



BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT, NOIDA

Date-5-Jun-18

CORRIGENDUM- 01

PROJECT	:	5 x 800 MW Yadadri TPP
PACKAGE	:	FUEL OIL HANDLING AND STORAGE SYSTEM
ENQUIRY NO	:	PE/PG/YAD/E-5946/2018 Dt. 18.05.2018

Type of Corrigendum			
Technical Corrigendum -	☒	Commercial Corrigendum -	☒

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

Please note the following.

1. Reply of Pre-bid queries (attached below).
2. Find attachment for vendor credential format. Bidders are requested to submit their credentials as per the attached format.

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

Vinit Kumar Verma
Dy. Manager

Pre-bid Clarification				
Sub: Tender for Fuel Oil Handling and Storage System for 5X800MW YADADRI TPS project (Enq No PE/PG/YAD/E-5946/2018)				
Sl. No.	Section/ Clause/ Page No.	Statement Of the referred clause	Clarification required	BHEL REPLY
1	Section IA/ Clause Annexure-E/ Page No. 203 & Section IA/ Clause 1.1.0(12)/ Page No.12	Pressure Reducing & Desuperheater skid	P&ID no. PE-DG-417-166-A001 Rev.0 Sh. 3 of 3 shows Pressure Reducing & Desuperheater skids as dotted. We presume that being a skid the same is shown as dotted, however it is to be considered in bidder scope. Please confirm that our understanding is correct.	Bidder understanding is correct. The same is in bidder scope.
2	Section IA/ Clause Annexure-E/ Page No. 203 & Section IA/ Clause 1.1.0(12)/ Page No.12	Terminal Point of Instrument Air is not given	P&ID no. PE-DG-417-166-A001 Rev.0 Sh. 3 of 3 shows B/L for Instrument Air Supply for pneumatic control valves. The size & terminal point for Instrument Air is not given. Please arrange to provide the same.	Pipe Size for Instrument Air Supply is 25 NB. Terminal point for Instrument Air is 5 meter from Tank dyke area.
3	Section IIB/ Clause Annexure-I/ Page No. 46 & Section IIB/ Clause 6.02.14/ Page No. 40	Size of Seamless Steel Tubes of heating element of floor coil is not given.	We have assumed the size of Seamless Steel Tubes of heating element of floor coil as 40NB. Please confirm.	Size is indicated in GA drawing (refer nozzle table) attached in ANNEXURE - E in technical specification.
4	Section IA/ Clause Annexure-E/ Page No. 204, 205	Tank roof thickness	As per Section IA/ Clause Annexure-E/ Page No. 204, 205 tank roof thickness is given as 8mm & Section IIA/ Clause A1C / Page No.367 specifies 6mm thickness for both shell & roof. Also as per IS 803 clause no. 6.4.2.2 page 36 calls for a min. nominal thickness of 5mm. Please clarify and confirm.	Please follow GA drawing for minimum requirement as per Section IA/ Clause Annexure-E/ Page No. 204, 205.
5	Section IIB/ Clause 6.02.14e/ Page No. 41	Conservation Vent Valve	Conservation vent valve or breather valve is not normally recommended for oil system because of tendency of choking and may lead of hazardous situation. Therefore not included in our offer and we have considered flame arrestor cum vent. Please review & revert.	Bidder to follow specification.
6	Section IA/ Clause 2.0.0(b)/ Page No. 15 & Section IA/ Clause 1.1.0(15)/ Page No.12	Civil works for OWS	Section IA/ Clause 2.0.0(b)/ Page No. 15 does not talk about the exclusion related to Civil works for OWS. Please clarify the civil work scope for OWS.	Civil works for OWS is in BHEL scope.
7	Section IIB/ Clause 4.05.00/ Page No. 36 & Section IA/ Clause 1.1.0(21)/ Page No.13	Number of tracers	The spec does not indicate number of tracers to be used. So we have considered 100NB & below-1no., 150NB to 300NB -2nos. & 350NB & above -3nos. Please confirm.	Confirmed
8	Section IIIA, Vol II B, Annexure III, Clause 4 d	Hoses	Specification for Steam and Condensate hoses is not furnished. Please provide Section I, Vol.II-D referred for same.	No Railway wagon heating is envisaged hence Steam and Condensate hoses is not applicable
9	Standard Electrical Scope Page 233 of 403 Technical Specification	Clause#2 Mandatory Spares Clause#3 Recommended O&M Spares	Please provide list of Mandatory Spares and O&M Spares for Electrical Items	List of Mandatory Spares for Electrical Items and O&M Spares for Electrical Items is not applicable. Please follow Annexure F/ Section IA for Mandatory spares list .
10	Specific Technical Requirement (C&I) Page 257 of 403 of Technical Specification	Clause#2 &3 Local Control Panel in Bidder Scope	Please provide system configuration diagram	One no. Local Control Panel is in bidder scope. No separate configuration diagram is applicable.
11	Technical specification for Instruments Page294 of 403 of Technical Specification	HART Hand-held Calibrator (5Nos.)	Please note that this FOHS is small package and few instruments are supplied, so, generally only one HART held calibrator is supplied as it is a costly device. Five (5) Nos, is larger quantity, please check and confirm	One no. hand held calibrator shall be provided by bidder.

