1 Machinery**

Steel surfaces shall be treated with complete paint system at Manufacturer's shop. The paint system shall be according to Manufacturer's Std. However, suitable for operating condition and the environmental condition where the machinery will operate. Where necessary machinery shall be restored at site by Contractor with suitable finish.

### **6.2 Electrical and Instrument Equipment**

Steel surfaces shall be treated with complete paint system at Manufacturer's shop. The paint system shall be according to Manufacturer's Std., however suitable for operating condition and the environmental condition where the electrical and instrument equipment will operate. Where



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necessary Electrical and Instrument Equipment shall be restored at site by Contractor with suitable finish.

## 7.0 COLOURS:

These shall be as required by specification and in particular for:

Description	Colour	Ra1	Correspond. Asian Paint colors to be defined – See Note-2
- Piping with temperature less than 90°C	GREY	7035	
- Piping, hot surface, flue gas ducts and stacks with temperature above 90°C	SMOOTH	ALUMINIUM	“
- Cooling Water Piping	SEA GREEN		“
- Fire fighting Piping	Red	3002	“
- Structures upto 2 MT	BLACK	9005	“
- Structures above 2 MT	GREY	7010	“
- Stair cases – ladders	BLACK	9005	“
- Walkways	GREY	7010	“
- Handrails assemblies	YELLOW	1004	“
- Equipment	GREY	7035	“
- Hot equipment	SMOOTH	ALUMINIUM	“
- Fire fighting equipment	RED	3002	“
- Valves in general	GREY	7035	“
- Hot valves	SMOOTH	ALUMINIUM	“
- Safety and Fire fighting valves	RED	3002	“
- Valves handwheels	BLACK	9005	
- Electric Rotary Machines	SKY BLUE	5012	
- Electric Static Machines	GREY	7035	
- Machinery (compressors & pumps) with operating temperature less than 90°C	GREY	7035	“
- Machinery (compressors & pumps) with operating temperature above 90°C	SMOOTH	ALUMINIUM	“
<b>FURNACES</b>			
- Casing and connected steel works	SMOOTH	ALUMINIUM	“
- Steel work not connected to casing	SMOOTH	ALUMINIUM	“
<b>AIR COOLER</b>			
- High Temperature Surfaces (Temp. > 90°C)	SMOOTH	ALUMINIUM	

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Description	Colour	Ra1	Correspond. Asian Paint colors to be defined – See Note-2
- Low Temperature surface (Temp. $\leq$ 90°C)	GREY	7035	“
- Flare $\leq$ 90°C	GREY	7035	“
- Flare $\geq$ 90°C)	SMOOTH	ALUMINIUM	“
<b>TANKS</b>			
- Shell of fixed roof	WHITE	9010	“
- Roof of fixed roof tank	WHITE	9010	

NOTE-1: The colours shall be according to IS2379:1990/International STD. RAL or BS, proposed by Contractor or Manufacturer

## 8.0 PARTICULAR DESCRIPTION

The abrasive Grit Blasting shall be used for surface preparation. **Sand blasting is prohibited due to environmental regulations.**

Primerized surface shall be faultless and shall not have mud-cracking, dripping over thickness and dry sprays.

Blast cleaning and painting shall not be carried out on wet surfaces.

Blast cleaning shall not be done when surfaces temperatures are less than 3°C above dew point, or temperature is below 5°C.

No acid washes or other cleaning solutions or solvents shall be used on metal surfaces after they have been blasted.

The surface preparation of all steel surfaces to be coated shall be free of all mill scale, rust corrosion product, oxides, paint, oil or other foreign matter



Only dry abrasive blasting procedures will be allowed. The compressed air supply used for blasting shall be free of detrimental amounts of water and oil. Adequate separator and traps shall be provided and these shall be kept emptied of water and oil. Any blast cleaning set up without functioning moisture separators shall be removed from blast cleaning areas.

All welded areas and appurtenances shall be given special attention for removal of welding flux in crevices. Welding splatter, slivers, laminations and underlying mill scale exposed during sand blasting shall be removed or repaired.

The blast-cleaned or power brushing surfaces shall be coated with primer within four hours of surface preparation.

No primer or intermediate or finishing coating shall be applied without prior notification to the Company.

The application of the products shall be carried out in strict compliance with the paint manufacturer's recommendation.

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The Contractor shall provide suitable protection for all adjacent plants or equipment from airborne during spraying and sand blasting.

## 9.0 INSPECTION AND TESTING

The inspection and testing requirements outlined in this section shall be performed for shop and site applied coating systems.

Preference shall be given to manufacturers and applicators that are quality certified to ISO 9001: 2000.

Documentation of coating material manufacturers and applicators shall include daily inspection reports, equipment reports, and shall clearly identify and trace materials supply and testing performed on coated items and areas.

Inspection and Test Plans (ITPs), and quality control procedures used for application of coating systems shall form part of the Method Statement and shall be submitted for approval by the Principal prior to commencement of work.

The applicator shall appoint a certified inspector of coatings for inspection and testing of coating systems.

Tests of coated areas and items shall form part of the ITPs.

- Surface Preparation in accordance to Swedish Standard SIS-05-5900 (Latest).
- Blast cleaning profile shall be checked using a suitable profile meter – Acceptable profile shall be 40 - 60 microns.
- Check of time of top coating and drying in accordance with the direction of the paint manufacturer.
- Check of dry film thickness by suitable non-destructive Instrument such as “MIKROTEST”, “DIAMETER” or equivalent.
- Before any coating work is performed on the site, the contractor shall ensure that any works applied by others is acceptable.



Any defect that are discovered, are to be notified in writing to the owner before proceeding with the contract work. To ensure the good execution of painting work following test shall be performed:

- Surface Preparation
- Surface contaminant tests
- Surface profile tests
- Coating thickness tests
- Tests for cure of coatings
- Adhesion tests
- Continuity testing
- Iron contamination
- Chloride contamination
- Dust Contamination

All Inspection and Test Records (ITRs) shall be submitted with the Manufacturer's Data Report (MDR) at the conclusion of the job.

Defective coated areas shall be suitably marked for rectification work to be performed in compliance with this specification.



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Access shall be granted for inspection of all paint work, and witnessing of test work. This shall not however relieve the Contractor of their own QA/QC responsibilities.

## 10.0 ADHESION TEST RESULTS

For all type of primer the Contractor shall guarantee the Classification of Adhesion Test Results as per ASTM D3359. The acceptable Rate Adhesion Test Results shall be for sandblasted and primerized surfaces shall be minimum 3A (or Higher)

For primer plus finishing coat(s) the Contractor shall guarantee the Classification of Adhesion Test Results as per ASTM D 3359. The acceptable Rate Adhesion Test Results shall be for blast cleaned and painted surfaces shall be minimum 3A ( or higher).

After test, the surface must be repaired according to the system applied.

## 11.0 SUBMISSION OF DATA

Contractor shall submit in phase of bid the original technical data sheet and system for all material supplied by him to apply for the permanent works and test report for the paint in compliance to IS101. This material shall be subject to Owner's approval.

The test certificates of zinc silicate shall provide the specific gravity of mixed paint.

## 12.0 LETTER AND NUMBER INSCRIPTION

Inscriptions letters, as herebelow indicated, shall be made on equipments, piping, storage tanks, machinery etc.

### 12.1 Geometric forms and dimensions

Letters and numbers dimensions shall be orientatively fixed according to following:

(A – Dimension of side of unitary elements of grid)

- Storage Tanks A – 60 mm
- Equipments and piping with O.D. above 600 mm A– 40 mm and
- Equipments and pipings with O.D. from 300 to 600 mm and for machinery of great dimensions A – 20 mm
- Equipments and pipings with O.D. less than 300 mm and for machinery with small dimensions A – 10 mm

### 12.2 Inscription's Colours

Inscriptions shall be Black ENI 901 (RAL 9005) on light base

Inscriptions shall be White ENI 101 (RAL 9010) on dark base

### 12.3 Spaces and Interspaces



Spaces between words and assemblage of numbers shall have dimensions equal to 2A

Interspaces between letters or numbers shall have dimensions equal to A.

## 13.0 Colour Band for piping ;-

As a rule minimum width of colour band shall confirm to the following Table:-



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Nominal pipe Size	Width L (mm)
3" & below	25
4" NB-6" NB	50
8" NB-12"NB	75
14" OD & above	100

**14.0 LIST OF MANUFACTURERS:** Paint supplier shall be as per given below list.

1. M/s Berger Paints
2. M/s Jensions & Nickolson
3. M/s Jotun Paints
4. M/s Asian Paints
5. M/s Grauer & Weil (India) Limited
6. M/s Shalimar paints
7. M/s Garware Paints
8. M/s Goodlass Nerolac Paints Ltd
9. M/s. HEMPEL Paints
10. M/s International Paints (Akzo Nobel Brand)
11. M/s Carboline (India) Pvt. Ltd.
12. M/s Mohan Paints

**15.0** The contractor shall obtain prior approval from Engineer-In-Charge for the brands of paint material proposed to be used. The contractor shall submit the following details of paint material either at the time of bidding or soon after award of work for approval of paints.

- a. Technical data sheet
- b. Material safety data sheet
- c. Finger printing of paint products as per ISO 20340

**16.0** Owner reserves the right to take random samples and get it tested through reputed labs. In case the supplied paint material do not meet the specified performance requirements then suitable action shall be taken against the paint supplier. The decision of Engineer-In Charge shall be final and binding on the Contractor in such cases

**17.0 WARRANTY:**

Contractor along with Paint Manufacturer jointly shall develop the paint schemes following the system specification.



They shall jointly provide a performance guarantee for a period 5 years as stipulated below,

After 1 years – Corrosion in 3% of total painted area accepted

After 2 years – Corrosion in 6% of total painted area accepted



After 3 years – Corrosion in 9% of total painted area accepted

After 4 years – Corrosion in 12% of total painted area accepted

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After 5 years – Corrosion in 15% of total painted area accepted

where spontaneous visible corrosion has broken down the paint film to a degree exceeding “Ri 3” (as defined in ISO 4628/3-2003).

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### **ANNEXURE- 7 - 3**

#### **QUALITY CONTROL PROCEDURE AND INSPECTION REQUIREMENTS**

##### **1.0 LSTK CONTRACTOR'S QUALITY CONTROL**



##### **1.1 LSTK CONTRACTOR shall provide a quality control program manual include specific WORK methods and inspections, which assure quality.**

This quality control program manual must be submitted to OWNER for Approval before starting the construction activities.



All installation WORK must be in strict accordance with this approved manual.

##### **1.2 The quality control program shall include as a minimum the following:**

- Methods use to control drawings; specifications and CONTRACT correspondence to assure that only the latest revisions are being used in the field.
- Inspection personal name, organization.
- Inspection methods and documentation of inspection (or tests) for shop fabrication, if required, and installation.
- Material control procedures from SITE receiving point, through "over, short and damage inspection" through storage and through installation.
- Positive material identification Procedures for:
  - Electrical cable pulling and testing.
  - Asphalt placement inspection.
  - Handling and storage methods to prevent damage.
- Inspection and testing procedures and reports for civil, structural, piping, electrical, instrument, equipment and all installation WORK.
- Repair.
- Scrap and reject.
- Grouting.
- Welding.
- Welder qualification.
- Receiving all permanent plant material & equipment.
- Rigging.
- Welder's tests.
- Nondestructive examinations to be used.
- Positive material identification. etc.
- Identification of LSTK CONTRACTORS and ensuring their compliance with the manual and WORK required.
- Material certification verification methods.
- Calibration procedures for measurements and test equipment.
- Marking and identification of components in process and complete assemblies.



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- 2.0 Shop fabrication and field installation inspection OWNER'S REPRESENTATIVE to ensure specifications. in the following areas will be performed by full adherence to Receiving and inspection.
- Calibration of test inspection equipment.
  - Preventive maintenance and storage protection.
  - Internal cleanliness.
  - Proper material use and control.
  - Nondestructive testing and its results.
  - Workmanship.
- 3.0 OWNER'S REPRESENTATIVE or others as authorized by OWNER are to be permitted access to LSTK CONTRACTOR'S work areas for the purpose of inspection of material, equipment, documentation and other areas as required in LSTK CONTRACTOR'S quality assurance / quality control program.
- 4.0 No concrete will be placed by LSTK CONTRACTOR without an OWNER "Pour Release Form'.
- 5.0 OWNER'S construction inspections will not relieve. LSTK CONTRACTOR of inspection or other responsibilities.
- 6.0 For piping all welders test pieces shall be supplied by LSTK CONTRACTOR and fully prepared for welding by LSTK CONTRACTOR.
- 7.0 LSTK CONTRACTOR shall evidence its familiarity and experience with the execution of the installation of WORK to the requirements of the applicable codes and shall perform its WORK in accordance to these requirements and to instructions issued by OWNER'S REPRESENTATIVE in this regard.
- 8.0 **CHECK ON QUALITY OF WORK**
- 8.1 OWNER'S REPRESENTATIVE'S inspector shall have free access to the place where the WORK is performed at all times, in order to check the quality of WORK
- 8.2 If during inspection / check reveals unsatisfactory WORK, LSTK CONTRACTOR shall immediately at LSTK CONTRACTOR'S expense. take such corrective measures as deemed required.
- 9.0 **CONTROL SYSTEMS**
- LSTK CONTRACTOR shall initiate and maintain the following control systems
- 9.1 **Backfilling**
- Compaction tests.
- 9.2 **Concrete**
- Design mix and approval record(s).
  - Batch plant inspection record.
  - Slump test record.
  - Compressive test record.
  - Pour release record.
  - Grouting release record.
  - Placement inspection records.
  - Concrete curing records.
- 9.3 **Asphalt**
- Design mix and approval records.
  - Batch plan inspection records. Placement inspection records.

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- 9.4 **Piping**
- Weld x-ray file.
  - Pipe and fitting certificate file.
  - Isometric weld control sheet. Hydrostatic test records.
- 9.5 **Grounding**  
Earth resistance test records.
- 9.6 **Electrical Cable and Instrument cable**
- Insulation resistance test records.
  - Continuity test records.
- 9.7 **Material certification files**
- 9.8 **Equipment**
- Weld x-ray file.
  - Material certificate files.
  - Equipment installation records.
  - Equipment maintenance record.
  - Hydrostatic test records.
  - Grouting release records.
  - Alignment records.
  - Vibration records.
10. **Requirements for Certification of Materials**
- 10.1 Mill certification of materials will be required based on the material type, the use and the codes and requirements.
- 10.2 LSTK CONTRACTOR shall provide:
- Type A certification of compliance, for all but not limited to the following materials which LSTK CONTRACTOR is responsible to supply:
- Imported backfill materials.
  - Ready mix concrete.
  - Asphalt paving materials
  - Prefab concrete items, including pre-cast manholes, catch basins, pits, sumps and sleepers.
  - Paving stones and tiles.
  - Inserted and embedded items, other than rebar, wire mesh and anchor bolts.
  - Masonry blocks.
  - Steel sliding plates.
  - Special grouting materials, i.e. non-shrink type.
  - Grouting materials, including grounding loop and branch wire which they are LSTK CONTRACTOR'S supply.
- Type "B "certificate, for all but not limited to the following materials, which LSTK CONTRACTOR is responsible to supply:
- Materials to be considered structural or structural grade.
  - Reinforcing grade.
  - Wires mesh reinforcement fabric.
  - Anchor bolts.
- 10.3 **Definition of Type of Certificates**  
**Type A (certificate of Compliance):**

This is a certificate of compliance, issued by the manufacturing or processing works and

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signed by the quality department or persons to carry the responsibility for quality and conformity, stating that the materials supplied correspond (5) with what was agreed in the purchase order.



Type B (mill Certificate) :

This is a certificate on which the manufacturer's head of quality department confirms that the product supplied corresponds with what has been agreed in the purchase order. Certification shall be on the basis of tests carried out on the material of the product itself, as per purchase order specification. The testing and certification are to be carried out by a testing center which is independent of the production section of the manufacturing works and which has the code-approved facilities. Independence of such testing center should be warranted by LSTK CONTRACTOR.

- 10.4 LSTK CONTRACTOR will maintain a systematic filing system of all certificates and reports for all tests and inspections carried out by it under the applicable specifications, standards and codes of practice quoted therein.

LSTK CONTRACTOR may use its own format for records but this must be submitted to OWNER'S REPRESENTATIVE for his approval prior to use.

LSTK CONTRACTOR can expect to be audited on a continuous basis. Originals of all documents to be sent to OWNER'S REPRESENTATIVE.

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## **ANNEXURE- 7 – 4**

### **SCHEDULE, PROGRESS EVALUATION AND PROGRESS REPORTING**

#### **1.0 GENERAL**

- 1.1 WORK shall start and be completed in the field as indicated on the approved project construction schedule.

LSTK CONTRACTOR shall follow the sequence of construction in executing the WORK as shown in the schedule or as modified by OWNER.

The detailed scheduling of WORK will be supplied by the LSTK CONTRACTOR. WORK shall be conducted in such a manner that other construction activities are not affected.

Once detailed schedule, established and approved by OWNER, LSTK CONTRACTOR commits itself to follow the schedule in detail.

#### **2.0 DETAILED & SCHEDULE**

- 2.1 Detailed construction schedule must cover all construction work, from lowest level up to highest level.
- 2.2 Activities shown by means of a bar chart must include as a minimum the activities listed in 4.

#### **3.0 PROGRESS REPORTING**

LSTK CONTRACTOR shall issue a reporting procedure and a representative sample of all progress reports.

Following schedules and reports must be issued by LSTK CONTRACTOR to OWNER:

Construction schedule. ( preliminary and detailed)  
Monthly status report.  
Weekly progress report.  
Monthly construction guide schedule.  
Daily manpower reports.



All except detailed construction schedule based on approved project construction schedule.

#### **4.0 CONSTRUCTION SCHEDULE**

Within **Two** months after Effective Date, LSTK CONTRACTOR will issue separate graphical "S" curves for the following work activities of total CONTRACT.

Installation of :



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- Concrete foundations, pits. manholes. catch basins, trenches and concrete structures.
- Prefabricated concrete items
- Concrete paving and elevated slabs
- Other paving and final surfacing
- Grouting.
- Final road paving.
- Underground piping.
- Underground cable trenches and cables.
- Building erection.
- Structural steel erection.
- Engineering and design of small bore carbon steel piping systems.
- Prefabrication of piping.
- Electrical installation.
- Instrument installation.
- Equipment assembly and elect
- Erection of piping.
- Flushing and cleaning
- Hydro-testing
- Painting
- Insulation.

## 5.0 INTRODUCTION

The introduction to the monthly status report shall include LSTK CONTRACTOR'S comments on the overall construction schedule with a status update line as attachment, and shall consist of the following items:

- Goals achieved last month.
- Goals for next month.
- Reason for delay, if any. Reason for deviation of original schedule.
- Average manpower by craft, including management and indirect staff.
- LSTK CONTRACTOR'S comments to general situation.



## 6.0 CONSTRUCTION ACTIVITIES STATUS

This section consists of scheduled versus actual progress curves.

The progress curves are to be commented upon by LSTK CONTRACTOR.

The basis for reporting shall be the construction schedule:

The monthly status shall be reported as a percentage of the total WORK per type of WORK.

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## 7.0 **MANPOWER AVAILABILITY / REQUIREMENTS FOR THE MONTH COMING**

LSTK CONTRACTOR shall submit its manpower availability requirements for the next month. This section consists also of the scheduled versus the actual manpower curves.

These manpower curves are accompanied by LSTK CONTRACTOR'S comments hereon.

## 8.0 **MAIN CONSTRUCTION EQUIPMENT AVAILABILITY / REQUIREMENTS FOR THE MONTH COMING**

LSTK CONTRACTOR shall submit its main construction equipment availability / requirements for the next month. This section consists also of the scheduled versus actual construction equipment requirement curves. These by LSTK CONTRACTOR'S comments hereon.

## 9.0 **WEEKLY PROGRESS REPORT**

Progress reporting will be done on a weekly basis by the actually completed work based on details of work such as quantities or piece of equipment as a percentage of the total anticipated work per work activities as defined in item 4.

9.1 Progress will only be reported on the basis of completed activities as per the percentage breakdown of the major steps as follows:

### **Progress Measurement Parameters**

Actual physical progress in the field shall be measured based upon standard percentage of completion of progress stages, that, they are to be prepared by LSTK CONTRACTOR and Approved by OWNER to calculate actual physical progress of the WORK, the exact weight value of each activity from lowest level up to highest level in each category of the WORK shall be specified by LSTK CONTRACTOR and supplied to OWNER.

After OWNER'S Approval this weight value can be used for calculation of actual progress of the WORK

## 10.0 **WEEKLY PROGRESS MEETING**



### 10.1 **Weekly Work List**

In the weekly progress review meeting LSTK CONTRACTOR shall forecast the WORK it plans to perform during the week by means of a weekly WORK list including its manpower resource allocation as per the activities listed in 4 and 6.

This weekly program shall be in accordance with the construction guide schedules.

### 10.2 **Work Front**

LSTK CONTRACTOR shall submit monthly and weekly a total recapitulation Of the total work

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front available with estimated manpower requirements, materials and equipment which shall be supplied by LSTK CONTRACTOR.

## 11.0 MONTHLY CONSTRUCTION GUIDE SCHEDULE

Based on approved overall construction schedule, LSTK CONTRACTOR must issue a monthly construction guide schedule covering a two (2) months period, for each individual activity.



Progress updating of construction guide schedules must be weekly and presented in the weekly progress review meeting at site.

The updated issue will show for each individual activity:

- Percent complete.
- Weight factor complete.

## 12.0 DAILY MANPOWER REPORTS

LSTK CONTRACTOR shall be furnished daily manpower report as per agreed format.

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## **ANNEXURE- 7 – 5**

### **EXECUTION PLAN**

#### **1.0 BIDDER ORGANISATION**

##### **1.1 Company Organisation**

Bid shall include a description of the organization, its management structure and organization chart of Bidder's company with particular reference to the means whereby the execution of this project will be related to the overall company organization.

The Bidder shall also furnish the name(s) of their partners, associated/ subsidiary companies & their activities, and whether any such associated/ subsidiary company will be involved in the execution of WORK, and if so, their scope thereof.

##### **1.2 Project Organization**

Bidder shall give charts of organization, which he intends to use in the execution of the work. Such charts must show lines of authority and communication of senior personals who will be assigned to this work in Bidder's home - office and other offices where WORK shall be performed (if any) and the lines connecting such Project Organization to the Bidder's internal overall organization including partners (if any). The chart shall be supported by a narrative, which shall explain how the proposed organisation will operate and in particular will provide

The name of the location of the office(s) in which the Basic and Detail Engineering Design Packages of the plant shall be carried out.

If any parts of the Basic and Detail Engineering Design Packages are to be carried out in more than one office, then details of the distribution of the jobs between offices and coordination procedure shall also be presented.

A description of the facilities offered to the OWNER'S resident engineers.

#### **2.0 Estimated project and Engineering man-hours**

Bidder shall give an estimate of the engineering man-hours and its break down for all activities

#### **3.0 Methods and procedures**

Bidder shall summarise the methods and procedures that BIDDER intends to implement during the performance of the WORK. It shall include the proposed procedures such as Engineering, Procurement, construction strategy, WORK Progress Measurement, Pre-commissioning, Commissioning and Performance Test Run of the PLANT, and Training.



BIDDER shall also furnish proposed procedures for the Project management, communication and method and frequency of reporting the progress of the WORK.

The final form for reports, which will be subject to OWNER's Approval, shall include as a minimum the following :

- a) Planning and Scheduling
- b) Work Progress
- c) Safety and Security

#### **NOTES:**

- a) Sample reporting forms and other key standard forms shall be included.
- b) Bidder shall state the extent to which he will be using computerized drafting, etc.

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#### 4.0 Job descriptions and personnel resumes

Bidder shall include job descriptions and personnel resumes of his staff nominated to the key positions, including (where applicable) at least the followings, or Bidder's equivalent:



Project director  
 Process engineering co-ordinator  
 Construction manager  
 Process engineer  
 Project engineering co-ordinator  
 Senior pre-commissioning engineer  
 Senior commissioning engineer  
 Training co-ordinator and instructor.  
 Construction Engineering Coordinator  
 Construction Quality Control Engineer  
 Construction Project Control Engineer  
 Welding Specialists  
 Heavy Lift Rigging Specialist  
 Senior Specialist Engineers  
 Senior Planning Engineers  
 Materials Coordinators  
 Senior Construction Engineers  
 Senior Pre-commissioning Engineers  
 Warehousing Officer  
 Material Planning Engineers

Resumes shall give at least the name, age, nationality, education, professional exception/deviation and previous experience of each assigned personnel. Additionally, one alternative shall be offered for each position. **Bidder shall ensure that personnel to be deployed meet the minimum criteria specified in Annexure-7-6**

Bidder shall confirm that these key personnel will be made available to WORK on the Project as required by the schedule on full time basis.

Bidder shall furnish Summary of its Deployment Schedule Personnel as per **Annexure-7-7**.

Bidder understands that the said proposal represents the minimum deployment and the Bidder acknowledges that the said deployment may have to be augmented with additional number and/or categories, if required, if directed by Engineer-in-Charge in order to complete the work within the completion schedule and quoted lump sum price.

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## 5.0 Construction equipment and machinery

The BIDDER shall furnish details of construction equipment & machinery, testing equipment, tools/tackles, etc., which will be made available by the Bidder at the Site. Bidder shall furnish Summary of such details as per **Annexure-7-8, Annexure-7-9**.

Such list shall, in no way limit the CONTRACTOR's responsibility to arrange & provide any additional construction equipment, tools, tackle, etc., which might be required to execute and complete the WORK as per contractual schedule.

BIDDER shall furnish the procedures and his tools for erection of the Heavy Lift Equipments including tall columns):

## 6.0 Heavy lifts

BIDDER shall furnish his proposed, site transportation, lifting, along with preliminary rigging schemes and erection procedure for the heavy lifts. Such plans / schemes shall be furnished along with detailed write -up on heavy cranes proposed to be deployed by CONTRACTOR, duly supported by relevant technical literature.

## 7.0 BIDDER experience & exception/deviation to perform the work

The BIDDER should have experience in the construction of similar Plants. The BIDDER should have successfully executed and completed construction of at least one similar Plant with his own project management and with complete responsibility of construction / erection and pre-commissioning.

The BIDDER shall furnish, as a part of his Tender Documents establishing the BIDDER'S experience and exception/deviation to perform the CONTRACT. Such documentary evidence shall also establish to OWNER's satisfaction that the BIDDER has the necessary financial, technical, project management capabilities and the requisite resources to execute the Work.

Such documentary evidence shall also be furnished for BIDDER'S proposed Subcontractors, if any. The Bidder shall furnish, in a tabular form, a list of jobs of similar type and magnitude executed by them in the past. BIDDER shall also furnish details of their experience in erection of heavy lifts. The Bidder shall furnish documentary evidence, establishing to OWNER satisfaction, that such jobs have been timely and successfully executed by them. The BIDDER shall also furnish the details of their present major commitments.

## 8.0 QA/QC Program

Bidder shall furnish a summary description of their proposed QA/QC program.

Bidder shall furnish any other technical information / details as per the requirements of ITB.



## 9.0 Technical assistance

The extent of the Technical Services and Assistance to be rendered by CONTRACTOR for, commissioning and performance test run, etc., is to be proposed

## 10.0 Training

Bidder shall furnish the following details regarding the Training of OWNER'S personnel:

- a) Bidder's organisation set up for Training program.

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b) Training facilities available with the Bidder to train the OWNER'S personnel in

- Theory of process, operation, maintenance and manufacturing of products
- Field (on the job) training in process, operation, maintenance and manufacturing of products, to train the personnel on the job.
- Test procedure and other matters.

c) The courses and their duration, number of attendees in each course and location where such courses will be held that the Bidder would recommend OWNER to consider.

d) Bidder's experience of training the personnel for units similar to the subject PLANT.

11.0 Estimate of the number of personnel required for the safe and satisfactory operation of the Plant.

For and on behalf of .....



Stamp & Signature : .....

Name : .....

Designation : .....

Date : .....





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## ANNEXURE-7-6

### Minimum Qualification & Exp. Of Key Supervisory Construction Personnel

<u>SL. NO.</u>	<u>CATEGORY</u>	<u>QUALIFICATION &amp; EXPERIENCE</u>
1	RESIDENT CONSTRUCTION MANAGER / RESIDENT ENGINEER / SITE-IN-CHARGE	Degree in Engg. With minimum 20 years relevant experience in construction should successfully constructed & commissioned at least one process unit in hydrocarbon / fertilizer sector.
2	LEAD DISCIPLINE ENGINEER	Degree in relevant Engg. discipline with minimum 15 years experience in Construction or Diploma in relevant Engg. Discipline with minimum 20 years experience in Construction.
3	LEAD WELDING / NDT ENGINEER	Degree in Mechanical Engg./Metallurgy with minimum 15 years experience in Welding / NDT (Non-Destructive Testing) plus Level-II in RT (Radiographic Testing) or diploma in Mechanical Engg. / Metallurgy with minimum 20 years experience in Welding / NDT plus Level-II in RT.
4	LEAD QA/QC ENGINEER	Degree in Engg. With 15 years Construction Experience of which 5 years should be as QA Manager.
5	LEAD PLANNING ENGINEER	Degree in Engg. With 15 years experience in Planning & Scheduling.
6	LEAD SAFETY OFFICER	Degree / Diploma in Engg. And Diploma in Industrial Safety with min. 10 years relevant experience in Construction Safety.
7	WAREHOUSE-IN-CHARGE / MATERIALS MANAGER	Graduate in Science or Diploma in Engg. / Materials Management with 15 years experience in Warehousing / Stores Management of similar nature.
8	DISCIPLINE SURVEYORS	Degree in relevant Engineering Discipline with minimum 3 years experience in Construction or diploma in relevant Engineering Discipline with minimum 6 years experience in Construction.
9	QUANTITY SURVEYORS	Degree in relevant Engineering Discipline with minimum 3 years experience or diploma in relevant Engineering Discipline with minimum 6 years experience in quantity estimation, field measurement, rate analysis etc. in construction field.

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For and on behalf of .....

Stamp & Signature : .....

Name : .....

Designation : .....

Date : .....

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ANNEXURE-7-7

Tentative Deployment Schedule of Supervisory Personnel

SL. NO.	DESCRITPI ON	DEPLOYMENT SCHDULE																											
		1	2	3	4	5	6	7	8	9	10	:	:	:	..	..	:	:	..	..	:	..	:	:	..	35	36	37	TOTAL
1	PROJECT MANAGEM ENT																												
1.1	PROJECT MANAGER																												
1.2	PLANNING MANAGER																												
1.3	PLANNING ENGINEERS																												
2	RESIDUAL DESIGN AND DETAILED ENGINEERI NG																												
2.1	PROJECT ENGINEERI NG MANAGER																												
2.2	ENGINEERI NG COORDINA TOR																												
2.3	ENGG. PERSONNE L FOR VARIOUS DISCIPLINE																												
2.3.1	CIVIL STRUCTURAL																												
(i)	ENGINEERS																												
2.3.2	PRESSURE VESSELS																												
2.3.3	MECHANICAL EQPT/ ROTARY EQPT.																												
2.3.4	PIPING																												
(i)	ENGINEERS																												
2.3.5	ELECTRICAL																												
(i)	ENGINEERS																												













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For and on behalf of :...

Stamp & Signature : .....

Name : .....

Designation : .....

Date : .....

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**ANNEXURE-7-9**  
**Details of Equipment Proposed to be used for Tendered Work**

**I / We, shall use the following MAJOR equipments owned by the tenderer for the work, if awarded to me /us :**

Sl. No	Description	Quantity. (Numbers)	Make	Capacity	Owner	Approximate date when it will be deployed at site	Period of retention at site

For and on behalf of .....

Stamp & Signature : .....

Name : .....

Designation : .....

Date : .....

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## PART II: TECHNICAL

### SECTION – 8.0



#### PERFORMANCE & GUARANTEE TESTS

**PLANT: COAL GASIFICATION PLANT FOR GENERATING SYNTHETIC NATURAL GAS**

**PROJECT: SYNTHETIC NATURAL GAS PRODUCTION THROUGH COAL GASIFICATION ROUTE AT BARDAHMAN, WEST BENGAL (INDIA).**

0	30/09/2025	16/09/2025	Issued for Tender Purpose	SK	TNN	MN
REV	REV DATE	EFF DATE	PURPOSE	PREPD	REVWD	APPD



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## 1.0 GUARANTEES

### 1.1 Performance Guarantees

#### 1.1.1 Coal Gasification Plant:

LSTK Contractor shall guarantee performance of Coal Gasification Plant as specified in this Clause under the following heads.

1. Capacity
2. Quality of the product
3. Pollution Level
4. Noise Level
5. LSTK Contractor shall specify Guaranteed Performance Parameters (specific consumption of raw material & utilities) for the Coal Gasification Plant for generating Purified Syn. Gas (as Specified in Section 2.0 of NIT) to produce Synthetic Natural Gas (SNG) as specified below:



Parameter	Units	Value (LSTK Contractor to indicate)
Purified Syn. gas on LSTK basis.	Nm <sup>3</sup> /Hr (Min/Nor/Max.)	* / 336000 /
Sulphur	% of recovery to be guaranteed	
Raw Material/ Utilities consumption per 1000 NM <sup>3</sup> of Purified Syn. Gas:		
Washed Coal (ash content upto 20%) to Coal Gasification Plant	MT	
Gasification agent,O <sub>2</sub>	Nm <sup>3</sup>	
Net import of HP steam	MT	
Fuel gas	Nm <sup>3</sup>	
LP Nitrogen	Nm3	
HP Nitrogen	Nm3	
Cooling Water from OSBL Cooling Towers to Coal Gasification Plant, M <sup>3</sup>	M <sup>3</sup>	
Power Consumption	KW/hr	

Note:- \* - Minimum figures for checking turn-down parameters.

Failure to meet capacity of the plants, quality of the products, specific consumption of raw material/ utilities, pollution levels and noise levels shall be breach of contract requiring corrective action by LSTK contractor irrespective of the cost involved.

**Contractor to guarantee the raw material & utility consumption for 1000 NM<sup>3</sup> of Purified Syn. Gas as per item mentioned in table under the clause 1.1.1.**



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### 1.1.2 Deleted

### 1.1.3 Works cost (Consumption of Raw material & Utilities) Guarantee:



LSTK Contractor shall guarantee overall consumption of Washed Coal, Fluxant, Power, Process water, De-mineralized water, Cooling Water, Oxygen, Nitrogen, Steam required for production of Synthetic Natural Gas at 100% plant capacity.

LSTK Contractor shall furnish all data as per Attachment-1 and shall guarantee the Total Works Costs per day for generating Syn. Gas (CO+H<sub>2</sub>)(3,36,000 NM<sup>3</sup>/hr) required for production of Synthetic Natural Gas meeting the quality and conditions in the following manner.

Sl. No	Raw Materials/ Utilities	Consumption per day (Q) (ref. note-VIII below)		Cost per day (Q*R)INR for Case-1 (PDC)
		Case-1: PDC	Case-2: EDC	
1.	Washed Coal, MT			Q*4461.45
2.	Fluxant, MT			Q*500
3.	De-mineralised water, M <sup>3</sup>			Q* 53.69
4.	Condensate export (**)			Q*(-)47.41
5.	Cooling Water for Coal Gasification Plant, M <sup>3</sup>			Q*35.75
6.	Make-up Water for Slag/Slag fines/Flyash Disposal System (if any)			Q*35.75
7.	Oxygen, NM3/hr			Q* 12
8.	LP Nitrogen, NM3/hr			Q*7
9.	HP Nitrogen, NM3/hr			Q*10
10.	Power, KWh			Q*6.08
11.	Net HP superheated Steam Import, MT			Q*1400
12.	Fuel gas SCM***			Q*25.80
13.		Guaranteed Total Works Cost "A"/Day = $\sum(Q \times R) \{ \text{Sl.No.1 to 12} \}$		
14.		Production figures (per day): a. Syn. Gas (CO+H <sub>2</sub> ) "N" = Nm <sup>3</sup>		
		Guaranteed Specific Work Cost/1000 Nm <sup>3</sup> Syn. Gas(CO+H <sub>2</sub> ) ("S" = A/N x 1000) =		

(\*\*)- Applicable for Gas purification unit only.



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**1.2.2** Coal Gasification island, Gas Cleaning & Purification Plant are operated under the direction and supervision of LSTK Contractor/ Process Licensor as defined in operating manuals to be supplied by LSTK Contractor/Process Licensors.

**1.3 Consumption of Raw Materials & Utilities:**

Consumption of raw materials and utilities shall be measured and calculated as per figures indicated by various calibrated instruments. **No instrument tolerance is acceptable during guarantee test and / or different operational phases.** All measuring instruments shall be part of the system/ plant installed by the LSTK Contractor and no special instrumentation for the purpose of guarantee tests shall be required. Contractor shall furnish overall raw material and utilities balance as per Attachment-1.

**1.4 Basis of Works Cost:**

- i) Costs mentioned in the clause 1.1.3 are indicative and may change at a later date. Revision, if any, will be intimated to LSTK Contractor before 15 days of price bid opening and the same shall be used for evaluation of the bids.
- ii) The guaranteed works cost shall include cost of materials and utilities required, for building cooling/heating, lighting, ventilations, air conditioning and consequent costs of such materials which are in the usual operation of the plant.

**1.5 Capacity Guarantees:**

The LSTK Contractor shall guarantee the Coal Gasification Plant for capacities indicated for PDC & EDC as per this table.

Parameter	Units	Value (Bidder to indicate)
Synthesis gas on LSTK basis.	Nm <sup>3</sup> /Hr (Min/Nor/Max.)	* / 336000 /



Note: -1. \*- Minimum figures for checking turn-down parameters (minimum turn down ratio should not be less than 50% of design capacity)

**1.6 Quality Guarantees:**

The LSTK Contractor shall guarantee the Coal Gasification Plant for qualities indicated for PDC/ EDC as per following tables.





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### 1.7.2 Ground Level Concentration:

The LSTK Contractor shall guarantee the ground level concentration in the atmospheric air of LSTK plant area 5m inside boundary and shall not exceed the limits given below:

TLV (for 8 hrs working) – LSTK Plant Area

Parameter	Value
Carbon monoxide	2 ppm

Ground level concentration in the atmospheric air of LSTK plant area 5m inside boundary shall be as per the requirement set latest OHSAS/ACHIH.

### 1.8 Noise Level:

LSTK Contractor shall guarantee the noise level within the ISBL Plant premises. Noise nuisance from machinery is normally specified as sound pressure level which for standard design shall not exceed, in work areas, 85dB (a) at 1m distance from each source. However, Noise level for CMD shall be guaranteed  $\leq 90$  dBA at 1 m distance.

### 1.9 Catalyst and Adsorbents Life Guarantees:



The Catalysts in the Gas cleaning and purification unit of Gasification Plant shall retain their full abilities and performance for the following periods which commence from the date of Preliminary Acceptance of the Plant.

Sl. No	Service	Guaranteed Life (in years)
1.0	HT/LT (if applicable) shift converter catalyst	5
2.0	Adsorbents	3

Contractor guarantees that if any catalyst or adsorbent does not meet the guaranteed EOR conditions before the expiry of its guaranteed life as specified in table above, from the date of preliminary acceptance of plant, contractor shall replace as follows:

If the catalyst /adsorbent fail to fulfil the guarantee, contractor shall deliver full replacement of catalyst volume free of charge for the 1<sup>st</sup> year. For the 2<sup>nd</sup> & 3<sup>rd</sup> year replacement would be on pro-rata basis. Pro-rata catalyst volume shall be calculated by multiplying full charge of loaded catalyst volume with the ratio between un-expired portion of the 2<sup>nd</sup> & 3<sup>rd</sup> year (in days calculated from the date of failure) and 730 days.

Contractor shall pass on to Owner the residual catalyst/adsorbent life as guaranteed by the catalyst manufacturers to Contractor, if any, beyond the guaranteed life of catalyst under contract.

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## 2.0 PERFORMANCE TESTS

### 2.1 General:



LSTK Contractor shall prove the performance guarantees during tests of the composite plant as specified in this clause under the following headlines:

- ❖ Sustained Load Test
- ❖ Notice of Guarantee Test
- ❖ Guarantee Test
- ❖ Measurements during Guarantee Test
- ❖ Inconsistent Measurements
- ❖ Deviations from Specifications
- ❖ Guarantee Test Results
- ❖ Demonstration Test Results

#### 2.1.1 Sustained Load Test:

After Mechanical Completion has occurred, the LSTK Contractor shall commence the Commissioning operations of Gasification Plant/ Gas Cleaning & Purification leading to generating purified Syn. Gas for Synthetic Natural Gas production. After Gasification Plant has commissioned and at least near rated daily capacity has been achieved, LSTK Contractor's authorised representative shall give notice in writing to Owner that Plant is ready for a sustained load test. On receipt of this notice, but not later than 15 days after the notice, LSTK Contractor shall conduct the sustained load test for a consecutive period of 45 days or less at the discretion of the Owner. The sustainedload test of the composite plant shall be deemed to have been completed if Plant produces an average of not less than 90% of the daily normal capacity. If, during the sustained load test, there are interruptions due to reasons not attributable to the obligations and responsibilities of LSTK Contractor, periods of such interruptions shall be included and regarded as days of operation at min. 90 % of daily normal capacity or actual load prior to interruptions whichever is lower. The cumulative period of such interruptions shall be limited to a maximum of **7** (seven) days. Owner shall have the option to reduce the period of sustained load test of 45 days. During the sustained load test, LSTK Contractor shall use their best efforts to ensure that pollution level and noise level are within the limits specified in the Contract. LSTK Contractor shall endeavour to complete the sustained load test within a reasonable period after Mechanical completion, but shall complete the same in any case within 90 days from Mechanical completion. If, during the sustained load test ,corrective measures are



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required and involve procurement of new items of Equipment or modification of items of Equipment which require longer period for delivery than covered by the 180 days period, the period shall be suitably adjusted as agreed with Owner. However, design engineering and placement of orders shall be completed within 90 days from Mechanical completion. On satisfactory completion of the sustained load test, the results achieved shall be tabulated and jointly signed by LSTK Contractor's and Owner's representatives within ten days of completing the sustained load test. During the sustained load test, no standby items of Equipment shall be used in parallel for completing the test.



### **2.1.2 Notice of Guarantee Test:**

On successful completion of the sustained load test, LSTK Contractor shall give notice in writing for commencing the guarantee test. On receipt of the notice, but not later than 15 days after the notice, Owner shall conduct the guarantee test run under the direction and supervision of LSTK Contractor. During the guarantee test, no stand by items of Equipment shall be used in parallel for proving the guarantee. The range of operating conditions shall be within the design conditions.

### **2.1.3 Guarantee Test:**

The guarantee test shall be carried out for 7 (Seven) consecutive days for each case separately as mentioned below. In determining the ability of the composite plant to meet the guarantees all feed rates, product rates and quality, and utility consumption shall be averaged over a period consisting of best continuous 120 hours selected out of the 7 (Seven) days test period The 120 consecutive hours period shall exclude periods during the test when the operating conditions are other than those recommended or approved by LSTK Contractor or periods of non-operation due to failure of Equipment, lack of sufficient feed or utilities, or any other cause.

For the purpose of computing the average performance, LSTK Contractor shall select any best continuous 5 days out of the 7 days test period so long as this includes a continuous and uninterrupted run of 120 (one hundred and twenty) hours and the aggregate total hours of interruptions do not exceed 48 hours. LSTK contractor will be given max. 3 nos. performance guarantee test run. In case of failure (beyond acceptable limits/parameters where Mutually Agreed Damages' are levied) of 2<sup>nd</sup> Guarantee test, the LSTK Contractor, within 30 days from the beginning of the 2nd guarantee test, shall give a full and detailed statement in writing to OWNER. The statement shall contain the detailed description and corrective measures which LSTK Contractor intends to take and the time required for the same to be completed and a repeat

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guarantee test to be made. LSTK contractor shall wherever possible shall carry out such corrective measures and repeat the guarantee test within the shortest possible time, but not later than 90 days (or for such time as may be mutually agreed between owner & LSTK contractor) from the beginning of the last guarantee test unless otherwise agreed with Owner. Further, refer clause no. 18.0 of SCC Part-1 Commercial. During the Guarantee Test Run, the Production capacity of Coal Gasification Plant for generating Syn. Gas for Synthetic Natural Gas (SNG) production shall be guaranteed as mentioned above in clause no. 1.5.

This guarantee for the Coal Gasification Plant capacity shall be substantially proved when 336000 Nm<sup>3</sup>/Hr of Purified Syn. gas is going to Methane synthesis section to produce Synthetic Natural Gas. The product quality as specified shall also be met during the Guarantee Test Run. Following are the various cases of performance guarantee test/ demonstration run as given below:

#### **Guarantee Test Run Cases:**

**Case-1 (PDC):** Considering 100% Washed Coal with 20% Ash as feed (plant capacity 100%, generating 2×170000/3×112000 Nm<sup>3</sup>/hr “CO+H<sub>2</sub> or CO + H<sub>2</sub>”/ 336000 Nm<sup>3</sup>/hr of Purified Syn. Gas to be considered as feed for Methane Synthesis Section.)

**Case-2 (EDC):** Considering 100% washed Coal with 20% Ash content as feed ,each gasifier generating 204000/134400 Nm<sup>3</sup>/hr “CO+H<sub>2</sub>”/ & equivalent amount of Purified Syn. Gas to be considered as feed for methane Synthesis Section.



**Note:** For EDC, if performance guarantee could not be achieved after applying clause no 2.1.7 of Section -8.0 Part–II Technical NIT. And, thereafter Licensor (Coal Gasification) is unable to suggest any further improvement to achieve performance. In that case, LSTK Contractor's liabilities shall be limited to license fee of Licensor for Coal gasification area.

However, for rest of plant, LSTK Contractor's liabilities shall be as per relevant clauses 2.1.7 of Section-8.0 Part-II Technical of NIT.

#### **Demonstration Run Cases:**

**LSTK Contractor shall meet the capacity and quality excluding works cost during demonstration run. Following demonstration cases is to be done by LSTK Contractor.**

**Case-1(a):** LSTK Contractor shall demonstrate on 100% Washed Coal that the ISBL Plant is capable of producing Purified Syn. Gas not less than 0.5× 336000 Nm<sup>3</sup>/Hr with product quality guarantee as per relevant clause of section 8.0. for 12 continuous hours or as mutually agreed by

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LSTK Contractor/ Owner/ PMC. Performance of SRU shall be demonstrated along with percentage Recovery of elemental Sulphur.

**Case-1(b):** LSTK Contractor shall demonstrate on 100% Washed Coal that the ISBL Plant is capable of producing 1.1× 336000 Nm<sup>3</sup>/Hr of Purified Syn. Gas with product quality guarantee as per relevant clause of section 8.0. for 12 continuous hours or as mutually agreed by LSTK Contractor/ Owner/ PMC. Performance of SRU shall be demonstrated along with percentage Recovery of elemental Sulphur.

#### **2.1.4 Measurements during Guarantee Test:**

For determination of the average performance achieved during the guarantee test, all inputs and outputs shall be measured through appropriate meters specified and installed in plant by LSTK Contractor and jointly calibrated and certified to be correct by LSTK Contractor and Owner. No metering tolerances shall be allowed. LSTK Contractor shall have all measurements and records certified by Owner beforehand.

#### **2.1.5 Inconsistent Measurements:**



If any measurement is demonstrably inconsistent with the bulk of the data, or is otherwise suspected to be incorrect, then meter will be re-calibrated. Inconsistency in metering after the calibration if observed then it has to be rectified or in the worst case, meter to be replaced. However in no case, reading should be adjusted.

#### **2.1.6 Deviations from Specifications:**

In the event that the Washed Coal, Fluxant, fuel gas, utilities, climatic conditions, or any other conditions is not in accordance with conditions specified or referred to in Contract and are prejudicial to LSTK Contractor or Owner as demonstrated by LSTK Contractor or Owner, Owner and LSTK Contractor shall mutually, reasonably, and in good faith negotiate an adjustment to the performance guarantees. Any such adjustments to the performance guarantees shall be made utilising the same methods of calculation as were used in establishing the original performance guarantees to the extent such methods continue to be applicable in accordance with good engineering principles and practice.

#### **2.1.7 Guarantee Test Run Results:**

Within a reasonable period of time but not later than 15 working days from the completion of the guarantee test Contractor shall determine the results thereof and if in LSTK Contractor's judgement, the performance guarantees/ have been achieved, submits its calculations and report to Owner for Owner's acceptance. The method of calculation for the Guarantee Test shall be

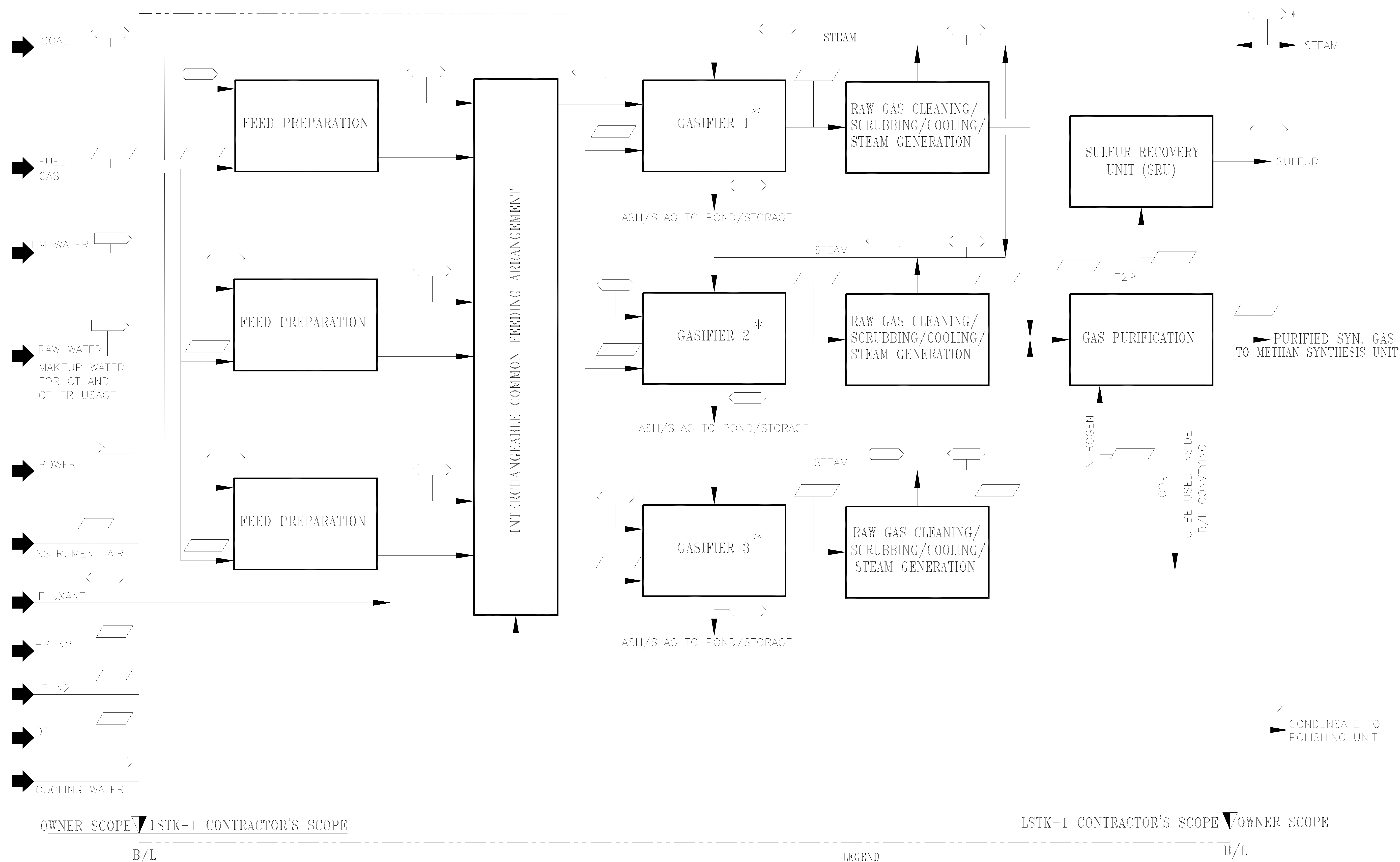
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mutually agreed by LSTK Contractor, Owner and PMC before starting of Guarantee Test. All data will be collected jointly in presence of LSTK contractor, Owner and PMC. Owner will review the report, calculations and the supporting data and accept the same in writing, if the results are in accordance with the provisions of this Section. In case, Owner does not accept the performance guarantee results, Owner shall indicate in writing to LSTK Contractor in what respect the performance guarantees have not been met, within 15 working days of receipt of the report by Owner from the LSTK Contractor. In the event of rejection of Guarantee test results by Owner, LSTK Contractor shall take immediate actions to make good as per the provisions of the contract and repeat guarantee test to the satisfaction of Owner.

#### **2.1.8 Demonstration Run Results:**

Within a reasonable period of time but not later than 15 working days from the completion of the Demonstration Run, Contractor shall determine the results thereof and if in LSTK Contractor's judgement, the Demonstrations have been achieved, submits its report to Owner for Owner's acceptance. The method of calculation for the Demonstration Run shall be mutually agreed by LSTK Contractor, Owner and PMC before starting of Demonstration Run. All data will be collected jointly in presence of LSTK contractor, Owner and PMC. Owner will review the report, calculations and the supporting data and accept the same in writing, if the results are in accordance with the provisions of this Section. In case, Owner does not accept the Demonstration results, Owner shall indicate in writing to LSTK Contractor in what respect the Demonstration have not been met, within 15 working days of receipt of the report by Owner from the LSTK Contractor. In the event of rejection of Demonstration Run results by Owner, LSTK Contractor shall take immediate actions to set right as per the provisions of the contract and repeat Demonstration Run to the satisfaction of Owner.

ATTACHMENT-1 OF SECTION-8.0 PART-II TECHNICAL





\*NOTES-

1. SURPLUS STEAM WITH QUALITY & QUANTITY.
2. START-UP STEAM WITH QUALITY, QUANTITY & DURATION.
3. REFER SECTION-3.0 PART-II TECHNICAL FOR GASIFIER CONFIGURATION.

LEGEND

- FLOW MTPH
- POWER IN KWH/H
- FLOW M<sup>3</sup>/H
- FLOW NM<sup>3</sup>/H

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## PART II: TECHNICAL



### SECTION – 9.0

#### DRAWINGS AND DOCUMENTS

**PLANT: COAL GASIFICATION PLANT FOR GENERATING SYNTHETIC NATURAL GAS.**

**PROJECT: SYNTHETIC NATURAL GAS PRODUCTION THROUGH COAL GASIFICATION ROUTE AT BARDAHMAN, WEST BENGAL (INDIA).**

0	30/09/2025	16/09/2025	Issued for Tender Purpose	SK	TNN	MN
REV	REV DATE	EFF DATE	PURPOSE	PREPD	REVWD	APPD



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4.0	List of Drawings & Documents	7

## LIST OF ATTACHMENTS

Attachment Number	Description	Number of Sheets

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## 1.0 DRAWINGS & DOCUMENTS

This chapter details out various drawings and documents to be generated at various stages during the course of execution of the Project by the LSTK Contractor for different project activities. Categorization of the documents/ drawings for review/ information/ records of PMC and the review/ approval requirements of the Owner/ PMC along with routing of the documents/ drawings will be conveyed separately as a philosophy.

The efficient handling of drawings and documents to be prepared by the LSTK Contractor under the contract is the key to the timely completion of the plants. The LSTK Contractor undertakes to ensure that all drawings and documents to be submitted by him to the Owner/ PMC shall be of professional quality and conforming to the contractual requirements. The LSTK Contractor also undertakes to institute a formal drawing control system which will be documented and submitted to the Owner/PMC for review or approval.



Compliance of this chapter on drawings and documents is mandatory and is non-negotiable.

The drawings / documents are to be generated by the LSTK Contractor at various stages of the project covering different activities. The drawings / documents generated will be in the category of Approval/ Review/ Information. The list of drawings and documents required is enclosed; however, the categorisation for the drawings/ documents will be informed separately. However, this will in no way relieve the LSTK Contractor of responsibility to conform to drawings, standards, specification, codes and contractual requirements / obligations.

The LSTK Contractor shall prepare the drawing numbering procedure and submit to Owner/ PMC for approval. Each Drawing submitted by the LSTK Contractor shall be clearly marked with the name of the Owner, PMC with revision number & date. It should contain the minimum following details:

- Size of Drawing.
- Discipline of Engineering for which the drawing is issued.
- Discipline wise segregation of numbering sequence for example:  
100 Series for Process. 200 Series for Mechanical etc.



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LSTK Contractor to note that the number corresponds to Coal Gasification section and Acid Gas Removal sections and shall be prefixed to all related documents/deliverables which shall be indicated to successful bidder.

**For Details of the Drawing and Documents submission and tools to be used for generating these documents, LSTK contractor is requested to refer Part- B of Section -9 of the NIT.**

All other documents like presentations etc. and other data shall be in MS Office; the required operating system for Data Exchange shall be at least Windows.

All documents before forwarding to Owner/PMC will have to be vetted in detail by the LSTK Contractor/duly approved engineering sub-contractor appointed by the LSTK Contractor. Document received without vetting will be returned.



The review by the PMC/Owner shall not be construed by the LSTK Contractor, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and drawings.

Each drawing submitted by the LSTK Contractor shall be clearly marked with the name of the Owner, Unit Designation, Specifications, Title, Specification number and the name of the Project with Revision number and date. If standards, catalogue pages are to be submitted, the applicable items shall be indicated therein. All titles, noting, markings and writings on the drawings shall be in English.

All the dimensions should be in metric units. Upon receiving comments on Drawings & Documents by the LSTK Contractor, the subsequent submission should give compliance report, separately on each of the comments, document-wise. Comments given by PMC/Owner to be discussed and finalised within agreed schedule.

The schedule of submission of the Drawings & Documents shall be in accordance with project plans only. The detailed list under different category, document-wise, shall be prepared by the LSTK Contractor for approval of Owner/PMC. This activity is to be completed within one month of Fax of Intent/Letter of Intent.

Sequence of submission of drawing is essential for proper review of documents and timely completion of the project is to be adhered. In case sequence is not maintained, the documents submitted will not be reviewed by Owner/ PMC and responsibility of timely execution of plant shall be to the LSTK Contractor's account.



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## 2.0 CATEGORY OF DOCUMENTS

Category	Description	Action by Owner/ PMC
1	Records/ Information	LSTK Contractor can continue to progress with the work. This drawings or documents will be retained with Owner/PMC for information only. Owner/ PMC reserves the right to advise the LSTK Contractor of any comments (deviations from the contract) at any time and the LSTK contractor is liable to respond to satisfy that the work being done is in accordance with the contract; deviations, if any will be bidder's risk and cost.
2	Review	Owner/PMC will review and advise the LSTK Contractor of any Comments on Contractor's Drawings / documents within specified schedule (i.e. 2 weeks), from date of receipt in PMC office of LSTK Contractor's drawings/documents. The review period is defined as date of receipt of documents by PMC, to date of issue of comments by PMC. This review period shall be valid only if submission of drawings is done by LSTK Contractor in accordance with approved drawings / documents schedule as indicated in ITB. In case of any non-conformity to the above by LSTK Contractor due to which the period of review extends beyond 2 weeks by the PMC, schedule delay, if any will have to be absorbed by the Contractor.

The documents falling under Review category will be returned with comments within specified time schedules subject to fulfilling other conditions enumerated. The information category document will be retained for information only but however Owner/PMC reserves the right to comment at any stage of the Project, but not later than two weeks of receipt.

Where clearance of Owner/ PMC is required for ordering of equipment materials, enquiry documents and one technically selected offer is to be submitted for review. The unpriced copies of purchase orders detailing both technical and commercial aspects for all items shall be submitted to PMC/ Owner within 15 days of issue of the same.

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Each purchase order forwarded should contain complete technical documents. It is obligatory for the LSTK Contractor to obtain acceptance on all the technical documents and accepted copy only to be forwarded to Owner / PMC. Any inaccuracies /omissions/inconsistencies noticed and brought to the notice of the LSTK Contractor at any stage of the project will be rectified/ replaced by LSTK Contractor without any cost & time implication to the Owner/ PMC.

Detailed manufacturing schedules of fabricated/ manufactured items shall be submitted within one month of ordering, Status report for all the items in detail, will be submitted once in a month.

Documents to Boiler Regulation authorities shall be submitted and getting the documents reviewed by PMC/Owner. To any other agencies, documents shall be submitted under intimation to PMC/Owner.

As built drawings and documents will be generated within one month of completion of activities on respective items of work.



**As Built Drawings:**

LSTK Contractor will furnish reproducible and electronic files of all the drawings under their scope to Owner / PMC, certified as "As-Built Issue" by Third Party Inspection Agency (TPIA) for Vendor Items coming under Third Party Inspection / LSTK Contractor for all other drawings.

Upon completion of identifiable units or components of the fabrication, construction and installation phase of the project the Contractor will complete all the related plans to the "as built" stage including all Vendor drawings and furnish Owner/PMC with the following:

- One complete set of all original tracings copies.
- One set of CD for all documents/drawings/data
- All the as built drawings duly certified should be scanned and converted into electronic files. These files should be securely stored using latest digital storage solution such as external Solid State drive (SSD) or any other latest secure mode in consultation with Owner/PMC.
- All other project documents such as operating and maintenance manuals, manufacturers' Catalogues etc. shall also be scanned on magnetic/optical discs/ external Solid State drive (SSD) or any other latest secure mode in consultation with Owner/PMC for safe storage and retrievals by the Owner when needed.
- 10 complete sets of full size prints of the drawings and 4 sets of reduced size (A3-297x420 mm) copies of all drawings.
- 10 complete bound sets of Manufacturer's specifications including design calculations.



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S. No	Description	With Bid (Y/N)	For Review/ Approval	For Information	Final/ Approved/ As-built
12.0	Instrumentation and Control Philosophy	Y	Y		Y
13.0	HAZOP Study and Compliance report	N	Y		Y
14.0	Flare Load Summary	Y	Y		Y
15.0	Plot Plan (Preliminary)	Y	Y		Y
16.0	Operating Manuals and maintenance manuals	N	Y		Y
17.0	Analytical Manual	N	Y		Y



Note:

- Note- Submission of Utility flow diagram (sl. no. 4.0) & Material Selection diagram (sl. no. 5.0) for all sections are not mandatory.
- Submission of P&IDs & Instrument Control Philosophy for Coal gasification section are not mandatory.

## PIPING :

### LIST OF DRAWINGS & DOCUMENTS:

Sl. No.	Description	With Bid (Y/N)	For Review/ Approval	For Information	Final/ Approved/ As-built
	<b>PIPING</b>				
1.0	Equipment layout drawing	Y	Y	-	Y
2.0	Piping Layout drawing	N	Y	Y	Y
3.0	Design data:				
3.1	Design basis	N	Y	-	Y
3.2	Piping material specification	N	Y	-	Y
3.3	Valve material specification(Valve Data Sheet)	N	Y	-	Y
4.0	Material Take-offs (Linewise & consolidated BOQ)	N	-	Y	Y
5.0	Material Requisitions schedule	N	-	Y	Y
6.0	Quality control plan/Inspection test plan	N	-	Y	Y
7.0	Vendor Drawings(Valves, Strainers, Traps etc)	N	Y	Y	Y
8.0	Issued for construction (IFC) Drawing				



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8.1	Piping GA drawings	N	-	Y	Y
8.2	Isometrics	N	-	Y	Y
8.3	Piping supports, operating platforms drg	N	-	Y	Y
9.0	Design calculation / Documents	N	-	Y	Y
10.0	Flexibility Analysis of Piping	N	Y	-	Y
11.0	Support and load data	N	-	Y	Y
12.0	All inspection, testing & NDT Records	N	-	Y	Y
13.0	As Built Drgs/Docs/MTCs	N	-	-	Y
14.0	3D model	N	Y	Y	Y
15.0	IBR Calculation/Network	N	Y	Y	Y



## STATIC :

### LIST OF DRAWINGS & DOCUMENTS:

S.no.	Name of Document	With Bid	Drawings/Documents Required After Award of Contract		
			For review/ approval	For information	Final Appr oved/ As-built
MECHANICAL STATIC EQUIPMENT					
STORAGE TANK					
1.1	Contractor document index with schedule of submission	-	-	Y	-
1.2	Mechanical Engineering Datasheet	-	-	Y	Y
1.3	General arrangement drawings of tank indicating design data , fabricated equipment weight, general notes, nozzle schedule, details of shell, supporting arrangement , main weld seams ,nozzle orientation plan etc.	N	Y	-	Y
1.4	Bottom And Annular Ring Layout & Weld Detail	N	Y		Y
1.5	Detail of sump for drain nozzles	N		Y	Y
1.6	Shell plate layout (showing location of nozzles and manhole)	N		Y	Y
1.7	Mechanical design calculations complying with the specifications and codes.	N	Y	-	Y



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S.no.	Name of Document	With Bid	Drawings/Documents Required After Award of Contract		
			For review/ approval	For information	Final Approved/ As-built
1.8	Detail of wind girder	N	Y	-	Y
1.9	Stairways, intermediate & top plate form	N	-	Y	Y
1.10	Roof plate layout & weld detail	N	Y	-	Y
1.11	Detail of nozzles on shell & roof	N	-	Y	Y
1.12	Details of internals like guide rollers, roof stoppers, still wells, dip pipe, heating coil e.t.c	N	-	Y	Y
1.13	Materials test certificates duly stamped by inspecting authority ( ** )	N	-	-	Y
5.14	QAP & inspection and test plan ( ** )	N	Y	-	Y
1.15	Welding procedure and qualification test reports ( ** )	N	-	Y	Y
1.16	Destructive and non destructive procedure & test reports (**)	N	-	Y	Y
1.17	Heat treatment, Hydro test procedure and time temperature charts ( ** )	N	-	Y	Y
1.18	Records of vacuum box test, spark test for rubber lining, plumpness, roundness, peaking, banding etc. (**)	N	-	Y	Y
1.19	Radiographic examination reports ( ** )	N	-	-	Y
1.20	Certified 'as built' drawings Incorporating actual dimensions And material used, duly certified by the inspector	N	-	Y	Y
1.21	Completion certificates (including inspection certificates, hydrostatic test certificate , local code requirements) ( ** )	N	-	Y	Y
1.22	Vendor's quality assurance Practice ( ** )		-	-	Y
1.22	1. Final civil load data including details of foundation/anchor bolts 2. Foundation settlement check record (**)	N	-	Y	Y
1.23	List of spare parts and details (**)	N	Y	-	Y
1.24	Information on all bought out Components i.e vendors, size, model No., catalogues, installation & Operating manual, drawings and Calculations as applicable	-	-	Y	Y



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S.no.	Name of Document	With Bid	Drawings/Documents Required After Award of Contract		
			For review/ approval	For information	Final Appr oved/ As-built
	Document marked as (**) are to be approved by authorized Third Party Inspection Agency and relevant Statutory Authorities, as applicable				
PRESSURE VESSEL/ FILTER/COLUMN/ REACTOR e.t.c					
1.1	Mechanical Engineering Datasheet	-	-	Y	Y
1.2	General arrangement drawings indicating design data , fabricated equipment weight, general notes, nozzle schedule, details of shell, heads supporting arrangement , main weld seams ,nozzle orientation plan etc	N	Y	-	Y
1.3	Detail of nozzles, manholes, accessories etc.	N	-	Y	Y
1.4	Detail of internals such as tray, tray support ring, bolting bars etc.	N	-	Y	Y
1.5	Detail of demister	N	Y	-	Y
1.6	Mechanical & Structural Design calculations, Hydrodynamic calculation for Internals including fabrication drgs. of main equipment & Internals complying with the specifications and codes.	N	Y	-	Y
1.7	Detail of packing support, demister support, grating & grating support	N	Y	-	Y
1.8	Detail of internal distributor	N	Y	-	Y
1.9	Detail of external clips such as ladder, platform, pipe support	N	-	Y	Y
1.10	Detail of insulation ,fireproofing	N	-	Y	Y
1.11	Detail of pipe davit	N	-	Y	Y
1.12	Detail of lifting lug, tailing lug & trunion etc. including design calculation	N	-	Y	Y
1.13	Shell development drawings incorporating all attachments and weld seams	N	-	Y	Y
1.14	Name plate drawing detail along with name plate bracket	N	Y	-	Y
1.15	Template Drawing For Anchor Chair Of Equipment	N	-	Y	Y
1.16	Mechanical design calculation (strength calculation)	N	Y	-	Y
1.17	Approved certificate & approved Documents from statutory Authority (if applicable)	N	-	Y	Y





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S.no.	Name of Document	With Bid	Drawings/Documents Required After Award of Contract		
			For review/ approval	For information	Final Approved/ As-built
1.18	Certified 'as built' drawings Incorporating actual dimensions And material used, duly certified by the inspector	N	-	Y	Y
1.19	Data folder as per specification	N	-	Y	Y
1.20	Materials test certificates duly stamped by inspecting authority ( ** )	N	-	-	Y
1.21	QAP & inspection and test plan ( ** )	N	Y	-	Y
1.22	Welding procedure and qualification test reports ( ** )	N	-	Y	Y
1.23	Destructive and non destructive procedure & test reports ( ** )	N	-	-	Y
1.24	Heat treatment, Hydro test procedure and time temperature charts ( ** )	N	-	Y	Y
1.25	Radiographic examination reports ( ** )	N	-	-	Y
1.26	Records/ drawings, charts duly approved, signed and stamped by Statutory Authorities ( ** )	N	-	-	Y
1.27	Completion certificates (including Inspection certificate, hydrostatic Test certificate, local code requirements, rubbing of code Stamp and name plate etc.) ( ** )	N	-	-	Y
1.28	Packing and forwarding instruction ( ** )	N	-	-	Y
1.29	Transportation drawing showing overall dimension, C.G. weight and handling instructions duly approved by appropriate authority	N	-	Y	Y
1.30	Erection scheme drawings Including weights, C.G., slinging Facilities, guideline & instructions	N	-	Y	Y
1.31	Assembly & Installation Detail ( ** )	N	-	Y	Y
1.32	Final civil load data including details of foundation/anchor bolts	N	-	Y	Y
1.33	List of spare parts and details ( ** )	N	Y	-	Y
1.34	Material & Purchase Requisition of equipment	N	-	Y	Y
Document marked as ( ** ) are to be approved by authorized Third Party Inspection Agency and relevant Statutory Authorities, as applicable					
<b>HEAT EXCHANGERS</b>					
1.1	Mechanical Engineering Datasheet	N	Y	-	Y

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S.no.	Name of Document	With Bid	Drawings/Documents Required After Award of Contract		
			For review/ approval	For information	Final Approved/ As-built
1.2	General arrangement drawings indicating design data , fabricated equipment weight, general notes, nozzle schedule, details of shell, heads supporting arrangement , main weld seams ,nozzle orientation plan etc.	N	Y	-	Y
1.3	Tube bundle details & tube layout. Detail drawings	N	-	Y	Y
1.4	Details of nozzles and exchanger support	N	-	Y	Y
1.5	Details of gaskets	N	Y	-	Y
1.6	Heat exchanger detailed drawings and parts list	N	-	Y	Y
1.7	Mechanical design calculations complying with the specifications and codes.	N	Y	-	Y
1.8	For expansion bellow : Expansion bellow mechanical Design calculation along with detailed Drawings indicating design data, Component details, material Details, fabrication procedure, NDT Proposed, heat treatment Procedure e.t.c	N	-	Y	Y
1.9	List of spare parts with details, special accessories, tools & tackles, etc.	N	Y	-	Y
1.10	Name plate drawing detail along With name plate bracket	N	-	Y	Y
1.11	Approved certificate & approved Documents from statutory Authority (if applicable)	N	-	Y	Y
1.12	Manufacturer's Data Report	N	-	Y	Y
1.13	Final civil load data including details of foundation/anchor bolts	N	-	Y	Y
1.14	Welding procedure and qualification test reports ( ** )	N	-	Y	Y
1.15	Transportation drawing showing overall dimension, C.G. weight and handling instructions duly approved by appropriate authority (**)	N	-	Y	Y
1.16	Destructive and non destructive procedure & test reports (**)	N	-	Y	Y
1.17	Heat treatment, Hydrotest procedure and time temperature charts ( ** )	N	-	Y	Y





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**LEGEND: Y – Yes, N – No**

**Notes :**



1. Final documentation shall be supplied in both hard copy and soft copy formats, including Pen drive and CD. Applicable software formats include MS Office 2000—specifically Word, Access, and Excel.
2. Documents marked with (\*\*) shall be approved by the authorized Third Party Inspection Agency and relevant Statutory Authorities, as applicable.
3. Final documentation shall be provided in 6 hard copies, 2 soft copies on pen drives or CDs, and also submitted electronically via email.
4. All drawing & documents shall be submitted in A2/A3 or A4 paper size .Documents in higher paper size shall be submitted in exceptional circumstances or as indicated in MR/Tender.
5. Bill of material (showing part no. MOC, Size, quantity, weight of each part) shall form part of the respective drawing.
6. Each vendor drawing/data listed under “Review & Information” shall be reviewed by the LSTK Contractor to ensure strict compliance with the NIT Specification requirements. Such documents must bear the reviewer’s signature and seal of the Contractor prior to submission for PMC’s review, record, and final documentation. Drawings submitted without the Contractor’s review shall be returned. Any deviations from the Purchase Specifications must be clearly identified and submitted through Deviation Waiver Permits for PMC’s approval.
7. The Purchase Requisition shall be submitted only for Record purpose and same shall not be reviewed by PMC/Owner. The onus of complying tender requirement lies with the Contractor. Any comment on vendor document during detail engineering to meet tender requirement shall be complied by the contractor without any cost or schedule implication to Owner/PMC.
8. For proprietary equipment supplied by the Process Licensor, the LSTK Contractor shall submit, at a minimum, the Licensor’s specifications, ITP, GA drawings, design calculations, civil foundation load details, and detailed drawings (excluding proprietary details of the Licensor) for PMC/Owner information and review during execution.
9. Mechanical Design of equipments shall be done on internationally reputed software such as PV-Elite etc. No hand calculations are acceptable  
Strength calculation shall be performed in latest version of PV-elite software. LSTK contractor/ Vendor shall send soft copy of PV-elite (.pvdb file) along with equipment document submission during detail engineering to PMC/Owner.

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**ROTATARY:**

**LIST OF DRAWINGS & DOCUMENTS:**

Sl No.	Description	With Bid (Y/N)	For Review/ Approval	For Information	Final/ Approved/ As-built
A.	Pumps				
1.0	List of drawings / documents including drawing number, revision number, description and approval status	N	Y	-	Y
2.0	Detailed manufacturing programme (Time bar chart )	N	Y	-	Y
3.0	Certified dimensional outline drawing	Y	Y	-	Y
4.0	Cross sectional drawing and bill of material	N		Y	Y
5.0	Shaft seal drawing and bill of material	N	Y	-	Y
6.0	Shaft coupling assembly drawing and bill of materials including allowable misalignment clearances, shaft bores & key ways dimensions with tolerances and the style of coupling guard	N	Y	-	Y
7.0	Primary & auxiliary sealing schematic and bill of materials including seal fluid, fluid flows, pressure pipe and valve sizes, instrumentation, orifice sizes, and piping arrangement drawings	N	Y	-	Y
8.0	Cooling or heating schematic and bill of materials including cooling & heating media, fluid flows, pressure, pipe and valve sizes, instrumentation, orifice sizes and piping arrangement drawings	N	Y	-	Y
9.0	Lube oil schematic and bill of materials	N	Y	-	Y
10.0	Lube oil system arrangement drawing including sizes, rating and location of all customer connections	N	Y	-	Y
11.0	Lube oil component drawings data	N	Y	-	Y
12.0	Electrical and instrumentation schematics, wiring diagrams and bill of materials	N	Y	-	Y
13.0	Electrical and instrumentation arrangement drawing and list of components	N	Y	-	Y
14.0	Performance curves	N		Y	Y
15.0	Pump specification sheet with complete details in Performance enclosed with enquiry / order	N	Y	-	Y

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16.0	Certified foundation assembly drawing of pump with driver & all accessories mounted on base plate with load diagram for foundation design (In case of motor being procured by purchaser, motor frame details will be supplied to vendor within 4 weeks.)	N	Y	-	Y
17.0	Engineering flow diagram showing: - Lubrication & sealing lines - Flushing / washing lines - Cooling / steam lines	N	Y	-	Y
18.0	Reference list for pumps supplied in past for similar duty conditions. Reference list shall contain complete address of user, user's purchase order number, brief specifications and date of commissioning , if owner desires		Y	-	
19.0	Lube oil schedule	N	-	-	Y
20.0	Automatic recirculation valve assembly drawing, sectional drawing with bill of material	N	Y	-	Y
21.0	Quality Assurance Plan / Inspection test plan	N	Y	-	-
22.0	Material test certificates and Inspection & performance test report along with dispatch clearance certificates from inspector	N	-	-	Y
23.0	Instruction manuals describing installation, operation and maintenance procedures	N	-	-	Y
24.0	Spare parts list		Y	-	Y
25.0	Parts catalogue complete with reference drawing nos. and sketches etc.	N	-	-	Y
B.	COMPRESSORS				
1.0	List of drawings / documents including drawing number, revision number, description and approval status	N	Y	-	Y
2.0	Detailed manufacturing programme (Time bar chart )	N	Y	-	Y
3.0	Specification sheet complete filled in PDIL proforma enclosed with enquiry/order.	N	Y	-	Y
4.0	Equipment layout with main overall dimensions including those required for foundations and piping design for compressor and auxiliaries. (This layout shall include the driven equipment and its auxiliaries).	Y	Y	-	Y
5.0	Performance curves for Centrifugal compressor :	N		Y	Y

















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	curves curve showing variation of exhaust temperature with inlet flow (i.e. under various loads) : - for change in live steam pressure - for change in live steam temperature - for change in speed from governor set point speed to max. continuous speed - for change in cooling water inlet temperature from 25°C to 35°C				
6.0	Thrust loading curves of each casing / barrel for various operating conditions	N	-	Y	Y
7.0	Overall dimensional drawing with all main dimensions, size and location of piping connections for turbine and its auxiliaries.	N	Y	-	Y
8.0	Cross sectional drawings of the turbine showing details of construction including governor, inlet trip and control valves sealing details, bearing details etc. With part no., description and material of construction.	N		Y	Y
9.0	Description of governing system	N	-	Y	Y
10.0	Blading plan for turbine	N	-	Y	Y
11.0	Coupling drawings	N	-	Y	Y
12.0	a) Engineering Flow diagram indicating all the Instruments with limit of supply of steam and condensate lines, lube and control oil lines, Flushing and washing line and cooling water lines. b) Material balance for steam condensate, lube & control oil.	N	Y	-	Y
13.0	Certified civil scope drawings for foundation of steam turbine and all auxiliaries.	N	Y	-	Y
14.0	Piping layout plan, elevation and support drawings for steam and condensate lines, lube and control oil lines, gland sealing steam lines, flushing and washing lines.	N	Y	-	Y
15.0	a) Piping isometrics for steam pipes for DN>20, piping manifold and all oil lines b) Flexibility analysis for steam lines	N	Y	-	Y
16.0	Piping support location drgs. With forces, moments and movements for steam and condensate pipes and with	N	Y	-	Y



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	weights for all lines				
17.0	Certified allowable forces, moments, movements, stresses for turbine nozzles.	N	-	Y	Y
18.0	Calculation of the lateral critical speeds of the turbines, Campbell diagram and Goodman diagram.	N	-	Y	Y
19.0	Bill of materials for piping and supports.	N	Y	-	Y
20.0	Bill of materials for insulation for piping.	N	Y	-	Y
21.0	Bill of quantity for painting for piping, equipments and auxiliaries.	N	Y	-	Y
22.0	Thermal calculation for heat exchangers, Mechanical calculation and fabrication drawings for heat exchangers and pressure vessels.	N	Y	-	Y
23.0	Instruction and Maintenance manual for erection & maintenance of turbine and its accessories (important clearances to be maintained should be clearly specified.).	N	-	-	Y
24.0	Cross sectional drawings of the Barring gear.	N	-	Y	Y
25.0	Lubrication schedule	N	-	-	Y
26.0	Inspection and Test Procedure.	N	-	-	Y
27.0	Quality Assurance Plan / Inspection test plan	N	Y	-	Y
28.0	Inspection and test reports, material test certificates, radiographic reports duly approved by specified inspecting authority.	N	-	-	Y
29.0	Reference list for Turbines supplied in past for similar duty conditions. Reference list shall contain complete address of user, user's purchase order number, brief specifications and date of commissioning , if owner desires		Y	-	-
30.0	Spare parts list		Y	-	Y
31.0	Parts catalogue complete with reference drawing nos. and sketches etc.	N	-	-	Y
D.	<b>FANS &amp; BLOWERS</b>				
1.0	Specification sheets completely filled in proforma.	N	Y	-	Y
2.0	Characteristic Curves - Performance curves, showing discharge pressure, capacity, and brake horse power at the inlet specified conditions (Pressure, capacity, temperature, molecular	N		Y	Y

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	weight).				
3.0	Spare parts list		Y	-	Y
4.0	Details of Lubrication and sealing system	N	-	-	Y
5.0	Data for selection of motor :	N	Y	-	Y
	a) Type				
	b) HP absorbed at duty point				
	c) RPM				
	d) Recommended HP				
	e) Max. starting torque as % NRT				
	f) GD2 figure for rotating mass of the Fan / Blower				
	g) Speed vs. Torque for the Fan / Blower				
6.0	General Arrangement Drawing with all main dimensions, size and location of connections for ducting with all horizontal & vertical clearance necessary for installation and disassembly.	N	Y	-	Y
7.0	Cross sectional drawing of fan with parts list	N		Y	Y
8.0	Instruction manual for erection, installation operation and maintenance of fan and its accessories (Important clearances to be maintained should be clearly specified).	N	-	-	Y
9.0	Quality Assurance Plan / Inspection test plan	N	Y	-	Y
10.0	Lubrication schedule	N	-	-	Y
11.0	Reference list indicating duty condition, location, year of installation, name of client, if owner desires		Y	-	-
12.0	GA drawing with all details & dims. Including fan, drive, motor	Y	Y	-	Y
13.0	Description of capacity control with details	Y	-	-	Y
E.	AGITATORS				
1.0	Specification sheets completely filled in PDIL proforma.	N	Y		Y
2.0	General Arrangement Drawing with all main dimensions, size and location of connections for installation and disassembly.	N	Y		Y
3.0	Spare parts list		Y		Y
4.0	Details of Lubrication and sealing system	N	-	-	Y
5.0	Instruction manual for erection, installation operation and maintenance of fan and its accessories (Important clearances to be maintained should be clearly	N	-	-	Y



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## **MATERIAL HANDLING:**

### **LIST OF DRAWINGS & DOCUMENTS:**

This chapter details out various drawings and documents to be generated at various stages during the course of execution of the Project by the LSTK Contractor for different project activities. Categorization of the documents/ drawings for review/ information/ records of PMC and the review/ approval requirements of the Owner/ PMC along with routing of the documents/ drawings will be conveyed separately as a philosophy.

The efficient handling of drawings and documents to be prepared by the LSTK Contractor under the contract is the key to the timely completion of the plants. The LSTK Contractor undertakes to ensure that all drawings and documents to be submitted by him to the Owner/ PMC shall be of professional quality and conforming to the contractual requirements. The LSTK Contractor also undertakes to institute a formal drawing control system which will be documented and submitted to the Owner/PMC for review or approval.



Compliance of this chapter on drawings and documents is mandatory and is non-negotiable.

The drawings / documents are to be generated by the LSTK Contractor at various stages of the project covering different activities. The drawings / documents generated will be in the category of Approval/ Review/ Information. The list of drawings and documents required is enclosed; however, the categorisation for the drawings/ documents will be informed separately. However, this will in no way relieve the LSTK Contractor of responsibility to conform to drawings, standards, specification, codes and contractual requirements / obligations.

The LSTK Contractor shall prepare the drawing numbering procedure and submit to Owner/ PMC for approval. Each Drawing submitted by the LSTK Contractor shall be clearly marked with the name of the Owner, PMC with revision number & date. It should contain the minimum following details:

- d. Size of Drawing.
- e. Discipline of Engineering for which the drawing is issued.
- f. Discipline wise segregation of numbering sequence for example:  
100 Series for Process. 200 Series for Mechanical etc.

LSTK Contractor to note that the number corresponds to Coal Gasification plant and shall be prefixed to all related documents/deliverables which shall be indicated to successful bidder.

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**For Details of the Drawing and Documents submission and tools to be used for generating these documents, LSTK contractor is requested to refer Part- B of Section -9 of the NIT.**

All other documents like presentations etc. and other data shall be in MS Office; the required operating system for Data Exchange shall be at least Windows.

All documents before forwarding to Owner/PMC will have to be vetted in detail by the LSTK Contractor/duly approved engineering sub-contractor appointed by the LSTK Contractor. Document received without vetting will be returned.

The review by the PMC/Owner shall not be construed by the LSTK Contractor, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and drawings.


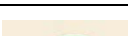
Each drawing submitted by the LSTK Contractor shall be clearly marked with the name of the Owner, Unit Designation, Specifications, Title, Specification number and the name of the Project with Revision number and date. If standards, catalogue pages are to be submitted, the applicable items shall be indicated therein. All titles, noting, markings and writings on the drawings shall be in English.

All the dimensions should be in metric units. Upon receiving comments on Drawings & Documents by the LSTK Contractor, the subsequent submission should give compliance report, separately on each of the comments, document-wise. Comments given by PMC/Owner to be discussed and finalised within agreed schedule.

The schedule of submission of the Drawings & Documents shall be in accordance with project plans only. The detailed list under different category, document-wise, shall be prepared by the LSTK Contractor for approval of Owner/PMC. This activity is to be completed within one month of Fax of Intent.

Sequence of submission of drawing is essential for proper review of documents and timely completion of the project is to be adhered. In case sequence is not maintained, the documents submitted will not be reviewed by Owner/ PMC and responsibility of timely execution of plant shall be to the LSTK Contractor's account.



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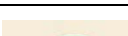
## 2.0 CATEGORY OF DOCUMENTS

Category	Description	Action by Owner/ PMC
1	Records/ Information	LSTK Contractor can continue to progress with the work. This drawings or documents will be retained with Owner/PMC for information only. Owner/ PMC reserves the right to advise the LSTK Contractor of any comments (deviations from the contract) at any time and the LSTK contractor is liable to respond to satisfy that the work being done is in accordance with the contract; deviations, if any will be bidder's risk and cost.
2	Review	Owner/PMC will review and advise the LSTK Contractor of any Comments on Contractor's Drawings / documents within specified schedule (ie 2 weeks), from date of receipt in PMC office of LSTK Contractor's drawings/documents. The review period is defined as date of receipt of documents by PMC, to date of issue of comments by PMC. This review period shall be valid only if submission of drawings is done by LSTK Contractor in accordance with approved drawings / documents schedule as indicated in ITB. In case of any non-conformity to the above by LSTK Contractor due to which the period of review extends beyond 2 weeks by the PMC, schedule delay, if any will have to be absorbed by the Contractor.

The documents falling under Review category will be returned with comments within specified time schedules subject to fulfilling other conditions enumerated. The information category document will be retained for information only but however Owner/PMC reserves the right to comment at any stage of the Project, but not later than two weeks of receipt.

Where clearance of Owner/ PMC is required for ordering of equipment materials, enquiry documents and one technically selected offer is to be submitted for review. The unpriced copies of purchase orders detailing both technical and commercial aspects for all items shall be submitted to PMC/ Owner within 15 days of issue of the same.



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Each purchase order forwarded should contain complete technical documents. It is obligatory for the LSTK Contractor to obtain acceptance on all the technical documents and accepted copy only to be forwarded to Owner / PMC. Any inaccuracies /omissions/inconsistencies noticed and brought to the notice of the LSTK Contractor at any stage of the project will be rectified/ replaced by LSTK Contractor without any cost & time implication to the Owner/ PMC.

Detailed manufacturing schedules of fabricated/ manufactured items shall be submitted within one month of ordering, Status report for all the items in detail, will be submitted once in a month.

Documents to Boiler Regulation authorities shall be submitted and getting the documents reviewed by PMC/Owner. To any other agencies, documents shall be submitted under intimation to PMC/Owner.



As built drawings and documents will be generated within one month of completion of activities on respective items of work.

**As Built Drawings:**

LSTK Contractor will furnish reproducible and electronic files of all the drawings under their scope to Owner / PMC, certified as “As-Built Issue” by Third Party Inspection Agency (TPIA) for Vendor Items coming under Third Party Inspection / LSTK Contractor for all other drawings.

Upon completion of identifiable units or components of the fabrication, construction and installation phase of the project the Contractor will complete all the related plans to the "as built" stage including all Vendor drawings and furnish Owner/PMC with the following:

- I. One complete set of all original tracings copies.
- m. One complete set of reduced size (A3-297x420 mm) copies of all drawings.
- n. One set of CD for all documents/drawings/data
- o. All the as built drawings duly certified should be scanned and converted into electronic files made on magnetic/discs/optical long storage.
- p. All other project documents such as operating and maintenance manuals, manufacturers' Catalogues etc. shall also be scanned on magnetic/optical discs for safe storage and retrievals by the Owner when needed.
- q. 10 complete sets of full size prints of the drawings and 4 sets of reduced size prints.
- r. 10 complete bound sets of Manufacturer's specifications including design calculations.
- s. 10 complete sets in hard binders of the Manufacturers data book including certified prints and data

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for all items including test reports. Data Books shall be complete with index as tag numbers associated with Manufacturer's data shown. Equipment data shall include as a minimum requirement the principal and description of operation, drawings and dimensions, spare parts lists and un-priced purchase orders and bill of material.

- t. 10 bound copies each of the Spare Parts data books and the Lubricants inventory Schedule.
- u. 10 complete sets of field records shall be signed by both the Contractor's and Owner's Representative at the site.
- v. Original approvals and related drawings and documents from the statutory authority.
- w. Copies of correspondence with the statutory authorities.



