



**BHARAT HEAVY ELECTRICALS LIMITED**  
**PROJECT ENGINEERING MANAGEMENT, NOIDA**

Date-29-Jan-21

**CORRIGENDUM- 01**

|                   |          |                                                |
|-------------------|----------|------------------------------------------------|
| <b>PROJECT</b>    | <b>:</b> | <b>5x800 MW YADADRI TPS</b>                    |
| <b>PACKAGE</b>    | <b>:</b> | <b>FUEL OIL HANDLING AND STORAGE SYSTEM</b>    |
| <b>ENQUIRY NO</b> | <b>:</b> | <b>PE/PG/YAD/E-6590/2020 Dated. 21.01.2021</b> |
| <b>SUBJECT</b>    | <b>:</b> | <b>PRE-BID CLARIFICATION</b>                   |

|                         |                                     |                          |                          |
|-------------------------|-------------------------------------|--------------------------|--------------------------|
| Type of Corrigendum     |                                     |                          |                          |
| Technical Corrigendum - | <input checked="" type="checkbox"/> | Commercial Corrigendum - | <input type="checkbox"/> |

In reference to the above mentioned tender enquiry for **FUEL OIL HANDLING AND STORAGE SYSTEM** package

Please note the following.

1. All bidders are requested to go through the attached pre-bid clarification.

All the other terms and conditions of the tender enquiry remain unchanged. All the bidders are requested to quote accordingly.

Yours faithfully,

For and on behalf of BHEL

Guru Das  
Manager

| PRE BID CLARIFICATION SCHEDULE |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                    |
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| <b>Project:</b>                | <b>5 x 800MW YADADRI TPP</b>                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                    |
| <b>Package:</b>                | <b>FUEL OIL UNLOADING AND STORAGE SYSTEM</b>                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                    |
| Sr.No.                         | Section/Clause/<br>Page No.                                                                     | Statement of the referred<br>clause                                                                                                                                                                                                                                                                                                                                                                                               | Clarification/ Confirm action required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | BHEL reply                                                                                                                                                                                                                                                                                                         |
| <b>A</b>                       | <b>Mechanical</b>                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                    |
| 1                              | SECTION-IA, System writeup, cl.1.1.2, Page 26 of 434.                                           | HFO shall be also delivered to power station by five (5) nos. road tankers having capacity of approx. 20 cum per Tanker (Road tanker located near Tank farm area). The road tankers shall be unloaded through flexible metallic / neoprene unloading hoses of min. 8.0m length with fire safe type ball valve for isolation and a hose stand for each unloading hose. The HFO unloading header will have 5 Nos. unloading points. | 1)As per specification, HFO road tanker unloading facility shall be designed for unloading of 5nos takers through the 3nos (2W+1S) 50m3/hr pumps. In that case, flow through the each road tanker unloading pipe (80NB) will be high. Corresponding velocity shall be around 1.1m/s. Hence its advised to unload 10 nos of tankers instead of 5nos. Please check & confirm.<br><br>2)From the referred P&ID for steam & condensate system for FOHS, we understood that HFO brought in the road tankers shall be heated prior to unloading of the same. In order to estimate the steam consumption for heating of HFO in the road tankers, please provide the initial & final temperatures of HFO and time required for heating of HFO. | 1) Bidder to follow technical specification.<br><br>2) Bidder to consider the initial and final temp. of HFO shall be considered as 10 Deg.C and 50 Deg.C respectively. However Steam Sizing calculation is subjected to customer approval during detail Engg.                                                     |
|                                | SECTION-IA, System writeup, cl.1.1.3, Page 26 of 434.                                           | HFO from unloading header shall be pumped to HFO storage tank with the help of Three (3) Nos (2W+1S) unloading pumps as indicated in the HFO Unloading and Storage system flow diagram.                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                    |
|                                | P&ID for HFO & steam Systems Dwg No: PE-DG-417-166-A001 (3 & 4 sheets), page 218 & 219 of 434.  | HFO Road tanker unloading system.                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                    |
| 2                              | SECTION: I-A, CUSTOMER SPECIFICATIONS, Page 37 of 434.                                          | 5.01.01. The unloading capacity shall be suitable to unload at a time a maximum of 50 nos BTPN wagons for each of HFO & LDO/HSD system.<br><br>5.01.02. Buffer to buffer dimension of HFO & LDO/HSD wagon is 12.42m. Therefore a net railway track length of minimum 665 metres paved with RCC shall be provided for oil unloading and shall be used unloading of HFO and LDO/HSD.                                                | As per referred clauses of customer specification, we understood that provision shall be made for unloading of both HFO & LDO oils from railway wagons. But in the BHEL specification & P&IDs, wagon unloading facility is considered for unloading of HFO only. Please clarify.                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Please note that LDO unloading through Railway wagons is not in bidder scope. Space provisions has been made for Railway LDO unloading for future use by TSGENCO. While preparing piping layout, space for LDO unloading through railway shall be indicated in drawing.                                            |
| 3                              | SECTION: I-A, CUSTOMER SPECIFICATIONS, Page 40 of 434.                                          | 6.02.00 HFO & LDO/HSD storage tanks<br>The tanks shall be constructed to IS 803 and API 650 as applicable. The oil tanks shall be vertical cylindrical type, installed outdoors; site fabricated and welded construction type with butt welded bottom plate.                                                                                                                                                                      | Referred clause calls for HFO & LDO storage bottom plates shall be of butt welded type. However we consider lap joints for bottom plates which are acceptable as per IS 803 and API 650. Please confirm.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Bidder to follow technical specification.<br><br>However, proposed Lap welding as per Design code IS 803/ API 650 shall be subject to customer approval during detail engineering.                                                                                                                                 |
| 4                              | TECHNICAL SPECIFICATION FOR PRESSURE AND STORAGE VESSELS, Page 82 of 434.                       | 3.16.00 wall thickness of each of atmospheric tanks shall not be less than 6mm. If higher thickness for any atmospheric storage tank is specified elsewhere in this specification, the same shall be provided.                                                                                                                                                                                                                    | Both the referred clauses are contradicting each other regarding the minimum thickness of atmospheric storage tanks. Please clarify.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | For shell, Roof and Bottom thickness of tank, Minimum thickness is specified in GA drawing of tanks ( refer technical spec. page no. 220 & 221 of 434 ). Bidder to note that the shell roof and bottom plates for HFO and LDO tanks is excluded from the scope of bidder in line with the technical specification. |
|                                | TECHNICAL SPECIFICATION FOR MISCELLANEOUS TANKS (STANDARD TANK SPECIFICATION), Page 397 of 434. | 3.2.6 Each shell course shall be of uniform width throughout longitudinal weld in plates. Make up for the course width shall not be permitted. Shell plates in each course width shall be so arranged that all vertical joints be staggered having a minimum of 600 mm stagger. Shell thickness could be reduced in upper courses depending on design requirements but in no case the plate thickness shall be less than 8 mm.    | Also note that top shell courses thickness are considered as 6mm in the GA drawings of HFO & LDO storage tanks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                    |
| 5                              | Volume IV, SECTION-VII, SUB SECTION-B, CONTROL VALVES, Page 312 of 434.                         | 2.04.00 Control valves shall be located near floor or platform for ease of access and with adequate clearances for maintenance and lay down and shall be placed as station with upstream motorized isolating valve, downstream motorized isolating, inching duty motorized bypass valve and manual drain valves.                                                                                                                  | Referred clause of customer specification calls for motorized valves in the downstream and upstream of control valves, where as in the steam and condensate P&ID, manual valves are shown in the downstream & upstream of control valves of HFO tanks Floor coil heater, suction heater steam supply lines and control valves of PRDS. Please clarify.                                                                                                                                                                                                                                                                                                                                                                                 | Bidder to follow details in the P&ID for the same.                                                                                                                                                                                                                                                                 |

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| 6  | SECTION-IA, Customer specification, Section - IIIB, Annexure - III, Pipes, fittings & valves, clause no.4-d, Page 53 of 434. | Hoses for Steam/Condensate Lines - Refer Section - I of Vol - IID                                                                                                                                                                                                 | Customer specification asks to refer section I of vol IID for steam and condensate line hoses. We have not found the same. However we are considering steam and condensate hoses as per referred BHEL specification section - IIA. Please confirm.                                                                                      | BHEL Noted.                                                                                                                                                                                                                                                                                         |
|    | Section- IIA, I. DATA SHEET FOR STEAM/CONDENSATE HOSES, page 390 of 434.                                                     | Refer datasheet                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                     |
| 7  | SECTION-IA, Customer specification, V.IIB/S-3A, Strainers, cl. no.6.02.03, Page 60 of 434.                                   | d) The strainer shall have screen of <b>stainless steel (AISI-316)</b> construction with wire diameter of about 0.01inch and open area of about 50%<br>e) Strainer body shall be made of <b>cast steel</b> . No cast Iron component shall be used in F.O. system. | Both the referred clauses are contradicting each other regarding the MOC of LDO/HFO unloading strainer body & screen. However we consider the MOC of strainer body & screen as per BHEL specification given in <b>Section- IIA, page 387 of 434</b> . Please confirm.                                                                   | Bidder to follow Customer specification, V.IIB/S-3A, Strainers, cl. no.6.02.03, Page 60 of 434. any specific technical constraint shall be reviewed during detail engineering.                                                                                                                      |
|    | Section- IIA, D. Stariners for LDO/HFO Unloading pumps , page 387 of 434.                                                    | Material of construction:<br>Body - <b>Fabricated from IS 2062/ Seamless pipe to ASTM A 106</b><br>Screen Basket - <b>SS304</b>                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                     |
| 8  | Customer specification, Section - IIIB, Annexure - III, Pipes, fittings & valves, clause no.4-e to i, Page 53 & 54 of 434.   | -----                                                                                                                                                                                                                                                             | In the referred clauses, type of end connection for valves is not given. Hence we consider valve end connections as socket welded for 50NB and below sizes and Flanged ends for above 50NB. Please confirm.                                                                                                                             | BHEL Noted.                                                                                                                                                                                                                                                                                         |
| 9  | P&ID for steam & Condensate Systems Dwg No: PE-DG-417-166-A001 (sheet 4 of 4), page 219 of 434.                              | Level indicator for flash tank.                                                                                                                                                                                                                                   | In the referred P&ID Float and board type indicator is indicated for level measurement in the flash tank. But the same is not recommended for flash steam service. Hence we want to consider side mounted level gauge of suitable type. Please confirm or advise on type & technical specification of level indicator to be considered. | Level Indicator suitable for the application need to be considered and provided.                                                                                                                                                                                                                    |
| 10 | P&ID for HFO Systems Dwg No: PE-DG-417-166-A001 (sheet 3 of 4), page 218of 434.                                              | -----                                                                                                                                                                                                                                                             | In the referred P&ID, two tappings of 300NB size are taken from HFO wagon unloading pumps discharge header and gets combined into 450NB line.<br><br>We understood that these 300NB discharge lines will get combined at outside the tank farm area. Please confirm.                                                                    | Bidder understanding is correct                                                                                                                                                                                                                                                                     |
| 11 | GA & Nozzle orientation drawing of HFO storage tank, Dwg No: PE-DG-417-166-A002 (sheet 01 of 02), page 220 of 434.           | Outlet Nozzles N2, N5                                                                                                                                                                                                                                             | In the referred drawing, HFO tank out let nozzles size is given as 450NB, where as in the HFO P&ID the same is indicated as 400NB. Both are contradicting, please clarify.                                                                                                                                                              | Outlet nozzle size for suction heater is 400 NB. Inlet nozzle size for suction heater is 450 NB or as per manufacturer recommendation.                                                                                                                                                              |
| 12 | Drawing no. PE-DG-417-166-A001, Rev 0; P& ID for HFO system, page 218of 434.                                                 | water pit - <b>pump and pipe</b> under ETP scope                                                                                                                                                                                                                  | From the referred clause we understood that pumps, pipes, instruments and valves coming in water pit is in the ETP scope of supply. Please confirm.                                                                                                                                                                                     | Bidder understanding is correct                                                                                                                                                                                                                                                                     |
|    | SECTION-IA, System description, Page 28 of 434.                                                                              | 1.4.9 Separated water from the oil water separator water pit shall be taken to CMB as per ETP philosophy. <b>Pumps, instruments</b> required for it are in ETP supplier scope.                                                                                    |                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                     |
| 13 | SECTION-IA, System description, cl.1.1.7, Page 26 of 434.                                                                    | Initial and final temperature for suction heater shall be <b>50 deg. C and 60 deg. C</b> respectively. However, suction heater will be designed for a temperature rise of <b>20 deg. C</b> .                                                                      | Both BHEL and customer specification is contradicting each other regarding suction heater initial and final temperature. Please clarify the temperatures to be considered.                                                                                                                                                              | Initial and final temperature for suction heater shall be 50 deg. C and 60 deg. C respectively. However, suction heater will be designed for a temperature rise of 20 deg. C. Further, Initial temperature of oil shall be 50 ± 5°C & final temperature of oil shall be 60 ± 5°C. Bidder to comply. |
|    | Customer specification, Section - IIIB, HFO TANK HEATERS - DESIGN PARAMETERS, clause no. 2, Page 48 of 434.                  | SUCTION HEATER IN HFO STORAGE & DAY TANKS<br>Initial temperature of oil : 50 ± 5°C<br>Final temperature of oil : 60 ± 5°C                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                     |
| 14 | SECTION-IA, System description, cl.1.3.3, Page 27 of 434.                                                                    | A condensate flash tank shall be provided by BHEL-Piping Center in the tank farm for collecting condensate from tank (floor coil heater and Suction heater) before discharging it to Oil Water Separator pit.                                                     | From the referred clause we presume that instruments and valves coming on Condensate flash tank is also in the BHEL scope of supply. Please confirm.                                                                                                                                                                                    | The technical specification is clear. Bidder to follow technical specification.                                                                                                                                                                                                                     |

