CHAPTER – B1
ERECTION WELDING PRACTICES FOR SA335 P91/P92, SA182 F91/F92 & SA217 C12A MATERIALS

1.0 SCOPE:

1.1. This document details out the practices to be adopted during erection of SA335 P91/P92,SA182 F91/F92 and SA 217 C12A materials.

2.0 MATERIAL:

2.1 Pipe materials shall be identified as follows:-

1) Colour codes given by the MUs.
2) Hard Stamping: Specification, Heat No, Size.
3) Paint / Stencil: WO DU, as per the relevant drawing & document.

2.2 When any defect like crack, lamination, and deposit noticed during visual examination the same shall be confirmed by Liquid Penetrant Inspection. If confirmed, it shall be referred to unit.

3.0 ERECTION:

3.1 Edge Preparation and fit up:

3.1.1 Cutting of P91/P92/F91/F92 material shall be done by band saw / hacksaw / machining / grinding only.Edge preparation (EP) shall be done by grinding/machining. During machining /grinding, care shall be taken to avoid excessive pressure to prevent heating up of the pipe edges.

3.1.2 All Edge Preparations done at site shall be subjected to Liquid Penetrant Inspection (LPI). Weld build-up on Edge Preparation is prohibited.

3.1.3 The weld fit-up shall be carried out properly to ensure proper alignment and root gap. Neither tack welds nor bridge piece shall be used to secure alignment. Partial root weldof minimum 25mm length by GTAW at minimum 4 locations and fit-up by a clamping arrangement is recommended. Use of site manufactured clamps for fit up is acceptable.The necessary purging and preheat shall be done as per clause 3.3 and 5.0 respectively. Welding shall be done employing IBR qualified welders only.

3.1.4 The fit-up shall be as per the drawing. Root gap shall be 2 to 2.5mm and root mismatchshall be within 1.6mm. Suitable reference punch marks shall be made on both the pipes (at least on three axis).

a) At 200 mm from the EP for UT.
b) At 1000 mm from the EP for identifying weld during PWHT.

3.2. Fixing of thermocouple (TC) and heating elements during preheating and PWHT:

3.2.1 Heat Treatment Manual (AA/CQ/GL/011/ PART II-HTM-Latest),Chapter 1, Clause no. 3.1.1, 3.1.5, 3.2.1, 3.2.2&3.2.6shall be referred for guidelines for fixing of thermocouples and heating elements on the jobs

3.3 Arrangement for purging:

3.3.1 Argon gas conforming to Gr 2 of IS 5760 (latest) shall be used for purging the root side of weld. The purging dam (blank) shall be fixed on either side of the weld bevel prior to pre-heating. The dam shall be fixed inside the pipe and it shall be located away from the heating zone. Purging shall be done for root welding(GTAW) followed by two filler passes of SMAW in case of butt welds. Purging is not required in the case of nozzle and attachment welds, when they are not full penetration joints.

3.3.2 The flow rate which shall be maintained during purging is 10 to 26 litres/minute. Purging shall be started from inside of pipe when root temperature reaches 220°C. Continuous and adequate Argon Gas shall be provided to ensure complete purging in the root area. The minimum pre-flushing time for purging before start of welding shall be 5 minutes, irrespective of the pipe size.

3.3.3 Wherever possible, solid purging gas chambers shall be used which shall be removed after welding. If not possible, only water-soluble paper is to be used. Plastic foils that are not water-soluble are NOT acceptable.

3.3.4 **Using Aluminium dam arrangement:**

In order to retain the Argon gas at the inside of the pipe near root area of the weld joint, the purging dams made of Aluminium (or other suitable material like mild steel) and permanent gaskets may be provided during the weld fit-up work similar to one as indicated in the Figure B2.1.The Aluminium discs shall be firmly secured with a thin wire rope. After completion of the root welding followed by two filler passes, the disc shall be pulled outwards softly.

CAUTION: ENSURE REMOVAL OF PURGE DAM ARRANGEMENT AFTER WELDING

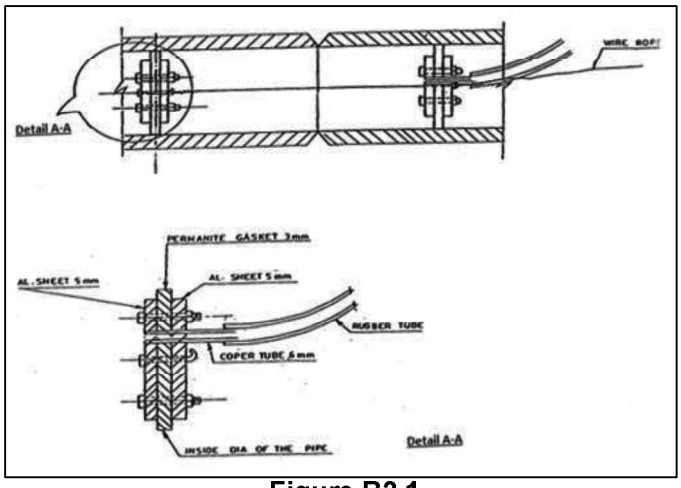


Figure B2.1

3.3.5 **Using water soluble paper:**

The dams can be made of water-soluble paper/water soluble tissue paper for creating the purging chamber. The advantage in such dam arrangement is that dissolving in water can flush thedams. The following are different methods used.

The Purge damming process illustrated as below:

3.3.5.1. For small diameter pipes, simply stuff water soluble paper/water soluble tissue paper into each section to be joined(Refer Figure B2.2).

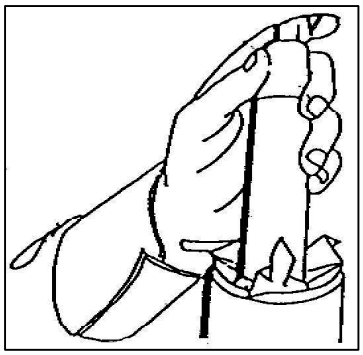


Figure B2.2

3.3.5.2. For larger pipes, cut out a circular aluminium foil disc slight larger than the diameter and shape it to the inside pipe circumference. (A small hole may be punched in the paper to ensure complete evacuation of air when purging)(ReferFigureB2.3).

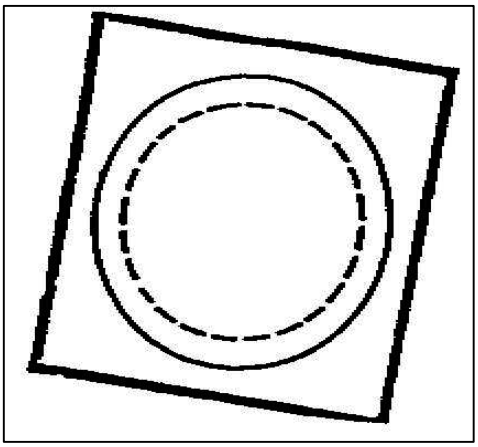


Figure B2.3

3.3.5.3. Position the disc within the pipe and tape in place with water soluble paper. Repeat procedure for other section. Insert the backing gas into the joint with a needle valve and make root pass in the usual manner (Refer Figure B2.4).

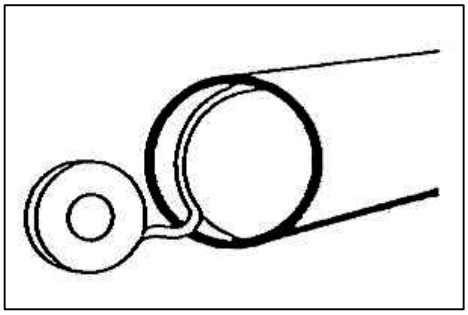


Figure B2.4

3.3.5.4. For pipes larger than 508 mm diameter, simply splice two sheets of water soluble paper together with water soluble tape as per Figure B2.5 and repeat procedure as shown in Figure B2.3 and B2.4 above.

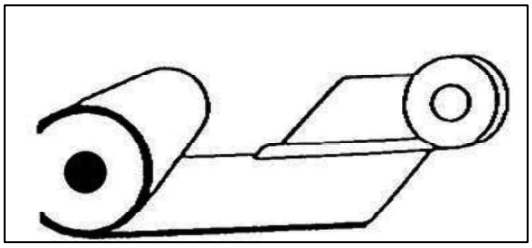


Figure B2.5

4.0 WELDING / WELDERS QUALIFICATION:

Welders Qualified as per IBR and qualified at site with Gr.91/Gr.92 material only shall be engaged. Welders log book shall be maintained and welders performance shall be monitored by site engineer. The applicable WPS as per FWS shall be followed for welder qualification and welding.

5.0 PREHEATING:

Heat Treatment Manual (AA/CQ/GL/011/ PART II-HTM-Latest),Chapter 1, Clause 3.1 shall be referred for guidelines for preheating.

6.0 WELDING:

6.1 Root Welding shall be done using GTAW process (as per WPS) five minutes after the start of argon purging. Filler wire shall be cleaned and free from rust or oil. Argon Purging shall be continued till minimum two filler passes of SMAW.

6.2 The inter-pass temperature shall not exceed 350°C. After completion of welding bring down the temp to 80–100°C and hold it at this temperature for one hour minimum. The PWHT shall commence after completing one hour of holding.

7.0 STORAGE OF WELDING CONSUMABLES:

Refer Chapter A3, Section A-3.4of this Manual for guidelines which shall be followed for receipt, storage, drying & holding and issue of welding consumables.

CAUTION:No LPI / Wet MPI/UT shall be carried out on weld before PWHT

8.0 POST WELD HEAT TREATMENT:

8.1 Heat Treatment Manual (AA/CQ/GL/011/ PART II-HTM– Latest), Chapter 1, Clause no. 3.2 shall be referred for guidelines on PWHT. In addition, the below requirements and precautions shall also be followed:

8.2 Welding and PWHT shall be monitored every one hour by site authorized personnel.

8.3 Preventive measures during power failure and non-functioning of equipment: No interruption is allowed during welding and PWHT. Hence all the equipment for the purpose of power supply, welding, heating etc., shall have alternative arrangements.(Diesel generator for providing power to the welding and heating equipment, standby welding and heating equipment, reserve thermocouple connections, gas burner arrangement for maintaining temperature etc.). Following preventive measures shall be adopted until normal power supply or backup power supply through diesel generator is restored.

8.3.1 **Interruption during start of preheating**:

In case of any power failure/interruption during preheating, the weld fit-up shall be insulated and brought to room temperature. After the electric supply resumes the joint shall bepreheated as per Clause No: 5.0.

8.3.2 **Interruption during GTAW / SMAW:**

Maintain a preheat temperature of 220°C minimum using LPG gas burners till the welding is restarted. In case, preheat temperature is not maintained, an inter-stage stress relieving shall be carried out followed by visual inspection to ensure that no surface cracks are present in the weld, prior to restart of the welding.