### 3.0 PROCEDURE

The procedure for compilation of final as-built documents / drawings shall be informed later. However the Procedure for routing the final / as built documents/ drawings to PMC / Owner shall be informed during the execution stage.



### 4.0 LIST OF DRAWINGS & DOCUMENTS

S. No	Description	With Bid (Y/N)	For Review/ Approval	For Information	Final/ Approved/ As-built
<b>A.</b>	<b>MATERIAL HANDLING</b>				
1.	Overall plot plan	Y	Y	-	Y
2.	Scheme / Layout drg. Of Coal and Ash Handling system	Y	Y	-	Y
3.	PFD of Coal and Ash Handling System	Y	Y	-	Y
4.	GA Drawings of all the Coal and Ash handling System equipments along with detail specification of each equipment.	N	Y	-	Y
5.	Mechanical G.A drg. of all buildings (e.g. Silo, Transfer Tower building etc.) showing Coal and Ash handling equipments	N	Y	-	Y



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7.0	Cable schedule.	N	--	Y	Y
8.0	Cable rack / trench / pipe layout.	N	Y	-	Y
9.0	Power Layout.	N	-	Y	Y
10.0	Schematic diagram for all control panel & switch boards.	N	-	Y	Y
11.0	Feeder Details of all switch boards	N	Y	-	Y
12.0	Interconnection & Terminal connection diagram	N	-	Y	Y
13.0	List of controls, interlocks, indication & metering at various locations for all drives.	N	-	Y	Y
14.0	Characteristic curves for motor/ relays etc.	N	-	Y	Y
15.0	Sizing Calculations for Electrical System and Equipment.	N	Y	-	Y
16.0	Design calculations (for system design and equipment sizing, earthing, lighting, cables, bus ducts etc.)	N	Y	-	Y
17.0	Earthing and lightning protection layout	N	Y	-	Y
18.0	Lighting layout and Distribution diagram	N	Y	-	Y
19.0	Drawings and documents asked for each equipment as per respective Technical Specifications	N	Y	-	Y
20.0	Control & operation write up/Block logic diagrams.	N	-	Y	Y
21.0	Catalogues for all bought out items	N	-	Y	Y
22.0	Bill of Materials covering all electrical equipment and installation materials	N	-	Y	Y
23.0	Installation operation and maintenance(Manual)	N	-	-	Y
24.0	System study Report	N	-	Y	Y
25.0	Spare Parts list	N	-	Y	Y
26.0	Test Certificates	N	-	Y	Y
27.0	Guarantee Certificates	N	-	Y	Y
28.0	Quality Assurance Plan & Formats	N	Y	-	Y
29.0	Hazardous area Classification Drawing	Y	Y	-	Y
30.0	Erection Drawings & Details	N	Y	-	Y
31.0	Construction & Commissioning specification and procedure for	N	-	Y	Y

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	all equipment.				
32.0	Any other drawings & data as required for satisfactory installation, operation & maintenance.	N	Y	Y	Y

#### INSTRUMENT:

#### LIST OF DRAWINGS & DOCUMENTS:

Sl.No	Description	With Bid (Y/N)	For Review/ Approval	For Information	Final/ Approve d/ As-built
1	Drawing & document schedule	N	Y	-	Y
2	Instrument Index	Y	-	Y	Y
3	Instrument sizing calculations (control vales, safety valves & flow elements)	N	Y	-	Y
4	Utility requirements	Y	Y	-	Y
5	Level sketches	N	-	Y	-
6	Material Requisition	N	Y	-	Y
7	Purchase Requisition	N	-	Y	-
8	Vendor Drawings	N	Y	Y	Y
9	Functional Schematic	N	-	Y	-
10	Logic Diagrams as per ISA 75.2	N	-	Y	-
11	Instrument loop drawings	N	-	Y	-



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27	Installation, operation & maintenance manuals	N	-	Y	-
28	As Built Drawings	N	-	Y	Y

Note: \* Indicates number of sets shall be as mentioned in the main NIT.

- Above list is indicative and minimum requirement. PMC/Client may ask any document / drawing post order which shall be absolutely essential to review/approval the instrumentation scope of work as per NIT / process requirements.

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## PART II: TECHNICAL

### SECTION - 10



#### SPARE PARTS

**PLANT:** COAL GASIFICATION PLANT FOR GENERATING SYNTHETIC NATURAL GAS

**PROJECT:** SYNTHETIC NATURAL GAS PRODUCTION THROUGH COAL GASIFICATION ROUTE AT BARDAHMAN, WEST BENGAL (INDIA).

0	30.09.2025	16.09.2025	Issued for tender purpose	SK	TNN	MN
REV	REV DATE	EFF DATE	PURPOSE	PREPD	REVWD	APPD





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2.1	Process Items	3
2.2	Centrifugal / Axial / Rotary Compressor	3
2.3	Reciprocating Compressor	5
2.4	Screw Compressor	6
2.5	Centrifugal Fan	7
2.6	Steam Turbine	7
2.7	Centrifugal Pump	9
2.8	Reciprocating Pump	9
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2.14	Material Handling items	32
2.15	Fire Fighting	37
3.0	Vendor recommended spare parts	37

### LIST OF ATTACHMENTS

Attachment Number	Description	Number of Sheets

	<div><div><div><b>COAL GASIFICATION PLANT FOR PROPOSED COAL TO SYNTHETIC NATURAL GAS</b></div><div><b>OWNER: COAL GAS INDIA LIMITED</b></div><div><b>SPARE PARTS</b></div></div></div>	PC217/E/001/P-II/SEC-10	0	
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## 1.0 SPARE PARTS FOR COMMISSIONING

LSTK Contractor shall supply free of cost (Include in the scope) spare parts and Consumables required during Pre-commissioning & Commissioning of the plants until the plant is handed over to the Owner after Performance Guarantee / 6 months supervisory operation and final acceptance of the plant Test as per mutual understanding of Contractor, Owner and PMC.

However, LSTK Contractor shall provide Pre-Commissioning and Commissioning Spare List along with their Bid.

## 2.0 MANDATORY / INSURANCE SPARE PARTS

LSTK Contractor shall supply mandatory spare parts of the plant as detailed below.



- a) Process Items
- b) Centrifugal / Axial / Rotary Compressor
- c) Reciprocating Compressor
- d) Screw Compressor
- e) Centrifugal Fan
- f) Steam Turbine
- g) Centrifugal Pump
- h) Reciprocating Pump
- i) Metering Pump
- j) Static Equipments
- k) Piping items
- l) Electrical items
- m) Instrument items
- n) Material Handling items

## MANDATORY SPARE PARTS

### 2.1 Process Items

S. No.	DESCRIPTION	QUANTITY
1.	Catalysts, Adsorbents	10% of full charge
2.	Tower Packings	10% of full charge

**Note:** Catalyst life shall be as per the guaranteed performance criteria in Technical ITB Section 8.0

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## MANDATORY SPARE PARTS:

### Rotary Items:



LSTK Contractor shall supply mandatory spare parts as per list of spares as detailed below:

- 2.2 Centrifugal / Axial / Rotary Compressor
- 2.3 Reciprocating Compressor
- 2.4 Screw Compressor
- 2.5 Centrifugal Fan
- 2.6 Steam Turbine
- 2.7 Centrifugal Pump
- 2.8 Reciprocating Pump
- 2.9 Metering Pump
  - Agitator
  - HVAC
  - EOT

## 2.2 Centrifugal/ Axial/ Rotary Compressor:

The mandatory spares to be supplied for each working train /unit shall be as under.

Sl. No.	DESCRIPTION	QUANTITY
<b>1.0</b>	<b>Compressor</b>	
1.1	Completely assembled dynamically balanced spare rotor including clearance check and mechanical run test	1 set
1.2	Complete spare coupling including distance piece and set of coupling bolts & nuts	1 set
1.3	Stator blade carrier with stator blades completely assembled ( for axial compressor)	1 set
1.4	Complete set of radial bearing ( Both suction & discharge side )	1 set
1.5	Complete set of Pads for radial bearing with built-in temperature elements ( Both suction & discharge side )	1 set
1.6	Complete set of thrust bearings ( Both active & inactive sides )	1 set
1.7	Complete set of Pads for thrust bearings with built-in temperature elements ( Both active & inactive sides )	1 set
1.8	Complete set of labyrinth seals for each casing including labyrinths for balance piston , oil scraper rings etc.	1 set
1.9	Complete set of Dry Gas Seals & assembly (if applicable)	1Set
1.10	Complete set of all oil seals	2 sets
1.11	Complete set of 'O' rings, gaskets, sealing rings for compressor	4 sets
1.12	Sealing compound	1 charge



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1.13	Timing gears for Rotary Compressor	1 set
<b>2.0</b>	<b>Gear Box</b>	
2.1	Complete set of bearings for gear box including driver end, intermediate stages and driven end	2 sets
2.2	Complete set of all gear wheels with shaft	1 set
2.3	Complete set of all Oil seals	2 sets
<b>3.0</b>	<b>Gas Coolers</b>	
3.1	Spare tubes for each cooler	5% of total tubes
3.2	Rupture disc for each cooler	2 nos
3.3	Set of all gaskets for each cooler	2 sets
<b>4.0</b>	<b>Lube Oil System</b>	
4.1	Spares for lube oil pump :	
	a) gears with Shaft	1 set
	b) complete set of bearings	1 set
	c) complete set of seal	2 sets
4.2	Lube oil filter cartridges	4 sets
<b>5.0</b>	<b>Accessories</b>	1 set
5.1	Set of spares for all valves ( Isolation, control, safety, non return etc.) in gas lines consisting of spindle, seat , disc, flap, packing , fasteners etc.	1 set
5.2	Spare elements for permanent filters in gas line	1 set
5.3	Complete Set of inlet air Filters for Air compressor, as applicable	2 sets
<b>6.0</b>	<b>Instrumentation</b>	
	As per Instrumentation specification enclosed with enquiry / order specification.	
<b>7.0</b>	<b>Electrical</b>	
	As per Electrical specification enclosed with enquiry / order specification.	

### 2.3 Reciprocating Compressor:

The mandatory spares to be supplied for each working train /unit shall be as under.

Sl. No.	DESCRIPTION	QUANTITY
<b>1.0</b>	<b>Compressor</b>	
1.1	Main bearings	1 set
1.2	Crankshaft journal bearings	1 set
1.3	Big end bearing	1 set
1.4	Cross head pin bearings	1 set
1.5	Complete Set of Connecting rod with fasteners	1 Set of each size
1.6	Complete Set Cross head body & guide assembly with fasteners	1 set of each size
1.7	Piston assembly complete with piston rod, piston, piston rings & lock nut etc. for each stage	1 set
1.8	Piston rings for each piston	2 sets
1.9	Complete stuffing box internal packing	1 set
1.10	Oil slinger ring	1 set
1.11	Liner for each stage	1 set



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1.12	Complete inlet valves assembly with internals for each cylinder	1 set
1.13	Complete discharge valves assembly with internals for each cylinder	1 Set
1.14	Complete Set of all Gasket and O-Ring .	2 sets
<b>2.0</b>	<b>Gas Coolers</b>	
2.1	Tubes for gas cooler	1 set
2.2	Tubes for oil cooler (when tube are easily replaceable)	5 % for each cooler
2.3	Complete set of Gaskets for coolers & pressure Vessels	2 sets
<b>3.0</b>	<b>Lube Oil System</b>	
3.1	Spares for lube oil pump :	
	a) gears with Shaft	1 set
	b) complete set of bearings	1 set
	c) complete set of seal	2 sets
3.2	Lube oil filter cartridges	4 sets
3.3	Cylinder lubrication system :	
	a) Complete set of Lubricator bearings	1 set
	b) Pumping unit assembly	1set
	c) Check valves of each size	1 set of each size
	d) Sight glass	1 set
<b>4.0</b>	<b>Accessories</b>	1 set
4.1	Set of spares for all valves ( Isolation, control, safety, non return etc.) in gas lines consisting of spindle, seat , disc, flap, packing , fasteners etc.	1 set
<b>5.0</b>	<b>Instrumentation</b>	
	As per Instrumentation specification enclosed with enquiry / order specification.	
<b>6.0</b>	<b>Electrical</b>	
	As per Electrical specification enclosed with enquiry / order specification.	

## 2.4 Screw Compressor :

The mandatory spares to be supplied for each working train /unit shall be as under.

Sl. No.	DESCRIPTION	QUANTITY
<b>1.0</b>	<b>Compressor</b>	
1.1	Completely assembled dynamically balanced spare rotor including clearance check and mechanical run test	1 set
1.2	Complete spare coupling including distance piece and set of coupling bolts & nuts	1 set
1.3	Complete Set of radial bearings (Both suction & discharge side)	1 set
1.4	Complete Set of Pads for radial bearings (Both suction & discharge side)	1 set
1.5	Complete Set of thrust bearings (both active & inactive sides), if applicable.	1 set
1.6	Complete Set of Pads for thrust bearings (both active & inactive sides), if applicable.	1 set



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1.7	Complete Set of Mechanical seal	1 set
1.8	Complete Set of oil seals	2 sets
1.9	Complete Set of 'O' rings, gaskets, sealing rings. for compressor	4 sets
<b>2.0</b>	<b>Oil System</b>	
2.1	Spare for oil pump	
	- Complete rotating assembly	1 set
	- Bearings	1 set
	- Oil seal	1 set
	- Gaskets & 'O' rings	2 sets
2.2	Cartridge for oil filter	4 sets
2.3	Gaskets for Oil cooler	2 sets
<b>3.0</b>	<b>Gear Box</b>	
3.1	Set of bearings for gear box including drive end, intermediate stages & driven end	2 sets
3.2	Set of spare wheels & shaft	1 set
3.3	Complete Set Oil seals	2 sets
<b>4.0</b>	<b>Accessories</b>	
4.1	Set of spares for all valves ( Isolation, control, safety, non return etc.) in gas lines consisting of spindle, seat , disc, flap, packing , fasteners etc.	1 set
4.2	Spare elements for permanent filters in gas line	1 set
<b>5.0</b>	<b>Instrumentation</b>	
	As per Instrumentation specification	
<b>6.0</b>	<b>Electrical</b>	
	As per Electrical specification enclosed with enquiry / order specification.	

## 2.5 Centrifugal Fan:

The mandatory spares to be supplied for each working train /unit shall be as under.



Sl. No.	DESCRIPTION	QUANTITY
1.0	Completely dynamically balanced rotor assembly including impeller, wheel, key etc.	1 Set
2.0	Shaft sleeve	1 Set
3.0	Complete set of all Bearings	1 Set
4.0	Stuffing box packing rings	1 Set
5.0	Complete set of all Gasket & 'O' rings	1 Set
6.0	Complete mechanical seal , if applicable	1 Set
7.0	Coupling bushes	1 Set
8.0	Complete set of coupling with elements	1 Set.
<b>9.0</b>	<b>Instrumentation</b>	
	As per Instrumentation specification	
<b>10.0</b>	<b>Electrical</b>	
	As per Electrical specification enclosed with enquiry / order specification.	

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## 2.6 Steam Turbine :

The mandatory spares to be supplied for each working train /unit shall be as under

Sl. No.	Description	Quantity
<b>1.0</b>	<b>Turbine</b>	
1.1	Completely assembled dynamically balanced rotor	1 set
1.2	Inlet nozzles complete set	1 set
1.3	Complete set of Journal bearing with internals	1 set
1.4	Complete set of Journal bearing Pads	1 set
1.5	Complete set of Thrust bearing with internals	1 set
1.6	Complete set of Thrust bearing Pads	1 set
1.7	Shaft seal carbon labyrinth	2 sets
1.8	Labyrinth seal	2 sets
1.9	Complete Set coupling with all internals/element for turbine & gear box	1 set
1.10	Governor assembly	1 set
1.11	Control valve & servo spares	1 set
1.12	Complete spares for HP/LP servomotor piston kit	2 sets
1.13	Emergency stop valve spare / pilot valve spare	1 set
1.14	Over speed trip spare	1 set
1.15	Thrust collar assembly	1 set
1.16	Sealing compound for parting plane	2 sets
1.17	Shaft driven Lube oil pump complete set	1 set
1.18	Complete Set of Oil seals & gaskets	1 set
<b>2.0</b>	<b>Gear Box Spares</b>	
2.1	Pinion & gears	1 set
2.2	Bearings complete set	1 set
2.3	Shaft seal complete set	2 sets
2.4	Complete set of 'O' ring, gaskets , Oil seals	2 sets
<b>3.0</b>	<b>Lube Oil System</b>	
3.1	Pump complete	1 set
3.2	All bearings	1 set
3.3	Internal gear / screw	1 set
3.4	Mech. seal complete	1 set
3.5	Pump Shaft	1 set
3.6	Set of Coupling , bolts, nuts & washer	1 set
3.7	Relief valve complete assembly with internal	1 set
3.8	Plug & seat for relief valve	1 set
3.9	Spring & stem for relief valve	1 set
3.10	Set of gaskets for each cooler	2 sets
3.11	Lube oil filter cartridges	3 sets
<b>4.0</b>	<b>Instrumentation</b>	
	As per Instrumentation specification	



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<b>5.0</b>	<b>Electrical</b>	
	As per Electrical specification enclosed with enquiry / order specification.	

## 2.7 Centrifugal Pump:



Sl. No.	Description	Quantity			
		No. of Pumps working			
		1	2	3	4
1.1	Impeller	1 set	1 set	1 set	1 set
1.2	Impeller locking nut	2 sets	2 sets	2 sets	2 sets
1.3	Wear Rings complete set	1 set	2 sets	3 sets	4 sets
1.4	Shaft with keys	1 No.	1 No.	1 No.	1 No.
1.5	Shaft Sleeve	1 set	2 sets	3 sets	4 sets
1.6	Interstage sleeves	1 set	2 sets	3 sets	4 sets
1.7	Interstage Bushes	1 set	2 sets	3 sets	4 sets
1.8	Complete Set of Mech. Seal where applicable	1 set	1 set	2 sets	2 sets
1.9	Constant level Oiler	2 sets	2 sets	2 sets	2 sets
1.10	Deflectors	2 sets	2 sets	3 sets	3 sets
1.11	Complete set of coupling with element and fasteners	1 set	1 set	2 sets	2 sets
1.12	Complete set of all Bearings	1 set	2 sets	2 sets	2 sets
1.13	Complete set of Gaskets & 'O' Rings	2 sets	3 sets	4 sets	6 sets
1.14	Labyrinths	2 sets	3 sets	4 sets	5 sets
1.15	Throat Bushing	1 No.	2 Nos.	3 Nos.	4 Nos.
1.16	Throttle Bushing	1 No.	2 Nos.	3 Nos.	4 Nos.
1.17	Complete set of Oil Seals	2 sets	3 sets	4 sets	6 sets
1.18	Balancing drum & sleeves, as applicable.	1 set	1 set	2 sets	2 sets
1.19	Leak-off valve-gaskets, 'O' Rings and springs	2 sets	3 sets	4 sets	5 sets
1.20	Spares for gear box ( complete set of bearings, all gears wheels with shaft and seals)	1 set	1 set	1 set	1 set
<b>2.0</b>	<b>Instrumentation</b>				
	As per Instrumentation specification				
<b>3.0</b>	<b>Electrical</b>				
	As per Electrical specification enclosed with enquiry / order specification.				



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## 2.8 Reciprocating Pump:



SI No.	Description	Quantity			
		No. of Pumps working			
		1	2	3	4
<b>A</b>	<b>Main Frame</b>				
1.	Main Bearings	1 set	1 set	1 set	1 set
2.	Big End Bearings	1 set	1 set	1 set	1 set
3.	Thrust Bearings	1 set	1 set	2 sets	2 sets
4.	Crosshead shoes	1 set	1 set	1 set	1 set
5.	Crosshead bushes	1 set	1 set	1 set	1 set
6.	Connecting rod with complete Fasteners for all size	2 sets.	2 sets	4 sets	4 sets
7.	Crank shaft	1 No.	1 No.	1 No.	1 No.
8.	Lube oil pump	1 No.	1 No.	1 No.	1 No.
9.	Spare parts for lube oil pump (set of gears, bushes, gaskets etc.)	1 set	1 set	2 sets	2 sets
10.	Cartridge for oil filter.	2 Nos.	2 Nos.	4 Nos.	4 Nos.
11.	Special gaskets, oil seals, 'O' rings, special bolts etc.	2 sets	2 sets	4 sets	4 sets
<b>B</b>	<b>Fluid End</b>				
1.	Cylinders	1 No.	1 No.	2 Nos.	2 Nos.
2.	Plungers / piston & piston rod assembly, piston rings (if applicable)	1 set	1 set	1 set	1 set
3.	Stuffing box Packings	2 sets	2 sets	4 sets	4 sets
4.	Plunger Packings	2 sets	2 sets	4 sets	4 sets
5.	Complete set of Suction valve & seat	1 set	2 sets	3 sets	4 sets
6.	Complete set of Discharge valve & seat	1 set	2 sets	3 sets	4 sets
7.	Flushing pump (if applicable)	1 No.	1 No.	1 No.	1 No.
8.	Spares for flushing pump.	1 set	1 set	2 sets	2 sets
	- Plunger - Plunger Packings - Valves - Gaskets				
9.	Special gaskets, springs, 'O' rings, and ring nuts for stuffing box packing, cylinder bolts.	2 sets	2 sets	4 sets	4 sets
<b>C</b>	<b>Gear Reducer (If Applicable)</b>				
	Spares for gear box ( complete set of bearings, all gears wheels with shaft and seals)	1 set	1 set	2 sets	2 sets
<b>D</b>	<b>Lube Oil Coolers (If Applicable)</b>				
1.	Special gaskets, if any	2 sets	2 sets	4 sets	4 sets
2.	Spare tubes.	10 %	10 %	10 %	10 %
<b>E.</b>	<b>Instrumentation</b>				
	As per Instrumentation				

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	specification				
<b>F.</b>	<b>Electrical</b>				
	As per Electrical specification enclosed with enquiry / order specification.				

## 2.9 Metering Pump:

Sl. No.	Description	Quantity			
		No. of Pumps working			
		1	2	3	4
<b>A</b>	<b>POWER END</b>				
1.	Main Bearings	1 set	1 set	1 set	1 set
2.	Big End Bearings	1 set	1 set	1 set	1 set
3.	Crosshead shoes	1 set	1 set	1 set	1 set
4.	Crosshead bushes	1 set	1 set	1 set	1 set
5.	Connecting rod with complete Fasteners for all size	2 sets.	2 sets	4 sets	4 sets
6.	Special gaskets, oil seals, 'O' rings , special bolts etc.	2 sets	2 sets	4 sets	4 sets
<b>B</b>	<b>FLUID END</b>				
1.	Cylinders	1 No.	1 No.	2 Nos.	2 Nos.
2.	Plungers	1 set	1 set	1 set	1 set
3.	Diaphragm	1 set	2 sets	3 sets	4 sets
4.	Stuffing box Packings	2 sets	2 sets	4 sets	4 sets
5.	Complete set of Suction valve & seat	1 set	2 sets	3 sets	4 sets
6.	Complete set of Discharge valve & seat	1 set	2 sets	3 sets	4 sets
7.	Special gaskets , springs , 'O' rings , ring nuts for stuffing box packing , cylinder bolts	2 sets	2 sets	4 sets	4 sets
<b>C.</b>	<b>Instrumentation</b>				
	As per Instrumentation specification				
<b>D.</b>	<b>Electrical</b>				
	As per Electrical specification enclosed with enquiry / order specification.				



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• **Agitator:**

Sl. No.	Description	Quantity			
		No. of Agitator working			
		1	2	3	4
1.1	Complete set of all Bearings	1 set	1 set	1 set	1 set
1.2	Complete set of High speed flexible coupling with bushes / elements.	1 set	1 set	1 set	1 set
1.3	High speed Coupling bushes	3 sets	3 sets	4 Sets	4 Sets
1.4	Complete set of Low speed flexible coupling with bushes / elements.	1 set	1 set	1 set	1 set
1.5	Low speed Coupling bushes	3 sets	3 sets	4 Sets	4 Sets
1.6	Complete set of all Oil seal for gear box	1 set	1 set	1 set	1 set
1.7	Complete set of all Oil seal for bearing housing	4 set	4 set	6 set	6 set
1.8	Complete set of Seal packing.	2 sets	2 sets	4 sets	4 sets
<b>2.0</b>	<b>Instrumentation</b>				
	As per Instrumentation specification				
<b>3.0</b>	<b>Electrical</b>				
	As per Electrical specification enclosed with enquiry / order specification.				

• **HVAC**

Sl. No.	Description	Quantity
1.1	Consumable	1set/type
1.2	v-belt	2set/each unit
1.3	Filter	1set/each unit
1.4	All rotary equipment i.e. Pump, blower etc	Clause no-2 (Spare parts of rotary equipment)
<b>2</b>	<b>Instrumentation &amp; Electrical</b>	As per specification



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• EOT.

Sl. No.	Description	Quantity
1.	Wire rope for main hoist	1set
2.	Wire rope for Auxiliary hoist	1set
3.	Rope guide for main Hoist	1set
4.	Rope guide for Auxiliary Hoist	1set
5.	Brake linings of each type	2 sets
6.	Gear sets	2 sets
7.	All type of Bearings	2 sets
8.	All type of Seal, Gaskets , O-rings	2 sets
<b>2.0</b>	<b>Instrumentation &amp; Electrical</b>	As per specification

**Notes:**

1. 'Set' means complete replacement of particular part in one machine.
2. Item wise price against each item shall be furnished in the Performa enclosed with the enquiry
3. The quotation should contain sectional drawing showing location & part no. (For exact identification) & material specification
4. Unless otherwise mentioned, Spares are to be considered dedicated for each individual machine on respective tag number basis. For similar (same model no./ capacity) machine, if repeatedly comes elsewhere in the plant shall have its own dedicated spares as per the list furnished above.

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## MANDATORY SPARE PARTS:

LSTK Contractor shall supply Mandatory spare parts (along with the equipment) for Static equipment as detailed below:



## STATIC EQUIPMENT:

### 2.10 STATIC EQUIPMENT



S.no	Spare Items	Quantities
<b>1.0</b>	<b>Pressure Vessel /Filter /Column/Reactor e.t.c</b>	
1.1	Gaskets for each nozzle with blind flange	200 %
1.2	Bolting for each nozzle with blind flange	10 % (Minimum 2 numbers)
1.3	Gaskets for each girth flange.	200 %
1.4	Bolting for each Girth flange	10 % (Minimum 2 numbers)
1.5	Bolting for internal flange	10 % (Minimum 2 numbers)
1.6	Gasket for internal flange	200 %
1.7	Spare for internals Clamps Washer Stud & bolt	2 % excess, min. 5 piece 20 % excess, min. 3 piece 10%(Minimum 2 numbers)
1.8	Sight/light glass assembly complete with bolting and gasket	300% of each installed glass
1.9	Filter Cartridge/Elements	200%
<b>2.0</b>	<b>Storage Tanks</b>	
2.1	Gaskets for each nozzle with blind flange	200 %
2.2	Bolting for each nozzle with blind flange	10 % (Minimum 2 numbers)
<b>3.0</b>	<b>Heat Exchangers – Shell &amp; Tube type</b>	
3.1	Bolting for each nozzle with blind flange	10 % (Minimum 2 numbers)
3.2	Gaskets for each nozzle with blind flange	200 %
3.3	Gaskets for each girth flange.	200%
3.4	Bolting for each Girth flange	10 % (Minimum 2 numbers)
3.5	Tube Plug	5 % of tube holes
<b>4.0</b>	<b>Plate type Exchanger</b>	
4.1	Plate gasket	10 %
4.2	Flow plate	10 %
4.3	Nozzle gasket	200 %
4.4	Glue (1 kg pot)	1
4.5	Special spanner tool	1 for each size/ type

#### Notes:

- Quantities shown are for each equipment.
- Above mentioned spare philosophy is also applicable for each Integral static equipment with in a package item.
- Wherever % age is identified, contractor shall supply next rounded figure.
- All spares supplied by contractor shall be properly wrapped and packed so that spares will be preserved in as new condition under the normal condition of storage envisaged and shall be properly tagged & coded so that at a later stage the same can be identified. Packing list shall be furnished so that parts can be identified without uncrating.
- The parts listed are the principal parts only. Other parts shall be considered for recommendation in quantities consistent with the above table.

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- 6) If required, all special tools and tackles necessary for the maintenance of critical items shall be supplied along with the equipment.
- 7) Spare parts shall be identical in all respects to the parts fitted on the main equipment, including dimensions, material of construction, testing & heat treatment.
- 8) The Bidder shall quote for all mandatory spares as specified above and applicable to the proposed equipment design. If any listed spare is not applicable due to the specific construction or design of the equipment, it shall be marked as “Not Applicable,” accompanied by a valid technical justification.
- 9) This spare philosophy excludes spares for electrical, instrumentation, piping, and rotating equipment associated with package items. These shall be as per the respective discipline specifications included in the NIT document.

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## MANDATORY SPARE PARTS:

### 2.11 Piping Items:

Following mandatory spares are to be supplied for the Piping items:				
Sl. No.	Part Description	Size Range (NB)	Quantity Required (% of as built)	Remark
1	Pipes & Fittings	$\leq 1.5''$	5%	min. qty. 6 mtr. / 1 No.
2	Pipes & Fittings	$\geq 2''$	2%	min. qty. 6 mtr. / 1 No.
3	Flanges	$\leq 6''$	5%	min. qty. 1 No.
4	Flanges	8'' to 36''	2%	min. qty. 1 No.
5	Valves	$\leq 14''$	5%	min. qty. 1 No.
6	Valves	$\geq 16''$ with rating $\geq 900\#$		Note-5
7	Bolts, Nuts & Gaskets		10%	min. qty. 1 No.
8	Traps		2%	min. qty. 1 No.
9	Expansion Bellow		10%	min. qty. 1 No.
10	Strainer element		10%	min. qty. 1 No.
11	Complete Gear Box for gear operated Valves		5%	min. qty. 1 No.
12	Seal ring for the Pressure seal type valves		5%	min. qty. 10 Nos.
13	Hose assembly		50%	min. qty. 10 Nos.
14	Bolt torque wrenches (Manual)		1 set	min. qty. 1 set. (Note-6)
15	Bolt torque wrenches (Hydraulic)		1 set	min. qty. 1 set. (Note-6)
16	Bolt tensioning for equipment		1 set	min. qty. 1 set. (Note-6)
<b>Note (Piping items):</b> <ol style="list-style-type: none"> <li>Percent of quantity required as mandatory spares is for each and every item/size/rating/thickness/ material consumed in as built.</li> <li>No substitution in size, rating and material is allowed.</li> <li>Pipe length in meter and other items in No. or Set shall be supplied.</li> <li>Fractional part of quantity shall be converted into nearest upward whole part.</li> <li>For rating <math>\geq 900\#</math> and sizes <math>\geq 16''</math>, minimum one qty. valve spare shall be supplied for each size, rating &amp; material.</li> <li>Quantity shall be supplied irrespective of as built/installed.</li> </ol>				



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## MANDATORY SPARE PARTS:

### 2.12 Electrical Items:



Sr. No.	Item	Quantity
<b>1.0</b>	<b>UPS of Each Rating</b>	
<b>A.</b>	Semiconductor Fuses or HRC Fuse Links of each rating	30%
<b>B.</b>	MCB, MCCB and control switches of each rating	1 Set
<b>C.</b>	SCR, diodes and transistors of each type	50%
<b>D.</b>	Capacitors, resistors and chokes of each type	50%
<b>E.</b>	Signal Lamps of each colour & voltage	30%
<b>F.</b>	Control Cards	1 Set
<b>G.</b>	Semiconductor fuses & HRC fuse links of each type	1 Set
<b>H.</b>	IGBT of each type	1 Set
<b>I.</b>	Software and programming terminal	1 Set
<b>J.</b>	Batteries	5 cells
<b>K.</b>	Isolator switch of each type	1 No.
<b>L.</b>	Ventilation Fan each type	2 Nos.
<b>M.</b>	PCBs of each type	1 No.
<b>N.</b>	Electrolyte	10%
<b>2.0</b>	<b>Power and Distribution Transformer (of each type &amp; rating)</b>	
<b>A.</b>	HV Bushing complete with metal parts for all 3 phases	1 Set





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Sr. No.	Item	Quantity
B.	LV Bushing complete with metal parts for all 3 phases	1 Set
C.	Neutral Bushing complete with metal parts	1 Set
D.	NCTs of each type	1 No.
E.	Complete set of Gaskets	1 Set
F.	Complete set of valves (1 no of each type)	1 Set.
G.	Radiator	1 No.
H.	PRV with alarm and trip contacts	1 Set
I.	Explosion vent diaphragm	1 No.
J.	Oil level gauge	1 No.
K.	Complete charge of silica gel with breather	2 Sets
L.	Gland packing / O-ring for every valve	1 Set
M.	Buchhloz relay	1 No.
N.	Analog type OTI	1 No.
O.	Analog type WTI	1 No.
P.	CT for WTI	1 No.
Q.	Magnetic oil level gauge	1 No.
R.	Dial type thermometer	1 No.
S.	Sealing/gauge glass of conservator	1 No.
T.	Oil ( % extra of total transformer oil)	10%
U.	Miscellaneous spares (control switches, fuses lamps) for Marshalling Box	2 Sets



V.	Cooler Fan with Motor	1 No.
W.	Remote tap position indicator	1 No.
X.	Oil surge relay for OLTC	1 No.
Y.	Starter contactors, switches and relays for electrical control panels	1 Set
<b>3.0</b>	<b>DRY TYPE Transformer (of each type &amp; rating)</b>	
A.	HV Bushing complete with metal parts for all 3 phases	1 Set
B.	LV Bushing complete with metal parts for all 3 phases	1 Set
C.	Neutral Bushing complete with metal parts	1 Set
D.	Complete set of Gaskets	1 Set
<b>4.0</b>	<b>Neutral Earthing Resistor (of each rating)</b>	
A.	Bushing with accessories	1 Set

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<b>B.</b>	Support Insulators	2 Nos.
<b>C.</b>	Bushing Insulator	1 No.
<b>D.</b>	Resistor Element	20% minimum one cartridge per type
<b>5.0</b>	<b>33 KV Gas Insulated Switchgear (GIS)</b>	
<b>A.</b>	Portable Gas Filling Equipment / SF6 gas cart	1 No.
<b>B.</b>	Handle for disconnect switch drive	4 Nos.
<b>C.</b>	Handle for earthing switch drive	4 Nos.
<b>D.</b>	Pre selection / Mechanical key	1 No.
<b>E.</b>	Power cable termination kit along with plug and socket (R,Y,B Phases)	2 Sets
<b>F.</b>	Tripping coil	2 Nos.
<b>G.</b>	Closing coil	2 Nos.
<b>H.</b>	Capacitive type voltage detectors	1 Set
<b>I.</b>	Control fuses / MCB	10 Nos. of each rating & type
<b>J.</b>	Density / Pressure Gauge	2 Nos. of each type
<b>K.</b>	Indicating lamps covers	5 nos. of each colour
<b>L.</b>	Indicating lamps	20% or 3 nos. (min.), whichever is more
<b>M.</b>	Portable SF6 Gas Leakage Detector	1 No.
<b>N.</b>	Ethernet Switch	1 no. of each type for all switchboards for each voltage level/type for each substation
<b>6.0</b>	<b>For Each 11 kV HV Switchboard and 3.3 kV HV Switchboard</b>	
<b>A.</b>	Complete VCB (ready to use) of each rating	1 No.

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B.	Trip bar spring and any other spring used in the circuit breaker mechanism for breaker of each rating	1 No.
C.	Shunt trip coil for breaker of each rating	10%
D.	Closing coil for breaker of each rating	10%
E.	Spring charging motor of each rating	1 No.
F.	Spring charging handle for breaker of each rating	1 No.
G.	Racking out handles for breaker of each rating	1 No.
H.	Secondary Isolating contact blocks for breaker of each rating	1 No.
I.	Micro Switch for Test/ Service Position for breaker of each rating	1 No.
J.	Micro Switch for Spring Charging for breaker of each rating	1 No.
K.	Main contact sets/ Jaw contact, Moving coil, Fixed coil compete for breaker of each rating	1 Set
L.	Trip-Neutral-Close Control Switch	2 Nos.
M.	Local-OFF-Remote Selector Switch	2 Nos.
N.	Ammeter Selector Switch	2 Nos.
O.	Voltmeter Selector Switch	2 Nos.
P.	Push Button Element of each type & rating	20 %
Q.	Push Button Actuator of each type	20 %
R.	Trip Selector Switch	2 Nos.
S.	Panel limit switches & interlocking switches	10% each type

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T.	Panel operating switches (all types)	1 Set each
U.	Breaker limit switches & interlocking switches	10% each type
V.	Protection Relays for different type of feeders i.e Incoming Feeder, Bus-coupler Feeder, Outgoing feeder, Motor Feeder, Transformer Feeder etc.	1 No. for each type of feeder
W.	Trip relays of each type	2 Nos
X.	Auxiliary Relays of each Type	2 Nos.
Y.	Miniature Circuit Breaker of each type & rating	20 %
Z.	Meters (of each type & rating) i) Ammeter ii) Voltmeter iii) Multifunction Meter iv) Energy Meter	1 No. 1 No. 1 No. 1 No.
AA.	Instrument Transformers of each type & rating i) CT ii) PT	3 Nos. 1 Nos.
BB.	Fuses of each type & rating i) HRC HV for VT ii) HRC LV	20 % 20 %
CC.	Lamp Complete assembly of each colour & voltage	10%
DD.	Current transducers of each rating	20%
EE.	Voltage transducers of each rating	20%
FF.	Power Transducers of each rating	20%
GG.	Bus-Bar Support Insulators	1 Set
HH.	Surge Arrestors	1 No.
II.	Inspection Glass	3 Nos.
JJ.	Sprouts	1 Set
KK.	Panel Space Heaters with Thermostat	2 Nos.
LL.	Alarm Annunciator of each type	1 No.
MM.	Interpanel insulation barriers	20% Minimum 1 No.
NN.	Earthing Trolley	1 No.
OO.	Maintenance Trolley for breaker of all rating	1 No.
PP.	Set of gaskets for all ratings & type	1 Set
QQ.	Panel shutter assembly	2 No.
RR.	Removable bus bar shrouds	1 Set
SS.	Bus bar mounted power fix contacts	1 Set
<b>7.0</b>	<b>For Each LT (415V) Switchboard (PMCC/EPMCC/APFC/PCC/MCC/ASDB/ DCDB/UPSDB/LSDB)</b>	
A.	Complete ACB (ready to use) of each rating	1 No.

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B.	Trip coils for breaker of each rating	10%
C.	Closing coils for breaker of each rating	10%
D.	Spring charging motors of each rating	1 No.
E.	Secondary Isolating contact blocks for breaker of each rating	1 Set.
F.	Arcing contacts & arcing chutes block for breaker of each rating	1 Set.
G.	Main contact sets/ Jaw contact compete for breaker of each rating	1 Sets
H.	Trip-Neutral-Close Control Switch	2 Nos.
I.	Local-OFF-Remote Selector Switch	2 Nos.
J.	Ammeter Selector Switch	2 Nos.
K.	Voltmeter Selector Switch	2 Nos.
L.	Push Button Element of each type & rating	20 %
M.	Push Button Actuator of each type	20 %
N.	Trip Selector Switch	2 Nos.
O.	Panel limit switches & interlocking switches	10% each type
P.	Panel operating switches (all types)	1 Set each
Q.	Breaker limit switches & interlocking switches	10% each type
R.	Protection Relays for different type of feeders i.e Incoming Feeder, Buscoupler Feeder, Outgoing feeder, Motor Feeder etc.	1 No. for each type of feeder
S.	Trip relays of each type	2 Nos
T.	Auxiliary Relays of each Type	2 Nos.
U.	Thermal over Load Relay of each rating	2 Nos.
V.	Contactors of each type & rating	2 Nos.
W.	Coils for Contactors – each type/voltage	2 Nos.
X.	ELCB & RCBO of each type	2 Nos.
Y.	Miniature Circuit Breaker of each type & rating	20 %
Z.	SFU of each rating	20 %
AA.	Meters (of each type & rating) i) Ammeter ii) Voltmeter iii) Multifunction Meter iv) Energy Meter	1 No. 1 No. 1 No. 1 No.
BB.	Instrument Transformers of each type & rating i) CT ii) PT	3 Nos. 1 Nos.
CC.	Fuses of of each type & rating HRC LV	20 %
DD.	Lamp Complete assembly of each colour& voltage	10%
EE.	Current transducers of each rating	20%
FF.	Voltage transducers of each rating	20%
GG.	Power Transducers of each rating	20%
HH.	Bus-Bar Support Insulators	1 Set
II.	Panel Space Heaters with Thermostat	2 Nos.
JJ.	Alarm Annunciator of each type	1 No.

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KK.	Interpanel insulation barriers	20% Minimum 1 No
LL.	Maintenance Trolley for breaker of all rating	1 No.
MM.	Set of gaskets for all ratings & type	1 Set
NN.	Panel shutter assembly	2 Nos.

OO.	Removable bus bar shrouds	1 Set
PP.	Bus bar mounted power fix contacts	1 Set



<b>8.0</b>	<b>Each Bus Duct</b>	
A.	Bus support insulators each type	2 Nos.
B.	Flexible connector (for switchgear end connection)	1 Set
C.	Flexible connector (for Transformer end connection)	1 Set
D.	Gasket	1 Set
E.	Bus duct CT's / VT's	1 Set
F.	Set of special tools, for dismantling and maintenance	1 Set

<b>9.0</b>	<b>HV Motor (For each rating)</b>	
A.	Bearings housing (complete with End Shield) both Driving End and Non driving end	1 set
B.	Cooling fan	1 No.
C.	Space heater	2 Nos.
D.	Terminal box	1 No.
E.	Terminal stud with bushing & star links	2 sets
F.	RTDs for HV motors for Bearing/ hot air	2 Nos. each
G.	Dial Type thermometer	2 sets
H.	Grease nipple & Plug (if installed)	2 Nos.
I.	Charge of Lubricating oil (if not centrally lubricated)	1 Charge



<b>10.0</b>	<b>LV Motor (For each rating)</b>	
A.	Bearings housing (complete with End Shield) both Driving End and Non driving end	1 set
B.	Cooling fan	2 No.
C.	Terminal box	1 No.
D.	Terminal stud with bushing & star links	1 No.
E.	Space heater, if installed	2 Nos.
F.	Grease nipple & Plug, if installed	2 Nos.
G.	Cooling fan cover	1 No.

<b>11.0</b>	<b>Interlocking switch socket &amp; plug</b>	
A.	Switch of each rating	3 Nos.
B.	Fuse base of each rating	3 Nos.
C.	Fuse of each rating	3 Nos.
D.	Plug Top	3 Nos.

<b>12.0</b>	<b>Lighting Fixtures</b>	
A.	LED Lighting fixtures (along with Driver) alongwith LED Lamp	10% of the total no. of



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		fixtures (Minimum of 5 No's of each type)
B.	Terminal block of each type	5 Nos.
C.	Heat resistance toughened glass cover of each type	5 Nos.
D.	Fuse holder of each type	5 Nos.
E.	Fuse of each Type	5 Nos.
F.	Allen keys of different sizes as applicable	2 Sets
<b>13.0</b>	<b>Battery Charger</b>	
A.	Set of diodes of each type and rating	2 Sets
B.	Set of silicon controlled Rectifiers	2 Sets
C.	Set of chokes of each type and rating	1 Set
D.	Set of resistors of each type and rating	1 Set
E.	Set of capacitors of each type and rating	1 Set
F.	Set of transistors of each type and rating	1 Set
G.	Set of load breaking switches of each type and rating	1 Set
H.	Off-Load Tap Changing Device	1 Set
I.	Current Regulator	1 Set
J.	Semiconductor fuses of each type and rating	3 Nos.
K.	Set of contactors of each type and rating	2 Sets
L.	Set of thermal overload relays of each type and rating	2 Sets
M.	Set of auxiliary contactors of each type and rating	2 Sets
N.	Set of power contactors of each type and rating	2 Sets
O.	Set of control and selector switches of each type and rating	2 Sets
P.	Set of controller cards of each installed charger	2 Sets
Q.	Indicating lights of each colour & voltage	2 Sets
R.	D.C. Ammeter	1 No.
S.	Miniature circuit Breaker of each type & rating	1 No.
T.	PCB's of each type	1 No.
U.	Float indicator	1 No.
V.	Thermometer	1 No.
W.	Under, over voltage and earth leakage protection devices	1 No.
X.	Panel / cabinet space heater	2 Nos.
Y.	Thermostat	2 Nos.
<b>14.0</b>	<b>Each Battery Bank</b>	
A.	Complete cells of each type	4 Sets



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B.	Float guide	2 Nos.
C.	Cell lid	2 Nos.
D.	Level indicators	2 Nos.
E.	Vent plugs	2 Nos.
F.	Inter cell connectors with nuts, bolts and washers	2 Sets
G.	P.V.C. Spill Trays	2 Sets
H.	Terminal Post	2 Sets
<b>15.0</b>	<b>Local Control Station</b>	
A.	Trip – neutral – close switch	20%
B.	Auto Manual / Local -Remote switch	20%
C.	Ammeters of different ranges	20%
D.	Terminal block	20%
E.	Indicating Lamps of different type	20%
F.	Push Buttons of different type	20%
G.	Complete LCS of each type	20%
<b>16.0</b>	<b>Junction Box</b>	
<b>A.</b>	Junction Box of each type	10 Sets
<b>17.0</b>	<b>Electricals for Overhead Cranes &amp; Hoists (per crane/hoist)</b>	
A.	Bearings of each type & no.	1 Set



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B.	Contacting Coil of various ratings	1 Set
C.	Complete set of contactor of each rating	1 Set
D.	Limit switches of each type	2 Nos.
E.	Push Button Elements	20%
F.	Push Button Actuators	20%
G.	Fuses of various ratings	20%
H.	Fuse fittings of various ratings	20%
I.	Indication lamp fittings of each type	20%
J.	Overload relays of various ranges	1 Set
K.	Brake coils for various brakes	1 Set
L.	Set of carbon brushes in case of S.R. motors	1 Set
M.	Set of resistors for S.R. motors	1 Set
N.	Any special tools and tackles required for maintenance	1 Set
<b>18.0</b>	<b>Variable Frequency Drives</b>	
A.	Set of fuses of all types & sizes used in system	5 Sets
B.	Controller Card of each type	1 Set
C.	Power Devices of each type	2 Sets
D.	Software for parameter setting each type	1 Set
<b>19.0</b>	<b>Fire Alarm &amp; Detection System</b>	
A.	Detectors of each type	20%
B.	Loop card of each type	10%
C.	Charger card	10%
D.	Interface Units of each type	10%
E.	Power supply unit of each type	10%
F.	PCB of all types	20%
G.	Manual Call Points	10%
H.	Fuses of each type & rating	10%
I.	Control relays of each type	10%
J.	Audible hooter/buzzer	10%
<b>20.0</b>	<b>Capacitor Bank</b>	
A.	Capacitor Unit of each rating	3 Sets.
B.	Fuses (if used) of each rating	3 Sets
C.	Power Contactor of each rating	3 Sets.
D.	PF controller card/unit of each type	1 Set
E.	Limit Switch for Capacitor Bank of each type	3 Sets
<b>21.0</b>	<b>Each ANNUNCIATOR PANEL</b>	
A.	Hooters	1 No.

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B.	Push Buttons of each type	3 Sets
C.	Terminals	3 Nos.
D.	Acrylics	1 No.
E.	PCB card of each type	1 No.
F.	LED of each colour & voltage	3 Sets
G.	DIP Switches	3 Nos.
H.	CPU	1 No.
I.	SMPS	1 No.
J.	Relays of each type	20% (Min. 1 No.)

- 1) Set means complete replacement of particular part in one machine.
- 2) The above spares do not includes commissioning spares and shall be purely warehouse spare.
- 3) Wherever "Each Type" is specified, it means "of the Type/make/model/size/rating and exactly replaceable"
- 4) Wherever "% qty." is specified, Bidder to quote in next higher rounded figure
- 5) Out of % age spares and minimum qty specified against each item - higher of the two shall be supplied.

Electrical EQUIPMENT which has not been mentioned in this table and needs spare parts, CONTRACTOR shall consider spare parts for them, the quantities for such spare parts shall then be APPROVED by OWNER/CONSULTANT.

## MANDATORY SPARE PARTS:

### 2.13 Instrument Items:

#### 1.0 INTRODUCTION

Purpose of this Specification is to set forth the mandatory requirements of spare parts for instrumentation. The Supplier shall provide spare parts and consumables according to this specification.

#### 2.0 SPARE PARTS FOR COMMISSIONING

The Supplier shall provide spare parts and Consumables for Commissioning apart from mandatory spares. They shall be listed and provided along with their bid according to Vendor experience.



Cost of Spare Parts for commissioning shall be included in the total bid price.

#### 3.0 MANDATORY SPARE PARTS

The Supplier shall provide mandatory spare parts and Consumables. They shall be listed and provided along with their bid according to the table as below.

Cost of Mandatory Spare Parts shall be included in the total bid price. The Definition of spare parts rules:



- i. "Set" means complete replacement of particular part in one device;

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- ii. Wherever "Each Type" is specified, it means "of the Type / make / model / size /
- iii. rating and exactly replaceable";
- iv. Wherever "% qty" is specified, Bidder to quote in next higher rounded figure;
- v. Out of "% qty" spares and minimum qty specified against each item - higher of the two shall be supplied.
- vi. Any other instruments which are not covered and is applicable for the plant, Spares quantity shall be minimum 10% or 1 number each type
- vii. Any instrument specified by licensor or any special cables/tools/accessories for instrument erection and termination Spares quantity shall be minimum 10% or 1 number each type
- viii. This spare list shall be applicable for other process(SRU/Purification/Coal handling and storage etc) /mechanical/rotarypackages like Compressors, turbines, motor, pumps, GTG/HRSG, EDG ID/FD Fan, Pressure Vessels, Exchangers, Reactors, HVAC, Boilers, Dampers, and Diverters etc.
- ix. Spares shall clearly indicating parts name & description, catalogue no., part no. , origin. If any shortfall is noticed during 2 years from date of commissioning, the same shall be supplied free of cost by the bidder.

### 2.13 Instrument Items:



No	Description	Quantity
<b>1.0</b>	<b>Flow Instruments</b>	
1.1	Mass flow meter	<ul style="list-style-type: none"> <li>- Power fuses: 6 nos per set</li> <li>- Sensor assembly: 10% or min 1 no</li> <li>- Electronic head unit: 10% or min1 no complete</li> <li>- Extension cables / special cables</li> </ul>
1.2	Magnetic Flow meter	<ul style="list-style-type: none"> <li>- Power fuses: 6 nos per set</li> <li>- Sensor assembly: 10% or min 1 no</li> <li>- Electronic head unit: 10% or min1 no complete</li> <li>- Extension cables / special cables</li> </ul>
1.3	Vortex Flow Meter	<ul style="list-style-type: none"> <li>- Sensing probe: 1 no for each type</li> <li>- Gasket and Packing: 1 set for each type</li> <li>- Electronic head unit: 10% or min1 no complete.</li> </ul>
1.4	Ultrasonic Flow meter	<ul style="list-style-type: none"> <li>- Probe: 1 pair for each instrument</li> <li>- Electronic card: 1 no for each type</li> <li>- Fuse: 2 nos for all types</li> </ul>
1.5	Rotameter (Metal)	<ul style="list-style-type: none"> <li>- Float &amp; set of Packing: 10% or min 1 no for each type</li> </ul>
1.6	Rotameter (Glass)	<ul style="list-style-type: none"> <li>- Glass tube: 10% or min 1 nos for each type</li> </ul>
1.7	Purge Rotameter	<ul style="list-style-type: none"> <li>- Complete instrument: 10% or min 1 nos for each type</li> </ul>

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1.8	Averaging Pitot Tube	<ul style="list-style-type: none"> <li>- Gasket, O-ring, Packing for Retract Mechanism: 1 set for each pitot tube</li> <li>- Needle Valve: 1 no. for each Pitot Tube</li> </ul>
<b>2.0</b>	<b>Level Instruments</b>	
2.1	Displacement Type Level Instruments	<ul style="list-style-type: none"> <li>- Instrument Head with Torque Tube Assembly and Transmitter: 10% or min 1 nos of each type</li> <li>- Float: 1 no for each type</li> <li>- Electronic and Display: 10% or min 1 no for each type</li> <li>- Local indicator: 10% or min 1 no</li> </ul>
2.2	Ultrasonic Type Level Instruments	<ul style="list-style-type: none"> <li>- Complete instrument: 10% or min 1 no for each type / range / material</li> <li>- Local indicator: 10% or min 1 no</li> </ul>
2.3	Radar Type Level Instruments	<ul style="list-style-type: none"> <li>- Complete instrument: 10% or min 1 no for each type / range / material</li> <li>- Local indicator: 10% or min 1 no</li> </ul>
2.4	Servo Type Level Instruments	<ul style="list-style-type: none"> <li>- Complete instrument: 10% or min 1 no for each type / range / material</li> <li>- Local indicator: 10% or min 1 no</li> </ul>
2.5	Level Gauge –Glass type / Bi-color	<ul style="list-style-type: none"> <li>- Complete instrument: 10% or min 1 no for each type / range / material</li> </ul>
2.6	Level Gauge –Transparent/Reflex	<ul style="list-style-type: none"> <li>- 10% subject to minimum 2 numbers of glass along with pair of Gaskets and glands sets for I/V valves of each type, size (Cushion &amp; Wet Gaskets), whichever is higher</li> </ul>
2.7	Level Gauge –Magnetic Type	<ul style="list-style-type: none"> <li>- Float, Magnet follower, ring gaskets: 10% or min 1 set for each type / range / material</li> </ul>
2.8	Hydrastep Level transmitter	<ul style="list-style-type: none"> <li>- Electronic unit: 10% or min 1 no</li> <li>- 2 Nos. probes of each type</li> <li>- Local indicator: 10% or min 1 no</li> </ul>
<b>3.0</b>	<b>Pressure Instruments</b>	
3.1	Pressure Gauge	<ul style="list-style-type: none"> <li>- Complete instrument: 10% or min 1 nos for each type and range</li> </ul>
3.2	DP Gauge	<ul style="list-style-type: none"> <li>- Complete instrument: 10% or min 1 nos for each type and range</li> </ul>
3.3	Pressure Transmitter	<ul style="list-style-type: none"> <li>- Complete instrument: 10% or min 1 nos for each type</li> </ul>
3.4	DP transmitter, DP seal / remote seal	<ul style="list-style-type: none"> <li>- Complete instrument: 10% or min 1 nos for each type</li> </ul>
3.5	Accessories- Snubber, Syphon, Gauge Saver	<ul style="list-style-type: none"> <li>- 10% or min 1 nos for each item</li> </ul>
<b>4.0</b>	<b>Temperature Instruments</b>	
4.1	RTD, Thermocouple with Thermowell	<ul style="list-style-type: none"> <li>- Complete instrument: 10% or min 1 nos for each type and range</li> </ul>

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4.2	Skin Thermocouple	- Complete instrument: 10% or min 1 nos for each type and range
4.3	Multipoint Thermocouple	- Sensor: 10% or min 1 no for each length
4.4	Temperature Gauge with Thermowell	- Complete instrument: 10% or min 1 nos for each type and range
4.5	Temperature Transmitter	- Complete instrument: 10% or min 1 nos for each type
5	<b>Analysers</b>	
5.1	Gas Chromatograph / Mass Spectrometer	<ul style="list-style-type: none"> <li>- Filters: 1 set</li> <li>- Detector Assembly: 1 set</li> <li>- PCB Assembly Power Supply: 2 nos</li> <li>- PCB Assembly Digital temp control: 2 nos</li> <li>- PCB Assembly: 1 no</li> <li>- Pressure Regulator: 1 no</li> <li>- Thermocouple Assembly: 1 no</li> <li>- Solenoid valve: 1 no</li> <li>- Backplane Assembly: 1 no</li> <li>- Igniter Assembly: 1 no</li> <li>- Pressure Sensor: 1 no</li> <li>- Filament Kit: 2 nos</li> <li>- Set of fuses: 1 no</li> <li>- Set of Fittings: 1 no</li> <li>- Pressure Gauge: 1 no</li> <li>- Temperature Gauge: 1 no</li> <li>- Sample Flow meter: 1 no</li> <li>- Bypass Flow meter: 1 no</li> <li>- Any other instrument item : 1 no</li> </ul>
5.2	Other Gas Analyser including CEMS	<ul style="list-style-type: none"> <li>- Sample Flow meter: 1 no</li> <li>- Bypass Flow meter: 1 no</li> <li>- Solenoid valve: 1 no</li> <li>- Communication Board: 1 no for each type</li> <li>- Display Unit: 1 no for each type</li> <li>- CPU Board: 1 no for each type</li> <li>- Sensor Electronic: 1 no for each type</li> <li>- Modulation Unit: 1 no for each type</li> <li>- Sample Cell: 1 no</li> <li>- Sensor: 1 no for each type</li> <li>- O Ring: 3 sets</li> <li>- Thermal Fuse: 2 sets</li> <li>- Heating Cartridge: 1 set</li> <li>- Thermal Trip: 2 sets</li> <li>- Analogue Module: 1 set for each type</li> <li>- Filter Membrane (pack of 25): 1 set</li> <li>- Fuse: 1 set for each type</li> <li>- Any other instrument item : 1 no</li> </ul>
5.3	Sample Conditioning system for all analysers	- Complete sample kit for sample pumps inclusive of 'O'rings, Seal ring, Diaphragm: 1 set



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		<ul style="list-style-type: none"> <li>- Solenoid valve for, more than one stream application: 1 no</li> <li>- Flow switch: 1 no</li> <li>- Vaporization system if required, which includes vaporizer, thermostat, electrical tracing cable and heater: 1 set</li> <li>- Cooling system if required, which includes one cooler, flow conditioning system: 1 set</li> <li>- Sample handling system fitting, valves, pressure gauges, regulators, solenoid valves, flow meters / flow switches and other components, etc: 10% or minimum 1 no. for each type</li> <li>- Consumables like filters, membranes, reagents, cal. Gas, carriers: For 1 year of continuous operation</li> <li>- Any other instrument item : 1 no</li> </ul>
5.4	pH, ConductivityAnalyser	<ul style="list-style-type: none"> <li>- Complete Analyser with sensor, cables, transmitters: 1 no for each type</li> </ul>
5.5	Silica Analyser	<ul style="list-style-type: none"> <li>- Sensor board: 1 no</li> <li>- Sensor and Detector: 1 no for each type</li> <li>- Rotameter: 1 no</li> <li>- Pressure Control Valve: 1 no</li> <li>- Fuses: 5 sets</li> <li>- Electronic card: 1 no for each type</li> <li>- Other Aux. Cards: 1 no for each type</li> <li>- Probe: 1 no for each type</li> <li>- Filters, O-rings, Gaskets: 2 sets</li> <li>- Consumable Kit: 2 sets</li> <li>- Any other instrument item : 1 no</li> </ul>
5.6	Any other Liquid & Gas Analyser	<ul style="list-style-type: none"> <li>- Sensor module: 1 No</li> <li>- Electronic module: 1 No</li> <li>- Any other instrument item : 1 no</li> </ul>
<b>7</b>	<b>Control Valves, On-off Valves, MOV PCV, Desuperheater/PRDS/coal feed/rotary/any other control/on-off valves</b>	
7.1	Pneumatic Actuator	<ul style="list-style-type: none"> <li>- Actuator diaphragm, actuator seal kit and spring sets: 10% or min 1 no for each type</li> </ul>
7.2	Electric Actuator	<ul style="list-style-type: none"> <li>- Main PCB: 1 no for each type</li> <li>- Local / off / Remote Switch: 1 no for each type</li> <li>- Open / Stop / Close Switch: 1 no for each type</li> </ul>
7.3	Trim Set	<ul style="list-style-type: none"> <li>- Trim set consisting of seat ring / seal ring, plug with stem, cage (if any) for each type</li> </ul>
7.4	Complete Actuator with Handwheel	<ul style="list-style-type: none"> <li>- one complete Actuator for each type</li> </ul>
7.5	Antisurge Control Valve	<ul style="list-style-type: none"> <li>- 1 no for each type</li> </ul>

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7.6	Gland Packing, Orings and Bonnet Gasket, Seat Gasket	- 1 set for each tag
7.7	Limit Switch/ Solenoid valve/ Positioner and all Other Accessories.	- 10% or min 1 nos foreach type
7.8	PRDS / Desuperheater	- Same as those of Control Valves - Gaskets for valve and connections per unit (if such gaskets, are special and supplied by PRDS/De-Super heater vendor
7.9	Self-operatedRegulator Repair kit consisting of orifice, plug, spring, gasket, diaphragm, spring, O-ring	- 20% or min 1 no for each type
7.10	MOVs Main PCB of each type Local / Remote / off Selector Switch each type Open / close / stop Selector Switch each type	- 10% or min. 1 no of each type
8	<b>Control Systems</b> <b>DCS/ESD/FGS/ any other PLC(including local)</b>	
8.1	Control SystemHardware	<ul style="list-style-type: none"> <li>- CPU : 10% or min 1 no each type</li> <li>- System DC Power supply: 10% or min 1 no each type</li> <li>- All Communication Module: 10% or min. 2 nos for each type</li> <li>- I/O Module: 20% or min 5 nos for each type</li> <li>- OPC / Modbus interface cards: 1 no each along with Connectors / cables</li> <li>- All type system Pre-fab Cable: 10% or min 5 sets foreach type</li> <li>- All type of communication cable: 10% or min 5 sets foreach type</li> <li>- Backplane Unit: 2 nos for each type</li> <li>- FTA board: 2 nos for each type</li> </ul>
		<ul style="list-style-type: none"> <li>- System Battery: 1 no for each type</li> <li>- Terminator: 1 no for each type</li> <li>- Various system / glass fuse: 100% for each type</li> </ul>
8.2	Cabinet	<ul style="list-style-type: none"> <li>- Filter: 100%</li> <li>- Fan: 5% or min. 2 nos for each type</li> <li>- Light: 5% or min. 2 nos for each type</li> <li>- PDB Voltmeter: 5% or min. 2 nos for each type</li> <li>- PDB fuse: 100% for each type</li> <li>- Circuit Breaker: 5 nos for each type</li> <li>- Temperature Monitoring for cabinets: 10% or min 1 sets for each type</li> <li>- Fan Failure Unit (FFU): 10% or min 1 sets for each type</li> </ul>
		<ul style="list-style-type: none"> <li>- Relay: 10% or min 5 nos for each type</li> <li>- Safety Barrier: 10% or min 5 nos for each type</li> <li>- Isolator, Convertor: 10% or min 5 nos for each</li> </ul>





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		type - Terminal Block with DIN rail: 100 nos for each type - Cables for marshalling rack wiring: 100 m of each color and size - 24V DC Power supply: 10% or min 1 nos for each type - 24 V DC Bulk Power Supply modules : 10% or min 1 nos for each type - Diode-O ring modules: 10% or minimum 1 no. each type
8.3	Hubs, all Switches, Routers ,Bus units	- 20% or min 1 no for each type
8.4	Hardwire console Pushbuttons, lamps, switches (Including relevant terminal modules / accessories):	- 10% or min 1 nos for each type
8.5	Workstation	- Communication card for operator workstation: 10% or min.1 no. - Communication card for engineering workstation: 10% or min.1 no. - Motherboard for operator workstation: 10% or min.1 no - Motherboard for engineering workstation: 10% or min.1 no. - Switching mode power supply: 10% or min.1 no. - Communication card for SOE workstation: 10% or min.1 no, as applicable -
8.6	SSD unit (including Raid-1, Raid-5 and Normal) with all connectors, plugs	- 10% or min. 2 set for each type
8.7	Keyboard (Including operator keyboard) and Mouse	- 2 nos of keyboard for each type - 5 nos of mouse
8.8	Consumables	- A3 Paper: 10 Rims - A4 Paper: 50 Rims - Laser Cartridge: For 6 month usage, min 2sets for each printer
<b>9</b>	<b>Machine Monitoring System / Vibration Monitoring System</b>	
9.1	Central Rack Monitor	- Power Supply Module: 10% or min 1 nos - Vibration, Axial Displace Module: 20% or min 1 nos - Key Phasor Module: 10% or min 1 nos - Relay Module: 10% or min 1 nos - Speed monitor card: 10% or min 1 nos - Display Unit: 10% or min 1 nos - Any other instrument item: 10% or min 1 nos
9.2	Field Sensors	- Proximity Probe with lead: 10% or min 1 no - Oscillator: 10% or min 1 no - Bearing temperature: 10% or min 1 no - Any other instrument item: 10% or min 1 nos





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9.3	Digital Governor / Antisurge controller	- 1 no complete unit for each type
9.4	Overspeed trip system	- 1 no complete unit for each type
9.5	Any other module associated with speed control system	- 1 no complete unit for each type
9.6	Speed Sensor	- 2 nos for Governor - 2 nos for Overspeed trip system
<b>10</b>	<b>Installation Material</b>	
10.1	Instrument Valve	- 10% or min 1 no for each type
10.2	Valve Manifold	- 10% or min 3 nos for each type
10.3	Tube fitting	- 10% or min 10 nos for each type
10.4	Tube	- 10% of total length for each type
10.5	Cable	- 10% of total length for each type
10.6	Junction Box and cable gland	- 10% or min 1 no for each type
10.7	Canopy	- 10% or min 1 no for each type
<b>11</b>	<b>Tools</b>	
11.1	Tool Kit set	- Screw driver, slide wrench, O&D Spanner: 10 nos
11.2	Cable Crimping tool	- For RJ45 connector: 5 nos - For 0.5 to 4.0 mm <sup>2</sup> wire: 5 nos - For BN3500 BNC connector: 2 nos
11.3	Adjustable Torque Wrench	- 2 nos
11.4	Insulation Remover	- 5 nos
11.5	IC puller	- 2 nos for each type
11.6	Logic probe	- 2 nos

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11.7	Screw driver kit	- 5 sets
11.8	Allen Key Set (1 mm to 8 mm)	- 5 sets
11.9	Lamp puller	- 3 nos
11.10	Torch	- Handheld LED Torch: 10 nos - Head Torch: 10 nos
11.11	Ferruling machine	- 1 no along with printer ribbon and sleeves size of 5.0mm <sup>2</sup> and 3.5 mm <sup>2</sup> , 100 meter each
11.12	Hand-held communicator	- 1 no.
11.13	Battery charger alongwith 1 set of batteries	- 2 nos of each type
12	Gas Detectors	- Transmitter: 10% or min 1 no for each type - Sensor: 10% or min 1 nos for each type - Smoke Detectors , MCP, Sounders, Hooters: 10% or min 1 nos for each type
13	Flame Scanners	- Electronic unit: 10% or min 1 no for each type - Sensor: As required for 1 year operation or 1 no min
14	Loop powered Indicators	- 10% or min 2 nos
15	CCTV camera, camera station lens with zoom, Pan & Tilt Unit, Receiver Unit, electronic unit, , power supply, Wiper & Washer Unit etc	- 10% or minimum one of each type of module.
16	Pressure Relief Valves/ Thermal Relief Valves/ Vaccum Relief Valves / Low Pressure Relief Valves / Pilot Operated Valves	- 10% or minimum one of each type of module
17	Rupture Disc	- 10% or minimum one of each type of module
18	Panel mounted instruments	- 10% or minimum one of each type of module
19	IPPBX Unit, Electronic Card each type	- 10% or minimum one of each type of module. - Handsets: 10% or min 1 no for each type/ range/ model
20	PCS , BSS , EPB , VGTU , ZSS or any other safety switch etc.	- 10% of each type of instruments, subject to minimum 2 nos. of each type
21	Load cell assembly , Load cell with connecting / special cables and mounting bracket, Tachometer and local indicator for Belt weigher and its all accessories etc.	- 10% of each type of instruments, subject to minimum 2 nos. of each type

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#### 4.0 SPARE PARTS FOR TWO YEARS OPERATION

The Supplier shall provide list of recommended spare parts of specialised items not covered under mandatory spare parts, along with price. This price list shall be validity of 2 years after PO date.



Cost of Spare Parts for Two-Year Operation shall not be included in the total BidPrice.

#### 5.0 VENDOR'S RECOMMENDED SPARE PARTS

Bidder shall submit list of recommended spare parts of specialised items not covered mandatory spares, along with itemised price. Owner will review and decide the recommended spares required for the project.

##### Notes:

1. All above list and spares are applicable for all package unit (Package items) also.
2. Spares mentioned above to be offered as 2 years spares. However, if these spares are not used in the equipments being offered / supplied, the same need not be supplied. Bidder shall clearly indicate against each such spare that these spares / items are not used in their equipments.
3. If any item is not mentioned above but supplied by the bidder. Bidder to consider 10% or minimum ONE for such items.
4. Mandatory spares shall be applicable Instrumentation items of sub packages also as per above mandatory spares philosophy.
5. The Bidder shall quote for all the mandatory spares as defined above & as applicable to the proposed design of the equipment. In case, any spare which is listed above but not applicable due to specific construction/design of the equipment, the same shall be highlighted as 'Not Applicable' against that spare supported with proper technical explanation
6. Spare parts shall be identical in all respects to the parts fitted on the main equipment, including dimensions, material of construction, testing & heat treatment.
7. Mandatory spares as specified elsewhere in the engineering specifications for other items are also to be provided by the contractor before Commissioning of the plant.

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## MANDATORY SPARE PARTS:



### 2.14 Material Handling items

#### 2.14.1 Ash Handling System



S. No.	Part Description	Quantity Requirement
<b>1.0</b>	<b>BOTTOM ASH SYSTEM ( DRAG CHAIN CONVEYOR SYSTEM )</b>	
<b>A</b>	<b>Bottom Ash hopper</b>	
	Bottom Ash hopper Gate liners	1 Sets
	Quenching Nozzle Assembly including Nozzle tip.	1 Sets
	Inspection Window assembly including glass panel, gaskets etc.	1 Sets
<b>B</b>	<b>Submerged Scrapper Conveyors</b>	
	Scrapper Conveyor Chains	One (1) no. completes chain lengths in case bidder is providing one working conveyors for each unit.
	Scrapper bars complete with fixing lugs etc.	1 Sets
	Guide Pulley Assembly Complete with shaft, bearing, mounting plate etc.	1 Sets
	Drive End Sprocket	1 Sets
	Tail End Take-up Sheaves	1 Sets
	Sprocket segments	1 Set
<b>C</b>	<b>Clinker Grinder / Ash Crusher</b>	
	Clinker Grinder Assembly	1 Nos.
	Clinker Grinder Liners	1 Sets
	Clinker Grinder Shaft Sleeves	3 Sets
	Clinker Grinder Gear Box	1 No.
	Clinker Grinder Drive Fluid Couplings	1 Nos.
	Bearing for Grinder motor along with the housing	1 Sets
	Lantern rings	2 Sets
	Wearing rings	2 Sets
	Motor for ash crusher	1 No.

#### 2.14.2 Coal Handling items:



S.No	Description	Quantity (Minimum one no. to be provided)
<b>A.</b>	<b>Conveyor system</b>	
1.	Pulleys complete with shaft excluding bearing & plummer blocks (complete with lagging)	1 no. of each type and size in pulley drum and shaft dia. (for population upto 10 Nos)
2.	Plummer Block complete with bearings & sleeves	2 no. each type and size

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3.	a. Roller each type & size (Carrying, Return, self-aligning etc)	20%
	b. Roller each type & size (impact)	40%
	c. Roller Brackets with bolts (each type & size)	20%
4.	a. Idlers set (Carrying, Return)	10%
	b. Idlers set (impact)	40%
<b>B.</b>	<b>Conveyor Belting</b>	
	Main Conveyors	one drum length of 250m of each type, size and rating
	Boom conveyor, belt feeder, intermediate conveyor & bunker seal belt	one complete length of each
<b>C</b>	<b>Gear Box</b>	
	Input shafts with pinion	1 set of each type and rating
	Oil seals	2 sets of each type and rating
	Bearings	1 set of each type and rating
	Hold back device	2 nos. of each type and rating
	Cooling fan with cover	2 nos. of each type and rating
	Complete gear box assy with hold back device	1 set of each type and rating
<b>D</b>	<b>Coupling</b>	
	<b>a) Gear coupling</b>	
	Gear Coupling	2 nos of each type
	Bolts for gear coupling	2 sets of each size
	Seal kit for gear coupling (o-ring)	2 sets of each type
	<b>b) Fluid Coupling</b>	
	Fluid Coupling complete	1 no. of each type and size
	Multi Disc assembly (for fluid coupling), if applicable.	4 nos each type and size
	Resilient Drive plate assy., if applicable	1 no. of each type and size
	Bearings	1 no. of each type and size
	Seal kit for fluid coupling	2 sets of each size
	Fusible plug	10 nos. Of each size
	Complete actuator and engaging assembly (including motor, gear box etc.)	1 set of each type
	Oil Cooler assembly (if applicable)	1 set of each type
	Oil pump-motor set (if applicable)	1 set of each type
	Water pump motor	1 set of each type
	Oil filters	5 sets of each type
	Oil Cooler valves (if applicable)	2 nos. of each type
<b>E.</b>	<b>Brakes</b>	

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	Brakes	1 no of each size & type
	Brake shoes	2 sets of each size
<b>F.</b>	<b>Belt cleaners and skirt board</b>	
	Modular segments for belt cleaner	5 %of total population of each type & size
	Modular segments for skirt board	5 %of total population of each type & size
	Skirt Rubber	5 %of total population of each type & size
	Complete belt cleaner (internal / external )	2 %of total population of each type & size
<b>G.</b>	<b>In-line magnetic separators</b>	
	Cleated conveyor belt	1 set
	Motor, gear box drive assy. complete	1 set
	Pulleys with plummer block & bearings	1 set of each size & type
<b>H.</b>	<b>Coal crusher</b>	
	Plummer Block assembly complete including bearing, lock nut, lock washer etc.	2 Set
	Shaft seal	4 Sets
	Hammer sets	2 sets for each crusher
	Rotor assembly complete consisting of rotor shaft & keys, End discs, Centre discs, distance rings, suspension bars, disc clamping nuts and shaft extension etc. but without hammers, bearings and pillow blocks, as applicable	1 Set
	Cags bars, if applicable	4 Set
	Breaker plate	4 Set
	Liners	2 sets
	Suspension bars	4 Set
	Kick-off plate	4 Set
	Screen plate upper & lower	4 no. each
	Tramp iron pick up plate	2no. each
<b>I.</b>	<b>Vibrating screening feeder</b>	
	Bearings	2 no. of each type & size
	Seals	2 no. of each size
	Liners	1 sets
	Screen plates	10 sets
	Complete vibrating assembly consisting of all rotating parts including drive & driven unbalanced shafts including bearings, casing spring, vibrating blocks, main shaft, sheave & unbalanced weights, (as applicable).	1 set of each type and rating and direction
	Hoses (if applicable)	2 set



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	Drive unit assembly (including electric motor, hydraulic pump, hydraulic motor, flexible shaft, gear box, (as applicable)	1 set
<b>J.</b>	<b>Electric hoists</b>	
	Brake linings	2 sets of each type
	Rope guide & rope tightner	1 no. of each type
	Limit switch	2 nos. Of each type & size
	Gear box/gear set	2 sets of each type
	Motor/geared motor	1 no of each type & rating
	Drum bearing	1 set of each type & rating
<b>K.</b>	<b>Flap gates (including that of trippers)</b>	
	Limit switch	8 nos. of each type & rating
	Actuator (complete with motor, gear box, limit switches etc.)	1 nos. of each type & rating
	Oil seals of Actuator	2 nos. of each type & rating
	Flap gate shaft	1 nos. of each type & rating
	Pressure nut	12 nos. Of each type & size
<b>L.</b>	<b>Rack &amp; pinion gate</b>	
	Limit switch	2 no. of each type & size
	Rollers with bearings	2 no. of each size
	Motor gear box assembly	1 set of each type
	Actuator (complete with motor, gear box, limit switches etc.)	1 nos of each type & rating
<b>M.</b>	<b>Travelling tripper</b>	
	Complete drive assembly including gear box, coupling, brake etc.	1 set
	Complete internals of speed reducer (including input shaft, output shaft, gear set)	1 set of each size & type
	Bearings for reducer	2 sets
	Drive axle with wheels, plummer blocks, bearings etc.	1 set
	Oil seals	2 nos. of each size
	Non-drive axle with wheels plummer blocks, bearings etc.	1 set of each type
	Chain assembly with sprockets	1 set of each type & size
	Festoon Roller assembly for flexible cable	4 Nos
	Pulleys and plummer block bearings	1 no of each type
	Plummer block with bearing for cable reel drums	1 set of each type
<b>N.</b>	<b>Bucket elevators</b>	
	Chain links & Buckets -	10% of installed qty
<b>O.</b>	<b>Screw conveyor/ feeder</b>	

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	Bearings	100% of installed qty
	Complete screw with keys	1 set
	Coupling complete	1 set
	Seals	1 set
	Gear Reducer, if applicable	1 set
<b>P.</b>	<b>Stacker and Reclaimer (Including boom conveyor, conveyors)</b>	
	Fluid coupling (complete)	1 no. of each type
	Fusible plug	4 sets for each type of coupling
	Oil seals	4 sets for each type of coupling
	Bearings	2 set of each type
	Couplings consisting input and output halves (for travel drive)	1 no. of each type
	Bearings excluding slewing bearings	1 no. of each type
	Hydraulic pump with electric motor & valves	1 no. of each type
	Hydraulic cylinder	1 no. of each type
	Repair kit for hydraulic cylinder including oil 2 set for each seals etc.	1 no. of each type
	Grease pump	1 no. of each type
	Hoses	2 sets of each type and size
	Solenoid valves with coils	2 nos. of each type
	Slew gear Box	1 nos. of each type and size
	Gear Box of bucket wheel	1 nos. of each type and size
	Carbon brushes for current collector of cable reeling drum	2 sets for each drum
	Plummer blocks and bearings of (CRD)	1 set of each type
	Traverse drive assembly consisting of reducer, couplings, brake assy. etc.	1 no. of each type and direction
	Brake shoes	4 sets for each type of brake
	Complete carriage wheel assembly (Each set comprising of 1 wheel + 1 axle + 2 bearing + 2 locking assly.)	1 sets
	Complete bucket with liners, etc.	1 Bucket requirement
	Drive assembly of cable reel drive consisting of motor, gear box, coupling, brake etc., as applicable	1 set of each type
	Chain & chain sprockets	1 set of each type
	Cable guide assembly	1 set of each type
	Various plummer block used in Stacker reclaimer	1 no. of each type & size
	Plummer block with bearing for cable reel drums	1 Set of each type
	Rail clamp assembly	1 Set of each type



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	Seal kit for thrustor assembly	1 Set of each type
	Thrustor cylinder assembly	1 Set of each type



#### **Notes:**

- 1) The above spares do not include installed spares as well as commissioning spares. The above shall be purely ware house spares.
- 2) Set means complete replacement of particular part in one machine.
- 3) Wherever "Each Type" is specified, it means "Type/make/model/size/rating and exactly replaceable".
- 4) Wherever "% qty." is specified, LSTK Contractor to quote in next higher rounded figure.
- 5) Spare parts of equipments shall not be applicable for those items which are not parts of Material Handling system.

#### **MANDATORY SPARE PARTS:**

##### **2.15 FIRE FIGHTING :**

Sl. No.	Part Description	Size Range (NB)	Quantity Required (% or part or fraction of as built quantity)	Remark
1	Pipes for each size, rating/thk. & material	≤1.5"	5%	min. qty. 6 mtr.
2	Pipes for each size, rating/thk. & material	≥ 2"	2%	min. qty. 6 mtr.
3	Fittings for each size, rating/thk. & material	≤1.5"	5%	min. qty. 1 No.
4	Fittings for each size, rating/thk. & material	≥ 2"	2%	min. qty. 1 No.
5	Flanges for each size, rating/thk. & material	up to 6"	5%	min. qty. 1 No.
6	Flanges for each size, rating/thk. & material	8" to 24"	2%	min. qty. 1 No.
7	Valves for each size, rating/thk. & material	up to 14"	5%	min. qty. 1 No.
8	Hose box, RRL hose ( 63mm) with couplings, jet nozzle with branch pipe, hydrant valve, landing valve		5%	min. qty. 1 No.
9	Hose reel with valve, nozzle, drum & mountings		5%	min. qty. 1 No.
10	Monitor (Per type & capacity)		1 no. each	
11	Portable fire extinguisher per type &		1%	min. qty. 1 No.

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	capacity (upto 10 kg )			
12	Wheel mounted fire extinguisher per type & capacity (greater than 10 kg )		1 no. each	
13	Bolts, Nuts & Gaskets (For each size, rating, material)		10%	min. qty. 1 No.
14	Expansion Bellow (For each size, rating, material)		10%	min. qty. 1 No.
15	Strainer element (For each size, rating, material)		10%	min. qty. 1 No.
16	Spray / sprinkler head per size, rating & material		10%	min. qty. 1 No.
17	Complete Gear Box for gear operated Valves	≥ 16"	5%	min. qty. 1 No.
18	Bolt torque wrenches (Manual)		1 set	min. qty. 1 set.

**Notes :**



- Percent of quantity required as mandatory spares is for each item consumed in as built.
- No substitution in size, rating and material is allowed.
- Pipe length in meter and other items in No. or Set shall be supplied.
- Fractional part of quantity shall be converted into nearest upward whole part.

**3.0 VENDOR'S RECOMMENDED SPARE PARTS**

Contractor shall provide list of recommended spare parts of all the equipments as recommended by OEM (Original Equipment Manufacturer) with recommended quantities not covered in mandatory spares along with itemized price. Owner will review and decide the recommended spares required for the project. Recommended spares and their quantities shall take into account related factors of equipment reliability, effect of equipment downtime upon production or safety, cost of parts and availability of vendor's service facilities around the proposed location of equipment.

**General Notes:**

- 1) The above spares do not include installed spares / commissioning spares. The above shall be Mandatory spares only.
- 2) Set means complete replacement of particular part in one machine/equipment/Fired heater etc.
- 3) Item wise price against each item shall be furnished.
- 4) Wherever "Each Type" is specified, it means "of the Type/make/model/size/rating and exactly replaceable"
- 5) Wherever "% qty." is specified, LSTK Contractor to quote in next higher rounded figure
- 6) Out of % age spares and minimum qty specified against each item - higher of the two shall be supplied.
- 7) Spares mentioned above to be offered as mandatory spares. However, if these spares are not used in the equipments being offered / supplied, the same need not be supplied. Bidder shall clearly indicate against each such spare that these spares / items are not used in their equipments.

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- 8) The above is owner's recommended list of spares. The supplier may add other items as per their recommendations.
- 9) The quotation should contain sectional drawing showing location & part no. (For exact identification) & material specification.
- 10) LSTK Contractor to supply all commissioning spares for all necessary equipment's for smooth & trouble free operation of complete system.

LSTK Contractor to supply all mandatory spares parts as per the list for all necessary equipment's for smooth & trouble free operation of complete system.

- 11) The above qty of Mandatory Spare parts under different heads is for tentatively 2 years. However Bidder to quote the lump sum cost for Spares, Lubricants, Chemicals and Consumable etc in SP1 of BOQ. Contractor shall also furnish item-wise prices for all spares including Consumables, six months before the MECHANICAL COMPLETION.

Itemised Price List (Optional) to be furnished by LSTK Contractor with validity of 2 Years for 2 years Bidder's recommended Operational Spares for smooth & trouble free operation of complete system.

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## PART II: TECHNICAL

### SECTION – 11.0



#### OWNER'S ENGINEERS IN LSTK CONTRACTOR'S OFFICE

**PLANT: COAL GASIFICATION PLANT FOR  
GENERATING SYNTHETIC NATURAL GAS**

**PROJECT: SYNTHETIC NATURAL GAS PRODUCTION  
THROUGH COAL GASIFICATION ROUTE AT  
BARDAHMAN, WEST BENGAL (INDIA).**

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## 1.0 OWNER'S ENGINEERS IN LSTK CONTRACTOR'S DESIGN OFFICE:

1.1 LSTK Contractor shall provide to Owner's Engineers in LSTK Contractor's Design Office the following facilities and services free of charge:

The basis is 15.man months for Gasification Plant not exceeding 5 Engineers at any time.

1.1.1 Fully furnished offices: one double occupancy office, one single occupancy office for each design office. A conference table shall be provided in the single occupancy office.

1.1.2 Office equipment for exclusive use by Owner's Engineers shall be:

- ❖ 1 Scanning machine
- ❖ 1 Speaker-type telephone per office
- ❖ 1 Small desk calculator per office
- ❖ 1 PC with internet per engineer and printing facility
- ❖ 1 Photocopying machine

1.1.3 Office stationery

1.1.4 Local transportation from residence to office and vice versa by means of public transport or car pool transportation.

1.1.5 Telephone facilities with STD and ISD calling in LSTK Contractor's Design office.

1.1.6 LSTK Contractor shall fully and on a best effort basis assist Owner's resident Engineers in obtaining required Work permits and Visa on time as necessary and required.

1.1.7 Owner's Engineers offices should be near LSTK Contractor's project team (as far as possible) and can access to LSTK Contractor's general computer services of the non confidential nature, computer network and the Engineers shall be authorized to use Internet and e-mail for inter office and other countries and use the video teleconference.

## 2.0 OWNER'S ENGINEERS IN LSTK CONTRACTOR'S DETAILED ENGINEERING OFFICE:

2.1 LSTK Contractor's Detailed Engineering Contractor shall provide to Owner's Engineers in their office the following facilities and services free of charge:

The basis is 35. man months not exceeding 5 Engineers at any time.



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## PART II: TECHNICAL

### SECTION – 12.0



#### TRAINING OF OWNER’S PERSONNEL

**PLANT : COAL GASIFICATION PLANT FOR GENERATING SYNTHETIC NATURAL GAS**

**PROJECT: SYNTHETIC NATURAL GAS PRODUCTION THROUGH COAL GASIFICATION ROUTE AT BARDAHMAN, WEST BENGAL (INDIA).**

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## **LIST OF ATTACHMENT**

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## 1.0 GENERAL:

*Given below is a typical program to train Owner's Operations' and Maintenance manpower in similar plants. Both Site training and classroom training shall be included in LSTK Contractor's Scope. Under this program nominated personnel shall be trained at:*

- ❖ *LSTK Contractor's Licensor's Office.*
- ❖ *LSTK Contractor's Detailed Engineering Office*
- ❖ *Equipment / DCS manufacturer's workshops*
- ❖ *New Plant Site*

## 2.0 OBJECTIVES OF MANPOWER TRAINING:

**2.1** The objectives of LSTK Contractor's training program shall be to transfer Process Technology and develop technical expertise in a core of individuals so that there is a pool of knowledge among Owner's personnel which can be used to operate and maintain complete plants and to give continuous long term training to junior operations and maintenance staff. The basic objective of training shall comprise of following main elements:



**2.1.1** Owner's manpower shall receive sufficient detailed instructions on the plants to enable them to carry out normal operations, to take corrective action in the event of upset conditions, and to set up routine operating and maintenance procedures.

**2.1.2** Owner's manpower shall be able to develop a thorough understanding of the plants and the know-how and processes behind it, be in a position to take positive and corrective action to prevent any upset and breakdown conditions from occurring, and to optimize plants' operations, maintenance and organization.

## 3.0 REQUIREMENT OF TRAINED PERSONNEL:

Requirement of Technical Personnel for the plants shall be demonstrated to Owner by LSTK Contractor based on organisation chart of similar Plants indicating the total number of personnel required or operation, maintenance, laboratory works, etc.

## 4.0 TRAINING PROGRAM: CONTENT AND TIMING:

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#### 4.1 **Title: Process Technology Training Course**



<b>Objective</b>	To train Process Engineers and Senior Operations' Personnel. It provides participation with theoretical and practical knowledge and skills required for efficient and safe operation of the plants.
<b>Content</b>	This course describes the process flow and equipment, process control, maintenance procedures, analytical procedures, metallurgy and safety. Process and catalyst and adsorbent and desorbent chemistry and effects of process variables are carefully explained. Plants start-up, shutdown, emergency procedures and production quality control are discussed in detail along with a trouble shooting analysis. Each participant will receive a Process Technology Training Manual.
<b>Duration</b>	4 weeks
<b>Trainers</b>	One LSTK Contractor's Instructor for each individual process training period. The instructor will be specialists in their respective areas.
<b>Participants</b>	Maximum Thirty
<b>Location</b>	Licensors's Similar Plant

#### 4.2 **Title: Training at Equipment / DCS Manufacturer's Shops:**

The Selected Personnel shall receive specialized training at vendor's shops. Training shall cover major equipment, items and systems incorporated in the subject plants such as DCS, compressors/Turbine, Gasifier, Coal Handling Equipments, FCS and the like.

A typical compressor/Turbine training syllabus at vendor shop premises is given below:

- Overall description and illustration of unit operating principles.
- Detailed examination of unit component parts: Fabrication, Materials, Stress and Corrosion criteria.
- Discussion of Control systems, Alarms, Interlock and Logic circuits.
- Instrument calibration.
- Review of Lube and Seal oil system.
- Detailed instruction of unit operations; control of operating parameters: Pressure, Temperature, Speed, Power cycles.
- Analysis of Routine/Scheduled/Emergency maintenance techniques; criteria and methods of troubleshooting.

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h. Hands-on training in inspection and test techniques: non-destructive tests; dimensional checking; inspection frequency criteria.

i. Spare parts: ordering, coding, care of spares.

j. Running and Workshop testing.