PRE BID CLARIFICATION SCHEDULE

Project:	5 x 800MW YADADRI TPP			
Package:	FUEL OIL UNLOADING AND STORAGE SYSTEM			
Sr.No.	Section/Clause/ Page No.	Statement of the referred clause	Clarification/ Confirm action required	BHEL Reply
1	SECTION-IA, System description, Page 25 of 403	BTPN wagons are not equipped with heating facility. Hence, no heating of wagons is provided. Steam header in the unloading area shall be provided for Unloading header tracing only.	Both BHEL and customer specification is contradicting regarding heating of HFO in the wagons. Please clarify.	BTPN wagons are not equipped with heating facility. Hence, no heating of wagons is provided. Steam header in the unloading area shall be provided for Unloading header tracing only.
	Customer specification, Section - IIIB, Short description of the System, Page 34 of 403	Before unloading HFO, it shall be heated by steam, in the wagon , to make it flow able, if necessary.		
2	SECTION-IA, System description, Page 25 of 403	LDO shall be delivered to power station by ten (10) nos road tankers . The road tankers shall be unloaded through flexible metallic / neoprene unloading hoses of min. 8.0m	Both BHEL and customer specification is contradicting regarding unloading of LDO by road tankers or railway wagons. Please clarify.	LDO shall be delivered to power station by ten (10) nos road tankers. The road tankers shall be unloaded through flexible metallic / neoprene unloading hoses of min. 8.0m length.
	Customer specification, Section - IIIB, Short description of the System, clause no. 3.01.00,	Oil both HFO and LDO shall be brought to plant site by Railway wagons .		
3	SECTION-IA, Terminal points, Page 16 of 403	Near fuel oil unloading & pressurizing pump house: LDO - Up to 2000 mm outside Pump house wall for suction & return line of LDO. Further routing shall be in BHEL-Try scope. HFO - 2000 mm outside pump house towards suction of HFO pressurizing pumps. Further, routing shall be in BHEL-Try scope.	Both BHEL and customer specification is contradicting each other regarding scope of supply. Please clarify.	Near fuel oil unloading & pressurizing pump house: LDO- Up to 2000 mm outside Pump house wall for suction & return line of LDO. Further routing shall be in BHEL-Try scope. HFO - 2000 mm outside pump house towards suction of HFO pressurizing pumps. Further, routing shall be in BHEL-Try scope.
	Customer specification, Section - IIIB, Short description of the System, clause no. 3.04.00, Page 34 of 403	Both HFO & LDO/ HSD shall be pumped from the storage tanks to day tanks by transfer pumps . HFO & LDO/ HSD transfer pumps along with strainers etc. will be located in the Fuel Oil Transfer Pump House adjacent to HFO and LDO/ HSD dyke area.		
4	Drawing no. PE-DG-417-166-A001, Rev 0; Process & instrumentation diagram for HFO system	water pit - pump and pipe 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.	Follow the specification.
	SECTION-IA, System description, Page 26 of 403	Separated water from the oil water separator water pit shall be taken to CMB as per ETP philosophy. Pumps, instruments required for it are in ETP supplier scope.		
5	Drawing no. PE-DG-417-100-M001, Rev 01; Plot plan	HFO unloading area	Kindly mark the coordinates in the plot plan regarding the HFO rail wagons as it is not clear to estimate the HFO unloading and pumping area.	Marked in Plot plan(attached)

6	SECTION-IA, System description, Page 25 of 403	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 .	Both BHEL and customer specification is contradicting each other regarding suction heater initial and final temperature. Please clarify the temperatures to be considered.	Follow the specification.
	Customer specification, Section IIIB, HFO TANK HEATERS - DESIGN PARAMETERS, clause no. 2, Page 47 of 403	SUCTION HEATER IN HFO STORAGE & DAY TANKS Initial temperature of oil : 50 ± 5°C Final temperature of oil : 60 ± 5°C		
7	SECTION-IA, System description, Page 26 of 403	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.	Bidder understanding is correct
8	Customer specification, Section IIIB, Short description of the System, clause no. 4.08.00,	Portable hand pumps of suitable design complete with discharge spout for removal of oil from the HFO day tank dyke area drain sumps.	As there is no HFO day tank in our scope we are not considering any portable hand pumps. Please confirm.	Confirmed.
9	Customer specification, Section IIIB, Annexure - III, Data sheet for fuel oil unloading pumps, clause no.15.6, 15.7, Page 49 of 403	HFO and LDO unloading pumps : 15.6) Suction & discharge pressure gauge connection 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.	Bidder to follow the P&ID.
	Drawing no. PE-DG-417-166-A001, Rev 0; sheet 1 of 3, sheet 2 of 3 Process & instrumentation diagram for LDO and HFO system	Pressure and temperature gauges	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.	
10	Customer specification, Section IIIB, Annexure - III, Pipes, fittings & valves, clause no.4a, Page 51	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	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 follow specification at page 369 of 403.
	Section- IIA, E. PIPES, FITTINGS & FLANGES , page 369 of 403	2) Pipe in oil lines shall be API 5L Gr. B (ERW). Minimum thickness as follows: -----		
11	Customer specification, Section IIIB, Annexure - III, Pipes, fittings & valves, clause no.4b, Page 52 of 403	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.	Confirmed.
	Section- IIA, E. PIPES, FITTINGS & FLANGES , page 369 of 403	3) Steam and Condensate line shall conform to ASTM 106 GR. B, Schedule 40.		

12	Annexure - F : Mandatory spares list, Page 208 of 403	CONTROL AND INSTRUMENTATION ITEMS : 3) HFO/LFO Oil meter	From the referred clause we understood that HFO / LFO oil meter is nothing but HFO and LDO flow meter. As flow meter is an expensive instrument we consider only flow transmitter as a spare and will provide the same. Please confirm.	Complete flowmeter for LDO and HFO to be provided.
13	Customer specification, Section - IIIB, clause no. 6.02.16, Page 43 of 403	Primer for internal surface shall be double boiled Linseed oil and that for external shall be synthetic red lead. Finish coat for both internal and external surface shall be of synthetic enamel. For bottom surface protection, one coat of bituminastic paint shall be applied.	Both referred clauses are contradicting each other. However we are considering surface preparation and painting for tanks and pipes as follows: Insulated Pipes(External) : Surface preparation - Wire brushing Primer : 1 coat of Epoxy resin based zinc phosphate primer - 100 dft Uninsulated pipes: Surface preparation - Wire brushing Primer : 1 coat of Epoxy resin based zinc phosphate primer - 100 dft Finish : 1 coat of epoxy pigmented with Titanium Dioxide - 100 dft Insulated Tanks : Internal : Wire brushing , 2 coats of Double boiled linseed oil. External : Sand blasting, 1 coat of Epoxy resin based zinc phosphate primer - 100 dft. Underneath : Wire brushing, 1 coat of Coal tar epoxy - 100 dft Un Insulated Tanks : Internal : Wire brushing , 2 coats of Double boiled linseed oil. External : Sand blasting, 1 coat of Epoxy resin based zinc phosphate primer - 100 dft , 1 coat of epoxy pigmented with Titanium Dioxide - 100 dft and 1 coat of polyurethane finish paint - 25 dft Underneath : Wire brushing, 1 coat of Coal tar epoxy - 100 dft Please confirm.	Please Refer attached Annexure-Y
	Annexure - G : Painting specification, clause no. 4.03.02Page 215 of 403	Specification for application of paints for external surfaces protection of vessels / tanks / equipment / pipng / fittings / valves etc to be installed outdoor shall be as follows :		
14	Customer specification, Section - IIIB, Annexure - I, Page 46 of 403	2. SUCTION HEATER IN HFO STORAGE & DAY TANKS 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. Please confirm.	