8.3.3 **Interruption during cooling cycle**: After SMAW welding completion and cooling to holding temperature at 80 to 100°C, care shall be taken to avoid faster cooling rate by providing adequate insulation. The required temperatureof 80 – 100°C shall be maintained by gas burner arrangements till power resumes / start of PWHT (within 8 hours).

8.3.4 **Interruption during post weld heat treatment**;Heat treatment Manual (AA/CQ/GL/011/ PART II-HTM– Latest), Chapter 1, clause no. 3.2.5 shall be referred for guidelines to be followed for interruption during PWHT.

8.3.5 In all the above cases (8.3.1 to 8.3.4), the temperaturemeasurement on the weld joint shall be recorded using calibrated gauges/instrumentsat regular Intervals of 15 minutes in the log book by SiteEngineer.

8.4 Caution:

The PWHT temperature recorded in the chart shall not deviate from the specified values since any deviations to the specified soaking temperature Range, will adversely affect the mechanical properties of the weldment and may lead to rejection of the weldment. The weld Joints should be kept dry and no water/liquid is allowed to come in contact with the weld or preheated portion of pipe under any circumstances, till PWHT is completed.

9.0 CALIBRATION:

All equipment like recorder, thermocouple, compensating cable, oven thermostat etc. shall have valid calibration carried at BHEL approved laboratories. The calibration reports shall be reviewed and accepted by welding In-charge at site prior to use.

10.0 NONDESTRUCTIVE EXAMINATION (ReferNDE ManualAA/CQ/GL/011/ Part III-NDEM latest):

10.1 All NDE shall be done after PWHT only.Prior to testing all welds shall be smoothly ground.All welds (fillet & butt) shall be subjected to MPI (MPI shall be done by YOKE type only). In addition to MPI, butt-welds and all full penetration welds shall be examined by UT.

UT procedure shall be as per BHE: NDT: PB: UT21 with additional requirementsas in (a) through (e):

a) The calibration blocks used shall be of the same product form and material specification or equivalent P-Number grouping as one of the materials being examined. P-Nos. 1, 3, 4, 5A through 5C, and 15A through 15F materials are considered equivalent for this purpose.

b) The UT equipment shall be calibrated prior to use and should be of 'digital type' capable of storing calibration data as well as ultrasonic test results as per procedure numberBHE:NDT:PB:UT-21.

c) All recordable indications shall be stored in memory of – either the digital flaw detector or a PC for review at a later period.

d) The equipment calibration data for specific weld as well as the hard copy of 'Static echo-trace pattern' – showing the flaw-echo amplitude with respect to DAC, flaw depth, projection surface distance (probe position) and beam-path shall be attached to UT test report. This hard-copy of echo-trace with equipment calibration data shall form part of test documentation.

e) The examination as well as evaluation shall be performed by a qualified Level II personnel, and a test report shall be issued. Any defect noticed during NDT shall be marked with marker.

11.0 REPAIR OF WELD JOINTS:

11.1 Weld repair at root:

If any surface defect is revealed at the time of visual inspection during root welding, the following steps shall be followed:

1. Maintain the temperature at 80-100°C for 1 hour.
2. Perform inter-stage PWHT.
3. Remove the defect by grinding.
4. After complete removal of defect, preheat the weld area to 220°C minimum and re weld with GTAW before starting SMAW, if required.

11.2 Weld repair on completion:

11.2.1 Any defect observed on the weld shall be brought to the notice of Site engineer. Any repair on weld shall be carried out with their approval only.

11.2.2 If any defects are noticed on the fully completed weld while performing UT after completion of PWHT, the depth of the defect shall be locatedfrom the weld outside surface. The defect area shall be marked and repaired as below:

a) The weld shall be removed by grinding (gouging not permitted) such that the area for repair welding shall be free from sharp corners and provided with sufficient slope towards the weldface sides.

b) Surface examination (MPI/LPI) on the ground area shall be performed to ensure complete defect removal before re-welding. Repair welding shall be carried as per the applicable WPS as for original welding.

12.0 HARDNESS SURVEY:

Hardness shall be measured using portable hardness tester.The equipment used for the hardness measurement shall be calibrated as recommended by the equipment manufacturer.

The surface shall be cleaned and prepared as per hardness test instrument manufacturer's recommendation prior to hardness survey.Hardness survey shall be done on each joint at three locations along the circumference. At each location three readings shall be taken on weld and parent metal .The readings on the parent metal shall be taken within 15mm from the edge of the weld.All the hardness values shall be recorded.

The hardness of the weld metal and the base metal in the soak band (heating band), excluding welding heat-affected zone shall be between 160HB & 300HB for Gr.91 and Gr.92 joints. The hardness measurements shall be recorded in the format as given in Annexure IX.Joints having hardness above 300HB shall be re-heat treated

and hardness shall be checked again. If hardness is still more, the case shall be referred to concerned MUs/ECs.In case Hardness falls below 160HB also, the case shall be referred to the concerned MUs/ECs.

Cautionary note: To achieve meaningful and consistent hardness results, below recommendations should be followed:

- The accuracy of the instrument shall be verified prior to use.
- The surface to be tested shall be reasonably flat and free of scale and oxides, grease, paint, etc.
- Prior to hardness test, the de-carburized surface layer with a thickness up to 0.8mm shall be removed by grinding/buffing, without encroaching the specified minimum wall thickness of the pipe/tube.

ANNEXURE IX – HARDNESS MEASUREMENT

BHARAT HEAVY ELECTRICALS LTD

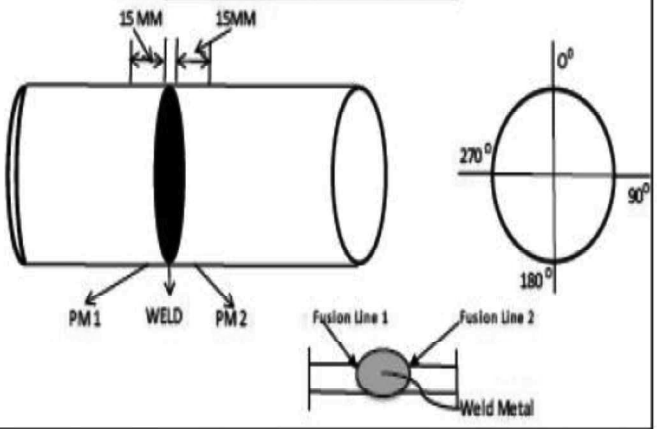
T91/T92/P91/P92/F91/F92/C12A HARDNESS TESTING PROTOCOL

PROJECT NAME :	UNIT No. :	Customer Name :
Report No.:	Date :	Contractor :
Description :	Specn :	Stage of test : After PWHT
Calibration Block No.:	Equipment details:	
PGMA :	Model No :	
JOINT NO. :		

Location	PM 1	WELD	PM 2
Readings	AVERAGE OF 3 READINGS	AVERAGE OF 3 READINGS	AVERAGE OF 3 READINGS
12 O'Clock/ 0^0			
3 O' Clock/ 90^0			
6 O'Clock/ 180^0			
9 O'Clock/ 270^0			

PM: PARENT MATERIAL (15 MM FROM THE WELD FUSION LINE). ALL AVERAGE READINGS SHOULD BE LESS THAN THE PERMISSIBLE HARDNESS VALUE.

HARDNESS TEST LOCATIONS SKETCH



Gap between successive reading shall be 1mm in the same spot

RECOMMENDATION / RESULT : ACCEPTED / NOT ACCEPTED / RE-PWHT

	AGENCY	NAME	SIGNATURE & DATE
INSPECTED BY	CONTRACTOR		
CHECKED BY	BHEL		
WITNESSED BY	CUSTOMER		

13.0 COMBINATION WELDING:

For other combination of materials with Gr.91/Gr.92, the applicableWPS for the same shall beobtained fromconcerned MUs/ECs.

14.0 DEMAGNETIZATION:

Refer NDE Manual BHEL:PS:NDM:latest Chapter 1.10

15.0 TRAINING:

15.1 The personnel engaged in P91 piping fabrication shall be trained in the following areas.

a. Method and care to be taken during fit-up.

b. Argon gas root purging arrangement.

c. Fixing of thermocouple and wires.

d. Arrangements for Pre/Post heating requirements and methods.

e. Adjustment of heating pads/cables at the time of controlling the temperature within specified tolerance limits during welding or PWHT in case of induction heating.

f. Good knowledge of the WPS requirements.

g. Handling of P91 welding consumables and re-drying conditions.

h. Special precautions to be taken during the power/equipment failure.

i. Weld joints of dissimilar thickness / material specification.

j. Weld defect control and weld repair systems.

15.2 **Specific training for welders:**

a. The qualified welders who will be engaged in P91 welding shall be given training on pipe joints simulated with P91 welding and heating cycle conditions.

b. The acquaintance on welding positions, as applicable shall be given using P91 pipes and P91 welding consumables.

c. Welding techniques and instructions on Dos and DON'Ts of P91 welding.

d. Welders only who are qualified on P91 welding alone shall be engaged.

e. Whenever new welders have to be engaged they shall undergo all the training as above and shall be qualified with P91 material only.

16.0 CONTROL ON WELDERS:

The welder during welding at site follow the following procedures.The welder shall interact with the HT operator (Induction equipment operator) to ensure that preheat and inter-pass temperature during welding are maintained as per requirements.The

welder shall not mix the welding electrodes with that of the other welder. At the end of the shift, the unused electrodes shall be returned to the stores.

17.0 PERSONNEL / CONTRACTORS ENGAGED FOR HEATING CYCLES (HT OPERATOR):

17.1 The Personnel / Contractor shall have adequate heat treat experience on P91 or similar material.

17.2 HT operator shall be aware of the following:

a. The equipment used and its working principle and operation.

b. The procedures to be followed in using heating equipment.

c. Procedure to be followed in case of power failure or equipment non-functioning so that heating cycle is not disrupted.

d. Calibration of equipment.

e. Method of fixing thermocouples and compensating cables leading to HT recorder.

f. Fixing of heating pads or elements on the pipe joints and also in maintaining the temperature within the specified limits.

18.0 NDE PERSONNEL QUALIFICATIONS:

All NDE personnel performing NDT like UT & MPI/LPI shall be qualified in accordance with BHEL Procedure meeting the requirements of recommended practice SNT–TC-IA.MPI & LPI shall be carried out by level I qualified personnel and shall be evaluated by level II qualified personnel. However UT examination and evaluation shall be done by level II qualified personnel.

19.0 LEVEL OF SUPERVISION

Site In charge shall be responsible for the completion of all activities from weld fit-up tofinal clearance of weld joints after satisfactory NDE and acceptance by BHEL/Customer/IBR.

