



BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT, NOIDA

Date-24-Oct-19

CORRIGENDUM- 01

PROJECT	:	1X660 MW UPRVUNL PANKI EXTN
PACKAGE	:	EFFLUENT TREATMENT PLANT
ENQUIRY NO	:	PE/PG/PKI/E-6311/2019 Dated. 05.10.2019
SUBJECT	:	TECHNICAL AMENDMENT

Type of Corrigendum			
Technical Corrigendum -	☒	Commercial Corrigendum -	☐

In reference to the above mentioned tender enquiry for **EFFLUENT TREATMENT PLANT** package, please note the following:

- 1. Amendment to technical specification is enclosed herewith. Kindly consider the same while submitting the offer.**

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

Yours faithfully,

For and on behalf of BHEL

Upendra Chaudhary
Manager



AMENDMENT ON TECHNICAL SPECIFICATION
FOR
EFFLUENT TREATMENT PLANT (ETP)
1X660 MW PANKI THERMAL POWER STATION

SPECIFICATION NO.: PE-TS-426-164-A001
AMENDMENT NO # 1
REV. NO. 00 DATE: 22/10/2019
Page 1 of 3

ANNEXURE-A

The following modifications with respect to Technical Specification for EFFLUENT TREATMENT PLANT (ETP) BHEL's Technical specification no PE-TS-426-164-A001 shall apply. Bidder to note that existing clauses/ details as appearing in the specification stands deleted and clauses/details as mentioned in "Modified clause/details" column shall be applicable and complied by the bidder as listed below in SCHEDULE A.

SCHEDULE-A

MODIFIED CLAUSES/ PAGE NUMBERS:

Sl no.	Vol. No.	Section/ Description	Clause no	Page no	Existing clause/details	Modified clause/details
1.	IIB	SECTION- C1	Drawings	112 of 519	P&ID FOR EFFLUENT TREATMENT PLANT -DRAWING NO.-PE-DG-426-164-A001, REV-0	P&ID FOR EFFLUENT TREATMENT PLANT - DRAWING NO.-PE-DG-426-164-A001, REV-1 is applicable.
2.	IIB	SECTION- C1	Drawings	113 of 519	PLOT PLAN - PE-DG-426-100-M001, R-04P (PROGRESSIVE AS ON 18.04.19)	PLOT PLAN - PE-DG-426-100-M001, R-04P (PROGRESSIVE AS ON 19.10.19) is applicable.
3.	IIB	SECTION- C1	3.1.3 a)	16 of 519	One (1) No. trolley mounted screw pump for switch yard area waste sump complete with drives, valves, piping, instruments as per P&ID and all other accessories required.	One (1) No. trolley mounted screw pump for switch yard area waste sump complete with drives, valves, piping, instruments as per P&ID and all other accessories required. Supply and erection of discharge buried pipe after pump discharge to E2 sump is in BHEL scope. Supply and erection of pipe from pump discharge to connection point of buried pipe is in bidders scope.
4.	IIB	SECTION- C1	2.5	102 of 519	Clariflocculator Bridge Mechanism	HRSCC Bridge Mechanism
5.	IIB	SECTION- C1	2.5.1	102 of 519	For Flocculator Paddle Drive	For HRSCC Paddle Drive