15	Customer specification, Section IIIB, Annexure - III, Velocity criteria, Page 51 of 403	For pipe sizing velocity of fluid in various pipe lines shall be considered as follows unless otherwise stated in the specification :	Velocity of some of line sizes in " Process & Instrumentation Diagram for HFO / LDO / Steam System" is exceeding over the referred velocity criteria. Please clarify whether we have to follow velocity criteria	Minimum line size is specified in the P&ID. Bidder to consider bigger line size if required as per velocity criteria.
16	SECTION-IA, Terminal points, Page 16 of 403	Terminal points	Terminal points for PRDS Spray water, Instrument air & Service water is not given in the referred clause. Please provide the same. Also provide spray water inlet / outlet temperatures.	Terminal Point for Steam, Spray Water and IA shall be 5.0m from Tank dyke area. Further, piping to other area shall be in bidder scope. Bidder to note that Service water is not in bidder scope.
17	General		Please clarify the function of small capacity unloading pumps 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.
18	General		Mandatory spares list for mechanical and electrical items are not given in the tender. Please provide the same.	Mandatory spares list for mechanical and electrical items are not applicable. Please follow Annexure F/ Section IA for Mandatory spares list .
B	Electrical, Control & Instrumentation			
1	2.0.0 EXCLUSION; Page 16 of 403, Specific Technical Requirements C&I, Page 257 of 403;	e) Control/ IO panel for Fuel Oil pump houses 2. FUEL OIL UNLOADING & STORAGE SYSTEM shall be operated & controlled from DCS (DCS is in BHEL's scope). Operation & Control shall be through Local Control Panel(LCP), also being referred as Backup Panel, along with DCS panels shall be placed in a Control Room near FOHS area and will be in bidder's scope. 3. LCP shall have the provision of command (start/stop, load/unload) & feedback interface with plant DCS. Local control panel shall have provision for hardwired annunciation facia, push buttons, digital indicators, lamps, colored mimics etc. Bidder shall connect up to terminal box (part of panel itself). Further cabling with DCS panel shall be in BHEL scope.	Referred clauses are contradiction each other about scope of Control panel. However we understood that there is a requirement of local control panel to wire all field instruments as specified in the "Specific Technical Requirements C&I, Page 257 of 403". Please confirm.	Bidder to provide one no. Local Control Panel(LCP). Local control panel shall have provision for hardwired annunciation facia, push buttons, digital indicators, lamps, colored mimics etc. which shall be finalized during detailed engineering.

2	2.0.0 EXCLUSION; Page 16 of 403,	h) Exclusion as indicated in Electrical & C&I portion of technical specification	We have not find any exclusions relevant to electrical and C&I scope in respective specifications. Please provide.	Bidder to note that all information is available in the specification. If exclusion list is not available in electrical and C&I part of specification, then same is not applicable
3	SECTION-IA, TECHNICAL SPECIFICATION FOR FUEL OIL UNLOADING & STORAGE SYSTEM (SYSTEM WRITE UP),	1.1.4 Each HFO Storage Tank shall be insulated and cladded on the shell.	Please clarify whether complete shell to be insulated or partially. If partially insulated, provide the height to be considered.	Complete shell to be insulated & cladded
4	VOLUME : IIB/3, SECTION-IIIB, TECHNICAL SPECIFICATION FOR FUEL OIL UNLOADING & TRANSFERRING SYSTEM, Page 36 of 403	4.10.00 Thermal Insulation Refer Cl. No. 4.06.00 of Sec. IIIA of Vol-II.	We have not find this clause in the tender document. However we are considering VOLUME : IID, SECTION-II, THERMAL INSULATION (Page 54 of 403 to 65 of 403 of the tender specification) as thermal insulation specification. Please confirm.	Please refer attached(Annexure-X)
5	VOLUME : IID, SECTION-II, THERMAL INSULATION, Page 56 of 403	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. 4.00.00 MATERIAL SPECIFICATIONS 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.	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.	Confirmed.
6	Specific Technical Requirements - C&I, Page 258 of 403;	14. BHEL shall provide 230 VAC UPS supply feeder at a single point. Further distribution to various instruments shall be in Bidder's scope. Bidder to include necessary power distribution board in his scope. Any power supply other than the above, if required by any instrument/device, has to be derived by the Bidder and all necessary Hardware/ software for the same shall be in bidder's scope. Bidder to furnish UPS power requirement along with the bid.	From the referred clause we understand that UPS & UPS ACDB is in BHEL scope and ACDB to LCP power distribution is in bidder scope. Please confirm. Also we understand that 230 VAC UPS power supply and 24V DC supply for instruments shall be supplied by BHEL, kindly confirm.	Confirmed. BHEL shall provide 230 VAC UPS supply feeder at a single point. Further distribution to various instruments shall be in Bidder's scope. Bidder to include necessary power distribution board in his scope. Any power supply other than the above, if required by any instrument/device, has to be derived by the Bidder and all necessary Hardware/ software for the same shall be in bidder's scope.

7	INSTRUMENTATION DATA SHEET, Page 286 to 287 of 403	1.01.00 PRESSURE TRANSMITTER: 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. 1.02.00 DIFFERENTIAL PRESSURE TRANSMITTER / FLOW TRANSMITTER 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.	Please define the applicability of extended diaphragm with 5M ss capillary. Also define for which services (ie., HFO/LDO) we have to consider extended diaphragm with capillary.	For All Fuel Oil Application
8	INSTRUMENTATION DATA SHEET, Page 286 to 294 of 403	1.01.00 PRESSURE TRANSMITTER: 18. Accessories - g. Handheld calibrator 1.02.00 DIFFERENTIAL PRESSURE TRANSMITTER / FLOW TRANSMITTER : 18. Accessories - g. Handheld calibrator 1.03.00 Displacer Type Level Transmitters: 23. Accessories - e. Handheld calibrator 1.04.02 TRANSMITTER: (MASS FLOW METER): 11. Accessories : a) Handheld calibrator 1.05.00 RADAR TYPE LEVEL MEASUREMENT: 14. Accessories : a) Handheld calibrator 1.06.00 ULTRASONIC LEVEL TRANSMITTER: 15. Accessories : a) Handheld calibrator 1.07.00 ULTRASONIC FLOW TRANSMITTER 11. Accessories : 1) Handheld calibrator	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.	1 no. Universal type Hand Held Calibrator shall be considered.
9	INSTRUMENTATION DATA SHEET, Page 294 of 403	2.00.00 HART HAND HELD CALIBRATOR 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. For this fuel oil handling system scope we are considering 1No. Universal type Hand Held Calibrator for all transmitters. Please confirm.	1 no. Universal type Hand Held Calibrator shall be considered.