|    |                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                               |
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| 15 | Customer specification, Section - IIIB, Annexure - III, Data sheet for fuel oil unloading pumps, clause no.15.6, 15.7, Page 50 of 434              | HFO and LDO unloading pumps :<br>15.6)Suction & discharge pressure gauge connection<br>15.7) Suction temperature gauge connection                                                                                                                                                                                                             | In the referred P&IDs pressure gauge is given in HFO and LDO UL pump common suction line and in each pump discharge sub headers. From the referred clause Please clarify whether PG to be considered in each UL pump suction and discharge sub header or as per P&ID. As per the referred clause, in LDO P&ID Temperature gauge is not shown in the UL pump suction. Please clarify whether we have to consider or not.                                                                                                                                                                 | Bidder to follow the P&IDs in Section-IA, ANNEXURE-E.                                                                                                                                                                                                                                                                                                         |
|    | Drawing no. PE-DG-417-166-A001, Rev 0; sheet 2 of 3, sheet 4 of 3 Process & instrumentation diagram for LDO and HFO system, Page 217 & 218 of 434. | Pressure and temperature gauges                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                               |
| 16 | Customer specification, Section - IIIB, Annexure - III, Pipes, fittings & valves, clause no.4a, Page 52 of 434.                                    | Fuel Oil Pipe Lines : API 5 L Gr. B or ASTM 106 Gr. B Butt welded ends of pipe sizes 65 mm NB and above as per ANSI B 16.25 and socket welded ends for lower sizes as per ANSI B 16.11.                                                                                                                                                       | In the customer specification, whether API 5L is an ERW or SMLS is not given and even thickness to be considered is also not given. However in the BHEL specification API 5L construction is given as ERW and thickness is also given. Please confirm whether we can consider BHEL given pipe MOC and thickness.                                                                                                                                                                                                                                                                        | Bidder to note that pipe will be free issued by BHEL as per technical specification. For pipes inside tanks please refer GA Drawing of tanks for MOC of pipe. Further for pipe of size 400 NB and above shall be fabricated from IS2062 plate. Thickness of plate fabricated pipe shall be 8.0mm (inline with the Section-II of the technical specification). |
|    | Section- IIA, E. PIPES, FITTINGS & FLANGES , page 388of 434.                                                                                       | 2) Pipe in oil lines shall be API 5L Gr. B (ERW). Minimum thickness as follows: -----                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                               |
| 17 | Customer specification, Section - IIIB, Annexure - III, Pipes, fittings & valves, clause no.4b, Page 53 of 434.                                    | b) Steam/Condensate Pipe - Refer Section - I of Vol - IID                                                                                                                                                                                                                                                                                     | Customer specification asks to refer section I of vol IID for steam and condensate pipe. We have not found the same. However we are considering steam and condensate pipe material and thickness as per referred BHEL specification section - IIA. Please confirm.<br><br>As per P&ID, minimum thickness of Pipes used for Steam & Condensate shall be Sch.std/40. But for sizes above 250NB, pipe thicknesses are different for sch.std and sch.40. Hence we consider thickness as sch.40 for pipes of sizes above 250NB as given in BHEL specification section - IIA. Please confirm. |                                                                                                                                                                                                                                                                                                                                                               |
|    | Section- IIA, E. PIPES, FITTINGS & FLANGES , page 388 of 434.                                                                                      | 3) Steam and Condensate line shall conform to ASTM 106 GR. B, Schedule 40.                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                               |
|    | P&ID Legend, Dwg No: PE-DG-417-166-A001 (sheet 1 of 4), page 216 of 434.                                                                           | Steam Line: ASTM 106 Gr.B, STD/40 SCH.                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                               |
| 18 | Customer specification, Section - IIIB, clause no. 6.02.16, Page 44 of 434.                                                                        | <b>Surface preparation &amp; painting</b><br>Primer for <b>internal surface</b> shall be double boiled Linseed oil and that for external shall be synthetic red lead. Finish coat for both <b>internal and external</b> surface shall be of synthetic enamel. For bottom surface protection, one coat of bituminastic paint shall be applied. | Painting specification given in the referred three (3) clauses are contradicting each other. However we follow painting specification as per painting schedule given in page 243 of 434. Please confirm.                                                                                                                                                                                                                                                                                                                                                                                | For painting specification refer page 243 and 244 of the technical specification. However, the painting specification is subject to customer approval during detail engineering without any commercial implication.                                                                                                                                           |
|    | Annexure - G : Painting specification, clause no. 4.03.02Page 235 of 434.                                                                          | Specification for application of paints for <b>external surfaces</b> protection of vessels / tanks / equipment / piping / fittings / valves etc to be installed outdoor shall be as follows :                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                               |
|    | Painting schedule, Page 243 of 434.                                                                                                                | -----                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                               |
| 19 | Customer specification, Section - IIIB, Annexure - I, Page 48 of 434.                                                                              | 2. SUCTION HEATER IN HFO STORAGE & DAY TANKS<br>ii) Shell head and tube sheets : Steel plates of IS-2002 Grade 2A                                                                                                                                                                                                                             | Due to non availability of IS -2002 Grade 2A material in the market, we are considering IS 2062 Gr. B material for shell heads and tube sheets and body of condensate flash tank. Please confirm.                                                                                                                                                                                                                                                                                                                                                                                       | In case of non-availability of IS -2002 Grade 2A material in the market, Bidder to consider material SA 516 Gr70.                                                                                                                                                                                                                                             |
|    | Section- IIA, Condensate Flash tank datasheet , page 391 of 434.                                                                                   | Material of construction - Plates : IS 2002 GR.2A                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                               |
| 20 | Customer specification, Section - IIIB, Annexure - III, Velocity criteria, Page 52 of 434.                                                         | For pipe sizing velocity of fluid in various pipe lines shall be considered as follows unless otherwise stated in the specification :                                                                                                                                                                                                         | Both velocity criteria and pipe sizes (in the P&ID's) are given in the specification. Please clarify whether pipe sizes shall be considered as per P&ID's or as per the velocity criteria in case of conflict.                                                                                                                                                                                                                                                                                                                                                                          | The pipe sizes indicated in the P&ID are the minimum requirement. Final sizes shall be decided during the detail engineering.                                                                                                                                                                                                                                 |
| 21 | SECTION-IA, Terminal points, Page 17 of 434.                                                                                                       | LDO & HFO<br>For the location of terminal point, refer drawing no. PE-DG-417-166-A003-LAYOUT DRAWING FOR FUEL OILCOMBINED PUMP.                                                                                                                                                                                                               | In referred drawing PE-DG-417-166-A003-LAYOUT DRAWING FOR FUEL OIL COMBINED PUMP, location of terminal points are not indicated. Please provide the same.                                                                                                                                                                                                                                                                                                                                                                                                                               | Refer between colum 6 & 7 for Unit 1 &2 and column 14 & 15 for Unit 3,4, &5 of drawing drawing PE-DG-417-166-A003-LAYOUT DRAWING FOR FUEL OILCOMBINED PUMP                                                                                                                                                                                                    |
| 22 | SECTION-IA, Terminal points, Page 17 of 434.                                                                                                       | Terminal Point for Steam, Spray Water (DM water @37 kg/cm2 (a) & 43 deg. C) and Instrument air & service air shall be as per drawing attached in Annexure-E (drawing no.PE-DG-417-100-M056 -YARD PIPING LAYOUT- 5). Bidder to note that Service water is not in bidder scope.                                                                 | Referred drawing no.PE-DG-417-100-M056 -YARD PIPING LAYOUT- 5 is not found in the Annexure-E. Please provide the same.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Drawing attached as annexure-1</b>                                                                                                                                                                                                                                                                                                                         |

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| 23 | EQUIPMENT SELECTION & DESIGN CRITERIA/ DATA SHEET /CL. 2. / Pg. 387 of 434                                            | FOR SUMP PUMP AND OIL RECOVERY PUMP: Data sheet                                                                                                                                                                                                                                                                                                                                                                                                                      | Both the statements are contradict to each other . Please confirm which type of Pump must be considered for the mentioned service and if Pumps are centrifugal type ,provide the technical Data sheet of the same. | <b>The pumps shall be vertical centrifugal type pumps inline with the CL 1.4 / Pg. No 27 of 434. The reference datasheet is attached as annexure-2. Further, bidder to note that the details indicated are minimum, other details shall be subjected to customer approval during detail engineering.</b> |
|    | DRAIN OIL SYSTEM, SUMP WATER & OIL WATER SEPARATION/ CL 1.4 / Pg. No 27 of 434                                        | 1.4.5) Two (2) nos. vertical centrifugal type pumps of capacity 10 cum/hr. is also envisaged in HFO unloading pump house to pump the oil water mixture collected in pump house to oil water separator pits provided in Tank farm area.<br>1.4.6) Two (2) nos. vertical centrifugal type pumps of capacity 10 cum/hr. is also envisaged in HFO unloading area to pump the oil water mixture in unloading area to oil water separator pits provided in Tank farm area. |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                          |
| 24 | Site grading sections (Railway unloading area), dwg. No. PE-DG-417-603-C002/Pg. No.225 of 434.                        | In this drawing 2 No of 80NB Ball Valves are indicated after the Hoses at unloading of each Railway Wagon of 50No.s.                                                                                                                                                                                                                                                                                                                                                 | Both the drawings are contradict to each other, please confirm which drawing to be considered                                                                                                                      | There is no contradiction and details are clear in the specification                                                                                                                                                                                                                                     |
|    | DWG: PE-DG-417-166-A001/Pg.No 218 of 434                                                                              | In the P&ID of HFO, 1 No of 80NB Ball Valves are specified after the Hoses at unloading of each Railway Wagon of 50No.s.                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                          |
| 25 | SECTION-IA, Customer specification, Section - IIIB, Annexure - I, HFO tank heater - Design parameter, Page 47 of 434. | Material heating element - Seamless steel tubes to ASTM, A 106, Group B or equivalent.                                                                                                                                                                                                                                                                                                                                                                               | Thickness of pipe to be considered for HFO storage tank floor coil heater heating element is not given. Hence we consider thickness as per sch.40 for the same. Please confirm.                                    | The thickness of floor coil heater pipes shall be subject approval of calculation during detail engg. However, min. thickness shall be sch.40.                                                                                                                                                           |
| 26 | General                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Please clarify the function of small capacity (25m3/hr) HFO unloading pumps considered in the wagon unloading system and confirm whether these pumps runs or not while main pumps are running.                     | These pumps will generally be used for initiating flow at the start and at the end when very small amount of oil is available in the header. However, these small pumps might run parallel with the main pumps. Bidder to design system accordingly.                                                     |
|    | <b>Mandatory spares</b>                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                          |
| 27 | ANNEXURE - F MANDATORY SPARES LIST), Page 227 of 434.                                                                 | 1.1 Suction heater gaskets<br>1.1.1 For LDO/HFO Tanks - 8 sets<br>1.2 Suction Heater Nuts and Bolts<br>1.2.1 For LDO/HFO Tanks - 2 Lot                                                                                                                                                                                                                                                                                                                               | We understood that given quantities are required for each size of suction heater. Please confirm.                                                                                                                  | Bidder understanding is correct. The given quantities are required for each size of suction heater.                                                                                                                                                                                                      |
| 28 | ANNEXURE - F MANDATORY SPARES LIST), Page 227 of 434.                                                                 | 1.10 Temperature element 4 Nos.<br>1.11 Pressure Gauge 6 Nos.<br>1.12 Temperature Gauge 6 Nos.<br>1.13 Relief Valve Spring 4 sets<br>1.13.1 For HFO & LDO unloading pump 6 nos.<br>1.13.2 For Drain Oil Pump 6 nos.<br>1.14 Flame Arrestor 4 Nos.<br>1.18 Mat Coil Heater – Heating Element 40 meter<br>1.19 Thermodynamic traps 10 Nos.<br>1.2 Inverted Bucket type traps 4 Nos.                                                                                    | We understood that the given spare quantities are total required quantities irrespective of size/type/rating/range. Please confirm.                                                                                | The quantities indicated are as per end customer requirement. The size/type/rating/range shall be decided during detail engineering and subject to customer approval without any commercial implication.                                                                                                 |
| 29 | ANNEXURE - F MANDATORY SPARES LIST), Page 227 of 434.                                                                 | 1.13 Relief Valve Spring 4 sets<br>1.13.1 For HFO & LDO unloading pump 6 nos.<br>1.13.2 For Drain Oil Pump 6 nos.                                                                                                                                                                                                                                                                                                                                                    | We are not considering spares indicated against sl.no. 1.13 as separate quantities are indicated in sub sl. nos.                                                                                                   | The quantities indicated are as per end customer requirement. The size/type/rating/range shall be decided during detail engineering and subject to customer approval without any commercial implication.                                                                                                 |
| 30 | ANNEXURE - F MANDATORY SPARES LIST), Page 227 of 434.                                                                 | 1.16 Adaptor 10 Nos. for each type                                                                                                                                                                                                                                                                                                                                                                                                                                   | From the given item description (Adaptor) we are unable to figure out the exact requirement. Please provide detail of item elaborately.                                                                            | Bidder to follow technical specification. Further in case any spare indicated in the specification is “not applicable” for particular equipment, then suitable applicable alternate spare shall be supplied by the bidder.                                                                               |

| B  | Electrical, Control & Instrumentation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 31 | <p>VOLUME : IID, SECTION-II, THERMAL INSULATION, Page 70 of 434.</p> <p>3.01.00 Thermal insulating Materials - preformed bonded mineral wool sections, bonded mineral wool mattresses, loose mineral wool and lightly resin bonded glass wool shall be provided.</p> <p>4.00.00 MATERIAL SPECIFICATIONS</p> <p>4.01.00 The insulating materials to be supplied under this specification shall be lightly resin bonded mineral wool of best grade conforming to IS:8183. Hand made mattresses is not acceptable. Material shall be rock wool only. Slag wool or slag wool inclusion shall not be accepted.</p>                                                                                                                         | <p>Particular type of material (preformed sections or LRB Mattresses) to be considered for Thermal Insulation is not given in the referred specifications. Hence we are considering LRB mattresses with 100Kg/M3 density. Please confirm.</p> <p>Technical specification is clear. Bidder to follow specification requirement.</p>                                                                                                                                                                                                                                                                                                                                                                                            |
| 32 | <p>Process &amp; Instrumentation Diagram for LDO, HFO &amp; steam Systems Dwg No: PE-DG 417-166-A001 (4 sheets), page 217 to 219 of 434.</p> <p>TE- TEMPERATURE ELEMENT</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>In the referred P&amp;ID only TE indicated on the pipe lines and Tanks. We understood that we have to provide TE with TT instead of only TE. Please confirm.</p> <p>TTs are not applicable.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 33 | <p>P&amp;ID for steam &amp; Condensate Systems Dwg No: PE-DG-417-166-A001 (sheet 4 of 4), page 219 of 434</p> <p>Level indicator for flash tank.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>In the referred P&amp;ID Float and board type indicator is indicated for level measurement in the flash tank. But the same is not recommended for flash steam service. Hence we want to consider side mounted level gauge of suitable type. Please confirm or advise on type &amp; technical specification of level indicator to be considered.</p> <p>Level Indicator suitable for the application need to be considered and provided.</p>                                                                                                                                                                                                                                                                                |
| 34 | <p>INSTRUMENTATION DATA SHEET, Page 317 to 318 of 434.</p> <p>1.01.00 PRESSURE TRANSMITTER:<br/>17. Sealing/Isolation : Extended diaphragm (Silicon oil/ Fluorolub filled ) with 5 meters SS armoured capillary for corrosive/viscous/solid bearing or slurry type fluid applications.<br/>Accuracy: 0.075% of span or better</p> <p>1.02.00 DIFFERENTIAL PRESSURE TRANSMITTER / FLOW TRANSMITTER<br/>17. Sealing/Isolation : Extended diaphragm (Silicon oil/ Fluorolub filled ) with 5 meters SS armoured capillary for corrosive/viscous/solid bearing or slurry type fluid applications.<br/>Accuracy: 0.075% of span or better</p>                                                                                               | <p>1)Please define the applicability of extended diaphragm with 5M SS capillary. Also define for which services (i.e., HFO/LDO) we have to consider extended diaphragm with capillary.</p> <p>2) Also Pressure transmitter calls for 5M Capillary with 0.075% Accuracy. Please be noted with this length we cannot attain that much low accuracy. And also, if capillary is provided, Manifolds are Not required. Please clarify.</p> <p>1) Specification is clear that for corrosive/viscous/solid bearing or slurry type fluid applications diaphragm type instruments with capillary need to be provided.</p> <p>2)Accuracy : Noted. However, Bidder to offer best possible accuracy with capillary. Manifold : Noted.</p> |
| 35 | <p>INSTRUMENTATION DATA SHEET, Page 317 to 321 of 434</p> <p>1.01.00 PRESSURE TRANSMITTER:<br/>18. Accessories - g. Handheld calibrator</p> <p>1.02.00 DIFFERENTIAL PRESSURE TRANSMITTER / FLOW TRANSMITTER :<br/>18. Accessories - g. Handheld calibrator</p> <p>1.03.00 Displacer Type Level Transmitters:<br/>23. Accessories - e. Handheld calibrator</p> <p>1.04.02 TRANSMITTER: (MASS FLOW METER):<br/>11. Accessories : a) Handheld calibrator</p> <p>1.05.00 RADAR TYPE LEVEL MEASUREMENT:<br/>14. Accessories : a) Handheld calibrator</p> <p>1.06.00 ULTRASONIC LEVEL TRANSMITTER:<br/>15. Accessories : a) Handheld calibrator</p> <p>1.07.00 ULTRASONIC FLOW TRANSMITTER<br/>11. Accessories : 1) Handheld calibrator</p> | <p>From the referred clause Handheld calibrator asked for each transmitter. Please clarify whether we have to give for each type of transmitter or 1No. for all transmitters.</p> <p>Hand Held Calibrator are not part of this package and need not to be supplied.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|                      |                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 36                   | INSTRUMENTATION DATA SHEET, Page 326 & 327 of 434                                                                             | 2.00.00 HART HAND HELD CALIBRATOR<br>Hand held calibrators (5 nos. for each type) shall be provided for adjustment/ calibration/maintenance of the HART compatible transmitters. The hand held calibrator shall be suitable for all types of transmitters supplied in the package. If one type of hand held type calibrator is not suitable for communicating with all types of transmitters then separate hand held calibrator will be provided. | We understood from the referred clause the requirement of 5Nos. Of each type of Hand held calibrators is for complete plant.<br>For this fuel oil handling system scope we are considering 1No. Universal type Hand Held Calibrator for all transmitters. Please confirm.                                               | Hand Held Calibrator are not part of this package and need not to be supplied.                                                                                                                                                                                                                                                                                                                                                |
| 37                   | SECTION - IIIE,ELECTRICAL LOAD DATA, Page 433 of 434                                                                          | -----                                                                                                                                                                                                                                                                                                                                                                                                                                             | Motorized bypass valves of the HFO storage tank suction heater steam supply line control valves are not included in the electrical load data. Please check.                                                                                                                                                             | The load data provided in the specification is indicative only. Bidder to include drives (if not included in the electrical load data) required as per technical specifications and furnish the signed and stamped copy of the same along with their offer.                                                                                                                                                                   |
| 38                   | Cl No. 5, Specific Technical Requirement fo Fuel Oil Unloading & Storage System.                                              | 1. As per the Clause, 5. Redundancy of sensors shall be provided, irrespective of instrumentation shown in the PID, by bidder as per following:<br>(i) Triple redundancy for all analog and binary inputs required for protection of system /drives.<br>(ii) For all other control functions & alarms, dual redundancy of the sensors shall be provided by the bidder.                                                                            | As per the P&ID, The Pressure Transmitters at some locations are only 1 No. But as per the Redundancy Formula, It should be Three. Please Confirm. In addition to that, regarding Flowmeter as per Redundancy formula, it shall be 3Nos. But as per P&ID it is Only 1No. Hence, We are considering 1No. Please Confirm. | Please note that Redundancy of sensors shall be provided, irrespective of instrumentation shown in the PID, by bidder as per following:<br>(i) Triple redundancy for all analog and binary inputs required for protection of system /drives.<br>(ii) For all other control functions, permissives dual redundancy of the sensors shall be provided by the bidder.<br>(iii) For alarm purpose, single transmitter can be used. |
|                      | Process & Instrumentation Diagram for LDO, HFO & steam Systems Dwg No: PE-DG-417-166-A001 (4 sheets), page 217 to 219 of 434. | 2. P&ID (LDO & HFO)                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | Cl.6.02.14, Point No. f Page.43 of 434                                                                                        | Instruments as shown in P&ID shall be provided                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 39                   | General                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Instrument installation/Hook up drawings are not provided in the tender documents. Please provide the same.                                                                                                                                                                                                             | Instrument Stub Detail is provided. Hook up diagram for any instrument shall be standard and should have drain, vent, isolation etc. Further the hook up diagram shall be submitted by bidder during detail engineering for review and approval by BHEL.                                                                                                                                                                      |
| 40                   | General                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Please provide vendor list for Pressure & Diff. pressure transmitter.                                                                                                                                                                                                                                                   | <b>Refer annexure-3</b>                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>A, MECHANICAL</b> |                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 41                   | DWG: PE-DG-417-166-A001/Pg.No 218 of 434                                                                                      | Size of header is given as 550 NB                                                                                                                                                                                                                                                                                                                                                                                                                 | As per velocity criteria given by you Header size is coming 750 NB. Kindly clarify .                                                                                                                                                                                                                                    | Size of header is 550 NB. Bidder to follow P & ID ( DWG: PE-DG-417-166-A001/Pg.No 218 of 434)                                                                                                                                                                                                                                                                                                                                 |
|                      | annexure - III/Pipes, Fitting/ Point No. 1/ Pg.52 of 434                                                                      | Suction pipe Velocity of 250NB & above : 0.4m/sec                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 42                   | Scope of supply /Cl. 1.1.0/ Point : 41/ Pg. No 14 of 434                                                                      | All valves, counter- flange with nuts, bolts and gaskets at all the terminal points.                                                                                                                                                                                                                                                                                                                                                              | Both the statements are contradict to each other . Please confirm the valves shall be considered at all the terminal points or not.                                                                                                                                                                                     | Bidder to consider all valves, counter- flange with nuts, bolts and gaskets at all the terminal points.                                                                                                                                                                                                                                                                                                                       |
|                      | All P&ID Drawings /Pg. No 216 -219 of 434                                                                                     | No valves are indicated at all the terminal Points.                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 43                   | Vendor list/194 of 434                                                                                                        | There is no mention of MICON VALVES (INDIA) PVT LTD as approved vendor inspite of having approval .Kindly clarify if MICON VALVES (INDIA) PVT LTD can be considered in this project                                                                                                                                                                                                                                                               | There is no mention of MICON VALVES (INDIA) PVT LTD as approved vendor for Valves inspite of having approval .Kindly clarify if MICON VALVES (INDIA) PVT LTD can be considered in this project                                                                                                                          | <b>Micon valves may be considered subject to customer approval during detail engineering. Refer Annexure-3</b>                                                                                                                                                                                                                                                                                                                |
| 44                   | Annex h/Technical condition of contract/cl no.1.13.4b)/ Wastage/page no. 248 of 394                                           | Wastage beyond four Percent (4%) of the aforesaid theoretical consumption (S-1)-penal rate is applicable                                                                                                                                                                                                                                                                                                                                          | Kindly note scrap percentage will come around 10%.We request BHEL to change scrap percentage to 10% from 4 %.                                                                                                                                                                                                           | <b>The revised clause no.1.13.4(b) of Annex h/Technical condition of contract/ Wastage (page no. 248 &amp; 249of 434 of technical specification) is attached herewith as Annexure-4.</b>                                                                                                                                                                                                                                      |