S. Kumar
Chandrasekhar Verna
23-10-19
Dan-avax



**AMENDMENT ON TECHNICAL SPECIFICATION
FOR
EFFLUENT TREATMENT PLANT (ETP)
1X660 MW PANKI THERMAL POWER STATION**

SPECIFICATION NO.: PE-TS-426-164-A001
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6.	IIB	SECTION-C1	1.08.00	118 of 519	Boiler Area Oily Waste Transfer Pumps (For Pit-1)	Boiler Area Oily Waste Transfer Pumps (For Pit-1 & 2)
7.	IIB	SECTION-C1	1.14.00	119 of 519	Common Oily Waste Water Transfer Pumps	Work Shop Waste Transfer Pump
8.	IIB	SECTION-C1	1.12.00.viii)c) & 1.14.00.viii)c)	119 of 519	Stator - Stator	Stator-Nitrile/EPDM
9.	IIB	SECTION-C1	4.06.00	122 of 519	INLET CHAMBER	Clause deleted
10.	IIB	SECTION-C1	4.08.00 iii)	122 of 519	Type & Construction - Pressure Class	Type & Construction - Radial RCC
11.	IIB	SECTION-C1	4.10.03 i)	123 of 519	Pump Required PE - NaOCl-	Pump Required PE - One (1) NaOCl- One (1)
12.	IIB	SECTION-C1	4.11.00 iii)	124 of 519	Construction - RCC	Construction - RCC, outdoor location with 5 mm thick coal tar epoxy screed lining
13.	IIB	SECTION-C1	4.22.00.iii)	126 of 519	Type of Tank - Above ground, fully covered, RCC tank	Type of Tank - MS Rubber Lined, Fully Covered.
14.	IIB	SECTION-C1	4.31.00.ii)	128 of 519	Vessel MOC - SS	Vessel MOC - SS-316
15.	IIB	SECTION-D	6.2	321 of 519	The functional guarantees of the equipment under the scope of the Contract shall be as per "Chapter 8 - Functional Guarantee & LD", Volume-II. These guarantees shall supplement the general functional guarantee provisions covered under General Conditions of Contract.	Bidder shall refer Annexure-II-Functional Guarantees and Liquidated Damages of the specification

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AMENDMENT ON TECHNICAL SPECIFICATION
FOR
EFFLUENT TREATMENT PLANT (ETP)
1X660 MW PANKI THERMAL POWER STATION

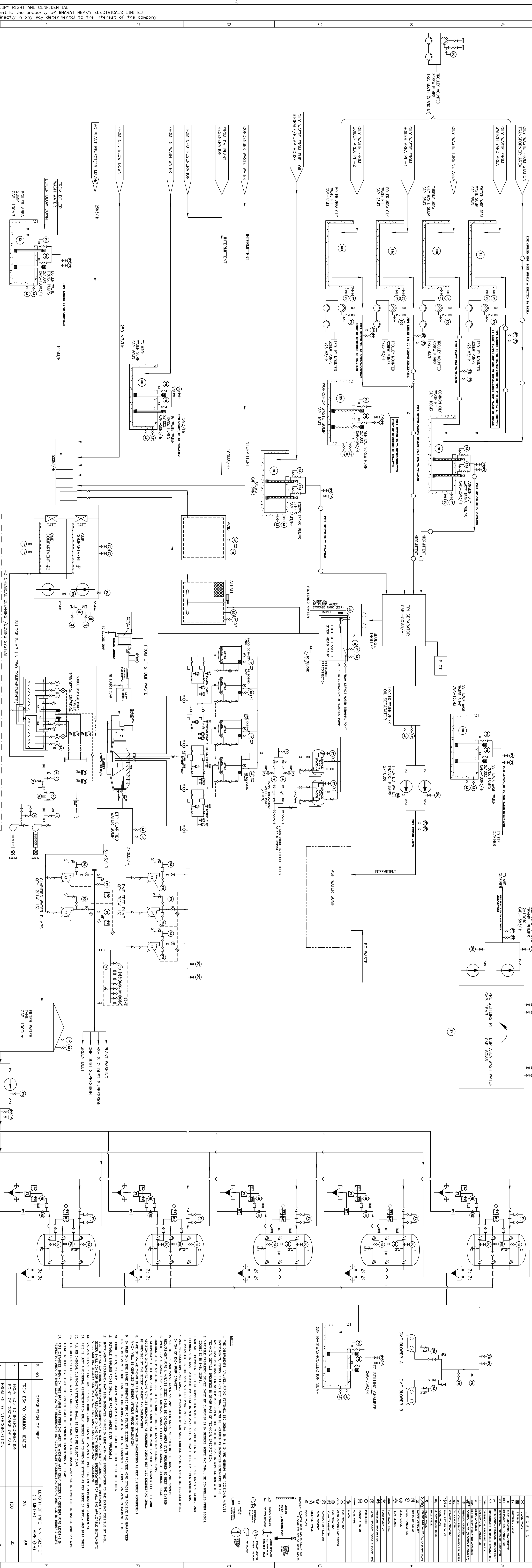
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NEW CLAUSES / SCOPE ADDED:

Sl no.	Vol. No.	Section/ Description	Clause no	Page no	Description
1.	IIB	SECTION - C1	3.4.7.102	Page 23 of 519	RCC tank construction shall be in BHEL scope, however tank lining as mentioned in specification, data sheet or elsewhere shall be supplied by bidder also tank lining shall be applied by bidder.
2.	IIB	SECTION - C1	3.4.7.103	Page 23 of 519	MOC for piping valves & fittings for chemical dosing system - MS/GI for lime and CPVC PN 10 for others.
3.	IIB	SECTION - C1	4.4	Page 106 of 519	CONTROL & INSTRUMENTATION (MANDATORY SPARES) pH, Conductivity and turbidity Analyzer a. Flow Through type cell and electrode - 1 no. of each type b. Electronic Transmitter unit without sensor - 1 no. of each type c. Pre-fabricated cable with connector - 1 Set
4.	IIB	SECTION-D			Detailed specification for "GENERAL REQUIREMENT FOR MISCELLANEOUS TANKS" is enclosed. Bidder to follow the same for ETP package.

28/10/19

Signature



SL. NO	Interpretation of Pipe	Length of Pipe Max. Size of (in. Metric) (in. Metric)
1.	FROM ELS TO COMMON HEADER	25
2.	FROM ELS TO INTERCONNECTION	65
3.	FROM ELS TO DISCHARGE OF ELS	150
4.	FROM ELS TO INTERCONNECTION POINT OF DISCHARGE OF ELS	40
5.	FROM COMMON HEADER NEAR ELS TO 1st	450
6.	FROM 110 TO E2	100
7.	FROM 110 TO 1st	300
8.	FROM 110 TO 2nd	80
9.	FROM 110 TO 3rd	550
10.	FROM 110 TO 4th	715
11.	FROM 110 TO 5th	100
12.	FROM 110 TO 6th	150
13.	FROM 110 TO 7th	450
14.	FROM 110 TO 8th	150
15.	FROM 110 TO 9th	150
16.	FROM 110 TO 10th	150
17.	FROM 110 TO 11th	150
18.	FROM 110 TO 12th	150
19.	FROM 110 TO 13th	150
20.	FROM 110 TO 14th	150
21.	FROM 110 TO 15th	150
22.	FROM 110 TO 16th	150
23.	FROM 110 TO 17th	150
24.	FROM 110 TO 18th	150
25.	FROM 110 TO 19th	150
26.	FROM 110 TO 20th	150
27.	FROM 110 TO 21st	150
28.	FROM 110 TO 22nd	150
29.	FROM 110 TO 23rd	150
30.	FROM 110 TO 24th	150
31.	FROM 110 TO 25th	150
32.	FROM 110 TO 26th	150
33.	FROM 110 TO 27th	150
34.	FROM 110 TO 28th	150
35.	FROM 110 TO 29th	150
36.	FROM 110 TO 30th	150
37.	FROM 110 TO 31st	150
38.	FROM 110 TO 32nd	150
39.	FROM 110 TO 33rd	150
40.	FROM 110 TO 34th	150
41.	FROM 110 TO 35th	150
42.	FROM 110 TO 36th	150
43.	FROM 110 TO 37th	150
44.	FROM 110 TO 38th	150
45.	FROM 110 TO 39th	150
46.	FROM 110 TO 40th	150
47.	FROM 110 TO 41st	150
48.	FROM 110 TO 42nd	150
49.	FROM 110 TO 43rd	150
50.	FROM 110 TO 44th	150
51.	FROM 110 TO 45th	150
52.	FROM 110 TO 46th	150
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79.	FROM 110 TO 73rd	150
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107.	FROM 110 TO 101st	150
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110.	FROM 110 TO 104th	150
111.	FROM 110 TO 105th	150
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114.	FROM 110 TO 108th	150
115.	FROM 110 TO 109th	150
116.	FROM 110 TO 110th	150
117.	FROM 110 TO 111st	150
118.	FROM 110 TO 112nd	150
119.	FROM 110 TO 113rd	150
120.	FROM 110 TO 114th	150
121.	FROM 110 TO 115th	150
122.	FROM 110 TO 116th	150
123.	FROM 110 TO 117th	150
124.	FROM 110 TO 118th	150
125.	FROM 110 TO 119th	150
126.	FROM 110 TO 120th	150
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346.	FROM 110 TO 340th	150
347.	FROM 110 TO 341st	150
348.	FROM 110 TO 342nd	150
349.	FROM 110 TO 343rd	150