10	LCP & JUNCTION BOXES SPECIFICATION, , Page 325 of 403	2.00.00 CONTROL DESKS & PANELS: -----	In referred clause we have not understand the requirement of control desk. We understood that we have to provide one Local Control Panel (LCP) to terminate/connect all the instrumentation cables/ signal cable through junction box to this LCP. Interfacing with DCS from this LCP is on BHEL scope. As per the scope matrix there is no requirement of Control desks and other description given in the respective specifications; and is not clear. Please elaborate the scope and purpose of control desks.	Bidder to provide one no. Local Control Panel(LCP). Local control panel shall have provision for hardwired annunciation facia, push buttons, digital indicators, lamps, colored mimics etc. which shall be finalized during detailed engineering. Control desk is not required.
11	Process & Instrumentation Diagram for LDO, HFO & steam Systems Dwg No: PE-DG-417-166-A001 (3 sheets), page 201	TE- TEMPERATURE ELEMENT	In the referred P&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.	Only Temperature Elements shall be provided.
12	Sub-vendor list, Page 180 to 193 of 403		Please provide list of sub-vendors for instrument racks which is not given in referred sub-vendor list.	The sub vendors are as follows: Pyrotech,Chemin & Sajas

Railway track

Distance between
Railway track and
unloading header is
5 mtrs (approx.)