20.0 DO'S AND DON'T'S DURING P 9 1 /P 92 /F9 1 /F92 /C1 2 A WELDING.HEAT TREATMENT AND NDE AT CONSTRUCTION SITE:

20.1 **DO ' S:**

a. Cutting by Band saw/Hack saw/Machining.

b. Pipes Edge Preparation by machining. Machining shall be done without excessive pressure to prevent heating up of pipe

c. Grinding may be done on exceptional cases after approval and taking adequate care to prevent overheating.

d. Thermocouple wire (hot/Cold junctions) shall be welded with capacitor discharge portable spot-welding equipment.

e. Reserve Thermocouples shall be madeavailable,in case of failure of connected thermocouple elements.

f. Ensure adequate Argon Gas for complete purging of air inside the pipe before starting GTAW root welding.

g. Ensure Preheating at 220 °C minimum before GTAW root welding.

h. Start preheating only after clearance from Welding engineer / Quality assurance engineer for weld fit-up and alignment of the joint as well as fixing of Thermocouple connections (for Induction heating)

i. Do visual inspection onroot weld maintaining weld preheating temp.

j. Continue Argon purging until the GTAW root welding followed by minimum two filler passes of SMAW, is completed.

k. Perform partial root welding to facilitate fit-up if necessary.

l. Ensure proper use of TIG wires as identified by color coding or suitable hard punching.

m. Keep the GTAW wires in absolutely clean condition and free from oil, rust, etc.

n. Dry the SMAW electrodes before use.

o. Ensure the inter-pass temperature is less than 350°C.

p. Hold at 80-100°C fora period ofMinimum 1 hour before the start of PWHT.

q. Record entire heating cycle on Chart through recorders.

r. Exercise control during grinding of weld and adjoining base metal while removing surface/sub-surface defects or during preparation for NDE.

s. Ensure no contact with moisture during preheat, welding, post heat and PWHT of Weld Joints.

t. Ensure removal of argon purging arrangements after welding.

u. Use short Arc only. The maximum weaving shall be limited to 1.5 times the Dia. of the electrode.

20.2 DO N' T' s:

a. Avoid Oxy-Acetylene flame cutting.

b. Avoid Weld-build up to correct the weld end-d1 or to set right the lip of the weld bevel.

c. Avoid Arc strike on materials at the time of weld fit up or during welding.

d. Do not Tack weld the Thermocouple wires with Manual Arc/TIG welding.

e. NO GTAW root welding without thorough purging of root area.

f. Do not use Oxy-acetylene flame heating for any heating requirements.

g. Do not use Thermal chalks on the weld groove.

h. Do not stop argon purging till completion of GTAW root welding and two layers of SMAW.

i. No Tack welding or Bridge piece welding is permitted.

j. Do not use unidentifiedTIG wires or electrodes.

k. Do not exceed the maximum interpass temperature indicated in WPS

l. Do not allow moisture, rain, water, cold wind, cold draft etc. to come in contact with the weld zone or heating zone during the entire cycle from preheat to PWHT.

m. Do not exceed the limits of PWHT soaking temperature.

n. Do not Interrupt the Welding/heating cycle except for unavoidable power failures

o. Do not use un-calibrated equipment for temperature measurement during heating, welding, post weld, heat treating etc.

21.0 DOCUMENTATION:

The documentation shall be as per the approved Quality Plan.

CHAPTER – B2
ERECTION WELDING PRACTICES FOR SA 213 T91/T92 MATERIALS

1.0 SCOPE:

1.1 This document details out the practices to be adopted during welding of SA213 T91/T92 material.

2.0 MATERIAL:

2.1 Tube materials shall be identified as follows:-

a) Colour codes given by the Manufacturing Units (MU).

b) Paint / Stencil: WO DU, as per the relevant drawing & document.

2.2 When any defect like crack, lamination, and deposit noticed during visual examination, the same shall be confirmed by Liquid Penetrant Inspection. If confirmed, it shall be referred to unit.

3.0 ERECTION:

3.1 **Edge preparation and Fit up:**

3.1.1 Cutting of T91/T92 material shall be done by band saw/hacksaw/machining/ grinding only. Edge preparation (EP) shall be done by grinding/machining. During machining/ grinding, care should be taken to avoid excessive pressure to prevent heating of the tube edges.

3.1.2 The weld fit-up shall be carried out to ensure proper alignment and root gap. Neither tack welds nor bridge pieces shall be used to secure alignment. Use site fabricated clamps for fit up. Ensure that coil load does not come on stubs/header. Coil load shall be transferred to the crown plate/ end bar assembly. The necessary purging and preheat shall be done as per clause 3.3 and 5.0 respectively.

3.2 **Fixing of thermocouple (TC) and heating elements during preheating and PWHT**

3.2.1 Heat Treatment Manual (AA/CQ/GL/011/ PART II-HTM-Latest), Chapter 1, Clause no. 3.1.1, 3.1.5, 3.2.1, 3.2.2, 3.2.6 & 3.2.7 shall be referred for guidelines for fixing of thermocouples and heating elements on the jobs.

3.3 **Arrangement for purging:**

3.3.1 Argon gas with requisite quality shall be used for purging the root side of weld. The purging dam (water soluble paper) shall be fixed on header nipple side of the weld bevel prior to fit-up and pre-heating. Purging is to be done from cross over tube downstream end. (Refer Figure B3.2 and B3.3). Ensure that atmospheric air is completely purged out through the root gap before starting welding and welding can be continued with Argon backing. The flow rate which shall be maintained for purging is 6 to 8 litres per minute.

3.3.2 When root temperature reaches 220°C, start purging through cross over tube downstream end for 5 minutes. Then the root gap is to be covered by insulating material. Continuous and adequate argon gas shall be provided to ensure complete

purging in the root area. Only water-soluble paper is to be used. Plastic foils that are not water-soluble are NOT acceptable.

3.3.3 Usage of water soluble paper:

3.3.3.1 The dams can be made of water-soluble paper /water soluble tissue paper for creating the purging chamber. The advantage in such dam arrangement is that the dissolving paper dam gets flushed during hydraulic test. The following is the method to be used:

3.3.3.2 Stuff the water-soluble paper/ water soluble tissue paper into the Header Nipples at a distance of 60mm(approximately) from the weld end as per attached Figure B3.1

4.0 WELDING/WELDERS QUALIFICATION:

4.1 Welders Qualified as per IBR and qualified at site with Gr.91/Gr.92 material only shall be engaged. Welders log book shall be maintained and welders performance shall be monitored by site engineer. The applicable WPS as per FWS shall be followed for welder qualification and welding.

5.0 PREHEATING (Bunching of tubes can be followed):

5.1 Heat Treatment Manual (AA/CQ/GL/011/ PART II-HTM-Latest), Chapter 1, Clause 3.1 shall be referred for guidelines for preheating.

6.0 WELDING:

6.1 Welding shall be done as per the WPS. Filler wire shall be clean and free from rust or oil. Argon Purging shall be continued till completion of welding in case of full GTAW and for minimum two filler passes of SMAW in case of GTAW + SMAW.

7.0 POST WELD HEAT TREATMENT (PWHT) – RESISTANCE HEATING METHOD(Bunching of tubes can be followed):

7.1 Heat Treatment Manual (AA/CQ/GL/011/ PART II-HTM– Latest), Chapter 1, Clause no. 3.2.12 shall be referred for guidelines on PWHT.

8.0 HARDNESS SURVEY:

8.1 100% hardness survey shall be conducted on welds and parent material in first five coils. Based on satisfactory results, the hardness survey can be reduced to 10% covering each heat treatment cycles as per FWS requirement. The equipment recommended to measure the hardness is EQUOTIP or equivalent. Portable equipment used in the hardness measurement shall be calibrated.

8.2 The surface shall be cleaned and prepared as per hardness test instrument manufacture's recommendation prior to hardness survey. Hardness survey of weld and parent metal (both tubes) shall be carried out. The hardness shall be between 160HB & 300HB. The hardness measurements shall be recorded in the format as given in Annexure IX. Joints having hardness above 300HB shall be re-heat treated and hardness shall be checked again. If hardness is still more, the case shall be

referred to concerned MUs. In case Hardness falls below 160HB also, the case shall be referred to the concerned MUs.