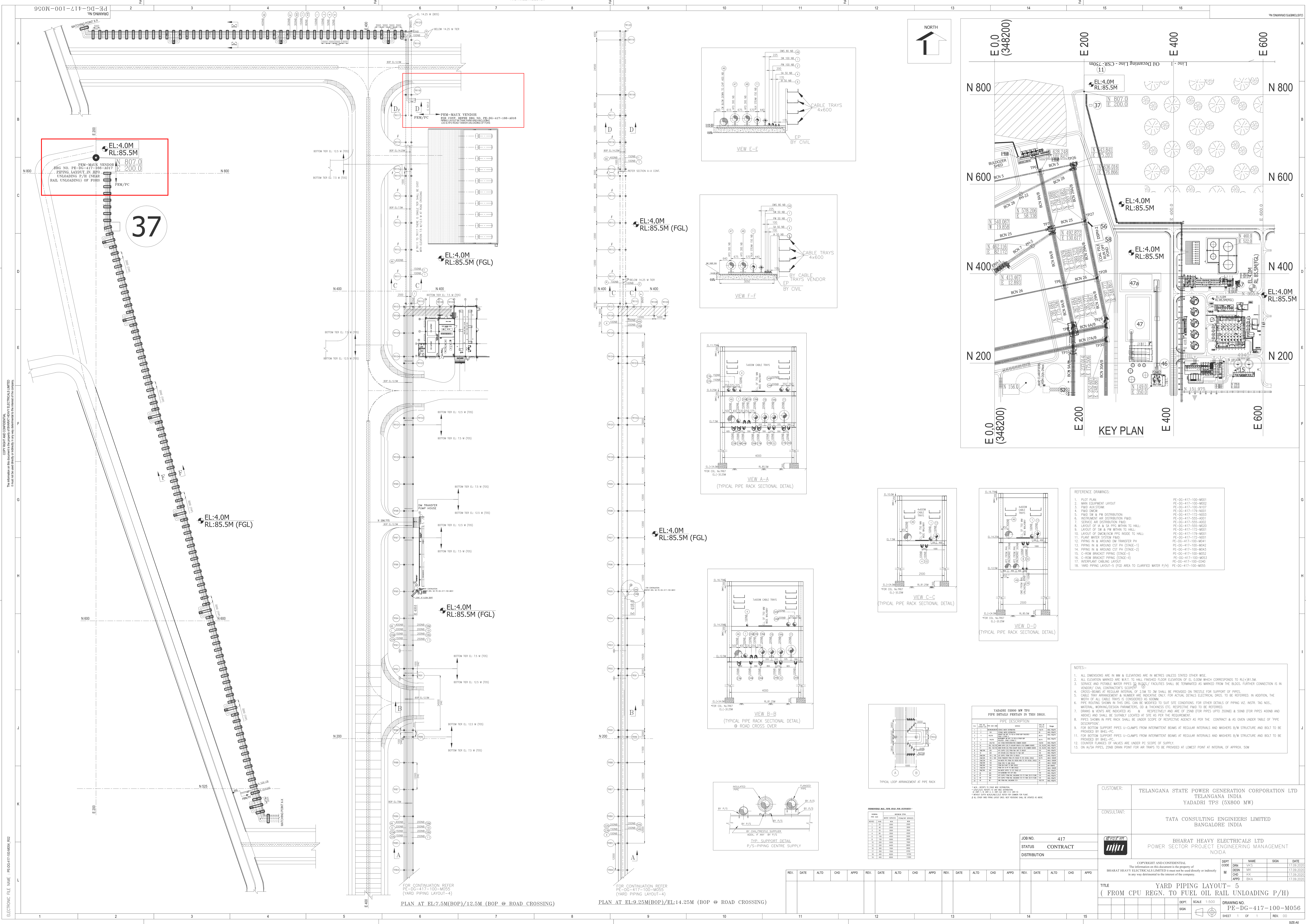


**TECHNICAL SPECIFICATION FOR  
FUEL OIL HANDLING SYSTEM**

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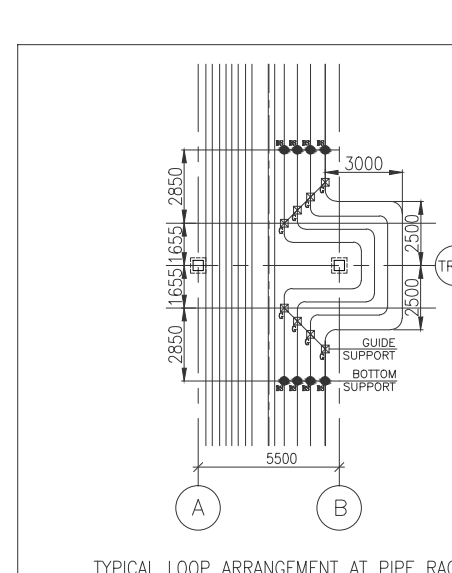
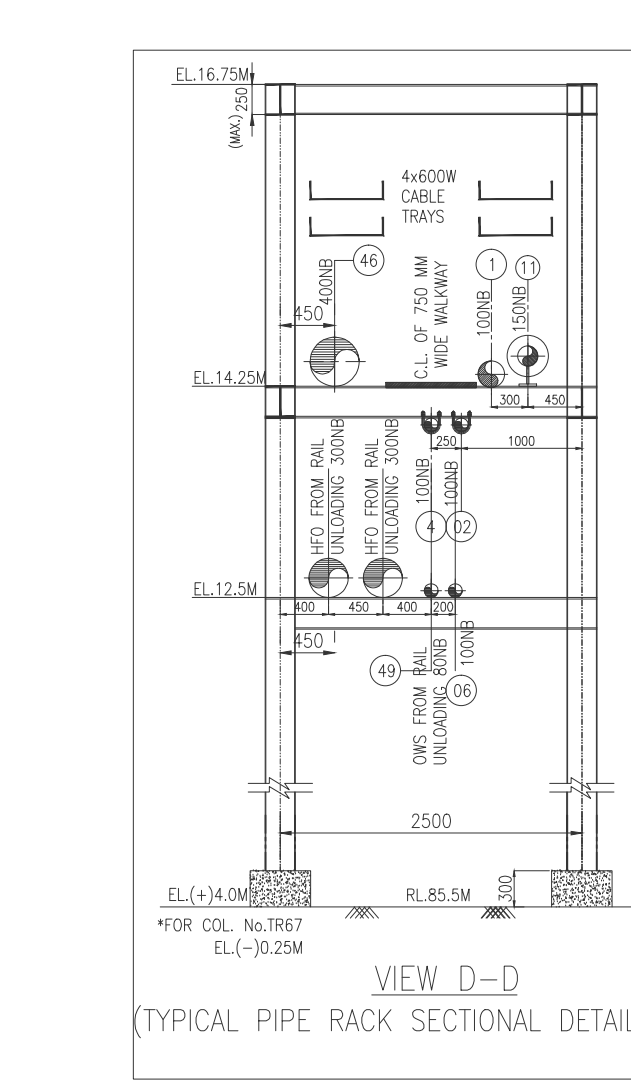
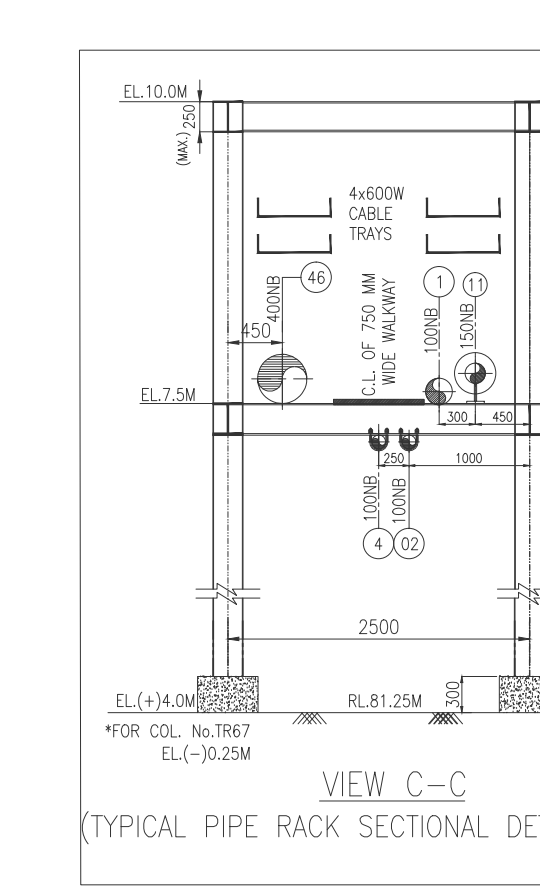
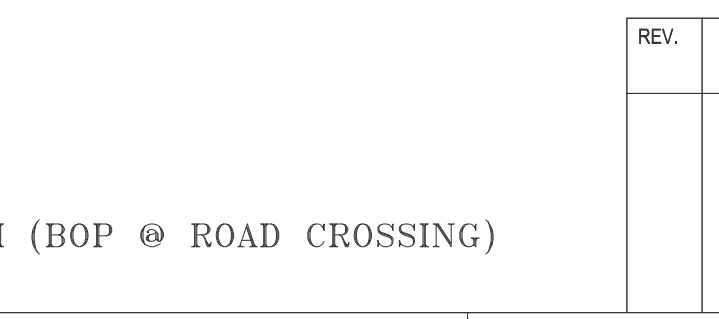
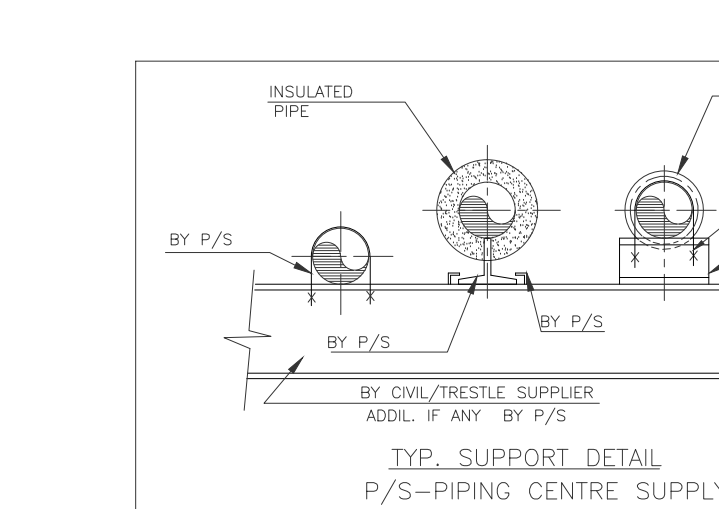
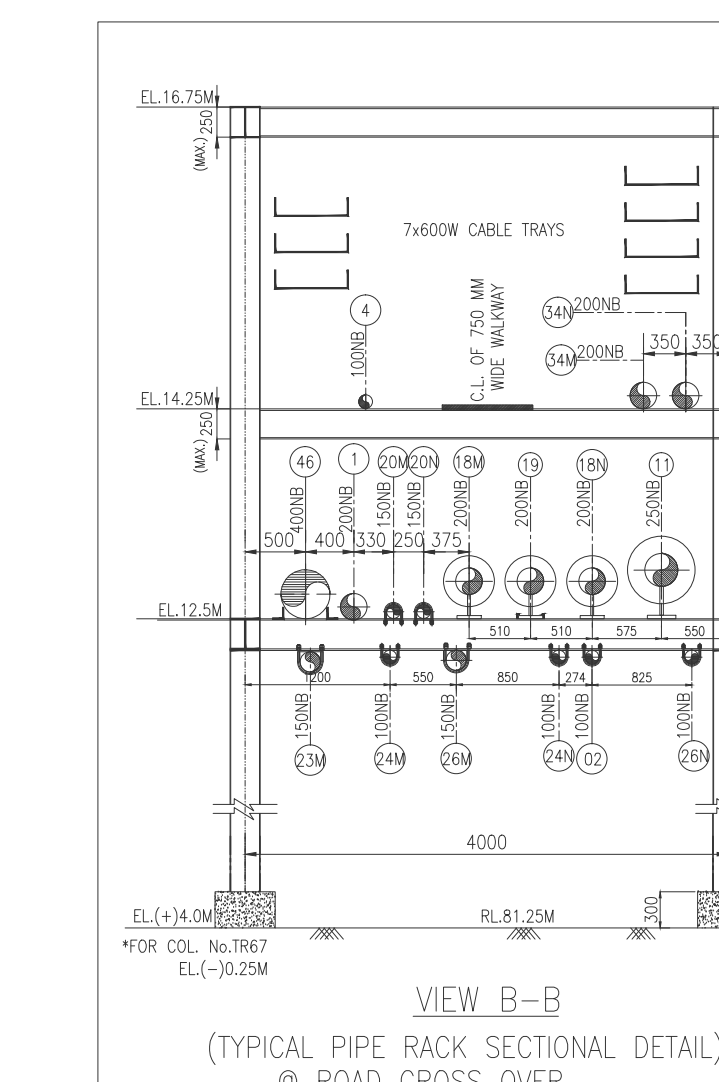
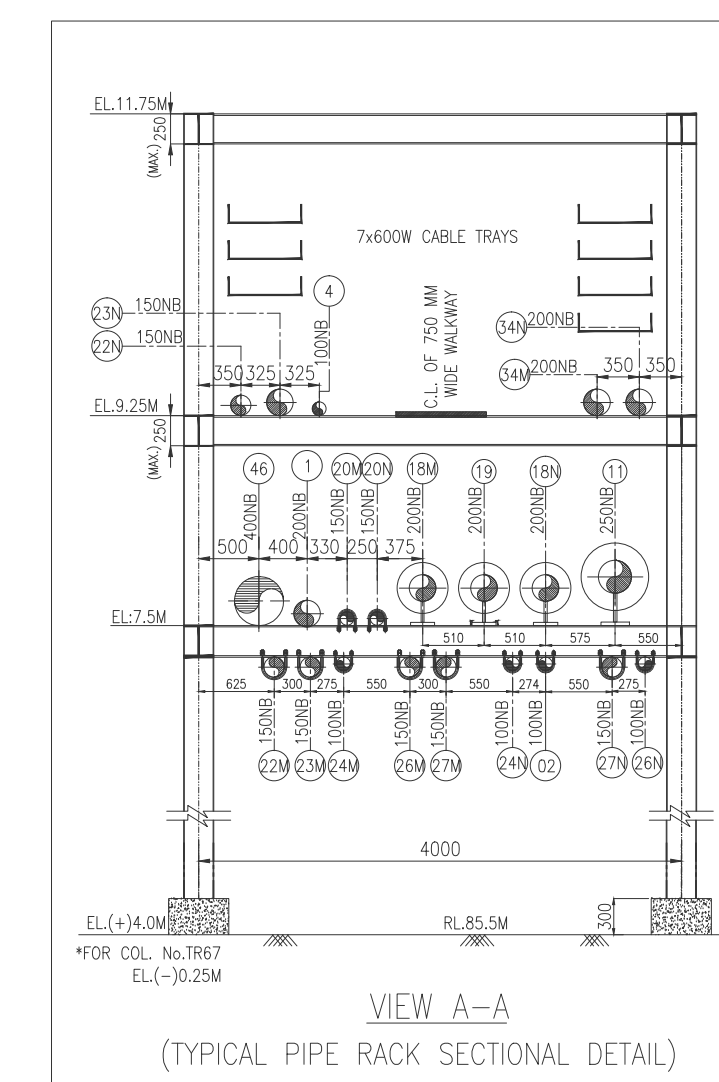
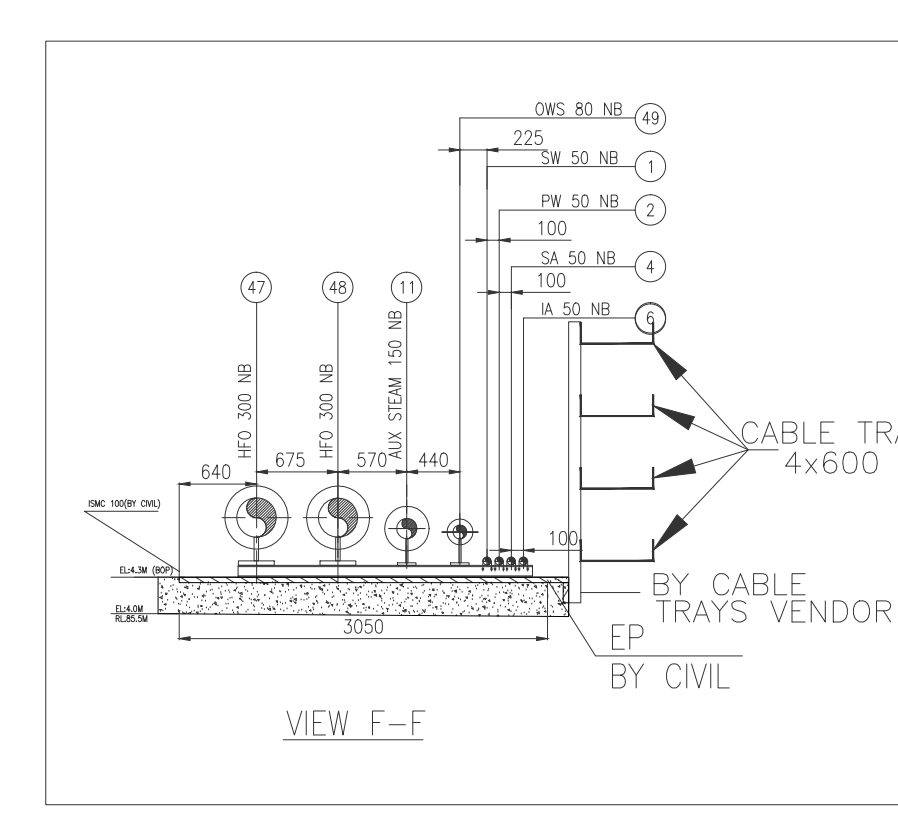
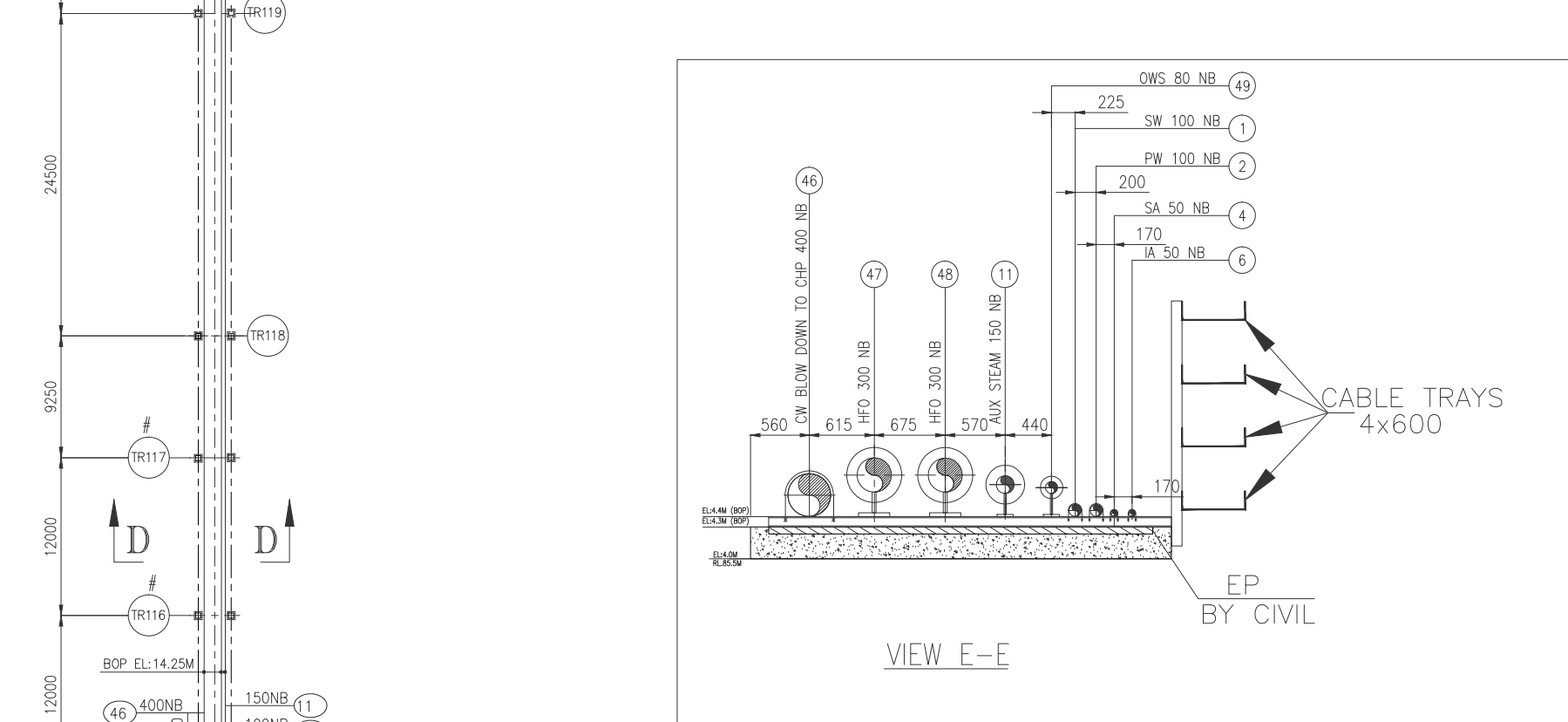
DATE: JAN 2021

**ANNEXURE-1**



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ELECTRONIC FILE NAME : PE-DG-417-100-M056.DWG



| NO. | REMARKS           | DATE       |
|-----|-------------------|------------|
| 1   | AS PER THE DESIGN | 17.09.2020 |
| 2   | AS PER THE DESIGN | 17.09.2020 |
| 3   | AS PER THE DESIGN | 17.09.2020 |
| 4   | AS PER THE DESIGN | 17.09.2020 |
| 5   | AS PER THE DESIGN | 17.09.2020 |
| 6   | AS PER THE DESIGN | 17.09.2020 |
| 7   | AS PER THE DESIGN | 17.09.2020 |
| 8   | AS PER THE DESIGN | 17.09.2020 |
| 9   | AS PER THE DESIGN | 17.09.2020 |
| 10  | AS PER THE DESIGN | 17.09.2020 |
| 11  | AS PER THE DESIGN | 17.09.2020 |
| 12  | AS PER THE DESIGN | 17.09.2020 |
| 13  | AS PER THE DESIGN | 17.09.2020 |
| 14  | AS PER THE DESIGN | 17.09.2020 |
| 15  | AS PER THE DESIGN | 17.09.2020 |
| 16  | AS PER THE DESIGN | 17.09.2020 |
| 17  | AS PER THE DESIGN | 17.09.2020 |
| 18  | AS PER THE DESIGN | 17.09.2020 |
| 19  | AS PER THE DESIGN | 17.09.2020 |
| 20  | AS PER THE DESIGN | 17.09.2020 |

- REFERENCE DRAWINGS:
1. PILOT PLAN
  2. MAIN EQUIPMENT LAYOUT
  3. P&ID AUXILIARY
  4. P&ID MAIN
  5. P&ID SW & PW DISTRIBUTION
  6. INSTRUMENT AIR DISTRIBUTION P&ID
  7. SERVICE AIR DISTRIBUTION P&ID
  8. LAYOUT OF SW & PW WITHIN TO HALL
  9. LAYOUT OF INSTRUMENT AIR WITHIN TO HALL
  10. LAYOUT OF INSTRUMENT AIR WITHIN TO HALL
  11. PLANT WATER SYSTEM P&ID
  12. P&ID IN & AROUND SW TRANSFER PH
  13. P&ID IN & AROUND CST PH (STAGE-1)
  14. P&ID IN & AROUND CST PH (STAGE-2)
  15. C-HOW BRACKET PIPING (STAGE-1)
  16. C-HOW BRACKET PIPING (STAGE-2)
  17. INTERMEDIATE CABLING LAYOUT
  18. YARD PIPING LAYOUT-5 (FOOD AREA TO CLARIFIED WATER P/H)