NOTE: PIPE DIAMETER/SIZE MENTIONED IS MINIMUM TO BE FOLLOWED BY BIDDER. HOWEVER IF ANY HIGHER SIZE OF PIPE IS REQUIRED SAME SHALL BE PART OF BIDDER'S SCOPE WITHOUT ANY IMPLICATION TO BHEL.

CUSTOMER.	UTTAR PRADESH RAYU VIDYUT UTPADAN NIGAM LIMITED	
CONSULTANT.	DEVELOPAMENT CONSULTANTS PRIVATE LIMITED	
PROJECT.	1 X 660 MW PANKI THERMAL POWER STATION	
	BUILDING HEAVY ELECTRODIALS LTD.	426

DISTRIBUTION				PROJECT ENGINEER: MAACHEN	
REV	DATE	ALT	CHD	APPD	
THIS DRAWING AND APPENDICES HEREIN ARE THE PROPERTY OF BLAGH HAVAN ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interests of the company.		NO. 100		DATE: 21-10-2019 BY: 21-10-2019 CHECKED BY: 21-10-2019 DESIGNED BY: 21-10-2019	
P&I DIAGRAM FOR					

CHAPTER 35: GENERAL REQUIREMENT FOR MISCELLANEOUS TANKS**35.1 General**

35.1.1 This section covers the design, supply of steel pipes and plates, structural steel and all accessories as required, paints and protective paintings as specified and as required, fabrication, erection, painting, testing of Fabricated & Miscellaneous Tanks with accessories as specified and associated civil works.

35.2 Codes & Standards

The design, manufacture and testing of tanks shall comply with the requirements of one or more of the following standards as applicable.

- 35.2.1 IS-805: Code of practice for use of steel in gravity water tank.
- 35.2.2 IS-816: Code of practice for use of metal arc welding for general construction in mild steel.
- 35.2.3 IS-9595: Metal arc welding of carbon and carbon manganese steels – Recommendations.
- 35.2.4 BS EN 12285-1&2: Workshop fabricated horizontal cylindrical steel tank.
- 35.2.5 IS-10987: Horizontal Cylindrical storage tank for Petroleum products.
- 35.2.6 IS-803: Code of practice for design, fabrication and erection of vertical mild steel cylindrical welded oil storage tanks.
- 35.2.7 IS-804: Code of practice for material, design, fabrication and erection of rectangular pressed steel tanks.
- 35.2.8 API-650: Welded Steel Tanks for Oil Storage

35.3 Miscellaneous Steel Tanks : General Requirements

35.3.1 The connections, accessories and fittings to be supplied with each tank shall be as specified and as required. The piping material required inside or outside up to the flanged terminal shall be supplied by the Contractor.

Tank connections shall be provided with suitable counterflanges with necessary bolts, nuts & gaskets by the Contractor.

35.3.2 The tank, where applicable, shall be complete with supporting structure, legs or pedestals, base plate, anchor bolts, nuts & sleeves etc. as required.

35.3.3 The special fittings, e.g. conservation vent valves, level indicators etc. shall also be supplied by the Contractor.

35.3.4 Preparation of detailed design, fabrication drawings, bill of materials, tag and piece numbers, welding procedure, etc.

Stiffeners where not specified and other structural framing for supporting tank shell shall be designed by the Contractor including supply of materials for the same.