**Duration** : As required and to be mutually agreed.

**Participants** : Maximum 4 per each vendor (Total max. 4 man months \_\_\_\_ s).

### 4.3 Training Courses at the Owner's Plant Site:



#### 4.3.1 Title: Process Operation training Course

<b>Objective</b>	To provide a basic overview of process chemistry, operating variables and process control suitable for foreman, control room operators and outside.
<b>Content</b>	Description of Process flow and control, Equipment of Plants, Routine duties and operating emergency procedures course to cover all the technology part of LSTK area.
<b>Duration</b>	2 week
<b>Trainers</b>	Licensor's and LSTK Contractor's Technical Advisors.
<b>Participants</b>	Maximum Fifty in multiple batches
<b>Location</b>	Owner's Site at Bardhaman, West Bengal, India

#### 4.3.2 Title: Start-up, Shut-down, Safety and Emergency procedures Training Course

<b>Objective</b>	To reinforce the theoretical aspects of the operation presented in the Process Operation Training Course.
<b>Content</b>	On-site instruction and on-the job training during Pre-commissioning and Commissioning phase with classroom instruction as far as necessary.
<b>Duration</b>	4 weeks
<b>Trainers</b>	Licensor's and LSTK Contractor's Technical Advisors.
<b>Participants</b>	Maximum Fifty in multiple batches
<b>Location</b>	Owner's Site at Bardhaman, West Bengal, India

#### 4.3.3 Title: On-the-job Training Course

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<b>Objective</b>	To develop training skills and techniques of participants who will be Involved in operator training services.
<b>Content</b>	Program includes review of on-the-job training and module development material, determining of training needs and objectives, organization and preparation of training materials, curriculum design and lesson plan development. Participants must have attended the Process Technology or Process Operations training course.
<b>Duration</b>	Thirty (30) working days
<b>Trainers</b>	One LSTK Contractor's Training Advisor.
<b>Participants</b>	Maximum Fifty in multiple batches
<b>Location</b>	Owner's Site at Bardhaman, West Bengal, India



4.3.4 Title: Training on Smart Plant Tools and Integrated information Management System (SPF).

<b>Objective</b>	To develop training skills and techniques of participants who will be Involved in review and operation /maintenance.
<b>Content</b>	Program includes review of on-the-job training and module development material, determining of training needs and objectives, organization and preparation of training materials, curriculum design and lesson plan development. Participants must have attended the Process Technology or Process Operations training course.
<b>Duration</b>	1.0 For Core Group of 10 members 10 working days. 2.0 For User group 24 members for 30 working days.
<b>Trainers</b>	One LSTK Contractor's Training Advisor.
<b>Location</b>	Owner's Site at Bardhaman, West Bengal, India

## 5.0 EVALUATING AND REPORTING TRAINEE'S PROGRESS:

LSTK Contractor's training team shall evaluate performance of trainees and submit report based on following:

- ❖ Oral test
- ❖ Written test
- ❖ Observation at work
- ❖ Performance test

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## 6.0 INTEGRATING TRAINEES INTO THEIR WORK ENVIRONMENT:

LSTK Contractor shall recognize the need to integrate Owner's personnel into the new Plants organization as an essential part of their training program. From the start of the training period, LSTK Contractor shall apply a "team concept" to organize trainees into study groups, each with its own responsibilities and duties. The team concept shall be fully developed throughout the training period to reinforce the overall learning process and trainee's attitude, all duly adapted to Plants organization requirements and Owner's objectives.

Later, during Pre-commissioning, the team concept shall be further emphasized as Owner's personnel shall work side by side along with the LSTK Contractor's Commissioning specialists.

## 7.0 LANGUAGE OF TRAINING:



Both in India and outside India all training shall be conducted in English language.

All personnel to receive training must have a sufficient knowledge of reading, speaking and writing in the English language.

## 8.0 TRAINING SERVICES BY LSTK CONTRACTOR:

**8.1** To achieve the training objectives set forth herein, LSTK Contractor shall provide following services as a minimum:

- a. Task analysis of plant positions, followed by development of job profiles for all manpower included in LSTK Contractor's training program.
- b. General and detailed training program for all manpower to be trained.
- c. Written training aids tailored to each phase of training and for each job position included in the training program.
- d. Instructions by specialized training personnel inside and outside India.
- e. Periodic evaluation of individual trainee's progress during all phases of training, in and outside India.
- f. Comprehensive management of training services included in the training program.

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g. Advice and assistance in respect of travel, housing and subsistence problems related to training overseas.

h. All risks insurance and emergency medical coverage of trainees.

## 9.0 MANAGEMENT AND COORDINATION OF TRAINING SERVICES:

LSTK Contractor shall appoint a Training Manager to manage and coordinate training services for this Project. Owner for his part shall appoint a Training Manager to coordinate with LSTK Contractor. Owner's training Manager shall be responsible for discipline of trainees during all phases of training, inside and outside India.



## 10.0 MISCELLANEOUS:

For training courses in India, Owner shall provide services and facilities for LSTK Contractor's trainers. For training courses outside India, LSTK Contractor shall provide for Owner's trainees the following services and facilities for the duration of such training courses:

- ❖ 1 meal per day in respective canteen
- ❖ Local transportation from place of accommodation outside India to respective place of training course

Owner shall bear the following:

- ❖ Travel cost to/from India to location of training course
- ❖ Accommodation and living cost outside India.

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## PART - II: TECHNICAL



### SECTION – 13.0

#### INFORMATION REQUIRED IN THE TECHNICAL PROPOSAL

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GENERATING SYNTHETIC NATURAL  
GAS**

**PROJECT: SYNTHETIC NATURAL GAS PRODUCTION  
THROUGH COAL GASIFICATION ROUTE  
AT BARDAHMAN, WEST BENGAL (INDIA)**





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## LIST OF ATTACHMENT

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## 1.0 PLANT DATA:



The following information shall be submitted by LSTK Contractor in co-ordination with the licensor/s:

## 1.1 COAL GASSIFICATION PLANT:

(Note-1: Based on on-stream factor of 330 days/year).

### 1.1.1 PRODUCT PURIFIED SYN GAS:

SI.No	Description	Units	At 100% capacity	At 110 % capacity	At 50% capacity
i	Capacity (Note:1)	TPA of Purified Syn. Gas			
ii	Capacity (Note:1)	Nm <sup>3</sup> /hr of Purified Syn. Gas			
iii	Product Purified Syn Gas				
	Hydrogen (H <sub>2</sub> )	Vol %			
	Carbon Monoxide(CO)	Vol %			
	Carbon Di-oxide(CO <sub>2</sub> )				
	Nitrogen (N <sub>2</sub> )	Vol %			
	Argon (Ar),	PPMv (max.)			
	Mercury (Hg),	PPMv (max.)			
	Pressure	Kg/Cm2abs			
	Temperature	°C			
iv	Feed Consumption				
	Coal	kg/hr			
	Coal	Gcal/ton of Purified Syn Gas			
v	Fluxant	kg/hr			
vi	Export H.P./M.P./L.P. steam				
	Quantity	MT/hr			
	Pressure	kg/cm <sup>2</sup> g			
	Temperature	deg C			

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Sl.No	Description	Units	At 100% capacity	At 110 % capacity	At 50% capacity
vii	Power for balance of plants				
	Quantity	MW hr/hr			
	Voltage	KV			
	Frequency	Hz			
	Phase				

#### 1.1.2 CARBON DI-OXIDE GAS:



Sl.No	Description	Units	At 100% capacity	At 110 % capacity	At 50% capacity
i	Capacity (Note:1)	TPA of Carbon di-oxide Gas			
ii	Capacity (Note:1)	Nm <sup>3</sup> /hr of Carbon di-oxide Gas			
	Pressure	Kg/Cm <sup>2</sup> abs			
	Temperature	°C			

#### 1.1.4 BY-PRODUCT SULPHUR:

Sl.No	Description	Units	At 100% capacity	At 110 % capacity	At 50% capacity
i	Capacity (Note:1)	TPA of Sulphur (Solid)			
ii	Capacity (Note:1)	TPH of Sulphur (Solid)			
iii	Plant Turn-down ratio	%			
iv	By-Product Sulphur (Solid)	Wt%			
	Hydrogen Sulphide (H <sub>2</sub> S)	Wt.ppm			

#### 1.1.5 BY-PRODUCT ASH/ SLAG:

Sl.No	Description	Units	At 100% capacity	At 110 % capacity	At 50% capacity
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i	Capacity (Note:1)	TPA of Ash/ Slag			
ii	Capacity (Note:1)	TPH of Ash/ Slag			
iii	Plant Turn-down ratio	%			
iv	By-Product Ash/ Slag (Solid)	Wt%			
	Moisture (H <sub>2</sub> O)	Wt%			

## 2.0 UTILITY CONSUMPTION:

### 2.1 COAL GASIFICATION PLANT:



Sl.No	Utility	Units	At 100% capacity	At 110 % capacity	At 50 % capacity
i	Power	KWH			
ii	DM Water	m <sup>3</sup> /hr			
iii	Cooling water circulation	m <sup>3</sup> /hr			
iv	Make-up Water for Slag/Slag fines/Flyash Disposal System (if any)	m <sup>3</sup> /hr			
v	HP/MP/LP Steam Export	MT/hr			
vi	Instrument Air	Nm <sup>3</sup> /hr			
vii	Oxygen	Nm <sup>3</sup> /hr			
viii	High Pressure Nitrogen	Nm <sup>3</sup> /hr			
ix	Low Pressure Nitrogen	Nm <sup>3</sup> /hr			

## 3.0 PLANT START UP REQUIREMENT:

### 3.1 COAL GASIFICATION PLANT

Bidder to provide all the B/L items during start-up in the prescribed format

Sl.No	Item (Bidder to specify)	Units	
i			Bidder to specify
	Normal		Item-wise quantity, quality at B.L.
	Peak, including duration		required for start-up
	B/L Pressure		
	B/L Temperature		
	Minimum purity required		
	Minimum acceptable limit of		

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#### 4.0 CATALYST REQUIREMENT :

Bidder to specify Item-wise information on catalysts used in their process as per pro-forma given below:

Type	Supplier	Loaded Volume	Expected Life
		m <sup>3</sup>	Years

#### 5.0 EFFLUENTS AND EMISSIONS:

##### 5.1 Liquid Effluents (other than Coal Gasification Licensor's scope i.e. applicable for Gas purification units only.):

- a) Continuous
- b) Intermittent

##### 5.2 Gaseous Emissions:

- a) Continuous
- b) Intermittent

#### 6.0 FLARE LOAD SUMMARY:



- a) HP Flare load
- b) LP Flare load

#### 7.0 LIST OF EQUIPMENT

#### 8.0 LIST OF ON-LINE ANALYZERS

#### 9.0 FLOW MEASURING INSTRUMENTS AT PLANT BATTERY LIMITS:

Description	Recommended Flow Meter	Unit	Limits of Accuracy (Instrument Accuracy)
Syn Gas	Suitable	Nm <sup>3</sup> / hr, Nm <sup>3</sup> /day	Refer Section-5.2
Oxygen	Suitable	Nm <sup>3</sup> / hr	Refer Section-

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Description	Recommended Flow Meter	Unit	Limits of Accuracy (Instrument Accuracy)
			5.2
Nitrogen	Suitable	Nm <sup>3</sup> / hr	Refer Section-5.2
Carbon di-oxide	Suitable	Nm <sup>3</sup> / hr, Nm <sup>3</sup> /day	Refer Section-5.2
HP/MP/LP Steam Export	Orifice Plate	Kg/hr, Tonnes /day	+/- 2% of flow rate
DM water/ Potable water/ Construction water	Orifice Plate	m <sup>3</sup> /hr, m <sup>3</sup> /day	+/- 2% of flow rate
Circulating CW	Magnetic Flow meter	m <sup>3</sup> /hr, m <sup>3</sup> /day	+/- 0.5% FS
CW Make-up	Magnetic Flow meter	m <sup>3</sup> /hr, m <sup>3</sup> /day	+/- 0.5% FS
Instrument air/ Service air	Orifice Plate	Nm <sup>3</sup> /hr, Nm <sup>3</sup> /day	+/- 2% of flow rate
HP Flare Header	Ultrasonic Flow-meter (Insertion Type)	Nm <sup>3</sup> /hr, Nm <sup>3</sup> /day Kg/hr, Tonnes/day	+/- 2 %
LP Flare Header	Ultrasonic Flow-meter (Insertion Type)	Nm <sup>3</sup> /hr, Nm <sup>3</sup> /day Kg/hr, Tonnes/day	+/- 2 %

#### 10.0 OTHER TECHNICAL INFORMATION TO BE SUBMITTED ALONG WITH THE BID:

In addition to the requirements indicated in the earlier paragraphs, the following technical information in accordance with the offer is to be furnished (but not limited to) in the Technical proposal:

##### 10.1 Salient features and description of process along with flow diagram indicating operating temperature and pressure conditions of all equipment used in the process.

- Process description indicating the functions of various sections.
- Turndown capability and operating range.
- System suggested for on-line product quality control.
- The details of effluent treatment facilities included in the battery limit and the quantities of gaseous, liquid and solid wastes released from the plant along with their specifications for normal operation and during regeneration, if any.
- Utility summary including the requirements of start-up / shutdown of Coal Gasification Plant
- Flare load summary for various failure cases (cooling water, reflux, power, blocked



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out, fire).

g) Plant battery limit tie point details.

## 10.2 Equipment Layout plan:

Equipment Layout plan showing location of various equipment based on relevant appropriate norm.

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## SECTION –14.0



### SITE WORKING AND SAFETY CONDITIONS

**PLANT:** COAL GASIFICATION PLANT FOR GENERATING SYN GAS (CO+H<sub>2</sub>) FOR PRODUCTION OF SYNTHETIC NATURAL GAS (SNG)

**PROJECT:** COAL BASED SYNTHETIC NATURAL GAS (SNG) PROJECT AT BARDHAMAN, WEST BENGAL, INDIA

1	26.09.25	Issued for tender	JKY	JKY	RRK
REV	REV ATE	PURPOSE	PREPD	REVWD	APPD



	<b>COAL GASIFICATION PLANT FOR Proposed COAL TO SYNTHETIC NATURAL GAS</b>  <b>OWNER: JV OF GAIL AND CIL</b>  <b>SITE WORKING AND SAFETY CONDITIONS</b>	PC217/E/001/P-II/14.0	1	
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## 1.0 SITE LOCATION

FORM NO: 02-0000-0021 F2 REV3



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	<div><u>COAL GASIFICATION PLANT FOR Proposed COAL TO SYNTHETIC NATURAL GAS</u></div> <div><u>OWNER: JV OF GAIL AND CIL</u></div> <div><b>SITE WORKING AND SAFETY CONDITIONS</b></div>	PC217/E/001/P-II/14.0	1	
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The proposed project is located at Bahadurpur in the eastern part of Raniganj Coalfield in Asansol sub-division of Paschim-Bardhaman district of West Bengal. The proposed area lies within the latitude 23°41' 32" N to latitude 23°42'13"N & longitude 87°09'05"E to longitude 87°09'38"E. The proposed site is at a distance of 30 Kms from Asansol and 35 km from Durgapur Township, both of which are well-connected with Eastern Railway lines (Howrah-Delhi) of Indian Railways, as well as by the Howrah-Delhi Grand Trunk Road (N.H.-2) which is 10 km away from the proposed site. Raniganj-Suri Road (N.H.-60) which is around 2.5 km away from the proposed site is the closest major roadway. Kazi Nazrul Islam (Andal) Airport, the closest airport, is 26.5 km away. Nearest port is the Dr. Shyama Prasad Mukherjee Port Trust (Kolkata Port Trust) which is 209 km away.

## 2.0 SITE ESTABLISHMENT

- 2.1 The LSTK CONTRACTOR shall provide all huts, stores, tarpaulins and other covers for the accommodation of his staff, workmen and materials. All materials likely to deteriorate in the open shall be stored under suitable cover.
- 2.2 The LSTK contractor shall advise the owner within 15 days of the placement of LOI his space requirement which shall include for office, covered storage, open storage, fabrication space, etc. Depending on availability & requirement, space shall be allotted to the contractor for the duration of this contract. He will not be permitted to make use of any other space without the sanction of the Owner. The use of this space shall strictly be made for the execution of this contract only. The sanitary conditions of the ground in or around such structures shall, at all times, be maintained by the contractor in a manner satisfactory to the owner.
- 2.3 The security of the LSTK contractor's equipment and materials is his own responsibility.
- 2.4 The LSTK contractor's shall clear away periodically any rubbish, scrap materials, etc. and dump the same in the area indicated by the OWNER/PMC. All construction material shall be neatly stacked in an orderly manner as directed by the owner and care shall be taken to allow proper access to workmen and easy movement of men, vehicles, cranes and materials.
- 2.5 The LSTK contractor shall maintain all the drawings carefully mounted on the board of appropriate size and well protected from the ravages of weather termites and other insects.
- 2.6 The LSTK contractor shall not permit the entry to the site of any person not directly connected/concerned with the work without first having obtained the written permission of OWNER.
- 2.7 The LSTK contractor shall submit a list of plant, equipments, tools, tackles, etc. which he will use, to perform the work. The contractor shall submit a list in duplicate of all materials, tools and tackles etc. brought inside the plant site duly signed by owner's security staff as per the rules laid by owner. These tools, etc. shall not be removed from the site till the completion of job. A gate pass must be obtained from the owner in order to remove from site any plant, machinery, tools, materials and equipment.

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- 2.8 All items such as instructions and other pertinent data regarding erection/commissioning and maintenance should be typed and classified for transmittal in a manner approved by the owner.
- 2.9 All employees of the LSTK contractor shall conform to any rules of conduct, etc. established by owner. Failure to comply with the rules of conduct will be sufficient cause for removal of such person from the site.
- 2.10 The LSTK contractor will be responsible for providing all plant, tools and tackles, consumables and scaffolding required for the execution of his work as per the best engineering practices.
- 2.11 The receipt, unloading, movement and storage at site of all the LSTK contractor plant, tools and materials is his responsibility. The receipt, movement & storage of material issued by owner also shall be the responsibility of the LSTK CONTRACTOR/CONSTRUCTION CONTRACTOR.

#### 2.12 **ELECTRICITY**

DELETED

#### 2.13 **CONSTRUCTION WATER**

DELETED

#### 2.14 **FIRST AID**

The LSTK contractor may have access to the Owner's qualified first aid personnel and ambulance, in case of accidents, if available. The contractor will, however provide a first aid post for minor injuries to their staff.



### 3.0 **SUPERVISION OF WORK**

- 3.1 The LSTK contractor shall submit to the Owner resume of his site supervisors for approval prior to commencement of the work. Once approved, the LSTK contractor shall not remove his site supervisors without prior concurrence of the Owner.
- 3.2 The entire work is to be completed as per the agreed time schedule. The programme of work in details shall be submitted by the LSTK contractor before commencement of work. The detailed programmes prepared by the LSTK contractor shall conform to the targets set forth in the time schedule and will be subject to the approval of the owner. All the work shall be carried out in such a manner that the work of other agencies at site is not hampered due to any action of the LSTK contractor.

### 4.0 **INSPECTION**

The work of the LSTK contractor shall be subject to inspection by the OWNER/PMC at all times.

### 5.0 **EMPLOYMENT OF LABOUR**

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- 5.1 The LSTK contractor will be expected to employ on the work only his regular skilled employees with experience of this particular work. The permission of the Owner must be obtained before tradesman is recruited locally for the work. This rule does not apply to unskilled labour. No female labour shall be employed in dark hours/ i.e. hours prohibited under the applicable law. No person below the age of eighteen years shall be employed at any point of time.
- 5.2 All traveling expenses including provision of all necessary transport to and from site, lodging allowances and other payments to the LSTK contractor employees are his own responsibility.
- 5.3 The hours of work on LSTK Contractors / Owner and contractor shall adhere to the same.
- 5.4 All Construction contractors employees shall wear safety helmet and such identification marks as may be provided by LSTK contractor on work site and duly approved by Owner.
- 5.5 All notices displayed on the site and any instructions issued by the Owner shall be strictly adhered to by the LSTK Contractors and/or his LSTK contractor employees.
- 5.6 It shall be the responsibility of LSTK contractor to provide suitable accommodation including necessary facilities for their labour and staff.
- 5.7 LSTK contractor will arrange ID-CARD and Permits for labour as per statutory provisions for its labour, as necessary.
- 5.8 The LSTK contractor shall be required to maintain employment records as covered in relevant Acts and produce documentary evidence to the effect that he has discharged his obligations under the Employees Provident Fund Act 1952 for the workmen working at site.
- 5.9 In case the Owner becomes liable to pay any wages or dues to the labour of the LSTK Contractors or his contractor or any Govt. agency under any of the provision of the Minimum Wages Act, Workmen Compensation Act or any other law due to act of omission of the contractor, the Owner may make such payment and shall recover the sum from Contractor's bills or any other dues.

## 6.0 COMPLETION OF WORK

Before finally leaving site, all the LSTK contractor store, huts, plant, tools and rubbish shall be removed and the site left clean and tidy. The space allocated by Owner shall be vacated and handed over to the Owner.

## 7.0 WORKING AND SAFETY REGULATIONS

- 7.1 The LSTK Contractor shall observe all statutory safety and legal requirements regulations issued by Central and State Governments applicable to the work as well as any local regulations applicable to the site issue by the consultant or any other authority.

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7.2 Particular attention is drawn to the following:

- a) In case of accident, the Owner shall be informed in writing forthwith.  
The LSTK Contractor shall strictly follow regulations laid down by Factory Inspector, Govt. and State authorities in this regard.
- b) LSTK contractor shall fence his plant, platforms, excavations etc.
- c) Compliance with all electricity regulations.
- d) Compliance with statutory requirements for inspection and test of all lifting appliances and auxiliary lifting gear.
- e) Safety belts proposed to be used, shall be got checked by Fire & Safety Department of LSTK Contractor / OWNER in written before use.
- f) Before using the lifting or pulling equipment, LSTK contractor shall carryout load test which shall be witnessed by LSTK Contractor / OWNER.

7.3 Staircase, doors or gangways shall not be obstructed in any way that will interfere with means of access of escape.

7.4 No excavations will be started without the permission of the PMC / OWNER, who will inform the LSTK contractor of the position of any pipes or cables known to be buried in the area. All excavations must be effectively railed off at all times, or completely boarded over properly marked during the hours of darkness by red warning lamps, using Flame proof warning lamps in non smoking areas. Debris or material which cannot be immediately removed must be heaped in such a way as to be immediately remove and also to leave adequate passage way. Any finds such as relics or antiques coins or fossils etc. shall be promptly handed over to the Owner.



7.5 The LSTK contractor will notify the Owner of his intention to bring on the site any equipment, such as, space heating or welding apparatus or any container holding liquid or gaseous fuel or other substance which might create a hazard. The Owner will have a right to prohibit the use of such equipment or to prescribe the conditions under which such equipment may be used. The LSTK Contractor will have the right to inspect any construction plant, and to forbid its use if in his opinion it is un-suitable or unsafe. No claim arising there from shall be made by the LSTK Contractor.

The LSTK contractor or any one acting on his instructions will not bring on to the site any radio active substance or any apparatus using such substances or any X ray apparatus until written permission and direction regarding the use of such equipment has been received from the Owner.

The LSTK contractor shall be responsible for the safe storage of the radio graphic sources or those of his Construction contractors.

7.6 The LSTK contractor will meet all requirements, and act on the instructions of the Owner where it is necessary to operate a permit to work system.

7.7 Where it is necessary to provide and/or store petroleum products or petroleum mixtures and explosive, the LSTK contractor shall be responsible for carrying out such provision and/or storage in accordance with the rules and regulation laid down in Petroleum Act 1934, Explosive Act 1948 and Petroleum and Carbide of Calcium Manual Published by the Chief Inspector of Explosive of India. All such storage shall



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have prior approvals of the OWNER/PMC. In case any approval or clearance from Explosive or any statutory authorities is required, the contractor shall be responsible for obtaining the same.

- 7.8 The LSTK contractor shall have his own Fire Fighting Extinguishers and Equipment.
- 7.9 The LSTK contractor shall be responsible for the provision of all safety notices safety equipments including the safety gadgets for his workmen required by both the relevant legislation and such as the Owner may deem necessary.
- 7.10 While working at heights, safety belts with lifeline shall necessarily be used.
- 7.11 “LSTK contractor shall employ a safety officer for safe executing the construction activities of the project who will be responsible for implementing safety requirement contained in the documents.  
The safety officer shall possess a recognised degree in engineering discipline preferably, F&S or (Any branch of engineering) and had a post qualification construction experience of minimum two years.  
In addition, he/she shall also possess a recognised degree or diploma in industrial safety and preferably have adequate knowledge of the language spoken by majority of the workers at the construction sites.  
Contractor shall ensure physical presence of safety personnel at each work location wherever Hot Work permit is required. No work shall be started at site until above safety personnel are physically present at site. The contractor shall submit a safety organogram clearly indicating the lines of responsibility and reporting system and elaborate the responsibilities of safety personnel in the HSE MAUAL/Program. The contractor should furnish Bio-Data/Resume of the safety personnel as above, at least 01 month before the mobilization for PMC/OWNER’S approval.
- 7.12 LSTK contractor shall use only steel planks and clamps executing scaffolding. Wooden planks and rope shall not be allowed for this purpose.
- 7.13 LSTK contractor shall use asbestos cloth to ensure falling of weld spatters down below during above ground welding to ensure safety of electrical cables and personnel and avoiding any fire hazards.

## 8.0 ELECTRICAL SAFETY REGULATIONS

- 8.1 In no circumstances will the LSTK contractor interfere with fuse and electrical equipment belonging to the owner or other contractors.
- 8.2 Before the LSTK contractor connects any electrical appliances to any plug or socket belonging to the other contractor or owner, he will -
- Satisfy the Owner that the appliance is in good working condition.
  - Uses of matching sixes plug & does not uses bare wire to insert in socket.
  - Inform the Owner of the maximum current rating, voltage and phase of appliance.

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iv. Obtain permission of the Owner dealing the sockets to which the appliance may be connected.

v. Use distribution board with ELCB for feeding power to hand held tools.

8.3 The Owner will not grant permission to plug in until he is satisfied that-

- i. The appliance is in good condition and is fitted with a suitable plug.
- ii. The appliance is fitted with a suitable cable having two earth conductors, one of which shall be earthed metal sheath surrounding the cores.

8.4 No electric cable in use by the other LSTK contractor/owner will be distributed without prior permission. No weight of any description be imposed on any such cable and no ladder or similar equipment will rest against or be attached to it. Cables / Wires used shall be in good condition without cuts & in insulation & joints.

8.5 The voltage for all portable equipment e.g. drilling machines, temporary lighting etc. will not exceed 240 volts.

8.6 No work must be carried out on any live equipment. The equipment must be made safe and a "permit to work" issued before any work is carried out.

8.7 LSTK contractor shall employ electrician to maintain his temporary electrical installation.

8.8 Take necessary clearance for working in hazardous area.



## 9.0 REPORTING

- a) The LSTK contractor must report the following information to the Owner in writing daily. Number of men employed, trades-wise,
  - Progress achieved;
  - Concrete pour card, if any.
- b) If during excavation any materials such as but not limited to precious materials or treasure troves etc are found, the same shall be reported to owner immediately and shall be the property of owner.

## 10.0 GENERAL SAFETY REQUIREMENTS TO BE OBSERVED DURING SITE FABRICATION AND ERECTION BY THE CONSTRUCTION CONTRACTOR

1. Before starting the work, **LSTK contractor** should get safety work permit and should strictly follow instructions written by the concerned authority in work permit. Permit is required for all types of job i.e. Hot, Cold Excavation, Chipping, Grinding etc.
2. Smoking is strictly prohibited inside factory areas.





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3. Safety appraisal and equipments shall be provided to workmen as per the nature of work. Welders shall use gloves, goggles, shields etc. during welding, gas cutting etc. All technicians shall use gloves, goggles during grinding, chipping etc. If any unsafe practice is observed Fire & Safety Sections or the authority issuing the work permit is authorized to stop the work without any prior notice.
4. Temporary fire extinguishers, water hose shall be available near work place and in case of fire, Owner's Fire & Safety Section should be immediately informed by LSTK contractor from nearest available telephone. Project Manager should also be immediately informed.
5. LSTK contractor shall secure necessary insurance of his workmen for the entire duration of works under the contract. Owner is not responsible for any accident/injury caused whatsoever, to any person employed by the Construction Contractor. However, LSTK contractor has to inform Owner's Fire & Safety Section about accident, if any, immediately.
6. Temporary switch boards, cables, wires and electrical equipments should be installed in accordance with standard electrical practice with proper earthing etc. and should have prior approval of LSTK Contractor / Owner electrical engineer. Switch board shall be suitably protected against rainwater. The cable used for welding machine should have flexible tough rubber sheathing.
7. Temporary cables and wires including welding cables should be routed as not to cluster the work areas. Also any possibility of damage to live wires by falling objects should be avoided. Temporary electrical lines for power & lighting shall run overhead or underground so that they should not hinder the movement of men, materials and vehicles.
8. Portable hand lamps being used by construction crew shall be preferably of 24 Volts supply bulb to be protected with safety shields.
9. Earthing for welding shall not be taken through existing structure or equipments due to the very explosive nature of the plant, raw materials, reaction during process and final product. There is every possibility of fire and explosion in the equipment due to electric spark caused by loose earthing connection etc.
10. LSTK contractor should be careful while excavating so that no underground cable or pipe line is damaged. As soon as any brick cover or under ground cables are exposed he should stop the work and inform Construction Manager immediately for necessary action.
11. LSTK contractor should not leave any welding machine etc. running after the work is stopped. Before leaving the work place, Contractor should ensure that welding sets are disconnected from welding socket outlet.
12. All work areas shall be kept reasonably clear and clean for easy movement of men & material. Also all approach roads shall be free from obstacles for easy movement of cranes, vehicles, fork-lifts, trollies etc. and all debris shall be periodically removed.





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radiography work is completed. Construction Contractor's personnel should be able to communicate clearly/properly to stop entry of unauthorized personnel within the area cordoned for the radiography work.

### Refuse Disposal

23. Refuse must be removed daily to prevent accumulation. Materials liable to cause persons to slip or trip and fall should be cleared immediately.
24. Refuse removal teams working after work hour should be organized where normal cleaning can not cope with the build up of waste materials.
25. Projecting nails should be removed or bent over.



### Personal Protective Equipments

26. Helmets should be provided for all who are exposed to the dangers of falling material or structures they might strike against.
27. Suitable eye protection should be provided for all who are exposed to flying particles, harmful glare and dangerous substances.
28. In the handling of rough objects, gloves should be provided and used.
29. Safety footwear should be provided to all who are exposed to foot injury, should be good fitting and comfortable to wear.
30. Safety belts should be provided where other means are not practicable. Both the anchorage points and lifelines provided for attaching safety belts should be of adequate strength. The umbilical line should be fixed in such a way that user's freefall will not exceed 1 metre.
31. Catch net should be used where persons are liable to fall and these should be securely supported at a level as near as possible to the working level.
32. Noise defenders should be provided for work area where the noise level exceeds 85 dBA.
33. Respiratory protection should be provided by employers and used by workers where the dust level remains high and where control at source is not practicable.

### Inspection & Record Keeping

34. Where defects render the scaffolds unsafe, they should be rectified immediately. Where this is not practicable, a sign should be put warning against using it.

### Winches

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35. Adequate foundations should be provided for winches.

#### **Lifting Gear**

36. All lifting gear and slinging should be tested before use and thereafter inspected regularly by competent engineers. Workers should also check the lifting gear visually before using them.
37. Each piece of lifting gear should bear its safe working load, its identification number and its last inspection date. It could in addition be colour coded according to due date of inspection.
38. Wire ropes should be preserved against rusting, kinking, fraying, birdcaging and heat damage. Defective wires should be destroyed to prevent recycling.

#### **Concrete Mixers**

39. Moving parts which are liable to become nip points, such as gears, chains and rollers should be guarded.
40. Where concrete mixers are driven by internal combustion engines, exhaust points should be located away from the workers' work station so as to eliminate their exposure to obnoxious fumes.

#### **Electrical Components**



41. All components and conductors used must be in good condition.
42. Proper junction boxes and distribution boards from which electric power could be tapped should be provided at every floor level.

#### **Demolition: General Provisions**

43. Uncontrolled collapse of walls or other structures under demolition should be prevented.
44. The throwing of materials over the sides of the buildings should not be permitted.

#### **Waste Handling**

45. Where demolition is carried out near public areas:
- a) Hoardings slopping inwards should be erected around the building.
  - b) Protective nettings should be hung around the building to prevent materials falling outside the periphery shelter.
  - c) Where asbestos materials are present, appropriate dust control and respiratory protection approved by the local authority must be used.

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### **Excavation: General Provisions**

46. Test for toxic gases should be carried out where their presence is suspected.
47. Exposure of shorings to vibration such as that produced by engines or vehicular traffic should be kept to a minimum.

### **General – Ventilation, Fire Protection/Fighting**


48. Where flammable gas concentration could reach explosive levels, it may be necessary to provide intrinsically safe electrical equipments.
49. Adequate lighting and emergency lighting should be provided.
50. Adequate evacuation stairways should be provided for rapid evacuation in case of an emergency.

### **First Aid**

51. Sufficient First Aid Boxes containing simple dressings and supplies should be provided on the site under the control of the foreman.

### **Awareness**

52. The contractor shall brief the visitor about HSE precautions which are required to be taken before proceeding to site and make necessary arrangement to issue appropriate PPE's like HELMET, Safety shoes etc. to the visitors.  
The contractor shall promote and develop consciousness about Health, safety and environment among all personnel working for the contractor. Regular awareness programmes and fabrication shop/work site meeting at least on fortnightly basis shall be arranged on HSE activities to cover hazards involved in various operations during construction phase. During the awareness program, step shall be taken by the contractor to motivate & encourage the workmen and supervisory staff by issuing/awarding them the tokens/gifts/mementos/ Monetary incentives.  
A verbal warning shall be given to the workers during the first HSE violations. A written warning shall be issued on second violations and thereafter for the third violations; the services of worker shall be terminated. For all these violations, penalties' shall be imposed, separately on the contractor. Records of warning for each worker shall be kept in the records.

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## VENDORS LIST FOR

### MECHANICAL ITEMS (PR.VESSELS/HEAT EXCHANGERS)

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110508	SAMPLE COOLERS	65
<b>1106</b>	<b>FRP/PVC/RUBBER/GLASS/LEAD LINED TANKS &amp; VESSELS AND LINING</b>	
110601	FRP/PVC TANKS & VESSELS	67
110607	FRP/PVC LINING	68
110608	RUBBER LINING	69
<b>1107</b>	<b>MISC ITEMS(PV/HE)</b>	
110702	NITROGEN BOTTLES	70
110703	DISHED ENDS	71
<b>1108</b>	<b>MECHANICAL CONTRACTORS</b>	
110801	MECHANICAL WORKS(piping , machinery & equipment erection	72
110802	HEAVY LIFT	75
110803	HOT & COLD INSULATION OF EQUIPMENT & PIPING	76
110804	CAST IN-SITU TANK INSULATION	78
110805	CHEMICAL CLEANING	79
110806	EPOXY LINING	80
110807	PAINTING OF STRUCTURAL , EQUIPMENT & PIPING	81
110811	ONLY UNDERGROUND PIPING WORKS	83
110812	CROSS COUNTRY PIPELINE	84
<b>1109</b>	<b>MECHANICAL SUPPLY TEMS</b>	
110901	SUPPLY OF INDUSTRIAL PAINT	88



## 110101 : INDUSTRIAL & POWER BOILERS

CODE	NAME
<b>INDIA</b>	
1 . P0110	B H P V (Oil fired boilers upto 130TPH and 105Kg/cm <sup>2</sup> )
2 . P0107	BHARAT HEAVY ELECTRICALS LTD.
3 . P0801	ISGEC HEAVY ENGINEERING LIMITED
4 . P1219	THERMAX BABCOCK & WILCOX ENERGY SOLUTIONS LIMITED
5 . P0804	THERMAX BABCOCK & WILCOX LIMITED
<b>GERMANY</b>	
6 . P0499	BORSIG GmbH

## 110103 : W.H. BOILER (RG/CG/SYNLOOP,STEAM SUP. & STEAM DRUMS)

CODE	NAME
<b>INDIA</b>	
1 . P0483	LARSEN & TOUBRO LTD.
2 . P0497	LLOYDS ENGINEERING WORKS LIMITED
3 . P1210	TRUST WELL ENGINEERS INDIA PVT.LTD. (RG/CG/SYNLOOP,STEAM SUP. & STEAM DRUM ONLY)
<b>GERMANY</b>	
4 . P0499	BORSIG GmbH
5 . P1036	L.C.STEINMULLER GmbH
6 . P0122	MAN TURBOMASCHINEN AG GHH BORSIG
<b>ITALY</b>	
7 . P0254	FBM HUDSON ITALIANA S.p.A.
<b>JAPAN</b>	
8 . P0356	HITACHI BABCOCK LTD
9 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
10 . P0769	SUMISHO MACHINERY TRADE CORPORATION
<b>U.S.A.</b>	
11 . P0761	STRUTHERS INDUSTRIES INC.

## 110104 : WASTE HEAT BOILER (SULPHURIC / NITRIC ACID ETC)

CODE	NAME
<b>INDIA</b>	
1 . P0483	LARSEN & TOUBRO LTD.
2 . P1133	THERMAL SYSTEMS (HYDERABAD) PVT. LTD.
3 . P0804	THERMAX BABCOCK & WILCOX LIMITED
4 . P1210	TRUST WELL ENGINEERS INDIA PVT.LTD. (SULPHURIC / NITRIC ACID ETC)

## 110201 : AMMONIA CONVERTER (PRESSURE SHELL)

CODE	NAME
<b>INDIA</b>	
1 . P0110	B H P V
2 . P0483	LARSEN & TOUBRO LTD.
3 . P1164	ISGEC HITACHI ZOSEN LIMITED
<b>AUSTRIA</b>	
4 . P0708	SCHOELLER-BLECKMANN NITEC GMBH
5 . P0867	VOEST ALPINE MASCHINENBAU
<b>ITALY</b>	
6 . P0073	ATB ACCIAIERIA E TUBIFICIO DI BRESCIA SP
7 . P0098	BELLELI S.P.A.
8 . P0254	FBM HUDSON ITALIANA S.p.A.
9 . P0594	GE POWER (NUOVO PIGNONE SPA)
<b>JAPAN</b>	
10 . P0358	HITACHI ZOSEN
11 . P0458	KOBE STEEL LIMITED
12 . P0540	mitsubishi heavy industries ltd.
<b>KOREA</b>	
13 . P0462	KOREA HEAVY INDUSTRIES & CONSTN. CO. LTD

## 110202 : CONVERTER BASKET

CODE	NAME
<b>INDIA</b>	
1 . P0110	B H P V
2 . P0483	LARSEN & TOUBRO LTD.
3 . P1164	ISGEC HITACHI ZOSEN LIMITED
<b>AUSTRIA</b>	
4 . P0708	SCHOELLER-BLECKMANN NITEC GMBH
<b>FRANCE</b>	
5 . P0133	BSL INDUSTRIES
<b>ITALY</b>	
6 . P0073	ATB ACCIAIERIA E TUBIFICIO DI BRESCIA SP
7 . P0098	BELLELI S.P.A.
8 . P0254	FBM HUDSON ITALIANA S.p.A.
9 . P0594	GE POWER (NUOVO PIGNONE SPA)
10 . P0123	WALTER TOSTO SpA
<b>JAPAN</b>	
11 . P0358	HITACHI ZOSEN
12 . P0422	JAPAN STEEL WORKS LTD
13 . P0458	KOBE STEEL LIMITED
14 . P0540	mitsubishi heavy industries LTD.
<b>KOREA</b>	

## 110202 : CONVERTER BASKET

CODE	NAME
15 . P0462	KOREA HEAVY INDUSTRIES & CONSTN. CO. LTD

## 110203 : UREA REACTOR

CODE	NAME
<b>INDIA</b>	
1 . P0110	B H P V
2 . P0483	LARSEN & TOUBRO LTD.
3 . P1164	ISGEC HITACHI ZOSEN LIMITED
<b>AUSTRIA</b>	
4 . P0708	SCHOELLER-BLECKMANN NITEC GMBH
<b>GERMANY</b>	
5 . P0812	THYSSEN RHEINSTAHL TECHNIK GMBH
<b>ITALY</b>	
6 . P0015	ACCIAI SPECIALI TERNI
7 . P0073	ATB ACCIAIERIA E TUBIFICIO DI BRESCIA SP
8 . P0594	GE POWER (NUOVO PIGNONE SPA)
<b>JAPAN</b>	
9 . P0458	KOBE STEEL LIMITED
10 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
<b>U.S.A.</b>	
11 . P0761	STRUTHERS INDUSTRIES INC.

## 110204 : SECONDARY REFORMER, METHANATOR & OTHER REACTORS

CODE	NAME
<b>INDIA</b>	
1 . P0110	B H P V
2 . P0107	BHARAT HEAVY ELECTRICALS LTD.
3 . P1056	FABTECH PROJECTS & ENGINEERS LTD. (Except Secondary Reformer, Methanator)
4 . P0313	GODREJ & BOYCE MFG. CO. LTD. (except Secondary Reformer)
5 . P0801	ISGEC HEAVY ENGINEERING LIMITED ((Except Secondary Reformer))
6 . P0483	LARSEN & TOUBRO LTD.
7 . P1167	TECHNO PROCESS EQUIPMENTS (INDIA) PVT. LTD. (METHANATOR & OTHER REACTORS ONLY.)
8 . P1047	THE ANUP ENGINEERING LIMITED (OTHER REACTORS ONLY)
9 . P1164	ISGEC HITACHI ZOSEN LIMITED (For Secondary Reformer only.)
<b>FRANCE</b>	
10 . P0082	BABCOCK ENTERPRISE S.A. / CNIM
<b>GERMANY</b>	
11 . P0469	KRUPP INDUSTRIES-TECHNIK
12 . P0812	THYSSEN RHEINSTAHL TECHNIK GMBH
<b>ITALY</b>	
13 . P0073	ATB ACCIAIERIA E TUBIFICIO DI BRESCIA SP
14 . P0098	BELLELI S.P.A.
15 . P0254	FBM HUDSON ITALIANA S.p.A.



## 110204 : SECONDARY REFORMER, METHANATOR & OTHER REACTORS

CODE	NAME
16 . P0594	GE POWER (NUOVO PIGNONE SPA)
<b>JAPAN</b>	
17 . P0358	HITACHI ZOSEN
18 . P0458	KOBE STEEL LIMITED
19 . P0540	mitsubishi heavy industries ltd.
<b>KOREA</b>	
20 . P0334	DOOSAN MECATEC CO. LTD.
21 . P1035	HANJUNG DCM CO.LTD.
22 . P0369	HUNDAI HEAVY INDUSTRIES
23 . P1116	HYOSUNG CORPORATION (METHANATOR ONLY)
24 . P0462	KOREA HEAVY INDUSTRIES & CONSTN. CO. LTD
<b>U.K.</b>	
25 . P0280	FOSTER WHEELER POWER PRODUCTS LTD

## 110205 : VESSELS IN CS/AS/SS PRESSURE UPTO 10 Kg/cm<sup>2</sup>g

CODE	NAME
1 . P0861	
<b>INDIA</b>	
2 . P1180	BTL EPC LIMITED ((CS Only))
3 . P0643	PRECISION EQUIPMENTS (CHENNAI) PVT LTD
4 . P0018	AERO ENGINEERS
5 . P1048	AIRFRIGE INDUSTRIES
6 . P0060	ARTSON ENGINEERING LIMITED
7 . P1197	ATV PROJECTS INDIA LIMITED (CS ONLY)
8 . P0110	B H P V
9 . P0107	BHARAT HEAVY ELECTRICALS LTD.
10 . P1221	CHANDERPUR INDUSTRIES PRIVATE LIMITED (CS Only)
11 . P1126	CHEM PROCESS SYSTEMS PVT. LTD. (CS/SS only)
12 . P3389	COPERION IDEAL PVT. LTD. (CS, SS and low Alloy Steel only)
13 . P1177	CRYOSTAR TANKS AND VESSELS PVT.LTD. (CS/AS/SS PRESSURE UPTO 10 Kg/cm <sup>2</sup> g)
14 . P1224	ENPRO INDUSTRIES PVT. LTD.
15 . P1124	ESSAR HEAVY ENGINEERING SERVICES
16 . P1056	FABTECH PROJECTS & ENGINEERS LTD.

## 110205 : VESSELS IN CS/AS/SS PRESSURE UPTO 10 Kg/cm<sup>2</sup>g

CODE	NAME
17 . P1214	FIL SEP EQUIPMENTS PVT. LTD.
18 . P1213	FLOWCHEM PROCESS EQUIPMENTS
19 . P1105	FLOWLINK INDUSTRIES PVT. LTD. (CS/SS Except Urea service)
20 . P6053	FURNACE FABRICA (INDIA) LTD. (CS/SS)
21 . P0288	G R ENGINEERING PRIVATE LIMITED
22 . P0291	GANSONS LTD.
23 . P1045	GEMINI ENGI-FAB PVT. LTD. (Excluding AS Matl)
24 . P0308	GHANSHYAM STEEL WORKS LTD. (CS/SS)
25 . P0323	GMM PFAUDLER LIMITED
26 . P0313	GODREJ & BOYCE MFG. CO. LTD.
27 . P1218	GODREJ & BOYCE MFG.CO.LTD. (UPTO 10 Kg/cm <sup>2</sup> g)
28 . P0318	GRAND PRIX ENGINEERING PVT. LTD. (upto 4m D x 6m L x 80mm Thk)
29 . P1011	GRASIM INDUSTRIES
30 . P1222	GUJARAT INFRAPIPES PVT. LTD. (CS Only)
31 . P0341	HEATEX INDIAN CORPORATION
32 . P1216	HEMALATHAA HI-TECH INDUSTRIES
33 . P1052	HINDUSTAN DORR-OLIVER LTD.

## 110205 : VESSELS IN CS/AS/SS PRESSURE UPTO 10 Kg/cm<sup>2</sup>g

CODE	NAME
34 . P1019	ICEM ENGG. CO. LTD.
35 . P0380	INDIA TUBE MILLS & METAL INDUSTRIES LTD. (For CS/SS only)
36 . P0386	INDUS PROJECTS LTD.(FORMERLY INDUS ENGG)
37 . P0801	ISGEC HEAVY ENGINEERING LIMITED
38 . P1110	ISHAN EQUIPMENTS PVT. LTD. (CS/SS only)
39 . P0450	KINETICS TECHNOLOGY INDIA LTD.
40 . P1225	KRR Engineering Private Limited
41 . P0483	LARSEN & TOUBRO LTD.
42 . P0497	LLOYDS ENGINEERING WORKS LIMITED
43 . P1112	LOYAL EQUIPMENTS PVT. LTD. (CS/SS and Non IBR only)
44 . P0516	MARS DESIGN PVT.LTD.
45 . P0538	MISTRY PRABHUDAS MANJI ENGG. PVT. LTD.
46 . P1012	MOD FABRICATORS
47 . P1053	MULTI-MAX ENGINEERING WORKS PVT. LTD. ((CS and SS Materials only))
48 . P0565	NAVA BHARAT FERRO ALLOYS LTD
49 . P1113	NEW FIELD INDUSTRIAL EQUIPMENT PVT. LTD. (CS/SS Only)
50 . P1046	NIVITA ENGINEERING WORKS

## 110205 : VESSELS IN CS/AS/SS PRESSURE UPTO 10 Kg/cm<sup>2</sup>g

CODE	NAME
51 . P1054	NOVATECH PROJECTS INDIA (P) LTD. ((CS and SS material only))
52 . P1136	NUBERG ENGINEERING LIMITED
53 .	NUBERG ENGINEERING LIMITED (CS/SS ONLY)
54 . P1107	ORIENTAL MANUFACTURERS(A DIVN.OF ORIENTAL ENTERPRISE PVT.LTD (CS/SS only)
55 . P1013	PATELS AIRTEMP (INDIA LIMITED
56 . P1115	PHILS HEAVY ENGINEERING PVT. LTD. (For AS (P3 & P4) only)
57 . P1220	PHILS HEAVY ENGINEERING PVT. LTD.
58 . P1058	PRAJ INDUSTRIES LIMITED (CS/SS only)
59 . P1198	PRECISION GASIFICATION SERVICES PRIVATE LIMITED ((NON IBR))
60 . P0648	PROJECT TECHNOLOGISTS PVT. LTD.
61 . P1021	R.D.ENGINEERS (INDIA) PVT. LTD.
62 . P1014	RAJ ENGG. CO.
63 . P1050	RELIANCE FABRICATIONS PVT. LTD.
64 . P0671	REYNOLDS CHEMEQUIP PRIVATE LIMITED (CS/SS)
65 . P1215	S. MARK OIL FIELD ENGINEERING PRIVATE LIMITED
66 . P1015	SHRENO LTD. (UNIT 2)
67 . P1125	SPETECH PLANT EQUIPMENT PVT. LTD. (CS only)

## 110205 : VESSELS IN CS/AS/SS PRESSURE UPTO 10 Kg/cm<sup>2</sup>g

CODE	NAME
68 . P0785	TAS ENGINEERING CO.(P) LIMITED
69 . P0786	TATA CHEMICALS LTD
70 . P0790	TECHNO PROCESS EQUIPMENTS (INDIA) PVT. LTD.
71 . P1183	TECKSON STEEL INDUSTRIES (SS & CS ONLY)
72 . P1047	THE ANUP ENGINEERING LIMITED
73 . P1168	THE KCP LIMITED
74 . P1049	TITANIUM EQUIPMENT AND ANODE MFG. CO. LTD.
75 . P0833	TRIVENI STRUCTURALS LTD.
76 . P0842	UNITOP ENGINEERS PVT. LTD. (Max. shell Dia 4.65, Water vol.140m <sup>3</sup> )
77 . P1123	UNIVERSAL HEAT EXCHANGERS LIMITED (CS/SS/LTCS Only)
78 . P1129	VIJAY TANKS & VESSELS LTD., (KANDLA) (CS/SS only)
<b>AUSTRIA</b>	
79 . P1022	APPARATEBAU SCHWEISSTECHNIK GMBH
80 . P0708	SCHOELLER-BLECKMANN NITEC GMBH
<b>ITALY</b>	
81 . P0602	OLMI SPA
<b>JAPAN</b>	
82 . P0422	JAPAN STEEL WORKS LTD
<b>KOREA</b>	

**110205 : VESSELS IN CS/AS/SS PRESSURE UPTO 10 Kg/cm<sup>2</sup>g**

CODE	NAME
83 . P0334	DOOSAN MECATEC CO. LTD.
84 . P1035	HANJUNG DCM CO.LTD.
85 . P0369	HUNDAI HEAVY INDUSTRIES
86 . P1116	HYOSUNG CORPORATION (CS/SS/LAS only)
87 . P0462	KOREA HEAVY INDUSTRIES & CONSTN. CO. LTD
88 . P1060	SUNGJIN GEOTEC CO., LTD. (CS and SS only)

## 110206 : VESSELS IN CS/AS/SS PRESSURE 11 TO 60 Kg/cm<sup>2</sup>g

CODE	NAME
1 . P0861	(UPTO 37 Kg/cm <sup>2</sup> g)
<b>INDIA</b>	
2 . P1180	BTL EPC LIMITED ( (Upto 30 Kg/cm <sup>2</sup> g, CS only))
3 . P0643	PRECISION EQUIPMENTS (CHENNAI) PVT LTD (Upto 44 kg/cm <sup>2</sup> g)
4 . P0018	AERO ENGINEERS (CS only)
5 . P1057	ALTECH INFRASTRUCTURE PVT. LTD. (Upto 20 Kg/cm <sup>2</sup> (g) CS Material)
6 . P6063	ARIEN NEW DELHI PRIVATE LIMITED (CS/SS UP TO 11 to 30 kg/cm <sup>2</sup> (g))
7 . P1166	AVADH INDUSTRIES (Upto 34 Kg/cm <sup>2</sup> g (CS Only))
8 . P0110	B H P V
9 . P0107	BHARAT HEAVY ELECTRICALS LTD.
10 . P1221	CHANDERPUR INDUSTRIES PRIVATE LIMITED (CS Only)
11 . P1126	CHEM PROCESS SYSTEMS PVT. LTD. (CS/SS upto 30 Kg/cm <sup>2</sup> g only)
12 . P1143	CICB-CHEMICON PVT. LTD. (Upto 30 Kg/cm <sup>2</sup> g (CS only))
13 . P1177	CRYOSTAR TANKS AND VESSELS PVT.LTD. (PRESSURE 11 TO 60 KG/CM <sup>2</sup> G, (SS UPTO 30 KG/CM <sup>2</sup> G & CS UPTO 60 KG/CM <sup>2</sup> G))
14 . P1224	ENPRO INDUSTRIES PVT. LTD.
15 . P1124	ESSAR HEAVY ENGINEERING SERVICES
16 . P1106	EXPO GAS CONTAINERS LTD. (CS Only)



## 110206 : VESSELS IN CS/AS/SS PRESSURE 11 TO 60 Kg/cm<sup>2</sup>g

CODE	NAME
17 . P1131	FAB-TECH WORKS & CONSTRUCTIONS PRIVATE LIMITED
18 . P1056	FABTECH PROJECTS & ENGINEERS LTD.
19 . P1214	FIL SEP EQUIPMENTS PVT. LTD.
20 . P1213	FLOWCHEM PROCESS EQUIPMENTS
21 . P6053	FURNACE FABRICA (INDIA) LTD. (CS/SS UP TO 11 to 30 kg/cm <sup>2</sup> (g))
22 . P0288	G R ENGINEERING PRIVATE LIMITED
23 . P0291	GANSONS LTD.
24 . P1045	GEMINI ENGI-FAB PVT. LTD. (Upto 40 Kg/cm <sup>2</sup> g)
25 . P0308	GHANSHYAM STEEL WORKS LTD. (CS/SS)
26 . P0323	GMM PFAUDLER LIMITED (CS/SS Only)
27 . P0313	GODREJ & BOYCE MFG. CO. LTD.
28 . P1218	GODREJ & BOYCE MFG.CO.LTD. (11 TO 60 Kg/cm <sup>2</sup> g)
29 . P0318	GRAND PRIX ENGINEERING PVT. LTD.
30 . P1011	GRASIM INDUSTRIES (upto 30Kg/cm <sup>2</sup> g)
31 . P1222	GUJARAT INFRAPIPES PVT. LTD. (CS Only)
32 . P0341	HEATEX INDIAN CORPORATION
33 . P1216	HEMALATHAA HI-TECH INDUSTRIES

## 110206 : VESSELS IN CS/AS/SS PRESSURE 11 TO 60 Kg/cm<sup>2</sup>g

CODE	NAME
34 . P1052	HINDUSTAN DORR-OLIVER LTD. (CS/SS Only)
35 . P1137	INDCON PROJECTS & EQUIPMENT LIMITED (CS/LTCS/SS upto 30 Kg/cm <sup>2</sup> g)
36 . P0380	INDIA TUBE MILLS & METAL INDUSTRIES LTD. (For CS/SS only upto 30 Kg/cm <sup>2</sup> g)
37 . P0386	INDUS PROJECTS LTD.(FORMERLY INDUS ENGG)
38 . P0801	ISGEC HEAVY ENGINEERING LIMITED
39 . P1110	ISHAN EQUIPMENTS PVT. LTD. (CS/SS Upto 30 Kg/Cm <sup>2</sup> (g) only)
40 . P1154	JINDAL STEEL & POWER LTD. (MACHINERY DIVISION) (CS only)
41 . P0436	KAVERI ENGG. INDUSTRIES LTD.,
42 . P1225	KRR Engineering Private Limited
43 . P0483	LARSEN & TOUBRO LTD.
44 . P0497	LLOYDS ENGINEERING WORKS LIMITED
45 . P1112	LOYAL EQUIPMENTS PVT. LTD. (Upto 11-30 Kg/cm <sup>2</sup> , CS/SS and Non IBR only.)
46 . P1138	MEENAKSHI ASSOCIATES (P) LTD. (CS/LTCS/SS upto 30 Kg/cm <sup>2</sup> g)
47 . P1053	MULTI-MAX ENGINEERING WORKS PVT. LTD. (Up to 30 Kg/cm <sup>2</sup> g (CS and SS Materials only))
48 . P1113	NEW FIELD INDUSTRIAL EQUIPMENT PVT. LTD. (Upto 30 Kg/cm <sup>2</sup> g (CS/SS Only))
49 . P0572	NEWTON ENGG. & CHEMICALS LTD. (Upto 36 Kg/cm <sup>2</sup> (CS/SS only))
50 . P1136	NUBERG ENGINEERING LIMITED (CS/SS up to 30 Kg/cm <sup>2</sup> g)

## 110206 : VESSELS IN CS/AS/SS PRESSURE 11 TO 60 Kg/cm<sup>2</sup>g

CODE	NAME
51 . P1107	ORIENTAL MANUFACTURERS(A DIVN.OF ORIENTAL ENTERPRISE PVT.LTD (CS/SS only)
52 . P1013	PATELS AIRTEMP (INDIA LIMITED ((CS & SS only))
53 . P1115	PHILS HEAVY ENGINEERING PVT. LTD. (Up to 30 Kg/cm <sup>2</sup> (g))
54 . P1220	PHILS HEAVY ENGINEERING PVT. LTD.
55 . P1058	PRAJ INDUSTRIES LIMITED (CS/SS only)
56 . P1021	R.D.ENGINEERS (INDIA) PVT. LTD. (UPTO 30 KG/CM <sup>2</sup> g)
57 . P1014	RAJ ENGG. CO. (Up to 30kg/cm <sup>2</sup> (g) CS/SS/AS (P3 & P4 only))
58 . P1140	RELIANCE FABRICATIONS PVT. LTD. (CS/SS upto 30 Kg/cm <sup>2</sup> g)
59 . P1215	S. MARK OIL FIELD ENGINEERING PRIVATE LIMITED
60 . P1125	SPETECH PLANT EQUIPMENT PVT. LTD. (CS upto 30 Kg/cm <sup>2</sup> g only)
61 . P0790	TECHNO PROCESS EQUIPMENTS (INDIA) PVT. LTD.
62 . P1167	TECHNO PROCESS EQUIPMENTS (INDIA) PVT. LTD. (NON IBR ONLY)
63 . P1047	THE ANUP ENGINEERING LIMITED
64 . P1055	THE INDIAN SUGAR & GENERAL ENGG. CORPN.(ISGEC), DAHEJ (Except Urea Plant Critical Equipment)
65 . P1168	THE KCP LIMITED
66 . P1134	UNIQUE CHEMOPLANT EQUIPMENTS (CS/SS only up to 30 Kg/cm <sup>2</sup> g)
67 . P1123	UNIVERSAL HEAT EXCHANGERS LIMITED (CS/SS/LTCS upto 30 Kg/cm <sup>2</sup> g)

## 110206 : VESSELS IN CS/AS/SS PRESSURE 11 TO 60 Kg/cm2g

CODE	NAME
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68 . P1129 VIJAY TANKS & VESSELS LTD., (KANDLA) (CS/SS upto 30 Kg/cm2g only)

### **KOREA**

69 . P1149 ALPEC CO. LTD. (CS & AS only)

### **AUSTRIA**

70 . P0708 SCHOELLER-BLECKMANN NITEC GMBH

### **GERMANY**

71 . P0499 BORSIG GmbH

### **ITALY**

72 . P0098 BELLELI S.P.A.

73 . P0254 FBM HUDSON ITALIANA S.p.A.

74 . P0594 GE POWER (NUOVO PIGNONE SPA)

75 . P1042 ROLLE S.P.A (11 to 60 kg/cm2 pr.)

76 . P0123 WALTER TOSTO SpA

### **JAPAN**

77 . P0358 HITACHI ZOSEN

78 . P0458 KOBE STEEL LIMITED

79 . P0540 MITSUBISHI HEAVY INDUSTRIES LTD.

80 . P0541 MITSUI ENGINEERING & SHIPBUILDING CO.LTD

### **KOREA**

81 . P0334 DOOSAN MECATEC CO. LTD.

**110206 : VESSELS IN CS/AS/SS PRESSURE 11 TO 60 Kg/cm<sup>2</sup>g**

CODE	NAME
82 . P1035	HANJUNG DCM CO.LTD.
83 . P0335	HANTECH LIMITED
84 . P1116	HYOSUNG CORPORATION (CS/SS/LAS only)
85 . P0462	KOREA HEAVY INDUSTRIES & CONSTN. CO. LTD
86 . P1060	SUNGJIN GEOTEC CO., LTD. (CS and SS only)
<b>SPAIN</b>	
87 . P0524	MECANICA DE LA PENA S.A.
<b>U.S.A.</b>	
88 . P0096	BEAIRD INDUSTRIES LOUISIANA

## 110207 : VESSELS IN CS/AS/SS PRESSURE ABOVE 60 Kg/cm<sup>2</sup>g

CODE	NAME
<b>INDIA</b>	
1 . P0110	B H P V
2 . P0107	BHARAT HEAVY ELECTRICALS LTD.
3 . P1213	FLOWCHEM PROCESS EQUIPMENTS
4 . P0288	G R ENGINEERING PRIVATE LIMITED
5 . P0313	GODREJ & BOYCE MFG. CO. LTD.
6 . P1218	GODREJ & BOYCE MFG.CO.LTD. (ABOVE 60 Kg/cm <sup>2</sup> g)
7 . P1192	GRAND PRIX ENGINEERING PRIVATE LIMITED (CS ONLY)
8 . P1216	HEMALATHAA HI-TECH INDUSTRIES
9 . P1052	HINDUSTAN DORR-OLIVER LTD. (CS/SS/LTCS/LAS only)
10 . P0801	ISGEC HEAVY ENGINEERING LIMITED ((Except Urea Plant Critical Equipment))
11 . P0483	LARSEN & TOUBRO LTD.
12 . P1013	PATELS AIRTEMP (INDIA LIMITED ((CS only))
13 . P1220	PHILS HEAVY ENGINEERING PVT. LTD. (CS ONLY)
14 . P1058	PRAJ INDUSTRIES LIMITED (CS/SS only)
15 . P1215	S. MARK OIL FIELD ENGINEERING PRIVATE LIMITED
16 . P1167	TECHNO PROCESS EQUIPMENTS (INDIA) PVT. LTD. (NON IBR ONLY)
17 . P1047	THE ANUP ENGINEERING LIMITED

## 110207 : VESSELS IN CS/AS/SS PRESSURE ABOVE 60 Kg/cm<sup>2</sup>g

CODE	NAME
18 . P1055	THE INDIAN SUGAR & GENERAL ENGG. CORPN.(ISGEC), DAHEJ (Except Urea Plant Critical Equipment)
<b>KOREA</b>	
19 . P1149	ALPEC CO. LTD. (CS & AS only)
<b>INDIA</b>	
20 . P1164	ISGEC HITACHI ZOSEN LIMITED
<b>AUSTRIA</b>	
21 . P0708	SCHOELLER-BLECKMANN NITEC GMBH
<b>GERMANY</b>	
22 . P0499	BORSIG GmbH (upto 1500 Deg.C & upto 35000KPa)
23 . P0257	FERROSTAAL AKTIENGES ELLSCHAFTG
24 . P0469	KRUPP INDUSTRIES-TECHNIK
25 . P0812	THYSSEN RHEINSTAHL TECHNIK GMBH
<b>ITALY</b>	
26 . P0015	ACCIAI SPECIALI TERNI
27 . P0073	ATB ACCIAIERIA E TUBIFICIO DI BRESCIA SP
28 . P0098	BELLELI S.P.A.
29 . P0254	FBM HUDSON ITALIANA S.p.A.
30 . P0594	GE POWER (NUOVO PIGNONE SPA)
31 . P0602	OLMI SPA
32 . P0123	WALTER TOSTO SpA

## 110207 : VESSELS IN CS/AS/SS PRESSURE ABOVE 60 Kg/cm<sup>2</sup>g

CODE	NAME
<b>JAPAN</b>	
33 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
34 . P0458	KOBE STEEL LIMITED
35 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
36 . P0769	SUMISHO MACHINERY TRADE CORPORATION
<b>KOREA</b>	
37 . P0334	DOOSAN MECATEC CO. LTD.
38 . P1035	HANJUNG DCM CO.LTD.
39 . P0369	HUNDAI HEAVY INDUSTRIES
40 . P1116	HYOSUNG CORPORATION (CS/SS/LAS only)
41 . P0462	KOREA HEAVY INDUSTRIES & CONSTN. CO. LTD
42 . P1060	SUNGJIN GEOTEC CO., LTD. (CS and SS only)



## 110208 : TALL COLUMNS

CODE	NAME
1 . P0861	
<b>INDIA</b>	
2 . P0110	B H P V
3 . P1124	ESSAR HEAVY ENGINEERING SERVICES
4 . P1106	EXPO GAS CONTAINERS LTD.
5 . P1131	FAB-TECH WORKS & CONSTRUCTIONS PRIVATE LIMITED
6 . P1056	FABTECH PROJECTS & ENGINEERS LTD.
7 . P0288	G R ENGINEERING PRIVATE LIMITED
8 . P1045	GEMINI ENGI-FAB PVT. LTD.
9 . P0323	GMM PFAUDLER LIMITED
10 . P0313	GODREJ & BOYCE MFG. CO. LTD.
11 . P1218	GODREJ & BOYCE MFG.CO.LTD.
12 . P1052	HINDUSTAN DORR-OLIVER LTD.
13 . P0380	INDIA TUBE MILLS & METAL INDUSTRIES LTD.
14 . P0801	ISGEC HEAVY ENGINEERING LIMITED (CS/SS/AS)
15 . P1154	JINDAL STEEL & POWER LTD. (MACHINERY DIVISION) (CS only)
16 . P0483	LARSEN & TOUBRO LTD.

## 110208 : TALL COLUMNS

CODE	NAME
17 . P0497	LLOYDS ENGINEERING WORKS LIMITED
18 . P1115	PHILS HEAVY ENGINEERING PVT. LTD.
19 . P1220	PHILS HEAVY ENGINEERING PVT. LTD.
20 . P1058	PRAJ INDUSTRIES LIMITED
21 . P1021	R.D.ENGINEERS (INDIA) PVT. LTD.
22 . P1014	RAJ ENGG. CO. (CS/SS only)
23 . P1215	S. MARK OIL FIELD ENGINEERING PRIVATE LIMITED
24 . P1167	TECHNO PROCESS EQUIPMENTS (INDIA) PVT. LTD.
25 . P1047	THE ANUP ENGINEERING LIMITED
26 . P1055	THE INDIAN SUGAR & GENERAL ENGG. CORPN.(ISGEC), DAHEJ (CS/SS/AS)
27 . P1168	THE KCP LIMITED
28 . P1123	UNIVERSAL HEAT EXCHANGERS LIMITED
29 . P1129	VIJAY TANKS & VESSELS LTD., (KANDLA)
<b>KOREA</b>	
30 . P1149	ALPEC CO. LTD.
<b>INDIA</b>	
31 . P1164	ISGEC HITACHI ZOSEN LIMITED
<b>AUSTRIA</b>	
32 . P1022	APPARATEBAU SCHWEISSTECHNIK GMBH

## 110208 : TALL COLUMNS

CODE	NAME
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33 . P0708      SCHOELLER-BLECKMANN NITEC GMBH

### **GERMANY**

34 . P0499      BORSIG GmbH

### **ITALY**

35 . P0098      BELLELI S.P.A.

### **JAPAN**

36 . P0358      HITACHI Zosen

37 . P0458      KOBE STEEL LIMITED

38 . P0540      MITSUBISHI HEAVY INDUSTRIES LTD.

### **KOREA**

39 . P0334      DOOSAN MECATEC CO. LTD.

40 . P1035      HANJUNG DCM CO.LTD.

41 . P0369      HUNDAI HEAVY INDUSTRIES

42 . P1116      HYOSUNG CORPORATION

43 . P0462      KOREA HEAVY INDUSTRIES & CONSTN. CO. LTD

44 . P1060      SUNGJIN GEOTEC CO., LTD. (CS and SS only)

### **SPAIN**

45 . P0524      MECANICA DE LA PENA S.A.

## 110209 : SMALL COLUMNS

CODE	NAME
1 . P0861	
<b>INDIA</b>	
2 . P0643	PRECISION EQUIPMENTS (CHENNAI) PVT LTD
3 . P0060	ARTSON ENGINEERING LIMITED
4 . P0110	B H P V
5 . P1177	CRYOSTAR TANKS AND VESSELS PVT.LTD.
6 . P1224	ENPRO INDUSTRIES PVT. LTD.
7 . P1124	ESSAR HEAVY ENGINEERING SERVICES
8 . P1106	EXPO GAS CONTAINERS LTD.
9 . P1056	FABTECH PROJECTS & ENGINEERS LTD.
10 . P0288	G R ENGINEERING PRIVATE LIMITED
11 . P1045	GEMINI ENGI-FAB PVT. LTD.
12 . P0323	GMM PFAUDLER LIMITED
13 . P0313	GODREJ & BOYCE MFG. CO. LTD.
14 . P1218	GODREJ & BOYCE MFG.CO.LTD.
15 . P1011	GRASIM INDUSTRIES
16 . P1222	GUJARAT INFRAPIPES PVT. LTD.

## 110209 : SMALL COLUMNS

CODE	NAME
17 . P1052	HINDUSTAN DORR-OLIVER LTD.
18 . P0380	INDIA TUBE MILLS & METAL INDUSTRIES LTD.
19 . P0801	ISGEC HEAVY ENGINEERING LIMITED
20 . P1154	JINDAL STEEL & POWER LTD. (MACHINERY DIVISION) (CS only)
21 . P0436	KAVERI ENGG. INDUSTRIES LTD.,
22 . P1225	KRR Engineering Private Limited
23 . P0483	LARSEN & TOUBRO LTD.
24 . P0497	LLOYDS ENGINEERING WORKS LIMITED
25 . P0572	NEWTON ENGG. & CHEMICALS LTD.
26 . P1054	NOVATECH PROJECTS INDIA (P) LTD. ((CS & SS only))
27 . P1136	NUBERG ENGINEERING LIMITED
28 . P1013	PATELS AIRTEMP (INDIA LIMITED ((CS & SS only))
29 . P1115	PHILS HEAVY ENGINEERING PVT. LTD.
30 . P1220	PHILS HEAVY ENGINEERING PVT. LTD.
31 . P1058	PRAJ INDUSTRIES LIMITED
32 . P1021	R.D.ENGINEERS (INDIA) PVT. LTD.
33 . P1014	RAJ ENGG. CO. (CS/SS only)

## 110209 : SMALL COLUMNS

CODE	NAME
34 . P0786	TATA CHEMICALS LTD
35 . P0790	TECHNO PROCESS EQUIPMENTS (INDIA) PVT. LTD.
36 . P1167	TECHNO PROCESS EQUIPMENTS (INDIA) PVT. LTD.
37 . P1047	THE ANUP ENGINEERING LIMITED
38 . P1055	THE INDIAN SUGAR & GENERAL ENGG. CORPN.(ISGEC), DAHEJ (CS/SS/AS)
39 . P1168	THE KCP LIMITED
40 . P1134	UNIQUE CHEMOPLANT EQUIPMENTS
41 . P1123	UNIVERSAL HEAT EXCHANGERS LIMITED
42 . P1129	VIJAY TANKS & VESSELS LTD., (KANDLA)
<b>KOREA</b>	
43 . P1149	ALPEC CO. LTD.
<b>AUSTRIA</b>	
44 . P1022	APPARATEBAU SCHWEISSTECHNIK GMBH
45 . P0708	SCHOELLER-BLECKMANN NITEC GMBH
<b>ITALY</b>	
46 . P0073	ATB ACCIAIERIA E TUBIFICIO DI BRESCIA SP
47 . P0098	BELLELI S.P.A.
48 . P0594	GE POWER (NUOVO PIGNONE SPA)
49 . P1042	ROLLE S.P.A (Small Column)

## 110209 : SMALL COLUMNS

CODE	NAME
<b>JAPAN</b>	
50 . P0358	HITACHI ZOSEN
51 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
52 . P0542	MITSUI & COMPANY LTD.
<b>KOREA</b>	
53 . P0334	DOOSAN MECATEC CO. LTD.
54 . P1035	HANJUNG DCM CO.LTD.
55 . P0369	HUNDAI HEAVY INDUSTRIES
56 . P1116	HYOSUNG CORPORATION
57 . P0462	KOREA HEAVY INDUSTRIES & CONSTN. CO. LTD
58 . P1060	SUNGJIN GEOTEC CO., LTD. (CS and SS only)
<b>SINGAPORE</b>	
59 . P0714	SEMBAWANG ENGG. (PTE) LTD.
<b>SPAIN</b>	
60 . P0524	MECANICA DE LA PENA S.A.

## 110211 : VACUUM SEPARATOR, PRECONCENTRATOR FOR UREA PLANT

CODE	NAME
<b>INDIA</b>	
1 . P0643	PRECISION EQUIPMENTS (CHENNAI) PVT LTD
2 . P0110	B H P V
3 . P0288	G R ENGINEERING PRIVATE LIMITED
4 . P0291	GANSONS LTD.
5 . P0313	GODREJ & BOYCE MFG. CO. LTD.
6 . P0801	ISGEC HEAVY ENGINEERING LIMITED
7 . P0436	KAVERI ENGG. INDUSTRIES LTD.,
8 . P0483	LARSEN & TOUBRO LTD.
9 . P1013	PATELS AIRTEMP (INDIA LIMITED
10 . P1014	RAJ ENGG. CO.
11 . P0786	TATA CHEMICALS LTD
12 . P1047	THE ANUP ENGINEERING LIMITED
<b>AUSTRIA</b>	
13 . P0708	SCHOELLER-BLECKMANN NITEC GMBH
<b>ITALY</b>	
14 . P0098	BELLELI S.P.A.
15 . P0254	FBM HUDSON ITALIANA S.p.A.
16 . P0594	GE POWER (NUOVO PIGNONE SPA)



## 110211 : VACUUM SEPARATOR, PRECONCENTRATOR FOR UREA PLANT

CODE	NAME
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17 . P0597      OFFICIENE LUIGI RESTA S.P.A.

### **JAPAN**

18 . P0541      MITSUI ENGINEERING & SHIPBUILDING CO.LTD

19 . P0769      SUMISHO MACHINERY TRADE CORPORATION

### **KOREA**

20 . P0334      DOOSAN MECATEC CO. LTD.

21 . P1035      HANJUNG DCM CO.LTD.

22 . P0370      HYUNDAI CORPORATION

23 . P0462      KOREA HEAVY INDUSTRIES & CONSTN. CO. LTD

### **SPAIN**

24 . P0524      MECANICA DE LA PENA S.A.

## 110212 : LPG BULLETS

CODE	NAME
1 . P0861	
<b>INDIA</b>	
2 . P0110	B H P V
3 . P0107	BHARAT HEAVY ELECTRICALS LTD.
4 . P1131	FAB-TECH WORKS & CONSTRUCTIONS PRIVATE LIMITED
5 . P1056	FABTECH PROJECTS & ENGINEERS LTD.
6 . P0291	GANSONS LTD.
7 . P0386	INDUS PROJECTS LTD.(FORMERLY INDUS ENGG)
8 . P1110	ISHAN EQUIPMENTS PVT. LTD. (Above Ground only)
9 . P1225	KRR Engineering Private Limited
10 . P0483	LARSEN & TOUBRO LTD.
11 . P0497	LLOYDS ENGINEERING WORKS LIMITED
12 . P1013	PATELS AIRTEMP (INDIA LIMITED (ABOVE GROUND)
13 . P1023	R&C LIMITED
14 . P1014	RAJ ENGG. CO. (Upto 150 MT)
15 . P1016	SHARP TANKS & STRUCTURALS PVT. LTD.
16 . P0833	TRIVENI STRUCTURALS LTD.

## 110212 : LPG BULLETS

CODE	NAME
17 . P1129	VIJAY TANKS & VESSELS LTD., (KANDLA)

## 110213 : HORTON SPHERE

CODE	NAME
1 . P0861	
<b>INDIA</b>	
2 . P0110	B H P V
3 . P1131	FAB-TECH WORKS & CONSTRUCTIONS PRIVATE LIMITED
4 . P0288	G R ENGINEERING PRIVATE LIMITED
5 . P0380	INDIA TUBE MILLS & METAL INDUSTRIES LTD.
6 . P0483	LARSEN & TOUBRO LTD.
7 . P1016	SHARP TANKS & STRUCTURALS PVT. LTD.
8 . P0833	TRIVENI STRUCTURALS LTD.
9 . P1129	VIJAY TANKS & VESSELS LTD., (KANDLA)
<b>AUSTRIA</b>	
10 . P0708	SCHOELLER-BLECKMANN NITEC GMBH
11 . P0867	VOEST ALPINE MASCHINENBAU
<b>GERMANY</b>	
12 . P0469	KRUPP INDUSTRIES-TECHNIK
13 . P0494	LINDE AG
14 . P0812	THYSSEN RHEINSTAHL TECHNIK GMBH
<b>ITALY</b>	
15 . P0073	ATB ACCIAIERIA E TUBIFICIO DI BRESCIA SP

## 110213 : HORTON SPHERE

CODE	NAME
16 . P0098	BELLELI S.P.A.
17 . P0594	GE POWER (NUOVO PIGNONE SPA)
<b>JAPAN</b>	
18 . P0358	HITACHI ZOSEN
19 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
20 . P0458	KOBE STEEL LIMITED
21 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
<b>KOREA</b>	
22 . P0334	DOOSAN MECATEC CO. LTD.
23 . P1035	HANJUNG DCM CO.LTD.
24 . P0369	HUNDAI HEAVY INDUSTRIES
25 . P0462	KOREA HEAVY INDUSTRIES & CONSTN. CO. LTD

## 110214 : GAS HOLDERS

CODE	NAME
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1 . P0861

**INDIA**

2 . P0128      BRIDGE & ROOF CO.

3 . P0251      FACT ENGINEERING WORKS

4 . P0833      TRIVENI STRUCTURALS LTD.

## 110215 : DEARATORS (Vendor Design)

CODE	NAME
<b>INDIA</b>	
1 . P1057	ALTECH INFRASTRUCTURE PVT. LTD.
2 . P0110	B H P V
3 . P0107	BHARAT HEAVY ELECTRICALS LTD.
4 . P0297	GEA ENERGY SYSTEM (I) LTD.
5 . P0372	IAEC INDUSTRIES MADRAS LTD
6 . P0406	ION EXCHANGE (I) LIMITED
7 . P0409	ISGEC JOH.THOMPSON
8 . P1154	JINDAL STEEL & POWER LTD. (MACHINERY DIVISION) (CS only)
9 . P1102	LARSEN & TOUBRO LIMITED
10 . P0804	THERMAX BABCOCK & WILCOX LIMITED
11 . P1210	TRUST WELL ENGINEERS INDIA PVT.LTD. (Vendor Design)
<b>FRANCE</b>	
12 . P0034	ALSTHOM ATLANTIQUE
<b>JAPAN</b>	
13 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
14 . P0542	MITSUI & COMPANY LTD.
<b>KOREA</b>	
15 . P0369	HUNDAI HEAVY INDUSTRIES
<b>U.K.</b>	

## 110215 : DEARATORS (Vendor Design)

CODE	NAME
16 . P0280	FOSTER WHEELER POWER PRODUCTS LTD
17 . P0566	NEI JOHN THOMPSON



## 110301 : SHOP FABRICATED TANKS & NONCODED VESSELS

CODE	NAME
1 . P0861	
<b>INDIA</b>	
2 . P1180	BTL EPC LIMITED ((CS only))
3 . P0643	PRECISION EQUIPMENTS (CHENNAI) PVT LTD
4 . P1057	ALTECH INFRASTRUCTURE PVT. LTD.
5 . P0060	ARTSON ENGINEERING LIMITED
6 . P1197	ATV PROJECTS INDIA LIMITED (NON CODED VESSEL, CS ONLY)
7 . P1033	BAKSHI CHEMPHARMA EQUIPMENTS PVT.LTD
8 . P1177	CRYOSTAR TANKS AND VESSELS PVT.LTD.
9 . P1124	ESSAR HEAVY ENGINEERING SERVICES
10 . P1056	FABTECH PROJECTS & ENGINEERS LTD.
11 . P1213	FLOWCHEM PROCESS EQUIPMENTS
12 . P1105	FLOWLINK INDUSTRIES PVT. LTD. (CS/SS only)
13 . P0288	G R ENGINEERING PRIVATE LIMITED
14 . P0291	GANSONS LTD.
15 . P1051	GAYATRI TANKS & VESSELS
16 . P1045	GEMINI ENGI-FAB PVT. LTD.

## 110301 : SHOP FABRICATED TANKS & NONCODED VESSELS

CODE	NAME
17 . P0305	GENERAL MECH.& PROCESS EQUIPT.(P)LTD.
18 . P0313	GODREJ & BOYCE MFG. CO. LTD.
19 . P0318	GRAND PRIX ENGINEERING PVT. LTD.
20 . P1222	GUJARAT INFRAPIPES PVT. LTD.
21 . P1216	HEMALATHAA HI-TECH INDUSTRIES
22 . P0380	INDIA TUBE MILLS & METAL INDUSTRIES LTD.
23 . P1024	INDUS ENGG. COMPANY
24 . P1110	ISHAN EQUIPMENTS PVT. LTD. (CS/SS only)
25 . P0450	KINETICS TECHNOLOGY INDIA LTD.
26 . P1225	KRR Engineering Private Limited
27 . P1108	LAXMI ENGINEERING INDUSTRIES (BHOPAL) PRIVATE LIMITED (CS/SS Only)
28 . P0497	LLOYDS ENGINEERING WORKS LIMITED
29 . P1017	MABEL ENGINEERS PVT. LTD.
30 . P1053	MULTI-MAX ENGINEERING WORKS PVT. LTD.
31 . P0572	NEWTON ENGG. & CHEMICALS LTD.
32 . P1046	NIVITA ENGINEERING WORKS
33 . P1054	NOVATECH PROJECTS INDIA (P) LTD.

## 110301 : SHOP FABRICATED TANKS & NONCODED VESSELS

CODE	NAME
34 . P1136	NUBERG ENGINEERING LIMITED
35 . P1107	ORIENTAL MANUFACTURERS(A DIVN.OF ORIENTAL ENTERPRISE PVT.LTD (CS/SS only)
36 . P1157	OSWAL INFRASTRUCTURE LIMITED
37 . P0644	PRECISION TANKS & VESSELS
38 . P0648	PROJECT TECHNOLOGISTS PVT. LTD.
39 . P1021	R.D.ENGINEERS (INDIA) PVT. LTD.
40 . P1014	RAJ ENGG. CO.
41 . P1132	RELIABLE FABRICATING & ENGINEERING INDUSTRIES
42 . P1050	RELIANCE FABRICATIONS PVT. LTD.
43 . P1140	RELIANCE FABRICATIONS PVT. LTD.
44 . P1215	S. MARK OIL FIELD ENGINEERING PRIVATE LIMITED
45 . P1016	SHARP TANKS & STRUCTURALS PVT. LTD.
46 . P0785	TAS ENGINEERING CO.(P) LIMITED
47 . P0786	TATA CHEMICALS LTD
48 . P1183	TECKSON STEEL INDUSTRIES
49 . P1127	TITANIUM TANTALUM PRODUCTS LTD
50 . P0842	UNITOP ENGINEERS PVT. LTD. (Max shell Dia 4.65m, Vol 140m3)

## 110301 : SHOP FABRICATED TANKS & NONCODED VESSELS

CODE	NAME
51 . P1129	VIJAY TANKS & VESSELS LTD., (KANDLA)
52 . P0864	VIPJ INDUSTRIAL ENTERPRISES PVT. LTD.

## 110302 : STORAGE TANKS (Site Fabricated)

CODE	NAME
1 . P0861	
<b>INDIA</b>	
2 . P0060	ARTSON ENGINEERING LIMITED
3 . P1033	BAKSHI CHEMPHARMA EQUIPMENTS PVT.LTD
4 . P0128	BRIDGE & ROOF CO.
5 . P1106	EXPO GAS CONTAINERS LTD.
6 . P1131	FAB-TECH WORKS & CONSTRUCTIONS PRIVATE LIMITED
7 . P1056	FABTECH PROJECTS & ENGINEERS LTD.
8 . P0251	FACT ENGINEERING WORKS
9 . P0291	GANSONS LTD.
10 . P0313	GODREJ & BOYCE MFG. CO. LTD.
11 . P0380	INDIA TUBE MILLS & METAL INDUSTRIES LTD.
12 . P0386	INDUS PROJECTS LTD.(FORMERLY INDUS ENGG)
13 . P0483	LARSEN & TOUBRO LTD.
14 . P0497	LLOYDS ENGINEERING WORKS LIMITED
15 . P0500	MABEL ENGINEERS PRIVATE LIMITED
16 . P0516	MARS DESIGN PVT.LTD.

## 110302 : STORAGE TANKS (Site Fabricated)

CODE	NAME
17 . P0572	NEWTON ENGG. & CHEMICALS LTD.
18 . P1054	NOVATECH PROJECTS INDIA (P) LTD.
19 . P0644	PRECISION TANKS & VESSELS
20 . P0648	PROJECT TECHNOLOGISTS PVT. LTD.
21 . P1014	RAJ ENGG. CO.
22 . P1016	SHARP TANKS & STRUCTURALS PVT. LTD.
23 . P0749	SPS ENGINEERING LIMITED
24 . P0785	TAS ENGINEERING CO.(P) LIMITED
25 . P0786	TATA CHEMICALS LTD
26 . P0790	TECHNO PROCESS EQUIPMENTS (INDIA) PVT. LTD.

## 110303 : FLOATING ROOF TANKS

CODE	NAME
1 . P0861	
<b>INDIA</b>	
2 . P0128	BRIDGE & ROOF CO.
3 . P1106	EXPO GAS CONTAINERS LTD.
4 . P1131	FAB-TECH WORKS & CONSTRUCTIONS PRIVATE LIMITED
5 . P1056	FABTECH PROJECTS & ENGINEERS LTD.
6 . P0380	INDIA TUBE MILLS & METAL INDUSTRIES LTD.
7 . P1016	SHARP TANKS & STRUCTURALS PVT. LTD.
8 . P1025	SRINIVAS PLATE & VESSELS
9 . P0790	TECHNO PROCESS EQUIPMENTS (INDIA) PVT. LTD.
10 . P0833	TRIVENI STRUCTURALS LTD.

## 110401 : METALLIC TOWER PACKINGS

CODE	NAME
<b>INDIA</b>	
1 . P0338	HAVER STANDARD INDIA PVT.LTD.
2 . P0359	HI-PACK MASS TRANSFER PRODUCTS, (ALL CAPACITY)
3 . P0460	KOCH CHEMICAL TECHNOLOGY GROUP INDIA PVT. LTD.
4 . P7122	MASS TRANSFER PRODUCTS INDUSTRIES
5 . P0447	MUNTERS INDIA HUMIDITY CONTROL PRIVATE LIMITED(FORMERLY KEVI
<b>GERMANY</b>	
6 . P0660	RASCHIG GMBH
<b>ITALY</b>	
7 . P0461	KOCH GLITSCH ITALIA SRL
<b>NETHERLAND</b>	
8 . P0531	SULZER CHEMTECH NEDERLAND B.V.
<b>U.S.A.</b>	
9 . P0459	KOCH ENGG. CO. INC.
10 . P0592	NORTON CHEMICAL PROCESS PRODUCTS CORPN.



## 110403 : TRAYS, DISTRIBUTORS & INTERNALS

CODE	NAME
<b>INDIA</b>	
1 . P0313	GODREJ & BOYCE MFG. CO. LTD.
2 . P0338	HAVER STANDARD INDIA PVT.LTD.
3 . P0431	KAMAL ENGINEERING CORPORATION,
4 . P0460	KOCH CHEMICAL TECHNOLOGY GROUP INDIA PVT. LTD.
5 . P7122	MASS TRANSFER PRODUCTS INDUSTRIES
6 . P0447	MUNTERS INDIA HUMIDITY CONTROL PRIVATE LIMITED(FORMERLY KEVI
7 . P0766	SULZER INDIA PRIVATE LTD.
<b>AUSTRIA</b>	
8 . P1022	APPARATEBAU SCHWEISSTECHNIK GMBH
<b>FRANCE</b>	
9 . P0140	B.S.L. INDUSTRIES
<b>GERMANY</b>	
10 . P0660	RASCHIG GMBH
<b>ITALY</b>	
11 . P0311	GLITSH ITALIANA, SPA
12 . P0461	KOCH GLITSCH ITALIA SRL
<b>JAPAN</b>	
13 . P0157	CHIYODA CORPORATION
14 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
<b>NETHERLAND</b>	

## 110403 : TRAYS, DISTRIBUTORS &amp; INTERNALS

CODE	NAME
15 . P0531	SULZER CHEMTECH NEDERLAND B.V.
<b>U.K.</b>	
16 . P0299	GEA SPIRO GILLS LTD.
<b>U.S.A.</b>	
17 . P0592	NORTON CHEMICAL PROCESS PRODUCTS CORPN.

## 110404 : DEMISTERS

CODE	NAME
<b>INDIA</b>	
1 . P0246	EVERGREEN INDUSTRIES
2 . P0318	GRAND PRIX ENGINEERING PVT. LTD.
3 . P0338	HAVER STANDARD INDIA PVT.LTD. ( Demister pads with grids)
4 . P0342	HEIN LEHMANN (I) LTD.
5 . P1111	MISTER - MESH WIRE PRODUCTS
6 . P0447	MUNTERS INDIA HUMIDITY CONTROL PRIVATE LIMITED(FORMERLY KEVI
<b>ITALY</b>	
7 . P0179	COSTACURTA VICO S.P.A.
8 . P0311	GLITSH ITALIANA, SPA
<b>U.K.</b>	
9 . P0457	KNITMESH LTD.

## 110501 : H.P. UREA STRIPPER

CODE	NAME
<b>INDIA</b>	
1 . P0110	B H P V
2 . P1101	LARSEN & TOUBRO LIMITED
3 . P1164	ISGEC HITACHI ZOSEN LIMITED
<b>AUSTRIA</b>	
4 . P0708	SCHOELLER-BLECKMANN NITEC GMBH
<b>GERMANY</b>	
5 . P0494	LINDE AG
<b>ITALY</b>	
6 . P0098	BELLELI S.P.A.
7 . P0254	FBM HUDSON ITALIANA S.p.A.
8 . P0594	GE POWER (NUOVO PIGNONE SPA)
9 . P0602	OLMI SPA
<b>JAPAN</b>	
10 . P0458	KOBE STEEL LIMITED
11 . P0540	mitsubishi heavy industries LTD.