- PE-DG-417-100-M001  
PE-DG-417-100-M002  
PE-DG-417-100-M003  
PE-DG-417-100-M004  
PE-DG-417-100-M005  
PE-DG-417-100-M006  
PE-DG-417-100-M007  
PE-DG-417-100-M008  
PE-DG-417-100-M009  
PE-DG-417-100-M010  
PE-DG-417-100-M011  
PE-DG-417-100-M012  
PE-DG-417-100-M013  
PE-DG-417-100-M014  
PE-DG-417-100-M015  
PE-DG-417-100-M016  
PE-DG-417-100-M017  
PE-DG-417-100-M018  
PE-DG-417-100-M019  
PE-DG-417-100-M020

- NOTES:-
1. ALL DIMENSIONS ARE IN MM & ELEVATIONS ARE IN METRES UNLESS STATED OTHERWISE.
  2. ALL ELEVATION MARKED ARE W.R.T. TO HALL FINISHED FLOOR ELEVATION OF EL. 0.00M WHICH CORRESPONDS TO RL(+381.5M).
  3. SERVICE AND PORTABLE WATER PIPES TO BLDGS / FACILITIES SHALL BE TERMINATED AS MARKED FROM THE BLDGS. FURTHER CONNECTION IS IN VENDOR'S CIVIL CONTRACTOR'S SCOPE.
  4. CROSS-BEAMS AT REGULAR INTERVAL OF 2.5M TO 3M SHALL BE PROVIDED ON THE SITE FOR SUPPORT OF PIPES.
  5. CABLE TRAY ARRANGEMENT & NUMBER ARE INDICATED ONLY FOR ACTUAL DETAILS ELECTRICAL. (P&ID) TO BE REFERRED. IN ADDITION, THE WIDTH OF ALL CABLE TRAYS IS CONSIDERED AS 600MM.
  6. PIPE ROUTING SHOWN IN THIS Dwg. CAN BE MODIFIED TO SUIT SITE CONDITIONS. FOR OTHER DETAILS OF PIPING VIZ. INSTR. TAG NOS., MATERIAL, WORKING/DESIGN PARAMETERS, OD & THICKNESS ETC. RESPECTIVE P&ID TO BE REFERRED.
  7. DRAINAGE & VENTS ARE INDICATED AS: 1) 25MM (FOR PIPES UP TO 350MM) & 50MM (FOR PIPES 400MM AND ABOVE) AND SHALL BE SUITABLY LOCATED AT SITE AS PER THE REQUIREMENT.
  8. PIPES SHOWN IN PIPE RACK SHALL BE UNDER SCOPE OF RESPECTIVE AGENCY AS PER THE CONTRACT & AS GIVEN UNDER TABLE OF 'PIPE DESCRIPTION'.
  9. FOR BOTTOM SUPPORT, PIPES U-CRAMPS FROM INTERMITTENT BEAMS AT REGULAR INTERVALS AND WASHERS B/W STRUCTURE AND BOLT TO BE PROVIDED BY BHEL-HC.
  10. FOR BOTTOM SUPPORT, PIPES U-CRAMPS FROM INTERMITTENT BEAMS AT REGULAR INTERVALS AND WASHERS B/W STRUCTURE AND BOLT TO BE PROVIDED BY BHEL-HC.
  11. FOR BOTTOM SUPPORT, PIPES U-CRAMPS FROM INTERMITTENT BEAMS AT REGULAR INTERVALS AND WASHERS B/W STRUCTURE AND BOLT TO BE PROVIDED BY BHEL-HC.
  12. COUNTER FLANGES OF VALVES ARE UNDER PC SCOPE OF SUPPLY.
  13. ON A/SA PIPES, 25MM DRAIN POINT FOR AIR TRAPS TO BE PROVIDED AT LOWEST POINT AT INTERVAL OF APPROX. 50M.