- 35.3.5 This specification covers supply of steel plates, structural steel, pipes etc. as required.
- 35.3.6 The scope of work under this specification includes excavation and backfilling work required for installation of pipes running underground.
- 35.3.7 All pipe supports, thrust blocks, etc. as required will be properly designed and constructed by the Contractor in accordance with approved drawings. Necessary steel work at supports shall also be supplied, fabricated and erected by the Contractor.
- 35.3.8 The final fixing grout over the concrete support or through the opening left in the concrete work shall also be done by the Contractor.
- 35.3.9 The designer and manufacturer of storage tanks shall comply with and obtain approval of all currently applicable statutory regulations and safety codes in the locality where the equipment will be installed. The tanks shall conform to IS 803 / IS 804 / IS 805 / IS 2825 / API 650 / IS 4049 / IS 4682 (part-I) and IS 4864 to 4870 / ASME B& PV code Sec.-VIII as the case may be

35.4 DESIGN AND CONSTRUCTION

- (a) Design of all vertical atmospheric storage tanks containing water, acid, alkali and other chemical shall conform to IS: 803 & API 650.
- (b) Design of all horizontal atmospheric storage tanks containing water, acid, alkali and other chemicals shall generally conform to IS:2825 as regards to fabrication and general construction taking care of combined bending, shear & hoop stresses developed due to supporting arrangement.
- (c) Design temperature of vessels shall be 10 deg. C higher than the maximum temperature that any part of the vessel is likely to attain during the course of operation.
- (d) Tank shall be made from mild steel plates to BS 4350/IS-2062 Gr. B (or equivalent).
- (e) The joint efficiency factors to be adopted for design calculations shall be in accordance with the specified design code.
- (f) Tank shall be provided with suitable supporting joints. All vessels shall be provided with lifting lugs, eye bolts etc. for effective handling during erection.
- (g) The material for flanges shall be of ASTM A 105/IS-2062 Gr. B.
- (h) For cylindrical tanks, the plates shall be cold rolled through plate bending machine by several number of passes to true curvature.
- (i) Vessel seams shall be so positioned that they do not pass through vessel connections. For cylindrical vessel consisting of more than two sections longitudinal seams shall be offset.

- (j) Tanks shall be provided with float operated level indicators/level gauges/level transmitters and level switches, as required, with complete assembly. Suitable flanged pads for level switches mounting shall also be provided. The level indicator can be top or side mounted as the case may be.
- (k) In addition to inlet and outlet nozzles, the tanks shall be provided with vents, overflow, drain nozzles complete for various connections on tanks. Overflow lines from storage tanks is to be routed to the nearest surface drains. For tanks containing DM water, alkaline water or power cycle water the vent to atmosphere shall be through carbon-di-oxide absorber vessel suitably mounted on the tank. CO₂ absorber vessel shall be provided with the initial fill of chemicals. Similarly for equipment cooling water overhead tank, the overflow & drain from tank shall be combined together and shall be led to nearest drain (at zero level) via. a seal-trough so as not to come directly in contact with atmosphere.
- (l) Tanks shall have suitable stairs/ladders walking arrangement on inside and outside of the tanks, manholes/inspection covers as required and also platform suitably located.
- (m) Tank supporting arrangement as approved by Employer shall be provided with all plates/angles/joints/flats and supporting attachment including lugs, saddles, legs etc.
- (n) Piercing nozzles/pipes from tank body/dish ends shall be adequately compensated as per relevant code.
- (o) Tank fabrication drg. and design calculations shall be approved by the Project Manager.

35.5 Technical Requirements

- 35.5.1 Tanks shall be suitably constructed for safe, proper and continuous storage of liquid described. The design code, material standard, minimum plate thickness, size and other details shall be as per the specified Codes and Standards as applicable.
- 35.5.2 For cylindrical tanks, the plates shall be cold rolled through plate bending machine by several number of passes to true curvature.
- 35.5.3 Vessel seams shall be so positioned that they do not pass through vessel connections. For cylindrical vessels consisting of more than two sections, longitudinal seams shall be offset.
- 35.5.4 Where possible, the inside seam weld shall be ground smooth, suitable for application of corrosion resistant primer.
- 35.5.5 Due consideration for wind load and/or earthquake effect shall be given by the Contractor in the design of tanks. Data for wind load and earthquake shall be taken as indicated in the Project Information of this specification. Maximum allowable stresses for design loadings combined with wind or earthquake shall not exceed 133% of stress permitted for the design loading condition but in no case shall exceed 80% of specified minimum yield strength of the material.