Unloading header

LINE - 1 OIL SIDING - CSR - 750M

11

EL:4.0M
RL:85.5M

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BULDOZER
SHED

TP6 BCN 5

BCN 5

BCN 7

PH-2

BCN 8A/B

BCN 29A/B

BCN 25

BCN 25

TP7

BCN 25

PH-22

BCN 28

BCN 8A/B

BCN 26

TP8

BCN 8A/B

TP28

BCN 29A/B

BCN 6A/B

TP9

BCN 27A/B

TP29

TP30

COAL PILE
RUN OFF
POND

12

P/H

EL:4.0M
RL:85.5

10

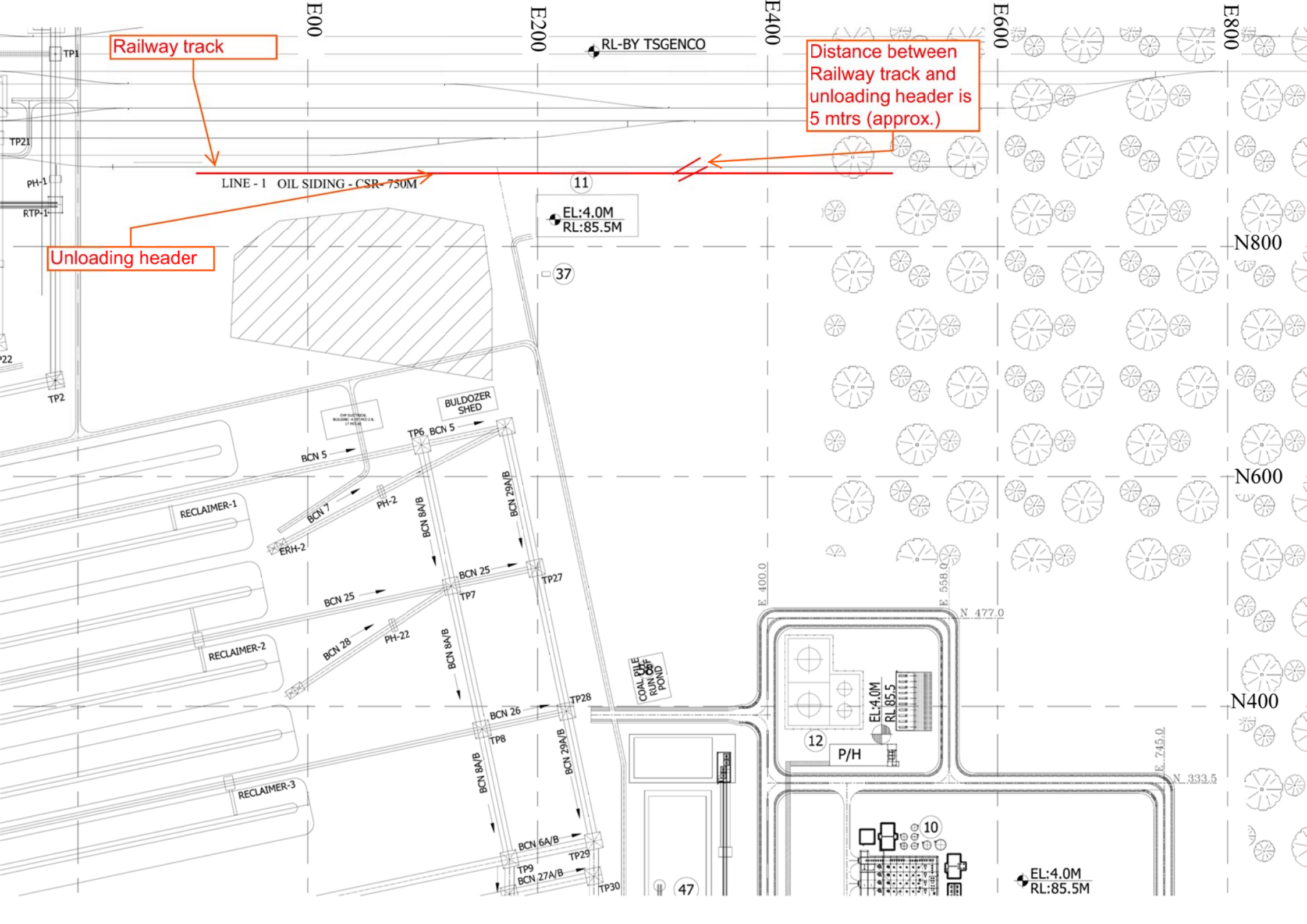
EL:4.0M
RL:85.5M

47

N800

N600

N400



PAINTING SCHEDULE (ANNEXURE-Y)						
APPLICATION	AREA	PROCESS	PAINT TYPE (SUITABLE FOR INDUSTRIAL APPLICATION)	NO OF COATS	DRY FILM THICKNESS (MICRONS/COAT)	SHADE / FINISH
HFO, LDO TANKS, DOT & HEATERS: (INTERNAL SURFACE OF ROOF, SHELL, BOTTOM AND FLOOR COIL HEATER)	INTERNAL	SURFACE PREPARATION	Wire Brushing			
		PRIMER	Double boiled linseed oil	2	--	NA
		INTERMEDIATE COAT	NA	NA	NA	NA
		FINAL COAT	NA	NA	NA	NA
		TOTAL DFT (MIN)			---	
HFO UN INSULATED & LDO TANKS (FOR EXTERNAL SURFACE)	EXTERNAL	SURFACE PREPARATION	Sand Blasting to SA 2.5			
		PRIMER	Epoxy resin based zinc phosphate primer.	1	100	NA
		INTERMEDIATE COAT	Epoxy resin based paint pigmented with Titanium Dioxide.	1	100	NA
		FINAL COAT	Epoxy paint	1	75	
			Polyurethane finish paint	1	25	
		TOTAL DFT (MIN)			300	
HFO INSULATED & DRAIN OIL TANKS (FOR EXTERNAL SURFACE)	EXTERNAL	SURFACE PREPARATION	Sand Blasting to SA 2.5			
		PRIMER	Epoxy resin based zinc phosphate primer.	1	100	NA
		INTERMEDIATE COAT	NA	NA	NA	NA
		FINAL COAT	NA	NA	NA	NA
		TOTAL DFT (MIN)			100	
STEAM AND CONDENSATE LINES AND SUCTION HEATER HEAD (FOR EXTERNAL SURFACE) INSULATED	EXTERNAL	SURFACE PREPARATION	Sand Blasting to SA 2.5			
		PRIMER	Heat Resistant Alumunium paint	2	20	NA
		INTERMEDIATE COAT	NA	NA	NA	NA
		FINAL COAT	NA	NA	NA	NA
		TOTAL DFT (MIN)			40	
HFO & LDO TANKS :	UNDERNEATH	SURFACE PREPARATION	Wire brushing			
		PRIMER	Coal tar epoxy	1	80-100	Black
		INTERMEDIATE COAT	NA	NA	NA	NA
		FINAL COAT	NA	NA	NA	NA
		TOTAL DFT (MIN)			80-100	

PAINTING SCHEDULE						
APPLICATION	AREA	PROCESS	PAINT TYPE	NO OF COATS	DRY FILM THICKNESS (MICRONS/COAT)	SHADE / FINISH
			(SUITABLE FOR INDUSTRIAL APPLICATION)			
HFO, DRAIN OIL PIPE LINES, PUMPS, STRAINERS, VALVES, ETC (INSULATED)	EXTERNAL	SURFACE PREPARATION	Degreasing and Mech. Cleaning with wire brushing/hand tool(SA/ST2/ST3 as applicable)			
		PRIMER	Epoxy resin based zinc phosphate primer.	1	100	NA
		INTERMEDIATE COAT	NA	NA	NA	NA
		FINAL COAT	NA	NA	NA	NA
		TOTAL DFT (MIN)			100	
LDO, OILY WATER, AIR AND WATER LINES, PUMPS, STRAINERS, VALVES AND STRUCTURALS	EXTERNAL	SURFACE PREPARATION	Sand Blasting to SA 2.5			
		PRIMER	Epoxy resin based zinc phosphate primer.	1	100	----
		INTERMEDIATE COAT	Epoxy resin based paint pigmented with Titanium Dioxide.	1	100	
		FINAL COAT	Epoxy paint	1	75	
			Polyurethane finish paint	1	25	
		TOTAL DFT (MIN)			300	
CONTROL PANEL	INTERNAL & EXTERNAL	SURFACE PREPARATION	Sand Blasting to SA 2.5			
		PRIMER	Inhibitive Epoxy Primer	2	1.5 MIL	----
		INTERMEDIATE COAT	NA	NA	NA	NA
		FINAL COAT	Catalyzed Epoxy or Polyurethane	2	2 MIL	
		TOTAL DFT (MIN)			7 MIL	
Notes:						
1		Incase of insulated surfaces,only primer coat shall be applied.				
2		G.I pipes will not be painted.Further GI piping shall be given necessary colour banding for identification as per colour scheme.				
3		All pipes shall be painted at site.				
4		All structural steel items shall be painted at site.				
5		All shop painted equipments should be repainted for any damages during transportation at site.				
6		Method of painting application shall be as per paint manufacturer's recommendation.				
7		All instruments shall be painted as per manufacturer standard practice.				
8		Surface Preparation as per Swedish Standards SIS 05-5900. Degreasing will be as per Standard SSPC-SP1.				

4.03.00 Tracing of HFO pipelines

4.03.01 For HFO pipelines complete steam-tracing system and necessary equipment shall be provided.

4.04.00 Auxiliary Steam

Auxiliary steam required for heaters of pressurizing unit shall be taken from auxiliary steam header. So, associated piping arrangement along with pressure reducing control station shall be provided.

Auxiliary steam required for heating of HFO during transferring and upto & including day oil tanks shall be taken from auxiliary steam header. Associated piping arrangement along with its auxiliaries shall be provided.

4.05.00 Pipe, Fittings, Specialties and Valves

4.05.01 Pipes, fittings, specialties, traps, strainers, valves, supports/ hangers etc. as per the piping system design requirement for the system as covered in drawing enclosed and also as enumerated below:

- a) Complete Fuel Oil (HFO and LDO/ HSD) piping system
- b) Auxiliary Steam lines (along with pressure reducing station).
- c) Condensate & drain line.
- d) Compressed Air line.
- e) Vent lines/Relief Valve discharge lines.

4.05.02 Valves as shown in the enclosed scheme shall be provided as minimum.

4.06.00 Thermal Insulation

Supply of thermal Insulation along with G.I sheet, binding wire, stitching wires etc. as specified elsewhere in this specification for the following systems but not limited to the same:

- a) HFO lines along with heating media
- b) Auxiliary Steam lines.
- c) Valves, fittings & specialties as required
- d) Jacketed equipment as required

~~4.07.00 One drain oil tank with necessary heater (steam heated) shall be provided to receive the miscellaneous drains of HFO and LDO/ HSD. The capacity of drain oil tank shall not be less than 5 m³.~~

- 4.08.00 Two nos. drain oil pumps shall be provided to re- circulate oil from drain oil tank to HFO tank.
- 4.07.00 All access platforms for various valves & all pipe cross-over platforms, as required for necessary approach and crossings shall be provided.
- 4.09.00 Anchor Bolts, Sleeves, Inserts, Foundation Plates, Lifting Lugs, Eye Bolts etc. shall be supplied.
- 4.10.00 Instrumentation & Control: Refer Volume - VI of this specification for details of instrumentation & control.
- 5.00.00 **SYSTEM DESIGN CRITERIA**
- 5.01.00 Fuel oil system and its facilities shall be designed as per Pollution Control/Petroleum/Explosive/Fire rules of Govt. of India and State Govt. (Telangana) in which the project site is located.
- 5.02.00 **HFO pressurizing and heating units**
- 5.02.01 Pressurizing pumps:
- a) Design flow capacity, each : 100% of the maximum boiler requirement of heavy fuel oil including continuous recirculation from burner header end and 10% spare capacity.
 - b) Normal inlet temperature : 60 °C within ± 5 °C
- 5.02.02 HFO Heaters
- Design oil flow of each heater shall be matching to each pump capacity and shall maintain the outlet temperature of HFO as required at the burner header. Working Oil pressure shall be as per requirement and design oil pressure shall be 1.5 times the working pressure. Total number of heaters shall be same as the pumps.
- 5.03.00 **LDO/ HSD Pressurizing System**
- Pressurizing Pumps
- For supplying LDO to burners of the boiler, the pump shall be as follows:
- a) Design flow capacity each : 100% of the maximum boiler requirement of light diesel oil including 10% spare capacity.
 - b) Normal inlet temp : 3 - 50 °C (For HSD 3-30°C)

5.04.00 HFO and LDO/ HSD Pressurizing Pumps Recirculation Control Valves

- a) Maximum flow capacity : Full pump discharge flow.
- b) Minimum flow capacity : 10% of pump discharge.