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| CUSTOMER:     | TELANGANA STATE POWER GENERATION CORPORATION LTD<br>TELANGANA INDIA<br>YADADRI TPS (5X800 MW) |
| CONSULTANT:   | TATA CONSULTING ENGINEERS LIMITED<br>BANGALORE INDIA                                          |
| DESIGNER:     | BHARAT HEAVY ELECTRICALS LTD<br>POWER SECTOR PROJECT ENGINEERING MANAGEMENT<br>NOIDA          |
| DEPT. CODE:   | DEPT. NAME: SIGN: DATE: 17.09.2020                                                            |
| STATUS:       | STATUS: CONTRACT                                                                              |
| DISTRIBUTION: | DISTRIBUTION: CONTRACT                                                                        |
| JOB NO.:      | 417                                                                                           |
| STATUS:       | CONTRACT                                                                                      |
| DISTRIBUTION: | CONTRACT                                                                                      |
| TITLE:        | YARD PIPING LAYOUT- 5<br>( FROM CPU REGN. TO FUEL OIL RAIL UNLOADING P/H)                     |
| DEPT. CODE:   | DEPT. NAME: SIGN: DATE: 17.09.2020                                                            |
| STATUS:       | STATUS: CONTRACT                                                                              |
| DISTRIBUTION: | DISTRIBUTION: CONTRACT                                                                        |
| JOB NO.:      | 417                                                                                           |
| STATUS:       | CONTRACT                                                                                      |
| DISTRIBUTION: | CONTRACT                                                                                      |



**TECHNICAL SPECIFICATION FOR  
FUEL OIL HANDLING SYSTEM**

SPECIFICATION NO. PE-TS-417-166-A002

DATE: JAN 2021

**ANNEXURE-2**



## TECHNICAL SPECIFICATION FOR FUEL OIL HANDLING SYSTEM

SPECIFICATION NO. PE-TS-417-166-A002

DATE: JAN 2021

### FOR SUMP PUMP AND OIL RECOVERY PUMP:

| S.No  | Characteristics                 | Drain oil pump /<br>Recovery oil pumps          | Sump Pump in Oil<br>Unloading Area | Sump Pumps in HFO<br>pump house |
|-------|---------------------------------|-------------------------------------------------|------------------------------------|---------------------------------|
| 1     | Type of Pumps                   | Vertical Single Screw<br>positive displacement. | Vertical Centrifugal<br>type       | Vertical Centrifugal<br>type    |
| 2     | No. &Capacity of Pumps          | As per scope of supply                          |                                    |                                 |
| 3     | Type of Duty                    | Intermittent                                    | Intermittent                       | Intermittent                    |
| 4     | Type of Drive                   | Direct driven by Electric Motor                 |                                    |                                 |
| 5     | Location                        | Indoor / Outdoor                                | Outdoor                            | Indoor                          |
| 6     | Nature of Fluid to be<br>pumped | HFO/LDO                                         | Water with traces of<br>oil        | Water with traces of<br>oil     |
| 7     | Design Viscosity range          | 2-500 cST                                       | 5-50cST                            | 5-50cST                         |
| 8     | Sealing                         | Manufacturer Specific                           |                                    |                                 |
| 9     | Design Code                     | Manufacturer specific.                          |                                    |                                 |
| 10    | Bearings                        | Antifriction type                               | Manufacturer specific              |                                 |
| 11    | Material of Construction        |                                                 |                                    |                                 |
| i)    | Casing                          | Cast Iron to IS 210 Gr FG 260/ CS Fabricated    |                                    |                                 |
| ii)   | Casing lining, if applicable    | Manufacturer specific                           |                                    |                                 |
| iii)  | Rotor/ Impeller                 | 13% chrome SS                                   | Cast Iron to IS 210 Gr FG 260)     |                                 |
| iv)   | Rotor housing, if applicable    | CI AS PER IS 210 GR.<br>260                     | Manufacturer specific              |                                 |
| v)    | Shaft                           | 13% chrome SS                                   | BS 970 EN-8 or equivalent          |                                 |
| vi)   | Relief valve body               | NA                                              | NA                                 |                                 |
| vii)  | Relief valve spring             | NA                                              | NA                                 |                                 |
| viii) | Base Plate                      | Fabricated from MS to IS 2062                   |                                    |                                 |
| ix)   | Coupling                        | Manufacturer specific                           |                                    |                                 |
| x)    | Hydrotest Pressure              | 1.5 Times maximum discharge pressure            |                                    |                                 |
| xi)   | Hydrotest Duration              | 30 Minutes                                      |                                    |                                 |



**TECHNICAL SPECIFICATION FOR  
FUEL OIL HANDLING SYSTEM**

SPECIFICATION NO. PE-TS-417-166-A002

DATE: JAN 2021

**ANNEXURE-3**



# TECHNICAL SPECIFICATION FOR FUEL OIL HANDLING SYSTEM

SPECIFICATION NO. PE-TS-417-166-A002

DATE: JAN 2021

## SUB-VENDOR LIST - FUEL OIL UNLOADING AND STORAGE SYSTEM

| SL. NO | ITEM                                                          | SUB-VENDORS                       | PLACE     | TECHNICAL LIMIT                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------|---------------------------------------------------------------|-----------------------------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | MECHANICAL<br><br>GATE, GLOBE AND CHECK (CARBON STEEL VALVES) | A.V. VALVES LTD                   | AGRA      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|        |                                                               | ATAM VALVES PVT. LTD.             | JALANDHAR |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|        |                                                               | MICON VALVES (INDIA) PVT LTD      | MUMBAI    | <b>Gate Valves:</b><br>Up to 50NB – Class-800 with MOC as FCS. Class 150 with MOC as CSS.<br>Size 65 NB to 600 NB- Class up to 600 with MOC as CCS/CSS.<br><br><b>Check valves:</b><br>Up to 50NB – Class-800 with MOC as FCS. Class 150 with MOC as CSS.<br>Size 65 NB to 700 NB- Class up to 600 with MOC as CCS/CSS.<br><br><b>Globe valves:</b><br>Up to 50NB – Class-800 with MOC as FCS. Class 150 with MOC as CSS.<br>Size 65 NB to 80 NB- Class 150 with MOC as CCS. |
|        |                                                               | FLUIDLINE VALVES COMPANY PVT.LTD. | GHAZIABAD |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|        |                                                               | M/S GM ENGINEERING                | RAJKOT    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|        |                                                               | INTERVALVE (INDIA) LTD.           | PUNE      | A) STEEL GATE VALVES: UPTO 50NB, #800 AND 65NB TO 150NB, #150 B)<br>STEEL GLOBE VALVES: UPTO 50NB, #800 AND 65NB TO 100NB, #150<br>C)SUPPLIER NOT REGISTERED FOR NR VALVES                                                                                                                                                                                                                                                                                                   |
|        |                                                               | LEADER VALVES LTD.                | JALANDHAR |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|        |                                                               | NITON VALVE INDUSTRIES PVT LTD    | MUMBAI    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|        |                                                               | NSSL LIMITED.                     | NAGPUR    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|        |                                                               | STEEL STRONG VALVES (I) PVT.LTD.  | MUMBAI    | LIMIT AS PER VD FILE AS ATTACHED IN SHEET 2                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|        |                                                               | VENUS PUMPS AND ENGG. WORKS       | KOLKATA   | CC/CSS-GATE-BBT-UPTO600NB CL UPTO300,GATE-PSBT UPTO250NB CL 1500,GLV-BBT-UPTO300NB CL UPTO600,SCNRV-BBT-UPTO600NB CL UPTO150,SCNRV-BBT-UPTO300NB CL 300,SCNRV-PSBT-UPTO150NB CL UPTO900                                                                                                                                                                                                                                                                                      |
|        |                                                               | VALTECH INDUSTRIES                | MUMBAI    | CAST CARBON & ALLOY STEEL - VALVE/RATING/SIZE-<br>GV/150/900,GV/300/400, GV/600/300 ,<br>GV/GLV/NRV/900/250 , GLV/300/300,GLV/150/350/ ,<br>SCNRV/150/700, SCNRV/300/350, SCNRV/600/250.                                                                                                                                                                                                                                                                                     |



# TECHNICAL SPECIFICATION FOR FUEL OIL HANDLING SYSTEM

SPECIFICATION NO. PE-TS-417-166-A002

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|   |                |                                        |                         |                                                                                                                                                        |
|---|----------------|----------------------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                | V.K. VALVES PVT. LTD.,                 | JALANDHAR               |                                                                                                                                                        |
|   |                | WEIR BDK VALVES                        | NEW DELHI               |                                                                                                                                                        |
|   |                | AUDCO -L&T                             | CHENNAI /<br>COIMBATORE |                                                                                                                                                        |
|   |                | OSWAL INDUSTRIES                       |                         |                                                                                                                                                        |
|   |                | HITECH                                 | AHMEDABAD               |                                                                                                                                                        |
|   |                | KSB WATER PUMPS / VALVES               | COIMBATORE              |                                                                                                                                                        |
|   |                | KBL                                    | KONDHAPURI              |                                                                                                                                                        |
|   |                | HAWA ENGINEERS                         | AHMEDABAD               |                                                                                                                                                        |
|   |                | BHEL                                   | GOINDWAL                |                                                                                                                                                        |
|   |                | FOURESS ENGG                           | MUMBAI                  | UPTO 600 NB, CL-300 & 300NB CL-600                                                                                                                     |
|   |                | FOURESS ENGG                           | AURANGABAD              |                                                                                                                                                        |
| 2 | CS BALL VALVES | A.V. VALVES LTD                        | AGRA                    |                                                                                                                                                        |
|   |                | AKAY INDUSTRIES PVT.LTD.               | DHARWAD                 |                                                                                                                                                        |
|   |                | BELGAUM AQUA VALVES PVT. LTD.          | BELGAUN                 |                                                                                                                                                        |
|   |                | MICON VALVES (INDIA) PVT LTD           | MUMBAI                  | Up to 50NB – Class-800 with MOC as FCS. Class 150 with MOC as CSS. Size 65 NB to 200 NB- Class 150/300 with MOC as CCS/CSS.                            |
|   |                | SHALIMAR VALVES                        | RABALE, NAVI MUMBAI     | Up to 300NB – Class-600                                                                                                                                |
|   |                | ASIAN INDUSTRIAL VALVES & INSTRUMENTS. | CHENNAI                 |                                                                                                                                                        |
|   |                | ATAM VALVES PVT. LTD.                  | JALANDHAR               | (1) BALL VALVES: FCS/FSS - 1/2" TO 2" #800 & CCS/CSS - 2.1/2" TO 4" #150 (2) BALL VALVES: GUN METAL VALVES SIZE 15 NB TO 80 NB - UPTO PN16.0           |
|   |                | DEMBLA VALVES LTD.                     | THANE                   |                                                                                                                                                        |
|   |                | M/S GM ENGINEERING                     | RAJKOT                  |                                                                                                                                                        |
|   |                | HAWA VALVES (INDIA) PVT. LTD.          | THANE                   | SIZE UP TO 2" & #800 WITH MOC AS FCS & FSS AND FOR SIZE FROM 65 NB TO 150 NB & #150 WITH MOC AS CCS AND CSS.                                           |
|   |                | INTERVALVE (INDIA) LTD.                | PUNE                    | STEEL BALL VALVES UPTO 50NB, #800 AND 65NB TO 150NB. #150                                                                                              |
|   |                | LEADER VALVES LTD.                     | JALANDHAR               | CAST STEEL UPTO 200 MM, CLASS 150/300.                                                                                                                 |
|   |                | MICROFINISH VALVES PVT LTD.            | HUBLI                   |                                                                                                                                                        |
|   |                | NILON VALVES PRIVATE LIMITED           | AHMEDABAD               |                                                                                                                                                        |
|   |                | SURYA VALVES AND INSTRUMENTS MFG CO.   | CHENNAI                 | FOR CARBON STEEL/STAINLESS STEEL UPTO SIZE 200NB.                                                                                                      |
|   |                | UNIFLOW                                | CHENNAI                 |                                                                                                                                                        |
|   |                | VALTECH INDUSTRIES                     | MUMBAI                  | FORGED CARBON & ALLOY STEEL BALL VALVES, SCREWED TYPE BALL VALVES RATING 800, SIZES UPTO 50 & CC& ALLOY STEEL BALL VALVES RATING 150 , SIZES 65 TO 200 |

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|----------------------------------------------------------------------------------|----------------------------------|-----------------------------------------------------------------|--------------|----------------------------------------------------------------------------------------------|----------------|
|                                                                                  |                                  |                                                                 |              |                                                                                              |                |
|                                                                                  |                                  |                                                                 |              |                                                                                              | DATE: JAN 2021 |
|                                                                                  |                                  |                                                                 |              |                                                                                              |                |
|                                                                                  |                                  |                                                                 |              | FLANGED TYPE.                                                                                |                |
|                                                                                  |                                  | VAAS AUTOMATION PVT. LTD.                                       | DELHI        |                                                                                              |                |
|                                                                                  |                                  | WEIR BDK VALVES- A UNIT OF WEIR INDIA PVT. LTD.                 | DELHI        |                                                                                              |                |
|                                                                                  |                                  | PEC                                                             | NASHIK       | (UPTO 400 NB CLASS 150 )                                                                     |                |
|                                                                                  |                                  | L&T VALVES                                                      | COIMBATORE   |                                                                                              |                |
|                                                                                  |                                  | L&T VALVES (AUDCO)                                              | CHHENNAI     |                                                                                              |                |
|                                                                                  |                                  | FLOW CHEM                                                       | AHMEDABAD    | (UPTO 350 NB CLASS 150 )                                                                     |                |
|                                                                                  |                                  | BELGUAM AQUA VALVES                                             | BELGAUM      | UPTO 200 NB, CL 150                                                                          |                |
| 3                                                                                | CS PLUG VALVES                   | FLOWSERVE (AUDCO)                                               | CHENNAI      |                                                                                              |                |
|                                                                                  |                                  | MICON VALVES (INDIA) PVT LTD                                    | MUMBAI       | Up to 50NB – Class-150 with MOC as CSS.<br>Size 150 NB to 400 NB- Class 150 with MOC as CCS. |                |
|                                                                                  |                                  | MICROFINISH                                                     | HUBLI        |                                                                                              |                |
|                                                                                  |                                  | WEIR BDK                                                        | HUBLI        | UPTO 150 NB CLASS 300 & UPTO 400 NB CLASS 150                                                |                |
|                                                                                  |                                  | FISHER XOMOX                                                    | CHENNAI      |                                                                                              |                |
|                                                                                  |                                  | LEADER VALVES LTD.                                              | JALANDHAR    | UPTO 150 NB CLASS 300 & UPTO 200 NB CLASS 150                                                |                |
| 4                                                                                | SUMP PUMP (VERTICAL CENTRIFUGAL) | DARLING PUMPS PVT. LTD                                          | INDORE       |                                                                                              |                |
|                                                                                  |                                  | FLOWMORE LTD.                                                   | GURGAON      |                                                                                              |                |
|                                                                                  |                                  | SU MOTORS PVT. LTD.                                             | MUMBAI       |                                                                                              |                |
|                                                                                  |                                  | VARAT PUMP AND MACHINERY PVT. LTD.                              | KOLKATA      |                                                                                              |                |
|                                                                                  |                                  | WPIL LIMITED                                                    | KOLKATA      |                                                                                              |                |
|                                                                                  |                                  | SAM TURBO INDUSTRY LTD                                          | COIMBATORE   |                                                                                              |                |
|                                                                                  |                                  | KISHORE                                                         | PUNE         |                                                                                              |                |
|                                                                                  |                                  | AQUA MACHINERY                                                  | AHMEDABAD    |                                                                                              |                |
|                                                                                  |                                  | FLOWMORE PUMP                                                   | GHAZIABAD    |                                                                                              |                |
|                                                                                  |                                  | M&P                                                             | PUNE         |                                                                                              |                |
|                                                                                  |                                  | B & C ENGG( BECON WEIR)                                         | CHENNAI      |                                                                                              |                |
| 5                                                                                | SCREW PUMPS                      | ROTO PUMPS                                                      | NOIDA        |                                                                                              |                |
|                                                                                  |                                  | TUSHACO                                                         | MUMBAI       |                                                                                              |                |
|                                                                                  |                                  | DELTA PD PUMPS LTD                                              | VAPI, GUJRAT |                                                                                              |                |
|                                                                                  |                                  | UT PUMPS                                                        | FARIDABAD    |                                                                                              |                |
| 6                                                                                | API 5L ERW PIPE                  | TISCO                                                           | JAMSHEDPUR   |                                                                                              |                |
|                                                                                  |                                  | SURYA ROSHNI                                                    | BAHADURGARH  | UP TO 400 NB                                                                                 |                |
|                                                                                  |                                  | JINDAL                                                          | GHAZIABAD    | UP TO 350 NB                                                                                 |                |
|                                                                                  |                                  | MSL                                                             | RAIGAD       | 200 TO 500 NB                                                                                |                |
|                                                                                  |                                  | SAIL                                                            | ROURKELA     |                                                                                              |                |
|                                                                                  |                                  | RATNAMANI                                                       | KUTCH        | UP TO 400 NB                                                                                 |                |
| 7                                                                                | ASTM A 106, CS                   | ISMT                                                            | AHMED NAGAR  | UP TO 150 NB                                                                                 |                |