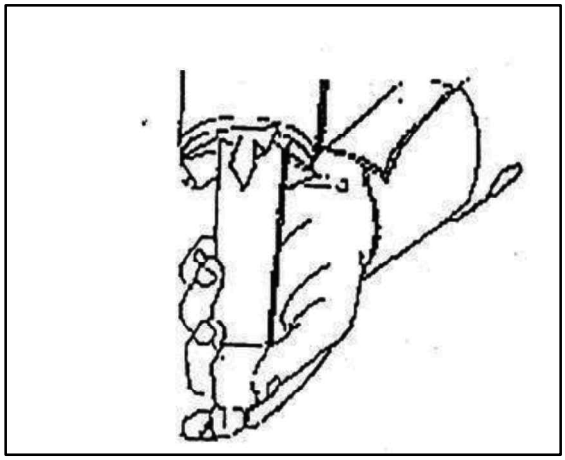


Figure B3.1: Insertion of Water Soluble Tissue paper

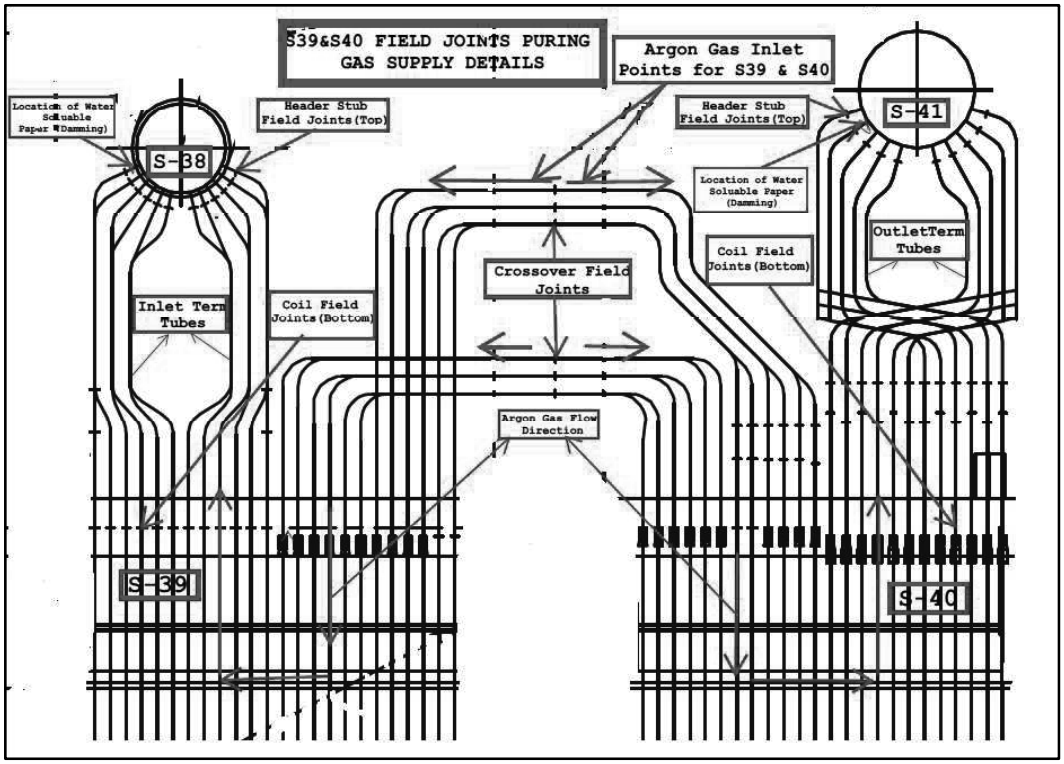


Figure B2.2: Purging Arrangement for SH Header Field Joints

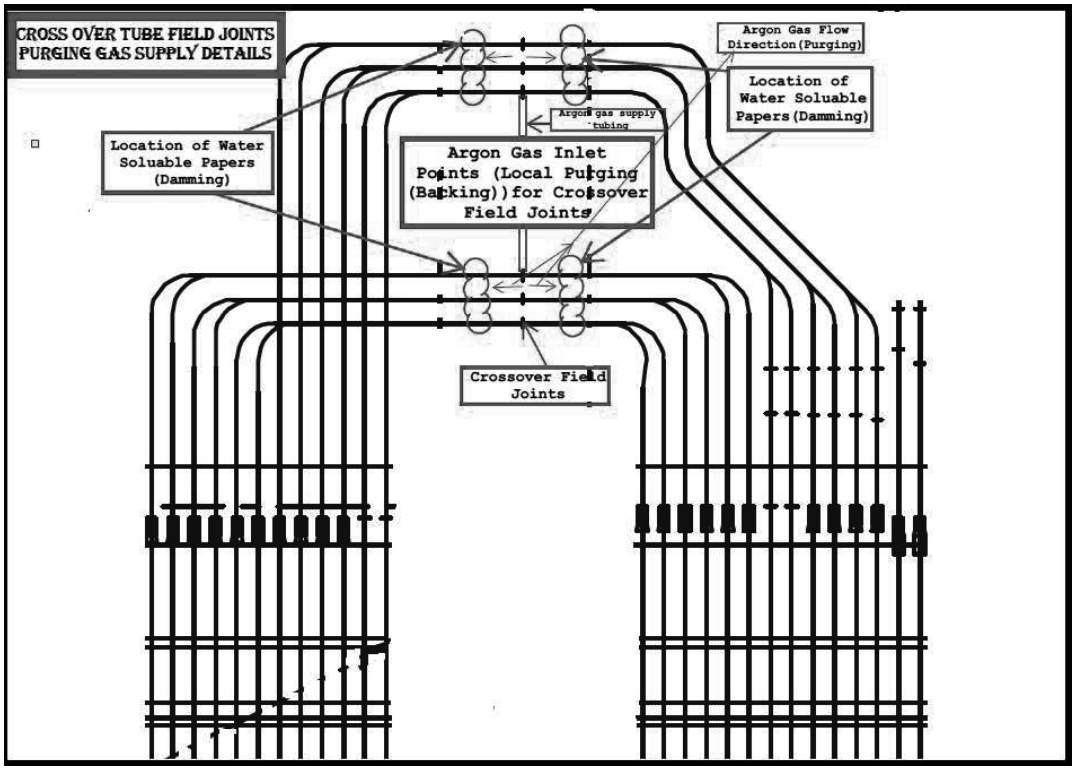


Figure B2.3: Purging Arrangement for Cross Over Tube Field Joints

CHAPTER –B3
ERECTION WELDING PRACTICES FOR SA213 T23 MATERIAL

1.0 SCOPE:

1.1 This procedure is applicable for the welding of T23 tubes at sites.

2.0 Ensure the availability of the following items/characteristics before preparing the joint for welding:

a) LPG gas (for heating in case of interruption in preheating)

b) Grinding machine

c) Mini cutter

d) Conical grinder

e) Proper illumination

f) Thermal chalk or pyrometer

g) Torch light

h) Portable Oven

i) Hacksaw and chisel

3.0 PROCEDURE:

The following procedure shall be followed for T23 Welding at Site:

3.1 Clean the edges of the tube, both OD & ID by buffing upto 30 mm from the edge of the tube.

3.2 Create a purging dam on both tubes at about 200 to 250 mm away from the joint beforefit-up.

3.3 Fit-up the tubes for butt joint with a root gap of 2 to 2.5 mm and ensure a land of 1 to 1.5 mm.

3.4 Set up Argon purging for the tube to tube butt joint.

3.5 Carryout preheating by wrapping heating pads/coils uniformly for a width of 200 mm on both sides of the joint. Each tube should be provided with a thermocouple (K type) at a distance of 75 mm from the joint.(Refer FigureB4.1, B4.2 &B4.3)

3.6 Preheat the joint to a minimum of 200°C and ensure the same with a thermal chalk or a pyrometer before the start of welding.

3.7 Ensure drying of SMAW electrodes at 250 to 300°C for 2 hours and keep them at a temperature of 150°C in a Holding oven after drying.

3.8 The electrodes shall be maintained dry at 65 to 100 °C in a portable oven after issue from the holding oven till use.

3.9 Perform welding as per applicable WPS using IBR qualified welders.

3.10 Ensure the welding of root and second pass by TIG welding process and further layers by SMAW process. Alternatively, the entire joint may be welded by TIG process using the applicable WPS.

3.11 Maintain the Interpass temperature at 350°C max. Ensure the same using thermal chalk or pyrometer after each pass of welding.

3.12 Conduct post heating on the completed weld at 250 to 280°C for a minimum of 1 hour immediately after completion of welding and then allow the joint to cool in air to ambient temperature.(Refer Figure B4. 4)

3.13 Perform RT to ensure that the joints are defect free.

3.14 If RT reveals any unacceptable defect, cut the joint and put a spool piece in place for a minimum length of 200 mm. Repeat the procedure from step 3.1 to 3.13.

3.15 Perform PWHT on the weldment within 7 days after post heating.

3.16 Use only calibrated PWHT accessories (thermocouples, temperature recorder, etc.).

3.17 Use only ceramic resistance pads with low voltage heating arrangement for PWHT.

3.18 Ensure the PWHT arrangement to meet the following conditions;

3.19 When heat treating butt welds, the width of the circumferential heating band on either side of the weld must be at least 3 times the width of the widest part of the weld groove but not less than twice the thickness of the thicker part welded. The width of the insulation band shall be at least twice the total width of the heating band.

3.20 Ensure wrapping of heating pads, location of thermocouples before covering with insulation.(referFigure B4.5& B4.6)

3.21 PWHT shall be carried out with 1 thermocouple per joint.

3.22 PWHT time and temperature shall be as per applicable WPS.

3.23 Measure hardness on the joint and ensure it to be within 160 to 260 HB. If hardness exceeds 260 HB, PWHT shall be repeated and hardness checked. The total no. of PWHT cycles shall not exceed 3 times for a joint.

3.24 In case the hardness measures above 260HB even after 3 PWHT cycles, cut the joint and put a spool piece in place for a minimum length of 200 mm. Repeat the procedure from step 3.1 to 3.23. In case the hardness measures below 160HB, it shall be referred to the MUs.

4.0 DOCUMENTATION:

Record the details of welding carried out in correlation to welders, heat treatment and NDE reports.