## 110502 : H.P. CARBAMATE CONDENSER

CODE	NAME
<b>INDIA</b>	
1 . P0110	B H P V
2 . P1101	LARSEN & TOUBRO LIMITED
3 . P0786	TATA CHEMICALS LTD
4 . P1164	ISGEC HITACHI ZOSEN LIMITED
<b>AUSTRIA</b>	
5 . P0708	SCHOELLER-BLECKMANN NITEC GMBH
<b>ITALY</b>	
6 . P0015	ACCIAI SPECIALI TERNI
7 . P0073	ATB ACCIAIERIA E TUBIFICIO DI BRESCIA SP
8 . P0098	BELLELI S.P.A.
9 . P0254	FBM HUDSON ITALIANA S.p.A.
10 . P0594	GE POWER (NUOVO PIGNONE SPA)
11 . P0602	OLMI SPA
<b>JAPAN</b>	
12 . P0458	KOBE STEEL LIMITED
13 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
<b>KOREA</b>	
14 . P0369	HUNDAI HEAVY INDUSTRIES

## 110503 : HEAT EXCHANGERS UPTO 30 Kg/cm<sup>2</sup>g

CODE	NAME
<b>INDIA</b>	
1 . P1180	BTL EPC LIMITED ((CS only))
2 . P0643	PRECISION EQUIPMENTS (CHENNAI) PVT LTD
3 . P0018	AERO ENGINEERS (CS ONLY)
4 . P0060	ARTSON ENGINEERING LIMITED
5 . P0110	B H P V
6 . P0107	BHARAT HEAVY ELECTRICALS LTD.
7 . P1221	CHANDERPUR INDUSTRIES PRIVATE LIMITED (CS Only)
8 . P1126	CHEM PROCESS SYSTEMS PVT. LTD. (CS/SS only)
9 . P1177	CRYOSTAR TANKS AND VESSELS PVT.LTD. (UPTO 30 KG/CM <sup>2</sup> G (CS ONLY))
10 . P1224	ENPRO INDUSTRIES PVT. LTD.
11 . P1124	ESSAR HEAVY ENGINEERING SERVICES
12 . P1131	FAB-TECH WORKS & CONSTRUCTIONS PRIVATE LIMITED
13 . P1056	FABTECH PROJECTS & ENGINEERS LTD.
14 . P1213	FLOWCHEM PROCESS EQUIPMENTS
15 . P1105	FLOWLINK INDUSTRIES PVT. LTD. (CS/SS Except Urea service)
16 . P0288	G R ENGINEERING PRIVATE LIMITED
17 . P0291	GANSONS LTD.

## 110503 : HEAT EXCHANGERS UPTO 30 Kg/cm<sup>2</sup>g

CODE	NAME
18 . P1045	GEMINI ENGI-FAB PVT. LTD.
19 . P0308	GHANSHYAM STEEL WORKS LTD. (CS/SS)
20 . P0323	GMM PFAUDLER LIMITED
21 . P0313	GODREJ & BOYCE MFG. CO. LTD.
22 . P1218	GODREJ & BOYCE MFG.CO.LTD. (UPTO 30 Kg/cm <sup>2</sup> g)
23 . P1011	GRASIM INDUSTRIES
24 . P1222	GUJARAT INFRAPIPES PVT. LTD.
25 . P0341	HEATEX INDIAN CORPORATION
26 . P1216	HEMALATHAA HI-TECH INDUSTRIES (CS Only)
27 . P1052	HINDUSTAN DORR-OLIVER LTD.
28 . P0380	INDIA TUBE MILLS & METAL INDUSTRIES LTD.
29 . P0386	INDUS PROJECTS LTD.(FORMERLY INDUS ENGG)
30 . P0801	ISGEC HEAVY ENGINEERING LIMITED
31 . P1225	KRR Engineering Private Limited
32 . P1101	LARSEN & TOUBRO LIMITED
33 . P1108	LAXMI ENGINEERING INDUSTRIES (BHOPAL) PRIVATE LIMITED (CS/SS only Except Urea service)
34 . P0497	LLOYDS ENGINEERING WORKS LIMITED

## 110503 : HEAT EXCHANGERS UPTO 30 Kg/cm<sup>2</sup>g

CODE	NAME
35 . P1017	MABEL ENGINEERS PVT. LTD.
36 . P1018	MANISH UDYOG HEAT EXCHANGERS PVT. LTD.
37 . P0538	MISTRY PRABHUDAS MANJI ENGG. PVT. LTD.
38 . P1053	MULTI-MAX ENGINEERING WORKS PVT. LTD. ((CS and SS Materials only))
39 . P1136	NUBERG ENGINEERING LIMITED
40 . P1013	PATELS AIRTEMP (INDIA LIMITED
41 . P1115	PHILS HEAVY ENGINEERING PVT. LTD. (For AS (P3 & P4) only.)
42 . P1220	PHILS HEAVY ENGINEERING PVT. LTD.
43 . P1021	R.D.ENGINEERS (INDIA) PVT. LTD.
44 . P1114	RADIANT HEAT EXCHANGER PVT. LTD. (CS/SS only)
45 . P1014	RAJ ENGG. CO.
46 . P1140	RELIANCE FABRICATIONS PVT. LTD. (CS/SS only)
47 . P0671	REYNOLDS CHEMEQUIP PRIVATE LIMITED (CS/SS)
48 . P0785	TAS ENGINEERING CO.(P) LIMITED
49 . P0786	TATA CHEMICALS LTD
50 . P0790	TECHNO PROCESS EQUIPMENTS (INDIA) PVT. LTD.
51 . P0796	TEMA INDIA LIMITED (ACHHAD UNIT-I)



## 110503 : HEAT EXCHANGERS UPTO 30 Kg/cm<sup>2</sup>g

CODE	NAME
52 . P1118	TEMA INDIA LIMITED (PANOLI, ANKLESHWAR-UNIT-III & UNIT IV) (In Non ASME Certification like U, U2, R etc. Category)
53 . P1117	TEMA INDIA LIMITED (SILVASSA, UNIT-II) (In Non IBR Category)
54 . P1047	THE ANUP ENGINEERING LIMITED
55 . P1049	TITANIUM EQUIPMENT AND ANODE MFG. CO. LTD.
56 . P1127	TITANIUM TANTALUM PRODUCTS LTD (CS & SS Materials)
57 . P1134	UNIQUE CHEMOPLANT EQUIPMENTS
58 . P1123	UNIVERSAL HEAT EXCHANGERS LIMITED (CS/SS/LTCS Only)
<b>AUSTRIA</b>	
59 . P1022	APPARATEBAU SCHWEISSTECHNIK GMBH
60 . P0708	SCHOELLER-BLECKMANN NITEC GMBH
<b>BELGIUM</b>	
61 . P0218	D'HONDT S.A.
<b>GERMANY</b>	
62 . P0499	BORSIG GmbH
<b>ITALY</b>	
63 . P0098	BELLELI S.P.A.
64 . P0254	FBM HUDSON ITALIANA S.p.A.
65 . P0594	GE POWER (NUOVO PIGNONE SPA)
66 . P0602	OLMI SPA

## 110503 : HEAT EXCHANGERS UPTO 30 Kg/cm<sup>2</sup>g

CODE	NAME
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67 . P0123 WALTER TOSTO SpA

### **JAPAN**

68 . P0358 HITACHI ZOSEN

69 . P0437 KAWASAKI HEAVY INDUSTRIES LTD.

70 . P0458 KOBE STEEL LIMITED

71 . P0541 MITSUI ENGINEERING & SHIPBUILDING CO.LTD

### **KOREA**

72 . P0334 DOOSAN MECATEC CO. LTD.

73 . P1035 HANJUNG DCM CO.LTD.

74 . P0335 HANTECH LIMITED

75 . P0369 HUNDAI HEAVY INDUSTRIES

76 . P0462 KOREA HEAVY INDUSTRIES & CONSTN. CO. LTD

77 . P1060 SUNGJIN GEOTEC CO., LTD. (CS and SS only)

### **SPAIN**

78 . P0524 MECANICA DE LA PENA S.A.

### **U.S.A.**

79 . P0510 MANNING & LEWIS ENGINEERING CO.,

## 110504 : HEAT EXCHANGERS 30 TO 60 Kg/cm<sup>2</sup>g

CODE	NAME
<b>INDIA</b>	
1 . P0643	PRECISION EQUIPMENTS (CHENNAI) PVT LTD
2 . P0018	AERO ENGINEERS (Upto 46 Kg/cm <sup>2</sup> g (CS only))
3 . P1166	AVADH INDUSTRIES (Upto 44 Kg/cm <sup>2</sup> g (CS Only))
4 . P0110	B H P V
5 . P0107	BHARAT HEAVY ELECTRICALS LTD.
6 . P1143	CICB-CHEMICON PVT. LTD. (CS only)
7 . P1224	ENPRO INDUSTRIES PVT. LTD.
8 . P1124	ESSAR HEAVY ENGINEERING SERVICES
9 . P1131	FAB-TECH WORKS & CONSTRUCTIONS PRIVATE LIMITED
10 . P1056	FABTECH PROJECTS & ENGINEERS LTD.
11 . P0288	G R ENGINEERING PRIVATE LIMITED
12 . P1045	GEMINI ENGI-FAB PVT. LTD.
13 . P0323	GMM PFAUDLER LIMITED
14 . P0313	GODREJ & BOYCE MFG. CO. LTD.
15 . P1218	GODREJ & BOYCE MFG.CO.LTD. (30 TO 60 Kg/cm <sup>2</sup> g)
16 . P1011	GRASIM INDUSTRIES
17 . P1052	HINDUSTAN DORR-OLIVER LTD. (CS/SS only)

## 110504 : HEAT EXCHANGERS 30 TO 60 Kg/cm<sup>2</sup>g

CODE	NAME
18 . P1137	INDCON PROJECTS & EQUIPMENT LIMITED (CS/SS only)
19 . P0801	ISGEC HEAVY ENGINEERING LIMITED
20 . P1101	LARSEN & TOUBRO LIMITED
21 . P1108	LAXMI ENGINEERING INDUSTRIES (BHOPAL) PRIVATE LIMITED (CS/SS only Except Urea service)
22 . P0497	LLOYDS ENGINEERING WORKS LIMITED
23 . P1138	MEENAKSHI ASSOCIATES (P) LTD. (CS/SS only)
24 . P1053	MULTI-MAX ENGINEERING WORKS PVT. LTD. (CS & SS ONLY)
25 . P0572	NEWTON ENGG. & CHEMICALS LTD. (Upto 36 Kg/cm <sup>2</sup> )
26 . P1136	NUBERG ENGINEERING LIMITED (CS Only up to 40 kg/cm <sup>2</sup> g)
27 . P1013	PATELS AIRTEMP (INDIA) LIMITED ((CS & SS only))
28 . P1220	PHILS HEAVY ENGINEERING PVT. LTD. (CS ONLY)
29 . P1058	PRAJ INDUSTRIES LIMITED (CS/SS only)
30 . P0790	TECHNO PROCESS EQUIPMENTS (INDIA) PVT. LTD.
31 . P0796	TEMA INDIA LIMITED (ACHHAD UNIT-I)
32 . P1117	TEMA INDIA LIMITED (SILVASSA, UNIT-II) (In Non IBR Category)
33 . P1047	THE ANUP ENGINEERING LIMITED
34 . P1055	THE INDIAN SUGAR & GENERAL ENGG. CORPN.(ISGEC), DAHEJ (Except Urea Plant Critical Equipment)

### **KOREA**

## 110504 : HEAT EXCHANGERS 30 TO 60 Kg/cm<sup>2</sup>g

CODE	NAME
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35 . P1149 ALPEC CO. LTD. (CS & AS only)

### **AUSTRIA**

36 . P1022 APPARATEBAU SCHWEISSTECHNIK GMBH

37 . P0708 SCHOELLER-BLECKMANN NITEC GMBH

### **GERMANY**

38 . P0499 BORSIG GmbH

### **ITALY**

39 . P0254 FBM HUDSON ITALIANA S.p.A.

40 . P0597 OFFICIENE LUIGI RESTA S.P.A.

41 . P1042 ROLLE S.P.A (30 to 60 kg/cm<sup>2</sup> pr.)

### **JAPAN**

42 . P0358 HITACHI ZOSEN

43 . P0540 MITSUBISHI HEAVY INDUSTRIES LTD.

### **KOREA**

44 . P0334 DOOSAN MECATEC CO. LTD.

45 . P1035 HANJUNG DCM CO.LTD.

46 . P0335 HANTECH LIMITED

47 . P0369 HUNDAI HEAVY INDUSTRIES

48 . P1060 SUNGJIN GEOTEC CO., LTD. (CS and SS only)

### **SPAIN**

110504 : HEAT EXCHANGERS 30 TO 60 Kg/cm<sup>2</sup>g

CODE	NAME
49 . P0524	MECANICA DE LA PENA S.A.

## 110505 : HEAT EXCHANGERS ABOVE 60 Kg/cm<sup>2</sup>g

CODE	NAME
<b>INDIA</b>	
1 . P0643	PRECISION EQUIPMENTS (CHENNAI) PVT LTD
2 . P0110	B H P V
3 . P0107	BHARAT HEAVY ELECTRICALS LTD.
4 . P1045	GEMINI ENGI-FAB PVT. LTD.
5 . P0313	GODREJ & BOYCE MFG. CO. LTD.
6 . P1218	GODREJ & BOYCE MFG.CO.LTD. (ABOVE 60 Kg/cm <sup>2</sup> g)
7 . P1052	HINDUSTAN DORR-OLIVER LTD.
8 . P0801	ISGEC HEAVY ENGINEERING LIMITED (Except Urea Plant Critical Equipment)
9 . P1101	LARSEN & TOUBRO LIMITED
10 . P1053	MULTI-MAX ENGINEERING WORKS PVT. LTD. (CS & SS ONLY)
11 . P1013	PATELS AIRTEMP (INDIA LIMITED ((CS only))
12 . P1058	PRAJ INDUSTRIES LIMITED (CS/SS only)
13 . P0796	TEMA INDIA LIMITED (ACHHAD UNIT-I)
14 . P1047	THE ANUP ENGINEERING LIMITED
15 . P1055	THE INDIAN SUGAR & GENERAL ENGG. CORPN.(ISGEC), DAHEJ (Except Urea Plant Critical Equipment)
16 . P1200	VIJAY TANKS & VESSELS PRIVATE LIMITED (CS ONLY)

### **KOREA**

110505 : HEAT EXCHANGERS ABOVE 60 Kg/cm<sup>2</sup>g

CODE	NAME
17 . P1149	ALPEC CO. LTD. (CS & AS only)
<b>INDIA</b>	
18 . P1164	ISGEC HITACHI ZOSEN LIMITED
<b>AUSTRIA</b>	
19 . P1022	APPARATEBAU SCHWEISSTECHNIK GMBH
<b>BELGIUM</b>	
20 . P0218	D'HONDT S.A.
<b>GERMANY</b>	
21 . P0499	BORSIG GmbH
<b>ITALY</b>	
22 . P0597	OFFICIENE LUIGI RESTA S.P.A.
23 . P0602	OLMI SPA
<b>KOREA</b>	
24 . P0369	HUNDAI HEAVY INDUSTRIES
25 . P1060	SUNGJIN GEOTEC CO., LTD. (CS and SS only)



## 110506 : EXCHANGERS AIRCOOLED/ FINNED TYPE

CODE	NAME
<b>INDIA</b>	
1 . P0110	B H P V
2 . P1122	BGR ENERGY SYSTEMS LIMITED - AIR FIN COOLER DIVN.
3 . P1059	ENGINEMATES HEAT TRANSFER PVT. LTD.,
4 . P1224	ENPRO INDUSTRIES PVT. LTD.
5 . P1056	FABTECH PROJECTS & ENGINEERS LTD.
6 . P1213	FLOWCHEM PROCESS EQUIPMENTS
7 . P0297	GEA ENERGY SYSTEM (I) LTD.
8 . P0301	GEI INDUSTRIAL SYSTEMS LTD.
9 . P1045	GEMINI ENGI-FAB PVT. LTD.
10 . P1043	JORD ENGINEERS INDIA LTD.
11 . P1101	LARSEN & TOUBRO LIMITED
12 . P0497	LLOYDS ENGINEERING WORKS LIMITED
13 . P1018	MANISH UDYOG HEAT EXCHANGERS PVT. LTD.
14 . P0615	PAHARPUR COOLING TOWERS (P) LTD.
15 . P1013	PATELS AIRTEMP (INDIA LIMITED
<b>UK</b>	
16 . P7129	CHART ENERGY & CHEMICALS INC. (HEAT EXCHANGERS AIRCOOLED ONLY)
<b>FRANCE</b>	

## 110506 : EXCHANGERS AIRCOOLED/ FINNED TYPE

CODE	NAME
17 . P1034	CREUSOT LOIRE INDUSTRIES
18 . P0184	USINOR INDUSTEEL (FRANCE)
<b>GERMANY</b>	
19 . P0494	LINDE AG
<b>ITALY</b>	
20 . P0019	AEROTO SRL
21 . P0602	OLMI SPA
<b>JAPAN</b>	
22 . P0358	HITACHI ZOSEN
23 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
24 . P0458	KOBE STEEL LIMITED
25 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
26 . P0541	mitsui ENGINEERING & SHIPBUILDING CO.LTD
27 . P0701	SASAKURA ENGG. CO. LTD.
<b>KOREA</b>	
28 . P0370	HYUNDAI CORPORATION
<b>U.K.</b>	
29 . P0056	APV SPIRO GILLS LTD
<b>U.S.A.</b>	
30 . P0515	MARLEY COOLING TOWERS CO.

## 110507 : PLATE TYPE HEAT EXCHANGERS

CODE	NAME
<b>INDIA</b>	
1 . P0032	ALFA LAVAL INDIA LIMITED
2 . P1031	APV (PRAJ)
3 . P1020	DOVER INDIA LTD (TRANter PHE DIVN)
4 . P1141	HRS PROCESS SYSTEMS LIMITED
5 . P1109	KELVION INDIA PRIVATE LIMITED (FORMERLY GEA ECOFLEX INDIA PV
6 . P1101	LARSEN & TOUBRO LIMITED
7 . P0433	SHRACHI ENGINEERING & INDUSTRIES LTD.
8 . P1195	SONDEX HEAT EXCHANGERS INDIA PRIVATE LIMITED
9 . P1128	TRANter INDIA PVT. LTD.
10 . P0848	URISAN HEAT EXCHANGERS PVT. LTD.,
<b>GERMANY</b>	
11 . P0494	LINDE AG
<b>JAPAN</b>	
12 . P0771	SUMITOMO METAL INDUSTRIES LTD.
<b>SPAIN</b>	
13 . P0524	MECANICA DE LA PENA S.A.
<b>U.S.A.</b>	
14 . P0510	MANNING & LEWIS ENGINEERING CO.,
15 . P0826	TRANter PHE, INC.

## 110508 : SAMPLE COOLERS

CODE	NAME
<b>INDIA</b>	
1 . P0643	PRECISION EQUIPMENTS (CHENNAI) PVT LTD
2 . P0018	AERO ENGINEERS
3 . P0047	ANAND ENGINEERING PVT.LTD.
4 . P0110	B H P V
5 . P1213	FLOWCHEM PROCESS EQUIPMENTS
6 . P0318	GRAND PRIX ENGINEERING PVT. LTD.
7 . P1108	LAXMI ENGINEERING INDUSTRIES (BHOPAL) PRIVATE LIMITED (CS/SS Only)
8 . P0516	MARS DESIGN PVT.LTD.
9 . P0538	MISTRY PRABHUDAS MANJI ENGG. PVT. LTD.
10 . P1012	MOD FABRICATORS (small sample coolers)
11 . P0561	NATIONAL ENGINEERING CO. (small sample coolers)
12 . P0563	NATIONAL HEAVY ENGG.CO.OPERATIVE LTD.
13 . P0654	P.J.SUROTIA & CO.
14 . P0635	POLYQUIP FABRICATION INDUSTRIES
15 . P0648	PROJECT TECHNOLOGISTS PVT. LTD.
16 . P0649	PROJECTS & DEVELOPMENT INDIA LIMITED
17 . P0785	TAS ENGINEERING CO.(P) LIMITED

## 110508 : SAMPLE COOLERS

CODE	NAME
18 . P0790	TECHNO PROCESS EQUIPMENTS (INDIA) PVT. LTD.
19 . P1183	TECKSON STEEL INDUSTRIES
20 . P0842	UNITOP ENGINEERS PVT. LTD. (upto tube OD 50mm, tubesheet thk 125mm)
<b>AUSTRIA</b>	
21 . P1022	APPARATEBAU SCHWEISSTECHNIK GMBH
<b>ITALY</b>	
22 . P0598	OFFICINE COSTRUZIONI SPECIALI S.P.A
<b>KOREA</b>	
23 . P0334	DOOSAN MECATEC CO. LTD.
24 . P1035	HANJUNG DCM CO.LTD.
<b>U.S.A.</b>	
25 . P0028	AITKEN INC.

**110601 : FRP/PVC TANKS & VESSELS**

CODE	NAME
<b>INDIA</b>	
1 . P1165	EPP COMPOSITES PVT. LTD.
2 . P0290	GANDHI AND ASSOCIATES
3 . P1039	SONAL ENGG. PLASTIC FABRICATOR
4 . P1223	SUNRISE INDUSTRIES (INDIA) LTD. (Up to 215 M3)
<b>AUSTRIA</b>	
5 . P1022	APPARATEBAU SCHWEISSTECHNIK GMBH (acid storage tanks upto 3.8 in dia.)

## 110607 : FRP/PVC LINING

CODE	NAME
<b>INDIA</b>	
1 . P1165	EPP COMPOSITES PVT. LTD.
2 . P0290	GANDHI AND ASSOCIATES
3 . P1223	SUNRISE INDUSTRIES (INDIA) LTD.

## 110608 : RUBBER LINING

CODE	NAME
<b>INDIA</b>	
1 . P1148	ARUL RUBBERS PVT. LTD.



## 110702 : NITROGEN BOTTLES

CODE	NAME
<b>INDIA</b>	
1 . P0496	AIR LIQUID ENGINEERING INDIA PVT. LTD.
2 . P0110	B H P V
3 . P0111	BHARAT PUMPS & COMPRESSORS LTD.
4 . P1037	LIQUID AIR ENGG.INDIA (P) LIMITED.
<b>KOREA</b>	
5 . P0335	HANTECH LIMITED
6 . P0462	KOREA HEAVY INDUSTRIES & CONSTN. CO. LTD

## 110703 : DISHED ENDS

CODE	NAME
<b>INDIA</b>	
1 . P1131	FAB-TECH WORKS & CONSTRUCTIONS PRIVATE LIMITED
2 . P1192	GRAND PRIX ENGINEERING PRIVATE LIMITED (CS ONLY)
3 . P1019	ICEM ENGG. CO. LTD. (uoto 6mm Dia x 100 mm thk.)
4 . P1154	JINDAL STEEL & POWER LTD. (MACHINERY DIVISION) (CS / AS only)
5 . P0497	LLOYDS ENGINEERING WORKS LIMITED

## 110801 : MECHANICAL WORKS(piping , machinery & equipment erection

CODE	NAME
<b>INDIA</b>	
1 . P6040	ARIO BROTHERS (UPTO Rs. 3.0 Cr.)
2 . P6055	ARTSON ENGINEERING LIMITED (UPTO Rs. 7.5 Cr.)
3 . P6005	BRIDGE AND ROOF CO.(INDIA) LTD.
4 . P6047	CHEM CONTRACT PVT. LTD. (UPTO Rs. 3.0 Cr.)
5 . P3222	CORRTECH INTERNATIONAL PVT.LTD. (for plant piping)
6 . P1121	DEMAC TECHNOLOGIES PVT. LTD. (Rs. 1500 Lacs)
7 . P6048	DOWEL ERECTORS PVT. LTD. (UPTO Rs. 7.5 Cr.)
8 . P1120	DURHA CONSTRUCTIONS PVT. LIMITED (Upto 100 Crores)
9 . P1196	EDAC ENGINEERING LIMITED
10 . P6015	ENGINEERING PROJECTS(I) LTD. (UPTO Rs. 3.0 Cr.)
11 . P6103	ESP (ASIA) PVT. LTD. (Upto Rs. 25 Crore)
12 . P6053	FURNACE FABRICA (INDIA) LTD. (UPTO Rs. 3.0 Cr.)
13 . P6049	G.M.W. ENGINEERS PVT. LTD. (UPTO Rs. 3.0 Cr.)
14 . P6003	GANNON DUNKERLEY & CO. LIMITED
15 . P1176	GOLDEN EDGE ENGINEERING PVT.LTD.
16 . P6052	GOPINATH ENGINEERING CO. PVT. LTD. (UPTO Rs. 3.0 Cr.)
17 . P6020	JAIHIND PROJECTS LIMITED (UPTO Rs. 3.0 Cr.)

## 110801 : MECHANICAL WORKS(piping , machinery & equipment erection

CODE	NAME
18 . P6001	LARSEN & TOUBRO LTD( ECC Division)
19 . P1130	MCNALLY BHARAT ENGINEERING CO. LTD. (Upto Rs. 15 Crores)
20 . P6051	MUKUND ENGINEERS LTD. (UPTO Rs. 7.5 Cr.)
21 . P6042	NEO STRUCTO CONSTRUCTION LIMITED (UPTO Rs. 7.5 Cr.)
22 . P6044	NEWTON ENGG. COST. CO. LTD. (Upto 55 Cr.)
23 . P6104	NUBERG ENGINEERING LIMITED (UPTO RS. 15 CRORE)
24 . P6102	ONSHORE CONSTRUCTION COMPANY PVT. LTD. (Up to 50 Crore)
25 . P6012	PETRON CIVIL ENGINEERING LIMITED
26 . P6033	POWER MAX INDIA PVT. LTD. (UPTO Rs. 3.0 CRORE)
27 . P6054	PROJECT TECHNOLOGISTS PVT. LTD. (UPTO Rs. 3.0 Cr.)
28 . P1152	ROTODYNE ENGINEERING SERVICES PVT. LTD. (Upto 5.0 Cr.)
29 . P6046	SATNAM GLOBAL INFRAPROJECTS LTD. (UPTO Rs. 3.0 Cr.)
30 . P6043	SPIC JEL ENGG. CONSTRUCTION LTD. (UPTO Rs. 7.5 Cr.)
31 . P6045	STEWARTS & LLOYDS OF INDIA LTD.
32 . P0786	TATA CHEMICALS LTD
33 . P1191	TECHNO ELECTRIC & ENGINEERING CO. LIMITED
34 . P6038	U.B.ENGINEERING LIMITED

110801 : MECHANICAL WORKS(piping , machinery & equipment erection

CODE	NAME
35 . P1163	DAYNITE ENGINEERGS & CONTRACTORS PVT.LTD. (Rs. 1500 lacs)

## 110802 : HEAVY LIFT

CODE	NAME
<b>INDIA</b>	
1 . P6056	ABG HEAVY INDUSTRIES LTD.
2 . P6047	CHEM CONTRACT PVT. LTD. (UPTO Rs. 1.0 Cr.)
3 . P1176	GOLDEN EDGE ENGINEERING PVT.LTD.
4 . P6052	GOPINATH ENGINEERING CO. PVT. LTD. (UPTO Rs. 1.0 Cr.)
5 . P6001	LARSEN & TOUBRO LTD( ECC Division)
6 . P6042	NEO STRUCTO CONSTRUCTION LIMITED (Upto 18 Cr.)
7 . P6102	ONSHORE CONSTRUCTION COMPANY PVT. LTD.
8 . P6012	PETRON CIVIL ENGINEERING LIMITED
9 . P6057	SANGHVI MOVERS (UPOT Rs. 1.0 Cr.)
10 . P6046	SATNAM GLOBAL INFRAPROJECTS LTD. (UPTO Rs. 1.0 Cr.)
11 . P6038	U.B.ENGINEERING LIMITED
12 . P1163	DAYNITE ENGINEERGS & CONTRACTORS PVT.LTD. (Rs. 1000 lacs)

## 110803 : HOT & COLD INSULATION OF EQUIPMENT & PIPING

CODE	NAME
<b>MAHATASHTRA</b>	
1 . P1178	INSULREF TECHNOLOGIES PRIVATE LIMITED
<b>INDIA</b>	
2 . P1162	ALP AEROFLEX INDIA PVT. LTD. (- 50 Deg C to 120 Deg C)
3 . P1150	AMOL DICALITE LIMITED (For Supply & Application of Perlite Block & Pipe Section)
4 . P1161	ARMACELL INDIA PVT. LTD. (ARMACELL ENGINEERED SYSTEMS) (Upto Rs. 3.0 Crore (For supply & application of Insulation & Acoustic Works).)
5 . P3203	ASIAN THERMAL INSULATION (I) PVT LTD
6 . P3214	ASSOCIATED INSULATION CO.
7 . P1186	ASSOCIATED INSULATION COMPANY
8 . P3210	CAPE INDUSTRIAL SERVICES (PVT) LTD
9 . P3212	CAPEX INSULATION & ENGINEERS (upto Rs 1.0 Crore)
10 . P3208	CONTINENTAL INSULATIONS PVT LTD (upto Rs 1.0 Crore)
11 . P1175	G+H INSULATION INDIA PVT.LTD.
12 . P1155	HI-TEC ROCK FIBRE PVT. LTD. (Upto Rs. 2 Crore (For the supply of Thermal Insulation materials only).)
13 . P3206	HYDERABAD INDUSTRIES LTD (For calcium silicate only)
14 . P3211	JD INSULATION (upto Rs 1.0 Crore)
15 . P3209	KAEFER PUNJ LLOYD LIMITED
16 . P3204	KHANDELWAL INSULATIONS PVT LTD

## 110803 : HOT & COLD INSULATION OF EQUIPMENT & PIPING

CODE	NAME
17 . P3201	LLOYDS INSULATION(i) LIMITED
18 . P3202	LLOYDS PROJECTS PVT LTD
19 .	LLOYDS PROJECTS PVT LTD (APPLICATION ONLY)
20 . P1119	MINWOOL ROCK FIBRES LIMITED (Upto 5 Crores)
21 . P3205	NEWKEM ENGINEERS PVT LTD
22 . P1201	PERMA-PIPE INDIA PRIVATE LIMITED
23 . P3213	POINEER INSULATION
24 . P1174	POLYBOND INSULATION PVT. LTD.
25 . P3207	SHARAD INSULATIONS & INTERIORS PVT LTD (upto Rs 1.0 Crore)
26 . P1217	STAIVE ENGINEERING AND TECHNICAL SERVICES PVT. LTD.
27 . P1191	TECHNO ELECTRIC & ENGINEERING CO. LIMITED
<b>1INDIA</b>	
28 . P1193	SUAVAL LORVEN INDIA PVT.LTD.



## 110804 : CAST IN-SITU TANK INSULATION

CODE	NAME
<b>MAHATASHTRA</b>	
1 . P1178	INSULREF TECHNOLOGIES PRIVATE LIMITED
<b>INDIA</b>	
2 . P1186	ASSOCIATED INSULATION COMPANY
3 . P3210	CAPE INDUSTRIAL SERVICES (PVT) LTD
4 . P1175	G+H INSULATION INDIA PVT.LTD.
5 . P1155	HI-TEC ROCK FIBRE PVT. LTD. (Upto Rs. 2 Crore)
6 . P3209	KAEFER PUNJ LLOYD LIMITED
7 . P3201	LLOYDS INSULATION(i) LIMITED
8 . P1217	STAIVE ENGINEERING AND TECHNICAL SERVICES PVT. LTD.

## 110805 : CHEMICAL CLEANING

CODE	NAME
<b>INDIA</b>	
1 . P3219	ALBATROSS FINE CHEM LTD
2 . P3217	ARUCHEM
3 . P3216	CHEM TREAT INDIA LTD
4 . P3218	D C INDUSTRIAL PLANT SERVICES LTD
5 . P3215	DYNAMIC INDL & CLEANING SERVICES(P) LTD
6 . P3220	KWALITY CHEMICAL INDUSTRIES
7 . P1026	MICRO CHEM LAB

## 110806 : EPOXY LINING

CODE	NAME
<b>INDIA</b>	
1 . P6063	ARIEN NEW DELHI PRIVATE LIMITED
2 . P6070	BARODA SURFACE PROTECTION SERVICES
3 . P2142	CIPY POLYURETHANES PVT. LTD. (On steel and concrete structure)
4 . P1171	JOTUN INDIA PRIVATE LIMITED
5 . P6059	M.PALLONJI & CO. PRIVATE LIMITED
6 . P6071	MAJOR GRAIND CORROSSION CONTROLLERS
7 . P1170	MOHAN PAINTS
8 . P6058	NATRAJ AND SIDDHARTH METACARE PVT. LTD.
9 . P6072	RESMET INDIA
10 . P1191	TECHNO ELECTRIC & ENGINEERING CO. LIMITED
11 . P6060	WASPRABHA

## 110807 : PAINTING OF STRUCTURAL , EQUIPMENT & PIPING

CODE	NAME
<b>MAHATASHTRA</b>	
1 . P1178	INSULREF TECHNOLOGIES PRIVATE LIMITED
<b>INDIA</b>	
2 . P1032	ARCOY INDUSTRIES
3 . P6063	ARIEN NEW DELHI PRIVATE LIMITED
4 . P6061	ASHISH DECORATORS
5 . P6068	BHARAT CHEMICALS & PAINTS (UPTO Rs. 1.0 Cr.)
6 . P6064	CP SYSTEMS PVT. LTD.
7 . P1145	GRAUER & WEIL (INDIA) LTD.
8 . P6062	HEERU PAINTS AND CONTRACTS PVT. LTD.
9 . P1171	JOTUN INDIA PRIVATE LIMITED
10 . P6059	M.PALLONJI & CO. PRIVATE LIMITED
11 . P1170	MOHAN PAINTS
12 . P6058	NATRAJ AND SIDDHARTH METACARE PVT. LTD.
13 . P6042	NEO STRUCTO CONSTRUCTION LIMITED
14 . P6067	POLY COATS (UPTO Rs. 1.0 Cr.)
15 . P6069	QUANTUM ENGINEERS ( UPTO Rs. 1.0 Cr.)
16 . P1146	RAMDEV RESINS PVT. LTD

**110807 : PAINTING OF STRUCTURAL , EQUIPMENT & PIPING**

CODE	NAME
17 . P6066	RESMET INDIA (UPTO Rs. 1.0 Cr.)
18 . P6065	SETWELL COATING INDIA PVT. LTD. (UPTO Rs. 1.0 Cr.)
19 . P1191	TECHNO ELECTRIC & ENGINEERING CO. LIMITED
20 . P6060	WASPRABHA
21 . P1226	RAMDEV RESINS PRIVATE LIMITED (INR 2..0 CRORE IN A YEAR)

## 110811 : ONLY UNDERGROUND PIPING WORKS

CODE	NAME
<b>INDIA</b>	
1 . P6041	ABAN CONSTRUCTION
2 . P6040	ARIO BROTHERS
3 . P6005	BRIDGE AND ROOF CO.(INDIA) LTD.
4 . P6006	GAMMON INDIA LTD.
5 . P6003	GANNON DUNKERLEY & CO. LIMITED
6 . P1176	GOLDEN EDGE ENGINEERING PVT.LTD.
7 . P6001	LARSEN & TOUBRO LTD( ECC Division)
8 . P6042	NEO STRUCTO CONSTRUCTION LIMITED
9 . P6044	NEWTON ENGG. COST. CO. LTD.
10 . P6039	PUNJ LLOYD LTD.
11 . P6043	SPIC JEL ENGG. CONSTRUCTION LTD.
12 . P1191	TECHNO ELECTRIC & ENGINEERING CO. LIMITED
13 . P6038	U.B.ENGINEERING LIMITED

## 110812 : CROSS COUNTRY PIPELINE

CODE	NAME
<b>INDIA</b>	
1 . P6041	ABAN CONSTRUCTION
2 . P6040	ARIO BROTHERS
3 . P3222	CORRTECH INTERNATIONAL PVT.LTD. (upto 24" dia & 100km)
4 . P6006	GAMMON INDIA LTD.
5 . P6020	JAIHIND PROJECTS LIMITED
6 . P6001	LARSEN & TOUBRO LTD( ECC Division)
7 . P6044	NEWTON ENGG. COST. CO. LTD.
8 . P6039	PUNJ LLOYD LTD.


110813 :

CODE	NAME
<b>INDIA</b>	
1 . P1208	CAPRICORN COATINGS & COLOURS



## 110901 : SUPPLY OF INDUSTRIAL PAINT

CODE	NAME
<b>INDIA</b>	
1 . P1226	RAMDEV RESINS PRIVATE LIMITED (125000 LITER PER MONTH)

	<b>MASTER VENDORS LIST FOR PROJECTS</b>	04-00MM-0011	19
		DOCUMENT NO	REV

**MASTER VENDORS LIST**  
**FOR**  
**PROJECTS**  
**MECHANICAL ITEMS (PIPING)**

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## 120101 : CS PIPES IS-1239 (BLACK & GI)

CODE	NAME
<b>INDIA</b>	
1 . P0039	AMBICA TUBES CO.
2 . P2055	ANIL METAL CORPORATION
3 . P2253	BHARAT ENTERPRISES (All sizes from PDIL enlisted pipe mills/manufacture)
4 . P2274	BMS INTERNATIONAL (BOMBAY) LLP (All Sizes & grades from PDIL enlisted pipe mills/manufacture)
5 . P2216	CHETAN STEELS (Upto 6")
6 . P2196	DADU PIPES (P) LIMITED (½" to 6")
7 . P2075	GOOD LUCK STEEL TUBES LTD. (15 mm to 150 mm dia)
8 . P0326	GUJRAT STEEL TUBES LTD.
9 . P2166	HI-TECH PIPES LTD. (ERW MS / GI Pipes:½" NB to 6" NB, (Thickness 2.2 mm to 6.0 mm))
10 . P0814	INDIAN TUBE CO. (TATA DIV. OF TUBES & PIPES) (For >200M)
11 . P0387	INDUS TUBES LIMITED (½" to 6")
12 . P2121	JAY LAKSHMI STEEL & ENGINEERING CO.
13 . P0427	JINDAL PIPES LTD. (1/2" to 4")
14 . P2193	JOTINDRA STEEL & TUBES LTD. (½" to 6")
15 . P2111	KALPESH TUBE(INDIA), (TRADER) (upto a max order value Rs.25.0 lakh)
16 . P2264	KWALITY TUBES (All sizes and grades from PDIL enlisted pipes mill/manufacture)
17 . P2276	MOKSHI INDUSTRIES PVT. LTD. (All sizes and grades from PDIL enlisted pipes mills/manufacture)

## 120101 : CS PIPES IS-1239 (BLACK & GI)

CODE	NAME
18 . P0548	MUKAT PIPES LTD
19 . P2178	NAVRATAN PIPE AND PROFILE LTD. (Upto 6")
20 . P2040	P.K.FORGE & FITTING INDUSTRIES
21 . P2116	SAGAR STEEL CORPORATION (TRADER)
22 . P2110	SANGHVI METALS (TRADER)
23 . P2250	SHRIPAL METAL LIMITED (CS Pipes IS-1239 (Black & GI) All sizes from PDIL enlisted pipe mills/manufacturer)
24 . P0775	SURINDRA ENGINEERING CO. PVT. LTD.
25 . P0776	SURYA ROSHNI LTD. (15mm to 150mm)
26 . P2123	THE BENGAL MILL STORES SUPPLY CO.(TRADER)
27 . P2152	WELSPUN GUJARAT STAHL ROHREN LIMITED (ANJAR) (Upto 6")
28 . P0894	ZENITH LIMITED
29 . P2252	` (UP TO 6" (BLACK), UPTO 4" (GI))

## 120102 : CS WELDED PIPES IS-3589

CODE	NAME
<b>INDIA</b>	
1 . P2055	ANIL METAL CORPORATION
2 . P2253	BHARAT ENTERPRISES (All sizes from PDIL enlisted pipe mills/manufacturer)
3 . P2274	BMS INTERNATIONAL (BOMBAY) LLP (All Sizes & grades from PDIL enlisted pipe mills/manufacturer)
4 . P2196	DADU PIPES (P) LIMITED (6" to 12" (Thickness up to 9.5 mm))
5 . P2069	EVERGREEN HARDWARE STORES
6 . P2075	GOOD LUCK STEEL TUBES LTD. (Upto 150mm dia , 8 mm thick.)
7 . P0326	GUJRAT STEEL TUBES LTD.
8 . P2077	HEAVY METAL & TUBES LIMITED
9 . P2166	HI-TECH PIPES LTD. (ERW MS / GI Pipes: 6" NB OD to 12", (Thickness 2.6 mm to 8.0 mm))
10 . P0387	INDUS TUBES LIMITED (6" to 12")
11 . P2121	JAY LAKSHMI STEEL & ENGINEERING CO.
12 . P0427	JINDAL PIPES LTD. (8" to 14")
13 . P2193	JOTINDRA STEEL & TUBES LTD. (6" to 14")
14 . P2111	KALPESH TUBE(INDIA), (TRADER)
15 . P2264	KWALITY TUBES (All sizes and grades from PDIL enlisted pipes mill/manufacturer)
16 . P2124	LALIT PIPES & PIPES LIMITED (16" to 64", thickness upto 20mm)
17 . P2276	MOKSHI INDUSTRIES PVT. LTD. (All sizes and grades from PDIL enlisted pipes mills/manufacturer)

## 120102 : CS WELDED PIPES IS-3589

CODE	NAME
18 . P0548	MUKAT PIPES LTD
19 . P2178	NAVRATAN PIPE AND PROFILE LTD. (Upto 10")
20 . P2040	P.K.FORGE & FITTING INDUSTRIES
21 . P2174	PRATIBHA INDUSTRIES LTD., (16" NB to 24" NB, Wall Thickness: 6 mm to 20 mm)
22 . P0661	RATNAMANI METALS & TUBES LIMITED
23 . P2116	SAGAR STEEL CORPORATION (TRADER)
24 . P2110	SANGHVI METALS (TRADER)
25 . P2095	SAW PIPES
26 . P2105	SHRI RAM METALS
27 . P2250	SHRIPAL METAL LIMITED (CS Welded Pipes IS-3589 All sizes from PDIL enlisted pipe mills/manufacturer)
28 . P0754	STEEL AUTHORITY OF INDIA LTD.
29 . P0775	SURINDRA ENGINEERING CO. PVT. LTD.
30 . P0776	SURYA ROSHNI LTD. (6" to 16" ,(150mm to 400mm))
31 . P2123	THE BENGAL MILL STORES SUPPLY CO.(TRADER)
32 . P2153	WELSPUN GUJARAT STAHL ROHREN LIMITED (DAHEJ) (Upto 72" (50 mm thk.))
33 . P2152	WELSPUN GUJARAT STAHL ROHREN LIMITED (ANJAR) (Upto 100" (30 mm thk.))



## 120103 : CS WELDED PIPES TO API 5L SPIRAL/LONG. WELDED (SAW/EFSW)

CODE	NAME
<b>INDIA</b>	
1 . P2253	BHARAT ENTERPRISES (All sizes from PDIL enlisted pipe mills/manufacture)
2 . P2274	BMS INTERNATIONAL (BOMBAY) LLP (All Sizes & grades from PDIL enlisted pipe mills/manufacture)
3 . P2198	HEAVY METAL PIPE CENTRE (Upto 24" (Upto SCHXXS) (PDIL approved Manufacturer's Make only))
4 . P0427	JINDAL PIPES LTD. (2" TO 14")
5 . P2193	JOTINDRA STEEL & TUBES LTD. (½" to 14")
6 . P2111	KALPESH TUBE(INDIA), (TRADER)
7 . P2264	KWALITY TUBES (All sizes and grades from PDIL enlisted pipes mill/manufacture)
8 . P2124	LALIT PIPES & PIPES LIMITED (16" to 64", thickness upto 20mm)
9 . P2276	MOKSHI INDUSTRIES PVT. LTD. (All sizes and grades from PDIL enlisted pipes mills/manufacture)
10 . P0548	MUKAT PIPES LTD
11 . P2040	P.K.FORGE & FITTING INDUSTRIES
12 . P2174	PRATIBHA INDUSTRIES LTD., (16" NB to 24" NB, Wall Thickness: 6 mm to 14.27)
13 . P0661	RATNAMANI METALS & TUBES LIMITED
14 . P2116	SAGAR STEEL CORPORATION (TRADER)
15 . P0754	STEEL AUTHORITY OF INDIA LTD.
16 . P0775	SURINDRA ENGINEERING CO. PVT. LTD.
17 . P0776	SURYA ROSHNI LTD. (Gr. A, 3" to 4", Gr. B, 6" to 14")

## 120103 : CS WELDED PIPES TO API 5L SPIRAL/LONG. WELDED (SAW/EFSW)

CODE	NAME
18 . P2123	THE BENGAL MILL STORES SUPPLY CO.(TRADER)
19 . P2153	WELSPUN GUJARAT STAHL ROHREN LIMITED (DAHEJ) (Upto 72" (50 mm thk.))
20 . P2152	WELSPUN GUJARAT STAHL ROHREN LIMITED (ANJAR) (Upto 100" (30 mm thk.))
<b>FRANCE</b>	
21 . P0834	ETS TROUVAY & CAUVIN
22 . P0629	PHOCEENNE
<b>GERMANY</b>	
23 . P0509	MANNESMANN HANDEL AG
24 . P0813	THYSSEN-KRUPP STAHLUNION GmbH
<b>ITALY</b>	
25 . P0191	DALMINE SPA
26 . P2092	RACCORTUBI SRL
<b>JAPAN</b>	
27 . P0464	KOSEI SANGYO LTD
28 . P0517	MARUBENI ITOCHU STEEL
29 . P0539	MITSUBISHI CORPORATION
30 . P0583	NIPPON KOKAN
31 . P0585	NIPPON STEEL CORPORATION
32 . P0587	NISHITANI & CO. LTD.

**120103 : CS WELDED PIPES TO API 5L SPIRAL/LONG. WELDED  
(SAW/EFSW)**

<b>CODE</b>	<b>NAME</b>
33 . P0588	NISSHO IWAI CORPORATION
34 . P0601	OKURA & CO. LTD.
35 . P0575	SOJITZ CORPORATION
36 . P0770	SUMITOMO METAL INDUSTRIES LTD.
<b>KOREA</b>	
37 . P0370	HYUNDAI CORPORATION
<b>U.K.</b>	
38 . P2064	BRITISH STEEL CORPORATION
39 . P0129	CORUS TUBES LIMITED
<b>U.S.A.</b>	
40 . P0703	SAW PIPES USA,INC.

## 120104 : CS / AS / LTCS SEAMLESS PIPES

CODE	NAME
<b>INDIA</b>	
1 . P2224	ANAND SEAMLESS TUBES PVT. LTD. (CS Seamless Pipes Upto 2")
2 . P2253	BHARAT ENTERPRISES (All sizes from PDIL enlisted pipe mills/manufacturer)
3 . P0115	BHEL (VALVES DIVISION)
4 . P2274	BMS INTERNATIONAL (BOMBAY) LLP (All Sizes & grades from PDIL enlisted pipe mills/manufacturer)
5 . P2216	CHETAN STEELS (Upto 12" SCH 80)
6 . P2077	HEAVY METAL & TUBES LIMITED (Upto 8" (thickness upto 18.26 mm))
7 . P2198	HEAVY METAL PIPE CENTRE (Upto 24" (Upto SCHXXS) (PDIL approved Manufacturer's Make only))
8 . P0814	INDIAN TUBE CO. (TATA DIV. OF TUBES & PIPES)
9 . P0800	ISMT LIMITED
10 . P2121	JAY LAKSHMI STEEL & ENGINEERING CO.
11 . P2133	JINDAL SAW LIMITED
12 . P2264	KWALITY TUBES (All sizes and grades from PDIL enlisted pipes mill/manufacturer)
13 . P0503	MAHARASHTRA SEAMLESS LTD.
14 . P2276	MOKSHI INDUSTRIES PVT. LTD. (All sizes and grades from PDIL enlisted pipes mills/manufacturer)
15 . P2040	P.K.FORGE & FITTING INDUSTRIES
16 . P2138	RATNADEEP METAL & TUBES PVT. LTD. (<=168.3mm OD)
17 . P2170	SAINEST TUBES PVT. LTD. (½" NB to 3" Upto Sch 160 (ASTM A106 Gr. B, A333 Gr.1 & 6 & A335 Gr. P11))

## 120104 : CS / AS / LTCS SEAMLESS PIPES

CODE	NAME
18 . P2250	SHRIPAL METAL LIMITED (CS/AS/LTCS Seamless Pipes All sizes from PDIL enlisted pipe mills/manufacturer)
<b>FRANCE</b>	
19 . P0834	ETS TROUVAY & CAUVIN
20 . P0629	PHOCEENNE
<b>GERMANY</b>	
21 . P0477	HORST KURVERS GmbH
22 . P0509	MANNESMANN HANDEL AG
<b>ITALY</b>	
23 . P0191	DALMINE SPA
24 . P2119	GAM RACCORDI S.P.A
25 . P0175	IBF SEAMLESS PIPES Spa
26 . P2092	RACCORTUBI SRL
<b>JAPAN</b>	
27 . P0517	MARUBENI ITOCHU STEEL
28 . P0539	MITSUBISHI CORPORATION
29 . P0585	NIPPON STEEL CORPORATION
30 . P0587	NISHITANI & CO. LTD.
31 . P0588	NISSHO IWAI CORPORATION
32 . P0601	OKURA & CO. LTD.

## 120104 : CS / AS / LTCS SEAMLESS PIPES

CODE	NAME
33 . P0575	SOJITZ CORPORATION
34 . P0770	SUMITOMO METAL INDUSTRIES LTD.
<b>KOREA</b>	
35 . P0370	HYUNDAI CORPORATION
<b>SWEDEN</b>	
36 . P0004	AB SANDVIK STEEL
<b>U.K.</b>	
37 . P2064	BRITISH STEEL CORPORATION
38 . P0129	CORUS TUBES LIMITED
39 . P0870	VOMAL INTERNATIONAL LIMITED

## 120105 : SS SEAMLESS/WELDED PIPES

CODE	NAME
<b>GERMANY</b>	
1 . P2189	H. BUTTING GmbH & CO. (Seamless : Upto 30" (upto 16mm thk) & Welded: Upto 72" (upto 64mm thk.))
<b>INDIA</b>	
2 . P2183	APEX TUBES PVT. LIMITED (Seamless: Upto 8" (Sch80S) & Welded: Upto 48" (Sch160))
3 . P2258	ASR MET TECH PRIVATE LIMITED (Item-SS(Seamless), Size- Up to 12", Thk/Sch -Up to 12.7mm/SCH80, Specification/Grade - A312 Gr. 304/304L/316/316L)
4 . P2181	BHANDARI FOILS & TUBES LIMITED (Seamless Upto 4" (Sch. 80) & Welded Upto 20" (Thk. <= 8 mm))
5 . P2253	BHARAT ENTERPRISES (All sizes from PDIL enlisted pipe mills/manufacturer)
6 . P2274	BMS INTERNATIONAL (BOMBAY) LLP (All Sizes & grades from PDIL enlisted pipe mills/manufacturer)
7 . P2289	CHANDAN STEEL LIMITED (SS Seamless Pipes only (Up to 4" ))
8 . P2216	CHETAN STEELS (Upto 6" SCH 40)
9 . P0158	CHOKSI TUBE COMPANY LTD.
10 . P2242	DIVINE TUBES PVT.LTD. (UPTO 8")
11 . P2077	HEAVY METAL & TUBES LIMITED (Upto 8" (thickness upto 18.26 mm))
12 . P2198	HEAVY METAL PIPE CENTRE (Upto 8" ( Upto SCH80S) (PDIL approved Manufacturer's Make only))
13 . P2121	JAY LAKSHMI STEEL & ENGINEERING CO.
14 . P2133	JINDAL SAW LIMITED
15 . P2286	JINDAL SAW LIMITED (Seamless-33.4 to 88.9 mm, 1.65 to 11.13 mm, A312 TP304/L/H, 316/L/H & Welded- 273.0 to 1828 mm, 3.00 to 19.05 mm, A358 TP304/L/H, 316/L/H)
16 . P2288	KRYSTAL GLOBAL ENGINEERING LIMITED (Upto 12" -Seamless Pipes)

## 120105 : SS SEAMLESS/WELDED PIPES

CODE	NAME
17 . P2167	KRYSTAL STEEL MANUFACTURING PVT. LTD. (Upto 2" (Material upto Grade SS 321))
18 . P2264	KWALITY TUBES (All sizes and grades from PDIL enlisted pipes mill/manufacturer)
19 . P2084	MARDALE PIPES PLUS LTD
20 . P2168	MODERN TUBE INDUSTRIES LIMITED (Upto 2" (Upto SS Grade 321))
21 . P2276	MOKSHI INDUSTRIES PVT. LTD. (All sizes and grades from PDIL enlisted pipes mills/manufacturer)
22 . P0593	NUCLEAR FUEL COMPLEX
23 . P2040	P.K.FORGE & FITTING INDUSTRIES
24 . P2089	PRAKASH STEELAGE LIMITED (Seamless : Upto 12" & Welded: Upto 24")
25 . P2182	QUALITY STAINLESS PVT. LTD. ( Seamless: Upto 6" (SCH40S ), Welded: Upto 20" (SCH40S) (Upto SS Grade 316L))
26 . P2138	RATNADEEP METAL & TUBES PVT. LTD. (Seamless <=168.3mm.OD. Welded <=50.8mm OD)
27 . P0661	RATNAMANI METALS & TUBES LIMITED
28 . P2287	REMI EDELSTAHL TUBULARS LIMITED (Up to 48" for Welded pipes & Up to 8" for Seamless)
29 . P2268	S PLUS TUBE TECH (Upto 5" Seamless, SCH40S, A312 TP304L/316L, Upto 6" Welded, SCH40S, A312 TP304L/316L)
30 . P2206	SANDVIK ASIA PVT. LTD. (¾" to 2" (Thk: upto 8.74 mm))
31 . P2110	SANGHVI METALS (TRADER)
32 . P2169	SCORODITE STAINLESS (INDIA) PVT. LTD. (Seamless upto 16" NB, Welding upto 36")
33 . P2246	SHALCO INDUSTRIES PRIVATE LIMITED (SS Seamless Pipes - Up to 8", SS Welded Pipe - Up to 4")



## 120105 : SS SEAMLESS/WELDED PIPES

CODE	NAME
34 . P2250	SHRIPAL METAL LIMITED (SS Seamless/Welded Pipes All sizes from PDIL enlisted pipe mills/manufacturer)
35 . P2157	SHUBHLAXMI METALS & TUBES PVT. LTD. (SS Seamless ¾" NB to 2" NB; Thk: 1.2 mm to 8 mm, L upto 14 mtr; SS Welded ¾" NB to 8" NB; Thk: 1.2 mm to 8 mm Lupto 14 mtr (Material: SS 304, SS 304L, SS316, SS 316L, SS 321, SS 347, SS 347H))
36 . P2275	SHUBHLAXMI METALS AND TUBES PRIVATE LIMITED (1. PIPE-SS(SEAMLESS), UPTO 12", SCH40S, A312 GR. 304/304L/316/316L 2. PIPE-SS(SEAMLESS), UPTO 16", SCH40S, A312/A358 TP304/304L//316/316L)
37 . P2270	SUNCITY SHEETS PVT. LTD. (Upto 12" Welded, SCH 40S, A312 TP304L/316L)
38 . P2154	SURAJ LIMITED (SURAJ STAINLESS LIMITED)
39 . P2123	THE BENGAL MILL STORES SUPPLY CO.(TRADER)
40 . P2291	VENUS PIPES AND TUBES LIMITED ( SS Seamless Pipes Up to 16" & SS Welded Pipes Up to 54")
41 . P1205	Venus Pipes & Tubes Private Limited (Up to 16")
42 . P2244	WELSPUN SPECIALITY SOLUTIONS LIMITED (Upto 4" (only for Seamless Pipes))
<b>THE NETHERLANDS</b>	
43 . P2202	SOSTA BV (Upto 72" ( thickness upto 25.4 mm))
<b>CHINA</b>	
44 . P2131	ZHEJIANG JIULI STAINLESS STEEL PIPE CO. LTD.
<b>FRANCE</b>	
45 . P0834	ETS TROUVAY & CAUVIN
46 . P0629	PHOCEENNE
<b>GERMANY</b>	
47 . P0477	HORST KURVERS GmbH
48 . P0509	MANNESMANN HANDEL AG

## 120105 : SS SEAMLESS/WELDED PIPES

CODE	NAME
49 . P0813	THYSSEN-KRUPP STAHLUNION GmbH
<b>ITALY</b>	
50 . P0191	DALMINE SPA
51 . P2119	GAM RACCORDI S.P.A (thickness 2" to 24")
52 . P0175	IBF SEAMLESS PIPES Spa
53 . P2092	RACCORTUBI SRL
<b>JAPAN</b>	
54 . P0517	MARUBENI ITOCHU STEEL
55 . P0539	MITSUBISHI CORPORATION
56 . P0585	NIPPON STEEL CORPORATION
57 . P0587	NISHITANI & CO. LTD.
58 . P0588	NISSHO IWAI CORPORATION
59 . P0601	OKURA & CO. LTD.
60 . P0575	SOJITZ CORPORATION
61 . P0770	SUMITOMO METAL INDUSTRIES LTD.
<b>KOREA</b>	
62 . P0370	HYUNDAI CORPORATION
<b>SPAIN</b>	
63 . P2151	T.T.I. - TUBACEX TUBOS INOXIDABLES, S.A. (Upto 10")
<b>SWEDEN</b>	

## 120105 : SS SEAMLESS/WELDED PIPES

CODE	NAME
64 . P0004	AB SANDVIK STEEL
<b>U.K.</b>	
65 . P2064	BRITISH STEEL CORPORATION
66 . P0129	CORUS TUBES LIMITED
67 . P0870	VOMAL INTERNATIONAL LIMITED

## 120106 : SS SEAMLESS TUBES

CODE	NAME
<b>INDIA</b>	
1 . P2055	ANIL METAL CORPORATION
2 . P2183	APEX TUBES PVT. LIMITED (Upto 50.8 mm OD (Thickness Upto 4.00 mm))
3 . P2258	ASR MET TECH PRIVATE LIMITED (Item-SS(Seamless), Size101.60 mm Thk/Sch -Up to 4 mm, Specification/Grade - A213 Gr. 304/304L/316/316L/316TI/321)
4 . P2181	BHANDARI FOILS & TUBES LIMITED (Upto 50 mm OD)
5 . P2253	BHARAT ENTERPRISES (All sizes from PDIL enlisted pipe mills/manufacturer)
6 . P2274	BMS INTERNATIONAL (BOMBAY) LLP (All Sizes & grades from PDIL enlisted pipe mills/manufacturer)
7 . P2289	CHANDAN STEEL LIMITED (Up to 125 MM O.D.)
8 . P2242	DIVINE TUBES PVT.LTD. (UPTO 3")
9 . P2077	HEAVY METAL & TUBES LIMITED (Upto 8" (thickness upto 18.26 mm))
10 . P2288	KRYSTAL GLOBAL ENGINEERING LIMITED (Upto 51 MM OD)
11 . P2167	KRYSTAL STEEL MANUFACTURING PVT. LTD. (Upto 50.8 OD (Material upto Grade SS 321))
12 . P2264	KWALITY TUBES (All sizes and grades from PDIL enlisted pipes mill/manufacturer)
13 . P2168	MODERN TUBE INDUSTRIES LIMITED (Upto 50.80 OD (Upto SS Grade 321))
14 . P2089	PRAKASH STEELAGE LIMITED (114.3 mm OD Thickness upto 6 mm)
15 . P0661	RATNAMANI METALS & TUBES LIMITED
16 . P2268	S PLUS TUBE TECH (Upto 50.8mm OD x 2.11 mm THK SA213 TP304L/316L/321, Upto 76.02 mm OD x 3.18 mm THK SA269 TP304L/316L)
17 . P2206	SANDVIK ASIA PVT. LTD. (OD upto 60.33 (Thk: upto 8.74 mm))

## 120106 : SS SEAMLESS TUBES

CODE	NAME
18 . P2169	SCORODITE STAINLESS (INDIA) PVT. LTD. (19.05 mm OD to 50.80 mm OD, Thickness upto 3 mm)
19 . P2246	SHALCO INDUSTRIES PRIVATE LIMITED (Upto 76.2 mm OD)
20 . P2250	SHRIPAL METAL LIMITED (SS Seamless Tubes All sizes from PDIL enlisted pipe mills/manufacturer)
21 . P2275	SHUBHLAXMI METALS AND TUBES PRIVATE LIMITED (1. TUBE-SS(SEAMLESS), 42.04MM, UPTO 1.6MM, A213 GR. 304/304L/316/316L 2. TUBE-SS(SEAMLESS), 25.4MM, UPTO 2MM, A213 GR. 304/304L/316/316L)
22 . P2154	SURAJ LIMITED (SURAJ STAINLESS LIMITED)
23 . P2291	VENUS PIPES AND TUBES LIMITED (Up to 76.20 MM OD)
24 . P1205	Venus Pipes & Tubes Private Limited (Up to 50.8 mm OD)
25 . P2244	WELSPUN SPECIALITY SOLUTIONS LIMITED (Upto 114.3 MM OD)
<b>SPAIN</b>	
26 . P2151	T.T.I. - TUBACEX TUBOS INOXIDABLES, S.A. (Upto 250.0 mm OD)

## 120107 : SS PIPES UREA GRADE

CODE	NAME
<b>INDIA</b>	
1 . P2274	BMS INTERNATIONAL (BOMBAY) LLP (All Sizes & grades from PDIL enlisted pipe mills/manufacturer)
2 . P2239	KEY-TECH ENGINEERING COMPNAY (Upto 8")
<b>AUSTRIA</b>	
3 . P0120	BHDT GMBH
4 . P0708	SCHOELLER-BLECKMANN NITEC GMBH
<b>FRANCE</b>	
5 . P0834	ETS TROUVAY & CAUVIN
6 . P0629	PHOCEENNE
<b>GERMANY</b>	
7 . P0477	HORST KURVERS GmbH
8 . P0509	MANNESMANN HANDEL AG
9 . P0813	THYSSEN-KRUPP STAHLUNION GmbH
<b>ITALY</b>	
10 . P0191	DALMINE SPA
11 . P0175	IBF SEAMLESS PIPES Spa
<b>JAPAN</b>	
12 . P0517	MARUBENI ITOCHU STEEL
13 . P0539	MITSUBISHI CORPORATION
14 . P0585	NIPPON STEEL CORPORATION

## 120107 : SS PIPES UREA GRADE

CODE	NAME
15 . P0587	NISHITANI & CO. LTD.
16 . P0588	NISSHO IWAI CORPORATION
17 . P0601	OKURA & CO. LTD.
18 . P0575	SOJITZ CORPORATION
19 . P0770	SUMITOMO METAL INDUSTRIES LTD.
<b>KOREA</b>	
20 . P0370	HYUNDAI CORPORATION
<b>SPAIN</b>	
21 . P2151	T.T.I. - TUBACEX TUBOS INOXIDABLES, S.A. (Upto 10")
<b>SWEDEN</b>	
22 . P0004	AB SANDVIK STEEL
<b>U.K.</b>	
23 . P2064	BRITISH STEEL CORPORATION
24 . P0129	CORUS TUBES LIMITED
25 . P0870	VOMAL INTERNATIONAL LIMITED

## 120110 : HDPE/ MDPE PIPES & PIPE FITTINGS

CODE	NAME
<b>INDIA</b>	
1 . P2057	ASTRAL
2 . P2059	AUQUAGUARD PLASTICS & POLYMERS
3 . P2066	CLIMAX SYNTHETICS
4 . P2071	FIBRO PLASTICHEM (I) PVT. LTD.
5 . P2085	NATIONAL ORG CHEMICAL INDIA LTD.
6 . P2207	PARTH POLY VALVES PVT. LTD. ( $\frac{3}{4}$ " to 8" (150#))
7 . P2001	PENNWALT AGRU PLASTICS LTD. (upto 250mm Dia)
8 . P2094	RELIANCE INDUSTRIES 'RELPIPE'
9 . P1203	SANGIR PLASTICS PRIVATE LIMITED (UPTO 1200 MM OD)
10 . P1039	SONAL ENGG. PLASTIC FABRICATOR



## 120111 : SS WELDED TUBES

CODE	NAME
<b>INDIA</b>	
1 . P2183	APEX TUBES PVT. LIMITED (Upto 102 mm OD (Thickness Upto 4.00 mm))
2 . P2274	BMS INTERNATIONAL (BOMBAY) LLP (All Sizes & grades from PDIL enlisted pipe mills/manufacturur)
3 . P2242	DIVINE TUBES PVT.LTD. (UPTO 4")
4 . P2167	KRYSTAL STEEL MANUFACTURING PVT. LTD. (Upto 50.8 OD (Material upto Grade SS 321))
5 . P3418	MAXIM TUBES COMPANY PVT. LTD. (6 mm to 114.3 mm (0.5 mm to 4.5 mm thk.))
6 . P2168	MODERN TUBE INDUSTRIES LIMITED (Upto 50.80 OD (Upto SS Grade 321))
7 . P2089	PRAKASH STEELAGE LIMITED (114.3 mm OD thickness upto 6 mm)
8 . P2182	QUALITY STAINLESS PVT. LTD. ( Upto 4"OD (Upto 4.0 mm Thick) (Upto SS Grade 316L))
9 . P2287	REMI EDELSTAHL TUBULARS LIMITED ( Up to 50.8 mm O.D.)
10 . P2268	S PLUS TUBE TECH (Upto 19.05 mm OD x 0.711 mm THK SA249 TP304)
11 . P2235	SCODA TUBES LTD. (9.52 mm OD to 50.8 mm OD)
12 . P2169	SCORODITE STAINLESS (INDIA) PVT. LTD. (19.05 mm OD to 50.80 mm OD, Thickness upto 3 mm)
13 . P2275	SHUBHLAXMI METALS AND TUBES PRIVATE LIMITED (1. TUBE-SS(WELDED), UPTO 19.05MM, UPTO 1.2MM, SA249 TP 304/304L/316/316L & 2. TUBE-SS(WELDED), UPTO 38.01MM, UPTO 1.6MM, SA270 TP 304/304L/316/316L)
14 . P2240	STEAMLINE INDUSTRIES LTD. (6.00 mm OD to 50.8 mm OD)
15 . P2270	SUNCITY SHEETS PVT. LTD. (12.7mm to 127mm OD x 0.7mm to 4mmTHK SA249 TP 304/316L)
16 . P2230	SUNRISE STAINLESS PVT.LTD. (Upto 4" OD, thickness upto 6 mm.)
17 . P2154	SURAJ LIMITED (SURAJ STAINLESS LIMITED)

**120111 : SS WELDED TUBES**

<b>CODE</b>	<b>NAME</b>
18 . P2291	VENUS PIPES AND TUBES LIMITED (Up to 102 MM OD)
19 . P1205	Venus Pipes & Tubes Private Limited (Up to 73.1 mm OD)
20 . P2244	WELSPUN SPECIALITY SOLUTIONS LIMITED (Upto 50.8 MM OD)

## 120113 : FITTINGS: CS/AS/SS SEAMLESS & FORGED

CODE	NAME
<b>INDIA</b>	
1 . P2120	AMFORGE INDUSTRIES (Upto 24")
2 . P2055	ANIL METAL CORPORATION
3 . P2216	CHETAN STEELS (Upto 6" SCH 80)
4 . P0166	COMMERCIAL SUPPLYING AGENCY
5 . P2195	CSA FITTINGS (Forged: ½" to 2" (Upto 9000#) & Seamless: 2" to 8" (Upto SCH XXS))
6 . P0221	EBY FASTNERS
7 . P0222	EBY INDUSTRIES
8 . P2150	FIT-TECH INDUSTRIES ( Upto 24")
9 . P2159	FLASH FORGE(P) LTD. (Forged: Upto 4" (Upto 9000#) & Seamless: Upto 42")
10 . P2002	GUJARAT INFRAPIPES PVT. LTD.
11 . P2121	JAY LAKSHMI STEEL & ENGINEERING CO.
12 . P2111	KALPESH TUBE(INDIA), (TRADER) (upto a max order value Rs.25.0 lakh)
13 . P2266	KISAAN STEELS PRIVATE LIMITED (1. UPTO 6" CS SMLS FITTINGS, 2. UPTO 2" CS/AS/SS FORGED FITTINGS)
14 . P0553	M.S.FITTINGS MANUFACTURING CO.PVT.LTD.
15 . P2084	MARDALE PIPES PLUS LTD
16 . P2269	N J ENGINEERS (½" TO 24"-SCH 40/80/100/160 SEAMLESS FITTINGS & ½" TO 4" 3000#, 6000#, 9000# ELBOW, TEE, CAP, COUPLING, CROSS, WELDOLET, SOCKOLET)
17 . P2162	NAVKAR FORGINGS & FITTINGS PVT. LTD. (Forged: 3" (Upto 6000#) & Seamless: Upto 16" (Sch XXS))

## 120113 : FITTINGS: CS/AS/SS SEAMLESS & FORGED

CODE	NAME
18 . P2251	NEOSEAL ENGINEERING PRIVATE LIMITED (1. I. Fittings(Forged), CS, Up To 1.5", ANSI Class -Up To 3000#, 2. Fittings(SMLS), CS, Up To 10", SCH -Up To 40, 3. Fittings(SMLS), AS, Up To 6", SCH -Up To 40, 4. Fittings(SMLS), SS, Up To 8", SCH -Up To
19 . P2003	NL HAZRA (up to SCH 80)
20 . P2215	P K TUBES & FITTINGS PVT. LTD. (Forged upto 1 ½" & Seamless upto 24" (SCH 160))
21 . P2040	P.K.FORGE & FITTING INDUSTRIES
22 . P2199	PARAS FITTINGS PVT. LTD. (Forged CS: ½" to 2" & CS Seamless: 2" to 8" (Upto Sch XXS))
23 . P2156	PARMAR TECHNO FORGE (Elbow-1/2" to 12", Tees-1/2" to 8", Reducer (conc. & eccn.)-1/2" to 12", CAPS-1/2" to 18" (CS&SS))
24 . P2088	PERFECT MARKETING (P) LTD,
25 . P2187	PETROCHEM INDUSTRIES (Seamless: upto 16" (all Fittings) & upto 36" (Only Caps) Sch : XXS / 80S, Forged : Upto 3" 6000#)
26 . P2210	RAJENDRA FORGE INDUSTRIES (CS: Upto 12" Sch 40 & SS: 6" Sch 40S)
27 . P0733	S & G ENGINEERS (P) LTD.
28 . P2116	SAGAR STEEL CORPORATION (TRADER)
29 . P2110	SANGHVI METALS (TRADER)
30 . P2280	SARDA PIPES & FITTINGS PVT. LTD. (1. Upto 18"/12"/4" for CS/AS/SS Seamless Fittings 2. Upto 2" 3000# for CS Forged Fittings)
31 . P2004	SAWAN ENGINEERS PVT. LIMITED ( Upto 36" (SCH 160))
32 . P0728	SHIVANANDA PIPE FITTINGS LTD.,
33 . P2272	SKY FORGE PRIVATE LIMITED (1/2" to 24" SMLS & 1/2" to 3" Forged)
34 . P0758	STEWARTS AND LLOYDS OF INDIA LIMITED

## 120113 : FITTINGS: CS/AS/SS SEAMLESS & FORGED

CODE	NAME
35 . P0793	TEEKAY TUBES PRIVATE LIMITED
36 . P2123	THE BENGAL MILL STORES SUPPLY CO.(TRADER)
37 . P2165	TOPAZ PIPING INDUSTRIES (2" to 36" (Sch 10 to Sch 160))
38 . P2006	TUBE BEND (CALCUTTA) PVT LTD (CS FITTINGS ONLY)
39 . P0835	TUBE PRODUCTS INCORPORATE
40 . P2261	UNITED FORGE INDUSTRIES (1. Upto 24" SCH 40 for CS SMLS Fittings, 2. Upto 10" SCH 10S for SS SMLS Fittings & 3. Upto 1.5" 3000# CS/SS Forged Flanges)
41 . P2135	ZOLOTO INDUSTRIES (15mm to 150mm (only CS-Galv.))
<b>ITALY</b>	
42 . P2188	PETROL RACCORD S.P.A. (Seamless: 1" - 42" (Elbows) & 1" - 56" (Tees/ Reducers/Caps))
<b>FRANCE</b>	
43 . P0834	ETS TROUVAY & CAUVIN
44 . P0629	PHOCEENNE
45 . P0853	VALLOUREC
<b>GERMANY</b>	
46 . P0477	HORST KURVERS GmbH
47 . P0509	MANNESMANN HANDEL AG
48 . P0712	SEIKMANN ANLAGEN-TECHNIK GMPH.
49 . P0822	TPS-TECHNITUBE ROHRENWERKE GMBH

### **ITALY**

## 120113 : FITTINGS: CS/AS/SS SEAMLESS & FORGED

CODE	NAME
50 . P0191	DALMINE SPA
51 . P2119	GAM RACCORDI S.P.A
52 . P0175	IBF SEAMLESS PIPES Spa
53 . P0377	IND MECCANICA BASSI LUIGI & C. SPA
54 . P2083	MANTOVANI SpA
55 . P2092	RACCORTUBI SRL
56 . P0789	TECHNO FORGE SPA
<b>JAPAN</b>	
57 . P0517	MARUBENI ITOCHU STEEL
58 . P0583	NIPPON KOKAN
59 . P0587	NISHITANI & CO. LTD.
60 . P0588	NISSHO IWAI CORPORATION
61 . P0601	OKURA & CO. LTD.
62 . P0575	SOJITZ CORPORATION
63 . P0770	SUMITOMO METAL INDUSTRIES LTD.
<b>TAIWAN</b>	
64 . P2007	HAITIMA CORPORATION
<b>U.K.</b>	
65 . P2064	BRITISH STEEL CORPORATION

**120113 : FITTINGS: CS/AS/SS SEAMLESS & FORGED**

<b>CODE</b>	<b>NAME</b>
66 . P0129	CORUS TUBES LIMITED
67 . P0245	EUROTUBE LIMITED
68 . P0870	VOMAL INTERNATIONAL LIMITED
<b>U.S.A.</b>	
69 . P2063	BONNEY FORGE

## 120114 : FITTINGS: SS UREA GRADE

CODE	NAME
<b>INDIA</b>	
1 . P2239	KEY-TECH ENGINEERING COMPNAY (Upto 8")
<b>ITALY</b>	
2 . P2188	PETROL RACCORD S.P.A. (Size upto 14")
<b>AUSTRIA</b>	
3 . P0120	BHDT GMBH
<b>FRANCE</b>	
4 . P0834	ETS TROUVAY & CAUVIN
5 . P0629	PHOCEENNE
6 . P0853	VALLOUREC
<b>GERMANY</b>	
7 . P0477	HORST KURVERS GmbH
8 . P0509	MANNESMANN HANDEL AG
9 . P0712	SEIKMANN ANLAGEN-TECHNIK GMPH.
10 . P0822	TPS-TECHNITUBE ROHRENWERKE GMBH
<b>ITALY</b>	
11 . P0191	DALMINE SPA
12 . P0175	IBF SEAMLESS PIPES Spa
13 . P0377	IND MECCANICA BASSI LUIGI & C. SPA
14 . P2092	RACCORTUBI SRL



## 120114 : FITTINGS: SS UREA GRADE

CODE	NAME
15 . P0789	TECHNO FORGE SPA
<b>JAPAN</b>	
16 . P0517	MARUBENI ITOCHU STEEL
17 . P0583	NIPPON KOKAN
18 . P0587	NISHITANI & CO. LTD.
19 . P0588	NISSHO IWAI CORPORATION
20 . P0601	OKURA & CO. LTD.
21 . P0575	SOJITZ CORPORATION
22 . P0770	SUMITOMO METAL INDUSTRIES LTD.
<b>SWEDEN</b>	
23 . P0080	AVESTA CANDVITE TUBE AD
24 . P0343	HELENS ENERGY
<b>U.K.</b>	
25 . P2064	BRITISH STEEL CORPORATION
26 . P0129	CORUS TUBES LIMITED
27 . P0245	EUROTUBE LIMITED
28 . P0870	VOMAL INTERNATIONAL LIMITED

## 120115 : FRP/PVC PIPE AND PIPE FITTINGS

CODE	NAME
<b>INDIA</b>	
1 . P2278	ASHIRVAD PIPES PRIVATE LIMITED (Up to 8" SCH 80)
2 . P2058	ASTRAL POLYTECHNIK PVT. LTD. ( 1/2" TO 12" SIZE)
3 . P0290	GANDHI AND ASSOCIATES
4 . P2255	SATYAM COMPOSITES PVT. LTD. (Uo to 1800mm OD)
5 . P1039	SONAL ENGG. PLASTIC FABRICATOR

## 120116 : CAST IRON FITTINGS & PIPES

CODE	NAME
<b>INDIA</b>	
1 . P0182	CRAWLEY & RAY (F&E) PVT. LTD.
2 . P0374	IISCO LTD.
3 . P0445	KESORAM SPUN PIPES & FOUNDRIES
4 . P0704	SAYAJI IRON & ENGG.CO(P)LIMITED
5 . P0719	SHAKTI CAST (P)LIMITED
6 . P0720	SHALIMAR WORKS LTD
7 . P0727	SHIVA ENGINEERING WORKS
8 . P0866	VISVESARAYA IRON & STEEL LTD.

## 120117 : FORGED FLANGES

CODE	NAME
<b>INDIA</b>	
1 . P2053	AJAY FORGINGS PVT. LTD.
2 . P2120	AMFORGE INDUSTRIES (Upto 24" for upto 1500#; Upto 12" for 2500#)
3 . P0048	ANANDMAYEE FORGINGS PVT. LTD.
4 . P0141	C D ENGINEERING
5 . P2233	CHANDAN STEEL LIMITED (Only SS Flanges: Upto 36" - 150#, upto 24" - 300#, upto 20" - 600#, upto 16" - 900#, upto 12" - 1500#, upto 8" - 2500#)
6 . P2216	CHETAN STEELS (Upto 6" (150#))
7 . P0152	CHW FORGE PRIVATE LIMITED (FORMERLY CHAUDHARY HAMMER WORKS)
8 . P0223	ECHJAY INDUSTRIES LIMITED
9 . P0255	FERROUS ALLOYS FORGINING PVT.LTD.,
10 . P0314	GOLDEN IRON & STEEL WORKS
11 . P2194	GOODLUCK ENGINEERING CO. (½"-12" (Upto 2500#), 14"-16" (Upto 900#), 18"-32" (Upto 600#), 34"-48" (Upto 300#))
12 . P0417	J K FORGINGS (1/2" to 60",ANSI B16.5,Class 150 to 2500)
13 . P2266	KISAAN STEELS PRIVATE LIMITED (1. UPTO 64" 150# CS, 2. UPTO 54" 300# CS, 3. UPTO 38" 600# CS, 4. UPTO 42" 300# AS/SS, 5. UPTO 20" 600# AS/SS & 6. UPTO 12" 2500# CS/AS/SS)
14 . P2160	KUNJ FORGINGS PVT. LTD. (Upto 60"(upto 300#) & Upto 12"(upto 2500#))
15 . P2175	MAHESH INDUSTRIES (½" to 8" NB, Rating: 150#- SWRF, SORF & BLRF Material: ASTM A105 only; 2" NB to 4" NB, Rating: 150#- Weld Neck RF Flange Material: ASTM A105 only)
16 . P2223	METAL FORGINGS PVT. LTD. (Upto 86" (150#); 60" (300# to 600#); 48" (900#); 24" (1500#); 12" (2500#))
17 . P2269	N J ENGINEERS (½" TO 24" -150#, 300#, 600#, 900#, 1500# & ABOVE 24" TO 56"-150#,300#)

## 120117 : FORGED FLANGES

CODE	NAME
18 . P2251	NEOSEAL ENGINEERING PRIVATE LIMITED (1. Flange (Blind/WN), CS, Up To 36", ANSI Class -Up To 150#, 2. Flange (Blind/WN), CS, Up To 24", ANSI Class -Up To 2500#, 3. Flange (Blind/WN), AS, Up To 24", ANSI Class -Up To 1500#, 4. Flange (Blind/WN), SS,
19 . P2215	P K TUBES & FITTINGS PVT. LTD. (Upto 24" (upto 1500#) & upto 12" (upto 2500#) (Spectacle Blinds and Spacer & Blind only).)
20 . P2214	PARAMOUNT FORGE (CS, AS & SS: ½" to 42" (Upto 600#), ½" to 24" (Upto 900#), ½" to 16" (Upto 1500#), ½" to 12" ( Upto 2500#))
21 . P2088	PERFECT MARKETING (P) LTD,
22 . P2008	PUNJAB STEEL
23 . P2155	R.D. FORGE (A UNIT OF R D CHEMICALS PVT LTD) ( ½" to 54" - 150#, ½" to 40" - 300#, ½" to 42" - 600#, ½" to 20" - 900#, ½" to 20" - 1500#, ½" to 12" - 2500# (CS, AS & SS))
24 . P2210	RAJENDRA FORGE INDUSTRIES (CS & SS : Upto 12", 300#)
25 . P0733	S & G ENGINEERS (P) LTD.
26 . P2005	SANGHVI FORGINGS & ENGINEERING LTD. (Upto 42" (upto 300#), 36"(600#), 24"(upto1500#) & 12"(2500#))
27 . P2110	SANGHVI METALS (TRADER)
28 . P2280	SARDA PIPES & FITTINGS PVT. LTD. (1. Upto 16"/14" for CS/AS 300 # for Forged Flanges)
29 . P2004	SAWAN ENGINEERS PVT. LIMITED
30 . P2272	SKY FORGE PRIVATE LIMITED (1/2" to 20")
31 . P2185	TECHNO FORGE LTD. (Upto 42" (upto 300#), upto 24" (600#), upto 20" (900#), upto 16" (1500#), upto 12" (2500#))
32 . P2006	TUBE BEND (CALCUTTA) PVT LTD
33 . P2261	UNITED FORGE INDUSTRIES (Upto 30" 600# CS Forged Flanges)

### FRANCE

34 . P0834 ETS TROUVAY & CAUVIN

## 120117 : FORGED FLANGES

CODE	NAME
35 . P0629	PHOCEENNE

### **GERMANY**

36 . P0477      HORST KURVERS GmbH

### **ITALY**

37 . P0414      I.S. INTERNATIONAL

38 . P2083      MANTOVANI SpA

39 . P0599      OFFICINE NICOLA GALPERTI & FIGLIO S.P.A

40 . P2092      RACCORTUBI SRL

### **JAPAN**

41 . P0576      NICHINAN SANGYO CO. LTD.,

42 . P0587      NISHITANI & CO. LTD.

43 . P0575      SOJITZ CORPORATION

### **U.K.**

44 . P0870      VOMAL INTERNATIONAL LIMITED

## 120118 : PLATE RING FLANGES

CODE	NAME
<b>INDIA</b>	
1 . P2070	FABWELL ENGINEERS
2 . P2175	MAHESH INDUSTRIES (½" to 16" NB, Rating: 150# & 300#- SWRF, SORF & BLRF, Material: MS Plate Flanges of IS 2062 Grade)
3 . P1012	MOD FABRICATORS
4 . P2269	N J ENGINEERS (Upto 42")
5 . P2215	P K TUBES & FITTINGS PVT. LTD. (Upto 48" (Spectacle Blinds and Spacer & Blind only).)
6 . P2214	PARAMOUNT FORGE (CS & SS : ½" to 84")
7 . P2088	PERFECT MARKETING (P) LTD,
8 . P2011	R SQUARE ENGINEERS
9 . P2110	SANGHVI METALS (TRADER)
10 . P2272	SKY FORGE PRIVATE LIMITED (Upto 1385 MM)
11 . P2261	UNITED FORGE INDUSTRIES (Upto 36" 150# CS Plate Ring Flanges)

## 120119 : FITTINGS: CS/AS/SS WELDED

CODE	NAME
<b>KOREA</b>	
1 . P2238	TK CORPORATION
<b>INDIA</b>	
2 . P2227	PARAS ENGINEERING WORKS ( 8" to 36" NB, Sch 5 to Sch XXS (CS & SS))
3 . P2216	CHETAN STEELS (Upto 10" SCH 80)
4 . P2150	FIT-TECH INDUSTRIES (Upto 48")
5 . P2159	FLASH FORGE(P) LTD. (Upto 42")
6 . P2269	N J ENGINEERS (½" to 42" Welded)
7 . P2162	NAV KAR FORGINGS & FITTINGS PVT. LTD. (Upto 24" (Sch XXS, Material: CS only))
8 . P2251	NEOSEAL ENGINEERING PRIVATE LIMITED (1. Fittings(Welded), CS, Up To 14", SCH -Up To 40, 2. Fittings(Welded), SS, Up To 14", SCH -Up To 10S)
9 . P2215	P K TUBES & FITTINGS PVT. LTD. (Upto 48" (SCH 160))
10 . P2187	PETROCHEM INDUSTRIES (6" to 36" (all Fittings) & 6" to 56" (Only Conc. / Ecc. Reducers) Sch : XXS/ 80S)
11 . P2210	RAJENDRA FORGE INDUSTRIES (CS & SS : Upto 12", Sch 40)
12 . P2280	SARDA PIPES & FITTINGS PVT. LTD. (1. Upto 14"/4"/4" for CS/AS/SS Welded Fittings)
13 . P2004	SAWAN ENGINEERS PVT. LIMITED (Upto 52" (SCH 160))
14 . P2165	TOPAZ PIPING INDUSTRIES (8" to 48" (Sch 10 to Sch 160))
15 . P2261	UNITED FORGE INDUSTRIES (Upto 36" SCH 40 for CS Welded Fittings)
<b>ITALY</b>	
16 . P2188	PETROL RACCORD S.P.A. (4" - 56" (Tees/ Reducers/ Elbows))



## 120120 : PIPE COATINGS

CODE	NAME
<b>INDIA</b>	
1 . P2174	PRATIBHA INDUSTRIES LTD., (External Coating: 4" to 24" Pipe OD)
2 . P2153	WELSPUN GUJARAT STAHL ROHREN LIMITED (DAHEJ) (4" to 64" for external coating & 16" to 64" for internal coating.)

## 120121 : CPVC PIPE AND PIPE FITTINGS

CODE	NAME
<b>INDIA</b>	
1 . P2278	ASHIRVAD PIPES PRIVATE LIMITED (Up to 10" SCH 80)

## 120201 : STRAINERS (PERMANENT INCLUDING Y-TYPE)

CODE	NAME
<b>INDIA</b>	
1 . P2262	ACME FLUID SYSTEMS (Upto 24")
2 . P2117	CHEMTECH INDUSTRIAL VALVES PVT. LTD
3 . P2072	FLAIR STRAINERS & FILTERS (Size upto 42" (Rating upto 1500#))
4 . P2248	FLOTEK INDUSTRIES (Strainer (Y Type) CS, Upto 8", ANSI Class -Upto 2500 #)
5 . P2277	FLOWJET VALVES PVT. LTD. (Strainer, CS/SS, Upto 12", Upto 150#)
6 . P0318	GRAND PRIX ENGINEERING PVT. LTD. (upto 60" pipeline, upto ANSI 1500#)
7 . P0322	GREAVES LIMITED
8 . P0324	GUJARAT OTOFILT
9 . P2218	HAWA ENGINEERS LTD. (½" to 24" (150# / 300# / PN10 / PN40))
10 . P2010	KWIKFLO FILTERS PVT. LTD.
11 . P0487	LEADER VALVES LIMITED (size <= 12" - upto 300#)
12 . P1012	MOD FABRICATORS
13 . P0549	MULTITEX FILTRATION ENGINEERS LTD
14 . P1204	SAP Industries Limited (Up to 6")
15 . P2135	ZOLOTO INDUSTRIES (15mm to 100mm)
<b>CHINA</b>	
16 . P2173	BOTELI VALVE GROUP CO. LTD. (Y - Type only: 14" (150#) & 3" (300# & 600#))

## 120202 : STEAM TRAPS

CODE	NAME
<b>INDIA</b>	
1 . P0320	GREAVES LTD.
2 . P1012	MOD FABRICATORS (for Drip rings)
3 . P0624	PENNANT ENGINEERING PVT. LTD.
4 . P0865	VIRGO ENGINEERS LTD. (½" to 4" (Upto 600#) (CS/SS))
5 . P2103	YARWAY CORPORATION
6 . P2135	ZOLOTO INDUSTRIES (15mm to 25mm)
<b>GERMANY</b>	
7 . P0307	GESTRA AG
<b>U.S.A.</b>	
8 . P0059	ARMSTRONG INTERNATIONAL INC.
9 . P2086	OGONTZ CORPORATION
10 . P0889	TYCO INTERNATIONAL INC.,U.S.A.

## 120203 : SPRING SUPPORTS

CODE	NAME
<b>INDIA</b>	
1 . P1185	PIPE SUPPORTS CO. (UPTO 14 MT)
<b>INDIA</b>	
2 . P2256	BERGEN PIPE SUPPORTS INDIA PRIVATE LIMITED (Variable & Constant)
3 . P2265	CARPENTER & PATERSON INDIA PVT. LTD. (VARIABLE, CONSTANT)
4 . P2106	MYRICS PIPING SYSTEM PVT.LTD.
5 . P0550	PIPE SUPPORTS INDIA PVT. LTD.
6 . P0632	PIPING & ENERGY PRODUCTS (P) LTD.
7 . P0699	SARATHI ENGG. ENTERPRISES PVT. LTD.
8 . P0747	SPRING SUPPORTS MFG. CO.
<b>ITALY</b>	
9 . P0271	FLEXIDER S.P.A.

## 120204 : FLAME ARRESTORS

CODE	NAME
<b>INDIA</b>	
1 . P0027	AIROIL FLAREGAS (INDIA) PVT.LIMITED,
2 . P0237	EMFA INDUSTRIES,
3 . P2082	M.H. VALVES PVT. LTD. (1/2"-1.5":800#, 2"-6":600#)
4 . P2211	NIRMAL INDUSTRIAL CONTROLS PVT. LTD. (½" to 8", Rating : 150#)
5 . P0627	PETROL SERVICE INDIA PVT LTD,
<b>U.S.A.</b>	
6 . P0480	L & J TECHNOLOGIES

## 120205 : SPRAY NOZZLE ASSEMBLY

CODE	NAME
<b>INDIA</b>	
1 . P2229	CHEMTROLS SAMIL (INDIA) PVT. LTD.