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|----|--------------------------------------|------------------------------------|-----------------------------|------------------------------------------------------------------|
|    | <b>SEAMLESS PIPE</b>                 | MSL                                | RAIGAD                      | UP TO 350 NB                                                     |
|    |                                      | JINDAL SAW LTD                     | NASHIK                      |                                                                  |
|    |                                      | REMI METAL GUJRAT LTD              | BHARUCH                     | UP TO 150 NB HOT FINISH & UPTO 100NB COLD FINISH                 |
|    |                                      | ISMT                               | BARAMATI                    | UP TO 200 NB                                                     |
| 8  | <b>CS ERW PIPE (IS 1239 / 3589)</b>  | SURYA ROSHNI                       | BAHADURGARH                 | UPTO 400 NB ERW PIPES AS PER IS 1239/3589 AND SAW AS PER IS 3589 |
|    |                                      | JINDAL                             | GHAZIBAD/HISSAR             | UP TO 350 NB                                                     |
|    |                                      | MSL                                | RAIGAD                      | 200-500 NB ERW PIPES AS PER IS 3589                              |
|    |                                      | SAIL                               | ROURKELA                    |                                                                  |
|    |                                      | WELSPUN                            | ANJAR/BHARUCH               | UPTO 400 NB ERW PIPES AS PER IS 1239/3589 AND SAW AS PER IS 3589 |
|    |                                      | INDUS TUBE                         | GAUTAM BUDDH NAGAR          | UP TO 300 NB                                                     |
|    |                                      | RATNAMANI                          | KUTCH /AHMEDABAD / CHHATRAL | UPTO 400 NB ERW PIPES AS PER IS 3589 AND SAW AS PER IS 3589      |
|    |                                      | TATA TUBE                          | JAMSHEDPUR                  | UPTO 150 NB ERW PIPES AS PER IS 1239                             |
|    |                                      | PSL                                | CHENNAI/VIZAG/ KUTCH/DAMAN  | SPIRAL WELD SAW AS PER IS 3589                                   |
|    |                                      | LALIT PROFILE                      | THANE                       | SPIRAL WELD SAW AS PER IS 3589                                   |
|    |                                      | SAMSHI PIPES INDUSTRIES            | VADODARA                    | SPIRAL WELD SAW AS PER IS 3589                                   |
|    |                                      | MUKUT PIPES                        | RAJPURA                     | LONGITUDINAL SAW (SINGLE SIDE WELD) AS PER IS 3589               |
|    |                                      | INDUS TUBES                        | G B NAGAR                   | UPTO 300 NB ERW PIPES AS PER IS 1239/3589                        |
|    |                                      | MANN IND                           | INDORE                      | SPIRAL WELD SAW AS PER IS 3589                                   |
|    |                                      | SURENDRA ENGG                      | RAJPURA                     | SPIRAL WELD SAW AS PER IS 3589                                   |
|    |                                      | PRATIBHA PIPES & STRUCTURE PVT LTD | THANE                       | SPIRAL WELD SAW AS PER IS 3589                                   |
|    |                                      | JCO GAS PIPE                       | CHINDWARA                   | SPIRAL WELD SAW AS PER IS 3589                                   |
|    |                                      | NUKAT TANKS AND VESSELS            | TARAPUR                     | LONGITUDINAL SAW (SINGLE SIDE WELD) AS PER IS 3589               |
|    |                                      | DADU PIPES                         | SIKRANDRABAD                | UPTO 300 NB ERW PIPES AS PER IS 1239/3589                        |
|    |                                      | APL APOLLO TUBES LTD               | SIKRANDRABAD                | IS3589 UPTO 250 NB                                               |
| 9  | <b>SUCTION HEATER</b>                | PARKAIRE                           | DELHI                       |                                                                  |
|    |                                      | MVS                                | DELHI                       |                                                                  |
|    |                                      | MELCON                             | DELHI                       |                                                                  |
|    |                                      | GASO ENERGY                        | PUNE                        |                                                                  |
|    |                                      | INDCON                             | DELHI                       |                                                                  |
|    |                                      | TEMASME                            | NOIDA                       |                                                                  |
| 10 | <b>PRESSURE REDUCING VALVE &amp;</b> | CIRCOR (EARLIER MAZDA)             | AHMEDABAD                   |                                                                  |
|    |                                      | SPIRAX MARSHALL                    | PUNE                        |                                                                  |



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|    |                                                 |                                        |                                                 |                                                                                                 |
|----|-------------------------------------------------|----------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------|
|    | <b>DESUPERHEATER</b>                            | LEADER VALVES LTD.                     | JALANDHAR                                       |                                                                                                 |
|    |                                                 | SPX CORPORATION, USA                   | M/S SPX FLOW TECHNOLOGY INDIA PVT. LTD, GUJARAT |                                                                                                 |
|    |                                                 | CONTROL COMPONENT INDIA PVT. LTD.      | NOIDA                                           |                                                                                                 |
|    |                                                 | DAUME REGELARMATUREN GMBH,             | GERMANY                                         |                                                                                                 |
|    |                                                 | HOLTER REGELARMATUREN GMBH & CO.       | GERMANY                                         |                                                                                                 |
|    |                                                 | INSTRUMENTATION LTD.                   | PALAKKAD                                        |                                                                                                 |
|    |                                                 | SAMSON CONTROLS PVT LTD                | PUNE                                            |                                                                                                 |
| 11 | <b>STRAINERS (DUPLEX / SIMPLEX BASKET TYPE)</b> | GENERAL MECHANICAL WORKS PVT LTD       | VADODARA                                        |                                                                                                 |
|    |                                                 | GRAND PRIX                             | FARIDABAD                                       |                                                                                                 |
|    |                                                 | GUJARAT OTOFILT                        | VATVA , AHMEDABAD                               |                                                                                                 |
|    |                                                 | FILTRATION ENGRS                       | MUMBAI                                          |                                                                                                 |
|    |                                                 | JAYPEE INDUSTRIES PVT. LTD.            | NEW DELHI                                       |                                                                                                 |
|    |                                                 | MULTITEX FILTRATION ENGINEERS LIMITED, | NEW DELHI                                       |                                                                                                 |
|    |                                                 | OTOKLIN GLOBAL BUSINESS LIMITED        | MUMBAI                                          |                                                                                                 |
|    |                                                 | BHATIA ENGINEERING CO.                 | NEW DELHI                                       | SIMPLEX ONLY                                                                                    |
|    |                                                 | FILTRATION ENGINEERS (I) PVT. LTD.     | MUMBAI                                          | SIMPLEX ONLY                                                                                    |
|    |                                                 | SUNGOV ENGINEERING PVT. LTD.           | CHENNAI                                         |                                                                                                 |
|    |                                                 | SAROJINI ENTERPRISE                    | HOWRA                                           | SIMPLEX ONLY                                                                                    |
| 12 | <b>STEAM TRAP</b>                               | SPIRAX MARSHALL                        | PUNE                                            | MAIN CONTRACTOR COC +MANUFACTURER STANDARD TC SHALL BE SUBMITTED FOR ISSUING DESPATCH CLEARANCE |
|    |                                                 | UNIKLINGER                             | PUNE                                            |                                                                                                 |
|    |                                                 | LEADER                                 | JULLANDHAR                                      |                                                                                                 |
|    |                                                 | CRECENT VALVE MFG CO LTD               | MUMBAI                                          |                                                                                                 |
|    |                                                 | PENNANT ENGINEERING                    | PUNE                                            |                                                                                                 |
| 13 | <b>THERMAL INSULATION</b>                       | GOENKA ROCKWOOL (INDIA ) PVT.LTD.      | RAIPUR                                          |                                                                                                 |
|    |                                                 | LLOYD INSULATIONS (INDIA) LTD.         | NEW DELHI                                       |                                                                                                 |
|    |                                                 | MINWOOL ROCK FIBRES LTD.               | RAJNANDGAON                                     |                                                                                                 |
|    |                                                 | POLYBOND INSULATION PRIVATE LIMITED,   | BHILAI                                          |                                                                                                 |
|    |                                                 | ROCKWOOL (INDIA) PVT. LTD.             | HYDERABAD                                       |                                                                                                 |
|    |                                                 | SHREERAM EQUITECH PRIVATE LIMITED      | DURG                                            |                                                                                                 |
|    |                                                 | THERMOCARE ROCKWOOL INDIA PRIVATE LTD. | CHATTISGARH                                     |                                                                                                 |
|    |                                                 | LOPINUS ROCKWOOL                       | GWALIOR                                         |                                                                                                 |
| 14 | <b>STRUCTURAL STEEL / MS-PLATE</b>              | SAIL                                   |                                                 |                                                                                                 |
|    |                                                 | ESSAR STEEL                            |                                                 |                                                                                                 |



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|    |                           |                                |            |  |
|----|---------------------------|--------------------------------|------------|--|
|    |                           | TISCO                          |            |  |
|    |                           | RINL                           |            |  |
|    |                           | JINDAL                         |            |  |
|    |                           | M/S UTTAM VALUE STEEL (LLOYDS) |            |  |
|    |                           | ISPAT                          |            |  |
|    |                           | JSW                            |            |  |
|    |                           | INDIAN IRON & STEEL CO. LTD    |            |  |
| 15 | SAFETY RELIEF VALVE       | SPIRAX MARSHALL                | PUNE       |  |
|    |                           | FISCHER SANMAR                 | CHENNAI    |  |
|    |                           | BHEL                           | TRICHY     |  |
|    |                           | KEYSTONE                       | BARODA     |  |
|    |                           | LEADER                         | JULLANDHAR |  |
| 16 | PAINT                     | ASIAN PAINT                    |            |  |
|    |                           | BERGER                         |            |  |
|    |                           | KANSAI NEROLAC                 |            |  |
|    |                           | JOTUN                          |            |  |
|    |                           | SHALIMAR                       |            |  |
|    |                           | JENSON & NICHOLSON (I) LTD     |            |  |
|    |                           | CDC CARBOLINE (I) LTD.         |            |  |
|    |                           | ADDISON PAINTS LTD             |            |  |
|    |                           | GRAND POLYCOAT                 |            |  |
|    |                           | BOMBAY PAINTS                  |            |  |
|    |                           | HEMPLE PAINTS (SINGAPORE)      |            |  |
|    |                           | AKZONOBEL COATINGS             |            |  |
| 17 | FITTINGS (MS/SS)          | PIPE FIT ENGINEERS             | VADODARA   |  |
|    |                           | GUJRAT INFRA PIPES             | VADODARA   |  |
|    |                           | MS FITTINGS                    | KOLKATA    |  |
|    |                           | TUBE PRODUCT                   | VADODARA   |  |
|    |                           | SIDDARTH & GAUTAM              | FARIDABAD  |  |
|    |                           | EBY                            | MUMBAI     |  |
|    |                           | NL HAZRA                       | KOLKATA    |  |
|    |                           | EXCEL METAL                    |            |  |
|    |                           | INTERTECH                      |            |  |
|    |                           | FITTECH                        |            |  |
|    |                           | METAL LLOYDS                   | MUMBAI     |  |
|    |                           | TRUE FORGE                     | FARIDABAD  |  |
| 18 | OIL HOSE                  | D WREN & CO                    | KOLKATA    |  |
|    |                           | SUDEEP INDUSTRIES              | KOLKATA    |  |
|    |                           | HYDROKRIMP                     | MUMBAI     |  |
|    |                           | PRESIDENCY RUBBER              | KOLKATA    |  |
| 19 | STEAM AND CONDENSATE HOSE | ALLZFLEX ENGINEERS             | VADODARA   |  |
|    |                           | SUDEEP INDUSTRIES              | KOLKATA    |  |
| 20 | ALUMINUM CLADDING         | BHARAT ALUMINIUM COMPANY LTD   | DELHI      |  |



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|                    |                                               |                                            |                       |                                                              |
|--------------------|-----------------------------------------------|--------------------------------------------|-----------------------|--------------------------------------------------------------|
|                    |                                               | CHONGQING LANREN ALUMINIUM CO. LTD., CHINA | CHINA                 |                                                              |
|                    |                                               | HINDALCO INDUSTRIES LTD                    | MUMBAI                |                                                              |
|                    |                                               | NATIONAL ALUMINIUM COMPANY LTD.            | ODISHA                |                                                              |
| 21                 | METALLIC EXPANSION BELLOWS                    | AEROSUN TOLA EXPANSION JOINT CO. LTD.,     | CHINA                 |                                                              |
|                    |                                               | B. D. ENGINEERS                            | AHMEDABAD             |                                                              |
|                    |                                               | FLEXICAN BELLOWS AND HOSES PVT. LTD.       | BARODA                |                                                              |
|                    |                                               | FLEXATHERM EXPANLLOW PVT. LTD.             | VADODARA              |                                                              |
|                    |                                               | LONESTAR INDUSTRIES                        | CHENNAI               |                                                              |
|                    |                                               | MB METALLIC BELLOWS PVT. LTD.              | CHENNAI               |                                                              |
|                    |                                               | METALLIC BELOWS INDIA PVT. LTD.            | CHENNAI               |                                                              |
|                    |                                               | QINHUANGDAO NORTH METAL HOSE CO. LTD.,     | CHINA                 |                                                              |
|                    |                                               | TEDDINGTON ENGINEERED SOLUTIONS LTD.       | UK                    |                                                              |
| ELECTRICAL AND C&I |                                               |                                            |                       |                                                              |
| 1                  | LT MOTORS                                     | CROMPTON GREAVES LIMITED                   | AHMEDNAGAR            |                                                              |
|                    |                                               | KIRLOSKAR ELECTRIC COMPANY                 | BANGALORE / HUBLI     |                                                              |
|                    |                                               | SIEMENS                                    | MUMBAI                |                                                              |
|                    |                                               | ABB                                        | BANGALORE / FARADABAD |                                                              |
|                    |                                               | BHARAT BIJLEE                              | MUMBAI                |                                                              |
|                    |                                               | JYOTI                                      | VADODARA              |                                                              |
|                    |                                               | MARATHON                                   | KOLKATA               |                                                              |
|                    |                                               | NGEF                                       | BANDALORE / HUBLI     |                                                              |
|                    |                                               | BHARAT ELECTRIC (BHEL)                     |                       |                                                              |
|                    |                                               | LHP                                        | SOLAPUR               |                                                              |
| 2                  | LEVEL TRANSMITTER (RADAR AND ULTRASONIC TYPE) | K TEK (ABB)                                | FARIDABAD             |                                                              |
|                    |                                               | E & H                                      | AURANGABAD            |                                                              |
|                    |                                               | MEGNETROL                                  | BELGIUM               | ONLY RADAR TYPE                                              |
|                    |                                               | EMERSON PROCESS MGT                        | PAWANE                |                                                              |
|                    |                                               | MOORE INDUSTRIES INTERNATIONAL INC.        | USA                   |                                                              |
|                    |                                               | SIEMENS LIMITED                            | MUMBAI                |                                                              |
|                    |                                               | SMART INSTRUMENTS LTD, BRAZIL              | MUMBAI                | LD-301 & T-301 TRANSMITTER FROM M/S SMART EQUIPMENTS BRAZIL. |
|                    |                                               | HONEYWELL AUTOMATION INDIA LIMITED         | DELHI                 |                                                              |
|                    |                                               | TOSHNIWAL INDUSTRIES PVT. LTD.,            | AJMER                 |                                                              |
|                    |                                               | V. AUTOMAT & INTRUMENTS (P) LTD.           | DELHI                 |                                                              |
|                    |                                               | YOKOGAWA INDIA LIMITED,                    | BANGALORE             |                                                              |