5.05.00 Pipe, Fittings & Specialties

5.05.01 Determination of diameters of various pipes in the F.O. Handling system shall be done based on the velocity indicated in Annexure-III enclosed and the flow rates established by the system designer/ bidder..

5.05.02 Thickness calculation of the pipes shall be done based on the allowable stress of the pipe material (material for various pipe lines indicated in Annexure-III enclosed) at design temperature and the pressure as determined by the system designer/bidder.

5.05.03 Piping system should withstand the maximum operating temperature and pressure. The forces & moments at terminal/equipment due to thermal expansion should be kept under permissible limit. Piping system shall meet other requirements of the relevant codes & standards.

5.05.04 All valves shall function smoothly without sticking, rubbing, vibrating etc. during operation.

5.05.05 Drain pipe size shall be 25mm NB as minimum.

6.00.00 DESIGN & CONSTRUCTION

6.01.00 Pumps

6.01.01 Pumps shall be of positive displacement type with gear, screw or sliding vane rotary type or any other rotating element as per Annexure-I enclosed. Both HFO and LDO/ HSD pressurising pumps shall be located in the fuel oil pressurising pump house. Capacity of fuel oil pump shall be selected considering minimum expected viscosity of the fluid being pumped.

6.01.02 Bearing

Bearing shall be antifriction ball or roller preferably split type or sleeve type. Bearings shall be adequately sized to absorb radial as well as axial thrust loads, if any. Bearings shall be of external type. In the latter case provision of lubrication of the bearings by oil or grease shall be made.

6.01.03 Mechanical Seal

Mechanical seal shall be provided at roots where the shaft extends from the casing. The seal material shall have low co-efficient of friction and shall be suitable for the fluid handled.

6.01.04 Relief Valve

- a) Each pump shall have relief valve either built-in with the body or end plate, or attachable as specified elsewhere for protection against damage due to accidental closure of discharge valve & pressure build up.
- b) The capacity of the relief valve shall be at least that of the pump to ensure the full discharge of liquid through the bypass line to the suction side of the pump during accidental pressure build up.

6.01.05 Jacketed Body

HFO pumps and strainers at pump suction and discharge shall be of steam-jacketed type.

6.01.06 Timing Gear

Timing gear shall be provided to transmit torque from one rotor shaft to another and to maintain the proper angular relationship of the rotors. Proper lubricating arrangement for this shall be provided.

6.01.07 Coupling

- a) Pump shall be connected to its drive by means of flexible coupling.
- b) Coupling guard shall be provided.

6.01.08 Baseplate

Common baseplate for the pump and motor shall be provided. The baseplate shall be suitably drilled for the anchor bolts. The baseplate shall have drip pan and suitable draining arrangement.

6.01.09 Material of Construction

For material of construction for the vital parts of the pump, Annexure-I shall be referred.

6.01.10 Drive Motor

The design and construction of the drive motor shall be as specified in specification for electric motor presented in Volume- VA.

The drive motors for Oil Handling System shall also comply with the following requirement.

- a) Enclosure shall be sufficiently strong so as to withstand internal explosion that may occur within the motor. The enclosure shall also be provided with such devices as may be necessary to protect the motor from damage if an electrical defect such as sparking, occurs

accidentally due to internal fault in the apparatus like failure of insulation/fracture of conductor/loose connection.

- b) The surface temperature of the enclosure shall be kept within such value so as not to ignite the oil vapour, in which motor is working, under any condition of operation.
- c) The enclosure shall be constructed complying requirements of flameproof construction: IS-2148.
- d) Ratings of pump motor shall be selected considering maximum expected viscosity of the fluid being pumped.

6.02.00 **Pipes, Fittings, Valves and Specialties**

6.02.01 Pipe Line

- a) The pipes shall be designed for the maximum operating pressure and temperature as per ANSI B 31.1 or IBR Codes whichever is more stringent. The bidder shall indicate design pressure and temperature of various pipelines.
- b) Pipe supports shall be located as per ANSIB 31.1. Flexible supports shall be used to accommodate thermal expansion.

All pipe supports overground and on pipe rack shall be provided by the bidder.
- c) All piping shall be provided with vents at the highest points and drains at the lowest points. Moreover, drains shall be provided for emptying of oil pipes at convenient locations. Pipes shall be given slope towards proper direction.
- d) HFO oil line shall be traced by steam tracers.
- e) Oil pipeline shall be generally butt-welded connection except at the equipment. All flange connections shall be perfectly oil tight by gaskets.
- f) Stubs for instruments and other connections as required shall be supplied and erected by bidder.
- g) For material of construction of pipes refer Annexure III.
- h) Pipe, valves and specialties of steam line should have IBR (1950 edition) approval.
- i) For detail stipulation on piping, valves & specialties refer section-I of Volume-IID of this specification.

6.02.02 Valves

Valves shall be designed as per the following guidelines in general:

- a) Valves shall be used to start, stop or regulate flow. All valves shall be suitable for most stringent condition i.e. flow, temperature and pressure under which they may be required to operate.
- b) Gate valves shall be used for isolation purpose for all sizes in steam and condensate service.
- c) Globe valves shall be used for regulation purpose in steam, condensate and compressed air lines.
- d) Check valve shall be used for all sizes in steam, condensate, compressed air and oil line.
- e) Gate or Ball or plug valve shall be used in oil lines.
- f) Gate and globe valves shall preferably be of such design as to permit re-packing while in service.
- g) Open and shut direction shall be indicated on each valve. All valves shall be provided with brass discs showing the tag numbers.
- h) All gate and globe valves shall be raising stem type unless mentioned otherwise.
- i) Valves offered shall be from the approved manufacturer.
- j) Motor and gearbox of motor operated valves shall be designed to operate the valve against max. operating pressure in the line when the pressure on the other end of the valve is nil.

The limit switch shall restrict the valve-movement between its limits of travel by stopping the motor.

- k) For material of constructions of valve, refer Annexure-III.