## 120301 : GATE/GLOBE/CHECK VALVES CS/SS/AS < 900 Lbs

CODE	NAME
<b>INDIA</b>	
1 . P0003	A V VALVES LIMITED (Cast: Up to 42" (150#), 28" (300#), 24" (600#) & Forge:Upto 2" (800#))
2 . P2052	ADVANCE VALVES (2"- 80" (Upto 600#) (Dual Plate Check Valves only).)
3 . P0072	ASSOCIATED TOOLINGS (I) PVT. LTD. (½" to 2" (Rating upto : 800 #))
4 . P0077	AUDCO INDIA LIMITED(L&T VALVES DIVN.)
5 . P2136	AUTOCAP INDUSTRIES (1/2" to 2", 800 # (only CS & SS))
6 . P2060	BELL-O-SEAL VALVES PVT. LTD. (for zero leakage, hazardous fluids.)
7 . P0115	BHEL (VALVES DIVISION)
8 . P2146	BRIGHTCH VALVES AND CONTROLS PVT. LTD. (Upto 8" x 300# for CS, AS & SS Material)
9 . P2117	CHEMTECH INDUSTRIAL VALVES PVT. LTD
10 . P2229	CHEMTROLS SAMIL (INDIA) PVT. LTD. (Upto 12" - 150-# (Dual Plate Check Valves only))
11 . P2137	CRAWLEY & RAY (FOUNDERS & ENGINEERS) PVT. LTD ( <=300 # (only CS))
12 . P0194	DATRE CORPORATION LTD. (Upto 300#, 2-8 "(Gate),2-6"(Globe&Check))
13 . P0202	DEWRANCE MACNEILL & CO. LTD.
14 . P0224	ECONO VALVES PVT.LTD.
15 . P2118	EXPERT ENGINEERING ENTERPRISES (Forged: upto 2"- 800#; Gate & Globe Valve: upto12"- 150# & 300#; Check Valve: upto 32"- 150# & 300#)
16 . P0273	FLOCON SYSTEMS PVT. LTD. (CS upto 6" 150#)
17 . P2248	FLOTEK INDUSTRIES (1. Gate [CAST] -CS, Upto 30", ANSI Class -Upto 300 # 2. Gate [CAST]-AS/SS, Upto 16", ANSI Class -Upto 600 # 3. Globe [CAST] -CS,Upto 14", ANSI Class-Upto 600 # 4.Check [SWING] -CS/AS, Upto 12", Upto 600# 5.Check [DUAL



## 120301 : GATE/GLOBE/CHECK VALVES CS/SS/AS < 900 Lbs

CODE	NAME
18 . P2172	FLOVEL VALVES PVT. LTD. (Single Disc, Dual Plate & Nozzle Check Valves only: Upto 48" (150#) & 24" (upto 600#))
19 . P2277	FLOWJET VALVES PVT. LTD. (Gate [CAST], CS, Up to 36"- 300#, Gate/Globe/Check [CAST], CS/SS/AS, Up to 18"- 600# & Check [SWING], CS, Up to 30"- 150#, Gate/Globe/Check Valve, CS/SS/AS, Up to 2"- 800#)
20 . P2219	FLUIDTECH EQUIPMENT PVT. LTD. (Cast# (CS and SS): 2" to 12" 150# & 2" to 8" 300# and Forged (CS and SS) ½" to 2" (800#))
21 . P2114	FORWARD ALLOYS & CASTINGS (upto 14")
22 . P2254	G M VALVE PVT. LTD. (Item - FORGED, Material- CS/SS/AS, Size-2", ANSI Class - Upto 800 #)
23 . P2145	GURU INDUSTRIAL VALVES PVT. LTD. (Cast CS only: Upto 24"(150#), 20"(300#), 10"(600# & Forged: Upto 2" (800#))
24 . P2218	HAWA ENGINEERS LTD. (Gate Valve:Upto 40" (150#),Upto 26"(300#),Upto 24"(600#),Upto 2" (800#); Globe Valve:Upto 20"(150#),Upto 16" (300#),Upto 12"(600#),Upto 2"(800#); Check Valve:Upto 36" (150#),Upto 24"(300#),Upto 16"(600#),Upto 2" (800#) (Dual Plate:36" (150#
25 . P2013	HAWA VALVES INDIA PVT. LTD. (CS upto 6",150#)
26 . P0897	HI-TECH VALVES PVT. LTD. (CS,<=800# size 1/2"-2", <=300# for size 2"-6)
27 . P0404	INTERVALVE POONAWALLA LIMITED (Cast upto 24" (Upto 300#) & Upto 12" (600#), Forged: Upto 2" (800#))
28 . P2161	JC VALVES & CONTROLS INDIA PVT. LTD. (Cast: Upto 48" (150#), 24" (upto 600#) & Forged: Upto 2" (800#))
29 . P0451	KIRLOSKAR BROTHERS LIMITED (CS upto 12" size, 300#)
30 . P0473	KSB PUMPS LIMITED (VALVES DIVN)
31 . P1101	LARSEN & TOUBRO LIMITED (1/2" to 24")
32 . P0487	LEADER VALVES LIMITED (Casting<=20"- upto 600# & 30"-150#, Forging<=2"- upto 800#)
33 . P2082	M.H. VALVES PVT. LTD. (1/2" to 1 1/2" - 800#, 2"to 6"- 600#)
34 . P2147	MICON ENGINEERS (HUBLI) PVT. LTD. (Cast : Upto 12" (150# & 300#), 6" (600#) & Forged: Upto 2" (800#))

## 120301 : GATE/GLOBE/CHECK VALVES CS/SS/AS < 900 Lbs

CODE	NAME
35 . P0094	MICROFINISH VALVES PVT. LTD.
36 . P2243	NEOSEAL ENGINEERING PRIVATE LIMITED (Upto 24" rating upto 600#)
37 . P0590	NITON VALVE INDUSTRIES PVT. LTD. (Forging upto 800#, <= 1.5" size)
38 . P2279	NOVEL VALVES INDIA PVT. LTD. (1. Gate/Globe - CS/AS/SS, Up to 30" 300 # 2. Gate/Globe/Check - CS/AS/SS, Up to 6" 600 # & 3. check [dual plate] - CS/AS/SS , Up to 12" 300 #)
39 . P2164	NSSL LIMITED (Cast: Upto 80"(150#), 56"(Upto 600#) & Forged: Upto 2" (800#))
40 . P1207	NUTECH CONTROLS (Gate/Check Valve (CS) Up to 12", ANSI Class up to 300#, Globe valve (CS) Up to 10", ANSI Class up to 300#, Gate/Globe/Check Valve (SS/AS) Up to 8", ANSI Class up to 300# & Gate/Globe/check valve (CS/SS/AS) Up to 2", ANSI Class up to 300#)
41 . P2290	OCEAN VALVES MANUFACTURING COMPANY (Gate Valves: Class150, size upto30" NB, Class300, upto20" NB, Class600, upto14" NB Globe Valves: Class150, upto16" NB, Class300, upto12" NB, Class 600, upto8" NB Check Valves: Class150, upto24" NB,
42 . P2041	OSWAL INDUSTRIES LTD. (Upto 48" (150#), 32" (300#) & 24" (600#))
43 . P2096	S & M INDUSTRIAL VALVES LIMITED (CS Gate & Globe valves 2"- 24" <=300#)
44 . P2249	SAKHI ENGINEERS PVT. LTD. (1. CS/AS/SS, upto 16" , ANSI Class upto 150# 2.CS/AS/SS, upto 12", ANSI Class upto 300)
45 . P1204	SAP Industries Limited (Up to 14")
46 . P2204	SHALIMAR VALVES PVT. LTD. (Cast: Upto 24"(Upto 600#), Forged: ½" to 1½" (800#))
47 . P0731	SHREERAJ INDUSTRIES (CS upto 150#)
48 . P2097	STEEL STRONG VALVES (I) PVT. LTD (Upto 42")
49 . P1206	VALVE TECH INDUSTRIES (<900 LBS (UPTO 24" 600# FOR CS, UPTO 12" 300# FOR SS/AS))
50 . P2014	VENUS PUMP & ENGINEERING WORKS
51 . P2144	VIBA FLUID CONTROL ((1) Gate/Globe/Check Valves (Cast), CS/AS/SS, Size- Up to 14", and Up to 12", 600# (2) Gate/Globe/Check Valves (Forged), CS/SS, Size- Up to 1.5", 800#)

## 120301 : GATE/GLOBE/CHECK VALVES CS/SS/AS < 900 Lbs

CODE	NAME
52 . P0093	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Cast: Upto 36" (150#), 24" (300#), 12" (600#) & Forged: Upto 2"(800#))
53 . P2149	ZED VALVES CO. PVT. LTD. (Upto 14" (600#))
54 . P2135	ZOLOTO INDUSTRIES (40mm to 200mm (Only CS & SS))
<b>CANADA</b>	
55 . P0857	VELAN INC. (Size upto 48" (Rating upto 600#))
<b>CHINA</b>	
56 . P2173	BOTELI VALVE GROUP CO. LTD. (Cast: Upto 56" (150#), 36" (300#), 24" (600#) & Forged: Upto 2" (800#))
57 . P2080	Zhejiang Jiehua Valve Co.,Ltd .
<b>GERMANY</b>	
58 . P2016	PEMTO VALVE
<b>INDIA</b>	
59 . P2263	INTEGRAL PROCESS CONTROLS INDIA PVT. LTD. (1.Gate(cast),CS, Upto24", Upto150#, 2.Gate(cast), CS, Upto16", Upto600#, 3.Globe(cast), CS, Upto10", Upto300#, 4.Gate/Globe/Check Valve(cast), CS/SS, Upto8", Upto300#, 5.Check (Swing), CS, Upto18",
<b>ITALY</b>	
60 . P0150	CESARE BONETTI SPA (Cast: Upto 42" (Upto 300#), 24" (600#) & Forged: Upto 1 ½" (800#))
61 . P0253	FASANI S.P.A.
62 . P2179	FRIULCO SPA (Upto 48" (150#), 32" (Upto 600#))
63 . P0476	GTC ITALIA, S.R.L.
64 . P2083	MANTOVANI SpA
65 . P0603	OMB S.P.A.
66 . P0628	PETROL VALVES S.R.L

## 120301 : GATE/GLOBE/CHECK VALVES CS/SS/AS < 900 Lbs

CODE	NAME
<b>JAPAN</b>	
67 . P0520	MATSURA H. P MACHINE WORKS CO.LTD.,
68 . P0587	NISHITANI & CO. LTD.
69 . P0575	SOJITZ CORPORATION
<b>NETHERLAND</b>	
70 . P2093	REDPOINT ALLOYS BV
<b>SPAIN</b>	
71 . P0083	BABCOCK BORSIG ESPANA, S.A.
72 . P2201	POYAM VALVES, (AMPO S. COOP.) (Size upto 60"(Rating upto 800#))
73 . P2015	WALTHAN & WEIR
<b>U.A.E.</b>	
74 . P0764	SUFA LIMITED
<b>U.K.</b>	
75 . P0097	BEL VALVES
<b>UAE</b>	
76 . P2273	NEWAY VALVE (SUZHOU) CO., LTD. (Cast: upto 88" (150#), Upto 48" (300#), Upto 40" (600#), Forge: Upto 2" (800#))

## 120302 : GATE/GLOBE/CHECK VALVES CS/SS/AS >=900 Lbs

CODE	NAME
<b>INDIA</b>	
1 . P0003	A V VALVES LIMITED (Cast: Upto 24" (900# & 1500#), 8" (2500#) & Forge: Upto 2" (Upto 2500#))
2 . P2052	ADVANCE VALVES (2"- 36" (900#), 2" - 24" (1500#), 2" -12" (2500#) Dual Plate Check Valves only.)
3 . P0072	ASSOCIATED TOOLINGS (I) PVT. LTD. (½" to 2" (Rating: 900# & 1500#))
4 . P0077	AUDCO INDIA LIMITED(L&T VALVES DIVN.)
5 . P0115	BHEL (VALVES DIVISION)
6 . P2248	FLOTEK INDUSTRIES (1. Gate [CAST]-CS/AS, Upto 6", ANSI Class -Upto 2500 # 2.Globe [CAST]-CS/AS, Upto 4", ANSI Class -Upto 1500 # 3.Check [Swing]-CS/AS, Upto 10", ANSI Class -Upto 2500 # 4.GATE/GLOBE/CHECK VALVES [Forged]-CS/AS/SS, Upto 0.75", ANSI
7 . P2172	FLOVEL VALVES PVT. LTD. (Dual Plate Check Valves only: Upto 24" (900#))
8 . P2277	FLOWJET VALVES PVT. LTD. (Gate [CAST], CS/SS/AS, Up to 8"- 1500#, Gate/Globe/Check Valve , CS/SS/AS, Up to 2"- 2500# [FORGED])
9 . P2254	G M VALVE PVT. LTD. (Item -FORGED- CS/SS/AS, Size- Upto 2", ANSI Class- Upto 2500 #)
10 . P2218	HAWA ENGINEERS LTD. (Gate Valves: Upto 20" (900#), Upto 10" (1500# & 2500#); Globe Valves: Upto 8" (900# & 1500#), Upto 1" (2500#); Check Valves: Upto 10" (900# ), Upto 6" (1500#), Upto 1" (2500#))
11 . P0404	INTERVALVE POONAWALLA LIMITED (Forged: Upto 2" (1500#))
12 . P2161	JC VALVES & CONTROLS INDIA PVT. LTD. (Cast: Upto 12" (upto 1500#), 10" (2500#) & Forged: Upto 2" (2500#))
13 . P0473	KSB PUMPS LIMITED (VALVES DIVN)
14 . P1101	LARSEN & TOUBRO LIMITED (1/2" to 2")
15 . P0487	LEADER VALVES LIMITED (Casting <= 12" - upto 2500#, Forging <= 2" - upto 2500#)
16 . P0533	METROPOLITAN INDUSTRIES (size=200mm, ratings=2500 lb)
17 . P2147	MICON ENGINEERS (HUBLI) PVT. LTD. (Forged: Upto 2" (1500#))

## 120302 : GATE/GLOBE/CHECK VALVES CS/SS/AS >=900 Lbs

CODE	NAME
18 . P2243	NEOSEAL ENGINEERING PRIVATE LIMITED (Upto 24", rating upto 2500#)
19 . P2279	NOVEL VALVES INDIA PVT. LTD. (1. Gate/Globe - CS , Up to 10", 900 # 2. Gate/Globe - CS, Up to 3", 1500 # & 3. Check [SWING]- CS, Upto 8", 900 #)
20 . P2164	NSSL LIMITED (Cast: Upto 36" (900#), 24"(upto 2500#) & Forged: Upto 2"(upto 2500#))
21 . P1207	NUTECH CONTROLS (Gate/Globe/Check valve (CS/AS) Up to 2", ANSI Class up to 2500#)
22 . P2041	OSWAL INDUSTRIES LTD. (Upto 12" (900# & 1500#))
23 . P2249	SAKHI ENGINEERS PVT. LTD. (CS/AS/SS, upto 4" ANSI Class upto 1500#)
24 . P2204	SHALIMAR VALVES PVT. LTD. (Cast: Upto 20"(900#), Forged: ½" to 1 ½" (1500#))
25 . P1206	VALVE TECH INDUSTRIES (>=900 LBS (UPTO 8" 2500# FOR CS, UPTO 8" 1500# FOR SS/AS))
26 . P2285	VALVE TECH INDUSTRIES ((i) UP TO 24", 2500#, CS/AS/SS GATE/GLOBE (CAST) VALVE (ii) UP TO 28", 2500#, CS/AS/SS CHECK (CAST) VALVE (iii) UP TO 2", 2500#, SS GATE/GLOBE (FORGED) VALVE)
27 . P0093	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Cast: Upto 12" (Upto 2500#) & Forged: Upto 2"(1500#), 1"(2500#))
<b>CANADA</b>	
28 . P0857	VELAN INC. (Size upto 24" (Rating upto 2500#))
<b>CHINA</b>	
29 . P2173	BOTELI VALVE GROUP CO. LTD. (Cast: Upto 16" (upto 1500#) & 12" (2500#) & Forged: Upto 2" (1500# & 2500#))
30 . P2080	Zhejiang Jiehua Valve Co.,Ltd .
<b>INDIA</b>	
31 . P2263	INTEGRAL PROCESS CONTROLS INDIA PVT. LTD. (1. Gate(Cast), CS, Upto 16", Upto 900#, 2. Gate/Globe/Check Valve (Cast), CS/SS, Upto 4", Upto 1500#, 3. Gate/Globe/Check Valve (Cast), CS/SS, Upto 2", 800# to 2500#)
<b>ITALY</b>	
32 . P0103	BFE BONNEY FORGE VALVE LICENSEE

## 120302 : GATE/GLOBE/CHECK VALVES CS/SS/AS >=900 Lbs

CODE	NAME
33 . P0150	CESARE BONETTI SPA (Upto 24", (upto 2500#))
34 . P0253	FASANI S.P.A.
35 . P2179	FRIULCO SPA (Upto 32" (900#); 24" (1500#); 14" (2500#))
36 . P0476	GTC ITALIA, S.R.L.
37 . P0603	OMB S.P.A.
38 . P0628	PETROL VALVES S.R.L
39 . P2100	VALVITALIA SpA
<b>JAPAN</b>	
40 . P0520	MATSURA H. P MACHINE WORKS CO.LTD.,
41 . P0587	NISHITANI & CO. LTD.
<b>SPAIN</b>	
42 . P0083	BABCOCK BORSIG ESPANA, S.A.
43 . P2201	POYAM VALVES, (AMPO S. COOP.) (Size upto 30" (Rating upto 2500#))
<b>U.A.E.</b>	
44 . P0764	SUFA LIMITED
<b>U.K.</b>	
45 . P0097	BEL VALVES
<b>UAE</b>	
46 . P2273	NEWAY VALVE (SUZHOU) CO., LTD. (Cast: upto 24" (900# & 1500#), Upto 16" (2500#) & Forged Upto 2" (2500#))

## 120303 : BALL VALVES (SOFT SEATED)

CODE	NAME
<b>INDIA</b>	
1 . P0003	A V VALVES LIMITED (Up to 12" (Upto 600#))
2 . P2176	AIRA EURO AUTOMATION PVT. LTD. (Upto 6", Rating: 150# & 300#)
3 . P2056	AQUA VALVES PVT.LTD
4 . P2146	BRIGHTCH VALVES AND CONTROLS PVT. LTD. (4" x 150# for CS, AS & SS Material)
5 . P2117	CHEMTECH INDUSTRIAL VALVES PVT. LTD
6 . P2137	CRAWLEY & RAY (FOUNDERS & ENGINEERS) PVT. LTD (DN 25)
7 . P2163	DELVAL FLOW CONTROLS PRIVATE LIMITED (Upto12" ( Upto 900#))
8 . P0273	FLOCON SYSTEMS PVT. LTD. (CS upto 6" 150#)
9 . P2017	FLOW CONTROL
10 . P2073	FLOWCHEM INDUSTRIES ( upto 300# and upto 10")
11 . P2277	FLOWJET VALVES PVT. LTD. (Ball Valve(Cast), CS/SS, Up To 18"-150# & Ball Valve(Forged), CS, Up To 2" -800#)
12 . P2219	FLUIDTECH EQUIPMENT PVT. LTD. (Up to 4" (300#))
13 . P2114	FORWARD ALLOYS & CASTINGS (upto 900#)
14 . P2254	G M VALVE PVT. LTD. (1. Item- FORGED-CS, Size- Upto 2", ANSI Class- Upto 800 #, 2. Item - FORGED-- AS/SS, Size- Upto 1.25", ANSI Class- Upto 800 #)
15 . P2145	GURU INDUSTRIAL VALVES PVT. LTD. (Cast CS only: Upto 12"(Upto300#), 4" (Upto 900#) & Forged: Upto 2" (800#))
16 . P2218	HAWA ENGINEERS LTD. (Upto 16" (150# & 300#), Upto12" (600# & 900#))
17 . P0404	INTERVALVE POONAWALLA LIMITED (Forged: Upto 2" 800#, Cast: Upto 12" (Upto 300#))



## 120303 : BALL VALVES (SOFT SEATED)

CODE	NAME
18 . P2161	JC VALVES & CONTROLS INDIA PVT. LTD. (Upto 28" (upto 600#), 12" (900#, 1500#), 10" (2500#))
19 . P0473	KSB PUMPS LIMITED (VALVES DIVN) (CS upto 100DN,20 bar)
20 . P0487	LEADER VALVES LIMITED (Casting <= 6" - upto 600#, Forging <= 2" - upto 800#)
21 . P2228	MEVADA ENGINEERING WORKS PVT. LTD., MUMBAI (Upto 2" (800#), (Forged), Material: CS/AS/SS; Upto 14" (300#), Material: CS/AS/SS)
22 . P2147	MICON ENGINEERS (HUBLI) PVT. LTD. (Cast : Upto 6" (150# & 300#) & Forged: Upto 2" (800#))
23 . P0094	MICROFINISH VALVES PVT. LTD.
24 . P2243	NEOSEAL ENGINEERING PRIVATE LIMITED (Upto 12", rating upto 600# and Upto 8", rating upto 2500#)
25 . P2279	NOVEL VALVES INDIA PVT. LTD. (1. Ball Valve -CS, Up To 14"-900# 2. Ball Valve -CS, Up To 10"-900# & 3. Ball Valve (Forged) -SS Up To 2" -2500#)
26 . P2164	NSSL LIMITED (Upto 12" (150# & 300#))
27 . P1207	NUTECH CONTROLS (Ball valve(CS) Up to 10", ANSI Class up to 150#, Up to 2", ANSI Class up to 900#)
28 . P2041	OSWAL INDUSTRIES LTD. (Upto 24" (150#, 300# & 600#))
29 . P2249	SAKHI ENGINEERS PVT. LTD. (1. [Soft Seated] CS, upto 10", ANSI Class upto 300# 2.[Soft Seated] SS, upto 3" ,ANSI Class upto 150#)
30 . P1204	SAP Industries Limited (Up to 16", rating 600#)
31 . P2204	SHALIMAR VALVES PVT. LTD. (Upto 18" (600#) Material: CS/AS/SS)
32 . P1206	VALVE TECH INDUSTRIES (UPTO 24" 600#)
33 . P2144	VIBA FLUID CONTROL ((1) Ball Valves CS/SS, Size- Up to 18", 150# (2) Ball Valves CS, Size- Up to 6", 300#)
34 . P0865	VIRGO ENGINEERS LTD. (Upto16" (Upto 600#))

## 120303 : BALL VALVES (SOFT SEATED)

CODE	NAME
35 . P0093	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Cast: Upto 30" (150# & 300#); 20" NB (600#), 16" (900#), 12" (1500#) & Forged: Upto 2"(800#))
36 . P0264	XOMOX SANMAR LIMITED (FISHER XOMOX)

### **AUSTRIA**

37 . P0120 BHDT GMBH

### **CANADA**

38 . P0857 VELAN INC. (Size upto 16" (Rating upto 600#))

### **CHINA**

39 . P2173 BOTELI VALVE GROUP CO. LTD. (Upto 32" (150# & 300#), 30" (600#), 24" (900#))

40 . P2080 Zhejiang Jiehua Valve Co.,Ltd .

### **FRANCE**

41 . P0834 ETS TROUVAY & CAUVIN

### **GERMANY**

42 . P2186 PERRIN GmbH (Size upto 24" (Rating upto 2500#))

### **ITALY**

43 . P0150 CESARE BONETTI SPA (Cast: Upto 4" (150#) & Forged: Upto 1" (800#) Floating only)

44 . P2179 FRIULCO SPA (Upto 48" (150# & 300 #); 20" (Upto 1500#); 12" (2500#))

45 . P0476 GTC ITALIA, S.R.L.

46 . P2083 MANTOVANI SpA

47 . P0628 PETROL VALVES S.R.L

48 . P0631 PIBIVIESSE SRL (Upto 48", 600#)

### **SINGAPORE**

## 120303 : BALL VALVES (SOFT SEATED)

CODE	NAME
49 . P0568	METSO AUTOMATION

### **SPAIN**

50 . P2201 POYAM VALVES, (AMPO S. COOP.) (Size upto 42" (Rating Upto 2500#))

### **TAIWAN**

51 . P2007 HAITIMA CORPORATION

### **UAE**

52 . P2273 NEWAY VALVE (SUZHOU) CO., LTD. (Upto 2" (1500#), Upto 12" (900#), Upto 48" (600#))

## 120304 : BALL VALVES (METAL SEATED)

CODE	NAME
<b>INDIA</b>	
1 . P2176	AIRA EURO AUTOMATION PVT. LTD. (Upto 6", Rating: 150# & 300#)
2 . P2146	BRIGHTCH VALVES AND CONTROLS PVT. LTD. (4" x 150# for CS, AS & SS Material)
3 . P2163	DELVAL FLOW CONTROLS PRIVATE LIMITED (Upto12" (Upto 900#))
4 . P2277	FLOWJET VALVES PVT. LTD. (Ball Valve(Cast), CS/SS, Up To 8" -300#)
5 . P2145	GURU INDUSTRIAL VALVES PVT. LTD. (Cast CS only: Upto 12"(Upto300#), 4" (Upto 900#) & Forged: Upto 2" (800#))
6 . P2218	HAWA ENGINEERS LTD. (Upto 16" (150# & 300#), Upto12" (600# & 900#))
7 . P0404	INTERVALVE POONAWALLA LIMITED (Upto 12" (150#))
8 . P2161	JC VALVES & CONTROLS INDIA PVT. LTD. (Upto 28" (upto 600#), 12" (upto 1500#), 10" (2500#))
9 . P2147	MICON ENGINEERS (HUBLI) PVT. LTD. (Cast : Upto 6" (150# & 300#) & Forged: Upto 2" (800#))
10 . P0094	MICROFINISH VALVES PVT. LTD.
11 . P2243	NEOSEAL ENGINEERING PRIVATE LIMITED (Upto 12", rating upto 600#)
12 . P2279	NOVEL VALVES INDIA PVT. LTD. (Ball Valve - 1. CS , Up To 10", 900# 2. CS, Up to 6", 1500#)
13 . P2164	NSSL LIMITED (Upto 12" (150# & 300#))
14 . P2041	OSWAL INDUSTRIES LTD. (Upto 24" (150#, 300#, & 600#))
15 . P1206	VALVE TECH INDUSTRIES (UPTO 16" 300#)
16 . P2285	VALVE TECH INDUSTRIES (UP TO 24", 300# CS BALL VALVE)
17 . P0865	VIRGO ENGINEERS LTD. (Upto16" (Upto 600#))

## 120304 : BALL VALVES (METAL SEATED)

CODE	NAME
18 . P0093	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Cast: Upto 30" (150# & 300#); 20" NB (600#), 16" (900#), 12" (1500#) & Forged: Upto 2"(800#))

### **CANADA**

19 . P0857 VELAN INC. (Size upto 16" (Rating upto 600#))

### **CHINA**

20 . P2173 BOTELI VALVE GROUP CO. LTD. (Upto 32" (150# & 300#), 30" (600#), 24" (900#))

### **GERMANY**

21 . P2186 PERRIN GmbH (Size upto 24" (Rating upto 2500#))

### **ITALY**

22 . P2054 ALFA VALVOLE Srl

23 . P0150 CESARE BONETTI SPA (Upto 24" (150#) & 4" (Upto 1500#) Trunnion Mounted only)

24 . P2179 FRIULCO SPA (Upto 48" (150# & 300#); 20" (Upto 1500#); 12" (2500#))

25 . P0594 GE POWER (NUOVO PIGNONE SPA)

26 . P0476 GTC ITALIA, S.R.L.

27 . P0628 PETROL VALVES S.R.L

28 . P0631 PIBIVIESSE SRL (Upto 48", 600#)

29 . P2100 VALVITALIA SpA

### **NETHERLAND**

30 . P2093 REDPOINT ALLOYS BV

### **SINGAPORE**

31 . P0568 METSO AUTOMATION

## 120304 : BALL VALVES (METAL SEATED)

CODE	NAME
32 . P0606	ORBIT VALVES PLC

### **SPAIN**

33 . P2201 POYAM VALVES, (AMPO S. COOP.) (Size upto 42" (Rating Upto 2500#))

### **UAE**

34 . P2273 NEWAY VALVE (SUZHOU) CO., LTD. (Upto 2" (1500#), Upto 12" (900#), Upto 48" (600#))

## 120305 : BUTTERFLY VALVES

CODE	NAME
<b>INDIA</b>	
1 . P0003	A V VALVES LIMITED (Upto 48" (150#))
2 . P2052	ADVANCE VALVES (2" - 120" (Upto 150#), 2" - 80" (Upto 900#))
3 . P2176	AIRA EURO AUTOMATION PVT. LTD. (Upto 48", Rating: Upto 300#)
4 . P0077	AUDCO INDIA LIMITED(L&T VALVES DIVN.)
5 . P2018	BDK PROCESS CONTROLS PVT. LTD. (upto 1600mm)
6 . P2117	CHEMTECH INDUSTRIAL VALVES PVT. LTD
7 . P2137	CRAWLEY & RAY (FOUNDERS & ENGINEERS) PVT. LTD (40mm - 1000mm)
8 . P2163	DELVAL FLOW CONTROLS PRIVATE LIMITED (Upto 24" (Upto 300#))
9 . P0273	FLOCON SYSTEMS PVT. LTD. (CS upto 12" 150#)
10 . P2248	FLOTEK INDUSTRIES (1. Triple Offset, Material - CS/AS, Upto 18", ANSI Class -Upto 300 # 2. Double Offset & Concentric-CS, Upto 36", ANSI Class -Upto 150 #)
11 . P2277	FLOWJET VALVES PVT. LTD. (Butterfly Valves, CS, Up to 42"-150#)
12 . P2219	FLUIDTECH EQUIPMENT PVT. LTD. (Up to 12" (300#))
13 . P0281	FOURESS ENGINEERING (I) LTD.
14 . P2218	HAWA ENGINEERS LTD. (2" to 48" (PN10/PN16/150#/300#))
15 . P2013	HAWA VALVES INDIA PVT. LTD. (CS upto 6", 150#)
16 . P2134	HI-TECH BUTTERFLY VALVES INDIA PVT. LTD. (<300#,<30"(Teflon/Rubber) ,<72"(Metal ))
17 . P0400	INSTRUMENTATION LTD. (PALAKKAD)

## 120305 : BUTTERFLY VALVES

CODE	NAME
18 . P0404	INTERVALVE POONAWALLA LIMITED (Upto 72" (150#) & Upto 16" (300#))
19 . P2161	JC VALVES & CONTROLS INDIA PVT. LTD. (Upto 20" (150#) & 10" (300#))
20 . P1101	LARSEN & TOUBRO LIMITED (1/2" to 24")
21 . P0487	LEADER VALVES LIMITED (size <=16" - 150#)
22 . P0519	MATHER & PLATT (INDIA) LTD. (A Subsidiary of WILO SE German (upto DN 1600,PN10 Double flange type)
23 . P0533	METROPOLITAN INDUSTRIES (size=2000mm)
24 . P2147	MICON ENGINEERS (HUBLI) PVT. LTD. (Upto 24" (PN10 & PN16))
25 . P2279	NOVEL VALVES INDIA PVT. LTD. (1. CS, Up to 48"150# & 2. AS, Up to 8" 150#)
26 . P2284	OMVAL CONTROLS PRIVATE LIMITED (CS, UP TO 24" UP TO 150#)
27 . P2249	SAKHI ENGINEERS PVT. LTD. (1. upto 6", ANSI Class upto 150#)
28 . P1204	SAP Industries Limited (Up to 32", rating PN10, Up to 18", rating 150#)
29 . P1206	VALVE TECH INDUSTRIES (UPTO 48" 300# & UPTO 24" 600#)
30 . P2014	VENUS PUMP & ENGINEERING WORKS (upto 600NB,150#)
31 . P0865	VIRGO ENGINEERS LTD. ((Triple Offset only): 3" to 24", Upto 600# (CS/SS))
32 . P0093	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Upto 56" (Upto 250#); 24" (300#))
33 . P0264	XOMOX SANMAR LIMITED (FISHER XOMOX)

### **JAPAN**

34 . P2200	TOMOE VALVE CO. LTD. (Upto 48" (150# & 300#), Upto 24" (600#, 900# & 1500#))
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## 120305 : BUTTERFLY VALVES

CODE	NAME
<b>AUSTRIA</b>	
35 . P0120	BHDT GMBH
<b>CANADA</b>	
36 . P0857	VELAN INC. (Size upto 48" (Rating upto 600#))
<b>CHINA</b>	
37 . P2173	BOTELI VALVE GROUP CO. LTD. (36" (150# & 300#))
38 . P2080	Zhejiang Jiehua Valve Co.,Ltd .
<b>FRANCE</b>	
39 . P2076	GRISS SAPAG INDUSTRIAL VALVES
<b>GERMANY</b>	
40 . P2051	ADAMS ARMATUREN
<b>ITALY</b>	
41 . P0476	GTC ITALIA, S.R.L.
<b>TAIWAN</b>	
42 . P2007	HAITIMA CORPORATION
<b>U.K.</b>	
43 . P0489	LEEDS VALVE LTD
<b>U.K</b>	
44 . P2101	WEIR VALVES & CONTROLS DIVISION.
<b>U.S.A.</b>	
45 . P2068	CURTIS WRIGHT FLOW CONTROL CORPOARATION
46 . P0679	EMERSON PROCESS MGT

## 120305 : BUTTERFLY VALVES

CODE	NAME
47 . P0488	LEAR SIEGLER MEAS. CTRLS. CORP.
48 . P0174	SPX VALVES & CONTROLS (COPES-VULCAN LTD)
49 . P0889	TYCO INTERNATIONAL INC.,U.S.A.
50 . P2102	XOMOS(CRANE CO)
<b>UAE</b>	
51 . P2273	NEWAY VALVE (SUZHOU) CO., LTD. (Upto 56" (600#))

## 120306 : BLOWDOWN VALVES

CODE	NAME
<b>CANADA</b>	
1 . P0857	VELAN INC. (Size upto 2" (Rating upto 1500#))
<b>GERMANY</b>	
2 . P0307	GESTRA AG
<b>ITALY</b>	
3 . P0150	CESARE BONETTI SPA (Upto 3" (upto 2500#))
<b>U.S.A.</b>	
4 . P0889	TYCO INTERNATIONAL INC.,U.S.A.

## 120307 : SAMPLING VALVES/ NEEDLE VALVES

CODE	NAME
<b>INDIA</b>	
1 . P0072	ASSOCIATED TOOLINGS (I) PVT. LTD. (½" to 1-1/2" (Rating: 800#))
2 . P2117	CHEMTECH INDUSTRIAL VALVES PVT. LTD
3 . P0248	EXCELSIOR ENGG WORKS
4 . P2118	EXPERT ENGINEERING ENTERPRISES (Upto 12" - 150# & 300#)
5 . P2248	FLOTEK INDUSTRIES (Needle Valve- SS, Upto 0.5-0.75", ANSI Class -Upto 800-2500 #)
6 . P0487	LEADER VALVES LIMITED (size <= 1 1/2" - 800#)
7 . P0792	TECNOMATIC (INDIA) PVT. LTD.
8 . P0093	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Upto 50 mm size (Upto 2500#))
<b>UAE</b>	
9 . P2273	NEWAY VALVE (SUZHOU) CO., LTD. (Upto 1" (2500#))

## 120308 : PLUG VALVES (NON LUBRICATED)

CODE	NAME
<b>INDIA</b>	
1 . P0003	A V VALVES LIMITED (Upto 20" (150#) (CS & SS))
2 . P0077	AUDCO INDIA LIMITED(L&T VALVES DIVN.)
3 . P2177	AZ ARMATUREN GMBH (½" NB to 20" NB, 150#, 300#, 600# (Matl. CS, SS & AS))
4 . P2018	BDK PROCESS CONTROLS PVT. LTD.
5 . P2117	CHEMTECH INDUSTRIAL VALVES PVT. LTD
6 . P2229	CHEMTROLS SAMIL (INDIA) PVT. LTD. (Upto 12" - 150# & 300#)
7 . P2137	CRAWLEY & RAY (FOUNDERS & ENGINEERS) PVT. LTD (DN 200)
8 . P2219	FLUIDTECH EQUIPMENT PVT. LTD. (Up to 4" (300#))
9 . P2145	GURU INDUSTRIAL VALVES PVT. LTD. (Cast CS only: Upto 12"(Upto300#), 4" (Upto 900#) & Forged: Upto 2" (800#))
10 . P2218	HAWA ENGINEERS LTD. (½" to 8" (150#))
11 . P2161	JC VALVES & CONTROLS INDIA PVT. LTD. (Upto 12" (upto 300#))
12 . P1101	LARSEN & TOUBRO LIMITED ( 1/2" to 24")
13 . P0487	LEADER VALVES LIMITED (size <= 6" - upto 300#)
14 . P2294	RASAI FLOW LINES PRIVATE LIMITED (Size ½" to 14" (150# & 300#))
15 . P1204	SAP Industries Limited (Up to 12", rating 150#)
16 . P0093	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Upto 16"(150#), 12" (300#), 3" (600#))
17 . P0264	XOMOX SANMAR LIMITED (FISHER XOMOX)

**120308 : PLUG VALVES (NON LUBRICATED)**

<b>CODE</b>	<b>NAME</b>
<b>CHINA</b>	
18 . P2080	Zhejiang Jiehua Valve Co.,Ltd .
<b>ITALY</b>	
19 . P0612	O.M.S. SALERI DI SALERI P & FIGLI S.M.C.
<b>SPAIN</b>	
20 . P2201	POYAM VALVES, (AMPO S. COOP.) (Upto 30" (Upto 900#) for Lift Plug valves only.)

## 120309 : PLUG VALVES (LUBRICATED)

CODE	NAME
<b>INDIA</b>	
1 . P0003	A V VALVES LIMITED (Upto 20" (150#) (CS & SS))
2 . P0077	AUDCO INDIA LIMITED(L&T VALVES DIVN.)
3 . P2018	BDK PROCESS CONTROLS PVT. LTD.
4 . P2139	ECONO VALVES PVT. LTD. (<=8"(150-300#), <=1-1/2" (<=800#))
5 . P2219	FLUIDTECH EQUIPMENT PVT. LTD. (Up to 4" (300#))
6 . P2145	GURU INDUSTRIAL VALVES PVT. LTD. (Cast CS only: Upto 12"(Upto300#), 4" (Upto 900#) & Forged: Upto 2" (800#))
7 . P2218	HAWA ENGINEERS LTD. (½" to 8" (150#))
8 . P2161	JC VALVES & CONTROLS INDIA PVT. LTD. (Upto 12" (upto 300#))
9 . P0093	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Upto 8" (125#))
<b>CHINA</b>	
10 . P2080	Zhejiang Jiehua Valve Co.,Ltd .
<b>ITALY</b>	
11 . P2108	DELTA VALVES EUROPE
12 . P0612	O.M.S. SALERI DI SALERI P & FIGLI S.M.C.
<b>SPAIN</b>	
13 . P0083	BABCOCK BORSIG ESPANA, S.A.

## 120311 : DIAPHRAGM VALVES / RUBBER LINED CHECK VALVES

CODE	NAME
<b>INDIA</b>	
1 . P0003	A V VALVES LIMITED (Upto 12" (125#))
2 . P0029	AKAY INDUSTRIES PVT LTD
3 . P2018	BDK PROCESS CONTROLS PVT. LTD. (upto 150#, 6 mm to 350mm)
4 . P2117	CHEMTECH INDUSTRIAL VALVES PVT. LTD
5 . P2137	CRAWLEY & RAY (FOUNDERS & ENGINEERS) PVT. LTD (25 NB to 200 NB)
6 . P2218	HAWA ENGINEERS LTD. (½" to 8" (PN10))
7 . P0093	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Upto 14" (PN16))



## 120312 : CAST IRON VALVES

CODE	NAME
<b>INDIA</b>	
1 . P0003	A V VALVES LIMITED (Upto 48" (125#))
2 . P0182	CRAWLEY & RAY (F&E) PVT. LTD. (Buttterfly)
3 . P2219	FLUIDTECH EQUIPMENT PVT. LTD. (Up to 24" (PN 1.0 & PN 1.6))
4 . P2074	GEETA ENGINEERING WORKS
5 . P0451	KIRLOSKAR BROTHERS LIMITED (sluice,gate,butterfly valves PN1 & PN1.6)
6 . P0487	LEADER VALVES LIMITED (size <= 24" upto PN16 rating)
7 . P2096	S & M INDUSTRIAL VALVES LIMITED (ONLY GATE & GLOBE VALVES,50mm-600mm,125#)
8 . P1204	SAP Industries Limited (Up to 12", rating 150#)
9 . P2014	VENUS PUMP & ENGINEERING WORKS (sluice<900mm,Diphragm,<300mm,stop<500mm)
10 . P0093	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Upto 12" (PN6))

## 120313 : PVC/CPVC VALVES

CODE	NAME
<b>INDIA</b>	
1 . P2058	ASTRAL POLYTECHNIK PVT. LTD. (SIZE 1/2"-6",BUTTERFLY VALVE UPTO 24")
2 . P2096	S & M INDUSTRIAL VALVES LIMITED (32mm - 80mm Size)

## 120401 : ASBESTOS/RUBBER GASKETS

CODE	NAME
<b>INDIA</b>	
1 . P0256	FERROLITE JOINTINGS (P) LTD. (Asbestos,CAF only)
2 . P0294	GASKETS (INDIA) PVT. LTD. (Asbestos,CAF only)
3 . P2112	GOODRICH GASKET PVT. LTD. (upto 24")
4 . P0350	HINDUSTAN ASBESTOS & ALLIED PRODUCTS
5 . P0354	HINDUSTAN COMPOSITES LIMITED
6 . P2079	HINDUSTAN FERREDO LTD.
7 . P0373	IGP ENGINEERS LIMITED
8 . P0501	MADRAS INDUSTRIAL PRODUCTS (upto 48")
9 . P0525	MECHANICAL PACKING INDUSTRIES LTD.,
10 . P2243	NEOSEAL ENGINEERING PRIVATE LIMITED (Upto 80", rating 150# (Only Rubber Gaskets))
11 . P0614	PACKINGS & JOINTINGS (P) LTD.
12 . P2088	PERFECT MARKETING (P) LTD,
13 . P2090	PRASHANT ENGG STORES
14 . P0663	REINZ TALBROS PRIVATE LIMITED
15 . P0745	SPIRASEAL GASKETS PVT. LTD. (CAF & Teflon)
16 . P2115	STARFLEX SEALING INDIA PVT. LTD.
17 . P2123	THE BENGAL MILL STORES SUPPLY CO.(TRADER)

## 120401 : ASBESTOS/RUBBER GASKETS

CODE	NAME
18 . P2184	UNIQUE INDUSTRIAL PACKINGS PVT. LTD.

## 120402 : SPIRALLY WOUND GASKETS

CODE	NAME
<b>INDIA</b>	
1 . P0294	GASKETS (INDIA) PVT. LTD.
2 . P2112	GOODRICH GASKET PVT. LTD. (up to 24")
3 . P0373	IGP ENGINEERS LIMITED (10 to 3550mm size, 150#-2500# for exch gskt)
4 . P0501	MADRAS INDUSTRIAL PRODUCTS (upto 52")
5 . P2243	NEOSEAL ENGINEERING PRIVATE LIMITED (Upto 84", rating upto 150# and upto 30" rating upto 600#)
6 . P0614	PACKINGS & JOINTINGS (P) LTD.
7 . P2088	PERFECT MARKETING (P) LTD,
8 . P2090	PRASHANT ENGG STORES
9 . P0745	SPIRASEAL GASKETS PVT. LTD. (SS upto 12" & 150#)
10 . P2115	STARFLEX SEALING INDIA PVT. LTD.
11 . P2123	THE BENGAL MILL STORES SUPPLY CO.(TRADER)
12 . P2184	UNIQUE INDUSTRIAL PACKINGS PVT. LTD. (Upto 42"(600#) & Upto 24" (2500#))
<b>CHINA</b>	
13 . P2080	Zhejiang Jiehua Valve Co.,Ltd .

## 120403 : LENS GASKETS & RING JOINT (METALLIC)

CODE	NAME
<b>INDIA</b>	
1 . P0294	GASKETS (INDIA) PVT. LTD.
2 . P2112	GOODRICH GASKET PVT. LTD. (0.5" to 24")
3 . P0373	IGP ENGINEERS LIMITED (150# - 2500#)
4 . P0501	MADRAS INDUSTRIAL PRODUCTS
5 . P0533	METROPOLITAN INDUSTRIES (3mm thickness , ratings=300 lb)
6 . P2243	NEOSEAL ENGINEERING PRIVATE LIMITED (Upto 30", rating upto 900# and Upto 20" rating upto 2500#)
7 . P0614	PACKINGS & JOINTINGS (P) LTD.
8 . P2090	PRASHANT ENGG STORES
9 . P0745	SPIRASEAL GASKETS PVT. LTD.
10 . P2115	STARFLEX SEALING INDIA PVT. LTD.
11 . P2184	UNIQUE INDUSTRIAL PACKINGS PVT. LTD. (Ring Joint Gaskets only, Upto 16" (1500#))
<b>AUSTRIA</b>	
12 . P0120	BHDT GMBH
<b>ITALY</b>	
13 . P2083	MANTOVANI SpA

## 120405 : EXPANSION JOINTS & BELLOWS

CODE	NAME
<b>INDIA</b>	
1 . P0177	CORI ENGINEERS PVT. LTD. (For Rubbbber)
2 . P0217	D.WREN & CO. (For Rubber & Fabric)
3 . P0269	FLEXATHERM EXPANLLOW PVT. LTD. (Circular: Upto 240", Rectangular: No bar for size, (Up to 600#))
4 . P0270	FLEXICAN BELLOWS & HOSES PVT. LTD.
5 . P0274	FLUIDYNE ENGINEERS (I) PVT. LTD. (Metallic Bellows upto 800 mm dia)
6 . P0443	KELD ELLENTOFT INDIA PVT. LTD. (For Fabric)
7 . P0498	LONESTAR INDUSTRIES
8 . P0530	MB METALLIC BELLOWS PVT. LTD.
9 . P2090	PRASHANT ENGG STORES
10 . P2259	RATNAFLEX ENGINEERING PRIVATE LIMITED (EXPANSION JOINTS / BELLOWS METALLIC - PIPING)
11 . P0752	STANDARD PRECISION BELLOWS
<b>GERMANY</b>	
12 . P2019	TUBOFLEX
<b>ITALY</b>	
13 . P0271	FLEXIDER S.P.A.

## 120406 : FASTENERS

CODE	NAME
<b>INDIA</b>	
1 . P0017	AEP COMPANY
2 . P0146	CAPITAL INDUSTRIES
3 . P2020	CONSOL ENGG. & FASTNERS INDUSTRIES
4 . P0221	EBY FASTNERS
5 . P0265	FIT TIGHT NUTS & BOLTS LTD.
6 . P0266	FIX FIT FASTENERS MFG. PVT. LTD.
7 . P2245	HEM INDUSTRIES (Upto 4")
8 . P2180	INDUSTRIAL ENGINEERING CORPORATION (Size Upto 4" (M100))
9 . P2212	MEGA ENGINEERING PRIVATE LIMITED (½" to 3" Material: CS/AS/SS)
10 . P0532	METRO MECHANICAL PVT.LTD.
11 . P0559	NAGBHUSHANAM INDUSTRIES
12 . P0586	NIREKA ENGG. CO. PVT. LTD.
13 . P2021	PACIFIC FORGING & FASTENERS PVT. LTD. (M 10 to M125)
14 . P2088	PERFECT MARKETING (P) LTD,
15 . P2022	PIONEER NUTS & BOLTS PVT. LTD. (Up to 3.5")
16 . P0641	PRECISION AUTO ENGINEERS
17 . P0642	PRECISION ENGINEERING INDUSTRIES



## 120406 : FASTENERS

CODE	NAME
18 . P2257	PROCYON TECHNOLOGY (Upto 3.5")
19 . P0650	PTD FASTNERS PVT. LTD.
20 . P2110	SANGHVI METALS (TRADER)
21 . P0772	SUNDARAM FASTENERS LIMITED
22 . P2099	UDHERA FASTENERS

## 120501 : FIRE FIGHTING SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P2034	AGNICE FIRE PROTECTION LTD.
2 . P2062	BHARTIYA CACCIALANZA FIRE SYSTEMS LTD
3 . P0119	BLUE STAR LTD.
4 . P2027	DE'S TECHNICO
5 . P2220	DE'S TECHNICO PVT. LTD.
6 . P2033	FUTECH CONSULTANTS PVT. LTD.
7 . P2024	GENERAL MECHANICAL WORKS
8 . P2036	HD FIRE PROTECTION COMPANY
9 . P2271	INTEGRATED FIRE PROTECTION PVT. LTD.
10 . P2122	LAL ENTERPRISES
11 . P0519	MATHER & PLATT (INDIA) LTD. (A Subsidiary of WILO SE German
12 . P2197	MX SYSTEMS INTERNATIONAL PVT. LTD.
13 . P2026	NEWFIRE ENGINEERS SERVICES
14 . P2031	PRAGATI ENGG. (PVT.) LTD.
15 . P2091	PYROTEK INDUSTRIES (INDIA ) PVT. LTD.
16 . P2032	RADIANT FIRE PROTECTION ENGINEERS
17 . P2035	STEELAGE INDUSTRIES LTD.

## 120501 : FIRE FIGHTING SYSTEM

CODE	NAME
18 . P2030	TECHNOFAB ENGG.
19 . P2140	TRI-PARULEX FIRE PROTECTION SYSTEMS
20 . P2029	UNITECH MACHINES LTD.
21 . P2028	VIJAY FIRE PROTECTION SYSTEM LTD.

## 120503 : HOSE PIPES(METALLIC) & CAM LOCK COUPLING

CODE	NAME
<b>INDIA</b>	
1 . P2143	AEROFLEX INDUSTRIES LIMITED (Size 6mm to 250mm dia (SS Corrug. Flex.. Hose with Braid, Braid & Assembly)
2 . P2065	CHHATARIA RUBBER CHEMICALS INDUSTRIES
3 . P0217	D.WREN & CO.
4 . P0269	FLEXATHERM EXPANLLOW PVT. LTD. (1/2" to 6")
5 . P2023	GAYATRI INDUSTRIES
6 . P2192	GAYTRI INDUSTRIAL CORPORATION (Upto 6" ID)
7 . P2078	HELIFEX HYDRAULICS & ENGG CO. LTD.
8 . P0715	SENIOR INDIA PVT. LTD.

## 120504 : HOSE PIPE (NON-METALLIC) & CAM LOCK COUPLING

CODE	NAME
<b>INDIA</b>	
1 . P2065	CHHATARIA RUBBER CHEMICALS INDUSTRIES
2 . P0217	D.WREN & CO.
3 . P2023	GAYATRI INDUSTRIES
4 . P2192	GAYTRI INDUSTRIAL CORPORATION (Upto 8" ID)
5 . P2078	HELIFEX HYDRAULICS & ENGG CO. LTD.
6 . P2087	PADMINI INDUSTRIES LIMITED
7 . P2091	PYROTEK INDUSTRIES (INDIA ) PVT. LTD.
8 . P0715	SENIOR INDIA PVT. LTD.

## 120505 : FIRE WATER PUMPS

CODE	NAME
<b>INDIA</b>	
1 . P0102	BEST & CROMPTON ENGG. CO.
2 . P0321	GREAVES COTTON & CO. LTD.
3 . P3325	JAYANT ENGINEERING & MARKETING (P) LTD.
4 . P0451	KIRLOSKAR BROTHERS LIMITED
5 . P0519	MATHER & PLATT (INDIA) LTD. (A Subsidiary of WILO SE German

## 120506 : PORTABLE FIRE EXTINGUISHERS & FIRE FIGHTING CHEMICALS

CODE	NAME
<b>INDIA</b>	
1 . P2107	CEASEFIRE INDUSTRIES LTD
2 . P2271	INTEGRATED FIRE PROTECTION PVT. LTD.
3 . P2091	PYROTEK INDUSTRIES (INDIA ) PVT. LTD.
4 . P2029	UNITECH MACHINES LTD.
5 . P2104	ZENITH FIRE SEVICES INDIA PVT. LTD

## 120507 : SMOKE / GAS DETECTOR

CODE	NAME
<b>INDIA</b>	
1 . P2107	CEASEFIRE INDUSTRIES LTD
2 . P2091	PYROTEK INDUSTRIES (INDIA ) PVT. LTD.
3 . P2029	UNITECH MACHINES LTD.
4 . P2104	ZENITH FIRE SEVICES INDIA PVT. LTD




## 120508 : FIRE FIGHTING EQUIPMENTS

CODE	NAME
<b>INDIA</b>	
1 . P2220	DE'S TECHNICO PVT. LTD. (Deluge Valve and Sprinklers only.)
2 . P2141	HD FIRE PROTECT PVT. LTD.
3 . P2271	INTEGRATED FIRE PROTECTION PVT. LTD.
4 . P2091	PYROTEK INDUSTRIES (INDIA ) PVT. LTD.
5 . P2130	VENUS PUMP & ENGG. WORKS
6 . P2209	WINCO VALVES PVT. LTD. (Equipments for Fire Hydrant System)
7 . P2104	ZENITH FIRE SEVICES INDIA PVT. LTD

## 120602 : TRUCK/WAGON LOADING ARM

CODE	NAME
<b>INDIA</b>	
1 . P2232	WOODFIELD SYSTEMS INTERNALNATIONAL PVT.LTD. (Upto size: Core-4" / Jacket:-6")

	<b>MASTER VENDORS LIST FOR PROJECTS</b>	04-00MM-0011	19
		DOCUMENT NO	REV

**MASTER VENDORS LIST**  
**FOR**  
**PROJECTS**  
**MECHANICAL ITEMS (MACHINERY)**

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## 130101 : PUMPS FOR HP BFW SERVICE (ABOVE 60 KG/CM2 DISCH. PR.)

CODE	NAME
<b>INDIA</b>	
1 . P1179	KIRLOSKAR EBARA PUMPS LIMITED (Above 60 Kg/cm2 Disch. Pr.)
2 . P0111	BHARAT PUMPS & COMPRESSORS LTD.
3 . P3002	FLOWSERVE INDIA CONTROLS PVT. LTD.
4 . P0472	KSB PUMPS LIMITED (upto 190Kg/cm2 Differential pr.)
5 . P1302	RUHRPUMPEN INDIA PRIVATE LIMITED
6 . P0767	SULZER PUMPS INDIA LIMITED (upto 960 mlc, 80 m3/Hr)
<b>GERMANY</b>	
7 . P0470	KSB AG
<b>JAPAN</b>	
8 . P0220	EBARA CORPORATION
9 . P0724	SHIN NIPPON MACHINERY CO. LTD.
<b>U.K.</b>	
10 . P0395	FLOWSERVE (IDP)

## 130102 : PUMPS FOR SEMI LEAN SOLUTION

CODE	NAME
<b>INDIA</b>	
1 . P1179	KIRLOSKAR EBARA PUMPS LIMITED
2 . P3002	FLOWSERVE INDIA CONTROLS PVT. LTD.
3 . P3388	ITT CORPORATION INDIA PVT. LTD.
4 . P0472	KSB PUMPS LIMITED
5 . P1302	RUHRPUMPEN INDIA PRIVATE LIMITED
<b>AUSTRIA</b>	
6 . P0651	PUMPEN FABRIK ERNST VOGEL
<b>FRANCE</b>	
7 . P0471	KSB GUINARD
<b>GERMANY</b>	
8 . P0470	KSB AG
<b>ITALY</b>	
9 . P3001	FLOW SERVE
10 . P0594	GE POWER (NUOVO PIGNONE SPA)
11 . P0636	WEIR GABBIONETA SRL (FORMERLY POMPE GABBIONETA SPA)
<b>JAPAN</b>	
12 . P0220	EBARA CORPORATION
13 . P0539	MITSUBISHI CORPORATION
14 . P0724	SHIN NIPPON MACHINERY CO. LTD.

## 130102 : PUMPS FOR SEMI LEAN SOLUTION

CODE	NAME
15 . P0817	TORISHIMA PUMP MFG. CO. LTD.

**SINGAPORE**

16 . P0315 GOULD PUMPS INC.

**SWITZERLAND**

17 . P0768 SULZER PUMPS LTD.



## 130103 : PUMPS FOR HP REACTOR FEED (AMMONIA & CARBAMATE)

CODE	NAME
<b>INDIA</b>	
1 . P1179	KIRLOSKAR EBARA PUMPS LIMITED
2 . P3002	FLOWSERVE INDIA CONTROLS PVT. LTD.
3 . P0472	KSB PUMPS LIMITED (Under guarrantee & support form KSB Germany)
<b>JAPAN</b>	
4 . P0220	EBARA CORPORATION
5 . P0580	NIKKISO-SUNDSTRAND CO. LTD.

## 130104 : PUMPS FOR UREA MELT

CODE	NAME
<b>INDIA</b>	
1 . P3002	FLOWSERVE INDIA CONTROLS PVT. LTD.
2 . P1302	RUHRPUMPEN INDIA PRIVATE LIMITED ((SOLUTION OF UREA 64%))
<b>AUSTRIA</b>	
3 . P0651	PUMPEN FABRIK ERNST VOGEL
<b>GERMANY</b>	
4 . P0286	FRIATEC-RHEINHUTTE GMBH & CO.
<b>ITALY</b>	
5 . P0636	WEIR GABBIONETA SRL (FORMERLY POMPE GABBIONETA SPA)
<b>JAPAN</b>	
6 . P0057	ARAI PUMP MFG.CO. LTD.
7 . P0724	SHIN NIPPON MACHINERY CO. LTD.

## 130105 : PUMPS FOR CHEMICALS/ACID/ALKALI/BFW/CONDENSATE USE

CODE	NAME
<b>INDIA</b>	
1 . P1179	KIRLOSKAR EBARA PUMPS LIMITED
2 . P3301	A.R.WILFLEY INDIA PVT. LTD.
3 . P0029	AKAY INDUSTRIES PVT LTD
4 . P0095	BEACON WEIR LTD.
5 . P0111	BHARAT PUMPS & COMPRESSORS LTD.
6 . P3002	FLOWERVE INDIA CONTROLS PVT. LTD.
7 . P3388	ITT CORPORATION INDIA PVT. LTD.
8 . P0451	KIRLOSKAR BROTHERS LIMITED
9 . P0452	KIRLOSKAR EBARA PUMPS LIMITED,
10 . P0455	KISHORE PUMPS PVT.LTD.
11 . P0472	KSB PUMPS LIMITED
12 . P3339	MICROFINISH PUMPS PVT. LTD.
13 . P1302	RUHRPUMPEN INDIA PRIVATE LIMITED
14 . P1144	SAM TURBO INDUSTRY PRIVATE LTD. (Capacity - 900 m3/hr. Head - 60 mtr)
15 . P0767	SULZER PUMPS INDIA LIMITED (Single stage only)
<b>AUSTRIA</b>	
16 . P0651	PUMPEN FABRIK ERNST VOGEL
<b>BELGIUM</b>	

## 130105 : PUMPS FOR CHEMICALS/ACID/ALKALI/BFW/CONDENSATE USE

CODE	NAME
17 . P0241	ENSIVAL S.A.
<b>ITALY</b>	
18 . P0594	GE POWER (NUOVO PIGNONE SPA)
19 . P0636	WEIR GABBIONETA SRL (FORMERLY POMPE GABBIONETA SPA)
<b>JAPAN</b>	
20 . P0057	ARAI PUMP MFG.CO. LTD.
21 . P0697	SANWA HYDROTECH CORPORATION
<b>SINGAPORE</b>	
22 . P0315	GOULD PUMPS INC.
<b>U.K.</b>	
23 . P0395	FLOWSERVE (IDP)
24 . P0481	LA BOUR PUMP CO. LTD.

## 130106 : COOLING WATER PUMPS (HORIZONTAL)

CODE	NAME
<b>INDIA</b>	
1 . P3301	A.R.WILFLEY INDIA PVT. LTD.
2 . P0095	BEACON WEIR LTD.
3 . P0111	BHARAT PUMPS & COMPRESSORS LTD.
4 . P3316	FLOWMORE LIMITED (FORMERLY FLOWMORE PVT. LTD.)
5 . P3002	FLOWSERVE INDIA CONTROLS PVT. LTD.
6 . P0430	JYOTI LIMITED
7 . P0451	KIRLOSKAR BROTHERS LIMITED
8 . P0519	MATHER & PLATT (INDIA) LTD. (A Subsidiary of WILO SE German
9 . P1302	RUHRPUMPEN INDIA PRIVATE LIMITED
10 . P1144	SAM TURBO INDUSTRY PRIVATE LTD. (Capacity - 3600 m3/hr. Head - 35 mtr)
11 . P0869	VOLTAS LTD. (PUMPS & PROJECTS BUSINESS DIV)
<b>GERMANY</b>	
12 . P0470	KSB AG
<b>JAPAN</b>	
13 . P0540	mitsubishi heavy industries LTD.
14 . P0724	SHIN NIPPON MACHINERY CO. LTD.
15 . P0817	TORISHIMA PUMP MFG. CO. LTD.
<b>U.K.</b>	

## 130106 : COOLING WATER PUMPS (HORIZONTAL)

CODE	NAME
16 . P0395	FLOWSERVE (IDP)

## 130107 : PUMPS FOR SLURRY SERVICE

CODE	NAME
<b>INDIA</b>	
1 . P3301	A.R.WILFLEY INDIA PVT. LTD.
2 . P0029	AKAY INDUSTRIES PVT LTD
3 . P0095	BEACON WEIR LTD.
4 . P0102	BEST & CROMPTON ENGG. CO.
5 . P0111	BHARAT PUMPS & COMPRESSORS LTD.
6 . P1301	EGGER PUMPS INDIA PVT.LTD.
7 . P3316	FLOWMORE LIMITED (FORMERLY FLOWMORE PVT. LTD.)
8 . P0320	GREAVES LTD.
9 . P0455	KISHORE PUMPS PVT.LTD.
10 . P0472	KSB PUMPS LIMITED
11 . P3339	MICROFINISH PUMPS PVT. LTD.
12 . P1144	SAM TURBO INDUSTRY PRIVATE LTD. (Capacity - 1350 m3/hr. Head - 40 mtr)
13 . P0762	SU MOTORS PVT. LTD
14 . P0767	SULZER PUMPS INDIA LIMITED

## 130108 : RUBBER LINED PUMPS

CODE	NAME
<b>INDIA</b>	
1 . P0029	AKAY INDUSTRIES PVT LTD
2 . P0111	BHARAT PUMPS & COMPRESSORS LTD.
3 . P0353	HINDUSTAN DOOR-OLIVER LTD.
4 . P0403	INTERNATIONAL COMBUSTION INDIA (P)LTD.
5 . P0451	KIRLOSKAR BROTHERS LIMITED
6 . P0452	KIRLOSKAR EBARA PUMPS LIMITED,
7 . P0455	KISHORE PUMPS PVT.LTD.
8 . P0472	KSB PUMPS LIMITED
<b>BELGIUM</b>	
9 . P0241	ENSIVAL S.A.
<b>ITALY</b>	
10 . P0636	WEIR GABBIONETA SRL (FORMERLY POMPE GABBIONETA SPA)
<b>JAPAN</b>	
11 . P0220	EBARA CORPORATION
12 . P0724	SHIN NIPPON MACHINERY CO. LTD.
13 . P0817	TORISHIMA PUMP MFG. CO. LTD.
<b>U.K.</b>	
14 . P0395	FLOWSERVE (IDP)



## 130109 : POLY PROPYLENE PUMPS/FRP PUMPS

CODE	NAME
<b>INDIA</b>	
1 . P3301	A.R.WILFLEY INDIA PVT. LTD.
2 . P0086	BAKUBHAI AMBALAL
3 . P3339	MICROFINISH PUMPS PVT. LTD.

## 130110 : PUMPS FOR UTILITY SERVICES

CODE	NAME
<b>INDIA</b>	
1 . P1179	KIRLOSKAR EBARA PUMPS LIMITED
2 . P0029	AKAY INDUSTRIES PVT LTD
3 . P0095	BEACON WEIR LTD.
4 . P0102	BEST & CROMPTON ENGG. CO.
5 . P3316	FLOWMORE LIMITED (FORMERLY FLOWMORE PVT. LTD.)
6 . P3002	FLOWSERVE INDIA CONTROLS PVT. LTD.
7 .	FLOWSERVE INDIA CONTROLS PVT. LTD.
8 . P0451	KIRLOSKAR BROTHERS LIMITED
9 . P0452	KIRLOSKAR EBARA PUMPS LIMITED,
10 . P0455	KISHORE PUMPS PVT.LTD.
11 . P3339	MICROFINISH PUMPS PVT. LTD.
12 . P1302	RUHRPUMPEN INDIA PRIVATE LIMITED
13 . P1144	SAM TURBO INDUSTRY PRIVATE LTD. (Capacity - 1200 m <sup>3</sup> /hr. Head - 90 mtr)
14 . P0762	SU MOTORS PVT. LTD
15 . P0767	SULZER PUMPS INDIA LIMITED
16 . P0093	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.)

**130111 : DIAPHRAGM PUMPS**

CODE	NAME
<b>INDIA</b>	
1 . P3065	HI-LIFE MANUFACTURING CO. (2.5-4.5 m3/hr)
2 . P1160	S R METERING PUMPS & SYSTEMS (36-10080 LPH)

## 130112 : BARREL PUMPS

CODE	NAME
<b>INDIA</b>	
1 . P1179	KIRLOSKAR EBARA PUMPS LIMITED
2 . P3002	FLOWSERVE INDIA CONTROLS PVT. LTD.
3 . P3065	HI-LIFE MANUFACTURING CO. (122 cc/cycle)
4 . P1302	RUHRPUMPEN INDIA PRIVATE LIMITED

# 130201 : PUMPS FOR VERY LOW NPSH REQUIREMENTS (AMM./NAPTHA )

CODE	NAME
<b>INDIA</b>	
1 . P1179	KIRLOSKAR EBARA PUMPS LIMITED
2 . P0111	BHARAT PUMPS & COMPRESSORS LTD.
3 . P3002	FLOWERVE INDIA CONTROLS PVT. LTD.
4 . P3388	ITT CORPORATION INDIA PVT. LTD.
5 . P0472	KSB PUMPS LIMITED
6 . P1302	RUHRPUMPEN INDIA PRIVATE LIMITED
7 . P0767	SULZER PUMPS INDIA LIMITED
<b>FRANCE</b>	
8 . P0471	KSB GUINARD
<b>GERMANY</b>	
9 . P0470	KSB AG
<b>ITALY</b>	
10 . P0594	GE POWER (NUOVO PIGNONE SPA)
11 . P0636	WEIR GABBIONETA SRL (FORMERLY POMPE GABBIONETA SPA)
<b>JAPAN</b>	
12 . P0057	ARAI PUMP MFG.CO. LTD. (only Horizontal Pumps)
13 . P0220	EBARA CORPORATION
14 . P0580	NIKKISO-SUNDSTRAND CO. LTD.
15 . P0697	SANWA HYDROTECH CORPORATION (only Horizontal Pumps)

## 130201 : PUMPS FOR VERY LOW NPSH REQUIREMENTS (AMM./NAPTHA )

CODE	NAME
<b>SINGAPORE</b>	
16 . P0315	GOULD PUMPS INC.
<b>U.K.</b>	
17 . P0340	HAYWARD TYLER LTD.
<b>U.S.A.</b>	
18 . P0138	BYRON JACKSON PUMP

## 130203 : PUMPS FOR COOLING WATER SERVICE (VERTICAL)

CODE	NAME
<b>INDIA</b>	
1 . P0095	BEACON WEIR LTD.
2 . P0111	BHARAT PUMPS & COMPRESSORS LTD.
3 . P3316	FLOWMORE LIMITED (FORMERLY FLOWMORE PVT. LTD.)
4 . P3002	FLOWSERVE INDIA CONTROLS PVT. LTD.
5 . P0430	JYOTI LIMITED
6 . P0451	KIRLOSKAR BROTHERS LIMITED
7 . P0519	MATHER & PLATT (INDIA) LTD. (A Subsidiary of WILO SE German
8 . P1302	RUHRPUMPEN INDIA PRIVATE LIMITED
9 . P0869	VOLTAS LTD. (PUMPS & PROJECTS BUSINESS DIV)
<b>GERMANY</b>	
10 . P0470	KSB AG
<b>JAPAN</b>	
11 . P0540	mitsubishi heavy industries LTD.
12 . P0724	SHIN NIPPON MACHINERY CO. LTD.
13 . P0817	TORISHIMA PUMP MFG. CO. LTD.
<b>U.K.</b>	
14 . P0395	FLOWSERVE (IDP)

## 130204 : DEEP TUBEWELL PUMPS

CODE	NAME
<b>INDIA</b>	
1 . P0111	BHARAT PUMPS & COMPRESSORS LTD.
2 . P3316	FLOWMORE LIMITED (FORMERLY FLOWMORE PVT. LTD.)
3 . P0430	JYOTI LIMITED
4 . P0451	KIRLOSKAR BROTHERS LIMITED
5 . P0472	KSB PUMPS LIMITED
6 . P0519	MATHER & PLATT (INDIA) LTD. (A Subsidiary of WILO SE German
7 . P0642	PRECISION ENGINEERING INDUSTRIES
8 . P0869	VOLTAS LTD. (PUMPS & PROJECTS BUSINESS DIV)
<b>FRANCE</b>	
9 . P0471	KSB GUINARD
<b>GERMANY</b>	
10 . P0470	KSB AG
<b>ITALY</b>	
11 . P0636	WEIR GABBIONETA SRL (FORMERLY POMPE GABBIONETA SPA)



## 130205 : VERTICAL CAN PUMPS

CODE	NAME
<b>INDIA</b>	
1 . P1179	KIRLOSKAR EBARA PUMPS LIMITED
2 . P3002	FLOWSERVE INDIA CONTROLS PVT. LTD.
3 . P0472	KSB PUMPS LIMITED
4 . P1302	RUHRPUMPEN INDIA PRIVATE LIMITED
5 . P0767	SULZER PUMPS INDIA LIMITED

**130206 : CENTRIFUGAL MONOBLOCK PUMP SET**

CODE	NAME
<b>INDIA</b>	
1 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
2 . P0430	JYOTI LIMITED
3 . P0451	KIRLOSKAR BROTHERS LIMITED
4 . P0519	MATHER & PLATT (INDIA) LTD. (A Subsidiary of WILO SE German
5 . P0642	PRECISION ENGINEERING INDUSTRIES (small pumps upto 2HP)
6 . P3004	UJALA

## 130207 : POT/CAN MOUNTED AND INTANK SUBMERGED MOTOR CRYOGENIC PUMPS

CODE	NAME
<b>INDIA</b>	
1 . P3303	AGROTECH CORP (J.C.CARTER) (up to 1300 m <sup>3</sup> /hr ,2100m HEAD)

## 130208 : SUMP PUMPS

CODE	NAME
<b>INDIA</b>	
1 . P0029	AKAY INDUSTRIES PVT LTD
2 . P0095	BEACON WEIR LTD.
3 . P3002	FLOWSERVE INDIA CONTROLS PVT. LTD.
4 . P0455	KISHORE PUMPS PVT.LTD.
5 . P1302	RUHRPUMPEN INDIA PRIVATE LIMITED
6 . P1144	SAM TURBO INDUSTRY PRIVATE LTD. (Capacity - 550 m3/hr. Head - 35 mtr)

## 130301 : PUMPS FOR REACTOR FEED(AMMONIA & CARBAMATE)

CODE	NAME
<b>INDIA</b>	
1 . P0111	BHARAT PUMPS & COMPRESSORS LTD.
2 . P1156	GOMA ENGINEERING PVT. LTD. (Range: 0-1500 kg/cm <sup>2</sup> Horizontal Triplex Reciprocating Pluger/Piston Pumps (API-674), Capacity: 150 m <sup>3</sup> /hr. Max HP: 700 HP)
<b>GERMANY</b>	
3 . P0847	URACA PUMPENFABRIK GMBH & CO. KG
4 . P0882	WORTHINGTON PUMPS GMBH
<b>ITALY</b>	
5 . P0626	PERONI POMPE SPA (capacity=50m <sup>3</sup> /hr, pr=240kg/cm <sup>2</sup> )

## 130302 : PUMPS FOR CHEMICAL DOSING / METERING

CODE	NAME
<b>INDIA</b>	
1 . P3309	BRAN & LEUBE INDIA
2 . P0521	MATZ PUMPS PRIVATE LIMITED
3 . P3340	MILTON ROY INDIA (P) LTD.
4 . P3070	POSITIVE METERING PUMPS (I) PVT. LTD. (Plunger Pump : 300 LPH Diaphragm Pumps : 3000 LPH)
5 .	POSITIVE METERING PUMPS (I) PVT. LTD. (UP TO 0-6000 LPH)
6 . P1160	S R METERING PUMPS & SYSTEMS (0.3-12462 LPH)
7 . P0721	SHAPO TOOLS
8 . P0779	SWELORE ENGINEERING PVT.LTD.
9 . P0852	V K PUMPS INDUSTRIES PVT. LTD.
10 . P3067	VARICON SYSTEMS (Motor Driven / Pneumatic)
<b>FRANCE</b>	
11 . P0537	DOSAPRO MILLTON ROY
<b>GERMANY</b>	
12 . P0492	LEWA HERBERT OTT GMBH & CO.
<b>ITALY</b>	
13 . P0626	PERONI POMPE SPA (Metering Pump: Capacity 1.13 m3/hr., Pr. 5.59 kg/cm2)
<b>JAPAN</b>	
14 . P0578	NIIGATA WORTHNGTON PUPMS
15 . P0579	NIKKISO CO. LTD.

## 130302 : PUMPS FOR CHEMICAL DOSING / METERING

CODE	NAME
<b>U.K.</b>	
16 . P0125	BRAN & LUEBBE LTD.

## 130303 : PUMPS FOR MISC. SERVICE

CODE	NAME
<b>INDIA</b>	
1 . P3301	A.R.WILFLEY INDIA PVT. LTD.
2 . P0111	BHARAT PUMPS & COMPRESSORS LTD.
3 . P1156	GOMA ENGINEERING PVT. LTD. (Range: 0-1500 kg/cm <sup>2</sup> Capacity: 150 m <sup>3</sup> /hr.Max HP: 700 HP)
4 . P0472	KSB PUMPS LIMITED
5 . P0767	SULZER PUMPS INDIA LIMITED
6 . P3056	UT PUMPS & SYSTEMS PVT. LTD. (High pressure Triplex Plunger Pumps 50 LPM & Pressure 24 bar (Max), High Pressure Jet Cleaning Machine : 100 LPM & 200 bar (Max))
7 . P0852	V K PUMPS INDUSTRIES PVT. LTD. (For Non-critical use)
<b>GERMANY</b>	
8 . P0492	LEWA HERBERT OTT GMBH & CO.
9 . P0847	URACA PUMPENFABRIK GMBH & CO. KG
<b>ITALY</b>	
10 . P0210	DOSAPRO MILTON ROY
11 . P0626	PERONI POMPE SPA (capacity=95m <sup>3</sup> /hr, pr=306kg/cm <sup>2</sup> )
<b>JAPAN</b>	
12 . P0578	NIIGATA WORTHINGTON PUMPS
13 . P0579	NIKKISO CO. LTD.
<b>U.K.</b>	
14 . P0125	BRAN & LUEBBE LTD.



## 130304 : ROTARY PUMPS /SCREW PUMPS

CODE	NAME
<b>INDIA</b>	
1 . P0026	AIRAUTO INDUSTRIES
2 . P0199	DELTA CORPORATION
3 . P3070	POSITIVE METERING PUMPS (I) PVT. LTD. (UP TO 10000 LPH)
4 . P1304	RISANSI INDUSTRIES LIMITED (Single Screw Pump (Manufacturer Standard) Flow- 175 m3/hr & Head- 35 meter)
5 . P0683	ROTO PUMPS LTD.
6 . P3056	UT PUMPS & SYSTEMS PVT. LTD. (1. Single Screw Pump: Capacity-200m3/hr & Pressure- 24 bar (Max), 2. Twin Screw Pump: Capacity-450m3/hr & Pressure- 23 kg/cm2g (Max), 3. Triple Screw Pump: Capacity-103m3/hr & Pressure- 80 bar (Max))

## 130401 : COMPRESSOR FOR HP SERVICE (SYN.GAS,CO<sub>2</sub>,NG ETC.)

CODE	NAME
<b>INDIA</b>	
1 . P0108	BHARAT HEAVY ELECTRICALS LTD.
<b>GERMANY</b>	
2 . P0499	BORSIG GmbH
3 . P0122	MAN TURBOMASCHINEN AG GHH BORSIG
4 . P0735	SIEMENS AG, GERMANY
<b>ITALY</b>	
5 . P0594	GE POWER (NUOVO PIGNONE SPA)
<b>JAPAN</b>	
6 . P0357	HITACHI LTD.
7 . P0410	ISHIKAWAJIMA HARIMA HEAVY INDS.CO LTD (IHI)
8 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
9 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
<b>SINGAPORE</b>	
10 . P0215	DRESSER - RAND CO.

## 130402 : COMPRESSOR FOR MP SERVICE (PROCESS AIR,REF.,CO2,N2,NG)

CODE	NAME
<b>GERMANY</b>	
1 . P1159	FIMA MASCHINENBAU GMBH (Max Flow: 964 m3/Hr, Per Stage Pr. Ratio: Upto 2.3)
<b>INDIA</b>	
2 . P0108	BHARAT HEAVY ELECTRICALS LTD.
3 . P3071	CAMERON COMPRESSION SYSTEM (API 617: 60,000 CFM @ 80 bar; API 672:950,000 CFM @ 80 bar)
<b>GERMANY</b>	
4 . P0074	ATLAS COPCO ENERGAS GMBH
5 . P0309	GHH BORSIG TURBOMASCHINEN GMBH
6 . P0508	SIEMENS AG PGI
<b>ITALY</b>	
7 . P0594	GE POWER (NUOVO PIGNONE SPA)
<b>JAPAN</b>	
8 . P0357	HITACHI LTD.
9 . P0458	KOBE STEEL LIMITED
10 . P0540	mitsubishi heavy industries ltd.
<b>SINGAPORE</b>	
11 . P0215	DRESSER - RAND CO.

## 130403 : BOOSTER COMPRESSOR FOR CO2 & N2

CODE	NAME
<b>GERMANY</b>	
1 . P1159	FIMA MASCHINENBAU GMBH (Max Flow: 964 m3/Hr, Per Stage Pr. Ratio: Upto 2.3)
<b>INDIA</b>	
2 . P0108	BHARAT HEAVY ELECTRICALS LTD.
3 . P3071	CAMERON COMPRESSION SYSTEM (API 617: 60,000 CFM @ 80 bar; API 672:950,000 CFM @ 80 bar)
4 . P0766	SULZER INDIA PRIVATE LTD.
<b>GERMANY</b>	
5 . P0074	ATLAS COPCO ENERGAS GMBH
6 . P0309	GHH BORSIG TURBOMASCHINEN GMBH
7 . P3336	MANNESMAN DEMAG AG.
8 . P0508	SIEMENS AG PGI
<b>JAPAN</b>	
9 . P0410	ISHIKAWAJIMA HARIMA HEAVY INDS.CO LTD (IHI)
10 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
11 . P0458	KOBE STEEL LIMITED
12 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
13 . P0541	mitsui ENGINEERING & SHIPBUILDING CO.LTD
<b>SINGAPORE</b>	
14 . P0215	DRESSER - RAND CO.
<b>SWITZERLAND</b>	

## 130403 : BOOSTER COMPRESSOR FOR CO2 &amp; N2

CODE	NAME
15 . P0765	BURCKHARDT COMPRESSION AG
16 . P3377	SULZER TURBO LIMITED

## 130404 : COMPRESSOR FOR INSTRUMENT AIR SERVICE

CODE	NAME
<b>GERMANY</b>	
1 . P1159	FIMA MASCHINENBAU GMBH (Max Flow: 964 m3/Hr, Per Stage Pr. Ratio: Upto 2.3)
<b>INDIA</b>	
2 . P3057	INGERSOLL RAND INDIA LTD.
<b>GERMANY</b>	
3 . P0074	ATLAS COPCO ENERGAS GMBH
4 . P0309	GHH BORSIG TURBOMASCHINEN GMBH
5 . P0495	LINDE AG WERKSGRUPPE
6 . P3336	MANNESMAN DEMAG AG.
7 . P0508	SIEMENS AG PGI
<b>ITALY</b>	
8 . P0594	GE POWER (NUOVO PIGNONE SPA)
<b>JAPAN</b>	
9 . P0220	EBARA CORPORATION
10 . P0357	HITACHI LTD.
11 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
12 . P0458	KOBE STEEL LIMITED
13 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
14 . P0541	MITSUI ENGINEERING & SHIPBUILDING CO.LTD
<b>SINGAPORE</b>	

## 130404 : COMPRESSOR FOR INSTRUMENT AIR SERVICE

CODE	NAME
15 . P0215	DRESSER - RAND CO.

### **SWITZERLAND**

16 . P3377      SULZER TURBO LIMITED

### **U.S.A.**

17 . P0233      ELLIOT OVERSEAS CORPORATION.

## 130501 : RECIPROCATING COMPRESSOR

CODE	NAME
1 . P1194	ANEST IWATA MOTHERSON PVT. LTD. (UP TO 15 HP (for air services only))
<b>GERMANY</b>	
2 . P1169	NEUMAN & ESSER GmbH & Co. KG
<b>INDIA</b>	
3 . P3007	ATLAS COPCO INDIA LIMITED (for air service only)
4 . P0111	BHARAT PUMPS & COMPRESSORS LTD.
5 . P3387	BURCKHARDT COMPRESSION (INDIA) PVT. LTD. (Capacity upto 15520 m3/hr. Pressure upto 401 Bar abs (CNG application also))
6 . P3071	CAMERON COMPRESSION SYSTEM (API 618: 6000 KW @ 450 Bar)
7 . P3006	DRESSER RAND INDIA PVT. LTD.
8 . P1153	ELGI SAUER COMPRESSORS LTD. (Capacity up to: 172 m3/hr, Pressure up to: 280 bar)
9 . P3057	INGERSOLL RAND INDIA LTD. (for air & N2)
10 . P0478	KIRLOSKAR PNEUMATIC CO. LTD (For Air service only)
<b>KOREA</b>	
11 . P5001	KWANGSHIN MACHINE INDUSTRY CO., LTD. (Upto 3000 HP)
<b>FRANCE</b>	
12 . P0137	HOWDEN (FORMERLY BURTON CORBLIN)
<b>GERMANY</b>	
13 . P0495	LINDE AG WERKSGRUPPE
<b>ITALY</b>	
14 . P0594	GE POWER (NUOVO PIGNONE SPA)



## 130501 : RECIPROCATING COMPRESSOR

CODE	NAME
<b>JAPAN</b>	
15 . P0410	ISHIKAWAJIMA HARIMA HEAVY INDS.CO LTD (IHI)
16 . P0458	KOBE STEEL LIMITED
17 . P0541	mitsui ENGINEERING & SHIPBUILDING CO.LTD
<b>SWITZERLAND</b>	
18 . P0765	BURCKHARDT COMPRESSION AG
<b>THE NETHERLANDS</b>	
19 . P0810	THOMASSEN TURBINE SYSTEMS B.V.

## 130502 : PASSIVATION AIR COMPRESSOR FOR HP STRIPPER

CODE	NAME
<b>INDIA</b>	
1 . P3387	BURCKHARDT COMPRESSION (INDIA) PVT. LTD. (Capacity: 100 NM3/hr; Pressure upto 160 kg/cm 2g)
<b>FRANCE</b>	
2 . P0137	HOWDEN (FORMERLY BURTON CORBLIN)

## 130504 : SCREW COMPRESSOR

CODE	NAME
<b>GERMANY</b>	
1 . P1189	AERZENER MASCHINENFABRIK GMBH. (FOR PROCESS GAS - CAPACITY : 23000 Nm3/hr)
<b>INDIA</b>	
2 . P1211	ELGI EQUIPMENTS LIMITED (FOR INSTRUMENT AIR)
<b>DENMARK</b>	
3 . P0075	ATLAS COPCO KOMPRESSORTEKNIK A/S
<b>GERMANY</b>	
4 . P0499	BORSIG GmbH
5 . P0122	MAN TURBOMASCHINEN AG GHH BORSIG
<b>JAPAN</b>	
6 . P0458	KOBE STEEL LIMITED
<b>SWITZERLAND</b>	
7 . P3377	SULZER TURBO LIMITED
<b>U.K.</b>	
8 . P0368	HOWDEN SIROCCO LIMITED

## 130505 : VACCUM PUMPS AND COMPRESSORS

CODE	NAME
1 . P1194	ANEST IWATA MOTHERSON PVT. LTD. (UP TO 10 HP)
<b>INDIA</b>	
2 . P1158	ACME AIR EQUIPMENTS CO. PVT. LTD. (Upto 1662 CMH- Water Ring Type (Manufacturer Standard))
3 . P3316	FLOWMORE LIMITED (FORMERLY FLOWMORE PVT. LTD.)
4 . P0438	KAY INTERNATIONAL LIMITED
5 . P3063	MAZDA LIMITED
6 . P3351	PREMIER PUMPS PVT LTD. (LIQUID RING VACUUM PUMPS & COMPRESSORS)
7 . P3009	SLM MANEKLAL
8 . P3371	USHA COMPRESSORS PVT. LTD. (Manufacturer Standard)

## 130506 : DIAPHRAGM COMPRESSOR

CODE	NAME
<b>FRANCE</b>	
1 . P0137	HOWDEN (FORMERLY BURTON CORBLIN)

## 130507 : ROTARY COMPRESSOR

CODE	NAME
<b>INDIA</b>	
1 . P1158	ACME AIR EQUIPMENTS CO. PVT. LTD. (Twin/ Tri Lobe Blower -Upto 18720 CMH (Manufacturer Standard))
2 . P3371	USHA COMPRESSORS PVT. LTD.
<b>FRANCE</b>	
3 . P0137	HOWDEN (FORMERLY BURTON CORBLIN)

## 130601 : STEAM TURBINE UPTO 3 MW

CODE	NAME
<b>INDIA</b>	
1 . P1179	KIRLOSKAR EBARA PUMPS LIMITED
<b>CHINA</b>	
2 . P3392	HANGZHOU STEAM TURBINE CO. LTD.
<b>INDIA</b>	
3 . P0065	ASEA BROWN BOVERI LIMITED,
4 . P0108	BHARAT HEAVY ELECTRICALS LTD.
5 . P0452	KIRLOSKAR EBARA PUMPS LIMITED, (Upto 1562 KW (API 611 & API 612) for YR series Turbine)
6 . P0832	TRIVENI ENGINEERING WORKS LIMITED
<b>GERMANY</b>	
7 . P3302	ABB TURBINEN NUMBERG GmbH
8 . P0012	ALSTOM POWER TURBINEN GMBH
9 . P3304	ALTHOM POWER
10 . P0309	GHH BORSIG TURBOMASCHINEN GMBH
11 . P0734	SIEMENS AKTIENGESELLSCHAFT
12 . P0836	TUTHILL NADROWSKI TURBINEN GMBH
<b>ITALY</b>	
13 . P0594	GE POWER (NUOVO PIGNONE SPA)
<b>JAPAN</b>	
14 . P0220	EBARA CORPORATION

**130601 : STEAM TURBINE UPTO 3 MW**

CODE	NAME
15 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
16 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
17 . P0541	mitsui ENGINEERING & SHIPBUILDING CO.LTD
18 . P0724	SHIN NIPPON MACHINERY CO. LTD.
<b>U.S.A.</b>	
19 . P0797	DRESSER RAND CO
20 . P0233	ELLIOT OVERSEAS CORPORATION.
21 . P0825	TRANSMERICA DELAVAL INC.
22 . P0837	TUTHILL ENERGY SYSTEMS



## 130602 : STEAM TURBINE ABOVE 3 MW

CODE	NAME
<b>CHINA</b>	
1 . P3392	HANGZHOU STEAM TURBINE CO. LTD.
<b>INDIA</b>	
2 . P0108	BHARAT HEAVY ELECTRICALS LTD.
3 . P1190	TRIVENI TURBINE LIMITED (UP TO 25 MW FOR NON - API APPLICATIONS)
<b>GERMANY</b>	
4 . P3302	ABB TURBINEN NUMBERG GmbH
5 . P0012	ALSTOM POWER TURBINEN GMBH
6 . P0309	GHH BORSIG TURBOMASCHINEN GMBH
7 . P0734	SIEMENS AKTIENGESELLSCHAFT
<b>ITALY</b>	
8 . P0594	GE POWER (NUOVO PIGNONE SPA)
<b>JAPAN</b>	
9 . P0220	EBARA CORPORATION
10 . P0287	FUJI ELECTRIC SYSTEMS CO. LTD.
11 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
12 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
13 . P0541	MITSUI ENGINEERING & SHIPBUILDING CO.LTD
<b>SWEDEN</b>	
14 . P0064	ASEA BROWN BOVERI
<b>U.S.A.</b>	

**130602 : STEAM TURBINE ABOVE 3 MW**

<b>CODE</b>	<b>NAME</b>
15 . P0797	DRESSER RAND CO
16 . P0233	ELLIOT OVERSEAS CORPORATION.
17 . P0825	TRANSMERICA DELAVAL INC.
18 . P0837	TUTHILL ENERGY SYSTEMS

## 130603 : GAS TURBINE

CODE	NAME
<b>INDIA</b>	
1 . P0065	ASEA BROWN BOVERI LIMITED,
2 . P0108	BHARAT HEAVY ELECTRICALS LTD.
<b>FRANCE</b>	
3 . P0035	ALSTHOM FLUIDES SAPAG
<b>GERMANY</b>	
4 . P0309	GHH BORSIG TURBOMASCHINEN GMBH
<b>ITALY</b>	
5 . P0594	GE POWER (NUOVO PIGNONE SPA)
<b>JAPAN</b>	
6 . P0357	HITACHI LTD.
<b>SINGAPORE</b>	
7 . P0676	ROLLS-ROYCE ENERGY SYSTEMS INC.
<b>THE NETHERLANDS</b>	
8 . P0810	THOMASSEN TURBINE SYSTEMS B.V.
<b>U.K.</b>	
9 . P0428	JOHN BROWN ENGG. LTD.
<b>U.S.A.</b>	
10 . P3311	COOPER ROLLS INCORPORATED.
11 . P0797	DRESSER RAND CO
12 . P0303	GENERAL ELECTRIC CO.