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|   |                                                               |                                         |                                                              |                            |
|---|---------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------|----------------------------|
|   |                                                               | SIEMENS MILTRONICS                      | CANADA                                                       | ONLY RADAR TYPE            |
|   |                                                               | NIVELCO                                 | HUNGARY                                                      | ONLY RADAR TYPE            |
|   |                                                               | HAWK                                    | AUSTRALIA                                                    | ONLY RADAR TYPE            |
| 3 | PRESSURE / DP /<br>TEMP.SWITCH                                | SOR                                     | USA                                                          |                            |
|   |                                                               | GIC(GAUGES BOURDON)                     | PANVEL                                                       |                            |
|   |                                                               | HERION                                  | GERMANY                                                      |                            |
|   |                                                               | ITT BARTON                              | USA                                                          |                            |
|   |                                                               | DELTA CONTROL                           | UK                                                           |                            |
|   |                                                               | ASHCROFT                                | USA / GERMANY                                                |                            |
|   |                                                               | TRAFAG                                  | RANIPET                                                      |                            |
|   |                                                               | INDFOSS                                 | GHAZIABAD                                                    |                            |
|   |                                                               | ASHCROFT                                | GANDHINAGAR                                                  |                            |
|   |                                                               | SWITZER                                 | CHENNAI                                                      | EXCEPT 9000 SERIES         |
| 4 | LEVEL INDICATOR<br>FLOAT AND BOARD<br>TYPE                    | FLOW STAR                               | FARIDABAD                                                    |                            |
|   |                                                               | SCIENTIFIC DEVICES                      | MUMBAI                                                       |                            |
|   |                                                               | GAUGES BOURDEN                          | PANVEL                                                       |                            |
|   |                                                               | PUNE TECHTROL                           | PUNE                                                         |                            |
|   |                                                               | SBEM                                    | PUNE                                                         |                            |
|   |                                                               | LEVCON                                  | KOLKATA                                                      |                            |
|   |                                                               | SIGMA                                   | MUMBAI                                                       |                            |
|   |                                                               | CHEMTROL                                |                                                              |                            |
|   |                                                               | DK INSTRUMENT                           | KOLKATA                                                      |                            |
|   |                                                               | V AUTOMAT                               | DELHI                                                        |                            |
| 5 | PRESSURER / DP<br>GAUGE /<br>TEMPERATURE<br>GAUGE (DIAL TYPE) | H GURU (SI)                             | BANGALORE                                                    |                            |
|   |                                                               | H GURU INDUSTRIES                       | MUZAFFARPUR /<br>RISHRA                                      |                            |
|   |                                                               | AN INSTRUMENT                           | KOLKATA                                                      |                            |
|   |                                                               | GOA THERMOSTATIC                        | GOA                                                          |                            |
|   |                                                               | WAAREE                                  | VAPI                                                         |                            |
|   |                                                               | MANOMETER                               | MUMBAI                                                       |                            |
|   |                                                               | GLUCK                                   | MUMBAI                                                       |                            |
|   |                                                               | FORBES MARSHALL                         | HYDERABAD                                                    |                            |
|   |                                                               | ASHCROFT                                | GANDHINAGAR                                                  |                            |
|   |                                                               | WIKA                                    | PUNE                                                         |                            |
|   |                                                               | GAGES BOURDON                           | MUMBAI / GOA                                                 |                            |
|   |                                                               | BAUMER TECHNOLOGIES INDIA<br>PVT. LTD.  | MUMBAI                                                       |                            |
|   |                                                               | BOSE PANDA INSTRUMENTS<br>PVT.LTD.      | KOLKARA                                                      | ONLY PRESSURE AND DP GAUGE |
|   |                                                               | BUDENBERG GUAGE CO.LTD.                 | UK                                                           | ONLY TEMPERATURE GAUGE     |
|   |                                                               | GOA INSTRUMENTS INDUSTRIES<br>PVT.LTD., | GOA                                                          |                            |
| 6 | CONTROL VALVE                                                 | SPX CORPORATION, USA                    | M/S SPX FLOW<br>TECHNOLOGY<br>INDIA PVT. LTD.<br>(AHMEDABAD) |                            |
|   |                                                               | CONTROL COMPONENT INC.                  | USA                                                          |                            |



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|---|-----------------------------------------------|-----------------------------------------------|-------------|--|
|   |                                               | DRESSER VALVE INDIA PVT. LTD                  | COIMBATORE  |  |
|   |                                               | DAUME REGELARMATUREN GMBH,                    | GERMANY     |  |
|   |                                               | EMERSON PROCESS MANAGEMENT<br>CHENNAI LIMITED | CHENNAI     |  |
|   |                                               | FORBES MARSHALL ARCA PVT.LTD.                 | PUNE        |  |
|   |                                               | WEIR VALVES & CONTROLS UK LTD.                | UK          |  |
|   |                                               | HOLTER REGELARMATUREN GMBH<br>& CO.KG         | GERMANY     |  |
|   |                                               | INSTRUMENTATION LTD.                          | PALAKKAD    |  |
|   |                                               | KOSO INDIA PRIVATE LIMITED,                   | NASHIK      |  |
|   |                                               | LESLIE CONTROLS, INC                          | USA         |  |
|   |                                               | MIL CONTROLS LTD.                             | THRISSUR    |  |
|   |                                               | METSO SINGAPORE PTE. LTD.,                    | SINGAPORE   |  |
|   |                                               | PARCOL S.P.A                                  | ITALY       |  |
|   |                                               | R.K.CONTROL INSTRUMENTS PVT.<br>LTD.          | THANE       |  |
|   |                                               | RINGO VALVULAS S.L,                           | SPAIN       |  |
|   |                                               | SEVERN GLOCON INDIA PVT. LTD.                 | CHENNAI     |  |
|   |                                               | SHENJIANG VALVE CO. LTD.                      | CHINA       |  |
|   |                                               | SAMSON CONTROLS PVT LTD                       | PUNE        |  |
|   |                                               | VALVITALIA S.P.A. ,                           | ITALY       |  |
|   |                                               | WALDEMAR PRUSS<br>ARMATURENFABRIK GMBH        | GERMANY     |  |
| 7 | RTD<br>/THERMOCOUPLE<br>ASSEMBLY              | PYROELECTRIC                                  | GOA         |  |
|   |                                               | GIC(THERMAL INSTRUMENTS)                      | MAHARASHTRA |  |
|   |                                               | TEMPSENS                                      | UDAIPUR     |  |
|   |                                               | DETRIVE                                       | MUMBAI      |  |
|   |                                               | TECHNO INSTRUMENTS                            | GUJRAT      |  |
|   |                                               | TEMPSENS INSTRUMENT (I) PVT<br>LTD            | UDAIPUR     |  |
|   |                                               | TM TECNOMATIC SPA                             | ITALY       |  |
|   |                                               | TOSHNIWAL INDUSTRIES PVT. LTD.,               | AJMER       |  |
|   |                                               | THERMAL INSTRUMENT INDIA PVT.<br>LTD.         | MUMBAI      |  |
|   |                                               | BAUMER TECHNOLOGIES INDIA<br>PVT. LTD.        | MUMBAI      |  |
|   |                                               | GOA INSTRUMENTS INDUSTRIES<br>PVT.LTD.,       | GOA         |  |
| 8 | ELECTRICAL<br>ACTUATORS                       | ROTORK                                        | BANGALORE   |  |
|   |                                               | ROTORK                                        | CHENNAI     |  |
|   |                                               | AUMA                                          | BANGALORE   |  |
|   |                                               | LIMITORK                                      | FARIDABAD   |  |
| 9 | LEVEL SWITCH<br>(FLOAT AND<br>DISPLACER TYPE) | TRAC                                          | HYDERABAD   |  |
|   |                                               | LEVCON                                        | KOLKATA     |  |
|   |                                               | DK INSTRUMENTS                                | KOLKATA     |  |
|   |                                               | SBEM                                          | PUNE        |  |
|   |                                               | SBEM                                          | PUNE        |  |



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|    |                                                 |                                             |                       |                                                                  |
|----|-------------------------------------------------|---------------------------------------------|-----------------------|------------------------------------------------------------------|
|    |                                                 | FLOW STAR                                   | FARIDABAD             |                                                                  |
|    |                                                 | SIGMA                                       | MUMBAI                |                                                                  |
|    |                                                 | V AUTOMAT                                   | DELHI                 |                                                                  |
| 10 | TEMPERATURE TRANSMITTER                         | EMERSON PROCESS MGT                         | PAWANE                |                                                                  |
|    |                                                 | MOORE                                       | USA                   |                                                                  |
|    |                                                 | ABB                                         | FARIDABAD             |                                                                  |
|    |                                                 | YOKOGAWA                                    | BANGLORE              | MAKE YOKOGAWA, JAPAN                                             |
|    |                                                 | ABB LIMITED                                 | FARIDABAD             |                                                                  |
|    |                                                 | ENDRESS + HAUSER (INDIA) PVT. LTD.,         | DELHI                 |                                                                  |
|    |                                                 | MOORE INDUSTRIES INTERNATIONAL INC.         | USA                   |                                                                  |
|    |                                                 | SIEMENS LIMITED                             | MUMBAI                |                                                                  |
|    |                                                 | SMART INSTRUMENTS LTD, BRAZIL               | MUMBAI                |                                                                  |
|    |                                                 | HONEYWELL AUTOMATION INDIA LIMITED          | DELHI                 |                                                                  |
|    |                                                 | TOSHNIWAL INDUSTRIES PVT. LTD.,             | AJMER                 |                                                                  |
|    |                                                 | YOKOGAWA INDIA LIMITED,                     | BANGALORE             |                                                                  |
| 11 | PRESSURE TRANSMITTER/DIFF. PRESSURE TRANSMITTER | ABB INDIA LIMITED                           |                       |                                                                  |
|    |                                                 | V. AUTOMAT & INSTRUMENTS (P) LTD.           | NEW DELHI             |                                                                  |
|    |                                                 | TOSHNIWAL INDUSTRIES PVT. LTD.,             | AJMER, RAJASTHAN      |                                                                  |
|    |                                                 | PANAM ENGINEERS                             | NAVI MUMBAI           |                                                                  |
|    |                                                 | ENDRESS + HAUSER (INDIA) PVT. LTD.,         | AURANGABAD MAHARASTRA |                                                                  |
|    |                                                 | YOKOGAWA INDIA LIMITED,                     | BANGLORE              |                                                                  |
|    |                                                 | SBEM PVT. LTD.                              | PUNE                  | FOR CAPACITANCE TYPE ONLY                                        |
|    |                                                 | NIVO CONTROLS PVT. LTD.                     | INDORE, M.P           | FOR CAPACITANCE TYPE ONLY                                        |
|    |                                                 | EMERSON PROCESS MANAGEMENT (INDIA) PVT.LTD. | NAVI MUMBAI           |                                                                  |
|    |                                                 | MOORE INDUSTRIES INTERNATIONAL INC.         | CALIFORNIA, USA       |                                                                  |
|    |                                                 | SIEMENS LIMITED                             | MUMBAI                |                                                                  |
|    |                                                 | SMART INSTRUMENTS LTD                       | BRAZIL                | LD-301 & T-301 TRANSMITTER FROM M/S SMART EQUIPMENTS BRAZIL.     |
|    |                                                 | HONEYWELL AUTOMATION INDIA LIMITED          | PUNE                  |                                                                  |
| 12 | FLOWMETER (CORIOLIS TYPE)                       | EMERSON PROCESS MANAGEMENT                  | CHENNAI               |                                                                  |
|    |                                                 | E&H                                         | CHENNAI               |                                                                  |
|    |                                                 | RHEONIK MASSTECHNIK Gmbh                    | GERMANY               | With Indian Agent as ROCKWIN FLOWMETER INDIA PVT. LTD, Ghaziabad |
|    |                                                 | KROHNE MARSHALL                             | PUNE                  |                                                                  |
| 13 | FLOWMETER (TURBINE TYPE)                        | ROCKWIN FLOWMETER INDIA PVT. LTD.           | GHAZIABAD             |                                                                  |
| 14 | AIR FILTER REGULATOR                            | PLACKA INSTRUMENT                           | CHENNAI               |                                                                  |
|    |                                                 | SHAVO NORGEN                                | MUMBAI                |                                                                  |



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|----|-------------------------------------|----------------------------------------|-----------------|--|
|    |                                     | FISHER SANMAR                          | CHENNAI         |  |
| 15 | SOLENOID VALVE                      | AVCON                                  | MUMBAI          |  |
|    |                                     | ROTEX                                  | BARODA/VV NAGAR |  |
|    |                                     | SMC                                    | NOIDA           |  |
|    |                                     | NUCON                                  | HYDERABAD       |  |
|    |                                     | ASCO                                   | CHENNAI         |  |
| 16 | LOCAL CONTROL PANEL                 | PYROTECH                               | UDAIPUR         |  |
|    |                                     | POSITRONICS                            | VADODARA        |  |
|    |                                     | JACKSON                                | NOIDA           |  |
|    |                                     | CONTROL DEVICE                         | KOLKATA         |  |
|    |                                     | ROCKWELL AUTOMATION INDIA LTD          | GHAZIABAD       |  |
|    |                                     | SIEMENS LIMITED                        | DELHI           |  |
|    |                                     | SCHNEIDER ELECTRIC INDIA PVT.LTD.      | DELHI           |  |
|    |                                     | JOSPER                                 | NOIDA           |  |
|    |                                     | I C A                                  | MUMBAI          |  |
|    |                                     | INDIAN SWITCH GEAR                     | VADODARA        |  |
|    |                                     | SWITCHING CKT                          | KOLKATA         |  |
| 17 | JUNCTION BOX                        | PYROTECH                               | UDAIPUR         |  |
|    |                                     | POSITRONICS                            | VADODARA        |  |
|    |                                     | JACKSON                                | NOIDA           |  |
|    |                                     | CONTROL DEVICE                         | KOLKATA         |  |
|    |                                     | JOSPER                                 | NOIDA           |  |
|    |                                     | I C A                                  | MUMBAI          |  |
|    |                                     | AJMERIA INDUSTRIAL & ENGINEERING WORKS | MUMBAI          |  |
|    |                                     | FLEXPRO ELECTRICALS PVT. LTD.          | GUJARAT         |  |
|    |                                     | K.S.INSTRUMENTS PVT.LTD.               | BANGALORE       |  |
|    |                                     | SUCHITRA INDUSTRIES                    | BANGALORE       |  |
|    |                                     | SHRENIK & COMPANY,                     | AHMEDABAD       |  |
|    |                                     | HOFFMAN                                | BANGALORE       |  |
|    |                                     | RITTAL                                 | BANGALORE       |  |
|    |                                     | SWITCHING CKT                          | KOLKATA         |  |
| 18 | CABLE LUGS (NON FLAME PROOF)        | 3D                                     | UMERGAON        |  |
|    |                                     | DOWELL                                 | MUMBAI          |  |
|    |                                     | CHITRA                                 | NASIK           |  |
| 19 | CABLE GLANDS (NON FLAME PROOF)      | ARUP                                   | KOLKATA         |  |
|    |                                     | SUNIL                                  | KOLKATA         |  |
|    |                                     | QPIE                                   | KOLKATA         |  |
|    |                                     | COMMET                                 | MUMBAI          |  |
| 20 | CABLE GLAND, LUGS, JB (FLAME PROOF) | AJMERIA                                | MUMBAI          |  |
|    |                                     | BALIGA                                 | CHENNAI         |  |
|    |                                     | FLEXPRO                                | NAVSARI         |  |
| 21 | BATTERY CHARGER                     | CHLORIDE POWER                         | KOLKATA         |  |