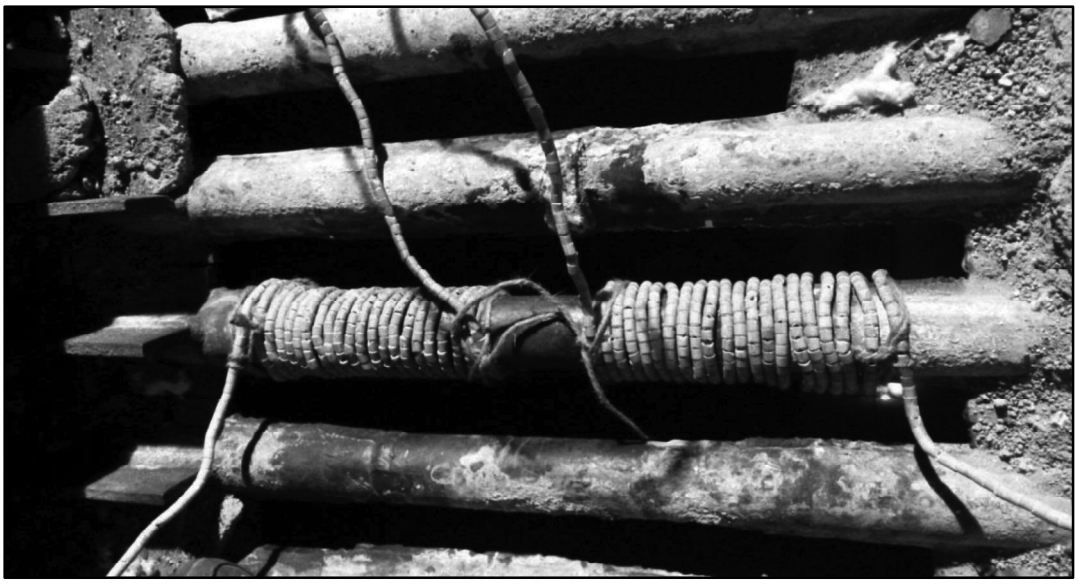


Figure B3.1: Preheating by Resistance coil winding

Figure B3.2: K - Type Thermocouple

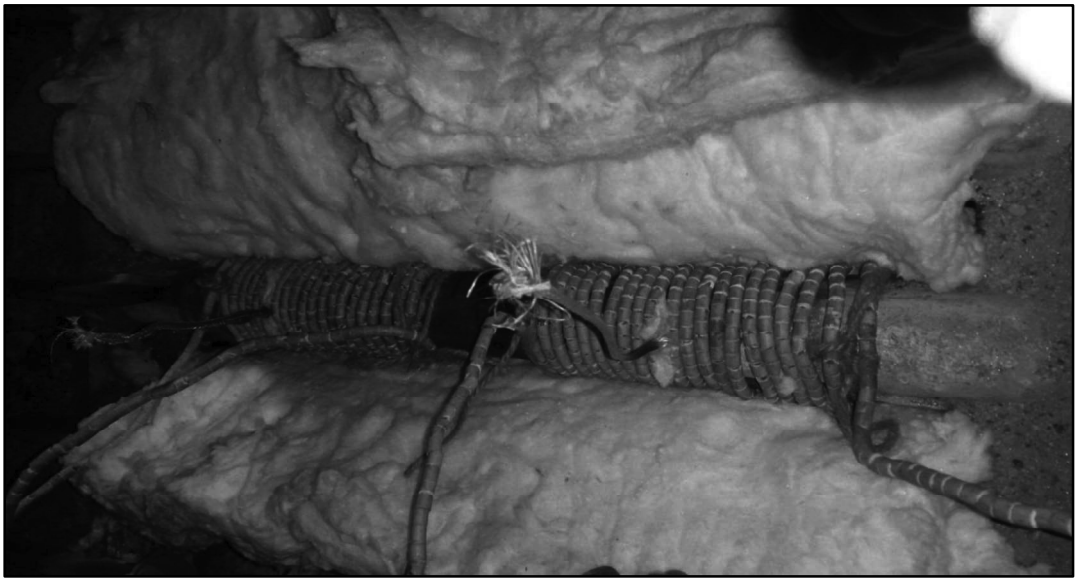


Figure B3.3: Preheating arrangement with thermocouples in place

Figure B3.4: Post heating arrangement

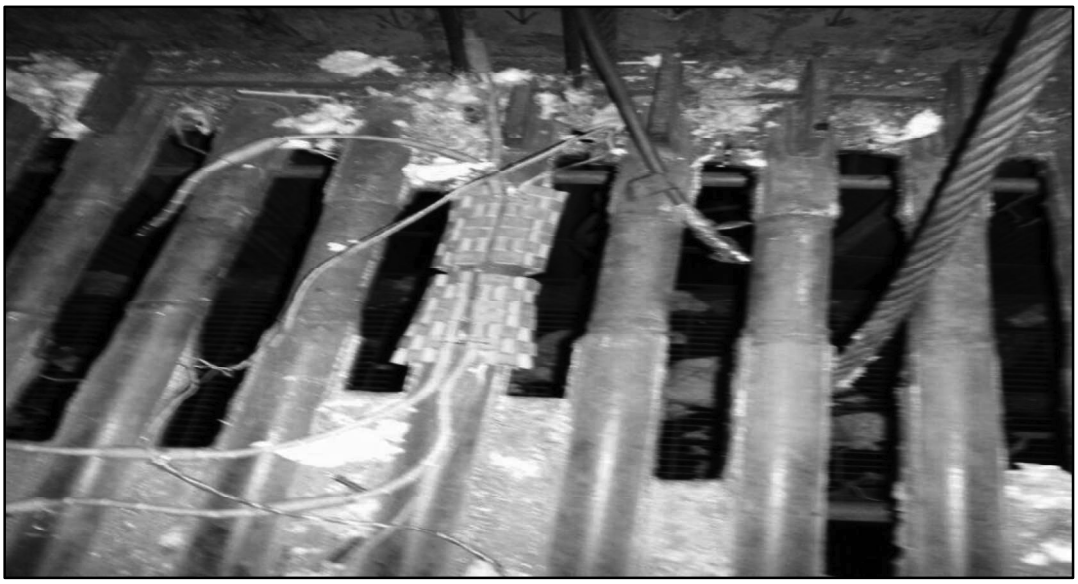


Figure B3.5: Heating pads in place for PWHT

Figure B3.6: PWHT in progress

TELANGANA POWER GENERATION CORPORATION LIMITED
(A Govt. Of Telangana Undertaking)
VidyutSoudha, Hyderabad - 500082.
Phone: 040 – 23499321 Fax: 040 – 23499323.

From:	To:
The Executive Director Thermal Projects Construction, TSGENCO, 2rd Floor, A-Block, VidyutSoudha, Khiarathabad Hyderabad-500 082. edtpctgenco@gmail.com	M/s BHEL, Piping Centre, Chennai-17 Ph:9500127314, E-mail: vishnujyoti@bhel.in

Kind Attention:Smt Vishnujyoti, Manager(Commercial)

Lr.No.ED/TPC/CE/SE-3/EME-14/YTPS(5X800MW)/F.Painting/D.No.99/18,Dt:06.07.2018

Sir,

Sub:- TSGENCO – YTPS(5x800 MW) –Painting Scheme for Piping - Approval-Reg.

Ref:- 1) M/s BHEL Email dt:23-04-2018
2) M/s TCE Email dt: 20-06-2018
3)Lr.No.ED/TPC/SE-3/EME-14/YTPS(5x800MW)/F.PaintingScheme/D.No.86/18,Dt.25-06-18
4) M/s BHEL Email, dt: 27-06-2018
5) M/s TCE Email dt: 05-07-2018

*****

Please refer to the letter 4th cited above, wherein M/s BHEL/Piping Centre, Chennai submitted the Painting Scheme for Piping pertaining to Yadadri TPS (5x800 MW) for review & approval.

Sl.No	Document No	Rev	Description
1.	7295:QPC:11	02	Painting Scheme for Piping

The above Painting Scheme furnished by M/s BHEL/Piping Centre, Chennai is herewith reviewed and approved. An approved copy of the above Painting Scheme is enclosed herewith for taking further necessary action at your end.

However, approval of the above Painting Scheme does not absolve the responsibility of supplying the above equipments to the specifications and relevant standards and to ensure satisfactory performance of the above equipment as per the terms of the contract.

It is requested to upload the approved Painting Scheme in PEDM Portal.

Encl: As above

Yours faithfully,

06/7

EXECUTIVE DIRECTOR/TPC

Copy Communicated to:

1) Chief Engineer/Construction/YTPS Site/Damaracherla/Nalgonda Dist.
2) Sri Y.A.Srinivas Rao, BHEL/PMG Camp Office, Vidyut Soudha, Hyderabad.
3) DE/Tech to Director/Projects/TSGENCO/VS/Hyderabad.
4) M/s Tata Consulting EngineersLimited,73/1,Sheriff Centre, St. Marks road, Bangalore-560 001.
5) M/s TCE /Room No.323 /Site Office/VidyutSoudha/Hyderabad

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE, CHENNAI– 17
QUALITY ASSURANCE & CONTROL DEPT.

PAINTING SCHEME FOR PIPING

PROJECT NAME : - YADADRI TPS - 5X800 MW

BHEL CUSTOMER Nos : 7295,7296,7297,7298,7299,7300&7306

QPNo: 7295:QPC:11
Rev.No: 02
DATE : 03.07.2018

Sl. NO	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate coat			Finish coat				REMARKS
			Primer	No of coats & DFT	Paint	No of coats & DFT	Shade	Paint	No of coats & DFT	Shade	Total DFT Microns (Min.)	
1	2	3	4	5	6	7		9	10	11	12	13
1	Insulated Piping, components (MS / HRH / CRH / Aux Steam lines, ... tanks&vessels)	SSPC-SP3/ Power Tool Cleaning	Red oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744	2 (30 microns per coat.)	-----	-----	-----	-----	-----	Red Oxide	60	
2	Uninsulated Piping, components (Spray Water / Condensate lines ...,Tanks & Vessels)	SSPC-SP3/ Power Tool Cleaning	Red Oxide - Zinc Phosphate (Alkyd base to IS: 12744)	2 (25 Microns per coat)	-----	-----	-----	Synthetic enamel Long oil Alkyd to IS: 2932	3 (35 microns per coat) (2 at shop + 1 at site)	Smoke Grey (Shade No. 692 of IS: 5)	120 at shop + 35 at site	
3	Structures	Abrasive Blast cleaning to Sa 2 1/2 (35-50 microns)	Epoxy based Zinc Phosphate to IS: 13238	1 (30 Microns per coat)	Epoxy Based MIO Pigmented Intermediate Coat.	1 (DFT=75 Micron Min Per coat)	-----	Epoxy based finish paint to IS: 14209 + Aliphatic Acrylic PU Paint to IS: 13213	1 (30 microns per coat) + 1 (30 microns per coat)	Smoke Grey (Shade No. 692 of IS: 5)	165	
4	Hangers & Supports - CLH & VLH	Abrasive Blast cleaning to Sa 2 1/2 (35-50 microns)	Epoxy Zinc rich primer to IS 14589 Gr.II,% VS = 35 Min	1 (50 microns per coat)	-----	-----	-----	Aliphatic Acrylic Polyurethane paint ,%VS = 40 min	2 (35 microns per coat)	Phirozi Blue Shade No.176 of IS 5	120	Refer Note 2
5	Pipe Clamps.	SSPC-SP3/ Power Tool Cleaning	Red Oxide - Zinc Phosphate (Alkyd base to IS: 12744)	2 (25 Microns per coat)	-----	-----	-----	Synthetic enamel Long oil Alkyd to IS: 2932	2 (35 microns per coat)	Smoke Grey (Shade No. 692 of IS: 5)	120	Refer Note 1
6	Stainless steel / Galvanized items	No paint										
7	Internal surface coating for ECW Tank	Blast cleaning to Sa2½ with surface profile 35-50 microns	Epoxy Zinc rich primer to IS 14589 Gr.II,% VS = 35 Min	2 (35 microns per coat)	-----	-----	-----	Epoxy based Polyamide cured finish paint	2 (65 microns per coat)	Smoke Grey Shade No 692 of IS 5	200	

Note 1 - Smoke grey shade for Carbon Steel ; White shade for Alloy Steel Clamps.

2 - For components other than CLH coming in H&S PGMAs shall be painted as per Sl.No:5 above. Plates, Pipes & Tubing Cut to size at site : Shall follow 2 coats of 60 microns of Red oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744 .

3 - TANKS : All are atmospheric tanks. (i) CW STORAGE TANK, (ii) IMPURE CONDENSATE TANK (iii) FLASH TANK & (iv) FLASH TANK & DRAIN TANK

PREPARED BY : VIVEKANANDA YELLU, DM/QA	APPROVED BY: C VAITHIANATHAN , AGM/QA	For Customer use

Executive Director
Thermal Projects Construction
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad-500 082.