## 130604 : HEAT RECOVERY STEAM GENERATION FOR GAS TURBINE

CODE	NAME
<b>INDIA</b>	
1 . P0108	BHARAT HEAVY ELECTRICALS LTD.
2 . P1104	LARSEN & TOUBRO LIMITED
<b>ITALY</b>	
3 . P1151	STF S.P.A. (Heat Recovery Steam Generation behind Gas Turbine from 1 MW upto 380 MW GT)
<b>JAPAN</b>	
4 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
5 . P0542	mitsui & COMPANY LTD.
6 . P0541	mitsui ENGINEERING & SHIPBUILDING CO.LTD
<b>THE NETHERLANDS</b>	
7 . P0759	NEM HENGEL0
8 . P3361	STORK KETALS
9 . P0810	THOMASSEN TURBINE SYSTEMS B.V.

## 130605 : FANS & BLOWERS

CODE	NAME
<b>GERMANY</b>	
1 . P1159	FIMA MASCHINENBAU GMBH (Max Flow: 900 m3/Hr, Per Stage Pr. Ratio: Upto 1.5)
2 . P1189	AERZENER MASCHINENFABRIK GMBH. (ROOT BLOWER - CAPACITY : 9200 m3/hr)
<b>INDIA</b>	
3 . P0267	ABB FLAKT INDIA LTD.
4 . P0020	AEROVENT PROJECTS PVT.LTD
5 . P0024	AIR CONDITIONING CORPN LTD
6 . P0025	AIR CONTROL & CHEMICAL ENGG. CO.LTD
7 . P0108	BHARAT HEAVY ELECTRICALS LTD.
8 . P3385	BOLDROCCHI INDIA PRIVATE LIMITED (FD/ID Fans / Blowers, Capacity 0.84 m3/s to 423.9 m3/s, Pr. 0.16 kPa to 64.6 kPa, Power 2 KW to 2000 KW)
9 . P3390	DRAFT-AIR INDIA PVT. LTD. (Upto 550 kW/737 HP)
10 . P1182	M/S CB DOCTOR VENTILATORS PVT. LTD. (2,30,000 M3/hr)
11 . P1139	MAXFLOW FANS MANUFACTURING (P) LTD. (Upto 6,16,000 M3/hr)
12 .	MAXFLOW FANS MANUFACTURING (P) LTD.
13 . P1039	SONAL ENGG. PLASTIC FABRICATOR (FOR FRP/PP/CPVC/BLOWERS/FANS ONLY)
14 . P1142	SWAM PNEUMATICS PVT. LTD. (Capacity -From 1485 m3/hr. to 48000 m3/hr. Pressure - From 0.7 barg to 3500 mmwc)
15 . P0804	THERMAX BABCOCK & WILCOX LIMITED
16 . P8028	TLT ENGINEERING INDIA PVT LTD
<b>U.S.A.</b>	

## 130605 : FANS &amp; BLOWERS

CODE	NAME
17 . P3321	ILLONNOIS BLOWERS INC

## 130701 : AGITATORS/ MIXERS

CODE	NAME
<b>INDIA</b>	
1 . P0291	GANSONS LTD.
2 . P3012	HYTEC GRANT INSTRUMENTS
3 . P3013	MARS DYE CHEM PVT. LTD.
4 . P1212	MILTONROY INDIA PRIVATE LIMITED
5 . P3383	RATHI LIGHTNIN MIXERS PRIVATE LIMITED
6 . P0666	REMI PROCESS PLANT & MACHINERY LIMITED
7 . P3011	SAFE MAX AGITATOR
8 . P0751	STANDARD ENGINEERS

## 130702 : FILTERS & SEPARATORS

CODE	NAME
<b>INDIA</b>	
1 . P3389	COPERION IDEAL PVT. LTD.
2 . P3384	FIL SEP EQUIPMENTS PVT. LTD.
3 . P3014	FILTRATION ENGINEERS PVT. LTD.
4 . P0291	GANSONS LTD.
5 . P0318	GRAND PRIX ENGINEERING PVT. LTD. (Cartridge Filters upto 1500#,40" size)
6 . P0338	HAYER STANDARD INDIA PVT.LTD. (only Disc Filters)
7 . P1184	M/S MULTITEX FILTRATION ENGINEERS LTD (UP TO 56" & 600# nozzle size & rating.)
8 . P0549	MULTITEX FILTRATION ENGINEERS LTD
9 . P0610	OTOKLIN PLANTS AND EQUIP LTD.
10 . P1173	PETROMAR ENGINEERED SOLUTIONS PVT.LTD.
11 . P0773	SUPERFLO FILTERS PVT. LTD.
12 . P0839	ULTRAFILTER (INDIA) PVT. LTD.,
<b>SINGAPORE</b>	
13 . P1135	PEERLESS MFG. COMPANY
<b>CANADA</b>	
14 . P3374	WATSON PROCESS SYSTEM (FOR VANE TYPE SEPARATORS)
<b>JAPAN</b>	
15 . P3341	MURA CHEMICALS EQPT.CO. LTD. (FOR VANE TYPE SEPARATORS)
<b>STEINWIESEN</b>	



## 130702 : FILTERS &amp; SEPARATORS

CODE	NAME
16 . P3353	RAUSCHERI VERFARENSTECHNIK GmbH

**U.S.A.**

17 . P3346      NORTHEAST CONTROLS EQPT.CO. LTD. (FOR VANE TYPE SEPARATORS)

## 130703 : PROCESS EJECTORS

CODE	NAME
<b>INDIA</b>	
1 . P1113	NEW FIELD INDUSTRIAL EQUIPMENT PVT. LTD.
2 . P0879	WIEGAND INDIA PVT. LTD.
<b>GERMANY</b>	
3 . P0298	GEA JET PUMPS GMBH
4 . P0463	KOERTING HANNOVER AG
<b>U.S.A</b>	
5 . P0316	GRAHAM CORPORATION
<b>U.S.A.</b>	
6 . P0446	KETEMA INC. SCHUTTE & KOERTING DIVISION

## 130704 : COUPLINGS

CODE	NAME
<b>INDIA</b>	
1 . P1172	CUBIC TRANSMISSION PVT. LTD. (Flexible Disc Coupling: 2kW- 60 MW; Flexible Gear Coupling: Upto 6600kW @100 RPM)
2 . P3017	ELECON ENGG. CO. LTD. (for flexible coupling)
3 . P3018	FENNER (INDIA) LTD. (for flexible coupling)
4 . P3058	HI-CLIFF (for gear coupling)
5 . P3059	RATHI TRANSPower PVT. LTD.
6 . P3060	RATHI TURBOFLEX PVT. LTD. (41.77 MW-6300 RPM MAX)

## 130705 : ARC VALVES

CODE	NAME
<b>GERMANY</b>	
1 . P3053	HOLTER REGELARMETUREN GMBH & CO. KG (HORA)
2 . P3051	SCHROEDAHL
3 . P3050	SCHROEDER
4 . P3052	YARWAY CORPORATION (Formerly TYCO ENGG. & CONSTN. PVT. LTD.)

## 130706 : AXIAL FLOW PUMPS

CODE	NAME
<b>INDIA</b>	
1 . P3316	FLOWMORE LIMITED (FORMERLY FLOWMORE PVT. LTD.)
2 . P3061	KESTNER

**130707 : MECHANICAL SEALS FOR ROTATING EQUIPMENTS**

CODE	NAME
<b>INDIA</b>	
1 . P1188	EAGLE BURGMANN INDIA PVT.LTD.
2 . P1181	LEAK-PROOF ENGINEERING (I) PVT. LTD.
3 . P1199	SEAL MATIC INDIA PRIVATE LIMITED (Mech Seals up to 185 MM Dia.)

## 130901 : AIR CONDITIONING SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P1202	ADVANCE VENTILATION PRIVATE LIMITED
2 . P0024	AIR CONDITIONING CORPN LTD
3 . P1209	ANEMO PROJECTS PRIVATE LIMITED
4 . P0119	BLUE STAR LTD.
5 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
6 . P1187	KIRLOSKAR PNEUMATIC CO. LTD. (VAPOUR ABSORPTION MACHINE - UP TO 600 TR)
7 . P3015	SUVIDHA ENGINEERS
8 . P1303	TAP ENGINEERING (300 TR)
9 . P0869	VOLTAS LTD. (PUMPS & PROJECTS BUSINESS DIV)


## 130902 : POLLUTION CONTROL EQUIPMENT

CODE	NAME
<b>INDIA</b>	
1 . P0024	AIR CONDITIONING CORPN LTD



## 130903 : REFRIGERATION SYSTEMS

CODE	NAME
<b>INDIA</b>	
1 . P1187	KIRLOSKAR PNEUMATIC CO. LTD. (UP TO 162,000 KG/HR)
2 . P3391	SYSTEMS & COMPONENTS (INDIA) PVT. LTD. (30 TR-750 TR)

	<b>MASTER VENDORS LIST FOR PROJECTS</b>	04-00MM-0011	19
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**MASTER VENDORS LIST**  
**FOR**  
**PROJECTS**  
**MECHANICAL ITEMS (REFORMER)**

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## 140101 : COMPLETE REFORMER PACKAGE

CODE	NAME
<b>INDIA</b>	
1 . P0110	B H P V
2 . P1103	LARSEN & TOUBRO LIMITED
<b>FRANCE</b>	
3 . P0345	HEURTEY PETROCHEM ENGG.
<b>GERMANY</b>	
4 . P0162	CLAUDIUS PETERS AG
<b>HOLLAND</b>	
5 . P0010	ABB LUMMUS HEAT TRANSFER B.V.
6 . P0475	TECHNIP BENELUX BV
<b>ITALY</b>	
7 . P0465	KRICHNER ITALIA S.P.A.
<b>JAPAN</b>	
8 . P0157	CHIYODA CORPORATION
9 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
10 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
<b>U.K.</b>	
11 . P0124	BOUSTEAD INTERNATIONAL HEATERS LIMITED
12 . P0280	FOSTER WHEELER POWER PRODUCTS LTD

## 140102 : COMPLETE REFORMER PACKAGE EXCEPT FREE ISSUE OF MATLS.

CODE	NAME
<b>INDIA</b>	
1 . P0110	B H P V
2 . P1103	LARSEN & TOUBRO LIMITED
<b>FRANCE</b>	
3 . P0345	HEURTEY PETROCHEM ENGG.
<b>GERMANY</b>	
4 . P0162	CLAUDIUS PETERS AG
<b>HOLLAND</b>	
5 . P0010	ABB LUMMUS HEAT TRANSFER B.V.
6 . P0475	TECHNIP BENELUX BV
<b>ITALY</b>	
7 . P0465	KRICHNER ITALIA S.P.A.
<b>JAPAN</b>	
8 . P0157	CHIYODA CORPORATION
9 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
10 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
<b>U.K.</b>	
11 . P0124	BOUSTEAD INTERNATIONAL HEATERS LIMITED
12 . P0280	FOSTER WHEELER POWER PRODUCTS LTD

## 140103 : FIRE HEATER PACKAGE

CODE	NAME
<b>INDIA</b>	
1 . P0110	B H P V
2 . P0450	KINETICS TECHNOLOGY INDIA LTD.
3 . P1103	LARSEN & TOUBRO LIMITED
4 . P2191	PETROFAB (A Div. of PETRON ENGINEERING CONSTRUCTION LTD.
<b>ITALY</b>	
5 . P2205	KIRCHNER ITALIA S.p.A.
<b>KOREA</b>	
6 . P2190	JNK HEATERS CO., LTD.
<b>FRANCE</b>	
7 . P0345	HEURTEY PETROCHEM ENGG.
<b>ITALY</b>	
8 . P0465	KRICHER ITALIA S.P.A.
<b>JAPAN</b>	
9 . P0157	CHIYODA CORPORATION
<b>U.K.</b>	
10 . P0124	BOUSTEAD INTERNATIONAL HEATERS LIMITED
11 . P0280	FOSTER WHEELER POWER PRODUCTS LTD

## 140104 : CATALYST TUBES /REFORMER TUBES

CODE	NAME
<b>INDIA</b>	
1 . P4001	CENTRA CERO S.A.
2 . P0589	NITIN CASTINGS LIMITED
3 . P0840	UNI ABEX ALLOY PRODUCTS LIMITED
<b>UK</b>	
4 . P2171	CRONITE SCOMARK ENGG. LTD. (Subject to approval by Process Licensor)
<b>CHINA</b>	
5 . P2158	YANTAI MANOIR HEAT RESISTANT ALLOYS CO. LTD. , P.R.OF CHINA (Material for Centrifugally-Cast Tubes and Static Casting Fittings - Manaurite XM, 900 & 900B with Complete assembly.(Sub. to approval by Process Licensor))
<b>FRANCE</b>	
6 . P0511	MANOIR INDUSTRIES
<b>GERMANY</b>	
7 . P0637	POSE-MARRE EDELSTAHLWERK GMBH
8 . P0707	SCHMIDT & CLEMENS GMBH & CO
<b>JAPAN</b>	
9 . P0412	ITOCHU CORPORATION (REP.KUBOTA CORPN.)
10 . P0458	KOBE STEEL LIMITED
<b>SPAIN</b>	
11 . P2151	T.T.I. - TUBACEX TUBOS INOXIDABLES, S.A. (Upto 250.0 mm OD)
<b>U.K.</b>	
12 . P0209	DONCASTERS-PARALLOY
<b>U.S.A.</b>	
13 . P0014	ABEX CORPORATION

## 140105 : BURNERS

CODE	NAME
<b>USA</b>	
1 . P2236	ZEECO. INC
<b>INDIA</b>	
2 . P0027	AIROIL FLAREGAS (INDIA) PVT.LIMITED,
<b>ITALY</b>	
3 . P2237	I.C.E. Srl (INTERNATIONAL COMBUSTION EQUIPMENT Srl)
<b>USA</b>	
4 . P2203	CALLIDUS TECHNOLOGIES, LLC
<b>JAPAN</b>	
5 . P0584	NIPPON NATIONAL AIR OIL
<b>U.K.</b>	
6 . P7034	CALIDUS
7 . P0333	HAMWORTHY COMBUSTION ENGINEERING LTD.
8 . P0429	JOHN ZINK COMPANY LIMITED
<b>U.S.A.</b>	
9 . P0895	ZINK JOHN CO.



## 140107 : REFRACTORIES (BRICKS)

CODE	NAME
<b>INDIA</b>	
1 . P0069	CALDERYS INDIA REFRACTORIES LIMITED
2 . P2221	GLOBE CARBON INDUSTRIES
3 . P4008	REFRACTORIES SHAPES PVT LTD (3400 MT/Annum)
<b>GERMANY</b>	
4 . P0205	DIDIER WERKE AG
<b>HOLLAND</b>	
5 . P0401	INSULCON B.V.
<b>ITALY</b>	
6 . P0160	CIRIA S.P.A.
<b>JAPAN</b>	
7 . P0634	PLIBRICO JAPAN CO. LTD.
<b>SINGAPORE</b>	
8 . P0336	HARBISON-WALKER REFRACTORIES COMPANY
<b>U.K.</b>	
9 . P0551	M.H. DETRICK CO. LTD.,
10 . P0799	THE CARBORUNDUM CO. LTD.
11 . P0803	THERMAL CERAMIC LTD.

## 140108 : REFRACTORIES (CERAMIC FIBRES)

CODE	NAME
<b>INDIA</b>	
1 . P2231	UNIFRAX INDIA LIMITED
<b>FRANCE</b>	
2 . P4006	SAVOIE REFRACTORIES
<b>GERMANY</b>	
3 . P0205	DIDIER WERKE AG
<b>HOLLAND</b>	
4 . P4005	INSULATION BV
<b>ITALY</b>	
5 . P0160	CIRIA S.P.A.
<b>JAPAN</b>	
6 . P4003	ISOLITE INSULATING PRODUCT
7 . P0634	PLIBRICO JAPAN CO. LTD.
8 . P4004	NICHIAS CORPN.
<b>SINGAPORE</b>	
9 . P0336	HARBISON-WALKER REFRACTORIES COMPANY
<b>U.K.</b>	
10 . P7008	CARBORANDUM RESISTANT MATERIAL
11 . P0551	M.H. DETRICK CO. LTD.,
12 . P4002	THERMAL CERAMICS LTD.
<b>U.S.A.</b>	
13 . P7010	AP GREEN REFRACTORIES

## 140108 : REFRACTORIES (CERAMIC FIBRES)

CODE	NAME
14 . P4007	CHRISTY REFRACTORIES COMPANY

## 140109 : HOT COLLECTOR & OUTLET PIGTAIL

CODE	NAME
<b>BELGIUM</b>	
1 . P0876	WELDERS N.V.
<b>FRANCE</b>	
2 . P0511	MANOIR INDUSTRIES
<b>GERMANY</b>	
3 . P0637	POSE-MARRE EDELSTAHLWERK GMBH
4 . P0707	SCHMIDT & CLEMENS GMBH & CO
<b>ITALY</b>	
5 . P0191	DALMINE SPA
<b>JAPAN</b>	
6 . P0412	ITOCHU CORPORATION (REP.KUBOTA CORPN.)
7 . P0458	KOBE STEEL LIMITED
<b>SWEDEN</b>	
8 . P0004	AB SANDVIK STEEL
<b>U.S.A.</b>	
9 . P0014	ABEX CORPORATION

## 140110 : INLET PIGTAIL & INLET DISTRIBUTOR

CODE	NAME
<b>INDIA</b>	
1 . P0589	NITIN CASTINGS LIMITED
<b>BELGIUM</b>	
2 . P0876	WELDERS N.V.
<b>FRANCE</b>	
3 . P0511	MANOIR INDUSTRIES
<b>GERMANY</b>	
4 . P0637	POSE-MARRE EDELSTAHLWERK GMBH
5 . P0707	SCHMIDT & CLEMENS GMBH & CO
<b>ITALY</b>	
6 . P0191	DALMINE SPA
<b>JAPAN</b>	
7 . P0412	ITOCHU CORPORATION (REP.KUBOTA CORPN.)
8 . P0458	KOBE STEEL LIMITED
<b>SWEDEN</b>	
9 . P0004	AB SANDVIK STEEL
<b>U.S.A.</b>	
10 . P0014	ABEX CORPORATION

# 140111 : W.H. RECOVERY COILS & TUBE MATL.FOR W.H.R. & FIRED HEATERS

CODE	NAME
<b>INDIA</b>	
1 . P0110	B H P V
2 . P1101	LARSEN & TOUBRO LIMITED
3 . P0840	UNI ABEX ALLOY PRODUCTS LIMITED (For cracker coils)
<b>SPAIN</b>	
4 . P2213	DELFIN TUBES, S.A. (Convection Section Coil Assessblies & Accessories)
<b>GERMANY</b>	
5 . P0713	SELAS-LINDE GMBH
<b>ITALY</b>	
6 . P0191	DALMINE SPA
<b>JAPAN</b>	
7 . P0157	CHIYODA CORPORATION
8 . P0412	ITOCHU CORPORATION (REP.KUBOTA CORPN.)
9 . P0458	KOBE STEEL LIMITED
<b>KOREA</b>	
10 . P0370	HYUNDAI CORPORATION
<b>SPAIN</b>	
11 . P2151	T.T.I. - TUBACEX TUBOS INOXIDABLES, S.A. (Upto 250.0 mm OD)
<b>U.K.</b>	
12 . P0124	BOUSTEAD INTERNATIONAL HEATERS LIMITED

## 140113 : COMBUSTION AIR PRE-HEATER

CODE	NAME
<b>INDIA</b>	
1 . P2217	KAMAL ENGINEERING CORPORATION (A DIV.OF KEC INDUSTRIES LTD.)
2 . P0431	KAMAL ENGINEERING CORPORATION,
3 . P1109	KELVION INDIA PRIVATE LIMITED (FORMERLY GEA ECOFLEX INDIA PV
<b>BELGIUM</b>	
4 . P0139	BY-CAST NV
<b>FRANCE</b>	
5 . P0332	HAMON INDUSTRIE THERMIQUE
<b>ITALY</b>	
6 . P0191	DALMINE SPA

## 140114 : ID/FD FAN SET

CODE	NAME
<b>INDIA</b>	
1 . P8028	TLT ENGINEERING INDIA PVT LTD (up to 100m3/sec,750KW, Blower upto 400 Deg.C)
<b>GERMANY</b>	
2 . P0309	GHH BORSIG TURBOMASCHINEN GMBH
3 . P0508	SIEMENS AG PGI
<b>ITALY</b>	
4 . P0196	DE CARDENAS S.R.L.
<b>JAPAN</b>	
5 . P0208	DMW STAINLESS SAS
6 . P0220	EBARA CORPORATION
7 . P0437	KAWASAKI HEAVY INDUSTRIES LTD.
<b>U.S.A.</b>	
8 . P0394	INGERSOLL DRESSER PUMP CO.
9 . P0896	ZURN INDUSRIES




**140115 : STATIC CASTINGS (TUBE SHEET / FITTINGS)**

CODE	NAME
<b>UK</b>	
1 . P2171	CRONITE SCOMARK ENGG. LTD. (Subject to approval by Process Licensor)

## 140116 : FINNED TUBES / STUDDED TUBES

CODE	NAME
<b>INDIA</b>	
1 . P2208	AKSHAR PRECISION TUBES PVT. LTD. (Finned Tubes:upto 6" , Studded Tubes: upto 8")
<b>SPAIN</b>	
2 . P2213	DELFIN TUBES, S.A. (Upto 10")

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## MASTER VENDORS LIST

### FOR

### PROJECTS

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## 150101 : UREA HANDLING SYSTEM

CODE	NAME
INDIA	
1 . P3017	ELECON ENGG. CO. LTD.
2 . P3018	FENNER (INDIA) LTD.
3 . P3027	INDIANA CONVEYORS PVT. LTD.
4 . P3019	TECHNIMONT ICB
5 . P3020	TRF LTD

## 150102 : RAW MATL / COAL HANDLING SYSTEM

CODE	NAME
INDIA	
1 . P3017	ELECON ENGG. CO. LTD. (>Rs.5 Crores)
2 . P3018	FENNER (INDIA) LTD. (>Rs.5 Crores)
3 . P3027	INDIANA CONVEYORS PVT. LTD.
4 . P3023	MACNALLY BHARAT ENGG. CO. LTD. (>Rs.5 Crores)
5 . P3022	MASYC PROJECTS PVT. LTD. (< Rs 10 Crores)
6 . P3024	SHREE CONVEYOR SYSTEMS PVT. LTD. (<Rs 5 Crores)
7 . P3025	SIMPLICITY PROJECTS (<Rs 5 Crores)
8 . P3020	TRF LTD (>Rs.5 Crores)

## 150103 : ASH HANDLING SYSTEM

CODE	NAME
INDIA	
1 . P3312	DESEIN (INDURE)
2 . P3334	MACAWBER BEEKAY PVT.LTD
3 . P2260	SOLID MATERIAL CONVEYING SYSTEMS (Upto 26.5 TPH)
4 . P3369	UNITED CONVEYOR CORPORATION



## 150104 : PNEUMATIC HANDLING SYSTEM

CODE	NAME
INDIA	
1 . P2292	ACME AIR EQUIPMENTS CO. PVT. LTD.
2 . P3389	COPERION IDEAL PVT. LTD. (From 500 kg/hr to 120,000 kg/hr)
3 . P3334	MACAWBER BEEKAY PVT.LTD
4 . P3021	SCORPIO ENGG. PVT. LTD.
5 . P2260	SOLID MATERIAL CONVEYING SYSTEMS (Upto 26.5 TPH)

## 150105 : AUTOMATIC BAGGING & PACKING

CODE	NAME
<i>INDIA</i>	
1 . P2282	ARODO INDIA PRIVATE LIMITED (UPTO 1000 BAGS/HR (BAG WEIGHT-50KG))
2 . P3035	CHRONOS RICHARDSON
3 . P0225	EEL INDIA LTD.
4 . P2293	PAYPER BAGGING INDIA PVT. LTD. (BAGGING CAPACITY UP TO 50 KG)
<i>ITALY</i>	
5 . P2225	CONCETTI S.P.A. (Up to 2400 bags/hr.)
<i>GERMANY</i>	
6 . P3308	BINDER CO AG
7 . P3038	LIBRAWERK
8 . P3039	VOLLENDRA-WERK
<i>JAPAN</i>	
9 . P3041	NEWLONG MACHINE CO.
<i>U.K.</i>	
10 . P3036	CLYDE RICHARD SIMON LTD

## 150106 : PALLETIZER

CODE	NAME
INDIA	
1 . P2282	ARODO INDIA PRIVATE LIMITED (UPTO 1000 BAGS/HR (HEIGHT-2100MM))
2 . P3035	CHRONOS RICHARDSON
3 . P2293	PAYPER BAGGING INDIA PVT. LTD. (SPEED UP TO 600 B/H)
ITALY	
4 . P2225	CONCETTI S.P.A. (Up to 2800 bags/hr.)

## 150201 : BELT CONVEYOR

CODE	NAME
INDIA	
1 . P3026	ADVANCE DYNAMICS (< Rs.3 Crores)
2 . P2222	BTL EPC LIMITED (FORMERLY BENGAL TOOLS LIMITED)
3 . P0164	COBIT ENGINEERING PVT. LTD.
4 . P2267	CONTINENTAL CONVEYORS PRIVATE LIMITED (500mm width to 2200mm width only)
5 . P0225	EEL INDIA LTD. (< 5 Crores)
6 . P3017	ELECON ENGG. CO. LTD.
7 . P3018	FENNER (INDIA) LTD.
8 . P3031	HYQUIP SYSTEMS PVT. LTD. (< Rs.3 Crores)
9 . P3027	INDIANA CONVEYORS PVT. LTD.
10 . P3028	KONEL PROJECTS
11 . P2234	MACMET ENGINEERING LIMITED
12 . P3023	MACNALLY BHARAT ENGG. CO. LTD.
13 . P3030	MAHINDRA ENGG. & CHEMICALS (< Rs.3 Crores)
14 . P3022	MASYC PROJECTS PVT. LTD.
15 . P3029	NAVEEN PROJECTS (< Rs.10 Crores)
16 . P3021	SCORPIO ENGG. PVT. LTD. (Upto 500TPH)
17 . P3024	SHREE CONVEYOR SYSTEMS PVT. LTD. (< Rs.5 Crores)

## 150201 : BELT CONVEYOR

CODE	NAME
18 . P3025	SIMPLICITY PROJECTS (< Rs.5 Crores)
19 . P3062	STALLION ENGG. SYSTEMS PVT. LTD. (< Rs 20 Lakhs)
20 . P3032	TEC PRO SYSTEMS LTD. (< Rs.5 Crores)
21 . P3020	TRF LTD

## 150202 : SCREW CONVEYOR

CODE	NAME
INDIA	
1 . P2222	BTL EPC LIMITED (FORMERLY BENGAL TOOLS LIMITED)
2 . P0164	COBIT ENGINEERING PVT. LTD.
3 . P3069	DOMACLS ENGG. (P) LTD.
4 . P3017	ELECON ENGG. CO. LTD.
5 . P3027	INDIANA CONVEYORS PVT. LTD.
6 . P3028	KONEL PROJECTS
7 . P3022	MASYC PROJECTS PVT. LTD.
8 . P3024	SHREE CONVEYOR SYSTEMS PVT. LTD.
9 . P3032	TEC PRO SYSTEMS LTD.

## 150203 : PIPE CONVEYORS

CODE	NAME
INDIA	
1 . P2222	BTL EPC LIMITED (FORMERLY BENGAL TOOLS LIMITED)
2 . P2234	MACMET ENGINEERING LIMITED
3 . P3022	MASYC PROJECTS PVT. LTD.
4 . P3029	NAVEEN PROJECTS
5 . P3024	SHREE CONVEYOR SYSTEMS PVT. LTD.

## 150204 : CONVEYOR BELTING

CODE	NAME
INDIA	
1 . P3049	ANDREW YULE & CO.
2 . P3378	ANIL RUBBER MILLS PVT. LIMITED
3 . P3047	MRF LIMITED
4 . P3046	ORIENTAL RUBBER INDUSTRIES LTD.
5 . P2148	PENTAGON RUBBER PVT. LTD., (Conveyor Belting of Grade N-17, M-24, HR, SHR & FR as per IS 1891/1994. Width <= 1600 mm and thk. 5-30mm.)
6 . P3048	SEMPERTRANS INDIA PRIVATE LIMITED
7 . P3370	UNIVERSAL CONVEYOR BELTING LTD



## 150205 : BUCKET ELEVATOR

CODE	NAME
INDIA	
1 . P3049	ANDREW YULE & CO.
2 . P3064	BHP ENGINEERS
3 . P2222	BTL EPC LIMITED (FORMERLY BENGAL TOOLS LIMITED)
4 . P0164	COBIT ENGINEERING PVT. LTD.
5 . P3069	DOMACLS ENGG. (P) LTD.
6 . P0225	EEL INDIA LTD. (upto 225 TPH)
7 . P3017	ELECON ENGG. CO. LTD.
8 . P3027	INDIANA CONVEYORS PVT. LTD.
9 . P3030	MAHINDRA ENGG. & CHEMICALS
10 . P3024	SHREE CONVEYOR SYSTEMS PVT. LTD.
11 . P3033	SOLCON ENGINEERS PVT. LTD. (upto 100TPH & 30M High)
12 . P3032	TEC PRO SYSTEMS LTD.
13 . P3020	TRF LTD

## 150206 : CONTINOUS BELT WEIGHER

CODE	NAME
INDIA	
1 . P3314	ENCARDIO-RITE ELECTRONICS PVT.LTD.
2 . P3326	JENSON & NICHOLSON
3 . P0639	POWER ENGG CO
4 . P3362	TEGA INDIA LIMITED
5 . P3365	TRANSWEIGH (INDIA) LIMITED
6 . P3375	WEITEX INDIA LIMITED.

## 150207 : BELT CONVEYOR COMPONENTS(IDLERS & PULLEYS)

CODE	NAME
INDIA	
1 . P2226	GLOBAL CONVEYOR SYSTEMS PVT. LTD. (HPPE (High Performance Poly Etheylene) Idlers & Ceramic Pulleys)
2 . P3026	ADVANCE DYNAMICS
3 . P2222	BTL EPC LIMITED (FORMERLY BENGAL TOOLS LIMITED)
4 . P0164	COBIT ENGINEERING PVT. LTD.
5 . P3017	ELECON ENGG. CO. LTD.
6 . P3018	FENNER (INDIA) LTD.
7 . P0373	IGP ENGINEERS LIMITED
8 . P3027	INDIANA CONVEYORS PVT. LTD.
9 . P2234	MACMET ENGINEERING LIMITED
10 . P3022	MASYC PROJECTS PVT. LTD.
11 . P3029	NAVEEN PROJECTS
12 . P3024	SHREE CONVEYOR SYSTEMS PVT. LTD.
13 . P3062	STALLION ENGG. SYSTEMS PVT. LTD. (idlers & pulley)
14 . P3032	TEC PRO SYSTEMS LTD.

## 150208 : EXTERNAL BELT CLEANER

CODE	NAME
INDIA	
1 . P3319	HOSCH EQUIPMENT (I) LIMITED.
2 . P3328	KAVERI ULTRA -POLYMERS LTD.
ITALY	
3 . P0791	TECHNOMATIC SPA

## 150209 : SKIRT BOARD SEALING SYSTEM

CODE	NAME
INDIA	
1 . P3328	KAVERI ULTRA -POLYMERS LTD.
2 . P3362	TEGA INDIA LIMITED
ITALY	
3 . P0791	TECHNOMATIC SPA

## 150210 : PRILLING BUCKETS FOR UREA, AN &ANP

CODE	NAME
INDIA	
1 . P3068	SIMCO PRILLING EQUIPMENTS

## 150301 : WEIGHING CUM TIPPING MACHINE (BAGGING M/C)

CODE	NAME
<i>INDIA</i>	
1 . P3035	CHRONOS RICHARDSON
2 .	CHRONOS RICHARDSON
3 . P0225	EEL INDIA LTD. (upto 600 Bags/Hr)
4 . P3034	JASUBHAI RICHARD SIMON
5 . P2293	PAYPER BAGGING INDIA PVT. LTD. (WEIGHING MACHINE UP TO 50 KG)
6 . P2283	TECHNO WEIGH SYSTEMS PVT. LTD. (UP TO 900 BAG / HR)
<i>AUSTRIA</i>	
7 . P3040	WAGNER BIRO BINDER AG
<i>GERMANY</i>	
8 . P3038	LIBRAWERK
9 . P3039	VOLLENDRA-WERK
<i>JAPAN</i>	
10 . P3041	NEWLONG MACHINE CO.
<i>U.K.</i>	
11 . P3037	CHRONOS RICHARDSON
12 . P3036	CLYDE RICHARD SIMON LTD

## 150302 : BAG STITCHING MACHINE

CODE	NAME
<i>INDIA</i>	
1 . P3035	CHRONOS RICHARDSON ((Sealing & Stitching M/c))
2 . P3354	REED MEDWAY PACKAGING CO. LIMITED
3 . P2247	SUMECH ENGINEERS PRIVATE LIMITED (upto 1200 bags/hr.)
4 . P2283	TECHNO WEIGH SYSTEMS PVT. LTD. (UP TO 900 BAG / HR)
<i>GERMANY</i>	
5 . P3368	UNION SPECIAL GmbH
<i>JAPAN</i>	
6 . P3345	NEWLONG MACHINE CO
<i>SINGAPORE</i>	
7 . P3315	FISCHBEN PACKAGING (SINGAPORE) PTE LTD.
<i>UAE</i>	
8 . P3344	NEW LONG FZE



**150303 : BIG BAG FILLING MACHINE**

CODE	NAME
INDIA	
1 . P0225	EEL INDIA LTD. (upto 2.0 Te)
2 . P3022	MASYC PROJECTS PVT. LTD.
3 . P2293	PAYPER BAGGING INDIA PVT. LTD. (UP TO 1000 KG)
4 . P3021	SCORPIO ENGG. PVT. LTD. (Upto 2.0 Te)
5 . P2283	TECHNO WEIGH SYSTEMS PVT. LTD. (UP TO 10 BAG / HR)

## 150304 : WAGON LOADERS &amp; TRUCK LOADERS

CODE	NAME
INDIA	
1 . P3042	BLUE STAR LIMITED (BINDER)
2 . P0225	EEL INDIA LTD. (upto 1200 Bags/Hr)
3 . P0638	POWER BUILD LTD
FRANCE	
4 . P3045	BABIELA
GERMANY	
5 . P3043	BEUMER
6 . P3308	BINDER CO AG
7 . P3044	MACHINEN FABRIK MOLLERS GMBH

## 150305 : FILLED BAG DIVERTOR

CODE	NAME
INDIA	
1 . P3022	MASYC PROJECTS PVT. LTD.
2 . P3024	SHREE CONVEYOR SYSTEMS PVT. LTD.
3 . P2283	TECHNO WEIGH SYSTEMS PVT. LTD. (UP TO 900 BAG / HR)

## 150306 : BULK LOADING / UNLOADING SYSTEM & SPOUT

CODE	NAME
INDIA	
1 . P3072	DCL BULK TECHNOLOGIES PVT.LTD.
2 . P2283	TECHNO WEIGH SYSTEMS PVT. LTD. (3T/ HR)

**150401 : CRUSHERS & VIBRATING SCREENS**

<b>CODE</b>	<b>NAME</b>
<i>INDIA</i>	
1 . P3069	DOMACLS ENGG. (P) LTD.
2 . P3017	ELECON ENGG. CO. LTD.
3 . P3323	INTERNATIONAL COMBUSTION
4 . P3329	KINERGY
5 . P3022	MASYC PROJECTS PVT. LTD.
6 . P3342	McNALLY BHARAT ENGG. CO
7 . P3358	SAYAJI IRON & ENGINEERING CO. LTD.
8 . P3366	TRF LIMITED.
9 . P3372	USHA MILL PVT.LIMITED

## 150402 : E.O.T. CRANES

CODE	NAME
INDIA	
1 . P3382	AVON CRANES
2 . P2241	SAFEX ENERGY PVT. LTD.
3 . P3066	SAMCO ENGINEERING PVT. LTD (upto 30 tonnes capacity)
4 . P3363	THE ACME MANUFACTURING CO.LTD.
5 . P3376	WMI CRANES

## 150403 : H.O.T CRANES

CODE	NAME
INDIA	
1 . P3305	ANUPAM INDUSTRIES LIMITED.
2 . P3310	CONSOLIDATED HOISTS PVT.LTD.
3 . P3318	GRIP ENGINEERS PVT. LTD.
4 . P0344	HERCULES HOISTS LTD.
5 . P3332	LIFTING EQPT.& ACCESSORIES LTD.
6 . P3337	MEEKA MACHINERY CO.
7 . P3355	REVA ENGG. INDUSTRIES LIMITED
8 . P3367	UNICON TECHNOLOGY INTERNATIONAL (P) LTD.
9 . P3373	W.H.BRADY & CO LTD.

## 150404 : ELECTRIC HOISTS

CODE	NAME
INDIA	
1 . P3017	ELECON ENGG. CO. LTD.
2 . P0320	GREAVES LTD.
3 . P0344	HERCULES HOISTS LTD.
4 . P0361	HOIST-O-MECH.LTD.
5 . P0365	HOPES METAL INDUSTRIES(I) LTD.
6 . P2241	SAFEX ENERGY PVT. LTD.
7 . P3066	SAMCO ENGINEERING PVT. LTD (upto 20 tonnes capacity)
8 . P0704	SAYAJI IRON & ENGG.CO(P)LIMITED
9 . P0855	VAUGHAN BURN CRANE CO.LIMITED
10 . P0885	W.H. BRADY & CO. LIMITED



## 150405 : CHAIN PULLEY BLOCKS/CHAIN HOISTS

CODE	NAME
INDIA	
1 . P0091	BATLIBOI & CO. LTD.
2 . P0344	HERCULES HOISTS LTD.
3 . P3332	LIFTING EQPT.& ACCESSORIES LTD.
4 . P3333	LIGHT LIFT INDUSTRIES.
5 . P3335	MANGLA HOIST & HYDRAULICS LTD.
6 . P3355	REVA ENGG. INDUSTRIES LIMITED
7 . P2241	SAFEX ENERGY PVT. LTD.
8 . P3364	TRACTEL TIRFOR INDIA PVT.LIMITED
9 . P3373	W.H.BRADY & CO LTD.

## 150406 : RAIL/ROAD WEIGH BRIDGE

CODE	NAME
INDIA	
1 . P3306	ASHBEE SYSTEMS (P) LIMITED.
2 . P3379	ATCO PRODUCTS LIMITED.
3 . P3307	AVERY INDIA LTD.
4 . P3317	GLOBAL WEIGHING INDIA
5 . P3320	HYDERABAD TULAMEN LTD.
6 . P3322	INTEGRATED PROCESS AUTOMATION
7 . P3326	JENSON & NICHOLSON
8 . P3327	JYOTI WEIGHING SYSTEM LTD.
9 . P3338	METTLER- TOLLEDO INDIA PVT.LTD.
10 . P3349	PENTA ELECTRONICS SYSTEM
11 . P3357	SANMAR WEIGHING SYSTEM LTD.

## 150407 : JIB CRANE

CODE	NAME
INDIA	
1 . P2241	SAFEX ENERGY PVT. LTD.
2 . P3066	SAMCO ENGINEERING PVT. LTD (upto 5 tonnes capacity)

## 150408 : DUST EXTRACTION SYSTEM

CODE	NAME
INDIA	
1 . P2281	C K AIRTECH INDIA PRIVATE LIMITED (a CENTRIFUGAL BLOWERS:1000 TO 2,00,000 CMH b BAG FILTERS: 1000 TO 1,50,000 CMH c CYCLONES: 1000 TO 1,50,000 CMH d SCRUBBERS: 1000 TO 2,00,000 CMH)
2 . P3072	DCL BULK TECHNOLOGIES PVT.LTD. (DRY (BAG FILTER) TYPE)

**150801 : LPG CHAIN CONVEYOR SYSTEM & INLINE EQUIPMENTS**

<b>CODE</b>	<b>NAME</b>
<i>INDIA</i>	
1 . P3331	LAYCOCK ENGINEERS
2 . P3380	MENON & PATEL
3 . P3347	PAM SYSTEM
4 . P3352	RAGHVENDRA AUTOMATION PVT. LTD.
5 . P3356	S.S.FABS
6 . P3360	SPECTRUM MECHANICAL ENGINEERS PVT. LTD.

## 150802 : LPG CAROUSAL

CODE	NAME
INDIA	
1 . P3380	MENON & PATEL
2 . P3347	PAM SYSTEM
DENMARK	
3 . P3330	KOSAN CRISPLANT
FRANCE	
4 . P3359	SIRAGA SA

## 150803 : LPG AIR COMPRESSOR

CODE	NAME
INDIA	
1 . P3313	ELGI EQUIPMENTS LTD.
2 . P3057	INGERSOLL RAND INDIA LTD.
3 . P0478	KIRLOSKAR PNEUMATIC CO. LTD


## 150804 : DG SET FOR LPG BOTTLING PLANT

CODE	NAME
INDIA	
1 . P0188	CUMMINS INDIA LIMITED
2 . P3381	GOEL POWER CONTROLS
3 . P0321	GREAVES COTTON & CO. LTD.
4 . P8008	JAKSON ENGINEERS LTD
5 . P0451	KIRLOSKAR BROTHERS LIMITED
6 . P3348	PARRY & CO
7 . P3350	POWERICA LIMITED



## 150805 : WEIGHBRIDGE (WEIGHING MACHINE)

CODE	NAME
INDIA	
1 . P3307	AVERY INDIA LTD.
2 . P3324	JAY INSTRUMENTS & SYSTEMS LIMITED. (JISL)
3 . P3326	JENSON & NICHOLSON
4 . P3343	NARVE TULAMEN /HYDERABAD TULAMAN
5 . P0623	PHILIPS INDIA LTD.
6 . P3357	SANMAR WEIGHING SYSTEM LTD.

	<b>MASTER VENDORS LIST FOR PROJECTS</b>	04-00MM-0011	18
		DOCUMENT NO	REV

**MASTER VENDORS LIST**  
**FOR**  
**PROJECTS**  
**INSTRUMENT ITEMS**

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3118	TRACING	
311801	ELECTRICAL HEAT TRACING	143

## 310101 : GAS ANALYSERS(IR,Thermal Conductivity, Paramagnetic)

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0153	CHEMTROLS INDUSTRIES LTD.
3 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
4 . P3427	ENDRESS+HAUSER (INDIA) PVT. LTD. (TDL type)
5 . P0891	YOKOGAWA INDIA LIMITED ((IR/UV, Thermal, UV, TDLS, Gas Density))
<b>GERMANY</b>	
6 . P0506	
7 . P0735	SIEMENS AG, GERMANY
<b>SINGAPORE</b>	
8 . P0262	EMERSON PROCESS MGT SINGAPORE LTD
<b>U.S.A.</b>	
9 . P0043	AMETEK, INC.
10 . P0552	M.S.A. INTERNATIONAL



## 310102 : pH , CONDUCTIVITY& ORP ANALYSER

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
3 . P3427	ENDRESS+HAUSER (INDIA) PVT. LTD. (Liquid Analysers)
4 . P0277	FORBES POLYMETRON PVT. LTD.
5 . P0891	YOKOGAWA INDIA LIMITED ((pH, conductivity, turbidity, chlorine))
<b>FRANCE</b>	
6 . P0893	ZELLWEGER SA
<b>JAPAN</b>	
7 . P0892	YOKOGAWA ELECTRIC CORPORATION
<b>SINGAPORE</b>	
8 . P0262	EMERSON PROCESS MGT SINGAPORE LTD
9 . P0283	FOXBORO FAR EAST PTE LTD
<b>U.S.A.</b>	
10 . P0328	HACH COMPANY

## 310103 : TRACE ANALYSER / ION SELECTIVE

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0277	FORBES POLYMETRON PVT. LTD.
<b>FRANCE</b>	
3 . P0893	ZELLWEGER SA
<b>U.K.</b>	
4 . P0125	BRAN & LUEBBE LTD.
<b>U.S.A.</b>	
5 . P0328	HACH COMPANY

## 310104 : SO<sub>x</sub> / NO<sub>x</sub> ANALYSER

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
3 . P0891	YOKOGAWA INDIA LIMITED ((CEMS, O <sub>2</sub> -Zirconia))
<b>GERMANY</b>	
4 . P0732	SICK AG
5 . P0735	SIEMENS AG, GERMANY
<b>JAPAN</b>	
6 . P0367	HORIBA LTD.
7 . P0892	YOKOGAWA ELECTRIC CORPORATION
<b>SINGAPORE</b>	
8 . P0262	EMERSON PROCESS MGT SINGAPORE LTD
<b>U.S.A.</b>	
9 . P0488	LEAR SIEGLER MEAS. CTRLS. CORP.
10 . P0552	M.S.A. INTERNATIONAL
11 . P0808	THERMO ENVIRONMENT INSTRUMENTS INC.

## 310105 : MASS SPECTROMETER

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
<b>U.K.</b>	
2 . P0858	VG GAS ANALYSIS SYSTEMS
<b>U.S.A.</b>	
3 . P0607	ORBITAL SCIENCE CORPORATION

## 310106 : GAS CHROMATOGRAPH

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
3 . P0891	YOKOGAWA INDIA LIMITED
<b>SINGAPORE</b>	
4 . P0054	APPLIED AUTOMATION INC
5 . P0283	FOXBORO FAR EAST PTE LTD

310107 : FLUE GAS ANALYSER (ZrO<sub>2</sub> Type)

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
3 . P0891	YOKOGAWA INDIA LIMITED
<b>IRELAND</b>	
4 . P0616	GE PANAMETRICS
<b>U.S.A.</b>	
5 . P0043	AMETEK, INC.

310108 : H<sub>2</sub>S / TOTAL SULPHUR ANALYSERS

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
<b>U.K.</b>	
2 . P0090	BARTON INSTRUMENT SYSTEMS LIMITED

## 310109 : SYSTEM HOUSE ANALYSERS

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P3431	ADAGE AUTOMATION PVT. LIMITED
3 . P3457	ANALYSER INSTRUMENT CO. PVT. LTD.
4 . P3492	AXIS SOLUTIONS PVT.LTD.
5 . P0153	CHEMTROLS INDUSTRIES LTD.
6 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
7 . P0891	YOKOGAWA INDIA LIMITED
<b>ITALY</b>	
8 . P0402	INTECH



## 310110 : DENSITY ANALYSERS

CODE	NAME
<b>INDIA</b>	
1 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD. (coriolis type)
<b>GERMANY</b>	
2 . P0121	BOPP & REUTHER MESSTECHNIK GMBH (coriolis type)
<b>U.K.</b>	
3 . P0741	SOLARTRON MOBREY

## 310111 : MOISTURE ANALYSERS

CODE	NAME
<b><i>IRELAND</i></b>	
1 . P0616	GE PANAMETRICS
<b><i>U.S.A.</i></b>	
2 . P0043	AMETEK, INC.

## 310113 : GAS & FIRE DETECTION SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P0050	ANDREW YULE & COMPANY LTD. (FIRE)
2 . P0787	HONEYWELL AUTOMATION INDIA LIMITED (GAS)
3 . P0415	J B BODA AND BROTHERS PVT. LTD. (GAS,Make-International Sensor Technology)
4 . P3101	POLLUTION PROTECTION SYSTEM MUMBAI PVT LTD (GAS)
5 . P3473	UNIPHOS ENVIROTRONIC PVT.LTD. (FOR GAS DETECTION SYSTEM ONLY)
<b>RUSSIA</b>	
6 . P3498	JSC "ELECTRONSTANDART-PRIBOR" (-)
<b>THAILAND</b>	
7 . P0794	TELEDYNE FLUID SYSTEMS (GAS)
<b>U.K.</b>	
8 . P0306	GENERAL MONITORS (GAS)

## 310114 : AIR QUALITY MONITORING SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P0153	CHEMTROLS INDUSTRIES LTD.

## 310115 : SAMPLE HANDLING SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P3457	ANALYSER INSTRUMENT CO. PVT. LTD.

## 310201 : FLOW ELEMENT:ORIFICE/VENTURI/ FLOW NOZZLE

CODE	NAME
<b>INDIA</b>	
1 . P3481	DYNAFLUID VALVES AND FLOW CONTROLS PVT.LTD
2 . P3482	MINCO (INDIA) PVT. LTD
3 . P0089	BALIGA LIGHTING EQUIPMENTS LIMITED (Only Orifice)
4 . P0153	CHEMTROLS INDUSTRIES LTD.
5 . P3476	COMFIT & VALVES PVT.LTD. (ONLY ORIFICE)
6 . P3199	EUREKA INDUSTRIAL EQUIPMENTS PRIVATE LIMITED (Upto 12" size & upto 600 #)
7 . P3510	EUREKA INDUSTRIAL EQUIPMENTS PVT. LTD.
8 . P3433	FLOWTECH INSTRUMENTS SERVICES (Orifice Plate /Venturi)
9 . P0304	GENERAL INSTRUMENTS CONSORTIUM,
10 . P3490	HYDROPNEUMATICS PVT.LTD
11 . P0400	INSTRUMENTATION LTD. (PALAKKAD)
12 . P0534	MICRO PRECISION PRODUCTS PRIVATE LTD.
13 . P3520	MINCO (INDIA) FLOW ELEMENTS PVT. LTD.
14 . P3453	MINCO (INDIA) FLOW ELEMENTS PVT.LTD. (All range)
15 . P3416	UNICONTROLS INSTRUMENTS PVT. LTD.
<b>GERMANY</b>	
16 . P0121	BOPP & REUTHER MESSTECHNIK GMBH
<b>ITALY</b>	

## 310201 : FLOW ELEMENT:ORIFICE/VENTURI/ FLOW NOZZLE

CODE	NAME
17 . P0791	TECHNOMATIC SPA
<b>U.K.</b>	
18 . P0408	ISA CONTROLS LIMITED
<b>U.S.A.</b>	
19 . P0193	DANIEL MEASUREMENT & CONTROL

## 310202 : PITOT TUBE / ANNUBAR

CODE	NAME
<b>INDIA</b>	
1 . P3481	DYNAFLUID VALVES AND FLOW CONTROLS PVT.LTD
2 . P3482	MINCO (INDIA) PVT. LTD
3 . P0151	ABB INDIA LIMITED
4 . P0171	CONTROL ENGINEERS
5 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
6 . P3510	EUREKA INDUSTRIAL EQUIPMENTS PVT. LTD.
7 . P0534	MICRO PRECISION PRODUCTS PRIVATE LTD.
8 . P3520	MINCO (INDIA) FLOW ELEMENTS PVT. LTD.
9 . P3416	UNICONTROLS INSTRUMENTS PVT. LTD.
<b>ITALY</b>	
10 . P0791	TECHNOMATIC SPA
<b>U.K.</b>	
11 . P0408	ISA CONTROLS LIMITED
<b>U.S.A.</b>	
12 . P0193	DANIEL MEASUREMENT & CONTROL



## 310203 : ROTAMETERS

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0153	CHEMTROLS INDUSTRIES LTD.
3 . P3199	EUREKA INDUSTRIAL EQUIPMENTS PRIVATE LIMITED
4 . P3510	EUREKA INDUSTRIAL EQUIPMENTS PVT. LTD.
5 . P3433	FLOWTECH INSTRUMENTS SERVICES
6 . P0398	INSTRUMENTATION ENGINEERS PVT. LTD.
7 . P0468	KROHNE MARSHALL PVT. LTD.
8 . P0633	PLACKA INSTRUMENTS & CONTROLS PVT. LTD. (Purge Rotameter only)
9 . P0680	ROTA INSTRUMENTATION
10 . P0891	YOKOGAWA INDIA LIMITED
<b>GERMANY</b>	
11 . P0467	KROHNE
12 . P0681	ROTA YOKOGAWA GMBH & CO. KG
<b>JAPAN</b>	
13 . P0888	AZBIL CORPORATION (Formerly YAMATAKE CORPORATION)
14 . P0816	TOKYO KEISO CO. LTD.
<b>U.S.A.</b>	
15 . P0679	EMERSON PROCESS MGT

## 310204 : MASS FLOW METER (CORIOLIS TYPE)

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0153	CHEMTROLS INDUSTRIES LTD.
3 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
4 . P3417	SIEMENS LTD.
5 . P0891	YOKOGAWA INDIA LIMITED
<b>GERMANY</b>	
6 . P0121	BOPP & REUTHER MESSTECHNIK GMBH
7 . P0238	ENDRESS + HAUSER GMBH & CO.,
8 . P0467	KROHNE
<b>U.S.A.</b>	
9 . P0706	SCHLUMBERGER RESOURCE MANAGEMENT LTD.

## 310205 : TURBINE FLOW METER

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0153	CHEMTROLS INDUSTRIES LTD.
3 . P0275	FMC SANMAR LTD.
4 . P3462	ROCKWIN FLOWMETER INDIA PVT.LTD.
<b>GERMANY</b>	
5 . P0121	BOPP & REUTHER MESSTECHNIK GMBH
<b>HOLLAND</b>	
6 . P0397	INSTROMET INTERNATIONAL N.V
<b>JAPAN</b>	
7 . P0888	AZBIL CORPORATION (Formerly YAMATAKE CORPORATION)
8 . P0412	ITOCHU CORPORATION (REP.KUBOTA CORPN.)
<b>SINGAPORE</b>	
9 . P0611	OVAL ASEA PACIFIC PTE LTD
<b>U.K.</b>	
10 . P0090	BARTON INSTRUMENT SYSTEMS LIMITED
11 . P0192	EMERSON PROCESS MGT
<b>U.S.A.</b>	
12 . P0679	EMERSON PROCESS MGT
13 . P0675	ROCKWELL INTERNATIONAL CORPN.

## 310206 : VORTEX METER

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
3 . P0468	KROHNE MARSHALL PVT. LTD.
4 . P3417	SIEMENS LTD.
5 . P0891	YOKOGAWA INDIA LIMITED
<b>GERMANY</b>	
6 . P0121	BOPP & REUTHER MESSTECHNIK GMBH
7 . P0238	ENDRESS + HAUSER GMBH & CO.,
8 . P0467	KROHNE
<b>JAPAN</b>	
9 . P0412	ITOCHU CORPORATION (REP.KUBOTA CORPN.)
<b>U.S.A.</b>	
10 . P0706	SCHLUMBERGER RESOURCE MANAGEMENT LTD.

## 310207 : PD METER

CODE	NAME
<b>INDIA</b>	
1 . P0153	CHEMTROLS INDUSTRIES LTD.
2 . P3102	ROCKWIN FLOW METERS (I) PVT. LTD.
3 . P3462	ROCKWIN FLOWMETER INDIA PVT.LTD.
<b>GERMANY</b>	
4 . P0121	BOPP & REUTHER MESSTECHNIK GMBH
<b>SINGAPORE</b>	
5 . P0611	OVAL ASEA PACIFIC PTE LTD
<b>U.S.A.</b>	
6 . P0679	EMERSON PROCESS MGT
7 . P0706	SCHLUMBERGER RESOURCE MANAGEMENT LTD.

## 310208 : MAGNETIC FLOW METER

CODE	NAME
<b>INDIA</b>	
1 . P3479	ADEPT FLUIDYNE PVT.LTD
2 . P0151	ABB INDIA LIMITED
3 . P0153	CHEMTROLS INDUSTRIES LTD.
4 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
5 . P3427	ENDRESS+HAUSER (INDIA) PVT. LTD.
6 . P3510	EUREKA INDUSTRIAL EQUIPMENTS PVT. LTD.
7 . P0468	KROHNE MARSHALL PVT. LTD.
8 . P3459	SBEM PVT. LTD.
9 . P3417	SIEMENS LTD.
10 . P0891	YOKOGAWA INDIA LIMITED
<b>GERMANY</b>	
11 . P0121	BOPP & REUTHER MESSTECHNIK GMBH
12 . P0467	KROHNE
<b>JAPAN</b>	
13 . P0888	AZBIL CORPORATION (Formerly YAMATAKE CORPORATION)

## 310209 : INSERTION TYPE FLOW METER

CODE	NAME
<b>INDIA</b>	
1 . P3417	SIEMENS LTD.

## 310210 : ULTRASONIC FLOW METER

CODE	NAME
<b>INDIA</b>	
1 . P3479	ADEPT FLUIDYNE PVT.LTD ((Insertion Type only))
2 . P0153	CHEMTROLS INDUSTRIES LTD.
3 . P3465	EIP ENVIRO LEVEL CONTROLS PRIVATE LIMITED
4 . P3427	ENDRESS+HAUSER (INDIA) PVT. LTD.
5 . P3417	SIEMENS LTD.
6 . P0891	YOKOGAWA INDIA LIMITED



## 310211 : ORIFICE METER

CODE	NAME
<b>INDIA</b>	
1 . P0153	CHEMTROLS INDUSTRIES LTD.

## 310212 : METERING SKID

CODE	NAME
<b>INDIA</b>	
1 .	CHEMTROLS INDUSTRIES LTD. ((For Liquid & Gas))

## 310301 : PRESSURE GAUGES

CODE	NAME
1 . P3185	(standard normal type)
<b>INDIA</b>	
2 . P3477	NESSTECH INSTRUMENTS PRIVATE LIMITED
3 . P3483	WIKA INSTRUMENTS INDIA PVT.LTD
4 . P0081	A N INSTRUMENTS PVT. LTD.
5 . P3103	BAUMER TECHNOLOGIES INDIA PVT. LTD.(FORMERLY WAAREE INSTRUM
6 . P3496	FORBES MARSHALL (HYD) PRIVATE LIMITED (Up to 0.6 to 600Kg/cm2)
7 . P3466	GAUGES BOURDON INDIA PVT. LTD.
8 . P0304	GENERAL INSTRUMENTS CONSORTIUM,
9 . P0371	H.GURU INDUSTRIES
10 . P3470	ITEC MEASURES PRIVATE LIMITED
11 . P0512	MANOMETER (INDIA) PVT. LTD.
12 . P3469	MICRO PROCESS CONTROLS
13 . P3517	MILLENNIUM INSTRUMENTS LIMITED
14 . P0622	PEEJEE ENGG. WORKS
15 . P3456	PRECISION MASS PRODUCTS PVT. LTD.
16 . P0646	PREMIUM INST. & CONTROLS LTD.

## 310301 : PRESSURE GAUGES

CODE	NAME
17 . P3454	THERMAL INSTRUMENT INDIA PVT.LTD.
18 . P0874	WALCHANDNAGAR INDUSTRIES LTD.
<b>GERMANY</b>	
19 . P0212	DRESSER EUROPE S.A.
20 . P0880	WIKA ALEXENDER WIEGAND GMBH & CO.
<b>ITALY</b>	
21 . P0746	SPRIANO SPA
<b>JAPAN</b>	
22 . P0558	NAGANO KEIKI SEISAKUSHO
<b>SWITZERLAND</b>	
23 . P0690	RUEGER SA
<b>U.K.</b>	
24 . P0136	BUDENBERG GAUGE CO. LTD.

## 310302 : VOL. SEAL PR. GAUGES

CODE	NAME
<b>INDIA</b>	
1 . P3483	WIKA INSTRUMENTS INDIA PVT.LTD
2 . P0081	A N INSTRUMENTS PVT. LTD. (= < 600# Except Urea Service)
3 . P3496	FORBES MARSHALL (HYD) PRIVATE LIMITED ((Diaphragm Seal Pressure Gauge) (0.06 to 40 Kg/cm <sup>2</sup> ; Low Pressure Gauge range (100mm WC to 6000mmWC)
4 . P3470	ITEC MEASURES PRIVATE LIMITED
5 . P3469	MICRO PROCESS CONTROLS
6 . P3517	MILLENNIUM INSTRUMENTS LIMITED
7 . P3456	PRECISION MASS PRODUCTS PVT. LTD.
8 . P3454	THERMAL INSTRUMENT INDIA PVT.LTD.
<b>GERMANY</b>	
9 . P0212	DRESSER EUROPE S.A.
10 . P0880	WIKA ALEXENDER WIEGAND GMBH & CO.
<b>ITALY</b>	
11 . P0746	SPRIANO SPA
<b>JAPAN</b>	
12 . P0558	NAGANO KEIKI SEISAKUSHO
<b>SWITZERLAND</b>	
13 . P0690	RUEGER SA
<b>U.K.</b>	
14 . P0136	BUDENBERG GAUGE CO. LTD.

## 310303 : LOCAL D/P INDICATORS

CODE	NAME
<b>INDIA</b>	
1 . P3466	GAUGES BOURDON INDIA PVT. LTD.
2 . P3469	MICRO PROCESS CONTROLS
3 . P3517	MILLENNIUM INSTRUMENTS LIMITED
4 . P3456	PRECISION MASS PRODUCTS PVT. LTD.
5 . P0781	SWITZER INSTRUMENT CO.,
<b>U.K.</b>	
6 . P0090	BARTON INSTRUMENT SYSTEMS LIMITED
7 . P0198	DELTA CONTROLS LTD.

## 310304 : PRESSURE & D/P TRANSMITTERS

CODE	NAME
<b>GERMANY</b>	
1 . P3430	VEGA GRIESHABER KG
<b>INDIA</b>	
2 . P0151	ABB INDIA LIMITED
3 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
4 . P3427	ENDRESS+HAUSER (INDIA) PVT. LTD.
5 . P0787	HONEYWELL AUTOMATION INDIA LIMITED
6 . P3417	SIEMENS LTD.
7 . P0891	YOKOGAWA INDIA LIMITED
<b>GERMANY</b>	
8 . P0735	SIEMENS AG, GERMANY
<b>JAPAN</b>	
9 . P0888	AZBIL CORPORATION (Formerly YAMATAKE CORPORATION)
10 . P0892	YOKOGAWA ELECTRIC CORPORATION
<b>SINGAPORE</b>	
11 . P0262	EMERSON PROCESS MGT SINGAPORE LTD
12 . P0740	SMAR SINGAPORE PTE. LTD.
<b>U.S.A.</b>	
13 . P0363	HONEYWELL INC.,
14 . P0544	MOORE PRODUCTS COMPANY

## 310305 : VOL. SEAL PR./DP TRANSMITTER

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
3 . P3427	ENDRESS+HAUSER (INDIA) PVT. LTD.
4 . P0787	HONEYWELL AUTOMATION INDIA LIMITED
5 . P3417	SIEMENS LTD.
6 . P0891	YOKOGAWA INDIA LIMITED
<b>JAPAN</b>	
7 . P0888	AZBIL CORPORATION (Formerly YAMATAKE CORPORATION)
8 . P0287	FUJI ELECTRIC SYSTEMS CO. LTD. (Except Urea Service)
9 . P0892	YOKOGAWA ELECTRIC CORPORATION
<b>SINGAPORE</b>	
10 . P0262	EMERSON PROCESS MGT SINGAPORE LTD
<b>U.S.A.</b>	
11 . P0544	MOORE PRODUCTS COMPANY



## 310310 : PRESSURE & D/P SWITCHES INCLUDING VOL. SEAL

CODE	NAME
<b>INDIA</b>	
1 . P3427	ENDRESS+HAUSER (INDIA) PVT. LTD.
2 . P0379	INDFOS INDUSTRIES LTD. (except vol.seal)
3 . P3405	KAUSTUBHA UDYOG
4 . P3469	MICRO PROCESS CONTROLS
5 . P3456	PRECISION MASS PRODUCTS PVT. LTD.
6 . P0781	SWITZER INSTRUMENT CO., (except vol.seal)
<b>JAPAN</b>	
7 . P0888	AZBIL CORPORATION (Formerly YAMATAKE CORPORATION)
8 . P0558	NAGANO KEIKI SEISAKUSHO
<b>U.K.</b>	
9 . P0198	DELTA CONTROLS LTD.
<b>U.S.A.</b>	
10 . P0743	SOR INC.
11 . P0899	UNITED ELECTRIC CONTROLS CO.

## 310311 : VOL. SEAL PRESSURE.&amp;DP SWITCHES (UREA SERVICE)

CODE	NAME
<b>INDIA</b>	
1 . P3477	NESSTECH INSTRUMENTS PRIVATE LIMITED
2 . P3427	ENDRESS+HAUSER (INDIA) PVT. LTD.
3 . P3456	PRECISION MASS PRODUCTS PVT. LTD.
<b>ITALY</b>	
4 . P0746	SPRIANO SPA
<b>U.K.</b>	
5 . P0198	DELTA CONTROLS LTD.
<b>U.S.A.</b>	
6 . P0743	SOR INC.

## 310401 : TRANSPARENT/ REFLEX / BICOLOR MAG.LEVEL GAUGES

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P3414	BLISS ANAND PRIVATE LIMITED
3 . P3181	CHEMTROLS SAMIL (INDIA) PVT LTD.
4 . P3433	FLOWTECH INSTRUMENTS SERVICES
5 . P3466	GAUGES BOURDON INDIA PVT. LTD.
6 . P3400	NISAN SCIENTIFIC PROCESS EQUIPMENTS PVT. LTD.
7 . P3186	PUNE TECHTROL PVT.LTD. (<=300# rating only)
8 . P0792	TECNOMATIC (INDIA) PVT. LTD.
9 . P3491	V.AUTOMAT & INSTRUMENTS (P) LTD
10 . P0871	V.AUTOMAT & INSTRUMENTS (P) LTD. (upto 300#)
<b>AUSTRIA</b>	
11 . P0672	RICHARD KLINGER AG
<b>ITALY</b>	
12 . P0150	CESARE BONETTI SPA
13 . P0791	TECHNOMATIC SPA
<b>JAPAN</b>	
14 . P0577	NIHON KLINGAGE CO. LTD.
<b>U.S.A.</b>	
15 . P0161	CLARK-RELIANCE CORP.

## 310401 : TRANSPARENT/ REFLEX / BICOLOR MAG.LEVEL GAUGES

CODE	NAME
16 . P0425	JERGUSON GAUGE & VALVE CO.
17 . P0889	TYCO INTERNATIONAL INC.,U.S.A.

## 310402 : LEVEL SWITCHES (FLOAT & DISPLACER TYPE)

CODE	NAME
<b>GERMANY</b>	
1 . P3430	VEGA GRIESHABER KG ((Tuning fork, Capacitance, Radar))
<b>INDIA</b>	
2 . P0151	ABB INDIA LIMITED
3 . P3414	BLISS ANAND PRIVATE LIMITED
4 . P3181	CHEMTROLS SAMIL (INDIA) PVT LTD.
5 . P3466	GAUGES BOURDON INDIA PVT. LTD.
6 . P3186	PUNE TECHTROL PVT.LTD.
7 . P3459	SBEM PVT. LTD.
8 . P3417	SIEMENS LTD. ((Ultrasonic, Vibrating Fork, Capacitance, Paddle))
9 . P3491	V.AUTOMAT & INSTRUMENTS (P) LTD
10 . P0871	V.AUTOMAT & INSTRUMENTS (P) LTD. (upto 300# , Non-critical service)
<b>BELGIUM</b>	
11 . P0502	MAGNETROL INTERNATIONAL N.V.
<b>U.K.</b>	
12 . P0408	ISA CONTROLS LIMITED
13 . P0441	KDG MOBREY LTD.
<b>U.S.A.</b>	
14 . P0743	SOR INC.

## 310403 : DISPLACER TYPE LEVEL TRANSMITTERS

CODE	NAME
<b>INDIA</b>	
1 . P0153	CHEMTROLS INDUSTRIES LTD.
2 . P3183	DRESSER VALVE INDIA PVT LTD (Rating <= 600#)
3 . P3491	V.AUTOMAT & INSTRUMENTS (P) LTD
<b>BELGIUM</b>	
4 . P0502	MAGNETROL INTERNATIONAL N.V. (LVDT)
<b>FRANCE</b>	
5 . P0518	DRESSER MASONEILAN
<b>GERMANY</b>	
6 . P0282	FOXBORO ECKARDT GmbH
<b>ITALY</b>	
7 . P0618	PARCOL SPA (Pneumatic Transmission only)

## 310404 : NUCLEONIC LEVEL TRANSMITTER

CODE	NAME
<b>GERMANY</b>	
1 . P3430	VEGA GRIESHABER KG
<b>INDIA</b>	
2 . P3465	EIP ENVIRO LEVEL CONTROLS PRIVATE LIMITED
<b>GERMANY</b>	
3 . P0101	BERTHOLD TECHNOLOGIES GMBH & CO.KG
4 . P0238	ENDRESS + HAUSER GMBH & CO.,
<b>U.S.A.</b>	
5 . P0439	KAY RAY

## 310405 : CAPACITANCE TYPE LEVEL TRANSMITTER

CODE	NAME
<b>GERMANY</b>	
1 . P3430	VEGA GRIESHABER KG
<b>INDIA</b>	
2 . P3427	ENDRESS+HAUSER (INDIA) PVT. LTD.
3 . P3417	SIEMENS LTD.
<b>BELGIUM</b>	
4 . P0502	MAGNETROL INTERNATIONAL N.V.
<b>GERMANY</b>	
5 . P0238	ENDRESS + HAUSER GMBH & CO.,
6 . P0467	KROHNE
<b>U.K.</b>	
7 . P0441	KDG MOBREY LTD.



## 310406 : TANK LEVEL INSTRUMENTS

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P3465	EIP ENVIRO LEVEL CONTROLS PRIVATE LIMITED
3 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
4 . P3186	PUNE TECHTROL PVT.LTD.
5 . P3459	SBEM PVT. LTD.
6 . P3417	SIEMENS LTD. ((Radar Level Transmitter, Guded Wave Radar))
<b>GERMANY</b>	
7 . P0238	ENDRESS + HAUSER GMBH & CO., (Non-contact & servo)
8 . P0467	KROHNE (Non-contact type)
<b>JAPAN</b>	
9 . P0816	TOKYO KEISO CO. LTD.
<b>SINGAPORE</b>	
10 . P0240	ENRAF SINGAPORE PTE. LTD.
<b>U.S.A.</b>	
11 . P0480	L & J TECHNOLOGIES

## 310408 : RESISTIVE ELECTRODE TYPE LEVEL INSTRUMENT

CODE	NAME
<b>U.S.A.</b>	
1 . P0161	CLARK-RELIANCE CORP.
2 . P0706	SCHLUMBERGER RESOURCE MANAGEMENT LTD.

## 310409 : SPECIAL LEVEL SWITCHES (VIBRATION FORK/RF ADMITTANCE)

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P3465	EIP ENVIRO LEVEL CONTROLS PRIVATE LIMITED
3 . P3404	PROTOCONTROL INSTRUMENTS (I) PVT. LTD. (For Non Critical application)
<b>GERMANY</b>	
4 . P0238	ENDRESS + HAUSER GMBH & CO.,
<b>U.S.A.</b>	
5 . P0743	SOR INC.

## 310410 : ULTRASONIC LEVEL TRANSMITTER

CODE	NAME
<b>GERMANY</b>	
1 . P3430	VEGA GRIESHABER KG
<b>INDIA</b>	
2 . P3465	EIP ENVIRO LEVEL CONTROLS PRIVATE LIMITED
3 . P3417	SIEMENS LTD.

## 310411 : TANK FARM MANAGEMENT

CODE	NAME
<b>INDIA</b>	
1 . P3427	ENDRESS+HAUSER (INDIA) PVT. LTD. (Servo, Radar)

## 310412 : GUIDED WAVE RADAR

CODE	NAME
<b>GERMANY</b>	
1 . P3430	VEGA GRIESHABER KG
<b>INDIA</b>	
2 . P3427	ENDRESS+HAUSER (INDIA) PVT. LTD.

## 310413 : NUCLEONIC DENSITY METER

CODE	NAME
<b>GERMANY</b>	
1 . P3430	VEGA GRIESHABER KG
<b>INDIA</b>	
2 . P3465	EIP ENVIRO LEVEL CONTROLS PRIVATE LIMITED

## 310501 : TEMPERATURE ELEMENTS (THERMOCOUPLE, RTD)

CODE	NAME
<b>INDIA</b>	
1 . P3477	NESSTECH INSTRUMENTS PRIVATE LIMITED
2 . P3483	WIKA INSTRUMENTS INDIA PVT.LTD
3 . P0151	ABB INDIA LIMITED
4 . P3184	ALTOP INDUSTRIES LTD. (only normal type (MI))
5 . P0201	DETRIV INSTRUMENTATION & ELECTRONICS LTD (Only Normal Type)
6 . P0227	ELECTRICAL & ELECTRONICS CORPORATION,
7 . P0232	ELEIND ENGINEERING PVT. LTD. (Only Normal Type)
8 . P3427	ENDRESS+HAUSER (INDIA) PVT. LTD.
9 . P3439	EXOTHERM INSTRUMENTS
10 . P3466	GAUGES BOURDON INDIA PVT. LTD.
11 . P0304	GENERAL INSTRUMENTS CONSORTIUM,
12 . P3436	GOA INSTRUMENTS INDUSTRIES PVT. LTD.
13 . P0390	INDUSTRIAL INSTRUMENTATION, (Only Normal Type)
14 . P3470	ITEC MEASURES PRIVATE LIMITED
15 . P3469	MICRO PROCESS CONTROLS
16 . P3517	MILLENNIUM INSTRUMENTS LIMITED
17 . P3456	PRECISION MASS PRODUCTS PVT. LTD.



## 310501 : TEMPERATURE ELEMENTS (THERMOCOUPLE, RTD)

CODE	NAME
18 . P3402	PYRO ELECTRIC INSTRUMENTS GOA PVT. LTD. (A.Thermocouple Assemblies with / without Thermowells; B. RTD Assemblies with / without Thermowells.)
19 . P3507	TECHNO INSTRUMENTS
20 . P3420	TEMPSENS INSTRUMENTS (I) PVT. LTD.
21 . P3454	THERMAL INSTRUMENT INDIA PVT.LTD. (All Ranges)
22 . P3416	UNICONTROLS INSTRUMENTS PVT. LTD.
<b>GERMANY</b>	
23 . P0716	SENSYCON ( M/S DEGUSSA AG )
24 . P0884	W.C. HERAEUS GMBH
<b>HOLLAND</b>	
25 . P0807	THERMO ELECTRIC CO. LTD.
<b>JAPAN</b>	
26 . P0888	AZBIL CORPORATION (Formerly YAMATAKE CORPORATION)
27 . P0600	OKAZAKI MANUFACTURING CO.

## 310502 : BIMETALLIC THERMOMETER

CODE	NAME
1 . P3185	
<b>INDIA</b>	
2 . P3477	NESSTECH INSTRUMENTS PRIVATE LIMITED
3 . P0081	A N INSTRUMENTS PVT. LTD.
4 . P3103	BAUMER TECHNOLOGIES INDIA PVT. LTD.(FORMERLY WAAREE INSTRUM
5 . P3496	FORBES MARSHALL (HYD) PRIVATE LIMITED ((-50 'C to -400'C))
6 . P3466	GAUGES BOURDON INDIA PVT. LTD.
7 . P0304	GENERAL INSTRUMENTS CONSORTIUM,
8 . P3436	GOA INSTRUMENTS INDUSTRIES PVT. LTD.
9 . P0371	H.GURU INDUSTRIES
10 . P3470	ITEC MEASURES PRIVATE LIMITED
11 . P0468	KROHNE MARSHALL PVT. LTD.
12 . P3517	MILLENNIUM INSTRUMENTS LIMITED
13 . P3456	PRECISION MASS PRODUCTS PVT. LTD.
14 . P3454	THERMAL INSTRUMENT INDIA PVT.LTD.
<b>ITALY</b>	
15 . P0791	TECHNOMATIC SPA
<b>JAPAN</b>	

## 310502 : BIMETALLIC THERMOMETER

CODE	NAME
16 . P0558	NAGANO KEIKI SEISAKUSHO

### **SWITZERLAND**

17 . P0690 RUEGER SA

### **U.S.A.**

18 . P0827 TREND INSTRUMENT INC.

## 310503 : DIAL THERMOMETER (Hg in Steel/Glass)

CODE	NAME
1 . P3185	
<b>INDIA</b>	
2 . P3477	NESSTECH INSTRUMENTS PRIVATE LIMITED
3 . P3483	WIKA INSTRUMENTS INDIA PVT.LTD
4 . P0081	A N INSTRUMENTS PVT. LTD.
5 . P3103	BAUMER TECHNOLOGIES INDIA PVT. LTD.(FORMERLY WAAREE INSTRUM
6 . P3496	FORBES MARSHALL (HYD) PRIVATE LIMITED (HG in Steel / Glass); (-50 'C to 600'C))
7 . P3466	GAUGES BOURDON INDIA PVT. LTD.
8 . P0304	GENERAL INSTRUMENTS CONSORTIUM,
9 . P3436	GOA INSTRUMENTS INDUSTRIES PVT. LTD. (Liquid filled, Gas filled, Mercury in steel)
10 . P0371	H.GURU INDUSTRIES
11 . P3470	ITEC MEASURES PRIVATE LIMITED
12 . P3469	MICRO PROCESS CONTROLS
13 . P3517	MILLENNIUM INSTRUMENTS LIMITED
14 . P0622	PEEJEE ENGG. WORKS
15 . P3456	PRECISION MASS PRODUCTS PVT. LTD.
16 . P3454	THERMAL INSTRUMENT INDIA PVT.LTD.

## 310503 : DIAL THERMOMETER (Hg in Steel/Glass)

CODE	NAME
17 . P0874	WALCHANDNAGAR INDUSTRIES LTD.

## 310504 : RADIATION PYROMETER

CODE	NAME
<b>INDIA</b>	
1 . P3420	TEMPSENS INSTRUMENTS (I) PVT. LTD.
<b>GERMANY</b>	
2 . P0735	SIEMENS AG, GERMANY
<b>ITALY</b>	
3 . P0189	C.C.R. TECHNICO
<b>JAPAN</b>	
4 . P0155	CHINO CORPN.
<b>U.K.</b>	
5 . P0482	LAND INFRARED
<b>U.S.A.</b>	
6 . P0873	WAHL INSTRUMENTS

## 310505 : TEMPERATURE TRANSMITTER

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P3427	ENDRESS+HAUSER (INDIA) PVT. LTD.
3 . P3417	SIEMENS LTD.
4 . P0891	YOKOGAWA INDIA LIMITED
<b>JAPAN</b>	
5 . P3415	M. SYSTEM CO., LTD., (Model No. B6U-B; Model No. 27HU-B)

## 310506 : TEMPERATURE SWITCHES

CODE	NAME
<b>INDIA</b>	
1 . P3436	GOA INSTRUMENTS INDUSTRIES PVT. LTD.



## 310507 : SPECIAL TEMPERATURE ELEMENTS

CODE	NAME
<b>INDIA</b>	
1 . P3513	THERMAL INSTRUMENT INDIA PVT. LTD.

## 310601 : GATE/PLUG VALVES

CODE	NAME
<b>INDIA</b>	
1 . P3531	AIRA EURO AUTOMATION PVT. LTD. (Plug Valves Only (Non Lubricated) - Up to 10", 150#, 300#)
2 . P0077	AUDCO INDIA LIMITED(L&T VALVES DIVN.)
3 . P0115	BHEL (VALVES DIVISION)
4 . P3181	CHEMTROLS SAMIL (INDIA) PVT LTD. (For Plug Valves only)
5 . P3424	FLOWSERVE INDIA CONTROL PVT. LTD. (Plug Valve upto 12" 300#, upto 6" 600#)
6 . P0473	KSB PUMPS LIMITED (VALVES DIVN)
7 . P3441	NU TECH CONTROLS (MOV Gate : ½" to 8" - 2500#; 10" to 14" - 300#)
8 . P3105	SAMSON CONTROLS PVT. LTD. (Upto 34" - 300 #)
9 . P3460	VALVE-TECH INDUSTRIES ((MOV - 8" Upto 2500#) Non Critical)
10 . P3448	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (GATE VALVE : Upto 14" 150#; 2"-12" upto 600#; 2"-12" 900# to 1500#; PLUG VALVE:Upto 16" 150#;2"-12" upto 300#;2"-3" upto 600#)
<b>india</b>	
11 . P3461	VALTECH INDUSTRIES (Upto 28" - 150#)
<b>CANADA</b>	
12 . P0857	VELAN INC. (Size : ¼" to 24" (Rating upto 2500 #), Size : 26" to 30" (Rating upto 600#))
<b>FRANCE</b>	
13 . P0507	MALBRANQUE S.A.
<b>ITALY</b>	
14 . P0150	CESARE BONETTI SPA
15 . P0253	FASANI S.P.A.

## 310601 : GATE/PLUG VALVES

CODE	NAME
16 . P0628	PETROL VALVES S.R.L

**JAPAN**

17 . P0520 MATSURA H. P MACHINE WORKS CO.LTD.,

**U.K.**

18 . P0097 BEL VALVES

## 310602 : GLOBE / ANGLE VALVES

CODE	NAME
<b>INDIA</b>	
1 . P3449	AST S.P.A (Up to 8" 900#, Urea Grade Also)
2 . P0153	CHEMTROLS INDUSTRIES LTD. ((For Water and Steam))
3 . P3425	CIRCOR FLOW TECHNOLOGIES INDIA PVT. LTD. (Globe 2" to 16" 300#, Angle 12" 2500#)
4 . P3529	DEMBLA VALVES LIMITED (Up to 32", 150# - 300#, Up to 18", 600# & Up to 10", 900# - 1500#)
5 . P3183	DRESSER VALVE INDIA PVT LTD (Rating <= 600# , Size 3/4 to 6")
6 . P3437	EMET CONTROLS PVT. LTD. (Globe Valve Upto 4" 300#, Angle Valve upto 1½" 2500#)
7 . P3424	FLOWSERVE INDIA CONTROL PVT. LTD. (Globe Valve upto 30" 600#, upto 24" 900#, upto 16" 2500#, upto 4" 4500#)
8 . P0400	INSTRUMENTATION LTD. (PALAKKAD) (=<2500#,except slurry,noise,cavitation)
9 . P3401	KOSO INDIA PVT. LTD. (Globe Valves :Upto 8": 2500#, 10" to 18": 300#; Angle Valves : Upto 8" : 300#)
10 . P3463	L&T VALVES LTD. (Upto 24" - 1500#, except Urea Grade)
11 . P3495	MASCOT VALVES PRIVATE LIMITED (UP TO 12"-150-300#)
12 . P0536	MIL CONTROLS LIMITED (Globe Valves:Size upto 24" & Rating upto 2500#(except slurry); Angle Valves:Upto 20" & Rating upto 2500# (except slurry))
13 . P3441	NU TECH CONTROLS (10" 150# for non-critical services)
14 . P3455	PNEUCON VALVES PVT. LTD. (Globe Valves, Upto 6" - 300#, Non Critical)
15 . P0656	R K CONTROL INSTRUMENTS PVT. LTD. (½" to 4" 1500#; 6" to 8" 150#, Water and Non-critical services)
16 . P3105	SAMSON CONTROLS PVT. LTD. (Upto 6" & Rating :=<600# (for small Projects))
17 . P3406	SEVERN GLOCON INDIA PVT. LTD. (1" - 30" 900#; Upto 20" 2500#)

## 310602 : GLOBE / ANGLE VALVES

CODE	NAME
18 . P3426	TECHNIK VALVES PVT. LTD. (Globe Valve (upto 4" - 150#, Air & Water service))
19 . P3508	TECHNIK VALVES PVT.LTD.
20 . P3460	VALVE-TECH INDUSTRIES ((MOV - 8" Upto 300#, 4" Upto 2500#) Non Critical)
<b>india</b>	
21 . P3461	VALTECH INDUSTRIES ( Upto 3" - 300#)
<b>FRANCE</b>	
22 . P0518	DRESSER MASONEILAN (=<2500#,Urea service also)
<b>GERMANY</b>	
23 . P0058	ARCA-REGLER GMBH (=< 2500#)
<b>ITALY</b>	
24 . P0618	PARCOL SPA (=<2500#,Urea service also)
<b>JAPAN</b>	
25 . P0888	AZBIL CORPORATION (Formerly YAMATAKE CORPORATION) (=<2500#)
26 . P0582	NIPPON FISHER CO. LTD. (=<2500#)
<b>SINGAPORE</b>	
27 . P0261	FISHER XOMOX (=< 2500#)
<b>U.S.A.</b>	
28 . P0854	FLOWSERVE (=<2500#)

## 310603 : BALL VALVES

CODE	NAME
<b>INDIA</b>	
1 . P3531	AIRA EURO AUTOMATION PVT. LTD. (Up to 14", 150#, 300#)
2 . P3419	ANAND TEKNOVA AIDS ENGINEERING INDIA LIMITED (UPTO 6", 600# (ON-OFF))
3 . P3434	BRAY CONTROLS INDIA PVT. LTD. (Upto 4" - 300#)
4 . P3505	CAIR EUROMATIC AUTOMATION PVT. LTD. (Non -critical services)
5 . P3484	DELVAL FLOW CONTROLS PVT.LTD. (up to 8"-300# and 8"-18"- 600#)
6 . P3529	DEMBLA VALVES LIMITED (Up to 48", 150# , Up to 36", 300#, Up to 12", 600# - 900# & Up to 3", 1500#)
7 . P3437	EMET CONTROLS PVT. LTD. (Upto 8" 150#, For Air Service)
8 . P3424	FLOWERVE INDIA CONTROL PVT. LTD. (Upto 16" 600#)
9 . P3450	INTERVALVE POONAWALLA LIMITED (Upto 10" 150#)
10 . P3526	INTERVALVE POONAWALLA LTD. (UP TO 6", 2500#, UP TO 12",1500# & UP TO 20", 900#)
11 . P3401	KOSO INDIA PVT. LTD. (Upto 8": 2500 # , 10" to 18": 900#)
12 . P3463	L&T VALVES LTD. (Upto 24" - 2500#, except Urea Grade)
13 . P3495	MASCOT VALVES PRIVATE LIMITED (UP TO 14"-300#)
14 . P3464	METSO INDIA PVT. LTD. (ON-OFF VALVE Upto 18" - 150#)
15 . P3468	MICROFINISH VALVES PVT. LTD. (Ball Valve :24" - 300#, 18" - 600#, 16" - 900#)
16 . P3441	NU TECH CONTROLS (14" 600# for non-critical services)
17 . P3111	PENTAIR VALVES AND CONTROLS INDIA PRIVATE LIMITED (=< 150 #)

## 310603 : BALL VALVES

CODE	NAME
18 . P3455	PNEUCON VALVES PVT. LTD. (Upto 6" - 150#. Non Critical)
19 . P3105	SAMSON CONTROLS PVT. LTD. (Upto 24" - 1500#)
20 . P3460	VALVE-TECH INDUSTRIES ((On-Off Metal Seated Valve 18" - 150#) Non Critical)
21 . P3518	VENTIL FLOWSERVE PVT. LTD. (1.5" TO 12" 150#)
22 . P0865	VIRGO ENGINEERS LTD. (=<600# with Maccair actuators)
23 . P3448	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Upto 16" 150#)
<b>india</b>	
24 . P3461	VALTECH INDUSTRIES (Upto 6" - 150#)
<b>CANADA</b>	
25 . P0857	VELAN INC. (Ball Valves (On/Off) Size : ¼" to 6" (Rating upto 2500 #), Size: 8" to 16"(Rating upto 900#), Size: 18" to 30" Rating upto 300#))
<b>GERMANY</b>	
26 . P3409	PERRIN GmbH (Size: ½ " to 12" & Rating 150# to 2500#; Size: 14" to 18" & Rating: 150# to 1500#; Size : 20" to 24" & Rating: 150# & 300#)
<b>ITALY</b>	
27 . P0476	GTC ITALIA, S.R.L. (=<300#)
28 . P0628	PETROL VALVES S.R.L
29 . P0631	PIBIVIESSE SRL (rating upto 2500 #)
<b>SINGAPORE</b>	
30 . P0568	METSO AUTOMATION (=<2500#)
31 . P0606	ORBIT VALVES PLC (=<2500#)

## 310604 : BUTTERFLY VALVES

CODE	NAME
<b>INDIA</b>	
1 . P3451	ADVANCE VALVES PVT.LTD. (Size: 2" to 24" upto 600 #)
2 . P3531	AIRA EURO AUTOMATION PVT. LTD. (Up to 48",150# & Up to 24",150#, 300#, Double & Triple Offset)
3 . P3434	BRAY CONTROLS INDIA PVT. LTD. (Upto 300#)
4 . P3505	CAIR EUROMATIC AUTOMATION PVT. LTD. (Non -critical services)
5 . P3484	DELVAL FLOW CONTROLS PVT.LTD. (2"-24" 150# and 2"-14" 300#)
6 . P3529	DEMBLA VALVES LIMITED (Up to 50", 150# Double offset, Up to 34", 300# - 600# Double & Triple offset)
7 . P3437	EMET CONTROLS PVT. LTD. (Upto 4" 900#, 6" 150# to 16" 150#, double eccentric)
8 . P3424	FLOWERVE INDIA CONTROL PVT. LTD. (Upto 30" 300#, upto 12" 600#)
9 . P0400	INSTRUMENTATION LTD. (PALAKKAD) (=< 300#)
10 . P3450	INTERVALVE POONAWALLA LIMITED (2" to 48" 150#)
11 . P3526	INTERVALVE POONAWALLA LTD. (UP TO 48", 150#)
12 . P3401	KOSO INDIA PVT. LTD. (Upto 12": 600#, 12" to 40": 300#)
13 . P3463	L&T VALVES LTD. (Upto 36" - 1500#, except Urea Grade)
14 . P3495	MASCOT VALVES PRIVATE LIMITED (UP TO 30"-150#)
15 . P3464	METSO INDIA PVT. LTD. (CONTROL VALVE Upto 4" - 300# ; ON-OFF VALVE Upto 16" - 300#)
16 . P3441	NU TECH CONTROLS (16" 300# for non-critical services)
17 . P3111	PENTAIR VALVES AND CONTROLS INDIA PRIVATE LIMITED (=< 150 #)



## 310604 : BUTTERFLY VALVES

CODE	NAME
18 . P3455	PNEUCON VALVES PVT. LTD. (Upto 8" - 150#, Non Critical)
19 . P0656	R K CONTROL INSTRUMENTS PVT. LTD. (Upto 8" 150# Cooling Water, Non-critical services)
20 . P3105	SAMSON CONTROLS PVT. LTD. (Upto 32 - 150#)
21 . P3406	SEVERN GLOCON INDIA PVT. LTD. (Up to 42"-150#, up to 30"-300#, up to 30"-600#)
22 . P3460	VALVE-TECH INDUSTRIES (Non-Critical)
23 . P0865	VIRGO ENGINEERS LTD. (= $\leq$ 300#)
24 . P3448	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Upto 16" 300#)
<b>KOREA</b>	
25 . P3403	KOREA UNICOM VALVE CO. LTD. (For Rating = $\leq$ 300 #)
<b>USA</b>	
26 . P3198	BRAY CONTROLS, USA (Rating : $\leq$ 300#)
<b>india</b>	
27 . P3461	VALTECH INDUSTRIES (Upto 6" - 300#)
<b>ITALY</b>	
28 . P3193	ORTON S.r.l. (Upto 2500#)
29 . P0618	PARCOL SPA (= $\leq$ 2500# Urea Service also)
<b>SINGAPORE</b>	
30 . P0448	KEYSTONE (Upto 2500#)
31 . P0568	METSO AUTOMATION (Upto 2500#)
<b>U.K.</b>	

## 310604 : BUTTERFLY VALVES

CODE	NAME
32 . P0489	LEEDS VALVE LTD

## 310605 : SAUNDERS (PINCH) VALVES

CODE	NAME
<b>INDIA</b>	
1 . P0093	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Upto 150#)

## 310606 : SOLENOID VALVES

CODE	NAME
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1 .