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|        |                                |                                      |               |                                      |
|--------|--------------------------------|--------------------------------------|---------------|--------------------------------------|
|        | FOR PLC                        | CHABBI                               | JALGAON       |                                      |
|        |                                | AMAR RAJA                            | TIRUPATI      |                                      |
|        |                                | STATCON                              | NOIDA         |                                      |
|        |                                | HBL POWER SYSTEM                     | HYDERABAD     |                                      |
|        |                                | JEMA ENERGY                          | SPAIN         |                                      |
|        |                                | MASS-TECH CONTROLS PVT.LTD.          | MUMBAI        |                                      |
|        |                                | DUBAS                                | BANGALORE     |                                      |
|        |                                | CALDYNE                              | KOLKATA       |                                      |
| 22     | DC LEAD ACID / NI-CD BATTERIES | AMCO SAFT INDIA LTD                  | BANGALORE     | NI-CD BATTERIES ONLY                 |
|        |                                | EXIDE INDUSTRIES LTD                 | DELHI         | LEAD ACID BATTERIES ONLY.            |
|        |                                | HBL POWER SYSTEMS LTD                | HYDERABAD     | NI/CD AND TUBULAR TYPE FOR LEAD ACID |
|        |                                | HOPPECKE BATTERIEN GMBH & CO.KG,     | GERMANY       |                                      |
|        |                                | AMAR RAJA                            | TIRUPATI      |                                      |
|        |                                | SAFT                                 | FRANCE/SWEDEN |                                      |
| 23     | CONTROL / POWER CABLE          | CORDS CABLE                          | BHIWADI       |                                      |
|        |                                | RADIANT CABLES                       | HYDERABAD     |                                      |
|        |                                | POLYCAB                              | DAMAN         |                                      |
|        |                                | KEI                                  | BHIWADI       |                                      |
|        |                                | NICCO                                | KOLKATA       |                                      |
|        |                                | RAVIN CABLES                         | PUNE          |                                      |
|        |                                | INCAB                                | PUNE          |                                      |
|        |                                | HVPL                                 | FARIDABAD     |                                      |
|        |                                | TORRENT CABLE                        | NADIAD        |                                      |
|        |                                | HAVELLS                              | ALWAR         |                                      |
|        |                                | PARAMOUNT                            | KHUSHKHERA    |                                      |
|        |                                | SRI RAM CABLES                       | BHIWADI       |                                      |
|        |                                | THERMOCABLES                         | HYDERABAD     |                                      |
|        |                                | TORRENT CABLE                        | NADIAD        |                                      |
|        |                                | UNIVERSAL CABLES                     | SATNA         |                                      |
|        |                                | GEMSCAB                              | BHIWADI       |                                      |
| DELTON | FARIDABAD                      |                                      |               |                                      |
| 24     | PLC BASED PANELS               | SIEMENS                              | NASIK         |                                      |
|        |                                | SCHNEIDER                            | NASIK         |                                      |
|        |                                | ROCKWELL                             | SAHIBABAD     |                                      |
|        |                                | GE INTELLIGENT PLATFORM              | BANGALORE     |                                      |
|        |                                | HONEYWELL AUTOMATION INDIA LIMITED , | PUNE          |                                      |
|        |                                | ABB                                  | BANGALORE     |                                      |
| 25     | OWS/PC                         | HP/COMPAQ /DELL/HCL/IBM/LENOVO       |               |                                      |
| 26     | PRINTER                        | HP/CANNON/EPSON/XEROX/IBM/L EXMARK   |               |                                      |
| 27     | INSTRUMENT FITTINGS            | AURA INCORPORATED                    | DELHI         |                                      |
|        |                                | ASTEC VALVES & FITTINGS PVT. LTD.,   | MUMBAI        |                                      |



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|    |                                                        |                                                   |                                          |                                                                                                                                     |
|----|--------------------------------------------------------|---------------------------------------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
|    |                                                        | ARYA CRAFTS & ENGINEERING PVT. LTD.               | MUMBAI                                   |                                                                                                                                     |
|    |                                                        | COMFIT & VALVE PVT. LTD.                          | NANDASAN                                 |                                                                                                                                     |
|    |                                                        | FLUIDFIT ENGINEERS PVT. LTD.                      | MUMBAI                                   | REGISTERED AS PER 22ND ELECTRICAL AND C&I MISCC MEETING DTD. 15.01.2014                                                             |
|    |                                                        | FLUID CONTROLS PVT. LTD.                          | MUMBAI                                   | NAME CHANGED FROM M/S HYD-AIR VALVES PVT. LTD. TO M/S FLUID CONTROLS PVT. LTD. AS PER 25TH MISCC-ELECTRICAL AND C&I DTD. 20.02.2014 |
|    |                                                        | HP VALVES & FITTINGS INDIA PVT. LTD.              | CHENNAI                                  |                                                                                                                                     |
|    |                                                        | PRECISION ENGINEERING INDUSTRIES                  | MUMBAI                                   |                                                                                                                                     |
|    |                                                        | PANAM ENGINEERS,                                  | MUMBAI                                   |                                                                                                                                     |
|    |                                                        | PERFECT INSTRUMENTATION CONTROL (INDIA) PVT. LTD. | MUMBAI                                   |                                                                                                                                     |
|    |                                                        | VIKAS INDUSTRIAL PRODUCTS                         | NOIDA                                    | FINANCIAL LIMIT REVIEWED ON 05.06.2014                                                                                              |
|    |                                                        |                                                   |                                          |                                                                                                                                     |
| 28 | <b>CABLE TRAY<br/>SUPPORT SYSTEM -<br/>BOLTABLE</b>    | AM-TECH ENGG.SERVICES                             | PUNE                                     |                                                                                                                                     |
|    |                                                        | INDUSTRIAL PERFORATION (I) PVT.LTD.               | KOLKATA                                  |                                                                                                                                     |
|    |                                                        | INDMARK FORMTECH PVT. LTD.                        | PUNE                                     |                                                                                                                                     |
|    |                                                        | PREMIER POWER PRODUCTS (CAL) PVT. LTD.            | KOLKATA                                  | GALVANISATION TO BE DONE AT ITS OWN PLANT OR FROM BHEL-PEM APPROVED GALVANIZERS.                                                    |
|    |                                                        | RATAN PROJECTS & ENGINEERING CO. PVT.LTD.         | KOLKATA                                  |                                                                                                                                     |
|    |                                                        | STEELITE ENGINEERING LTD.                         | MUMBAI                                   |                                                                                                                                     |
| 29 | <b>CABLE TRAY<br/>SUPPORT SYSTEM-<br/>WELDED(GALV)</b> | ASSOCIATED POWER STRUCTURES PVT. LTD.             | G. I. D. C., MAKARPURA, VADODARA-GUJARAT | WORKS ADDRESSES ARE APPLICABLE FOR MANUFACTURING AND GALVANISING.                                                                   |
|    |                                                        | INDUSTRIAL PERFORATION (I) PVT.LTD.               | DUM DUM KOLKATA-WEST BENGAL              |                                                                                                                                     |
|    |                                                        | INDMARK FORMTECH PVT. LTD.                        | MIDC BHOSARI PUNE-MAHARASHTRA            | GALVANIZING UNIT LOCATED AT PHAS-3, E-11/1, MIDC, PUNE ,                                                                            |
|    |                                                        | JAMNA METAL COMPANY                               | DSIDC, NARLA INDL. AREA DELHI            |                                                                                                                                     |
|    |                                                        | PREMIER POWER PRODUCTS (CAL) PVT. LTD.            | KOLKATA,-WEST BENGAL                     | GALVANISATION TO BE DONE AT ITS OWN PLANT OR FROM BHEL-PEM APPROVED GALVANIZERS.                                                    |
|    |                                                        | PATNY SYSTEMS (P) LTD                             | SARDAR PATEL ROAD SEUNDRABAD             |                                                                                                                                     |
|    |                                                        | PASSIVE INFRA PROJECTS PVT. LTD.                  | VAISHALI, PITAMPURA DELHI-               |                                                                                                                                     |



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|----|----------------------------------------------------------|----------------------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <b>CABLE TRAY<br/>SUPPORT SYSTEM-<br/>WELDED(GALV)</b>   | RUKMANI ELECTRICAL &<br>COMPONENTS PVT LTD   | KOLKATA-WEST<br>BENGAL-INDIA                                             | GALVANISATION TO BE DONE AT<br>ITS OWN PLANT OR FROM BHEL-<br>PEM APPROVED GALVANIZERS.                                                                                                                    |
|    |                                                          | RATAN PROJECTS & ENGINEERING<br>CO. PVT.LTD. | P.K. TAGORE<br>STREET, MAIN<br>BUILDING<br>KOLKATA-WEST<br>BENGAL        | GALVANISATION TO BE DONE AT<br>ITS OWN PLANT OR FROM BHEL-<br>PEM APPROVED GALVANIZERS.<br>ADDITIONAL WORKS AT "SANKRAIL<br>INDUSTRIAL PARK, BHAGABATIPUR<br>MAUJA, DHULAGARH, HOWRAH-<br>711302" APPROVED |
|    |                                                          | RABI ENGINEERING WORKS PVT.<br>LTD.          | R.N. GUHA<br>ROAD, DUM<br>DUM, KOLKATA-<br>WEST BENGAL                   | GALVANISATION TO BE DONE AT<br>ITS OWN PLANT OR FROM BHEL-<br>PEM APPROVED GALVANIZERS.                                                                                                                    |
|    |                                                          | SARAL INDUSTRIES                             | INDUSTRIAL<br>AREA-1<br>SULTANPUR<br>ROAD RAE<br>BARELI-UTTAR<br>PRADESH | REGISTERED IN PERMANENT<br>CATEGORY ALONG WITH<br>GALVANIZER M/S SARAL PROJECTS<br>AND PROCESSORS , ,                                                                                                      |
|    |                                                          | UNITECH FABRICATORS AND<br>ENGINEERS PVT LTD | M.B.RAOD ,<br>BIRATI<br>KALABAGAN<br>KOLKATA<br>KOLKATA-WEST<br>BENGAL   | GALVANISATION TO BE DONE AT<br>ITS OWN PLANT OR FROM BHEL-<br>PEM APPROVED GALVANIZERS.                                                                                                                    |
| 30 | <b>CABLE TRAY<br/>SUPPORT SYSTEM-<br/>WELDED(UNGALV)</b> | RASHTRIYA ISPAT NIGAM LIMITED                | AMBAWADI<br>AHMEDABAD-                                                   |                                                                                                                                                                                                            |
|    |                                                          | STEEL AUTHORITY OF INDIA LTD.                | ISPAT BHAWAN<br>LODI ROAD<br>NEW DELHI-                                  |                                                                                                                                                                                                            |
| 31 | <b>CABLE TERM.&amp;<br/>JOINT KITS</b>                   | 3M ELECTRO AND<br>COMMUNICATION INDIA P.LTD  | RAJENDRA PLACE,<br>DELHI                                                 |                                                                                                                                                                                                            |
|    |                                                          | HARI CONSOLIDATED<br>PVT.LTD.,NEW DELHI      | JHANDEWALAN,<br>NEW DELHI-DELHI                                          | HEAT SHRINKABLE TYPE ONLY.                                                                                                                                                                                 |
|    |                                                          | RAYCHEM RPG PRIVATE LIMITED                  | JANAKPURI NEW<br>DELHI                                                   |                                                                                                                                                                                                            |
|    |                                                          | YAMUNA CABLE ACCESSORIES PVT.<br>LTD.        | AMBALA ROAD,<br>JAGADHRI<br>YAMUNANAGAR-<br>HARYANA                      |                                                                                                                                                                                                            |
| 32 | <b>LIMIT SWITCH</b>                                      | BCH                                          | NEW DELHI                                                                |                                                                                                                                                                                                            |
|    |                                                          | SIEMENS                                      | NEW DELHI                                                                |                                                                                                                                                                                                            |
|    |                                                          | JAIBALAJI                                    | NEWDELHI                                                                 |                                                                                                                                                                                                            |
| 33 | <b>ANNUNCIATOR</b>                                       | IIC                                          | MUMBAI                                                                   |                                                                                                                                                                                                            |
|    |                                                          | MINILEC                                      | AHEMDABAD                                                                |                                                                                                                                                                                                            |
|    |                                                          | PROCON                                       | CHENNAI                                                                  |                                                                                                                                                                                                            |
| 34 | <b>INTERPOSING<br/>RELAY</b>                             | ECONIX                                       | MUMBAI                                                                   |                                                                                                                                                                                                            |
|    |                                                          | PHEONIX                                      | DELHI                                                                    |                                                                                                                                                                                                            |
| 35 | <b>SELECTOR SWITCH</b>                                   | SCHENIDER                                    | INDIA                                                                    |                                                                                                                                                                                                            |
|    |                                                          | SIEMENS                                      | INDIA                                                                    |                                                                                                                                                                                                            |
|    |                                                          | L&T                                          | INDIA                                                                    |                                                                                                                                                                                                            |
|    |                                                          | KAYCEE                                       | INDIA                                                                    |                                                                                                                                                                                                            |



## TECHNICAL SPECIFICATION FOR FUEL OIL HANDLING SYSTEM

SPECIFICATION NO. PE-TS-417-166-A002

DATE: JAN 2021

|    |                                                                              |           |           |  |
|----|------------------------------------------------------------------------------|-----------|-----------|--|
| 36 | <b>INDICATION LAMPS,<br/>PUSHBUTTON, AUX.<br/>CONTACTOR, AUX.<br/>RELAYS</b> | SCHENIDER | INDIA     |  |
|    |                                                                              | SIEMENS   | INDIA     |  |
|    |                                                                              | ABB       | INDIA     |  |
|    |                                                                              | L&T       | INDIA     |  |
| 37 | <b>TIMER</b>                                                                 | BCH       | INDIA     |  |
|    |                                                                              | EAPL      | INDIA     |  |
| 38 | <b>PNEUMATIC<br/>ACTUATOR/CYLINDER(METALLIC)</b>                             | SCHRADDER | MUMBAI    |  |
|    |                                                                              | NUCON     | HYDERABAD |  |
|    |                                                                              | ROTEX     | MUMBAI    |  |
|    |                                                                              | VAAS      | CHENNAI   |  |

The make of Sub-vendor items shall be generally as indicated above which is subject to customer / BHEL approval during detail engineering.

Make of any unlisted items shall be subject to customer / BHEL approval during detail engineering. For such items, bidder to furnish list of sub-vendors during detail engineering stage for Customer / BHEL's review and approval. Bidder shall furnish following supporting documentation within 1 month of placement of LOI. Thereafter no request for additional sub-vendor shall be entertained.

- a) Documentation to show that the equipment /system has been supplied for a plant of similar or higher capacity.
- b) Documentation in the form of certificate that the equipment/system has been operating satisfactorily for two years as on the scheduled date of bid opening.

The successful bidder will get the makes of all items approved from Customer/ Consultant during detail engineering within two months of placement of LOI. The complete list will be necessarily be submitted within one month of placement of LOI to ensure timely placement of order for BOIs

Bidder to assess the capability of their proposed sub-vendors in terms of preparation of drawings, calculations, documents, quality assurance, supply of material etc. as per project schedule before placing the order on them.

Dealers are not acceptable for any item of the package. Bidder shall procure all items including plates, structural, flanges; counter flanges etc. from approved sub vendor only.



**TECHNICAL SPECIFICATION FOR  
FUEL OIL HANDLING SYSTEM**

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**ANNEXURE-4**

## **Annexure-4**

### **1.13.4 (b) WASTAGE:**

Allowable wastage: - 10% (TEN percent) of the theoretical consumption shall be considered. Wastage shall be considered as cut pieces and scrap material, measured as per actual weightment basis. Invisible wastage (max limit to 0.5%), if any, shall be considered to be included in the specified 10 % allowable wastage.

| S.No | CONSUMPTION OF STRUCTURAL STEEL (ROLLED SECTION, PLATES)                                                                                                                                                          | BASIS OF ISSUE & PENAL RECOVERY |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| S-1  | Theoretical consumption (without considering any wastage, scrap or loss) as per spec. & drg.                                                                                                                      | Free                            |
| S-2  | Wastage limited to plus ten percent (+10%) of the aforesaid theoretical consumption (S-1) towards allowable wastage including invisible wastages (invisible wastages limited to 0.5% of theoretical consumptions) | Free                            |
| S-3  | Wastage beyond ten Percent (10%) of the aforesaid theoretical consumption (S-1)                                                                                                                                   | Penal Rate                      |