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-303
SYSTEM : MS PIPING TO AUX PRDS

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-303-21119	PIPE FITTING	SA335P91 SA234WP91	219.1	34	TIG & ARC	34 V	ER90SB9	E9015B9			1050 REV 05	220	755 ±15	2.5 Mts PER mm min 60 min	100% UT & 100% MPI	*	*	100% HARDNESS
		PIPE FITTING/VALVE	SA335P91 SA234WP91/F91				17	1020	306	425	901								
02	1-80-303-21119	PIPE	SA335P22	457.2	9.53	TIG & ARC	9.53 V	ER90SB3	E9018-B3			1038 REV 04	220	750 ±20	2.5mtS PER mm minimum 60 min	RT 100%	*	*	100% HARDNESS
		VALVE	F91				1	150	34	53	–								
03	1-80-303-21119	PIPE	SA335P11	457.2	20	TIG & ARC	9.53 V	ER80SB2	E8018B2			1012 REV 04	150	680 TO 720	2.5mtS PER mm minimum 60 min	RT 100%	*	*	3% HARDNESS
		FITTING	SA234WP22				1	158	34	53	–								
04	1-80-303-21119	PIPE	SA335P11	457.2	20	TIG & ARC	9.53 V	ER70SA1	E7018-1			1033 REV 03	150	660±10	2.5mtS PER mm minimum 60 min	RT 100%	*	*	3% HARDNESS
		FITTING	SA105				1	150	34	53	41								
05	1-80-303-21119	PIPE FITTING	SA106GRB SA234WPB	457.2	9.53	TIG & ARC	9.53 V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		PIPE FITTING/VALVE	SA106GRB SA234WPB/WCB				7	1050	238	371	–								
06	1-80-303-21119	PIPE	SA106GRB	219.1	6.35	TIG & ARC	6.35 V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 100%	*	*	
		FITTING PLATE	SA234WPB SA515GR70				2	142	74	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	C.HARITHA	10.03.17	4-80-303-79794	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-303
SYSTEM : MS PIPING TO AUX PRDS

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	1-80-303-21119	PIPE	SA335P22	457.2	9.53	TIG & ARC	9.53V	ER90SB3	E9018B3			1014 REV 03	150	700 ±20	2.5 Mts PER mm min 60 min	100% RT	*	*	3% HARDNESS
		FITTING	SA234WP22				1	150	34	53	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	C.HARITHA	10.03.17	4-80-303-79794	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-307
SYSTEM : HP & LP BYPASS WARMUP

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-307-21345	PIPE	SA335P91	60.3	12.5	TIG & ARC	12.5	ER90SB9	E9015B9			1036 REV 07	220	745 ±15	2.5 Mts PER mm min 30 min	100% RT	*	*	100% HARDNESS
		PIPE/BEND VALVE	SA335P91 C12A				48	480	624	336	–								
02	1-80-307-21345	PIPE	SA335P91	60.3	5.54	TIG & ARC	5.54	ER90SB9	E9015B9			1036 REV 07	220	745 ±15	2.5 Mts PER mm min 30 min	100% RT	*	*	100% HARDNESS
		PIPE/BEND VALVE	SA335P91 C12A				~40	520	400	–	–								
03	1-80-307-21345	PIPE	SA335P22	33.4	4.55	ARC	5	–	E9018B3			1023 REV 00	10	745 ±35	1 HOUR PER 25 MM min 60 min	LPI/ MPI 100%	*	*	HARDNESS 3%
		FITTING	F22				~20	–	40										

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	C.HARITHA	10.03.17	4-80-307-80268	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-322
SYSTEM : COLD REHEAT PIPING TO DEAERATOR PEGGING

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-322-21214	FITTING PIPE	SA106GRC SA234WPC	406.4	16	TIG& ARC	16 V̂	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 100%	*	*	
		FITTING PIPE/VALVE	SA234WPC SA106GRC/WCC				32	4544	960	1610	576								
02	1-80-322-21214	FITTING PIPE	SA106GRC SA234WPC	965	34	TIG& ARC	34 V̂	ER70SA1	E7018-1			1005 REV 05	100	635±15	2.5mtS PER mm minimum 30 min	RT 100%	*	*	
		FITTING PIPE/VALVE	SA234WPC SA106GRC/WCC				2	670	152	249	572								
03	1-80-322-21214	FITTING PIPE	SA106GRC SA234WPC	965	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		FITTING PIPE/VALVE	SA234WPC SA106GRC/WCC				9	2981	681	1070	–								
04	1-80-322-21214	FITTING PIPE	SA106GRB SA234WPB	323.9	12.7	TIG& ARC	12.7 V̂	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		FITTING PIPE	SA106GRB SA234WPB				2	224	48	102	–								
05	1-80-322-21214	FITTING PIPE	SA106GRC SA234WPC	219.1	8.18	TIG& ARC	8.18 V̂	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 100%	*	*	
		FITTING PIPE	SA106GRC SA234WPC				2	140	34	36	–								
06	1-80-322-21214	THERMOWELL	ANSI321	63.5	13	TIG & ARC	13 V̂	ERNiCr3	ENiCrFe3			1025 REV 01	10	610±15	2.5mtS PER mm min 30mts	RT 100% LPT 100%	*	*	
		TEMP STUB	SA 105				1	25	14	10	2								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	10.03.17	4-80-322-80017	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-322
SYSTEM : COLD REHEAT PIPING TO DEAERATOR PEGGING

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	1-80-322-21214	FITTING	SA234WPB	273	12.7	TIG& ARC	12.7 ◊	ER70SA1	E7018-1			WT412 REV-00				RT 100%	*	*	
		VALVE	WC9				1	87	20	30	-								
08	1-80-322-21214	FITTING	SA105	508	20	TIG& ARC	20 ◊	ER70SA1	E7018-1			WT412 REV-00				RT 100%	*	*	
		VALVE	WC9				1	177	38	63	46								
09	1-80-322-21214	FITTING	SA234WPB	660	22	TIG& ARC	22 ◊	ER70SA1	E7018-1			1004 REV 03	10	610 ±15	2.5mtS PER mm minimum 30 min	RT 100%	*	*	
		FITTING	SA234WPB				1	233	50	83	162								
10	1-80-322-21214	FITTING	SA234WPB	762	9.53	TIG& ARC	9.53 ◊	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		FITTING	SA234WPB				1	258	63	99	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	10.03.17	4-80-322-80017	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-323
SYSTEM : EXTRACTION STEAM PPG TO BFPT A&B

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-323-21220	FITTING PIPE	SA234WPC SA106GRC	OD273	12.7	TIG& ARC	12.7⌒V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		FITTING PIPE	SA234WPC SA106GRC				33	3441	740	1221	222								
02	1-80-323-21220	VALVE	SA216WCC	OD273	12.7	TIG& ARC	12.7⌒V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		FITTING PIPE	SA234WPC SA106GRC				8	744	160	264	48								
03	1-80-323-21220	WN FLANGE	SA515GR70	OD273	12.7	TIG& ARC	12.7⌒V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		FITTING PIPE	SA234WPC SA106GRC				4	372	80	132	24								
04	1-80-323-21220	FITTING PIPE	SA234WPB SA106GRB	OD323.9	9.53/36	TIG& ARC	9.53⌒V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		FITTING PIPE	SA234WPB SA106GRB				16	1664	384	592	–								
05	1-80-323-21220	PIPE	SA106GRC	OD114.3	6.02	TIG& ARC	6.02⌒V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		FITTING	SA234WPB				8	216	168	–	–								
06	1-80-323-21220	BRANCH PIPE	SA106GRC	OD168.3	14.27	ARC	12◺	–	E7018-1			1021 REV 01	–	–	–	LPI/MPI 10%			
		FLANGE	SA515GR70				2	–	–	30	–								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	10.03.17	4-80-323-80024	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-324
SYSTEM : CRH PIPING TO AUX PRDS

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-324-21295	PIPE FITTING	SA106GRB SA234WPB	114.3	6.02	TIG & ARC	6.02 V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		PIPE FITTING/VALVE	SA106GRB SA234WPB/WCB				27	719	567	--	--								
02	1-80-324-21295	PIPE	SA335P11	114.3	6.02	TIG & ARC	6.02 V	ER70SA1	E7018-1			1017 REV 03	125	–	–	RT 100%	*	*	3% HARDNESS
		VALVE	WCB				1	27	21	--	--								
03	1-80-324-21295	PIPE	SA335P11	114.3	6.02	TIG & ARC	6.02 V	ER80SB2	E8018B2			1011 REV 01	150	–	–	RT 100%	*	*	3% HARDNESS
		VALVE	WC9				1	27	21	--	--								
04	1-80-324-21295	VALVE	WC9	114.3	6.02	TIG & ARC	6.02 V	ER90SB3	E9018B3			1013 REV 02	150	–	–	RT 100%	*	*	3% HARDNESS
		FITTING	SA234WP22				1	27	21	--	--								
05	1-80-324-21295	PIPE	SA335P11	219.1	12.7	TIG & ARC	12.7 V	ER80SB2	E8018B2			1012 REV 04	150	680 TO 720	2.5mtS PER mm minimum 60 min	RT 100%	*	*	3% HARDNESS
		FITTING	SA234WP22				1	73	17	25	8								
06	1-80-324-21295	PIPE	SA335P11	219.1	12.7	TIG & ARC	12.7 V	ER70SA1	E7018-1			1033 REV 03	150	610±10	2.5mtS PER mm minimum 60 min	RT 100%	*	*	3% HARDNESS
		VALVE	WCB				1	67	17	25	8								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	C.HARITHA	10.03.17	4-80-324-80176	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-324
SYSTEM : CRH PIPING TO AUX PRDS

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	1-80-324-21295	PIPE	SA106GRB	219.1	12.7	TIG & ARC	12.7 V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		VALVE FITTING	WCB SA234WPC				2	146	34	50	16								
08	1-80-324-21295	PIPE FITTING	SA106GRB SA234WPB	219.1	6.35	TIG & ARC	6.35 V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		PIPE FITTING/VALVE	SA106GRB SA234WPB/WCB				19	1349	703	--	--								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	C.HARITHA	10.03.17	4-80-324-80176	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-329
SYSTEM : EXTRACTION STEAM PPG TO BFPT A&B

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
							QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-329-21266	PART-1 FITTING PIPE/VALVE	PART-1 SA234WPB SA106GRB/WCB	508	12.7	TIG& ARC	12.7	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PART-2 FITTING PIPE	PART-2 SA234WPB SA106GRB				14	2534	532	882	196								
02	1-80-329-21266	FITTING PIPE/VALVE	SA234WPB SA106GRB/WCB	406.4	9.53	TIG& ARC	9.53	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		FITTING PIPE	SA234WPB SA106GRB				45	5940	1350	2115									
03	1-80-329-21266	FITTING PIPE	SA234WPB SA106GRB	273	9.27	TIG& ARC	9.27	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		FITTING PIPE	SA234WPB SA106GRB				28	2436	560	840	-								
04	1-80-329-21266	NOZLLE	GRB EQUIVALENT	273	9.27	TIG& ARC	9.27	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE	SA106GRB				4	348	80	120	-								
05	1-80-329-21266	PLATE PIPE	SA515GR70 SA106GRC	219.1	6.35	TIG& ARC	6.35	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE	SA106GRB				6	426	222	-	-								
06	1-80-329-21266	THERMOWELL	ANSI321	63.5	13	TIG & ARC	13.0	ERNiCr3	ERNiCrFe3			1025 REV 01	10	610 ±15	2.5mtS PER mm minimum 30 min	RT100% LPI100%	*	*	
		TEMP STUB	SA 105				2	50	28	20	4								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	10.03.17	4-80-329-80105	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-332
SYSTEM : EXTRACTION STEAM PIPING TO LOW PRESSURE HEATER-3