### **INDIA**

2 . P0062 ASCO (INDIA) LIMITED

3 . P3438 AVCON CONTROLS PVT. LTD. (For Non-critical areas)

4 . P3527 AVCON CONTROLS PVT. LTD.

5 . P0682 ROTEX AUTOMATION LIMITED

6 . P3447 SCHRADER DUNCAN LTD. (1/8" to 1½" Port size (For Non-critical Applications))

7 . P3444 U FLOW AUTOMATION (Non-critical)

### **GERMANY**

8 . P0375 IMI NORGREN-HERION FLUIDTRONIC GMBH&CO.

### **U.K.**

9 . P0031 ALEXENDER CONTROLS LTD.,

10 . P0061 ASCO JOUCOMATIC LTD.

## 310607 : PRDS & SPRAY NOZZLE, VENT VALVES upto 2500#

CODE	NAME
<b>INDIA</b>	
1 . P3106	ARCA (FORBES MARSHAL) (Mech.spray nozzle type desuperheater only)
2 . P0153	CHEMTROLS INDUSTRIES LTD. ((PRDS Combine & Split))
3 . P3425	CIRCOR FLOW TECHNOLOGIES INDIA PVT. LTD. (1" to 20" Upto 150#, 1" to 10" Upto 1500#, 1" to 8" Upto 2500#)
4 . P0170	CONTROL COMPONENTS INC.
5 . P3401	KOSO INDIA PVT. LTD. (Hp steam Inlet Size & Rating: 10" 2500# MP/LP Steam Outlet size Rating: 12" 600#)
6 . P3495	MASCOT VALVES PRIVATE LIMITED (UP TO 8"-150-2500#)
7 . P3105	SAMSON CONTROLS PVT. LTD. (Upto 6" - 150#)
<b>SWEDEN</b>	
8 . P0135	CCI VALVE TECHNOLOGY AB
<b>U.S.A.</b>	
9 . P0174	SPX VALVES & CONTROLS (COPES-VULCAN LTD)

## 310611 : ELECTRIC ACTUATOR

CODE	NAME
<b>INDIA</b>	
1 . P3445	CAIR EUROMATIC AUTOMATION PVT.LTD. (Non-critical)
2 . P3500	AUMA INDIA PRIVATE LIMITED
3 . P3505	CAIR EUROMATIC AUTOMATION PVT. LTD.
4 . P1147	MARSH AUTOMATION PVT. LTD. (FOR SAFE AREA)
<b>GERMANY</b>	
5 . P0684	ROTORK CONTROL (DEUTSCHLAND) GMBH
<b>ITALY</b>	
6 . P0117	BIFFI ITALIA S.R.L.
<b>U.S.A.</b>	
7 . P0493	LIMITORQUE, U.S.A.

## 310613 : AIR FILTER REGULATOR

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P3527	AVCON CONTROLS PVT. LTD.
3 . P0207	DIVYA CONTROL ELEMENTS PVT. LTD.
4 . P0633	PLACKA INSTRUMENTS & CONTROLS PVT. LTD.
5 . P3447	SCHRADER DUNCAN LTD. (¼" to 2" Port Size)
6 . P0722	SHAVO NORGREN (INDIA) PVT. LTD.

## 310614 : LIMIT/PROXIMITY SWITCHES

CODE	NAME
<b>INDIA</b>	
1 . P3445	CAIR EUROMATIC AUTOMATION PVT.LTD. (Non-critical)
2 . P3505	CAIR EUROMATIC AUTOMATION PVT. LTD.
3 . P3525	EL-O-MATIC (INDIA) PVT. LTD.
4 . P3195	EL-O-MATIC INDIA PRIVATE LIMITED
5 . P0608	OSNA ELECTRONICS PVT. LTD. (Intrinsically Safe Proximity Switches)
6 . P3109	PEPPERL + FUCH
7 . P3404	PROTOCONTROL INSTRUMENTS (I) PVT. LTD. (For Non Critical application)
<b>GERMANY</b>	
8 . P3108	PEPPERL + FUCH
<b>SINGAPORE</b>	
9 . P0625	PEPPERL + FUCHS PTE LTD.
<b>U.S.A.</b>	
10 . P0363	HONEYWELL INC.,



## 310615 : VALVE ACTUATOR (PNEUMATIC / ROTARY)

CODE	NAME
<b>INDIA</b>	
1 . P3531	AIRA EURO AUTOMATION PVT. LTD. (Up to 2000 MM)
2 . P3434	BRAY CONTROLS INDIA PVT. LTD.
3 . P3525	EL-O-MATIC (INDIA) PVT. LTD.
4 . P3195	EL-O-MATIC INDIA PRIVATE LIMITED
5 . P3515	MICROFINISH VALVES PRIVATE LIMITED
6 . P3447	SCHRADER DUNCAN LTD. (Linear Actuator, ½" to 20" dia & Rotary Actuators 14 N-m to 3260 N-m Torque (For Non-critical Applications))
7 . P3521	SUSIN I-TORK INDIA PRIVATE LIMITED

## 310616 : SELF ACTUATED PRESSURE CONTROL VALVES

CODE	NAME
<b>INDIA</b>	
1 . P3441	NU TECH CONTROLS (Upto 10" 600#)
2 . P3455	PNEUCON VALVES PVT. LTD. (Upto 4" - 150#, Non Critical)
3 . P3105	SAMSON CONTROLS PVT. LTD. (Upto 2" - 150#)

## 310617 : SLAM SHUT OFF VALVE

CODE	NAME
<b>INDIA</b>	
1 . P3197	NIRMAL INDUSTRIAL CONTROLS PRIVATE LIMITED (Size: ½" to 6" & Rating : <= 300 #)

## 310618 : ELECTROPNEUMATIC POSITIONER

CODE	NAME
<b>INDIA</b>	
1 . P3196	ROTEX MANUFACTURERS & ENGINEERS PRIVATE LIMITED
2 . P3417	SIEMENS LTD.

## 310619 : TURBINE BYPASS VALVES

CODE	NAME
<b>INDIA</b>	
1 . P3425	CIRCOR FLOW TECHNOLOGIES INDIA PVT. LTD. (2" to 24" upto 2500#)

## 310620 : DESUPERHEATERS

CODE	NAME
<b>INDIA</b>	
1 .	CIRCOR FLOW TECHNOLOGIES INDIA PVT. LTD. (Upto 24" 300#, Upto 28" 150#, Multi-Nozzle 3" to 4" Upto 2500#)
2 . P3437	EMET CONTROLS PVT. LTD. (Desuperheating Control Valves 1½" 600# x 3" 2500#)
3 . P3495	MASCOT VALVES PRIVATE LIMITED (UP TO 8"-150-2500#)

## 310621 : PRESSURE REDUCING STATION

CODE	NAME
<b>INDIA</b>	
1 . P3425	CIRCOR FLOW TECHNOLOGIES INDIA PVT. LTD. (1" to 20" Upto 150#, 1" to 10" Upto 1500#, 1" to 8" Upto 2500#)

## 310622 : PRESSURE REGULATOR

CODE	NAME
<b>INDIA</b>	
1 . P0153	CHEMTROLS INDUSTRIES LTD.
2 . P3518	VENTIL FLOWSERVE PVT. LTD.



## 310623 : ELECTROHYDRAULIC ACTUATORS

CODE	NAME
<b>INDIA</b>	
1 . P3196	ROTEX MANUFACTURERS & ENGINEERS PRIVATE LIMITED

## 310701 : SAFETY VALVES & THERMAL RELIEF VALVES upto 2500#

CODE	NAME
<b>INDIA</b>	
1 . P3449	AST S.P.A (Pressure relief valve Up to 8" 2500#; Up to 10" 300# , Urea Grade Also; Series SMFN & SMF & SU-7000)
2 . P3414	BLISS ANAND PRIVATE LIMITED (8" x 10" 300#; 6" x 8" 600#; 4" x 6" 1500#)
3 . P3188	FAINGER LESER VALVES (P) LTD. (UPTO 600#, 1/2" TO 6")
4 . P0400	INSTRUMENTATION LTD. (PALAKKAD)
5 . P0711	MEKASTER ENGG. LTD.(FORMERLY SEBIM VALVES INDIA PVT. LTD.) (upto 600#, Safety - 4"x6",Th.Relief-3/4"x1")
6 . P3502	NIRMAL INDUSTRIAL CONTROLS PVT.LTD. (Up to 2500#)
7 . P3441	NU TECH CONTROLS (Upto 2" - 300# x 3" - 150#)
8 . P0838	PENTAIR SANMAR LTD. (Formerly TYCO SANMAR LTD. )
9 . P3472	UNI KLINGER LIMITED (Safety Valves: IBR & NON IBR: 4" x 6" - 1500#; 6" x 8 - 600#; 8" x 10" - 300#; Safety Valves: IBR for Boiler Service : 4" x 6" - 1500#; Thermal Relief Valves: 1/2"-1 1/2" - 1500#; 1"-1 1/2" - 600#)
10 . P3460	VALVE-TECH INDUSTRIES (Non-Critical)
11 . P3518	VENTIL FLOWSERVE PVT. LTD. (1/4" TO 1")
12 . P3448	WEIR BDK VALVES (A UNIT OF WEIR INDIA PVT. LTD.) (Pressure Relief Valve Upto 8" 150# x10 150#; Upto 6" 300# x 8"150#, Upto 3" 600# x 4" 150#; Thermal Relief Valves : Series 9 Upto 1/2" 2500# x 1/2")
<b>CANADA</b>	
13 . P0214	DRESSER VALVE & CONTROLS
<b>FRANCE</b>	
14 . P0698	SAPAG GEC ALSTHOM
<b>GERMANY</b>	
15 . P0121	BOPP & REUTHER MESSTECHNIK GMBH
<b>ITALY</b>	

## 310701 : SAFETY VALVES & THERMAL RELIEF VALVES upto 2500#

CODE	NAME
16 . P0618	PARCOL SPA (For Urea Service also)
17 . P0784	TAI MILANO S.P.A (For Urea Service also)
<b>JAPAN</b>	
18 . P0412	ITOCHU CORPORATION (REP.KUBOTA CORPN.)
<b>THAILAND</b>	
19 . P0794	TELEDYNE FLUID SYSTEMS
<b>U.K.</b>	
20 . P0186	CROSSBY VALVE & ENGG. COMPANY LTD.
21 . P0252	FARRIS
<b>U.S.A.</b>	
22 . P0213	DRESSER INDUSTRIES INCORPORATED

## 310703 : VACUUM BREAKERS

CODE	NAME
<b>INDIA</b>	
1 . P3509	GROTH CONTINENTALMANUFACTURING PRIVATE LIMITED
2 . P3443	PROTEGO INDIA PVT. LTD. (With Flame Arrestors (Breather Valves))
<b>GERMANY</b>	
3 . P0126	BRAUNSCHWEIGER FLAMMENFILTER GMBH
<b>ITALY</b>	
4 . P0618	PARCOL SPA
5 . P0784	TAI MILANO S.P.A
<b>JAPAN</b>	
6 . P0411	ITOCHU CORPORATION
<b>U.K.</b>	
7 . P0021	SAFETY SYSTEMS UK LTD.
8 . P0878	WHESOE VAREC LIMITED

## 310704 : RUPTURE DISCS

CODE	NAME
<b>INDIA</b>	
1 . P0134	BS&B SAFETY SYSTEMS (INDIA) LIMITED
<b>BELGIUM</b>	
2 . P0258	FIKE EUROPE
<b>FRANCE</b>	
3 . P0698	SAPAG GEC ALSTHOM
<b>THAILAND</b>	
4 . P0794	TELEDYNE FLUID SYSTEMS
<b>U.S.A.</b>	
5 . P0169	CONTINENTAL CONTROLS INC.

## 310705 : PILOT RELIEF VALVES

CODE	NAME
<b>INDIA</b>	
1 . P3449	AST S.P.A (Inlet size:- Upto 3", Upto 1500#, Outlet Size:- Upto 4", Upto 300 #; Inlet size:- Upto 4", Upto 300 #; Inlet size:- Upto 6" Upto 150# Outlet Size:- Upto 8" Upto 150 #)
2 . P3414	BLISS ANAND PRIVATE LIMITED (Size : 1" x 2" 2500#)
3 . P3509	GROTH CONTINENTALMANUFACTURING PRIVATE LIMITED
4 . P3472	UNI KLINGER LIMITED (PILOT OPERATED RELIEF VALVES: 4"X 6" - 900#; 8" X 10" - 300#)

## 310706 : LOW PRESSURE RELIEF VALVES

CODE	NAME
<b>INDIA</b>	
1 . P3509	GROTH CONTINENTALMANUFACTURING PRIVATE LIMITED
2 . P3443	PROTEGO INDIA PVT. LTD. (Less Than 1 Bar With Flame Arrestors (Breather Valves))

## 310708 : FLAME ARRESTOR

CODE	NAME
<b>INDIA</b>	
1 . P3509	GROTH CONTINENTALMANUFACTURING PRIVATE LIMITED
2 . P3443	PROTEGO INDIA PVT. LTD.



## 310801 : CONTROL PANEL

CODE	NAME
<b>INDIA</b>	
1 . P0230	ELECTRONICS CORPORATION OF INDIA LTD
2 . P3458	EX- PROTECTA
3 . P3442	HULASI METALS PVT. LTD. (For safe area.)
4 . P0389	INDUSTRIAL CONTROL APPLIANCES (P) LTD.,
5 . P3485	IRIS AUTOMATION PVT.LTD.
6 . P0421	JAISUN & HUTCHISUN CONTROLS LTD.,
7 . P3407	PRIMA AUTOMATION (INDIA) PVT. LTD. (For package equipments)
8 . P0653	PYROTECH ELECTRONICS PVT.LTD.
9 . P3499	RITTAL INDIA PVT.LTD.
10 . P3432	TAN SWA TECHNOLOGIES INC
11 . P0841	UNITED ELECTRIC CO. (DELHI) PVT. LTD. (Upto 10 Mtrs.)
12 . P0891	YOKOGAWA INDIA LIMITED
<b>HOLLAND</b>	
13 . P0397	INSTROMET INTERNATIONAL N.V

## 310802 : PANEL ACCESS. ( Relay,Switch,Lamp,Terminal,Push Button)

CODE	NAME
<b>INDIA</b>	
1 . P3487	CONNECTWELL INDUSTRIES PVT.LTD. (Terminal Block)
2 . P3411	ECONIX HI-TECH COMPONENTS PVT. LTD. (For Terminal Blocks & Accessories only)
3 . P3410	ELMEX CONTROLS PVT. LTD. (For Terminal Blocks & Accessories only)
4 . P3458	EX- PROTECTA
5 . P0430	JYOTI LIMITED (Relay)
6 . P0484	LARSEN & TOUBRO LTD.(CONTROL& AUTOMATION (Lamp, Push Button)
7 . P3421	PHOENIX CONTACT (INDIA) PVT. LTD. (For Terminal Blocks only)
8 . P3435	POWERCAM ELECTRICALS PVT. LTD. (For Pilot Lamp, Push Button only.)
9 . P0033	ROCKWELL AUTOMATION INDIA PVT. LTD. (Relays)
10 . P3523	WAGO PRIVATE LIMITED (Only for Terminal Blocks)
<b>GERMANY</b>	
11 . P0206	DIGITABLE THIELEN GMBH & CO
12 . P0630	PHOENIX CONTACT GMBH & CO.
13 . P0735	SIEMENS AG, GERMANY (Lamp,PushButton,Contactors)
14 . P0750	STAHL-UND APPARATEBAU HANS LEFFER GMBH (Lamp,PushButton)
15 . P0872	WAGO KONTAKLTECHNIK GMBH
16 . P0875	WEIDMULLER LTD. (Terminal)
<b>JAPAN</b>	

**310802 : PANEL ACCESS. ( Relay,Switch,Lamp,Terminal,Push Button)**

CODE	NAME
17 . P0605	OMRON CORPORATION (Relay)

***SINGAPORE***

18 . P0625      PEPPERL + FUCHS PTE LTD. (Switch)

## 310803 : PROGRAMABLE LOGIC CONTROLLER

CODE	NAME
<b>INDIA</b>	
1 . P3428	ABB INDIA LIMITED
2 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD. (Delta V SIS ESD System)
3 . P0296	GE FANUC SYSTEMS PRIVATE LIMITED
4 . P0787	HONEYWELL AUTOMATION INDIA LIMITED (Safety System)
5 . P0484	LARSEN & TOUBRO LTD.(CONTROL& AUTOMATION (Non Failsafe)
6 . P3530	MITSUBISHI ELECTRIC INDIA PRIVATE LIMITED (Only for Water Related Application)
7 . P0543	MOORE CONTROLS LTD. (FailSafe)
8 . P3512	PHOENIX CONTACT INDIA PRIVATE LIMITED
9 . P0033	ROCKWELL AUTOMATION INDIA PVT. LTD. (Non Failsafe & Failsafe (ICS Triplex TMR, DMR))
10 . P3440	RTP CONTROLS INDIA PVT. LTD. (RTP 3000 TAS & SIS TMR/DMR SIL3 CERTIFIED PLS FOR TERMINAL AUTOMATION SYSTEM AND FIRE AND GAS APPLICATION)
11 . P3528	SCHNEIDER ELECTRIC SYSTEMS INDIA PVT. LTD.
12 . P0736	SIEMENS LTD. (Non Failsafe)
13 . P3417	SIEMENS LTD. (ESD- Simatic S7-400 FH / PLC - Simatic S-300, S7-400 (FMR/DMR))
14 . P0891	YOKOGAWA INDIA LIMITED (ESD System also)
<b>SINGAPORE</b>	
15 . P3503	TRISEN ASIA CONTROL PTE LTD.
<b>GERMANY</b>	
16 . P0348	HIMA PAUL HILDEBRANDT GMBH + CO KG (Failsafe)

## 310803 : PROGRAMABLE LOGIC CONTROLLER

CODE	NAME
<b>ITALY</b>	
17 . P0514	MARCONI ITALIANA (Non Failsafe)
<b>JAPAN</b>	
18 . P0605	OMRON CORPORATION (Non Failsafe)
<b>SINGAPORE</b>	
19 . P0829	TRICONEX (Fault Tolerant TMR)
<b>U.S.A.</b>	
20 . P0295	GE FANUC AUTOMATION NORTH AMERICA, INC. (Fault Tolerant TMR)

## 310804 : DISTRIBUTED CONTROL SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P3428	ABB INDIA LIMITED
2 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
3 . P0787	HONEYWELL AUTOMATION INDIA LIMITED
4 . P3467	ROCKWELL AUTOMATION INDIA PRIVATE LIMITED (PLANTPax (Offisite like DM Water Plant, ETP, Captive Power Plant, Sugar & Pharmaceutical Plant, Steel Sector, Mines))
5 . P3417	SIEMENS LTD. (Simatic - PCS7)
6 . P0891	YOKOGAWA INDIA LIMITED
<b>USA</b>	
7 . P3471	ROCKWELL AUTOMATION, INC (PlantPax)
<b>GERMANY</b>	
8 . P0735	SIEMENS AG, GERMANY
<b>HOLLAND</b>	
9 . P0284	INVENSYS
<b>JAPAN</b>	
10 . P0892	YOKOGAWA ELECTRIC CORPORATION
<b>SINGAPORE</b>	
11 . P0262	EMERSON PROCESS MGT SINGAPORE LTD
<b>U.S.A.</b>	
12 . P0084	BAILEY CONTROLS COMPANY
13 . P0363	HONEYWELL INC.,

## 310805 : MULTIPLEXER / REMOTE I/O

CODE	NAME
<b>INDIA</b>	
1 . P0547	MTL INSTRUMENT LIMITED
2 . P3109	PEPPERL + FUCH
3 . P3512	PHOENIX CONTACT INDIA PRIVATE LIMITED
<b>GERMANY</b>	
4 . P3108	PEPPERL + FUCH
5 . P0750	STAHL-UND APPARATEBAU HANS LEFFER GMBH
<b>JAPAN</b>	
6 . P3415	M. SYSTEM CO., LTD., (Remote I/O: Model No. R3)
<b>SINGAPORE</b>	
7 . P0625	PEPPERL + FUCHS PTE LTD.
<b>U.K.</b>	
8 . P0554	M.T.L., U.K.

## 310806 : RECEIVER INSTRUMENTS (INDICATOR,CONTROLLER,RECORDER)

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0156	CHINO-LAXSONS (INDIA) PVT. LIMITED (Only Recorder)
3 . P0244	EUROTHERM DEL INDIA LIMITED
4 . P0787	HONEYWELL AUTOMATION INDIA LIMITED
5 . P3408	MASIBUS AUTOMATION & INSTRUMENTATION PVT. LTD. (Receiver Instruments except Recorder)
6 . P0543	MOORE CONTROLS LTD.
7 . P0891	YOKOGAWA INDIA LIMITED
<b>GERMANY</b>	
8 . P0735	SIEMENS AG, GERMANY
<b>JAPAN</b>	
9 . P0155	CHINO CORPN.
10 . P0490	HERAEUS ELECTRO-NITE INTERNATIONAL N.V.
11 . P0892	YOKOGAWA ELECTRIC CORPORATION
<b>U.S.A.</b>	
12 . P0363	HONEYWELL INC.,



## 310807 : ALARM ANNUNCIATOR

CODE	NAME
<b>INDIA</b>	
1 . P0391	INDUSTRIAL INSTRUMENTS & CONTROLS
2 . P0729	SHREE ELECTRONICS
<b>U.K.</b>	
3 . P0554	M.T.L., U.K.
4 . P0674	ROCHESTER INSTRUMENT SYSTEMS LTD.,
<b>U.S.A.</b>	
5 . P0673	RILEY PANALARM
6 . P0677	RONAN ENGG. CO.,

## 310808 : BARRIER/ISOLATOR/TRIP AMPLIFIER

CODE	NAME
<b>INDIA</b>	
1 . P0547	MTL INSTRUMENT LIMITED
2 . P3109	PEPPERL + FUCH
3 . P3512	PHOENIX CONTACT INDIA PRIVATE LIMITED
<b>GERMANY</b>	
4 . P0206	DIGITABLE THIELEN GMBH & CO
5 . P0282	FOXBORO ECKARDT GmbH
6 . P3108	PEPPERL + FUCH
7 . P0750	STAHL-UND APPARATEBAU HANS LEFFER GMBH
<b>JAPAN</b>	
8 . P3415	M. SYSTEM CO., LTD., (Signal Isolators Fittings: Model Nos. M2VS; M5VS; W2VS; W5VS; M3LU & 2M3LU2)
9 . P0892	YOKOGAWA ELECTRIC CORPORATION
<b>SINGAPORE</b>	
10 . P0625	PEPPERL + FUCHS PTE LTD.
<b>SWITZERLAND</b>	
11 . P0145	CAMILLE BAUER AG
<b>U.K.</b>	
12 . P0554	M.T.L., U.K.
<b>U.S.A.</b>	
13 . P0363	HONEYWELL INC.,

## 310809 : TEMPERATURE SCANNER

CODE	NAME
<b>INDIA</b>	
1 . P0390	INDUSTRIAL INSTRUMENTATION,
2 . P3404	PROTOCONTROL INSTRUMENTS (I) PVT. LTD.

## 310810 : CCTV / ACCESS SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P0787	HONEYWELL AUTOMATION INDIA LIMITED

**310815 : MISCELLENOUS ITEMS (RTU / SCADA ETC)**

<b>CODE</b>	<b>NAME</b>
<b>INDIA</b>	
1 . P3428	ABB INDIA LIMITED
2 . P3530	mitsubishi electric india private limited (RTU/SCADA, ETC (Only for Water Related Application))
3 . P3512	PHOENIX CONTACT INDIA PRIVATE LIMITED
4 . P0033	ROCKWELL AUTOMATION INDIA PVT. LTD.
5 . P3417	SIEMENS LTD. (Simatic WINcc)

## 310816 : ENERGY METER

CODE	NAME
<b>JAPAN</b>	
1 . P3415	M. SYSTEM CO., LTD., (Model No. 53U)

## 310821 : SURGE PROTECTION DEVICES

CODE	NAME
<b>INDIA</b>	
1 . P3421	PHOENIX CONTACT (INDIA) PVT. LTD.

## 310824 : WIRING DUCTS

CODE	NAME
<b>INDIA</b>	
1 . P3422	TRINITY TOUCH PVT. LTD.



310825 : DIN RAIL

CODE	NAME
<b>INDIA</b>	
1 . P3487	CONNECTWELL INDUSTRIES PVT.LTD.
2 . P3422	TRINITY TOUCH PVT. LTD.

## 310826 : INTERFACE MODULE

CODE	NAME
<b>INDIA</b>	
1 . P3487	CONNECTWELL INDUSTRIES PVT.LTD.
2 . P3422	TRINITY TOUCH PVT. LTD.

## 310827 : CABLE CONNECTOR

CODE	NAME
<b>INDIA</b>	
1 . P3421	PHOENIX CONTACT (INDIA) PVT. LTD.

## 310828 : ADVANCE PROCESS CONTROL SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P0891	YOKOGAWA INDIA LIMITED

## 310829 : VIDEO WALL DLP CUBE AND VIDEO WALL CONTROLLER

CODE	NAME
<b>INDIA</b>	
1 . P3504	Delta Electronics India Private Limited

## 310901 : MACHINE MONITORING SYSTEM

CODE	NAME
<b>SWITZERLAND</b>	
1 . P3480	MEGGITT SA
<b>JAPAN</b>	
2 . P3452	SHINKAWA ELECTRIC COMPANY LTD.
<b>GERMANY</b>	
3 . P0131	BRUEL & KJAER GMBH
<b>SINGAPORE</b>	
4 . P0738	SKF CONDITION MONITORING INC.
<b>U.S.A.</b>	
5 . P0100	BENTLEY NEVEDA LLC

## 310902 : SPEED INDICATOR

CODE	NAME
<b>GERMANY</b>	
1 . P3108	PEPPERL + FUCH
<b>JAPAN</b>	
2 . P0725	SHINKAWA ELECTRIC CO.
<b>SINGAPORE</b>	
3 . P0625	PEPPERL + FUCHS PTE LTD.
<b>SWITZERLAND</b>	
4 . P0419	JACQUET
<b>U.S.A.</b>	
5 . P0100	BENTLEY NEVEDA LLC

## 310903 : ANTI SURGE CONTROLLER

CODE	NAME
<b>SINGAPORE</b>	
1 . P3503	TRISEN ASIA CONTROL PTE LTD.
2 . P0167	COMPRESSOR CONTROL CORPORATION
3 . P0215	DRESSER - RAND CO.
4 . P0830	INVENSYS TRICONEX



## 311001 : BURNER MANAGEMENT SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P0216	DURAG INDUSTRIE ELEKTRONIK GMBH & CO KG
<b>GERMANY</b>	
2 . P0735	SIEMENS AG, GERMANY
<b>JAPAN</b>	
3 . P0888	AZBIL CORPORATION (Formerly YAMATAKE CORPORATION)
4 . P0540	MITSUBISHI HEAVY INDUSTRIES LTD.
5 . P0605	OMRON CORPORATION
<b>U.S.A.</b>	
6 . P0363	HONEYWELL INC.,

## 311002 : FURNACE CAMERA, HEATER, THERMAL IMAGER

CODE	NAME
<b>INDIA</b>	
1 . P3420	TEMPSENS INSTRUMENTS (I) PVT. LTD.

## 311101 : TERMINAL AUTOMATION SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P3428	ABB INDIA LIMITED
2 . P0153	CHEMTROLS INDUSTRIES LTD.
3 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
4 . P0787	HONEYWELL AUTOMATION INDIA LIMITED

## 311501 : I/P CONVERTER

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0263	EMERSON PROCESS MANAGEMENT (I) PVT. LTD.
3 . P0891	YOKOGAWA INDIA LIMITED
<b>JAPAN</b>	
4 . P0892	YOKOGAWA ELECTRIC CORPORATION
<b>U.S.A.</b>	
5 . P0678	EMERSON PROCESS MANAGEMENT LTD
6 . P0544	MOORE PRODUCTS COMPANY

## 311601 : INSTRUMENT POWER & CONTROL CABLES

CODE	NAME
<b>INDIA</b>	
1 . P3514	ASSOCIATED CABLES PRIVATE LIMITED
2 . P0068	ASSOCIATED CABLES PVT. LTD.
3 . P0070	ASSOCIATED FLEXIBLES & WIRES PVT. LTD.
4 . P3501	CENTURION POWER CABLES PVT.LTD.
5 . P0176	CORDS CABLE INDUSTRIES LTD.
6 . P0200	DELTON CABLES LTD
7 . P3110	INSUCON CABLES & CONDUCTORS (P) LTD. (For smaller non-critical projects)
8 . P0416	J K CABLES LIMITED
9 . P0442	KEI INDUSTRIES LIMITED
10 . P3522	MIRACLE CABLES INDIA PVT. LTD.
11 . P0617	PARAMOUNT CABLE CORPORATION
12 . P3474	SUYOG ELECTRICALS LTD.
13 . P8086	T C COMMUNICATION PVT LTD
14 . P3506	TC WIRE & CABLES PRIVATE LIMITED
15 . P0809	THERMO CABLES LIMITED
16 . P3524	THERMO CABLES LIMITED
17 . P0820	TOSHNIWAL CABLES

## 311601 : INSTRUMENT POWER & CONTROL CABLES

CODE	NAME
18 . P3191	UDEY PYRO CABLES PVT. LTD.

### ***ITALY***

19 . P3516      RAMCRO S.P. A.

## 311602 : EXTENSION & COMPENSATING CABLES

CODE	NAME
<b>INDIA</b>	
1 . P3514	ASSOCIATED CABLES PRIVATE LIMITED
2 . P0068	ASSOCIATED CABLES PVT. LTD.
3 . P0070	ASSOCIATED FLEXIBLES & WIRES PVT. LTD.
4 . P3501	CENTURION POWER CABLES PVT.LTD.
5 . P0176	CORDS CABLE INDUSTRIES LTD.
6 . P0200	DELTON CABLES LTD
7 . P0304	GENERAL INSTRUMENTS CONSORTIUM,
8 . P0416	J K CABLES LIMITED
9 . P0442	KEI INDUSTRIES LIMITED
10 . P0617	PARAMOUNT CABLE CORPORATION
11 . P3474	SUYOG ELECTRICALS LTD.
12 . P8086	T C COMMUNICATION PVT LTD
13 . P3506	TC WIRE & CABLES PRIVATE LIMITED
14 . P0809	THERMO CABLES LIMITED
15 . P3524	THERMO CABLES LIMITED
16 . P0820	TOSHNIWAL CABLES
<b>ITALY</b>	

## 311602 : EXTENSION & COMPENSATING CABLES

CODE	NAME
17 . P3516	RAMCRO S.P. A.



## 311603 : SPECIAL CABLES (FOUNDATION FIELD BUS CABLES)

CODE	NAME
<b>INDIA</b>	
1 . P3489	LEONI CABLE SOLUTIONS (INDIA) PVT.LTD.
2 . P3486	M/S LAPP INDIA PVT.LTD.
3 . P3474	SUYOG ELECTRICALS LTD.
4 . P8086	T C COMMUNICATION PVT LTD
5 . P0809	THERMO CABLES LIMITED
6 .	THERMO CABLES LIMITED
7 . P3524	THERMO CABLES LIMITED
<b>ITALY</b>	
8 . P3516	RAMCRO S.P. A. (PROFIBUS, MODBUS, COMMUNICATION CABLE (CAT-6, OFC))

## 311606 : CABLE TRAYS & ACCESSORIES (AL./GI)

CODE	NAME
<b>INDIA</b>	
1 . P0312	GLOBE ELECTRICAL INDUSTRIES
2 . P0385	INDIANA ENGG WORKS PVT LTD
3 . P0529	METALITE INDUSTRIES
4 . P0619	PAREKH ENGINEERING COMPANY
5 . P3446	PARMAR METALS PVT. LIMITED
6 . P0695	SADHANA ENGINEERING CORPORATION
7 . P0756	STEELITE ENGINEERING LIMITED

## 311607 : MULTI TRANSIT INLET SYSTEM

CODE	NAME
<b>SWEDEN</b>	
1 . P0522	MCT BRATTBERG AKTIEBOLAG
2 . P0685	ROXTEC AB
<b>U.K.</b>	
3 . P0339	HAWKE INTERNATIONAL

## 311608 : JUNCTION BOX & CABLE GLAND

CODE	NAME
<b>INDIA</b>	
1 . P0089	BALIGA LIGHTING EQUIPMENTS LIMITED
2 . P3458	EX- PROTECTA
3 . P0147	FCG FLAMEPROOF CONTROL GEARS PVT. LTD. (FORMERLY CEAG FLAME
4 . P0268	FLAMEPROOF EQUIPMENTS PVT. LTD.
5 . P3412	FLEXPRO ELECTRICALS PVT. LTD.
6 . P3475	PHOENIX MECANO (INDIA) PVT.LTD.
7 . P3499	RITTAL INDIA PVT.LTD.
8 . P3432	TAN SWA TECHNOLOGIES INC (JUNCTION BOX)
9 . P3422	TRINITY TOUCH PVT. LTD. (Only Cable Glands upto Size 25M)
<b>GERMANY</b>	
10 . P0750	STAHL-UND APPARATEBAU HANS LEFFER GMBH

## 311615 : CS SEAMLESS PIPES

CODE	NAME
<b>INDIA</b>	
1 . P0814	INDIAN TUBE CO. (TATA DIV. OF TUBES & PIPES)
2 . P0800	ISMT LIMITED
3 . P0503	MAHARASHTRA SEAMLESS LTD.
<b>FRANCE</b>	
4 . P0834	ETS TROUVAY & CAUVIN
5 . P0629	PHOCEENNE
<b>GERMANY</b>	
6 . P0477	HORST KURVERS GmbH
7 . P0509	MANNESMANN HANDEL AG
<b>ITALY</b>	
8 . P0191	DALMINE SPA
9 . P0175	IBF SEAMLESS PIPES Spa
<b>JAPAN</b>	
10 . P0517	MARUBENI ITOCHU STEEL
11 . P0585	NIPPON STEEL CORPORATION
12 . P0588	NISSHO IWAI CORPORATION
13 . P0601	OKURA & CO. LTD.
14 . P0575	SOJITZ CORPORATION
15 . P0770	SUMITOMO METAL INDUSTRIES LTD.

## 311615 : CS SEAMLESS PIPES

CODE	NAME
<b>KOREA</b>	
16 . P0370	HYUNDAI CORPORATION
<b>U.K.</b>	
17 . P0870	VOMAL INTERNATIONAL LIMITED

## 311616 : SS SEAMLESS PIPES

CODE	NAME
<b>INDIA</b>	
1 . P0158	CHOKSI TUBE COMPANY LTD.
2 . P3488	DIVINE TUBES PVT.LTD. (UPTO 38 MM)
3 . P3418	MAXIM TUBES COMPANY PVT. LTD.
4 . P0593	NUCLEAR FUEL COMPLEX
5 . P0661	RATNAMANI METALS & TUBES LIMITED
6 . P0659	REMI EDELSTAHL TUBULARS LIMITED
<b>FRANCE</b>	
7 . P0629	PHOCEENNE
<b>GERMANY</b>	
8 . P0822	TPS-TECHNITUBE ROHRENWERKE GMBH
<b>ITALY</b>	
9 . P0191	DALMINE SPA
<b>SPAIN</b>	
10 . P2151	T.T.I. - TUBACEX TUBOS INOXIDABLES, S.A. (½" NB SS Pipe)

## 311617 : SS TUBES

CODE	NAME
<b>INDIA</b>	
1 . P3497	ASTEC VALVES & FITTINGS PRIVATE LIMITED
2 . P0158	CHOKSI TUBE COMPANY LTD.
3 . P3488	DIVINE TUBES PVT.LTD. (UPTO 18 MM)
4 . P3418	MAXIM TUBES COMPANY PVT. LTD.
5 . P0593	NUCLEAR FUEL COMPLEX
6 . P0661	RATNAMANI METALS & TUBES LIMITED
7 . P0659	REMI EDELSTAHL TUBULARS LIMITED
<b>JAPAN</b>	
8 . P0412	ITOCHU CORPORATION (REP.KUBOTA CORPN.)
9 . P0587	NISHITANI & CO. LTD.
10 . P0771	SUMITOMO METAL INDUSTRIES LTD.



## 311618 : PIPE FITTINGS

CODE	NAME
<b>INDIA</b>	
1 . P3476	COMFIT & VALVES PVT.LTD.
2 . P0222	EBY INDUSTRIES
3 . P0247	EXCEL HYDRO-PNEUMATICS PVT LTD,
4 . P3519	GLOBAL VALVES AND FITTING (INDIA) PVT. LTD. (FOR NON IBR APPLICATION)
5 . P0534	MICRO PRECISION PRODUCTS PRIVATE LTD.
6 . P2109	PRECISION ENGINEERING INDUSTRIES
7 . P0792	TECNOMATIC (INDIA) PVT. LTD.
8 . P3518	VENTIL FLOWSERVE PVT. LTD.
9 . P3413	WESMEC ENGINEERING PVT. LTD.
<b>FRANCE</b>	
10 . P0149	CELLIER S.A.
<b>GERMANY</b>	
11 . P0508	SIEMENS AG PGI
12 . P0813	THYSSEN-KRUPP STAHLUNION GmbH
<b>ITALY</b>	
13 . P0150	CESARE BONETTI SPA
14 . P0791	TECHNOMATIC SPA
<b>JAPAN</b>	
15 . P0771	SUMITOMO METAL INDUSTRIES LTD.

## 311618 : PIPE FITTINGS

CODE	NAME
<b>U.K.</b>	
16 . P0203	DEWRANCE & CO. LTD.
17 . P0366	HOPKINSONS LIMITED
18 . P0811	THOMPSON VALVES LTD.
19 . P0856	VELAN ENGINEERING CO. LIMITED
<b>U.S.A.</b>	
20 . P0049	ANDERSON GREENWOOD & CO.
21 . P0181	CRANE COMPANY INTL. SALES

## 311619 : COMPRESSION FITTINGS

CODE	NAME
<b>INDIA</b>	
1 . P3192	ARYA CRAFTS & ENGINEERING PVT.LTD. (Upto Line Pressure Class 600 # rating.)
2 . P3182	AURA INC
3 . P0088	BALDOTA VALVE & FITTING CO.PVT.LTD.
4 . P3476	COMFIT & VALVES PVT.LTD.
5 . P0247	EXCEL HYDRO-PNEUMATICS PVT LTD,
6 . P0248	EXCELSIOR ENGG WORKS
7 . P3194	FLUID CONTROLS PRIVATE LIMITED ((Double Ferrule Compression Tube Fittings))
8 . P3519	GLOBAL VALVES AND FITTING (INDIA) PVT. LTD. (FOR NON IBR APPLICATION)
9 . P3493	HAVI ENGINEERING INDIA PVT.LTD
10 . P3189	PANAM ENGINEERS
11 . P2109	PRECISION ENGINEERING INDUSTRIES
12 . P0664	RELIANCE ENGG. & ELECTRICAL CORPN.
13 . P3518	VENTIL FLOWSERVE PVT. LTD.
14 . P0862	VIKAS INDUSTRIAL PRODUCTS
15 . P3413	WESMEC ENGINEERING PVT. LTD.
<b>SINGAPORE</b>	
16 . P0620	PARKER HANNIFIN SINGAPORE PTE. LTD.,
<b>U.S.A.</b>	

## 311619 : COMPRESSION FITTINGS

CODE	NAME
17 . P0778	SWAGELOCK COMPANY/CREXIMCO

## 311620 : INSTRUMENT MINIATURE VALVES

CODE	NAME
<b>INDIA</b>	
1 . P0077	AUDCO INDIA LIMITED(L&T VALVES DIVN.)
2 . P3182	AURA INC
3 . P0115	BHEL (VALVES DIVISION)
4 . P0153	CHEMTROLS INDUSTRIES LTD.
5 . P3181	CHEMTROLS SAMIL (INDIA) PVT LTD.
6 . P3476	COMFIT & VALVES PVT.LTD.
7 . P0247	EXCEL HYDRO-PNEUMATICS PVT LTD,
8 . P0248	EXCELSIOR ENGG WORKS
9 . P3194	FLUID CONTROLS PRIVATE LIMITED
10 . P3519	GLOBAL VALVES AND FITTING (INDIA) PVT. LTD. (FOR NON IBR APPLICATION)
11 . P3493	HAVI ENGINEERING INDIA PVT.LTD
12 . P0473	KSB PUMPS LIMITED (VALVES DIVN)
13 . P3189	PANAM ENGINEERS
14 . P0792	TECNOMATIC (INDIA) PVT. LTD.
15 . P3518	VENTIL FLOWSERVE PVT. LTD.
16 . P3413	WESMEC ENGINEERING PVT. LTD.

### **FRANCE**

## 311620 : INSTRUMENT MINIATURE VALVES

CODE	NAME
17 . P0149	CELLIER S.A.
<b>ITALY</b>	
18 . P0103	BFE BONNEY FORGE VALVE LICENSEE
19 . P0243	EUROMISURE CREMONA
20 . P0791	TECHNOMATIC SPA
<b>JAPAN</b>	
21 . P0464	KOSEI SANGYO LTD
22 . P0771	SUMITOMO METAL INDUSTRIES LTD.
<b>U.K.</b>	
23 . P0203	DEWRANCE & CO. LTD.
24 . P0366	HOPKINSONS LIMITED
25 . P0856	VELAN ENGINEERING CO. LIMITED
<b>U.S.A.</b>	
26 . P0049	ANDERSON GREENWOOD & CO.
27 . P0181	CRANE COMPANY INTL. SALES
28 . P0778	SWAGELOCK COMPANY/CREXIMCO

## 311621 : PURGE ROTAMETER

CODE	NAME
<b>INDIA</b>	
1 . P3199	EUREKA INDUSTRIAL EQUIPMENTS PRIVATE LIMITED
2 . P0398	INSTRUMENTATION ENGINEERS PVT. LTD.
3 . P0633	PLACKA INSTRUMENTS & CONTROLS PVT. LTD.

## 311622 : AIR HEADER/ADPOT

CODE	NAME
<b>INDIA</b>	
1 . P3497	ASTEC VALVES & FITTINGS PRIVATE LIMITED
2 . P3476	COMFIT & VALVES PVT.LTD.
3 . P3413	WESMEC ENGINEERING PVT. LTD.



## 311623 : CONDENSATE POT

CODE	NAME
<b>INDIA</b>	
1 . P3497	ASTEC VALVES & FITTINGS PRIVATE LIMITED
2 . P3476	COMFIT & VALVES PVT.LTD.
3 . P3413	WESMEC ENGINEERING PVT. LTD.

## 311624 : VALVE MANIFOLDS

CODE	NAME
<b>INDIA</b>	
1 . P3497	ASTEC VALVES & FITTINGS PRIVATE LIMITED
2 . P3476	COMFIT & VALVES PVT.LTD.
3 . P3519	GLOBAL VALVES AND FITTING (INDIA) PVT. LTD. (FOR NON IBR APPLICATION)
4 . P3494	HAVI ENGINEERING INDIA PVT.LTD
5 . P3518	VENTIL FLOWSERVE PVT. LTD.
6 . P3413	WESMEC ENGINEERING PVT. LTD.

## 311626 : CALIBRATION EQUIPMENT & SERVICES

CODE	NAME
<b>INDIA</b>	
1 . P3420	TEMPSENS INSTRUMENTS (I) PVT. LTD.

## 311627 : ENCLOSURES

CODE	NAME
<b>INDIA</b>	
1 . P3458	EX- PROTECTA
2 . P3499	RITTAL INDIA PVT.LTD.
3 . P3422	TRINITY TOUCH PVT. LTD. (Weatherproof size 80 X 80 mm)

## 311628 : MONOFLANGES

CODE	NAME
<b>INDIA</b>	
1 . P3497	ASTEC VALVES & FITTINGS PRIVATE LIMITED

## 311629 : CLOSE COUPLE HOOK-UPS (CCHU)

CODE	NAME
<b>INDIA</b>	
1 .	ASTEC VALVES & FITTINGS PRIVATE LIMITED
2 . P3476	COMFIT & VALVES PVT.LTD.

## 311631 : INSTRUMENTATION VALVES (NEEDLE VALVE & CHECK VALVES

CODE	NAME
<b>INDIA</b>	
1 . P3497	ASTEC VALVES & FITTINGS PRIVATE LIMITED
2 . P3476	COMFIT & VALVES PVT.LTD.

## 311701 : INSTRUMENT CONTRACTOR FOR INST. CONSTRUCTION/ERECTION WORKS

CODE	NAME
<b>INDIA</b>	
1 . P3178	ANI INSTRUMENT (upto 0.5 Crores)
2 . P3429	GODREJ & BOYCE MFG. CO. LTD.
3 . P3177	INSTROCON ENGINEERS AND CONTROLS (I) PVT. LTD (upto 0.5 Crores)
4 . P3172	JASUBHAI ENGINEERING PVT. LTD.
5 . P3180	L&T (CONSTRUCTION CONTRACTS DIVN.)
6 . P3179	MIRAJ INSTRUMENTATION SERVICE (upto 0.5 Crores)
7 . P3187	NARAYAN ENGINEERING (< RS. 5 LACS (SMALL PROJECT))
8 . P3175	PACE PROCESS CONTROL PVT. LTD.
9 . P3173	PETRON ENGG. CONSTRUCTION LTD.
10 . P3176	PROTECH CONTROL PVT. LTD. (upto 0.5 Crores)
11 . P3511	SPARK AUTOMATION
12 . P3171	TECHNIMONT ICB LTD.




## 311801 : ELECTRICAL HEAT TRACING

CODE	NAME
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1 .

**INDIA**

2 . P3478 THERMOPADS PVT.LTD.

	<b>MASTER VENDORS LIST FOR PROJECTS</b>	04-00MM-0011	18
		DOCUMENT NO	REV

**MASTER VENDORS LIST**  
**FOR**  
**PROJECTS**  
**CIVIL ENGG. ITEMS**

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## 610201 : PILING

CODE	NAME
<b>INDIA</b>	
1 . P6007	AFCONS INFRASTRUCTURE LIMITED
2 . P6005	BRIDGE AND ROOF CO.(INDIA) LTD.
3 . P6006	GAMMON INDIA LTD.
4 . P6003	GANNON DUNKERLEY & CO. LIMITED
5 . P6009	HINDUSTAN CONSTRUCTION CO.
6 . P6008	INTEGRATED PILE FOUNDATION(MADRAS) PVT. LTD.
7 . P6001	LARSEN & TOUBRO LTD( ECC Division)
8 . P6004	SIMPLEX INFRASTRUCTURES LIMITED
9 . P6002	SKANSKA CEMENTATION INDIA LIMITED.

## 610202 : PRILLING TOWER(UREA) (using slip from technique)

CODE	NAME
<b>INDIA</b>	
1 . P6005	BRIDGE AND ROOF CO.(INDIA) LTD.
2 . P6006	GAMMON INDIA LTD.
3 . P6001	LARSEN & TOUBRO LTD( ECC Division)
4 . P6004	SIMPLEX INFRASTRUCTURES LIMITED

## 610203 : CHIMNEY(using slip form technique)

CODE	NAME
<b>INDIA</b>	
1 . P6011	BYGGING INDIA
2 . P6006	GAMMON INDIA LTD.
3 . P6003	GANNON DUNKERLEY & CO. LIMITED
4 . P6001	LARSEN & TOUBRO LTD( ECC Division)
5 . P6010	NILA BAUART ENGINEERING LTD.

610204 : SILO(parabolic or a type)

CODE	NAME
<b>INDIA</b>	
1 . P6005	BRIDGE AND ROOF CO.(INDIA) LTD.
2 . P6006	GAMMON INDIA LTD.
3 . P6003	GANNON DUNKERLEY & CO. LIMITED
4 . P6001	LARSEN & TOUBRO LTD( ECC Division)
5 . P6004	SIMPLEX INFRASTRUCTURES LIMITED

## 610205 : WORKS CIVIL & STRUCTURAL

CODE	NAME
<b>INDIA</b>	
1 . P6027	A.N.S. CONSTRUCTION (UPTO Rs.7.5 CRORE)
2 . P6013	BHAGEERATHA ENGINEERING LIMITED
3 . P6005	BRIDGE AND ROOF CO.(INDIA) LTD.
4 . P6031	BSBK LTD.
5 . P6034	C.P. SYSTEMS PVT, LTD. (UPTO Rs.3.0 CRORE)
6 . P6017	DUAL STRUCTURAL (P) LTD. (UPTO Rs.3.0 CRORE)
7 . P6015	ENGINEERING PROJECTS(I) LTD. (UPTO Rs.7.5 CRORE)
8 . P6006	GAMMON INDIA LTD.
9 . P6003	GANNON DUNKERLEY & CO. LIMITED
10 . P6030	GILLANDERS ARBUTHNOT & CO. LTD.,UNIT-MICCO (UPTO RS. 3.0 CRORE)
11 . P6029	GLOBE HI-FAB (UPTO Rs. 7.5 CRORE)
12 . P6022	HINDUSTAN STEEL WORKS CONSTRUCTION LTD. (UPTO Rs.7.5 CRORE)
13 . P6036	INDIAN COMMERCE & INDUSTRIES CO. PVT. LTD. (UPTO Rs.3.0 CRORE)
14 . P6025	J.M.C. PROJECTS (INDIA) LIMITED. (UPTO Rs.7.5 CRORE)
15 . P6020	JAIHIND PROJECTS LIMITED (UPTO Rs.3.0 CRORE)
16 . P6001	LARSEN & TOUBRO LTD( ECC Division)
17 . P6018	MSK PROJECTS (INDIA) LIMITED. (UPTO Rs. 7.5 CRORE)



## 610205 : WORKS CIVIL & STRUCTURAL

CODE	NAME
18 . P6019	NATIONAL BUILDERS (UPTO Rs. 7.5 CRORE)
19 . P6021	NATIONAL BUILDINGS CONST. CORPORATION LTD. (UPTO Rs.7.5 CRORE)
20 . P6010	NILA BAUART ENGINEERING LTD. (UPTO Rs. 7.5 CRORE)
21 . P6023	ORIENTAL CIVIL ENGINEERING CO. LTD. (UPTO Rs. 7.5 CRORE)
22 . P6012	PETRON CIVIL ENGINEERING LIMITED
23 . P6033	POWER MAX INDIA PVT. LTD. (UPOT Rs. 7.5 CRORE)
24 . P6028	RAMJI DAS DARSHAN KUMAR (UPTO Rs. 7.5 CRORE)
25 . P6024	RASTRIYA PARIYOJNA NIRMAN NIGAM LTD. (UPTO Rs. 7.5 CRORE)
26 . P6004	SIMPLEX INFRASTRUCTURES LIMITED
27 . P6002	SKANSKA CEMENTATION INDIA LIMITED.
28 . P6026	SKB BUILDERS (UPTO Rs.7.5 CRORE)
29 . P6016	SVC PROJECTS PRIVATE LIMITED (UPTO Rs.3.0 CRORE)
30 . P6014	TARAPORE & COMPANY
31 . P6035	TEKNOW CONSULTANTS & ENGINEERS PVT. LTD. (UPTO Rs.3.0 CRORE)
32 . P6032	UNITECH LTD. (UPTO RS. 7.5 CRORE)
33 . P6037	VASAVI ENGINEERING CORPORATION (UPTO Rs.3.0 CRORE)

## 610206 : UNDERGROUND PIPING WORKS (AS PART OF CIVIL WORK)

CODE	NAME
<b>INDIA</b>	
1 . P6013	BHAGEERATHA ENGINEERING LIMITED
2 . P6005	BRIDGE AND ROOF CO.(INDIA) LTD.
3 . P6006	GAMMON INDIA LTD.
4 . P6003	GANNON DUNKERLEY & CO. LIMITED
5 . P6001	LARSEN & TOUBRO LTD( ECC Division)
6 . P6004	SIMPLEX INFRASTRUCTURES LIMITED
7 . P6014	TARAPORE & COMPANY

## 610213 : PRILLING TOWER LINING (INSIDE)

CODE	NAME
<b>INDIA</b>	
1 . P6063	ARIEN NEW DELHI PRIVATE LIMITED
2 . P6139	BERGER PAINTS INDIA LIMITED
3 . P6059	M.PALLONJI & CO. PRIVATE LIMITED
4 . P6071	MAJOR GRAIND CORROSION CONTROLLERS
5 . P6140	SYNORGANIC PAINTS PVT. LTD.
6 . P6060	WASPRABHA

**610216 : COMPOSITE WORK**

<b>CODE</b>	<b>NAME</b>
<b>INDIA</b>	
1 . P6005	BRIDGE AND ROOF CO.(INDIA) LTD.
2 . P6106	ESSAR STEEL INDIA LTD. (For H.R. Plates/ Sheets/Coils/CRCA Coils/Sheets)
3 . P6003	GANNON DUNKERLEY & CO. LIMITED
4 . P6001	LARSEN & TOUBRO LTD( ECC Division)
5 . P6051	MUKUND ENGINEERS LTD.
6 . P6012	PETRON CIVIL ENGINEERING LIMITED
7 . P6043	SPIC JEL ENGG. CONSTRUCTION LTD.
8 . P6045	STEWARTS & LLOYDS OF INDIA LTD.
9 . P6038	U.B.ENGINEERING LIMITED

## 610221 : ARCHITECTURAL SERVICES

CODE	NAME
<b>INDIA</b>	
1 . P6082	ALLIED ARCHITECTS PVT. LIMITED.
2 . P6081	GARG & ASSOCIATES
3 . P6085	KOTHARI ASSOCIATES PVT. LIMITED.
4 . P6084	R.K.ASSOCIATES
5 . P6083	S.K.INTEGRATED CONSULTANTS

## 610222 : GEOTECHNICAL WORKS

CODE	NAME
<b>INDIA</b>	
1 . P6087	CENGRS GEOTECHNICA PVT. LIMITED.
2 . P6086	GEOTECH CONSULTANTS PVT. LIMITED

## 610226 : SMALL MAINTENANCE WORKS

CODE	NAME
<b>INDIA</b>	
1 . P6088	SHIVA CONSTRUCTIONS

## 610228 : STRUCTURAL GRATINGS

CODE	NAME
<b>INDIA</b>	
1 . P6111	ERCON COMPOSITES (FRP Gratings)
2 . P6123	FERROTECH STRUCTURALS (INDIA) PVT.LTD.
3 . P6136	INDIANA GRATINGS PRIVATE LIMITED
4 . P6089	INDIANA GRATINGS PVT. LIMITED.
5 . P8089	KANADE ANAND UDYOG PVT. LTD.
6 . P6105	KEMROCK INDUSTRIES & EXPORTS LTD. ( For FRP Gratings)
7 . P6108	PENTAX FERRO INCORPORATE (For Gratings/Floor Grill - MS, MS Hot Dipped Galvanized.)
8 . P6110	PINAX STEEL INDUSTRIES PRIVATE LIMITED (Electroforged Gratings)
9 . P6125	PINAX STEEL INDUSTRIES PRIVATE LIMITED
10 . P6109	SUTTATTI ENTERPRISES LTD.



## 610231 : WATER PROOFING AND ROOF TREATMENT

CODE	NAME
<b>INDIA</b>	
1 . P6139	BERGER PAINTS INDIA LIMITED
2 . P6130	IWL INDIA PRIVATE LIMITED
3 . P6101	PIDILITE INDUSTRIES LIMITED (Including all Chemicals & Accessories)
4 . P6128	STP LIMITED
5 . P6126	SUNANDA SPECIALITY COATINGS PVT.LTD.
6 . P6140	SYNORGANIC PAINTS PVT. LTD.
7 . P6131	TIKI TAR DANOSA INDIA PVT. LTD. (MATERIAL)
8 . P6100	TRISTAR INTECH PVT. LTD.

## 610232 : WATER SUPPLY AND SANITATION

CODE	NAME
<b>INDIA</b>	
1 . P6099	KAPILANSH DHATU UDYOG (P) LTD.

## 610233 : ANTI-CORROSIVE MATERIAL (MANUFACTURE & APPLICATOR)

CODE	NAME
<b>INDIA</b>	
1 . P1032	ARCOY INDUSTRIES (Cement / Morter / Rubber / Tile Lining Work)
2 . P6133	ARCOY INDUSTRIES (INDIA) PVT.LTD.
3 . P6139	BERGER PAINTS INDIA LIMITED
4 . P6135	DOOALL CORPRO INDIA PVT. LTD.
5 . P6130	IWL INDIA PRIVATE LIMITED
6 . P6128	STP LIMITED
7 . P6126	SUNANDA SPECIALITY COATINGS PVT.LTD.
8 . P6140	SYNORGANIC PAINTS PVT. LTD.
9 . P6131	TIKI TAR DANOSA INDIA PVT. LTD.

## 610234 : REHABILITATION WORKS

CODE	NAME
<b>INDIA</b>	
1 . P6107	STANDARD REHABILITATORS PVT. LTD. (For Civil Structure with Painting)
2 . P6140	SYNORGANIC PAINTS PVT. LTD.

## 610235 : TMT RE-BAR

CODE	NAME
1 .	
<b>INDIA</b>	
2 . P6119	Jindal Steel & Power Limited
3 . P6114	M/S ELECTROSTEEL STEELS LTD. (V-XEGA)
4 . P6137	MS AGARWAL FOUNDRIES PVT. LTD.
5 . P6129	RASHMI METALIKS LIMITED
6 . P6134	REAL ISPAT AND POWER LIMITED
7 . P6121	SHRI BAJRANG POWER & ISPAT LTD. (GOEL TMT)
8 . P6115	SHRI RATHI STEEL LTD.
9 . P6127	SHYAM METALICS AND ENERGY LTD.
10 . P6112	SHYAM STEEL INDUSTRIES LIMITED
11 . P6122	SPS STEELS ROLLING MILLS LIMITED
12 . P6116	SRMB SRIJAN PRIVATE LIMITED

## 610236 : STRUCTURAL STEEL

CODE	NAME
<b>INDIA</b>	
1 . P6113	JINDAL STEEL & POWER LIMITED
2 . P6138	RR ISPAT (A UNIT OF GODAWARI POWER AND ISPAT LTD.) (a. Angle : Upto 200 x 200 x 20MM, b. Channel : Upto 200 x 75MM, c. H-Beam : Upto 152 x 152MM (37.1Kg) & d. Flat)
3 . P6127	SHYAM METALICS AND ENERGY LTD.

**610237 : FRP, POLYCARBONATE AND METAL SHEET PRODUCTS**

CODE	NAME
<b>INDIA</b>	
1 . P6124	ROOFCLAD INFRA PVT.LTD.
2 . P6117	SHIV SHAKTI FIBER UDYOG


**610238 : CONST. CHEMICALS (ADMIXT, WATERPROOFING, FLOORING & COATING, REPAIR & RESTORE, GROUT & ANCHOR,BUILDINGS & JOIN**

<b>CODE</b>	<b>NAME</b>
<b>INDIA</b>	
1 . P6139	BERGER PAINTS INDIA LIMITED (Admixture, Waterproofing, Grout & Joint sealant)
2 . P6130	IWL INDIA PRIVATE LIMITED
3 . P6120	Jay Chemical Industries Pvt. Ltd. (K2)
4 . P6118	MYK ARMENT PRIVATE LIMITED
5 . P6128	STP LIMITED
6 . P6126	SUNANDA SPECIALITY COATINGS PVT.LTD.
7 . P6140	SYNORGANIC PAINTS PVT. LTD.
8 . P6131	TIKI TAR DANOSA INDIA PVT. LTD.



## 610239 : PRE FABRICATED STRUCTURE

CODE	NAME
<b>INDIA</b>	
1 . P6132	PINAX STEEL INDUSTRIES PRIVATE LIMITED

	<b>MASTER VENDORS LIST FOR PROJECTS</b>	04-00MM-0011	18
		DOCUMENT NO	REV

**MASTER VENDORS LIST**  
**FOR**  
**PROJECTS**  
**PROCESS ENGG. ITEMS**

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## 710101 : CATALYST

CODE	NAME
<b>INDIA</b>	
1 . P7001	PROJECTS & DEVELOPMENT INDIA LTD.
2 . P7002	SUD CHEMIE
<b>DENMARK</b>	
3 . P7003	HALDOR TOPSOE
<b>GERMANY</b>	
4 . P7005	BASF AKTIENGESELL SC HAFT
<b>NETHERLAND</b>	
5 . P7006	NORSK HYDRO
<b>U.K.</b>	
6 . P7004	ICI

## 710102 : CATALYST BED SUPPORT,CERAMIC BALLS ,ALUMINA BALLS

CODE	NAME
<b>INDIA</b>	
1 . P7011	CALDERYS INDIA REFRACTORIES LTD
2 . P7007	OXIDE INDIA PVT. LTD.
<b>DENMARK</b>	
3 . P7003	HALDOR TOPSOE
<b>U.K.</b>	
4 . P7008	CARBORANDUM RESISTANT MATERIAL
<b>U.S.A.</b>	
5 . P7009	ALCOA
6 . P7010	AP GREEN REFRACTORIES

## 710103 : PURGE GAS RECOVERY

CODE	NAME
<b>INDIA</b>	
1 . P7012	BHPV
2 . P7017	LIQUID AIR ENGG. INDIA LTD.
<b>BELGIUM</b>	
3 . P7016	AIR PRODUCT
<b>FRANCE</b>	
4 . P7015	AIR LIQUIDE
<b>GERMANY</b>	
5 . P7013	LINDE
<b>JAPAN</b>	
6 . P7019	NIPPON SAUSO KK
7 . P7018	SUMITOMO CHEM ENGG. CO. LTD.
<b>U.K.</b>	
8 . P7014	COSTAIN ENGG. LTD.

## 710104 : ACTIVATED CARBON

CODE	NAME
<b>INDIA</b>	
1 . P7023	ACTIVE CARBON INDIA PVT. LTD.
2 . P7148	GRAND PRIX ENGINEERING PVT.LTD.
3 . P7020	INDUSTRIAL CARBON
4 . P7027	ION EXCHANGE INDIA LTD.
5 . P7021	SHRI RAJPIPLA AMAR CARBON
<b>GERMANY</b>	
6 . P7024	CARBOTECH AKTIVKOHLEN GMBH
<b>ITALY</b>	
7 . P7026	CHEM VIRON
<b>U.S.A.</b>	
8 . P7022	NORIT
9 . P7025	CALGON CORPORATION



## 710105 : REFRIGERATION SYSTEMS INVOLVING AMMONIA AND HYDROCARBON GASES BOIL OFF AND CRYOGENIC SYSTEMS

CODE	NAME
<b>INDIA</b>	
1 . P7142	SYSTEMS & COMPONENTS (INDIA) PVT. LTD. (49 TR at minus 75°C with Methanol / R22 as refrigerant; 175 TR at minus 20°C with R717 / Methanol as refrigerant; 787 TR at 8°C with water as refrigerant)

## 710201 : OIL WATER SEPARATION UNIT (TPI/CPI TYPE DISC OIL)

CODE	NAME
<b>INDIA</b>	
1 . P7032	BP LIMITED
2 . P7148	GRAND PRIX ENGINEERING PVT.LTD.
3 . P7029	HINDUSTAN DORR OLIVER LTD.
4 . P7027	ION EXCHANGE INDIA LTD.
5 . P7031	K-PACK
6 . P7150	MULTITEX FILTRATION ENGINEERS LTD.
7 . P7140	OSWAL INFRASTRUCTURE LIMITED (3508 Kg/Hr.)
8 . P7030	PARAMOUNT INDIA LTD.
<b>india</b>	
9 . P7141	OXYBEE SOLUTIONS (60 KLD)
<b>ITALY</b>	
10 . P7028	OCS

## 710202 : FLARE SYSTEM

CODE	NAME
<b>INDONESIA</b>	
1 . P7146	PT. KOTAMINYAK INTERNUSA (500 MMSCFD)
<b>INDIA</b>	
2 . P7033	ADOR SAMIA
3 . P0027	AIROIL FLAREGAS (INDIA) PVT.LIMITED,
4 . P7138	EUROPEM NV (25000-170891 Kg/hr)
5 . P7140	OSWAL INFRASTRUCTURE LIMITED (3508 Kg/Hr.)
<b>ITALY</b>	
6 . P7135	THERMOENGINEERING SRL (700 - 1620400 Kg/Hr.)
<b>UNITED STATES</b>	
7 . P7134	ZEECO, INC. (1921080 Kg/hr)
<b>U.K.</b>	
8 . P7034	CALIDUS
9 . P0429	JOHN ZINK COMPANY LIMITED

## 710203 : DM WATER / CONDENSATE POLISHING UNIT

CODE	NAME
<b>INDIA</b>	
1 . P7137	BGR ENGERGY SYSTEMS LIMITED (55 - 130 M3/Hr)
2 . P7055	DOSHI ION EXCHANGE & CHEMICAL INDUSTRIES LTD
3 . P7133	DRIPLEX WATER ENGINEERING PVT.LTD. (8 X 172 m3/hr)
4 . P7037	INDOCON ENGG. SYSTEM PVT. LTD.
5 . P7027	ION EXCHANGE INDIA LTD.
6 . P7030	PARAMOUNT INDIA LTD.
7 . P7136	PRAJ INDUSTRIES LIMITED (5 - 33 m3/hr)
8 . P7038	PROJECTS & DEVELOPMENT INDIA LTD.
9 . P7036	THERMAX INDIA LTD.
10 . P7035	V.A. TECH WABAG
11 . P7130	VA TECH WABAG LTD. (12-14400 m3/hr)
<b>india</b>	
12 . P7141	OXYBEE SOLUTIONS (1000 - 10000 LPH)
<b>AUSTRALIA</b>	
13 . P7042	VIVENDI WATER SYSTEM
<b>ITALY</b>	
14 . P7041	IDRECO
15 . P7039	TERMOKIMIK CORPORATION SPA
<b>KOREA</b>	

## 710203 : DM WATER / CONDENSATE POLISHING UNIT

CODE	NAME
16 . P7040	KOREA HEAVY INDUSTRIES & CONSTRUCTION

## 710204 : INSTRUMENT AIR DRYING UNIT

CODE	NAME
<b>INDIA</b>	
1 . P7047	ADVANCED COMPRESSED AIR SYSTEM
2 . P7045	CHEM TECH ENGINEERS
3 . P7044	CLEAN AIR SYSTEMS & EQUIPMENTS
4 . P7139	GAS PROCESSING EQUIPMENT PVT. LTD. (300 - 7750 NM3/Hr)
5 . P7046	GASO ENERGY SYSTEMS INDIA LTD.
6 . P7043	LLOYDS STEEL LTD.
7 . P7052	MAS GAS AIR SYSTEMS PVT. LTD.
8 . P7049	MECHNEIL & MAGOR
9 . P7053	MELLCON ENGINEERS PVT. LTD. (All Type & Capacity)
10 . P7050	MIRCH TECHNOLOGIES LIMITED
11 . P7150	MULTITEX FILTRATION ENGINEERS LTD.
12 . P7051	MVS ENGG. LIMITED
13 . P7107	NATIONAL ENGINEERING INDUSTRIES
14 . P7149	SUMMITS HYGRONICS PRIVATE LIMITED
15 . P7048	TECHNIP KT INDIA LIMITED
<b>ITALY</b>	
16 . P7123	PREMABERGO ITALIANA srl

## 710205 : PSA NITROGEN PLANT

CODE	NAME
<b>INDIA</b>	
1 . P7054	BRITISH OXYGEN
2 . P7139	GAS PROCESSING EQUIPMENT PVT. LTD. (25 - 700 NM3/Hr)
3 . P7149	SUMMITS HYGRONICS PRIVATE LIMITED
4 . P7048	TECHNIP KT INDIA LIMITED
<b>BELGIUM</b>	
5 . P7016	AIR PRODUCT
<b>FRANCE</b>	
6 . P7015	AIR LIQUIDE
<b>GERMANY</b>	
7 . P7024	CARBOTECH AKTIVKOHLEN GMBH
8 . P7013	LINDE

## 710206 : REVERSE OSMOSIS PLANT

CODE	NAME
<b>INDIA</b>	
1 . P7132	AQUA DESIGNS INDIA PVT. LTD. (7-105 m3/hr.)
2 . P7137	BGR ENGERGY SYSTEMS LIMITED (75 - 541.6 M3/Hr (13 MLD))
3 . P7055	DOSHI ION EXCHANGE & CHEMICAL INDUSTRIES LTD
4 . P7133	DRIPLEX WATER ENGINEERING PVT.LTD. (7 X 219 m3/hr)
5 . P7029	HINDUSTAN DORR OLIVER LTD.
6 . P7027	ION EXCHANGE INDIA LTD.
7 . P7057	METITO POLLUTION CONTROL INDIA PVT. LTD.
8 . P7056	NEWCHEM WEIR LTD.
9 . P7058	ONDEO DEGREMONT
10 . P7030	PARAMOUNT INDIA LTD.
11 . P7136	PRAJ INDUSTRIES LIMITED (10 - 80 m3/hr)
12 . P7036	THERMAX INDIA LTD.
13 . P7121	TRIVENI ENGINEERING & INDUSTRIES LIMITED
14 . P7130	VA TECH WABAG LTD. (50-8333 m3/hr)
<b>india</b>	
15 . P7141	OXYBEE SOLUTIONS (50 - 20000 LPH)
<b>ITALY</b>	
16 . P7041	IDRECO



## 710206 : REVERSE OSMOSIS PLANT

CODE	NAME
<b>JAPAN</b>	
17 . P7059	MHI
<b>U.S.A.</b>	
18 . P7061	DUPONT
19 . P7060	HYDRANAUTICS

## 710207 : AIR LIQUIFICATION / LIQUID NITROGEN PLANT

CODE	NAME
<b>INDIA</b>	
1 . P7012	BHPV
2 . P7054	BRITISH OXYGEN
3 . P7063	INOX
<b>FRANCE</b>	
4 . P7015	AIR LIQUIDE
<b>GERMANY</b>	
5 . P7013	LINDE
<b>U.S.A.</b>	
6 . P7062	AIR PRODUCTS

## 710208 : CHLORINATION UNIT

CODE	NAME
<b>INDIA</b>	
1 . P7066	BABUBAI NAROTTAM DAS
2 . P7065	CAPITAL CONTROL INDIA PVT. LTD.
3 . P7057	METITO POLLUTION CONTROL INDIA PVT. LTD.
4 . P7064	PENNWALT
5 . P7127	TOSHCON JESCO (INDIA) PVT. LTD.,
6 . P7145	VASU CHEMICALS (6-60 Kg/hr)
<b>india</b>	
7 . P7141	OXYBEE SOLUTIONS (30 - 480 LPH)
<b>ITALY</b>	
8 . P7123	PREMABERGO ITALIANA srl

## 710209 : VALVELESS AUTO WASH GRAVITY SAND FILTER

CODE	NAME
<b>INDIA</b>	
1 . P7069	DELKOR TECHNIK INDIA PVT. LTD.
2 . P7067	OTOKLIN INDIA LTD.
3 . P7036	THERMAX INDIA LTD.
<b>IRELAND</b>	
4 . P7068	DOLLINGER INTERNATIONAL AEROMECCANICA STRANIC
<b>INDIA</b>	
5 . P7144	SUREFLO TECHCON PVT.LTD. (10 m3/hr - 3264 m3/hr)

## 710210 : WATER PRE-TREATMENT PLANT

CODE	NAME
<b>INDIA</b>	
1 . P7116	AKAR IMPEX PVT LTD
2 . P7132	AQUA DESIGNS INDIA PVT. LTD. (500-6000 KLD)
3 . P7137	BGR ENGERGY SYSTEMS LIMITED (380 - 3800 M3/Hr)
4 . P7055	DOSHI ION EXCHANGE & CHEMICAL INDUSTRIES LTD
5 . P7133	DRIPLEX WATER ENGINEERING PVT.LTD. (2 X 3000 m3/hr)
6 . P7070	ENVIRO CONTROL ASSOCIATES (I) PVT. LTD.
7 . P7071	GEO MILLER
8 . P7029	HINDUSTAN DORR OLIVER LTD.
9 . P7058	ONDEO DEGREMONT
10 . P7030	PARAMOUNT INDIA LTD.
11 . P7136	PRAJ INDUSTRIES LIMITED (11 - 124 m3/hr)
12 . P7038	PROJECTS & DEVELOPMENT INDIA LTD.
13 . P7121	TRIVENI ENGINEERING & INDUSTRIES LIMITED
14 . P7035	V.A. TECH WABAG
<b>india</b>	
15 . P7141	OXYBEE SOLUTIONS (50 KLD)

## 710211 : WASTE WATER TREATMENT PLANT

CODE	NAME
<b>INDIA</b>	
1 . P7147	CHEM PROCESS SYSTEMS PVT.LTD
2 . P7137	BGR ENGERGY SYSTEMS LIMITED (10-331 M3/Hr)
3 . P7133	DRIPLEX WATER ENGINEERING PVT.LTD. (1400 m3/hr)
4 . P7070	ENVIRO CONTROL ASSOCIATES (I) PVT. LTD.
5 . P7071	GEO MILLER
6 . P7029	HINDUSTAN DORR OLIVER LTD.
7 . P7073	LARSEN & TOUBRO
8 . P7058	ONDEO DEGREMONT
9 . P7030	PARAMOUNT INDIA LTD.
10 . P7136	PRAJ INDUSTRIES LIMITED (65 - 6000 m3/day)
11 . P7038	PROJECTS & DEVELOPMENT INDIA LTD.
12 . P7074	TRIVENI ENGG.
13 . P7121	TRIVENI ENGINEERING & INDUSTRIES LIMITED
14 . P7072	UEM INDIA LIMITED
15 . P7035	V.A. TECH WABAG
16 . P7130	VA TECH WABAG LTD. (25-2300 m3/hr (including Recycle Plant - 12-4170 m3/hr))
<b>india</b>	

## 710211 : WASTE WATER TREATMENT PLANT

CODE	NAME
17 . P7141	OXYBEE SOLUTIONS (25 - 300 KLD)

## 710212 : CHEMICAL DOSING SYSTEM FOR COOLING TOWER

CODE	NAME
<b>INDIA</b>	
1 . P3219	ALBATROSS FINE CHEM LTD
2 . P7076	AQUAPHARAM CHEMICAL CO. PVT. LTD.
3 . P7151	CHEMBOND WATER TECHNOLOGIES LIMITED
4 . P7133	DRIPLEX WATER ENGINEERING PVT.LTD. (83200 m3/hr)
5 . P7077	GE BETZ LTD.
6 . P7148	GRAND PRIX ENGINEERING PVT.LTD.
7 . P7027	ION EXCHANGE INDIA LTD.
8 . P3340	MILTON ROY INDIA (P) LTD.
9 . P7075	NLC NALCO INDIA LIMITED
10 . P7140	OSWAL INFRASTRUCTURE LIMITED (10 LPH)
11 . P7036	THERMAX INDIA LTD.
12 . P7145	VASU CHEMICALS (19794-80000 m3/hr)



## 710213 : COOLING TOWERS

CODE	NAME
<b>INDIA</b>	
1 . P7109	AADI HEAT EXCHANGERS PVT. LTD.
2 . P7080	BALKE DURR
3 . P7143	ENEXIO POWER COOLING SOLUTIONS INDIA PVT.LTD. (i. Induced Draft Cooling Tower ii. Natural Draft Cooling Tower)
4 . P7125	GACTEL TURNKEY PROJECTS LIMITED (RCC. All range)
5 . P7108	NORTH STREET COOLING TOWERS(P) LTD.
6 . P7078	PAHARPUR COOLING TOWER
7 . P7126	PALTECH COOLING TOWERS & EQUIPMENTS LTD (Wooden Cooling Tower; RCC Cooling Tower; Pultruded Cooling Tower ; FRP Cooling Tower)
8 . P7079	SHRIRAM TOWER TECH. LTD.
9 . P7124	SOUTHERN COOLING TOWERS PRIVATE LTD. (20-3500 m3/hr Single Cell)
<b>GERMANY</b>	
10 . P7083	BALKE DURR
<b>U.K.</b>	
11 . P7081	MARLEY C.T.
<b>U.S.A.</b>	
12 . P7082	TOWER TECH

## 710214 : POLLUTION CONTROL EQUIPMENTS

CODE	NAME
<b>INDIA</b>	
1 . P0353	HINDUSTAN DOOR-OLIVER LTD.
2 . P7107	NATIONAL ENGINEERING INDUSTRIES
3 . P7058	ONDEO DEGREMONT
4 . P7030	PARAMOUNT INDIA LTD.
5 . P7106	TECPRO TREMA LIMITED
<b>india</b>	
6 . P7141	OXYBEE SOLUTIONS (10 - 200 KLD)

## 710215 : MIST TYPE COOLING TOWER

CODE	NAME
<b>INDIA</b>	
1 . P7120	MIST RESSONANCE ENGG.PVT.LTD. (UPTO 10000 CUBIC MTR/HR.)

## 710216 : EFFLUENT TREATMENT PLANT (ETP)

CODE	NAME
<b>INDIA</b>	
1 . P7132	AQUA DESIGNS INDIA PVT. LTD. (600-7200 KLD)

## 710217 : SEA WATER DESALINATION PLANT

CODE	NAME
<b>INDIA</b>	
1 . P7130	VA TECH WABAG LTD. (100 MLD)

## 710218 : SEWAGE TREATMENT PLANT

CODE	NAME
<b>INDIA</b>	
1 . P7132	AQUA DESIGNS INDIA PVT. LTD. (30-3000 KLD)

## 710219 : JET AERATOR

CODE	NAME
<b>INDIA</b>	
1 . P7131	KOERTING ENGINEERING PVT. LTD. (7.5 - 2 x 106M3/hr.)

710221 : Chemicals-V<sub>2</sub>O<sub>5</sub>,Antifoam agent,TSP,KNO<sub>2</sub>,H<sub>2</sub>SO<sub>4</sub>,HCL,  
Methanol,DEA,Hydrazin

CODE	NAME
<b>INDIA</b>	
1 . P7110	AMINES & PLASTICIZERS
2 . P7104	AMJEY CHEMICALS (All Capacity)
3 . P7076	AQUAPHARAM CHEMICAL CO. PVT. LTD.
4 . P7085	ATUL CO.
5 . P7084	AVM SALES CORPN.
6 . P7086	BHANWARILAL JHANWAR & SONS
7 . P7088	CATALYST INDIA PVT.LTD.
8 . P7087	CATLCO CHEMICALS PVT. LTD.
9 . P7151	CHEMBOND WATER TECHNOLOGIES LIMITED
10 . P7090	CHEMICALS & INSTS. CORPN.
11 . P7091	EVERLIGHT INTERNATIONAL
12 . P7092	FELCHEM
13 . P7093	HARYANA CHEMICALS & PESTICIDES
14 . P7089	HENKEL CHEMBOND SURFACE TECHONOLOGIES LTD.
15 . P7094	INDUSTRIAL ALLOYS
16 . P7103	J.BROTHERS
17 . P7095	JYOTI DYE CHEM



710221 : Chemicals-V<sub>2</sub>O<sub>5</sub>,Antifoam agent,TSP,KNO<sub>2</sub>,H<sub>2</sub>SO<sub>4</sub>,HCL,  
Methanol,DEA,Hydrazin

CODE	NAME
18 . P7096	MULTICHEM
19 . P7105	PARAS INTERMEDIATES PVT LTD
20 . P7097	RARE METALS & CHEMICALS
21 . P7098	S.G.ENTERPRISES
22 . P7099	SHREE RAM CHEMICALS
23 . P7100	SUCHEM INTERNATIONAL
24 . P7101	SUNIL CHEMICALS
25 . P7102	VEE CHEM INDUSTRIES
<b>india</b>	
26 . P7141	OXYBEE SOLUTIONS (50 - 1000 Ltr.)

## 710222 : NATURAL GAS TREATMENT PLANT/SKID

CODE	NAME
<b>INDIA</b>	
1 . P7139	GAS PROCESSING EQUIPMENT PVT. LTD. (300 - 45200 NM3/Hr)
2 . P7150	MULTITEX FILTRATION ENGINEERS LTD.
3 . P7140	OSWAL INFRASTRUCTURE LIMITED (0.3 MMSCFD)
<b>ITALY</b>	
4 . P7123	PREMABERGO ITALIANA srl

## 710223 : TOWER PACKING

CODE	NAME
<b>INDIA</b>	
1 . P7128	FENIX PROCESS TECHNOLOGIES PVT. LTD.

## 710224 : TOWER/SEPARATOR INTERNALS

CODE	NAME
<b>INDIA</b>	
1 .	FENIX PROCESS TECHNOLOGIES PVT. LTD.
2 . P7148	GRAND PRIX ENGINEERING PVT.LTD.

## 710225 : DISTILLATION TOWER TRAYS

CODE	NAME
<b>INDIA</b>	
1 . P7128	FENIX PROCESS TECHNOLOGIES PVT. LTD.

710226 : COLD BOXES

CODE	NAME
<b>UK</b>	
1 . P7129	CHART ENERGY & CHEMICALS INC.

## 710227 : MEMBRANE BIO REACTOR

CODE	NAME
<b>INDIA</b>	
1 . P7132	AQUA DESIGNS INDIA PVT. LTD. (30-1050 KLD)

## 710228 : ULTRA FILTRATION PLANT

CODE	NAME
<b>INDIA</b>	
1 . P7133	DRIPLEX WATER ENGINEERING PVT.LTD. (7 X 200 m3/hr)



## 710229 : SEWAGE / EFFLUENT TREATMENT PLANT

CODE	NAME
<b>INDIA</b>	
1 .	DRIPLEX WATER ENGINEERING PVT.LTD. (1400 m3/hr)

## 710401 : LOADING OF CATALYST & PACKING

CODE	NAME
<b>INDIA</b>	
1 . P6074	AMOL CONSTRUCTIONS
2 . P6020	JAIHIND PROJECTS LIMITED
3 . P6073	PASHUPATI SINGH & CO.
4 . P6012	PETRON CIVIL ENGINEERING LIMITED

	<b>MASTER VENDORS LIST FOR PROJECTS</b>	04-00MM-0011	18
		DOCUMENT NO	REV

**MASTER VENDORS LIST**  
**FOR**  
**PROJECTS**  
**ELECTRICAL ITEMS**

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## 810101 : CIRCUIT BREAKERS,66KV & ABOVE.

CODE	NAME
<b>INDIA</b>	
1 . P0066	ASEA BROWN BOVERI LTD.
2 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
3 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
4 . P0869	VOLTAS LTD. (PUMPS & PROJECTS BUSINESS DIV)

## 810102 : HIGH VOLTAGE CIRCUIT BREAKERS.

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0066	ASEA BROWN BOVERI LTD.
3 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
4 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
5 . P8173	CG POWER AND INDUSTRIAL SOLUTIONS LIMITED
6 . P8104	JYOTI LIMITED
7 . P0736	SIEMENS LTD.
8 . P0802	THE MYSORE ELECTRICAL INDUSTRIES LTD.

810103 : MV ACB.

CODE	NAME
<b>INDIA</b>	
1 . P0173	C&S ELECTRIC LTD. (Upto 6300A)
2 . P0573	GE POWER CONTROLS INDIA PVT. LTD.
3 . P0485	LARSEN & TOUBRO LTD.(EL.PRODUCTS DIVN)
4 . P0736	SIEMENS LTD.
5 . P8051	SPACEAGE SWITCHGEARS LIMITED

## 810104 : MOULDED CASE CIRCUIT BREAKERS (MCCB)

CODE	NAME
<b>INDIA</b>	
1 . P0173	C&S ELECTRIC LTD. (Upto 400A)
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P0573	GE POWER CONTROLS INDIA PVT. LTD.
4 . P0337	HAVELLS INDIA LTD.
5 . P8060	HPL ELECTRIC & POWER PVT. LTD. (10A to 800A)
6 . P0485	LARSEN & TOUBRO LTD.(EL.PRODUCTS DIVN)
7 . P0736	SIEMENS LTD.
8 . P8051	SPACEAGE SWITCHGEARS LIMITED
9 . P8070	STANDARD ELECTRICALS LIMITED (MCCB)

## 810105 : MINIATURE CIRCUIT BREAKERS(MCB)

CODE	NAME
<b>INDIA</b>	
1 . P8068	ADHUNIK SWITCHGEARS (P) LTD.
2 . P0173	C&S ELECTRIC LTD.
3 . P0337	HAVELLS INDIA LTD.
4 . P8060	HPL ELECTRIC & POWER PVT. LTD.
5 . P0384	INDIANA CURRENT CONTROL LTD.
6 . P0413	INDO ASIAN FUSEGEAR LTD
7 . P0523	LEGRAND INDIA LTD
8 . P0693	S & S POWER SWITCHGEAR LTD
9 . P8070	STANDARD ELECTRICALS LIMITED

## 810106 : MV ELCB

CODE	NAME
<b>INDIA</b>	
1 . P0173	C&S ELECTRIC LTD.
2 . P0573	GE POWER CONTROLS INDIA PVT. LTD.
3 . P0337	HAVELLS INDIA LTD.
4 . P0413	INDO ASIAN FUSEGEAR LTD
5 . P0523	LEGRAND INDIA LTD
6 . P0693	S & S POWER SWITCHGEAR LTD
7 . P0736	SIEMENS LTD.
8 . P8070	STANDARD ELECTRICALS LIMITED

## 810201 : EHV SWITCHES/ISOLATORS

CODE	NAME
<b>INDIA</b>	
1 . P0780	ELPRO INTERNATIONAL LIMITED
2 . P0693	S & S POWER SWITCHGEAR LTD
3 . P0824	TRANSLECT

## 810202 : HV SWITCHES/ISOLATORS

CODE	NAME
<b>INDIA</b>	
1 . P0066	ASEA BROWN BOVERI LTD.
2 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
3 . P8190	ELEKTROLITES (POWER) PRIVATE LIMITED
4 . P0780	ELPRO INTERNATIONAL LIMITED
5 . P0736	SIEMENS LTD.
6 . P0824	TRANSLECT



## 810203 : LOW VOLTAGE INDUSTRIAL SWITCHES/ISOLATORS

CODE	NAME
<b>INDIA</b>	
1 . P0066	ASEA BROWN BOVERI LTD.
2 . P0173	C&S ELECTRIC LTD.
3 . P0573	GE POWER CONTROLS INDIA PVT. LTD.
4 . P0337	HAVELLS INDIA LTD.
5 . P8060	HPL ELECTRIC & POWER PVT. LTD.
6 . P0440	KAYCEE INDUSTRIES LTD
7 . P0485	LARSEN & TOUBRO LTD.(EL.PRODUCTS DIVN)
8 . P0736	SIEMENS LTD.

## 810301 : POWER TRANSFORMER, 66 KV & ABOVE (OIL FILLED)

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0066	ASEA BROWN BOVERI LTD.
3 . P8162	ATLANTA ELECTRICALS PVT. LTD
4 . P0104	BHARAT BIJLEE LTD
5 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
6 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
7 . P0236	EMCO LIMITED (upto 100 MVA)
8 . P0392	IMP POWER LTD.
9 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
10 . P0868	VOLTAMP TRANSFORMERS LTD. (upto 132KV , 50MVA)

## 810302 : POWER TRANSFORMER,33KV & BELOW

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P8162	ATLANTA ELECTRICALS PVT. LTD
3 . P0104	BHARAT BIJLEE LTD
4 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
5 . P0236	EMCO LIMITED
6 . P8124	ESENNAR TRANSFORMERS (P) LTD.
7 . P0378	INDCOIL TRANSFORMERS PVT. LTD.
8 . P0432	KANOHAR ELECTRICALS LTD. (upto 10 MVA)
9 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
10 . P8157	RAYCHEM RPG PRIVATE LIMITED
11 . P8136	VARDHMAN ELECTRO-MECH PVT. LTD. (Upto 8 MVA)
12 . P0868	VOLTAMP TRANSFORMERS LTD. (upto 132KV,50MVA)
13 . P0869	VOLTAS LTD. (PUMPS & PROJECTS BUSINESS DIV)

## 810303 : AUXILIARY SUPPLY TRANSFORMER

CODE	NAME
<b>INDIA</b>	
1 . P8124	ESENNAR TRANSFORMERS (P) LTD.
2 . P8111	GUJARAT PLUG-IN DEVICES PVT. LTD. (Upto 300 KVA)
3 . P0392	IMP POWER LTD.
4 . P0378	INDCOIL TRANSFORMERS PVT. LTD.
5 . P8052	KALPA ELECTRICAL PRIVATE LIMITED ( DRY TYPE UPTO 100 KVA)
6 . P0079	MEHRU ELECTRICALS (FORMERLY AUTOMATIC ELECTRIC LIMITED)
7 . P8157	RAYCHEM RPG PRIVATE LIMITED
8 . P0723	SHEPHARD TRANSFORMERS LTD
9 . P8136	VARDHMAN ELECTRO-MECH PVT. LTD.