6.02.03 Strainers

- a) There shall be Simplex Strainers on the Fuel Oil Line.
- b) The strainer shall have basket type straining elements permitting easy removal and replacement.
- c) The open area ratio (i.e. straining area to the inlet area ratio) shall be at least 6:1.
- d) The strainer shall have screen of stainless steel (AISI-316) construction with wire diameter of about 0.01 inch and open area of about 50%.
- e) Strainer body shall be made of Cast steel. No Cast Iron component shall be used in F.O. system.
- f) Each strainer shall be provided with a pair of counter flanges and associated bolts, nuts and gaskets. Material of counter flanges shall be

of tested quality steel conforming to IS-2062. All strainers shall also be provided with oil drip plates beneath them for collection of oil.

- g) Bolts and nuts shall be as per IS-1363. Gaskets shall be minimum 3 mm thick and made of compressed asbestos fiber as per IS-2712.

6.02.04 Steam Traps with Strainers

- a) The steam traps shall be inverted bucket or thermodynamic type complete with integral or separate strainers.
- b) Traps shall have carbon steel body with stainless steel internals to AISI 316.
- c) Y-type strainers whether integral with steam traps or otherwise shall have body of Cast Steel Class 150 material and perforated metal screen of type AISI-316 stainless steel with about 0.8 mm perforation. The strainer shall have screwed blow off connections fitted with removable plug. The free hole area shall be at least three (3) times the internal pipe area.
- d) Numbers and location of steam traps shall be selected by the Bidder.

6.02.05 Fuel Oil Heaters

- a) Each heater shall be located adjacent to each fuel oil pump preferably on a common structural steel base plate with suitable drip lip and plugged drain connection.
- b) The heater shall be shell and tube type heat exchanger designed as per TEMA/IS-4503 or equivalent to meet the performance requirements as given. The heat exchanger shall be shell/straight tube single pass type having oil flow through the tubes. Care shall be taken in design and construction to prevent oil leakage into steam space.
- c) Suitable lugs for gripping the insulation material shall be provided on the heater shell.
- d) Each heater shall be furnished with cast steel flanged relief valves to protect the heater from excess pressure and air vents with valves in the oil and the steam compartment. Steam trap outlets and all drains shall be brought to one common point.

6.02.06 Hangers and Supports (if applicable)

Design of hangers, supports and auxiliary supporting steel members shall comply with the requirements of ANSI B 31.1 as a minimum. Fabrication of steel hangers shall be in accordance with the requirements of MSS-SP-58 Section-5 (ANSI B 31.1). Selection of location, type and rating of hangers/supports are included in Tenderer's Scope. Bidder would consider the following guidelines in general :

- a) Pipe hangers shall be concentric with webs of structural steel supporting member. Brackets and structural framing are generally not acceptable and will be subject to Engineer's review. Attachments to bracing members will not acceptable.
- b) All supports shall have adequate thread engagements. The amount of thread engaged and that available for further adjustment shall be plainly visible and sight holes shall be provided where necessary. All the threaded connections shall be provided with lock nuts. Each adjustable rod shall be provided with lock nuts.
- c) All rigid and non-rigid supports and restraints shall be provided with sufficient adjustment after installation to allow for subsequent readjustment.
- d) Supports shall be designed so that they can not become disengaged by movements of the supported pipes.
- e) All supports shall be continuous, coupling shall not be used. Each rod of a double hanger shall be designed for the full hydrotest load of the hanger. Rods of less than 9.5 mm dia. for support of pipe 50 mm NB and smaller or less than 12.5 mm dia. for support of pipe 65mm NB and larger shall not be used.
- f) The hot lines shall be supported with flexible connections to permit axial and lateral movements without restraint or binding at any supporting element.
- g) Expansion loops wherever necessary shall be provided in auxiliary steam and HFO line in order to restrict end forces and movements.
- h) If an outdoor saddle support is assumed to permit sliding movement of pipe over the support, consideration shall be given in selection of supporting material at the interface so that no rust formation takes place and actual sliding movement becomes feasible in practice.
- i) The supports shall be so interspaced as to minimise sagging of the pipes and to keep them within permissible limits where pipes are full with the conveying media.
- j) Type of hangers and components of all piping shall be selected as per sound engineering practice and approval shall be obtained from the Purchaser/Consultant.

6.02.07 Fabrication : Piping System

- a) The piping systems shall be constructed in accordance with the requirements of ANSI B-31.1. The requirements of IBR, (with latest amendments) wherever more stringent than ANSI B- 31.1, shall be complied with for the piping systems which are under the purview of IBR.

- b) Piping shall be fabricated in the shop in the largest practicable sections to minimize the number of field weld joints. The choice of field weld joint location shall be based on the traverse of the pipe through walls, floors, sleeves or other restrictive areas.
- c) All workmanship shall be accomplished using methods and procedures of best recognized pipe fabrication and must be done in a good and workmanlike manner in accordance with latest revisions of applicable ANSI standards, ASME codes, PFI standards and IBR as applicable.
- d) Flanged or welded nozzles, branch connections, welding outlets, adaptors and taps shall be true and faced at right angles to the axis of the pipe to ensure accurate fit. Connections shall not extend inside the pipe.
- e) Bends and offsets shall be made true to the sizes, dimensions, angles and radii, with ends true and faced at right angles to the axis of the pipe. All 90 degree elbows shall be long radius type unless otherwise stated.

Access holes for field radiography shall be provided in fabricated piping for which 100 percent radiographic examination is required by governing code. Access holes for shop radiography shall be provided only if the area to be radiographed is not accessible through the ends of the pipe.

- f) The pipe wall shall be reinforced in accordance with requirements of the Power Piping Code. ANSI B-31.1 where necessary, to compensate for large locally applied external forces, dead weight loads, or hydrostatic test loads.
- g) Internal surfaces of pipe shall be ground smooth and flush after drilling operations. Alternately the final hole sizing may be accomplished by reaming.

6.02.08 Bending

- a) Bend thinning allowance on straight pipe prior to bending shall be applied as per ANSI B 31.1. For bends of 5D or higher radius, the difference between maximum and minimum diameters shall not exceed 8 percent of average measured outside diameter of the pipe before bending.
- b) All bends in 65 mm NB and larger piping shall be made hot. Bends in 50 mm NB and smaller piping may be made cold only when commercially available bending shoes are used. Finished bends shall be smooth in contour and free from buckles and distortion.
- c) Pipe bends may be fabricated by the incremental induction heating process. Circumferential butt welds or longitudinal welds (where seamless piping has been specified) shall not be used in the arc of

the pipe bends, without Engineer's permission. After bending, such welds, where permitted, shall be re-examined and re-inspected.