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-332-21255	FITTING PIPE	SA672GRB70 SA234WPC	610	10	TIG& ARC	10 ◇	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		FITTING PIPE/VALVE	SA672GRB70 SA234WPC/WCC				22	4502	1020	1600	–								
02	1-80-332-21255	FITTING PIPE	SA672GRB70 SA234WPC	813	10	TIG& ARC	10 ◇	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		FITTING PIPE/VALVE	SA672GRB70 SA234WPC/WCC				12	3312	756	1188	–								
03	1-80-332-21255	PIPE	SA106GRB	273	6.35	TIG& ARC	6.35 ◇	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		PIPE SA515GR70	SA106GRB SA515GR70				2	223	44	22	–								
04	1-80-332-21255	PIPE	SA106GRB	219.1	6.35	TIG& ARC	6.35 ◇	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		PIPE SA515GR70	SA106GRB SA515GR70				4	355	163	–	–								
05	1-80-332-21255	THERMOWELL	ANSI321	30	13	TIG & ARC	10 ⌐ +6 ◺	ERNiCr3	ENiCrFe3			1025 REV 01	10	610 ±15	2.5mtS PER mm minimum 30 min	RT100% LPI100%	*	*	
		TEMP STUB	SA 105				2	20	28	14									
06	1-80-332-21255	FITTING	SA234WPB	914	10	TIG& ARC	10 ◇	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		NOZZLE	SA515GR70				1	313	84	132	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	07.02.17	4-80-332-80085	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-334
SYSTEM : EXTRACTION PPG TO LPH#04

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-334-21256	PIPE FITTING	SA106GRB SA234WPB	508	12.7	TIG & ARC	12.7 V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		PIPE FITTING/VALVE	SA106GRB SA234WPB/WCB				33	5973	1254	2079	462								
02	1-80-334-21256	FITTING	SA234WPB	610	12.7	TIG & ARC	12.7 V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		TURBINE NOZZ	SA106GRB				1	270	47	76	17								
03	1-80-334-21256	FITTING	SA234WPB	559	16	TIG & ARC	16.0 V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*		
		LPH NOZZLE	SA106GRB				1	270	47	76	26								
04	1-80-334-21256	PIPE	SA106GRB	219.1	6.35	TIG & ARC	6.35 V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		PLATE FITTING	SA515GR70 SA234WPB				4	284	148	--	--								
05	1-80-334-21256	THERMOWELL	AISI 321	63.5	13	TIG & ARC	13.0 V	ERNiCr3	ENiCrFe3			1025 REV 01	10	610 ±15	2.5mtS PER mm minimum 30 min	RT100% LPI100%	*	*	
		TEMP STUB	SA 105				3	75	42	30	6								
06	1-80-334-21256	THERMOWELL	AISI 321	24	17	TIG & ARC	17U+6L	ERNI Cr3	ENI Cr Fe3			1025 REV 01	10	610 ±15	2.5mtS PER mm minimum 30 min	RT100% LPI100%	*	*	
		STUB	SA 105				1	5	7	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	C.HARITHA	07.02.17	4-80-334-80086	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-334
SYSTEM : EXTRACTION PPG TO LPH#04

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	1-80-334-21256	PIPE FITTING	SA106GRB SA234WPB	508	16	TIG & ARC	16.0 V	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		PIPE FITTING/VALVE	SA106GRB SA234WPB/WCB				1	180	38	63	24								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	C.HARITHA	07.02.17	4-80-334-80086	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-335
SYSTEM : EXTRACTION STEAM PPG TO DEAERATOR

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-335-21215	TURBINE NOZZLE	16Mo3	610	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE	SA672GRB70				1	203	47	73	-								
02	1-80-335-21215	PIPE FITTING	SA672GRB70 SA234WPB	610	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE FITTING	SA672GRB70 SA234WPB				8	1620	370	581	-								
03	1-80-335-21215	PIPE FITTING	SA106GRB SA234WPB	508	12.7	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE FITTING	SA106GRB SA234WPB				32	5792	1216	2016	576								
04	1-80-335-21215	PIPE FITTING	SA672GRB70 SA234WPB	660	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE FITTING	SA672GRB70 SA234WPB				6	1326	300	500	-								
05	1-80-335-21215	BRANCH PIPE FITTING	SA672GRB70 SA234WPB	219.1	6.35	TIG& ARC	6.35V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE	SA106GRB				4	284	148	-	-								
06	1-80-335-21215	FITTING	SA234WPB	762	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		FITTING	SA234WPB				1	258	59	93	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	03.08.16	4-80-335-80019	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-335
SYSTEM : EXTRACTION STEAM PPG TO DEAERATOR

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	1-80-335-21215	PIPE FITTING/NOZZ	SA672GRB70 SA234WPB/SA106GrB	965	10	TIG& ARC	10 ▽	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE FITTING	SA672GRB70 SA234WPB				5	1656	378	594	-								
08	1-80-335-21215	THERMOWELL	ANSI 321	63.5	13	TIG & ARC	13.0 ▽	ERNiCr3	ENiCrFe3			1025 REV 01	10	610 ±15	2.5mtS PER mm minimum 30 min	RT100% LPI100%	*	*	
		TEMP STUB	SA 105				4	100	42	40	8								
09	1-80-335-21215	THERMOWELL	AISI 321	30	10	TIG & ARC	6μ + 6◺	ERNiCr3	ENi Cr Fe3			1025 REV 01	10	610 ±15	2.5mtS PER mm minimum 30 min	RT100% LPI100%	*	*	
		STUB	SA 105				1	5	7	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	03.08.16	4-80-335-80019	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-336
SYSTEM : EXTRACTION STEAM PPG TO HIGH PRESSURE HEATER 6A & 6B

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-336-21238	NOZZLE	13CRMo4-5	406.4	16.0	TIG& ARC	16.0 V	ER80S-B2	E8018-B2			1012 REV 04	150	680 – 720°	2.5 Mts PER mm 60 min	RT 100%	*	*	3% HARDNESS
		FITTING	SA234WP22				1	150	34	53	18								
02	1-80-336-21238	FITTING PIPE	SA234WP22 SA335P22	323.9	9.53	TIG& ARC	9.53 V	ER90SB3	E9018-B3			1014 REV 03	150	680 –720	2.5 Mts PER mm 60 min	RT 100%	*	*	3% HARDNESS
		FITTING PIPE/VALVE	SA234WP22 SA335P22/WC9				32	3328	768	1184	–								
03	1-80-336-21238	FITTING PIPE	SA234WP22 SA335P22	273	9.27	TIG& ARC	9.27 V	ER90SB3	E9018-B3			1014 REV 03	150	680 –720	2.5 Mts PER mm 60 min	RT 100%	*	*	3% HARDNESS
		FITTING PIPE	SA234WP22 SA335P22				20	1740	400	600	–								
04	1-80-336-21238	NOZZLE	SA182F11	273	9.27	TIG & ARC	9.27 V	ER80S-B2	E8018-B2			1012 REV 04	150	680 – 720°	2.5 Mts PER mm 60 min	RT 100%	*	*	3% HARDNESS
		FITTING	SA234WP22				2	180	40	60	–								
05	1-80-336-21238	PIPE	SA335P22	168.3	7.11	TIG& ARC	7.11 V	ER90SB3	E9018B3			1013 REV 02	150	–	–	RT 100%	*	*	3% HARDNESS
		FITTING PLATE	SA234WP22 SA387GR22				4	212	60	44	–								
06	1-80-336-21238	THERMOWELL	AISI321	63.5	13	TIG & ARC	13 V	ERNi Cr3	ENi Cr Fe3			1024 REV 01	150 ON P5 SIDE	680 TO 720	1 HOUR PER 25mm 60 min	RT100% LPI100%	*	*	
		STUB	SA182F22CL3				1	25	14	10	2								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	07.02.17	4-80-335-80066	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-336
SYSTEM : EXTRACTION STEAM PPG TO HIGH PRESSURE HEATER 6A & 6B

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	1-80-336-21238	THERMOWELL	AISI321	30	7	TIG & ARC	7 ▽	ERNi Cr3	ENi Cr Fe3			1024 REV 01	150 ON P5 SIDE	680 TO 720	1 HOUR PER 25mm 60 min	RT100% LPI100%	*	*	
		STUB	SA182F22CL3				1	10	14	7	–								
08	1-80-336-21238	PIPE	SA106GRB	273	6.35	TIG& ARC	6.35▽	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		FITTING PIPE	SA234WPB SA106GRB				40	3600	800	440	–								
09	1-80-336-21238	THERMOWELL	ANSI321	63.5	13	TIG & ARC	13.0 ▽	ERNiCr3	ENiCrFe3			1025 REV 01	10	610 ±15	2.5mtS PER mm minimum 30 min	RT100% LPI100%	*	*	
		TEMP STUB	SA 105				4	100	42	40	8								

NOTES: 01.* REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	07.02.17	4-80-335-80066	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-337
SYSTEM : EXTRACTION STEAM PPG FROM CRH TO HPH 7A & 7B

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-337-21239	FITTING PIPE	SA234WPC SA106GRC	406	16	TIG& ARC	16 V̂	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 100%	*	*	
		FITTING PIPE	SA234WPC SA106GRC				6	850	180	300	108								
02	1-80-337-21239	FITTING PIPE	SA234WPC SA106GRC	323.9	12.7	TIG& ARC	12.7V̂	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 100%	*	*	
		FITTING PIPE	SA234WPC SA106GRC				38	4256	912	2090	–								
03	1-80-337-21239	HPH NOZZLE	SA350LF2CL1	273	12.7	TIG& ARC	12.7V̂	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 100%	*	*	
		FITTING	SA234WPC				2	206	48	110	–								
04	1-80-337-21239	PIPE	SA106GRC	114.3	6.02	TIG& ARC	6.02V̂	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 100%	*	*	
		FITTING	SA234WPC				4	107	84	–	–								
05	1-80-337-21239	THERMOWELL	ANSI321	63.5	13	TIG & ARC	13 V̂	ERNiCr3	ENiCrFe3			1025 REV 01	10	610±15	2.5mtS PER mm min 30mts	RT 100% LPT 100%	*	*	
		TEMP STUB	SA 105				4	100	56	40	8								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURHTY	HARITHA.C	07.02.17	4-80-337-80067	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-338
SYSTEM : EXTRACTION STEAM PPG FROM TO HIGH PRESSURE HEATER 8A & 8B