## 810304 : AUTO TRANSFORMER

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0104	BHARAT BIJLEE LTD
3 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
4 . P0236	EMCO LIMITED
5 . P0329	HACKBRIDGE - HEWITTIC & EASUN LTD
6 . P0378	INDCOIL TRANSFORMERS PVT. LTD.
7 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
8 . P0823	TRANSFORMERS & ELECTRICALS KERALA LTD

## 810305 : REACTOR

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
3 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
4 . P0329	HACKBRIDGE - HEWITTIC & EASUN LTD

## 810306 : EARTHING TRANSFORMER

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0104	BHARAT BIJLEE LTD
3 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
4 . P0236	EMCO LIMITED
5 . P0329	HACKBRIDGE - HEWITTIC & EASUN LTD
6 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
7 . P0823	TRANSFORMERS & ELECTRICALS KERALA LTD

## 810307 : CURRENT TRANSFORMERS, 66KV & ABOVE

CODE	NAME
<b>INDIA</b>	
1 . P0066	ASEA BROWN BOVERI LTD.
2 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
3 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
4 . P0079	MEHRU ELECTRICALS (FORMERLY AUTOMATIC ELECTRIC LIMITED)
5 . P0560	NAGPUR TRANSFORMERS LTD
6 . P0823	TRANSFORMERS & ELECTRICALS KERALA LTD



**810308 : POTENTIAL TRANSFORMER, 66KV & ABOVE**

CODE	NAME
<b>INDIA</b>	
1 . P0066	ASEA BROWN BOVERI LTD.
2 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
3 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
4 . P0079	MEHRU ELECTRICALS (FORMERLY AUTOMATIC ELECTRIC LIMITED)
5 . P0560	NAGPUR TRANSFORMERS LTD
6 . P0823	TRANSFORMERS & ELECTRICALS KERALA LTD

## 810309 : HV CURRENT TRANSFORMERS

CODE	NAME
<b>INDIA</b>	
1 . P8128	ANANT POWERTECH ((11 KV to 33 KV))
2 . P0066	ASEA BROWN BOVERI LTD.
3 . P8214	ASIAN ELECTRICAL & ELECTRONICS
4 . P8052	KALPA ELECTRICAL PRIVATE LIMITED
5 . P0079	MEHRU ELECTRICALS (FORMERLY AUTOMATIC ELECTRIC LIMITED)
6 . P8053	PERFECT SALES CORPORATION

## 810310 : HV POTENTIAL TRANSFORMER

CODE	NAME
<b>INDIA</b>	
1 . P8128	ANANT POWERTECH ((11 KV to 33 KV))
2 . P0066	ASEA BROWN BOVERI LTD.
3 . P8214	ASIAN ELECTRICAL & ELECTRONICS
4 . P8052	KALPA ELECTRICAL PRIVATE LIMITED
5 . P0079	MEHRU ELECTRICALS (FORMERLY AUTOMATIC ELECTRIC LIMITED)
6 . P8053	PERFECT SALES CORPORATION

## 810311 : MV CURRENT TRANSFORMERS

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P8128	ANANT POWERTECH
3 . P8214	ASIAN ELECTRICAL & ELECTRONICS
4 . P0378	INDCOIL TRANSFORMERS PVT. LTD.
5 . P0434	KAPPA ELECTRICALS
6 . P0079	MEHRU ELECTRICALS (FORMERLY AUTOMATIC ELECTRIC LIMITED)
7 . P8155	NEWTEK ELECTRICALS
8 . P8053	PERFECT SALES CORPORATION
9 . P0736	SIEMENS LTD.

## 810312 : MV POTENTIAL TRANSFORMERS

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P8214	ASIAN ELECTRICAL & ELECTRONICS
3 . P0378	INDCOIL TRANSFORMERS PVT. LTD.
4 . P8052	KALPA ELECTRICAL PRIVATE LIMITED
5 . P0434	KAPPA ELECTRICALS
6 . P0485	LARSEN & TOUBRO LTD.(EL.PRODUCTS DIVN)
7 . P0079	MEHRU ELECTRICALS (FORMERLY AUTOMATIC ELECTRIC LIMITED)
8 . P8155	NEWTEK ELECTRICALS
9 . P8053	PERFECT SALES CORPORATION
10 . P0736	SIEMENS LTD.

## 810401 : HIGH VOLTAGE SWITCH BOARD

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P8191	APPLICATION CONTROL PANELS PVT. LTD.
3 . P0066	ASEA BROWN BOVERI LTD.
4 . P8197	ASTEK ELECTRICAL INDIA PRIVATE LIMITED
5 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
6 . P0116	BIECCO LAWRIE LIMITED
7 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
8 . P8104	JYOTI LIMITED
9 . P8101	LARSEN & TOUBRO LIMITED
10 . P8041	LOTUS POWERGEAR PVT LTD
11 . P0736	SIEMENS LTD.
12 . P8176	STELMEC LIMITED
13 . P8183	TENCO SYSTEMS & SWITCH GEARS PVT. LTD.

## 810402 : MEDIUM VOLTAGE SWITCH BOARD(PCC/MCC)

CODE	NAME
1 . P0405	
<b>INDIA</b>	
2 . P0036	ALSTOM LIMITED ( AREVA T & D)
3 . P8191	APPLICATION CONTROL PANELS PVT. LTD.
4 . P8197	ASTEK ELECTRICAL INDIA PRIVATE LIMITED
5 . P0113	BHARTIA INDUSTRIES LTD. (DIVN. BCH)
6 . P0173	C&S ELECTRIC LTD.
7 . P8069	COSMIC POWER SYSTEMS PVT. LTD.
8 . P0231	ELECMECH CORPORATION
9 . P0573	GE POWER CONTROLS INDIA PVT. LTD.
10 . P8008	JAKSON ENGINEERS LTD
11 . P0485	LARSEN & TOUBRO LTD.(EL.PRODUCTS DIVN)
12 . P8041	LOTUS POWERGEAR PVT LTD
13 . P8210	RASHMI ELECTRICALS
14 . P0736	SIEMENS LTD.
15 . P8051	SPACEAGE SWITCHGEARS LIMITED
16 . P8183	TENCO SYSTEMS & SWITCH GEARS PVT. LTD.

**810402 : MEDIUM VOLTAGE SWITCH BOARD(PCC/MCC)**

CODE	NAME
17 . P8106	VENUS CONTROLS & SWITCHGEAR (P) LTD.



## 810403 : DRAW-OUT MCC

CODE	NAME
1 . P0405	
	<b>INDIA</b>
2 . P8129	ADVANCE PANELS & SWITCHGEARS (P) LTD.
3 . P8191	APPLICATION CONTROL PANELS PVT. LTD.
4 . P8197	ASTEK ELECTRICAL INDIA PRIVATE LIMITED
5 . P0173	C&S ELECTRIC LTD.
6 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
7 . P0172	CONTROLS & SCHEMATICS PVT LTD.
8 . P8069	COSMIC POWER SYSTEMS PVT. LTD.
9 . P0231	ELECMECH CORPORATION
10 . P0573	GE POWER CONTROLS INDIA PVT. LTD.
11 . P8054	JASPER SWITCHGEARS LIMITED
12 . P0485	LARSEN & TOUBRO LTD.(EL.PRODUCTS DIVN)
13 . P8041	LOTUS POWERGEAR PVT LTD
14 . P8126	POWERTECH SWITCHGEARS (INDIA) PVT. LTD.
15 . P8210	RASHMI ELECTRICALS
16 . P0736	SIEMENS LTD.

## 810403 : DRAW-OUT MCC

CODE	NAME
17 . P8051	SPACEAGE SWITCHGEARS LIMITED
18 . P8183	TENCO SYSTEMS & SWITCH GEARS PVT. LTD.
19 . P8106	VENUS CONTROLS & SWITCHGEAR (P) LTD.
20 . P8046	VIDHYUT CONTROL(INDIA) PVT LTD

## 810404 : NON-DRAWOUT M.C.C.

CODE	NAME
1 . P0405	
<b>INDIA</b>	
2 . P0045	ANAND POWER LIMITED (upto 1800 Amp.)
3 . P0071	ASSOCIATED SWITCHGEARS & PROJECTS LTD.
4 . P8105	AVONE SYSTEM & CONTROLS
5 . P0173	C&S ELECTRIC LTD.
6 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
7 . P0172	CONTROLS & SCHEMATICS PVT LTD.
8 . P8069	COSMIC POWER SYSTEMS PVT. LTD.
9 . P0231	ELECMECH CORPORATION
10 . P0226	ELECTRIC SUPPLY & SERVICES (P) LTD
11 . P0352	HINDUSTAN CONTROL & EQPT PV. LTD.
12 . P8054	JASPER SWITCHGEARS LIMITED
13 . P8041	LOTUS POWERGEAR PVT LTD
14 . P0670	REUNION ELECTRICAL MANUFACTURERS (P) LTD
15 . P8212	RITTAL PRIVATE LIMITED
16 . P8107	SHIVALIC POWER CONTROL (P) LTD.

## 810404 : NON-DRAWOUT M.C.C.

CODE	NAME
17 . P8051	SPACEAGE SWITCHGEARS LIMITED
18 . P0828	TRICOLITE ELECTRICAL INDUSTRIES PVT.LTD.
19 . P8106	VENUS CONTROLS & SWITCHGEAR (P) LTD.
20 . P8046	VIDHYUT CONTROL(INDIA) PVT LTD

## 810405 : ELECTROMAGNETIC TYPE CONTROL PANEL/DESKS

CODE	NAME
1 . P0405	
<b>INDIA</b>	
2 . P8129	ADVANCE PANELS & SWITCHGEARS (P) LTD.
3 . P0078	AUTOMATIC CONTROLS CORPORATION
4 . P0231	ELECMECH CORPORATION
5 . P0226	ELECTRIC SUPPLY & SERVICES (P) LTD
6 . P0352	HINDUSTAN CONTROL & EQPT PV. LTD.
7 . P8008	JAKSON ENGINEERS LTD
8 . P8041	LOTUS POWERGEAR PVT LTD
9 . P8126	POWERTECH SWITCHGEARS (INDIA) PVT. LTD.
10 . P8212	RITTAL PRIVATE LIMITED

## 810406 : PROGRAMMABLE LOGIC CONTROLLER.

CODE	NAME
<b>INDIA</b>	
1 . P0066	ASEA BROWN BOVERI LTD.
2 . P8076	HONEYWELL AUTOMATION INDIA LIMITED
3 . P0399	INSTRUMENTATION LTD
4 . P8008	JAKSON ENGINEERS LTD
5 . P0444	KERALA STATE ELECTRONICS DEV. CORPN. LTD.
6 . P0485	LARSEN & TOUBRO LTD.(EL.PRODUCTS DIVN)
7 . P0033	ROCKWELL AUTOMATION INDIA PVT. LTD.
8 . P0736	SIEMENS LTD.
<b>GERMANY</b>	
9 . P0348	HIMA PAUL HILDEBRANDT GMBH + CO KG
<b>SINGAPORE</b>	
10 . P0362	HONEYWELL HIPACK ASIA PACIFIC

## 810407 : STATIC TYPE CONTROL PANEL/DESKS.

CODE	NAME
<b>INDIA</b>	
1 . P8129	ADVANCE PANELS & SWITCHGEARS (P) LTD.
2 . P0036	ALSTOM LIMITED ( AREVA T & D)
3 . P0066	ASEA BROWN BOVERI LTD.
4 . P0172	CONTROLS & SCHEMATICS PVT LTD.
5 . P0231	ELECMECH CORPORATION
6 . P0391	INDUSTRIAL INSTRUMENTS & CONTROLS
7 . P8054	JASPER SWITCHGEARS LIMITED
8 . P0485	LARSEN & TOUBRO LTD.(EL.PRODUCTS DIVN)
9 . P8041	LOTUS POWERGEAR PVT LTD
10 . P8126	POWERTECH SWITCHGEARS (INDIA) PVT. LTD.
11 . P8212	RITTAL PRIVATE LIMITED
12 . P0736	SIEMENS LTD.
13 . P0737	SILKAANS ELECTRICAL MFG. CO. PVT.LTD.

## 810408 : FLOOR MOUNTING TYPE DISTRIBUTION BOARDS.

CODE	NAME
1 . P0405	
<b>INDIA</b>	
2 . P0045	ANAND POWER LIMITED
3 . P8191	APPLICATION CONTROL PANELS PVT. LTD.
4 . P0071	ASSOCIATED SWITCHGEARS & PROJECTS LTD.
5 . P8197	ASTEK ELECTRICAL INDIA PRIVATE LIMITED
6 . P0078	AUTOMATIC CONTROLS CORPORATION
7 . P8105	AVONE SYSTEM & CONTROLS
8 . P0173	C&S ELECTRIC LTD.
9 . P0172	CONTROLS & SCHEMATICS PVT LTD.
10 . P8069	COSMIC POWER SYSTEMS PVT. LTD.
11 . P8203	DURGA TECHNO INDUSTRIES
12 . P0231	ELECMECH CORPORATION
13 . P0226	ELECTRIC SUPPLY & SERVICES (P) LTD
14 . P8200	EX-PROTECTA
15 . P0573	GE POWER CONTROLS INDIA PVT. LTD.
16 . P0312	GLOBE ELECTRICAL INDUSTRIES



## 810408 : FLOOR MOUNTING TYPE DISTRIBUTION BOARDS.

CODE	NAME
17 . P8114	HI-TECH ENGINEERS
18 . P0352	HINDUSTAN CONTROL & EQPT PV. LTD.
19 . P8008	JAKSON ENGINEERS LTD
20 . P8054	JASPER SWITCHGEARS LIMITED
21 . P0485	LARSEN & TOUBRO LTD.(EL.PRODUCTS DIVN)
22 . P8041	LOTUS POWERGEAR PVT LTD
23 . P8210	RASHMI ELECTRICALS
24 . P0670	REUNION ELECTRICAL MANUFACTURERS (P) LTD
25 . P8212	RITTAL PRIVATE LIMITED
26 . P8107	SHIVALIC POWER CONTROL (P) LTD.
27 . P0736	SIEMENS LTD.
28 . P8051	SPACEAGE SWITCHGEARS LIMITED
29 . P0828	TRICOLITE ELECTRICAL INDUSTRIES PVT.LTD.
30 . P0831	TRIDENT SWITCHGEARS PVT. LTD. (upto 3200 A)
31 . P0841	UNITED ELECTRIC CO. (DELHI) PVT. LTD.
32 . P0845	UNIVERSAL INDUSTRIAL PRODUCTS
33 . P8106	VENUS CONTROLS & SWITCHGEAR (P) LTD.

**810408 : FLOOR MOUNTING TYPE DISTRIBUTION BOARDS.**

CODE	NAME
34 . P8046	VIDHYUT CONTROL(INDIA) PVT LTD

## 810409 : WALL MOUNTING TYPE DISTRIBUTION BOARDS.

CODE	NAME
1 . P0405	
<b>INDIA</b>	
2 . P8068	ADHUNIK SWITCHGEARS (P) LTD.
3 . P0045	ANAND POWER LIMITED
4 . P8191	APPLICATION CONTROL PANELS PVT. LTD.
5 . P0071	ASSOCIATED SWITCHGEARS & PROJECTS LTD.
6 . P8197	ASTEK ELECTRICAL INDIA PRIVATE LIMITED
7 . P0078	AUTOMATIC CONTROLS CORPORATION
8 . P8105	AVONE SYSTEM & CONTROLS
9 . P0173	C&S ELECTRIC LTD.
10 . P0172	CONTROLS & SCHEMATICS PVT LTD.
11 . P8203	DURGA TECHNO INDUSTRIES
12 . P0231	ELECMECH CORPORATION
13 . P8200	EX-PROTECTA
14 . P0312	GLOBE ELECTRICAL INDUSTRIES
15 . P0337	HAVELLS INDIA LTD.
16 . P8114	HI-TECH ENGINEERS

## 810409 : WALL MOUNTING TYPE DISTRIBUTION BOARDS.

CODE	NAME
17 . P0352	HINDUSTAN CONTROL & EQPT PV. LTD.
18 . P0384	INDIANA CURRENT CONTROL LTD.
19 . P0413	INDO ASIAN FUSEGEAR LTD
20 . P8008	JAKSON ENGINEERS LTD
21 . P0523	LEGRAND INDIA LTD
22 . P8041	LOTUS POWERGEAR PVT LTD
23 . P8210	RASHMI ELECTRICALS
24 . P0670	REUNION ELECTRICAL MANUFACTURERS (P) LTD
25 . P8212	RITTAL PRIVATE LIMITED
26 . P8107	SHIVALIC POWER CONTROL (P) LTD.
27 . P8070	STANDARD ELECTRICALS LIMITED
28 . P0828	TRICOLITE ELECTRICAL INDUSTRIES PVT.LTD.
29 . P0831	TRIDENT SWITCHGEARS PVT. LTD.
30 . P8106	VENUS CONTROLS & SWITCHGEAR (P) LTD.

## 810410 : VARIABLE SPEED MOTOR PACKAGE

CODE	NAME
<b>INDIA</b>	
1 . P8082	AMTECH ELECTRONICS (INDIA) LTD. (LT)
2 . P0066	ASEA BROWN BOVERI LTD.
3 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
4 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
5 . P8098	DANFOSS INDUSTRIES PVT. LTD. (Upto 1400 KW)
6 . P8152	DELTA ELECTRONICS INDIA PVT.LTD. (VARIABLE FREQUENCY DRIVE SYSTEM UP TO 75 KW)
7 . P8178	HITACHI HI-REL POWER ELECTRONICS PRIVATE LIMITED
8 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
9 . P0485	LARSEN & TOUBRO LTD.(EL.PRODUCTS DIVN)
10 . P0033	ROCKWELL AUTOMATION INDIA PVT. LTD.
11 . P0736	SIEMENS LTD.
12 . P8142	TMEIC INDUSTRIAL SYSTEMS INDIA PRIVATE LIMITED
13 . P8120	VACON DRIVES & CONTROL PVT. LTD. (Variable Frequency Drive System)
14 . P8164	YASKAWA INDIA PRIVATE LIMITED (UPTO 355 KW)
<b>FRANCE</b>	
15 . P0034	ALSTHOM ATLANTIQUE
<b>GERMANY</b>	
16 . P0735	SIEMENS AG, GERMANY

## 810410 : VARIABLE SPEED MOTOR PACKAGE

CODE	NAME
<b>ITALY</b>	
17 . P0052	ANSALDO ROBICON
<b>JAPAN</b>	
18 . P0287	FUJI ELECTRIC SYSTEMS CO. LTD.
19 . P8127	TOSHIBA MITSUBISHI ELECTRIC INDUSTRIAL SYSTEMS CORPORATION
<b>SWITZERLAND</b>	
20 . P0130	BROWN BOVERI CORPORATION
<b>U.K.</b>	
21 . P0300	GEC INDUSTRIAL CONTROL LTD.

## 810411 : SOFT STARTER

CODE	NAME
<b>INDIA</b>	
1 . P8082	AMTECH ELECTRONICS (INDIA) LTD.
2 . P8098	DANFOSS INDUSTRIES PVT. LTD. (Upto 800 KW)
3 . P8178	HITACHI HI-REL POWER ELECTRONICS PRIVATE LIMITED
4 . P8071	INNOVATIVE TECHNOMATICS PVT. LTD.
5 . P8122	JAYASHREE ELECTRON PVT. LTD.
6 . P8066	KIMO ELECTRONICS PVT. LTD.
7 . P0485	LARSEN & TOUBRO LTD.(EL.PRODUCTS DIVN)
8 . P0033	ROCKWELL AUTOMATION INDIA PVT. LTD.
9 . P0736	SIEMENS LTD.
10 . P8142	TMEIC INDUSTRIAL SYSTEMS INDIA PRIVATE LIMITED

## 810501 : HT POWER CABLE

CODE	NAME
<b>INDIA</b>	
1 . P8151	CMI LIMITED
2 . P8121	ADVANCE CABLE TECHNOLOGIES PRIVATE LIMITED
3 . P8087	APAR INDUSTRIES LTD. (UNIT: UNIFLEX CABLES)
4 . P0142	CABLE CORPN. OF INDIA LIMITED
5 . P8103	DIAMOND POWER INFRASTRUCTURE LTD.
6 . P8184	DYNAMIC CABLES LIMITED
7 . P8159	GEMSCAB INDUSTRIES LTD (Upto 33 KV (Single core upto 500 sq.mm & Three core upto 300 sq.mm.))
8 . P8195	GLOSTER CABLES LIMITED
9 . P8171	GRANDLAY ELECTRICALS INDIA
10 . P8117	GUPTA POWER INFRASTRUCTURE LTD. ((Up to 33 KV & size up to 3CX400 sq.mm and 1CX1000 sq.mm))
11 . P0337	HAVELLS INDIA LTD.
12 . P0388	INDUSTRIAL CABLES (I) LIMITED (3.3 KV PVC/XLPE & 11 KV XLPV Insulated)
13 . P8209	KEC INTERNATIONAL LIMITED
14 . P0687	KEC INTERNATIONAL LTD. (FORMERLY RPG CABLES LIMITED-
15 . P0442	KEI INDUSTRIES LIMITED (Upto 33 KV)
16 . P0574	NICCO CORPORATION LTD
17 . P8116	PARAMOUNT COMMUNICATIONS LTD. ( (Up to 33 KV & size up to 3CX400 sq.mm and 1CX630 sq.mm))



## 810501 : HT POWER CABLE

CODE	NAME
18 . P8199	PARAMOUNT COMMUNICATIONS LTD.
19 . P8055	PLAZA CABLE INDUSTRIES LIMITED
20 . P8001	POLYCAB INDIA LIMITED (FORMERLY POLYCAB WIRES PRIVATE LTD.)
21 . P8043	RAVIN CABLES LIMITED
22 . P8130	STERLITE TECHNOLOGIES LTD., (6.6 kV to 33 kV)
23 . P0818	TORRENT CABLES LTD.
24 . P0843	UNIVERSAL CABLES LTD.
25 . P8177	V-MARC INDIA LIMITED

## 810502 : LT POWER CABLES

CODE	NAME
<b>INDIA</b>	
1 . P8151	CMI LIMITED
2 . P8056	ALPHA COMMUNICATION LIMITED
3 . P8087	APAR INDUSTRIES LTD. (UNIT: UNIFLEX CABLES)
4 . P8182	AXELON INDUSTRIES
5 . P0142	CABLE CORPN. OF INDIA LIMITED
6 . P8166	CHANDRESH CABLES LIMITED
7 . P8149	CORDS CABLE INDUSTRIES LTD.
8 . P0200	DELTON CABLES LTD
9 . P8103	DIAMOND POWER INFRASTRUCTURE LTD.
10 . P8184	DYNAMIC CABLES LIMITED
11 . P0260	FINOLEX CABLES LTD
12 . P8204	GEEP POLYMERS INDIA PRIVATE LIMITED
13 . P8159	GEMSCAB INDUSTRIES LTD
14 . P8112	GENUS ELECTROTECH LTD.
15 . P8195	GLOSTER CABLES LIMITED
16 . P0319	GRANDLAY ELECTRICALS (INDIA) (1.1 KV PVC/XLPE Insulated)
17 . P8171	GRANDLAY ELECTRICALS INDIA

## 810502 : LT POWER CABLES

CODE	NAME
18 . P8113	GRID INDIA POWER CABLES PVT. LTD.
19 . P0327	GUPTA ELECTRIC & MACHINERY STORES (GEMSCAB) (3-1/2 core 400 mm2)
20 . P8117	GUPTA POWER INFRASTRUCTURE LTD.
21 . P0337	HAVELLS INDIA LTD.
22 . P8180	HPL ELECTRIC & POWER LIMITED
23 . P0388	INDUSTRIAL CABLES (I) LIMITED (1.1 KV PVC/XLPE Insulated)
24 . P0416	J K CABLES LIMITED
25 . P8209	KEC INTERNATIONAL LIMITED
26 . P0687	KEC INTERNATIONAL LTD. (FORMERLY RPG CABLES LIMITED-
27 . P0442	KEI INDUSTRIES LIMITED
28 . P8175	KLJ PARAFLEX INDIA LIMITED
29 . P0466	KRISHNA ELECTRICAL INDUSTRIES LTD.
30 . P8193	LUMINO INDUSTRIES LIMITED
31 . P8093	MANSFIELD CABLE CO.
32 . P8187	NEC WIRE & CABLES PRIVATE LIMITED
33 . P0569	NETCO CABLE INDUSTRIES (PVT.) LTD. (Upto 3-½ core 400 mm2)
34 . P0574	NICCO CORPORATION LTD

## 810502 : LT POWER CABLES

CODE	NAME
35 . P0604	OMEGA CABLES LTD.
36 . P8057	PARAGON CABLES
37 . P8199	PARAMOUNT COMMUNICATIONS LTD.
38 . P8055	PLAZA CABLE INDUSTRIES LIMITED
39 . P8001	POLYCAB INDIA LIMITED (FORMERLY POLYCAB WIRES PRIVATE LTD.)
40 . P8207	POLYVION CABLES PVT. LTD
41 . P8090	PRESTIGE CABLE INDUSTRIES
42 . P0647	PREW INDUSTRIES LTD.
43 . P8147	R R KABEL LIMITED
44 . P0658	RADIANT CABLES PVT. LIMITED
45 . P8167	RAVI INDUSTRIES
46 . P8043	RAVIN CABLES LIMITED
47 . P0702	SATELLITE CABLES PVT. LTD. (3-1/2 core 400 mm <sup>2</sup> )
48 . P8078	SHYAM CABLES INDUSTRIES
49 . P0739	SKYTONE ELECTRICALS (I) LTD. (3-1/2 core 400 mm <sup>2</sup> )
50 . P0744	SPECIAL CABLES PVT. LTD.
51 . P0777	SUYOG ELECTRICALS LTD.

## 810502 : LT POWER CABLES

CODE	NAME
52 . P8086	T C COMMUNICATION PVT LTD
53 . P8109	TCL CABLES LTD.
54 . P8094	TERACOM LIMITED
55 . P0818	TORRENT CABLES LTD.
56 . P8165	TORTEK INDIA PRIVATE LIMITED
57 . P0843	UNIVERSAL CABLES LTD.
58 . P8177	V-MARC INDIA LIMITED
59 . P8206	ZENIUM CABLES LIMITED

## 810503 : CONTROL CABLE

CODE	NAME
<b>INDIA</b>	
1 . P8151	CMI LIMITED
2 . P8056	ALPHA COMMUNICATION LIMITED
3 . P8087	APAR INDUSTRIES LTD. (UNIT: UNIFLEX CABLES)
4 . P8182	AXELON INDUSTRIES
5 . P8058	BHANSALI CABLES & CONDUCTORS PVT. LTD
6 . P0142	CABLE CORPN. OF INDIA LIMITED
7 . P8166	CHANDRESH CABLES LIMITED
8 . P8149	CORDS CABLE INDUSTRIES LTD.
9 . P0200	DELTON CABLES LTD
10 . P8103	DIAMOND POWER INFRASTRUCTURE LTD.
11 . P8184	DYNAMIC CABLES LIMITED
12 . P0260	FINOLEX CABLES LTD
13 . P8204	GEEP POLYMERS INDIA PRIVATE LIMITED
14 . P8159	GEMSCAB INDUSTRIES LTD
15 . P8112	GENUS ELECTROTECH LTD.
16 . P8195	GLOSTER CABLES LIMITED
17 . P0319	GRANDLAY ELECTRICALS (INDIA) (PVC/XLPE Insulated)

## 810503 : CONTROL CABLE

CODE	NAME
18 . P8171	GRANDLAY ELECTRICALS INDIA
19 . P8113	GRID INDIA POWER CABLES PVT. LTD.
20 . P0327	GUPTA ELECTRIC & MACHINERY STORES (GEMSCAB) (19 core 2.5 mm2)
21 . P8117	GUPTA POWER INFRASTRUCTURE LTD.
22 . P0337	HAVELLS INDIA LTD.
23 . P8180	HPL ELECTRIC & POWER LIMITED
24 . P0416	J K CABLES LIMITED
25 . P8209	KEC INTERNATIONAL LIMITED
26 . P0687	KEC INTERNATIONAL LTD. (FORMERLY RPG CABLES LIMITED-
27 . P0442	KEI INDUSTRIES LIMITED
28 . P8175	KLJ PARAFLEX INDIA LIMITED
29 . P0466	KRISHNA ELECTRICAL INDUSTRIES LTD.
30 . P8193	LUMINO INDUSTRIES LIMITED
31 . P8093	MANSFIELD CABLE CO.
32 . P8059	N.C. CABLES LIMITED (FORMERLY NATIONAL CABLES)
33 . P8187	NEC WIRE & CABLES PRIVATE LIMITED
34 . P0569	NETCO CABLE INDUSTRIES (PVT.) LTD. (Upto 19 core 2.5 mm2)

## 810503 : CONTROL CABLE

CODE	NAME
35 . P0574	NICCO CORPORATION LTD
36 . P0604	OMEGA CABLES LTD.
37 . P8057	PARAGON CABLES
38 . P8199	PARAMOUNT COMMUNICATIONS LTD.
39 . P8055	PLAZA CABLE INDUSTRIES LIMITED
40 . P8001	POLYCAB INDIA LIMITED (FORMERLY POLYCAB WIRES PRIVATE LTD.)
41 . P8207	POLYVION CABLES PVT. LTD
42 . P8090	PRESTIGE CABLE INDUSTRIES
43 . P0647	PREW INDUSTRIES LTD.
44 . P8147	R R KABEL LIMITED
45 . P0658	RADIANT CABLES PVT. LIMITED
46 . P8167	RAVI INDUSTRIES
47 . P8043	RAVIN CABLES LIMITED
48 . P0702	SATELLITE CABLES PVT. LTD. (19 core 2.5 mm2)
49 . P8078	SHYAM CABLES INDUSTRIES
50 . P0739	SKYTONE ELECTRICALS (I) LTD. (19 core 2.5 mm2, 1.1 KV)
51 . P0744	SPECIAL CABLES PVT. LTD.



## 810503 : CONTROL CABLE

CODE	NAME
52 . P0777	SUYOG ELECTRICALS LTD.
53 . P8168	SVARN INFRATEL PRIVATE LIMITED
54 . P8086	T C COMMUNICATION PVT LTD
55 . P8109	TCL CABLES LTD.
56 . P8094	TERACOM LIMITED
57 . P0818	TORRENT CABLES LTD.
58 . P8165	TORTEK INDIA PRIVATE LIMITED
59 . P0843	UNIVERSAL CABLES LTD.
60 . P8177	V-MARC INDIA LIMITED
61 . P8206	ZENIUM CABLES LIMITED

## 810504 : FLEXIBLE CABLE.

CODE	NAME
<b>INDIA</b>	
1 . P8002	ANCHOR ELECTRICALS PVT. LTD.
2 . P8182	AXELON INDUSTRIES
3 . P8058	BHANSALI CABLES & CONDUCTORS PVT. LTD
4 . P8166	CHANDRESH CABLES LIMITED
5 . P0200	DELTON CABLES LTD
6 . P0260	FINOLEX CABLES LTD
7 . P8204	GEEP POLYMERS INDIA PRIVATE LIMITED
8 . P8195	GLOSTER CABLES LIMITED
9 . P8171	GRANDLAY ELECTRICALS INDIA
10 . P8117	GUPTA POWER INFRASTRUCTURE LTD.
11 . P0337	HAVELLS INDIA LTD.
12 . P8180	HPL ELECTRIC & POWER LIMITED
13 . P8075	KALINGA CABLES & CONDUIT CO.
14 . P8175	KLJ PARAFLEX INDIA LIMITED
15 . P8059	N.C. CABLES LIMITED (FORMERLY NATIONAL CABLES)
16 . P8187	NEC WIRE & CABLES PRIVATE LIMITED
17 . P0574	NICCO CORPORATION LTD

## 810504 : FLEXIBLE CABLE.

CODE	NAME
18 . P8199	PARAMOUNT COMMUNICATIONS LTD.
19 . P8055	PLAZA CABLE INDUSTRIES LIMITED
20 . P8001	POLYCAB INDIA LIMITED (FORMERLY POLYCAB WIRES PRIVATE LTD.)
21 . P8207	POLYVION CABLES PVT. LTD
22 . P8090	PRESTIGE CABLE INDUSTRIES
23 . P0647	PREW INDUSTRIES LTD.
24 . P8147	R R KABEL LIMITED
25 . P8167	RAVI INDUSTRIES
26 . P8078	SHYAM CABLES INDUSTRIES
27 . P0739	SKYSTONE ELECTRICALS (I) LTD. (3-1/2 core, 185 mm <sup>2</sup> )
28 . P0744	SPECIAL CABLES PVT. LTD.
29 . P0777	SUYOG ELECTRICALS LTD.
30 . P8168	SVARN INFRATEL PRIVATE LIMITED
31 . P8086	T C COMMUNICATION PVT LTD
32 . P8094	TERACOM LIMITED
33 . P0818	TORRENT CABLES LTD.
34 . P8165	TORTEK INDIA PRIVATE LIMITED

810504 : FLEXIBLE CABLE.

CODE	NAME
35 . P8177	V-MARC INDIA LIMITED
36 . P8206	ZENIUM CABLES LIMITED

## 810505 : TELEPHONE CABLE

CODE	NAME
<b>INDIA</b>	
1 . P8056	ALPHA COMMUNICATION LIMITED
2 . P8058	BHANSALI CABLES & CONDUCTORS PVT. LTD
3 . P0163	CMI LIMITED
4 . P8149	CORDS CABLE INDUSTRIES LTD.
5 . P0200	DELTON CABLES LTD
6 . P0260	FINOLEX CABLES LTD
7 . P0351	HINDUSTAN CABLES LTD
8 . P0574	NICCO CORPORATION LTD
9 . P8057	PARAGON CABLES
10 . P8055	PLAZA CABLE INDUSTRIES LIMITED
11 . P8001	POLYCAB INDIA LIMITED (FORMERLY POLYCAB WIRES PRIVATE LTD.)
12 . P8090	PRESTIGE CABLE INDUSTRIES
13 . P0647	PREW INDUSTRIES LTD.
14 . P0665	RELIANCE ENGINEERS LTD.
15 . P0688	RPG TELECOM LTD
16 . P8078	SHYAM CABLES INDUSTRIES
17 . P8168	SVARN INFRATEL PRIVATE LIMITED

## 810505 : TELEPHONE CABLE

CODE	NAME
18 . P0850	USHA BELTRON LIMITED,
19 . P0863	VINDHYA TELELINK LTD

## 810506 : CABLES FOR EARTHING

CODE	NAME
<b>INDIA</b>	
1 . P8121	ADVANCE CABLE TECHNOLOGIES PRIVATE LIMITED
2 . P0200	DELTON CABLES LTD
3 . P0260	FINOLEX CABLES LTD
4 . P0327	GUPTA ELECTRIC & MACHINERY STORES (GEMSCAB)
5 . P0416	J K CABLES LIMITED
6 . P0569	NETCO CABLE INDUSTRIES (PVT.) LTD.
7 . P0574	NICCO CORPORATION LTD
8 . P8001	POLYCAB INDIA LIMITED (FORMERLY POLYCAB WIRES PRIVATE LTD.)
9 . P8090	PRESTIGE CABLE INDUSTRIES
10 . P8078	SHYAM CABLES INDUSTRIES
11 . P0777	SUYOG ELECTRICALS LTD.
12 . P8168	SVARN INFRATEL PRIVATE LIMITED
13 . P8086	T C COMMUNICATION PVT LTD
14 . P0843	UNIVERSAL CABLES LTD.

**810507 : SPECIAL CABLES**

<b>CODE</b>	<b>NAME</b>
<b>INDIA</b>	
1 . P8121	ADVANCE CABLE TECHNOLOGIES PRIVATE LIMITED
2 . P8056	ALPHA COMMUNICATION LIMITED
3 . P8058	BHANSALI CABLES & CONDUCTORS PVT. LTD
4 . P8057	PARAGON CABLES
5 . P8055	PLAZA CABLE INDUSTRIES LIMITED
6 . P8090	PRESTIGE CABLE INDUSTRIES
7 . P8078	SHYAM CABLES INDUSTRIES



## 810601 : HIGH VOLTAGE INDUCTION MOTORS

CODE	NAME
<b>INDIA</b>	
1 . P8158	ABB INDIA LIMITED
2 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
3 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
4 . P8140	JEUMONT ELECTRIC INDIA PVT. LTD. (Excluding Flame Proof (Exd) type Motors but Pressurised (Exp) Type Motors - upto 1300 KW; Increased Safety (Exe) Type Motors - Upto 770 KW; Non-Sparking (Exn) Type Motors - Upto 860 KW and Safe Area Motors - Upto
5 . P8104	JYOTI LIMITED
6 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
7 . P8163	MARATHON ELECTRIC MOTORS (INDIA ) LTD. (UP TO 2800KW)
8 . P8142	TMEIC INDUSTRIAL SYSTEMS INDIA PRIVATE LIMITED
9 . P8137	WEG INDUSTRIES (INDIA) PVT. LTD (Up to Frame Size 1600 and rating up to 16 MW)
<b>FRANCE</b>	
10 . P0034	ALSTHOM ATLANTIQUE
11 . P0426	JEUMONT INDUSTRIE
<b>GERMANY</b>	
12 . P0016	AEG TELEFUNKEN AG
<b>ITALY</b>	
13 . P0052	ANSALDO ROBICON
<b>JAPAN</b>	
14 . P0287	FUJI ELECTRIC SYSTEMS CO. LTD.
15 . P0539	MITSUBISHI CORPORATION

## 810601 : HIGH VOLTAGE INDUCTION MOTORS

CODE	NAME
16 . P0726	SHINKO ELECTRICALS CO. LTD.
17 . P0819	TOSHIBA CORPORATION
18 . P8127	TOSHIBA MITSUBISHI ELECTRIC INDUSTRIAL SYSTEMS CORPORATION ((Excludin g Flame-proof motors of frame size more than 900))
<b>SWEDEN</b>	
19 . P0064	ASEA BROWN BOVERI
<b>U.K.</b>	
20 . P0486	LAURENCE, SCOTT & ELECTROMOTORS LTD.
21 . P0621	PEEBLES ELECTRICAL MACHINES
<b>U.S.A.</b>	
22 . P0303	GENERAL ELECTRIC CO.
23 . P0877	WESTINGHOUSE ELECTRIC CORPORATION

## 810602 : MEDIUM VOLTAGE INDUCTION MOTORS

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0066	ASEA BROWN BOVERI LTD.
3 . P0104	BHARAT BIJLEE LTD
4 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
5 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
6 . P8042	ELGI ELECTRIC INDUSTRIES LTD
7 . P8102	HEM INDUSTRIES
8 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
9 . P8081	LAXMI HYDRAULICS PVT. LTD. (Upto 355L Frame Size)
10 . P8202	ROTOMOTIVE POWERDRIVES INDIA LTD.
11 . P0736	SIEMENS LTD.
<b>FRANCE</b>	
12 . P0034	ALSTHOM ATLANTIQUE
13 . P0426	JEUMONT INDUSTRIE
<b>GERMANY</b>	
14 . P0016	AEG TELEFUNKEN AG
15 . P0735	SIEMENS AG, GERMANY
<b>ITALY</b>	

## 810602 : MEDIUM VOLTAGE INDUCTION MOTORS

CODE	NAME
16 . P0052	ANSALDO ROBICON
<b>JAPAN</b>	
17 . P0287	FUJI ELECTRIC SYSTEMS CO. LTD.
18 . P0539	MITSUBISHI CORPORATION
19 . P0726	SHINKO ELECTRICALS CO. LTD.
20 . P0819	TOSHIBA CORPORATION
<b>SWEDEN</b>	
21 . P0064	ASEA BROWN BOVERI
<b>U.K.</b>	
22 . P0486	LAURENCE, SCOTT & ELECTROMOTORS LTD.
23 . P0621	PEEBLES ELECTRICAL MACHINES
<b>U.S.A.</b>	
24 . P0303	GENERAL ELECTRIC CO.
25 . P0877	WESTINGHOUSE ELECTRIC CORPORATION

## 810603 : MEDIUM VOLTAGE FLAME PROOF/ INCREASED SAFETY MOTORS

CODE	NAME
<b>INDIA</b>	
1 . P0066	ASEA BROWN BOVERI LTD.
2 . P0104	BHARAT BIJLEE LTD
3 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
4 . P8102	HEM INDUSTRIES (0.18 KW TO 200 KW)
5 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
6 . P8081	LAXMI HYDRAULICS PVT. LTD. (Upto 315L Frame Size)
7 . P8202	ROTOMOTIVE POWERDRIVES INDIA LTD.
<b>FRANCE</b>	
8 . P0426	JEUMONT INDUSTRIE
<b>GERMANY</b>	
9 . P0735	SIEMENS AG, GERMANY
<b>ITALY</b>	
10 . P0052	ANSALDO ROBICON
<b>JAPAN</b>	
11 . P0287	FUJI ELECTRIC SYSTEMS CO. LTD.
12 . P0539	mitsubishi CORPORATION
13 . P0819	TOSHIBA CORPORATION
<b>SWEDEN</b>	
14 . P0064	ASEA BROWN BOVERI
<b>U.K.</b>	

## 810603 : MEDIUM VOLTAGE FLAME PROOF/ INCREASED SAFETY MOTORS

CODE	NAME
15 . P0486	LAURENCE, SCOTT & ELECTROMOTORS LTD.
16 . P0621	PEEBLES ELECTRICAL MACHINES
<b>U.S.A.</b>	
17 . P0303	GENERAL ELECTRIC CO.
18 . P0877	WESTINGHOUSE ELECTRIC CORPORATION

## 810604 : SYNCHRONOUS MOTORS

CODE	NAME
<b>INDIA</b>	
1 . P0066	ASEA BROWN BOVERI LTD.
2 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
3 . P8202	ROTOMOTIVE POWERDRIVES INDIA LTD.
4 . P8137	WEG INDUSTRIES (INDIA) PVT. LTD (Up to Frame Size 1600 and rating up to 16 MW)
<b>FRANCE</b>	
5 . P0034	ALSTHOM ATLANTIQUE
6 . P0426	JEUMONT INDUSTRIE
<b>GERMANY</b>	
7 . P0016	AEG TELEFUNKEN AG
8 . P0735	SIEMENS AG, GERMANY
<b>ITALY</b>	
9 . P0052	ANSALDO ROBICON
<b>JAPAN</b>	
10 . P0287	FUJI ELECTRIC SYSTEMS CO. LTD.
11 . P0539	mitsubishi CORPORATION
12 . P0726	SHINKO ELECTRICALS CO. LTD.
13 . P0819	TOSHIBA CORPORATION
14 . P8127	TOSHIBA MITSUBISHI ELECTRIC INDUSTRIAL SYSTEMS CORPORATION
<b>SWEDEN</b>	

## 810604 : SYNCHRONOUS MOTORS

CODE	NAME
15 . P0064	ASEA BROWN BOVERI
<b>U.K.</b>	
16 . P0486	LAURENCE, SCOTT & ELECTROMOTORS LTD.
17 . P0621	PEEBLES ELECTRICAL MACHINES
<b>U.S.A.</b>	
18 . P0303	GENERAL ELECTRIC CO.
19 . P0877	WESTINGHOUSE ELECTRIC CORPORATION



## 810605 : CANNED MOTORS

CODE	NAME
<b>INDIA</b>	
1 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
2 . P0736	SIEMENS LTD.

## 810606 : GEARED MOTORS

CODE	NAME
<b>INDIA</b>	
1 . P0321	GREAVES COTTON & CO. LTD.
2 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
3 . P0571	NEW ALLENBERRY WORKS
4 . P8084	NORD DRIVESYSTEMS PVT. LTD.
5 . P0638	POWER BUILD LTD
6 . P8202	ROTOMOTIVE POWERDRIVES INDIA LTD.
7 . P8091	SEW EURODRIVE INDIA PRIVATE LIMITED

## 810701 : BATTERY CHARGER

CODE	NAME
<b>INDIA</b>	
1 . P0040	AMCO POWER SYSTEMS LIMITED
2 . P0154	CHHABI ELECTRICALS PVT. LTD.
3 . P0144	CHLORIDE POWER SYSTEMS AND SOLUTIONS LTD. (formerly CALDYNE
4 . P8092	DUBAS ENGINEERING PVT. LTD.
5 . P0694	HBL NIFE POWER SYSTEMS LTD.
6 . P0444	KERALA STATE ELECTRONICS DEV. CORPN. LTD.
7 . P0079	MEHRU ELECTRICALS (FORMERLY AUTOMATIC ELECTRIC LIMITED)
8 . P8131	SERVILINK ENGINEERS PVT. LTD.
9 . P0845	UNIVERSAL INDUSTRIAL PRODUCTS

## 810703 : STATIC TYPE UPS SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P0195	DB POWER ELECTRONICS PVT. LTD.
2 . P8092	DUBAS ENGINEERING PVT. LTD.
3 . P8003	EMERSON NETWORK POWER (INDIA) PVT. LTD.
4 . P0573	GE POWER CONTROLS INDIA PVT. LTD.
5 . P0360	HITACHI HI-REL POWER ELECTRONICS PVT. LTD.
6 . P0399	INSTRUMENTATION LTD
7 . P0444	KERALA STATE ELECTRONICS DEV. CORPN. LTD.
8 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
<b>GERMANY</b>	
9 . P0016	AEG TELEFUNKEN AG
<b>JAPAN</b>	
10 . P0287	FUJI ELECTRIC SYSTEMS CO. LTD.
11 . P0819	TOSHIBA CORPORATION
<b>SWEDEN</b>	
12 . P0064	ASEA BROWN BOVERI
<b>U.S.A.</b>	
13 . P0303	GENERAL ELECTRIC CO.
14 . P0742	SOLIDSTATE CONTROL INC.
15 . P0877	WESTINGHOUSE ELECTRIC CORPORATION

## 810705 : ELECTROSTATIC TYPE VOLTAGE STABILIZERS

CODE	NAME
<b>INDIA</b>	
1 . P0055	APLAB LIMITED

**810801 : NEUTRAL EARTHING RESISTOR**

<b>CODE</b>	<b>NAME</b>
<b>INDIA</b>	
1 . P0113	BHARTIA INDUSTRIES LTD. (DIVN. BCH)
2 . P0231	ELECMECH CORPORATION
3 . P8041	LOTUS POWERGEAR PVT LTD
4 . P8004	PEFCO FOUNDRY & CHEM LTD
5 . P0669	RESITECH ELECTRICALS PRIVATE LIMITED
6 . P0689	RSI SWITCHGEAR PRIVATE LTD.
7 . P0692	S R NARKHEDE ENGINEERING PVT. LTD.

**810802 : EARTHING & LIGHTNING PROTECTION MATERIAL, AL  
WIRE/STRIP**

<b>CODE</b>	<b>NAME</b>
<b>INDIA</b>	
1 . P0046	ANAND ELECTRIC TRADING CO.
2 . P8135	INDMARK FORMTECH PVT. LTD.
3 . P8085	JAMNA METAL COMPANY
4 . P0423	JAYANT METAL MFG CO
5 . P0504	MAHAVIR INDUSTRIAL CORPORATION
6 . P0533	METROPOLITAN INDUSTRIES
7 . P8072	PREMIER POWER PRODUCTS (CALCUTTA) PVT. LTD.
8 . P0696	SAI GALVANISERS & FABRICATORS PVT LTD

## 810803 : EARTHING & LIGHTNING PROTECTION MATERIAL,G.I.WIRE/STRIP

CODE	NAME
<b>INDIA</b>	
1 . P0046	ANAND ELECTRIC TRADING CO.
2 . P0112	BHARTI EXPORTS
3 . P8203	DURGA TECHNO INDUSTRIES
4 . P8205	INDIANA GRATINGS PRIVATE LIMITED
5 . P8135	INDMARK FORMTECH PVT. LTD.
6 . P8085	JAMNA METAL COMPANY
7 . P0423	JAYANT METAL MFG CO
8 . P0504	MAHAVIR INDUSTRIAL CORPORATION
9 . P0529	METALITE INDUSTRIES
10 . P0533	METROPOLITAN INDUSTRIES
11 . P8189	PINAX STEEL INDUSTRIES PRIVATE LIMITED
12 . P8072	PREMIER POWER PRODUCTS (CALCUTTA) PVT. LTD.
13 . P8174	R.K. Engineering Works
14 . P8179	RATAN PROJECTS AND ENGINEERING CO. PVT. LTD.
15 . P8044	RUKMANI ELECTRICALS & COMPONENTS PVT LTD
16 . P0695	SADHANA ENGINEERING CORPORATION
17 . P0696	SAI GALVANISERS & FABRICATORS PVT LTD



810803 : EARTHING & LIGHTNING PROTECTION  
MATERIAL,G.I.WIRE/STRIP

CODE	NAME
18 . P0753	STEALITE ENGG CO
19 . P8154	TELECOM NETWORK SOLUTIONS PVT.LTD.

## 810901 : MV Ex. Proof Items(Switches/Switch Skt./Plugs/Isolators/J.Box/LCS/DB)

CODE	NAME
<b>INDIA</b>	
1 . P0089	BALIGA LIGHTING EQUIPMENTS LIMITED
2 . P8138	EX-PROTECTA
3 . P0147	FCG FLAMEPROOF CONTROL GEARS PVT. LTD. (FORMERLY CEAG FLAME
4 . P8007	FCG POWER INDUSTRIES PVT.LTD.
5 . P0268	FLAMEPROOF EQUIPMENTS PVT. LTD.
6 . P0272	FLEXPRO ELECTRICALS PVT. LTD.
7 . P8134	INDUSTRIAL PRODUCTS EQUIPMENT
8 . P8132	KAYSONS TECHNO EQUIPMENTS PVT. LTD.
9 . P8045	PETROLEUM SAFETY PRODUCTS INDUSTRIES PRIVATE LTD.
10 . P8088	PROMPT ENGINEERING WORKS
11 . P8194	Phoenix Mecano (India) Pvt.Ltd.
12 . P8156	SHREYA EX-TECH PRIVATE LIMITED
13 . P0763	SUDHIR SWITCHGEARS PVT. LTD.
<b>FRANCE</b>	
14 . P0491	LEGRAND S.A.
<b>GERMANY</b>	
15 . P0016	AEG TELEFUNKEN AG
16 . P0092	BBC-BROWN BOVERI & CIE AG

## 810901 : MV Ex. Proof Items(Switches/Switch Skt./Plugs/Isolators/J.Box/LCS/DB)

CODE	NAME
17 . P0657	R STAHL SCHALTGERATE GMBH
18 . P0735	SIEMENS AG, GERMANY
19 . P0875	WEIDMULLER LTD.
<b>ITALY</b>	
20 . P0178	CORTEM S.p.A.
<b>JAPAN</b>	
21 . P0287	FUJI ELECTRIC SYSTEMS CO. LTD.
22 . P0815	TOGAMI ELECTRIC MFG. COMPANY
23 . P0819	TOSHIBA CORPORATION
<b>SWEDEN</b>	
24 . P0064	ASEA BROWN BOVERI
<b>U.K.</b>	
25 . P0187	CROUSE-HINDS (EUROPE) LTD.
26 . P0300	GEC INDUSTRIAL CONTROL LTD.
27 . P0555	M&C SWITCHGEAR

## 810903 : EXPLOSION PROOF LIGHTING FIXTURES

CODE	NAME
<b>INDIA</b>	
1 . P0089	BALIGA LIGHTING EQUIPMENTS LIMITED
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P8138	EX-PROTECTA
4 . P0147	FCG FLAMEPROOF CONTROL GEARS PVT. LTD. (FORMERLY CEAG FLAME
5 . P8007	FCG POWER INDUSTRIES PVT.LTD.
6 . P0268	FLAMEPROOF EQUIPMENTS PVT. LTD.
7 . P0272	FLEXPRO ELECTRICALS PVT. LTD.
8 . P8132	KAYSONS TECHNO EQUIPMENTS PVT. LTD.
9 . P8045	PETROLEUM SAFETY PRODUCTS INDUSTRIES PRIVATE LTD.
10 . P8148	SAIEX FLAMEPROOF EQUIPMENTS PVT LTD
11 . P8156	SHREYA EX-TECH PRIVATE LIMITED
12 . P0763	SUDHIR SWITCHGEARS PVT. LTD.

## 810904 : EXPLOSION PROOF PANIC LIGHTS

CODE	NAME
<b>INDIA</b>	
1 . P0089	BALIGA LIGHTING EQUIPMENTS LIMITED
2 . P0147	FCG FLAMEPROOF CONTROL GEARS PVT. LTD. (FORMERLY CEAG FLAME
3 . P8007	FCG POWER INDUSTRIES PVT.LTD.
4 . P0268	FLAMEPROOF EQUIPMENTS PVT. LTD.
5 . P0272	FLEXPRO ELECTRICALS PVT. LTD.
6 . P8132	KAYSONS TECHNO EQUIPMENTS PVT. LTD.
<b>FRANCE</b>	
7 . P0513	MAPELEC SA
<b>GERMANY</b>	
8 . P0148	CEAG LIGHT-UDN STROMVERSORGUNGS TECHNIK

## 810906 : FLAMEPROOF CABLE GLAND

CODE	NAME
<b>INDIA</b>	
1 . P0089	BALIGA LIGHTING EQUIPMENTS LIMITED
2 . P0165	COMET BRASS PRODUCTS
3 . P8100	COMET INDUSTRIES
4 . P0211	DOWELL'S ELECTRICALS
5 . P0228	ELECTROMAC INDUSTRIES
6 . P8138	EX-PROTECTA
7 . P0147	FCG FLAMEPROOF CONTROL GEARS PVT. LTD. (FORMERLY CEAG FLAME
8 . P8007	FCG POWER INDUSTRIES PVT.LTD.
9 . P0268	FLAMEPROOF EQUIPMENTS PVT. LTD.
10 . P0272	FLEXPRO ELECTRICALS PVT. LTD.
11 . P8134	INDUSTRIAL PRODUCTS EQUIPMENT
12 . P8132	KAYSONS TECHNO EQUIPMENTS PVT. LTD.
13 . P0639	POWER ENGG CO
14 . P8088	PROMPT ENGINEERING WORKS
15 . P8194	Phoenix Mecano (India) Pvt.Ltd.
16 . P8148	SAIEX FLAMEPROOF EQUIPMENTS PVT LTD
17 . P8156	SHREYA EX-TECH PRIVATE LIMITED

## 810906 : FLAMEPROOF CABLE GLAND

CODE	NAME
18 . P0763	SUDHIR SWITCHGEARS PVT. LTD.

## 810909 : EXPLOSION PROOF EXHAUST FAN

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P0147	FCG FLAMEPROOF CONTROL GEARS PVT. LTD. (FORMERLY CEAG FLAME
4 . P0268	FLAMEPROOF EQUIPMENTS PVT. LTD.
5 . P8134	INDUSTRIAL PRODUCTS EQUIPMENT
6 . P8156	SHREYA EX-TECH PRIVATE LIMITED



## 811001 : COMMERCIAL LTG FIXTURES

CODE	NAME
<b>INDIA</b>	
1 . P0085	BAJAJ ELECTRICALS LIMITED
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P0337	HAVELLS INDIA LTD.
4 . P8215	INSTAPOWER LTD. (LED)
5 . P8099	KESELEC SCHREDER PRIVATE LIMITED
6 . P8211	LEGERO LIGHTING INDIA PVT. LTD.
7 . P8170	LIGHTING TECHNOLOGIES INDIA PRIVATE LIMITED (-)
8 . P8208	ORIENT ELECTRIC LIMITED
9 . P0623	PHILIPS INDIA LTD.
10 . P8186	PYROTECH ELECTRONICS PVT. LTD.
11 . P8096	SURYA ROSHNI LTD.
12 . P0881	WIPRO LIGHTING

**811002 : CORROSION PROOF INDUSTRIAL LTG.FIXTURES**

<b>CODE</b>	<b>NAME</b>
<b>INDIA</b>	
1 . P0085	BAJAJ ELECTRICALS LIMITED
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P0337	HAVELLS INDIA LTD.
4 . P8099	KESELEC SCHREDER PRIVATE LIMITED
5 . P0623	PHILIPS INDIA LTD.
6 . P8186	PYROTECH ELECTRONICS PVT. LTD.

## 811003 : HOSE PROOF INDUSTRIAL LTG.FIXTURES

CODE	NAME
<b>INDIA</b>	
1 . P0085	BAJAJ ELECTRICALS LIMITED
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P8099	KESELEC SCHREDER PRIVATE LIMITED
4 . P0623	PHILIPS INDIA LTD.
5 . P8186	PYROTECH ELECTRONICS PVT. LTD.
6 . P8051	SPACEAGE SWITCHGEARS LIMITED
7 . P8096	SURYA ROSHNI LTD.
8 . P0881	WIPRO LIGHTING

## 811004 : STREET/FLOOD LTG.FIXTURES

CODE	NAME
<b>INDIA</b>	
1 . P0085	BAJAJ ELECTRICALS LIMITED
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P0337	HAVELLS INDIA LTD.
4 . P8215	INSTAPOWER LTD. (LED)
5 . P8099	KESELEC SCHREDER PRIVATE LIMITED
6 . P8211	LEGERO LIGHTING INDIA PVT. LTD.
7 . P8170	LIGHTING TECHNOLOGIES INDIA PRIVATE LIMITED (-)
8 . P8208	ORIENT ELECTRIC LIMITED
9 . P0623	PHILIPS INDIA LTD.
10 . P8186	PYROTECH ELECTRONICS PVT. LTD.
11 . P8051	SPACEAGE SWITCHGEARS LIMITED
12 . P8096	SURYA ROSHNI LTD.
13 . P0881	WIPRO LIGHTING

**811005 : AIR OBSTRUCTION LIGHTS (NEON TYPE)**

CODE	NAME
<b>INDIA</b>	
1 . P0085	BAJAJ ELECTRICALS LIMITED
2 . P0686	ELECAB POYSHA
3 . P0881	WIPRO LIGHTING

## 811006 : LAMPS & TUBES

CODE	NAME
<b>INDIA</b>	
1 . P8002	ANCHOR ELECTRICALS PVT. LTD.
2 . P0085	BAJAJ ELECTRICALS LIMITED
3 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
4 . P8006	ECE BULBS & TUBES
5 . P0337	HAVELLS INDIA LTD.
6 . P8215	INSTAPOWER LTD. (LED)
7 . P8211	LEGERO LIGHTING INDIA PVT. LTD.
8 . P8170	LIGHTING TECHNOLOGIES INDIA PRIVATE LIMITED (-)
9 . P8208	ORIENT ELECTRIC LIMITED
10 . P8005	OSRAM INDIA LTD.
11 . P0623	PHILIPS INDIA LTD.
12 . P8096	SURYA ROSHNI LTD.
13 . P0881	WIPRO LIGHTING

## 811007 : COMPACT FLUORESCENT LAMPS

CODE	NAME
<b>INDIA</b>	
1 . P0085	BAJAJ ELECTRICALS LIMITED
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P0337	HAVELLS INDIA LTD.
4 . P0413	INDO ASIAN FUSEGEAR LTD (Ecolite make)
5 . P8005	OSRAM INDIA LTD.
6 . P0623	PHILIPS INDIA LTD.
7 . P8070	STANDARD ELECTRICALS LIMITED
8 . P8096	SURYA ROSHNI LTD.

## 811101 : ALKALINE BATTERY

CODE	NAME
<b>INDIA</b>	
1 . P0040	AMCO POWER SYSTEMS LIMITED
2 . P0694	HBL NIFE POWER SYSTEMS LTD.
3 . P0346	HIGH ENERGY BATTERIES (INDIA) LTD.
<b>JAPAN</b>	
4 . P0287	FUJI ELECTRIC SYSTEMS CO. LTD.
5 . P0357	HITACHI LTD.



## 811102 : LEAD ACID BATTERY

CODE	NAME
<b>INDIA</b>	
1 . P0151	ABB INDIA LIMITED
2 . P0038	AMARA RAJA BATTERIES LTD
3 . P0249	EXIDE INDUSTRIES LIMITED
4 . P8108	MICROTEX ENERGY P LTD.

## 811201 : LIFT

CODE	NAME
<b>INDIA</b>	
1 . P0609	OTIS ELEVATOR CO (I) LTD
<b>JAPAN</b>	
2 . P0190	DAIICHI JITSUGYO CO., LTD.
3 . P0287	FUJI ELECTRIC SYSTEMS CO. LTD.
4 . P0581	NIPPON ELEVATOR IND.CO. LIMITED
<b>SWITZERLAND</b>	
5 . P0705	SCHINDLER AG

## 811301 : DIESEL GENERATOR SET.

CODE	NAME
<b>INDIA</b>	
1 . P0091	BATLIBOI & CO. LTD.
2 . P8009	BHASKAR POWER PROJECTS LTD.
3 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
4 . P8014	CATERPILLAR
5 . P0188	CUMMINS INDIA LIMITED
6 . P0292	GARDEN REACH SHIPBUILDERS & ENGINEERS LTD.
7 . P0321	GREAVES COTTON & CO. LTD.
8 . P8114	HI-TECH ENGINEERS (Upto 625 KVA)
9 . P8008	JAKSON ENGINEERS LTD
10 . P8015	JEEVAN DIESEL & ELECTRICALS LTD.
11 . P8013	KIRLOSKAR OIL ENGINES
12 . P8188	STERLING GENERATORS PRIVATE LIMITED
13 . P8010	SUDHIR GENSETS LTD.
14 . P8012	TOYO DENKI POWER SYSTEMS PVT. LTD.
15 . P8011	WARTSILLA INDIA LTD.
<b>JAPAN</b>	
16 . P0539	MITSUBISHI CORPORATION

**811301 : DIESEL GENERATOR SET.**

CODE	NAME
17 . P0821	TOYO ELECT. MFG. CO. LTD.

**SWEDEN**

18 . P0064      ASEA BROWN BOVERI

## 811401 : HIGH VOLTAGE BUS DUCT.

CODE	NAME
1 . P0405	
<b>INDIA</b>	
2 . P0102	BEST & CROMPTON ENGG. CO.
3 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
4 . P0435	KARAMCHAND THAPAR
5 . P8041	LOTUS POWERGEAR PVT LTD
6 . P0640	POWERGEAR LIMITED
7 . P8051	SPACEAGE SWITCHGEARS LIMITED

## 811402 : MEDIUM VOLTAGE BUS DUCT

CODE	NAME
1 . P0405	
<b>INDIA</b>	
2 . P0045	ANAND POWER LIMITED
3 . P0071	ASSOCIATED SWITCHGEARS & PROJECTS LTD.
4 . P8197	ASTEK ELECTRICAL INDIA PRIVATE LIMITED
5 . P8105	AVONE SYSTEM & CONTROLS
6 . P0102	BEST & CROMPTON ENGG. CO.
7 . P0173	C&S ELECTRIC LTD.
8 . P0172	CONTROLS & SCHEMATICS PVT LTD.
9 . P8069	COSMIC POWER SYSTEMS PVT. LTD.
10 . P0195	DB POWER ELECTRONICS PVT. LTD.
11 . P0312	GLOBE ELECTRICAL INDUSTRIES
12 . P0352	HINDUSTAN CONTROL & EQPT PV. LTD.
13 . P8041	LOTUS POWERGEAR PVT LTD
14 . P8074	MAHESHWARI ELECTRICAL MFRS. (P) LTD.
15 . P0640	POWERGEAR LIMITED
16 . P0670	REUNION ELECTRICAL MANUFACTURERS (P) LTD

**811402 : MEDIUM VOLTAGE BUS DUCT**

<b>CODE</b>	<b>NAME</b>
17 . P8107	SHIVALIC POWER CONTROL (P) LTD.
18 . P8051	SPACEAGE SWITCHGEARS LIMITED
19 . P0841	UNITED ELECTRIC CO. (DELHI) PVT. LTD.
20 . P8106	VENUS CONTROLS & SWITCHGEAR (P) LTD.

## 811501 : SWITCHYARD PACKAGE

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0066	ASEA BROWN BOVERI LTD.
3 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
4 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
5 . P8104	JYOTI LIMITED (upto 33KV only)
6 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
7 . P8016	L&T (ECE DIVISION)
8 . P0079	MEHRU ELECTRICALS (FORMERLY AUTOMATIC ELECTRIC LIMITED)
9 . P0132	RELIANCE POWER
10 . P0670	REUNION ELECTRICAL MANUFACTURERS (P) LTD
11 . P0736	SIEMENS LTD.
12 . P0798	THE AHMEDABAD ELECTRICITY CO LTD
13 . P0869	VOLTAS LTD. (PUMPS & PROJECTS BUSINESS DIV)



## 811502 : SUB-STATION PACKAGE

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0102	BEST & CROMPTON ENGG. CO.
3 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
4 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
5 . P8016	L&T (ECE DIVISION)
6 . P0132	RELIANCE POWER
7 . P0670	REUNION ELECTRICAL MANUFACTURERS (P) LTD
8 . P0736	SIEMENS LTD.
9 . P0798	THE AHMEDABAD ELECTRICITY CO LTD

## 811503 : PLANT ELECTRIFICATION PACKAGE(Major Projects)

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P0453	KIRLOSKAR ELECTRIC COMPANY LTD.
4 . P8077	KMG ATOZ SYSTEMS PVT. LTD.
5 . P0132	RELIANCE POWER
6 . P0736	SIEMENS LTD.
7 . P8145	STERLING ELECTRO ENTERPRISES PVT.LTD.
8 . P0798	THE AHMEDABAD ELECTRICITY CO LTD
9 . P0860	VIDUIT AND COMPANY (I) PVT. LTD.
<b>U.K.</b>	
10 . P0481	LA BOUR PUMP CO. LTD.

## 811504 : PLANT ELECTRIFICATION PACKAGE(MINOR PROJECTS)

CODE	NAME
<b>INDIA</b>	
1 . P0045	ANAND POWER LIMITED
2 . P8169	ARYAN ELECTRICALS PRIVATE LIMITED (-)
3 . P8017	CHASMITA ENGRS PVT LTD
4 . P8192	GENICS ELECTROTECH PVT. LTD.
5 . P8077	KMG ATOZ SYSTEMS PVT. LTD.
6 . P8118	MEC ENGINEERS
7 . P8020	PACE PROCESS CONTROLS
8 . P8021	POWERMAX ELECTRICALS PVT LTD
9 . P0670	REUNION ELECTRICAL MANUFACTURERS (P) LTD
10 . P8018	ROHINI ELECTRIC
11 . P8145	STERLING ELECTRO ENTERPRISES PVT.LTD.
12 . P0860	VIDUIT AND COMPANY (I) PVT. LTD.
13 . P8019	ZODIAC POWER PROJECTS

## 811505 : AIR PRESSURISATION / VENTILLATION SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P0267	ABB FLAKT INDIA LTD.
2 . P0024	AIR CONDITIONING CORPN LTD
3 . P0041	AMERICAN REFRIGERATION CO LTD.
4 . P0119	BLUE STAR LTD.
5 . P0869	VOLTAS LTD. (PUMPS & PROJECTS BUSINESS DIV)

## 811506 : FIRE DETECTION AND ALARM SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P8201	ZAP FIRE

## 811601 : PRE-FABRICATED AL-CABLE TRAYS

CODE	NAME
<b>INDIA</b>	
1 . P8203	DURGA TECHNO INDUSTRIES
2 . P0312	GLOBE ELECTRICAL INDUSTRIES
3 . P0355	HINUSTAN VIDYUT PRODUCTS
4 . P0385	INDIANA ENGG WORKS PVT LTD
5 . P8205	INDIANA GRATINGS PRIVATE LIMITED
6 . P8135	INDMARK FORMTECH PVT. LTD.
7 . P8085	JAMNA METAL COMPANY
8 . P8089	KANADE ANAND UDYOG PVT. LTD.
9 . P8074	MAHESHWARI ELECTRICAL MFRS. (P) LTD.
10 . P0529	METALITE INDUSTRIES
11 . P0619	PAREKH ENGINEERING COMPANY
12 . P8189	PINAX STEEL INDUSTRIES PRIVATE LIMITED
13 . P8072	PREMIER POWER PRODUCTS (CALCUTTA) PVT. LTD.
14 . P8174	R.K. Engineering Works
15 . P8179	RATAN PROJECTS AND ENGINEERING CO. PVT. LTD.
16 . P8044	RUKMANI ELECTRICALS & COMPONENTS PVT LTD
17 . P0695	SADHANA ENGINEERING CORPORATION

**811601 : PRE-FABRICATED AL-CABLE TRAYS**

<b>CODE</b>	<b>NAME</b>
18 . P0748	SREE ATREYA ENTERPRISES
19 . P0753	STEALITE ENGG CO

## 811602 : PRE-FABRICATED G.I. CABLE TRAYS

CODE	NAME
<b>INDIA</b>	
1 . P8203	DURGA TECHNO INDUSTRIES
2 . P0312	GLOBE ELECTRICAL INDUSTRIES
3 . P0385	INDIANA ENGG WORKS PVT LTD
4 . P8205	INDIANA GRATINGS PRIVATE LIMITED
5 . P8135	INDMARK FORMTECH PVT. LTD.
6 . P8085	JAMNA METAL COMPANY
7 . P8089	KANADE ANAND UDYOG PVT. LTD.
8 . P8074	MAHESHWARI ELECTRICAL MFRS. (P) LTD.
9 . P0529	METALITE INDUSTRIES
10 . P0619	PAREKH ENGINEERING COMPANY
11 . P8189	PINAX STEEL INDUSTRIES PRIVATE LIMITED
12 . P8072	PREMIER POWER PRODUCTS (CALCUTTA) PVT. LTD.
13 . P8174	R.K. Engineering Works
14 . P8179	RATAN PROJECTS AND ENGINEERING CO. PVT. LTD.
15 . P8044	RUKMANI ELECTRICALS & COMPONENTS PVT LTD
16 . P0695	SADHANA ENGINEERING CORPORATION
17 . P8067	SLOTCO STEEL PRODUCTS PVT. LTD.



**811602 : PRE-FABRICATED G.I. CABLE TRAYS**

CODE	NAME
18 . P0748	SREE ATREYA ENTERPRISES
19 . P0753	STEALITE ENGG CO

## 811603 : FRP CABLE TRAYS

CODE	NAME
<b>INDIA</b>	
1 . P8022	ENERCON
2 . P8146	EPP COMPOSITES PVT.LTD.
3 . P8079	ERCON COMPOSITES (upto 600 mm wide)
4 . P8205	INDIANA GRATINGS PRIVATE LIMITED
5 . P8024	KEMROCK
6 . P8125	KEMROCK INDUSTRIES & EXPORTS LTD.
7 . P8119	SATYAM COMPOSITES PVT. LTD.
8 . P8023	SINTEX INDUSTRIES LTD.
9 . P8083	SUMIP COMPOSITES PVT. LTD.
10 . P8213	SUMIP COMPSITES PVT. LTD.

## 811604 : GI PIPES &amp; CONDUITS

CODE	NAME
<b>INDIA</b>	
1 . P0112	BHARTI EXPORTS
2 . P0814	INDIAN TUBE CO. (TATA DIV. OF TUBES & PIPES)
3 . P0427	JINDAL PIPES LTD.
4 . P0527	MEGHJYOT ENTERPRISES
5 . P8044	RUKMANI ELECTRICALS & COMPONENTS PVT LTD
6 . P0755	STEELCRAFT

## 811605 : PVC PIPES &amp; CONDUITS

CODE	NAME
<b>INDIA</b>	
1 . P8037	A.K.G.
2 . P8039	FINOLEX INDUSTRIES LTD. (PIPES & PVC DIVN.)
3 . P8075	KALINGA CABLES & CONDUIT CO.
4 . P8055	PLAZA CABLE INDUSTRIES LIMITED
5 . P8040	POLYPACK
6 . P8038	PRAKASH INDUSTRIES LTD.

## 811606 : INDUSTRIAL CABLE GLAND

CODE	NAME
<b>INDIA</b>	
1 . P0089	BALIGA LIGHTING EQUIPMENTS LIMITED
2 . P0165	COMET BRASS PRODUCTS
3 . P8100	COMET INDUSTRIES
4 . P0211	DOWELL'S ELECTRICALS
5 . P0228	ELECTROMAC INDUSTRIES
6 . P8200	EX-PROTECTA
7 . P0147	FCG FLAMEPROOF CONTROL GEARS PVT. LTD. (FORMERLY CEAG FLAME
8 . P0310	GLAND-MECH. INDUSTRIES
9 . P8134	INDUSTRIAL PRODUCTS EQUIPMENT
10 . P0639	POWER ENGG CO
11 . P0655	QUALITY & PRECISION INDL. EQUIPMENT
12 . P8025	S J METAL INDUSTRIES (JAINSON)

## 811607 : CABLE LUGS

CODE	NAME
<b>INDIA</b>	
1 . P0211	DOWELL'S ELECTRICALS
2 . P0279	FORWARD ENGG INDUSTRIES
3 . P0474	KSE ELECTRICAL PVT. LTD.
4 . P8133	MG ELECTRICA
5 . P0639	POWER ENGG CO
6 . P8025	S J METAL INDUSTRIES (JAINSON)
7 . P0851	USHA MARTIN INDUSTRIES LTD. (ISMAL DIVN)

## 811608 : BITUMENOUS BASED CABLE TERMINATION/STRAIGHT THROUGH JOINTING KITS.

CODE	NAME
<b>INDIA</b>	
1 . P0118	BIRLA 3M LTD.
2 . P0142	CABLE CORPN. OF INDIA LIMITED
3 . P0505	MAHINDRA ENGG. & CHEMICAL PRODUCTS LTD.
4 . P8026	RAYCHEM RPG LTD.
5 . P0900	YAMUNA POWER & INFRASTRUCTURE LIMITED

## 811609 : EPOXY BASED TERMINATION/STRAIGHT THROUGH JOINTING KITS.

CODE	NAME
<b>INDIA</b>	
1 . P0118	BIRLA 3M LTD.
2 . P0142	CABLE CORPN. OF INDIA LIMITED
3 . P8198	GALA SHRINK FIT (Epoxy/Cross linked Polyolefine)
4 . P8027	HARI CONSOLIDATED PVT LTD.
5 . P0505	MAHINDRA ENGG. & CHEMICAL PRODUCTS LTD.
6 . P8026	RAYCHEM RPG LTD.
7 . P0900	YAMUNA POWER & INFRASTRUCTURE LIMITED
8 . P0890	YASHWANT INDUSTRIAL WORKS PVT. LTD.



**811610 : SI RUBBER BASED CABLE TERM./STRAIGHT THRU JOINTING KITS.**

CODE	NAME
<b>INDIA</b>	
1 . P0142	CABLE CORPN. OF INDIA LIMITED
2 . P8027	HARI CONSOLIDATED PVT LTD.
3 . P0505	MAHINDRA ENGG. & CHEMICAL PRODUCTS LTD.
4 . P8026	RAYCHEM RPG LTD.
5 . P0900	YAMUNA POWER & INFRASTRUCTURE LIMITED

## 811611 : LIGHTING POLES

CODE	NAME
<b>INDIA</b>	
1 . P0112	BHARTI EXPORTS
2 . P8146	EPP COMPOSITES PVT.LTD.
3 . P8125	KEMROCK INDUSTRIES & EXPORTS LTD. (For FRP Type only)
4 . P8170	LIGHTING TECHNOLOGIES INDIA PRIVATE LIMITED (-)
5 . P0529	METALITE INDUSTRIES
6 . P8208	ORIENT ELECTRIC LIMITED
7 . P8072	PREMIER POWER PRODUCTS (CALCUTTA) PVT. LTD.
8 . P0695	SADHANA ENGINEERING CORPORATION
9 . P8119	SATYAM COMPOSITES PVT. LTD.
10 . P8213	SUMIP COMPSITES PVT. LTD.
11 . P8096	SURYA ROSHNI LTD.
12 . P8181	UTKARSH INDIA LIMITED

## 811612 : TRANSFORMER OIL

CODE	NAME
<b>INDIA</b>	
1 . P0053	APAR INUSTRIES LTD.
2 . P0381	INDIAN OIL CORPORATION LTD

## 811613 : INDUSTRIAL EXHAUST FAN

CODE	NAME
<b>INDIA</b>	
1 . P0024	AIR CONDITIONING CORPN LTD
2 . P0036	ALSTOM LIMITED ( AREVA T & D)
3 . P0041	AMERICAN REFRIGERATION CO LTD.
4 . P0085	BAJAJ ELECTRICALS LIMITED
5 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
6 . P0337	HAVELLS INDIA LTD.
7 . P0782	S.F. INDIA LTD
8 . P8028	TLT ENGINEERING INDIA PVT LTD

## 811701 : ELECTRO-MECHANICAL RELAYS

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0066	ASEA BROWN BOVERI LTD.
3 . P0219	EASUN REYROLLE LIMITED
4 . P8104	JYOTI LIMITED

## 811702 : MICROPROCESSOR / NUMERICAL RELAYS

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0066	ASEA BROWN BOVERI LTD.
3 . P8173	CG POWER AND INDUSTRIAL SOLUTIONS LIMITED
4 . P0219	EASUN REYROLLE LIMITED
5 . P0485	LARSEN & TOUBRO LTD.(EL.PRODUCTS DIVN)
6 . P8123	PROK DEVICES PRIVATE LIMITED ((Over Current and Earth Fault Relay, Earth Fault Relay, Earth Leakage Relay with CBCT))
7 . P0736	SIEMENS LTD.

## 811703 : METERS

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P8047	HOTLINE SWITCHGEAR & CONTROLS
3 . P0392	IMP POWER LTD.
4 . P0420	JAIPUR METALS & ELECTRICAL LTD
5 . P8095	M.B. CONTROL & SYTSTEMS PVT. LTD. ((Only for Multifunctional Meter))
6 . P0526	MECO INSUTRUMENTS
7 . P0079	MEHRU ELECTRICALS (FORMERLY AUTOMATIC ELECTRIC LIMITED)
8 . P8155	NEWTEK ELECTRICALS
9 . P8123	PROK DEVICES PRIVATE LIMITED
10 . P8029	RISHABH INSTRUMENTS PVT. LTD.
11 . P0710	SEAHORSE INDUSTRIES LTD.
12 . P8196	THE MOTWANE MANUFACTURING COMPANY PVT. LTD. (ELETRICAL TESTING & MEASURING EQUIPMENTS)

## 811704 : RECORDERS

CODE	NAME
<b>INDIA</b>	
1 . P8030	ALACRITY ELECTRONICS LTD.
2 . P8022	ENERCON
3 . P0479	L & G SWITZERLAND



## 811801 : HIGH VOLTAGE SHUNT CAPACITORS

CODE	NAME
<b>INDIA</b>	
1 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P0449	KAPSALES ELECTRICALS LTD.
4 . P0730	SHREEM CAPACITORS PVT. LTD.
5 . P0843	UNIVERSAL CABLES LTD.

## 811802 : MEDIUM VOLTAGE SHUNT CAPACITORS

CODE	NAME
<b>INDIA</b>	
1 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P0449	KAPSALES ELECTRICALS LTD.
4 . P0730	SHREEM CAPACITORS PVT. LTD.
5 . P0843	UNIVERSAL CABLES LTD.

## 811803 : LOW VOLTAGE SHUNT CAPACITORS

CODE	NAME
<b>INDIA</b>	
1 . P0114	BHEL (ELECTRICAL MACHINES DIVN.)
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P0449	KAPSALES ELECTRICALS LTD.
4 . P0730	SHREEM CAPACITORS PVT. LTD.
5 . P0843	UNIVERSAL CABLES LTD.

## 811901 : OVERHEAD CONDUCTORS-AL /ACSR

CODE	NAME
<b>INDIA</b>	
1 . P0037	ALUMINIUM INDUSTRIES LTD
2 . P8184	DYNAMIC CABLES LIMITED
3 . P8171	GRANDLAY ELECTRICALS INDIA
4 . P8193	LUMINO INDUSTRIES LIMITED
5 . P0574	NICCO CORPORATION LTD
6 . P8167	RAVI INDUSTRIES
7 . P8177	V-MARC INDIA LIMITED

## 811902 : EHV/HV INSULATORS

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0109	BHARAT HEAVY ELECTRICALS LTD.
3 . P0717	SESHASAYEE INDUSTRIES LTD

## 811903 : M.V.INSULATORS

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0347	HIGH TENSION INSULATORS FACTORY
3 . P0717	SESHASAYEE INDUSTRIES LTD

## 811904 : LIGHTNING ARRESTOR

CODE	NAME
<b>INDIA</b>	
1 . P0036	ALSTOM LIMITED ( AREVA T & D)
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P8190	ELEKTROLITES (POWER) PRIVATE LIMITED
4 . P0234	ELPRO INTERNATIONAL LTD
5 . P0595	OBLUM ELEC. INDUSTRIES PVT LTD

## 812001 : TELEPHONE EXCHANGE EQUIPMENTS

CODE	NAME
<b>INDIA</b>	
1 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
2 . P0330	HAKOTRONICS PRIVATE LIMITED
3 . P0383	INDIAN TELEPHONE INDUSTRIES LTD.
4 . P0623	PHILIPS INDIA LTD.
5 . P0736	SIEMENS LTD.
6 . P0788	TATA TELECOM LIMITED
<b>GERMANY</b>	
7 . P0570	NEUMANN GMBH ELEKTRONIK
<b>SINGAPORE</b>	
8 . P0546	MOTOROLA SINGAPORE PTE LTD.



## 812002 : PAGING EQUIPMENTS / PUBLIC ADDRESS SYTEM

CODE	NAME
<b>GERMANY</b>	
1 . P8161	INDUSTRONIC INDUSTRIE-ELECTRONIC GMBH & CO. KG
<b>INDIA</b>	
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P0330	HAKOTRONICS PRIVATE LIMITED
4 . P0383	INDIAN TELEPHONE INDUSTRIES LTD.
5 . P0623	PHILIPS INDIA LTD.
6 . P0788	TATA TELECOM LIMITED
7 . P0795	TELEMAX CORPROATION
<b>SINGAPORE</b>	
8 . P8144	COMTROL PTE.LTD.
<b>RUSSIA</b>	
9 . P8150	ARMTEL LLC
<b>GERMANY</b>	
10 . P0570	NEUMANN GMBH ELEKTRONIK
<b>INDIA</b>	
11 . P8185	LARAON ENGINEERS AND CONSULTANTS PVT. LTD.
<b>SINGAPORE</b>	
12 . P0546	MOTOROLA SINGAPORE PTE LTD.
<b>U.K.</b>	
13 . P0289	GAI TRONICS SRL

## 812101 : INDUSTRIAL HEATER

CODE	NAME
<b>France</b>	
1 . P8153	Chromalox Etirex SAS
<b>INDIA</b>	
2 . P0030	ALCO HEATING CO.
3 . P0091	BATLIBOI & CO. LTD.
4 . P0234	ELPRO INTERNATIONAL LTD
5 . P0242	ESCORTS LTD
6 . P8139	FATI GENERAL EQUIPMENTS PVT.LTD.
7 . P8031	KANTILAL CHUNNILAL & SONS APPLIANCES PVT. LTD.
8 . P8032	MACNEIL & MAGOR (KILNBURN)
9 . P0535	MIDDLETON ENGG CO
10 . P8033	RAYCOLD LTD.
11 . P8034	T.M.I (TRANSFORMERS MFG. INDUSTRIES)
<b>GERMANY</b>	
12 . P8080	KLOPPER-THERM GmbH & Co. KG

## 812201 : HOSE PROOF LOCAL CONTROL STATION

CODE	NAME
<b>INDIA</b>	
1 . P0089	BALIGA LIGHTING EQUIPMENTS LIMITED
2 . P0113	BHARTIA INDUSTRIES LTD. (DIVN. BCH)
3 . P8138	EX-PROTECTA
4 . P0147	FCG FLAMEPROOF CONTROL GEARS PVT. LTD. (FORMERLY CEAG FLAME
5 . P8007	FCG POWER INDUSTRIES PVT.LTD.
6 . P0268	FLAMEPROOF EQUIPMENTS PVT. LTD.
7 . P8047	HOTLINE SWITCHGEAR & CONTROLS
8 . P0639	POWER ENGG CO
9 . P8212	RITTAL PRIVATE LIMITED
10 . P8160	SHRENIK & COMPANY

## 812202 : INDUSTRIAL TYPE SW. SOCKET & PLUG

CODE	NAME
<b>INDIA</b>	
1 . P0089	BALIGA LIGHTING EQUIPMENTS LIMITED
2 . P0185	CG POWER AND INDUSTRIAL SOLUTION LIMITED
3 . P0144	CHLORIDE POWER SYSTEMS AND SOLUTIONS LTD. (formerly CALDYNE
4 . P0902	CYCLO ELECTRIC DEVICES & SERVICES CO.
5 . P8138	EX-PROTECTA
6 . P0147	FCG FLAMEPROOF CONTROL GEARS PVT. LTD. (FORMERLY CEAG FLAME
7 . P8007	FCG POWER INDUSTRIES PVT.LTD.
8 . P0268	FLAMEPROOF EQUIPMENTS PVT. LTD.
9 . P0523	LEGRAND INDIA LTD
10 . P8160	SHRENIK & COMPANY
<b>FRANCE</b>	
11 . P0491	LEGRAND S.A.
<b>GERMANY</b>	
12 . P0092	BBC-BROWN BOVERI & CIE AG
13 . P0657	R STAHL SCHALTGERATE GMBH
14 . P0875	WEIDMULLER LTD.
<b>ITALY</b>	
15 . P0178	CORTEM S.p.A.

## 812203 : HOSEPROOF JUNCTION BOXES

CODE	NAME
<b>INDIA</b>	
1 . P0089	BALIGA LIGHTING EQUIPMENTS LIMITED
2 . P0113	BHARTIA INDUSTRIES LTD. (DIVN. BCH)
3 . P8138	EX-PROTECTA
4 . P0147	FCG FLAMEPROOF CONTROL GEARS PVT. LTD. (FORMERLY CEAG FLAME
5 . P8007	FCG POWER INDUSTRIES PVT.LTD.
6 . P0268	FLAMEPROOF EQUIPMENTS PVT. LTD.
7 . P8194	Phoenix Mecano (India) Pvt.Ltd.
8 . P8212	RITTAL PRIVATE LIMITED
9 . P8160	SHRENIK & COMPANY

**812204 : ELECTROMAGNETIC EQUIPMENT**

<b>CODE</b>	<b>NAME</b>
<b>INDIA</b>	
1 . P0229	ELEKTROMAG DEVICES PVT. LTD
2 . P0638	POWER BUILD LTD
3 . P0757	STERLING CONTROLS PVT. LTD.
4 . P0760	STORM KRAFT CONTROLS

**812205 : LIMIT SWITCHES / BELT MONITORING SWITCHES**

<b>CODE</b>	<b>NAME</b>
<b>INDIA</b>	
1 . P0002	A G SYSTEM CONTROLS
2 . P0022	AG MECHANICAL ENTERPRISES (P) LTD.
3 . P8036	BALAJI ELECTRICALS
4 . P0113	BHARTIA INDUSTRIES LTD. (DIVN. BCH)
5 . P0424	JAYASHREE ELECTRODEVICES PVT. LTD.
6 . P8097	PROTOCONTROL INSTRUMENTS (I) PVT. LTD.
7 . P0691	R.K. ELECTRICAL ENGG. WORKS

## 812206 : LIMIT SWITCHES (FLAMEPROOF TYPE)

CODE	NAME
<b>INDIA</b>	
1 . P0089	BALIGA LIGHTING EQUIPMENTS LIMITED
2 . P8138	EX-PROTECTA
3 . P0147	FCG FLAMEPROOF CONTROL GEARS PVT. LTD. (FORMERLY CEAG FLAME
4 . P8007	FCG POWER INDUSTRIES PVT.LTD.
5 . P0268	FLAMEPROOF EQUIPMENTS PVT. LTD.
6 . P8097	PROTOCONTROL INSTRUMENTS (I) PVT. LTD.
7 . P8148	SAIEX FLAMEPROOF EQUIPMENTS PVT LTD




## 812207 : HORN/HOOTER/KLAXON

CODE	NAME
<b>INDIA</b>	
1 . P0089	BALIGA LIGHTING EQUIPMENTS LIMITED
2 . P8138	EX-PROTECTA
3 . P0268	FLAMEPROOF EQUIPMENTS PVT. LTD.
4 . P0883	WORTHMAX ENGINEERS

## 812301 : CATHODIC PROTECTION SYSTEM

CODE	NAME
<b>INDIA</b>	
1 . P8073	CONSTRUCTION GUILD PVT. LTD.
2 . P8110	ELECTRO PROTECTION SERVICES INDIA PVT. LTD. ((Also manufacturer of Anodes for CP System))
3 . P8141	SARK EPC PROJECTS PVT.LTD.
4 . P8143	UNDERGROUND PIPELINE & NDT SERVICES PRIVATE LIMITED
5 .	UNDERGROUND PIPELINE & NDT SERVICES PRIVATE LIMITED
6 . P8172	UNIVERSAL CORROSION PREVENTION INDIA

	<b>MASTER VENDORS LIST FOR PROJECTS</b>	04-00MM-0011	18
		DOCUMENT NO	REV

## MASTER VENDORS LIST

### FOR

### PROJECTS

### CUSTOM CLEARANCE & TRANSPORTATION ITEMS

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910101	CUSTOM CLEARANCE & TRANSPORTATION (INCLUDING ODC / OWC)	2

**910101 : CUSTOM CLEARANCE & TRANSPORTATION (INCLUDING ODC / OWC)**

CODE	NAME
<b>INDIA</b>	
1 . P9002	J M BAXI & CO.
2 . P9003	PREMIER TRANSPORT LIMITED
3 . P9001	RRC INTERNATIONAL FREIGHT SERVICES LTD.