- d) All piping bends are subject to heat treatment as required by the original material specification unless otherwise approved by the Engineer.
- e) All pipe bends in 65 mm NB and larger piping shall be examined ultrasonically after fabrication for wall thickness conformance. Measurements shall be taken in accordance with PFI Standard ES-20 using the "Pulse Echo" method. Data reports containing information as recommended in PFI Standard ES-20 shall be forwarded to the Engineer for record purposes.
- f) Where examination of pipe bends indicates that wall thinning has resulted in less than code required minimum wall thickness repair by weld deposit shall be allowed only where the affected area is 150 mm or less as measured along the outside arc and with Engineer's approval. Repairs in excess of this amount shall not be permitted.
- g) Pipe elbows with mitering bend is not permitted.

6.02.09 Branch Connections

- a) Branch connections shall be in accordance with ANSI B-31.1 or IBR whichever is applicable. All branch connection welds shall be full penetration except as permitted by ANSI B- 31.1/IBR.
- b) Socket welding and threaded connections on pipelines shall be made by forged outlet fittings. The holes in pipe headers made for these connections shall be drilled to the same size as the fitting inside diameter. All burrs shall be removed and threaded fitting shall be repeated after welding.
- c) For branch connection, additional reinforcements shall be provided wherever necessary by the applicable codes including supply of necessary material by the contractor at his own cost.
- d) The design and fabrication details for the instrument stub connection is included in Bidder's scope. Materials for instrument connection shall be the same as that of the pipe to which it is attached. Fittings ratings shall be in accordance with those specified for the main process pipe.

6.02.10 End Preparation, Cutting etc.

- a) For steel pipes, end preparation for butt-welding shall be done by machining/flame cutting.
- b) Socket weld end preparation shall be saw/machine cut.

- c) For tees, laterals and other irregularities details, cutting template shall be used for accurate cutting and cutting shall follow the outline of the template.

Alignment Considerations

- a) The pipes joined by welding shall be aligned correctly within the existing tolerances on diameter, wall thickness and out of roundness, which shall be preserved during welding.
- b) All flange facings shall be true and perpendicular to the axis of the pipe with bolt holes being off center.

6.02.11

Welding

In addition to the requirements spelt out in Section : VII of Vol.II-A, the followings shall be taken into consideration:

- a) Welding Process
 - i) Welding under this specification shall be done by one of the following processes :
 - Manual oxy-acetylene welding process
 - Manual shielded metal arc process
 - Manual inert gas tungsten arc process (TIG)
 - ii) Automatic or semi-automatic welding shall be done only with the specific approval of the Purchaser/Consultant.
 - iii) Socket weld joint shall be done with low hydrogen type covered electrodes with manual shielded metal arc process.
 - iv) Welding at any joint should be completed uninterrupted. If this procedure cannot be followed for some reason, the weld shall be insulated for slow and uniform cooling.
 - v) As far as possible welding shall be carried out in flat position. If not possible, welding shall be done in a position as close to flat position as possible.
 - vi) As a rule no backing ring shall be used for circumferential butt welds.
- b) Alignment and Spacing
 - i) Components to be welded shall be aligned and spaced. Root opening shall be as under :
 - For wall thickness 2.5 mm or under and for all thickness

in oxy-acetylene welding	1.0 mm - 2.0 mm
For wall thickness over 2.4 mm	2.0 mm - 3.0 mm

Special care shall be taken for fitting and alignment in case of inert gas tungsten arc welding. Flame heating for adjustment of ends is not permitted without the approval of the Purchaser/Consultant.

- ii) A wire spacer of proper diameter may be used for the weld root opening but must be removed after tack welding and before application in root pass.
- ii) Tack welding for the alignment of pipe joints shall be executed carefully and shall be free from defects since tack welds form a part of final welding. Defective welds shall be removed prior to the welding of joints. Electrode size for tack welding shall be selected depending upon the root opening.

Tacks should be equally spaced as follows :

For 65 mm NB pipe and smaller	-	2 tacks
For 80 mm NB to 300 NB pipe	-	4 tacks
For 350 mm NB and larger pipes	-	6 tacks

c) Welding Technique

- i) Root pass shall be made with respective electrodes/ filler wires. The size of the electrodes shall not be greater than 3.25 mm (10 SWG). Welding shall be done with direct current values recommended by the electrode manufacturers.
- ii) Upward technique shall be adopted for welding pipes in horizontally fixed position. For pipes with wall thickness less than 3 mm, oxy-acetylene welding is recommended.

6.03.12 General Instruction for Erection

In addition to the requirements spelt out in S-VI of Vol-II A, the general guidelines for erection are as follows :

- a) All workmanship shall be accomplished using accepted methods in accordance with IBR and applicable ANSI standards, ASME codes, PFI standards and MSS specifications. Erection of pipes and appurtenances shall comply with the requirements of ANSI B 31.1.
- b) All pipes of size 65 mm NB and above shall be shop fabricated. Pipes of size 50 mm and below shall be field run.

- c) All field welding, stress relieving and heat treatment shall be done as per the procedure submitted by the Contractor and approved by the Purchaser/Consultant.
- d) For instrument connections, pipe stubs including the instrument tubing up to the root valve(s) shall be installed by the Contractor. The erection of instruments is also included under the scope of this specification.
- e) All drips and drains for piping and equipment shall terminate on the ground level at suitable point unless otherwise noted.
- f) The Contractor shall be responsible for correct orientation of all valves so that seats, stem and hand wheels will be in desired locations.

7.00.00 **CONTROL & INSTRUMENTATION**

7.01.00 **Control and Operation Philosophy**

- 7.01.01. The HFO and LDO/ HSD pressurising system control shall be realized in plant Distributed Digital Control & Management Information System (DDCMIS). There shall also be provision for local start/stop operation.

The pressurising pumps shall, however, be automatically tripped in the event of any of the followings:

- a) low level in the connected storage tanks
- b) pump suction temperature lower than 55°C (for HFO only).

The stand by pressurising pump shall be automatically started in the event of either low pressure in respective pump discharge header or tripping of any of the running pumps.

- 7.01.02 Steam flow to each HFO heater shall be independently regulated by means of automatic control valve on steam line and actuated from heater outlet oil temperature. The motorised valves on steam supply lines to HFO heaters shall have start/stop facilities from local and also remote from DDCMIS.

- 7.01.03 Individual recirculation control valve shall be provided for each HFO and each LDO/ HSD pressurising pump to maintain the pump discharge.

7.02.00 **Annunciations**

For safe and reliable operation control of the Fuel Oil System all necessary annunciations are to be provided which shall include but not be limited to the followings :

- a) high differential pressure across each strainer in HFO line at pressurizing pump suction and at heater outlet.

VENDOR'S CREDENTIALS

PROJECT:

PACKAGE:

VENDOR NAME:

CREDENTIAL BOOKLET

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