- 35.5.6 Except where otherwise indicated in the Purchaser's drawings/ specifications, if the stiffening of the shell and/or roof is necessary the same shall be stiffened from outside.
- 35.5.7 Reinforcement pads in tank connections shall be provided as per applicable code & the reinforced connection shall be completely preassembled into a shell plate. The completed assembly including the connection shall be thermally stress-relieved as per API Standard 620 if specified.
- 35.5.8 All welding shall be done as per IS-816, IS-817 and IS-9595, latest revision as applicable. All welds are to be continuous welds. Bidder shall clearly state in his offer the make and type of welding rods proposed by him for fabrication. Inspection of welding shall be carried out in accordance to IS-822 and IS-9595. Welding sequence shall be adopted in such a way so as to minimise the distortion due to welding shrinkage, Contractor shall indicate in his Drawing the sequence of welding proposed by him which should meet prior approval of the Purchaser/Consultant.

35.6 Tank Connections

- (a) Bidder shall furnish all piping material required for the tank connections.
- (b) Unless otherwise specified, for all flanged connections Bidder shall furnish suitable counterflanges and the necessary nuts, bolts, gaskets etc.
- (c) Flange faces of all nozzles shall be machined and square with the vessel centrelines.
- (d) Unless otherwise stated, bolts and nuts shall be of hexagonal head conforming to IS-1357, latest revision.
- (e) The material and thickness of gaskets shall be suitable for the specified service. On completion of hydraulic test, Contractor shall replace the gaskets used during testing at his own cost.
- (f) All tanks shall be provided with connections for drains, vents and overflow.

35.7 Accessories

The tanks shall be provided with following minimum accessories as indicated in the Specification. All the accessories shall conform to relevant Indian Standards.

- a) **Level transmitter**
SMART (HART) type D.P. level transmitters shall be provided for continuous level measurement as well as for alarm/Interlock (wherever applicable).
- b) **Level gauge**
Reflex type Gauge Glass shall be provided at each tank.
- c) Where the tank height exceeds 2 M, vertical ladder is to be provided with cage.

- d) Top Manhole shall be provided in all tanks. Manhole size shall be 600 mm NB (minimum).
- 35.8 When installation of tank is specified the recommendation regarding installation in BS EN 12285-1 & 2 shall be followed in general. In addition to those recommendations, the following shall also be taken care of.
- 35.9 The finished tank grade for cylindrical tank shall be crowned from the outer periphery to the centre with a slope. The sloping factor shall be taken as 1:35 unless otherwise specified.
- 35.10 Welding shall be done in accordance with IS-816, IS-817, IS-822 & IS-9595.
- 35.11 Welding sequence shall be adopted in such a way so as to minimise the distortion due to welding shrinkage. Contractor shall indicate in his drawing the sequence of welding proposed by him which should meet prior approval of the Engineer.
- 35.12 **Corrosion Protection**
- (a) A corrosion allowance, applicable to surface in contact with corrosive media, when required, shall be taken into consideration.
- (b) Manholes shall be provided for easy access into the vessels. The size shall be minimum 500 mm and will be with cover plate, nuts bolts, etc. to ensure leak tightness at the test pressure.
- (c) Each tank shall be provided with drilled cleats welded to the tank for electrical grounding. Material of cleats shall be same as that of the shell.
- (d) Epoxy-coating shall be provided on the inside of vessel in three coats (minimum) resulting in total thickness of not less than 150 micron in which ever case required, such as equipment cooling water overhead tank, sodium hydroxide tank, condensate storage tank, condensate surge tank etc.
- 35.13 **Cleaning & Painting**
- (a) Inside surface of all tanks shall be protected by anti-corrosive paints as required.
- (b) For tanks/vessel requiring epoxy painting, all inside surface shall be blast cleaned using non-siliceous abrasive after usual wire brushing.
- (c) Outside surfaces of all vessels shall be provided with two coats of primer with three (3) coats of epoxy resin based paint of approved color.