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-338-21240	NOZZLE (HPH-8)	SA182F11	168.3	10.97	TIG& ARC	10.97 ▽	ER80S-B2	E8018-B2			1010 REV 06	150°C	655°C ±15°	2.5mtS PER mm minimum 60 min	RT 100%	*	*	3% HARDNESS
		ELBOW	SA234WP11				2	102	30	46	–								
02	1-80-338-21240	FITTING PIPE	SA234WPC SA106GRC	168.3	10.97	TIG& ARC	10.97 ▽	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 100%	*	*	
		FITTING PIPE/VALVE	SA234WPC SA106GRC/WCC				36	1836	540	828	–								
03	1-80-338-21240	FITTING PIPE	SA234WPC SA106GRC	219.1	12.7	TIG& ARC	12.7 ▽	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 100%	*	*	
		FITTING PIPE/VALVE	SA234WPC SA106GRC/WCC				32	2144	544	800	256								
04	1-80-338-21240	PIPE	SA106GRC	114.3	13.49	TIG& ARC	13.49▽	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 100%	*	*	
		FITTING	SA234WPC				8	272	88	120	–								
05	1-80-338-21240	ELBOW	SA234WP11	168.3	10.97	TIG& ARC	10.97 ▽	ER80SB2	E8018-B2			1012 REV04	150	700 ±20	2.5mtS PER mm minimum 60 min	RT 100%	*	*	
		NOZZLE	SA182F22				2	102	30	46	–								
06	1-80-338-21240	THERMOWELL	ANSI321	63.5	13	TIG & ARC	13.0 ▽	ERNiCr3	ENiCrFe3			1025 REV 01	–	610 ±15	2.5mtS PER mm minimum 30 min	RT100% LPI100%	*	*	
		TEMP STUB	SA 105				6	150	84	60	12								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	07.02.17	4-80-338-80136	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-338
SYSTEM : EXTRACTION STEAM PPG FROM TO HIGH PRESSURE HEATER 8A & 8B

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	1-80-338-21240	THERMOWELL	AISI 321	30	10	TIG & ARC	6U + 6△	ERNi Cr3	ENi Cr Fe3			1025 REV 01	10	610±15	2.5mtS PER mm min 30mts	RT 100% LPT 100%	*	*	
		STUB	SA 105				1	5	7	–	–								
08	1-80-338-21240	FITTING	SA234WP11	168.3	14.27	TIG & ARC	14.27▽	ER70S-A1	E7018-1			1033 REV 04	150	660±10	2.5mtS PER mm min 30mts	RT 100%	*	*	3% HARDNESS
		PIPE	SA106GRB				2	106	30	46	8								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	07.02.17	4-80-338-80136	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM (1X800MW)
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-339
SYSTEM : AUX. STEAM TO TURBO DRIVEN BOILER FEED PUMP

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
							QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2-80-339-14065	PART-1 FITTING PIPE	PART-1 SA234WPB SA106GRB	219.1	6.35	TIG& ARC	6.35 ◊	ER70SA1	E7018-1			1003 REV 03	10	–	–	10% RT	*	*	
		PART-2 FITTING PIPE/VALVE	PART-2 SA234WPB SA106GRB/WCB				32	2272	1184	–	–								
02	2-80-339-14065	PART-1 PIPE	PART-1 SA106GRC	219.1	12.7	TIG& ARC	12.7 ◊	ER70SA1	E7018-1			1003 REV 03	10	–	–	100% RT	*	*	
		PART-2 FITTING/ VALVE	PART-2 SA234WPC/ WCC				4	292	68	100	32								
03	2-80-339-14065	PART-1 PIPE	PART-1 SA106GRB	114.3	6.02	TIG& ARC	6.02 ◊	ER70SA1	E7018-1			1003 REV 03	10	–	–	10% RT	*	*	
		PART-2 FITTING	PART-2 SA234WPB				2	54	42	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAAMURTHY	HARITHA.C	07.02.17	4-80-339-80069	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-340
SYSTEM : AUX STEAM HEADER

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-340-21246	PIPE FITTING	SA106GRB SA234WPB	457.2	9.53	TIG & ARC	9.53 V	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE FITTING/VALVE	SA106GRB SA234WPB/WCB				25	3800	850	1325	0								
02	1-80-340-21246	PIPE FITTING	SA106GRB SA234WPB	273	6.35	TIG & ARC	6.35 V	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE FITTING	SA106GRB SA234WPB				3	270	60	33	--								
03	1-80-340-21246	PIPE	SA106GRB	219.1	6.35	TIG & ARC	6.35 V	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PLATE FITTING	SA515GR70 SA234WPB				4	284	148	--	--								
04	1-80-340-21246	PIPE	SA106GRB	114.3	6.02	TIG & ARC	6.02 V	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE FITTING/VALVE	SA106GRB SA234WPB/WCB				8	213	168	--	--								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	C.HARITHA	07.02.17	4-80-340-80102	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-345
SYSTEM : AUXILIARY STEAM TO DEAERATOR

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-345-21216	FITTING PIPE	SA234WPB SA106GRB	273	6.35	TIG& ARC	6.35	ER70SA1	E7018-1			1003 REV 03	10	–	–	10% RT	*	*	
		FITTING PIPE/VALVE	SA234WPB SA106GRB/WCB				35	3150	700	385	–								
02	1-80-345-21216	PIPE FITTING	SA672GRB70 SA234WPB	508	12.7	TIG& ARC	12.7	ER70SA1	E7018-1			1003 REV 03	10	–	–	10% RT	*	*	
		PIPE FITTING/VALVE	SA672GRB70 SA234WPB/WCB				18	3258	684	1134	324								
03	1-80-345-21216	PIPE FITTING	SA106GRB SA234WPB	168.3	7.11	TIG& ARC	7.11	ER70SA1	E7018-1			1003 REV 03	10	–	–	10% RT	*	*	
		PIPE FITTING/VALVE	SA106GRB SA234WPB/WCB				18	954	270	198	–								
04	1-80-345-21216	PIPE FITTING	SA106GRB SA234WPB	406.4	9.53	TIG& ARC	9.53	ER70SA1	E7018-1			1003 REV 03	10	–	–	10% RT	*	*	
		PIPE/NOZZLE FITTING	SA106GRB SA234WPB				2	264	60	94	–								
05	1-80-345-21216	PIPE	SA106GRB	219.1	6.35	TIG& ARC	6.35	ER70SA1	E7018-1			1003 REV 03	10	–	–	10% RT	*	*	
		BRANCH/ PLATE	SA106GRC SA515GR70				2	180	74	–	–								
06	1-80-345-21216	PIPE	SA106GRB	114.3	6.02	TIG& ARC	6.02	ER70SA1	E7018-1			1003 REV 03	10	–	–	10% RT	*	*	
		FITTING	SA234WPB				2	54	42	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S. RAMAMURTHY	HARITHA.C	07.02.17	4-80-345-80021	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-345
SYSTEM : AUXILIARY STEAM TO DEAERATOR

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	1-80-345-21216	VALVE(ASV-8)	WC9	273	6.35	TIG& ARC	12.7 ⌒	ER80S-B2	E8018-B2			1012 R04	150	700±20	2.5mtS PER mm min 60mts	100% RT 3% HARDNESS	*	*	
		PIPE	SA335P11				2	186	40	22	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S. RAMAMURTHY	HARITHA.C	07.02.17	4-80-345-80021	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-349
SYSTEM : AUX STEAM TO TURBINE GLAND SEALING

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-349-21296	PIPE	SA106GRB	OD88.9	5.49	TIG& ARC	5.49 ⌒	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING	SA234WPB																
		PIPE	SA106GRB				30	600	450	-	-								
		FITTING/VALVE	SA234WPB/WCB																
02	1-80-349-21296	PIPE	SA106GRB	OD48.3	5.08	TIG& ARC	5.08 ⌒	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		PIPE	SA106GRB				~12	120	96	-	-								
03	1-80-349-21296	PIPE	SA106GRB	OD48.3	5.08	ARC	5◺	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING	SA105				~30	-	100	-	-								
04	1-80-349-21296	PIPE	SA106GRB	OD33.4	4.55	TIG& ARC	4.55 ⌒	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		PIPE	SA106GRB				~12	84	60	-	-								
05	1-80-349-21296	PIPE	SA106GRB	OD33.4	4.55	ARC	5◺	-	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING	SA105				~30	-	35	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV.
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	10.03.17	4-80-349-80180	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-400
SYSTEM : CONDENSATE SUCTION PIPING

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-400-21237	FITTING PIPE	SA106GRB SA234WPB	355.6	9.53	TIG& ARC	9.53	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				20	2875	594	902	-								
02	1-80-400-21237	FITTING PIPE	SA672GRB70 SA234WPB	660	10	TIG& ARC	10	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA672GRB70 SA234WPB				23	5079	1160	1822	-								
03	1-80-400-21237	FITTING PIPE	SA672GRB70 SA234WPB	559	10	TIG& ARC	10	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE/WCC	SA234WPB SA672GR70/WCB				12	2070	416	654	-								
04	1-80-400-21237	FITTING PIPE	SA234WPB SA672GRB70	610	10	TIG& ARC	10	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA672GRB70				9	1822	416	654	-								
05	1-80-400-21237	PIPE	SA106GRB	60.3	5.54	TIG & ARC	5.54	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		PIPE	SA106GRB				36	454	360	-	-								
06	1-80-400-21237	PIPES	SA106GRB	60.3 & 33.4	5.54 & 4.55	ARC	6 5	-	E7018-1			1003 REV 03	10	-	-	LPI/MPI 10%	*	*	
		FLANGE	SA515GR70				45	-	163	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	10.03.17	4-80-400-79999	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-401
SYSTEM : CEP DISCHARGE TO DEAERATOR

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	0-80-401-07009 0-80-401-07010 0-80-401-07011	FITTING PIPE/VALVE	SA234WPB SA106GRB/WCC	457.2	12.7	TIG& ARC	12.7 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				141	22842	4794	7896	2256								
02	0-80-401-07009 0-80-401-07011	FITTING PIPE/VALVE	SA234WPB SA106GRB/WCC	323.9	9.53	TIG& ARC	9.53 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				48	4992	1152	1776	-								
03	0-80-401-07009	FITTING PIPE	SA234WPB SA106GRB	406.4	12.7	TIG& ARC	12.7 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				17	2431	510	850	204								
04	0-80-401-07009	FITTING PIPE/VALVE	SA234WPB SA106GRB/WCC	88.9	5.49	TIG& ARC	5.49 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				32	640	480	-	-								
05	0-80-401-07010 0-80-401-07011	FITTING PIPE	SA234WPB SA106GRB	508	12.7	TIG& ARC	12.7 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				12	2172	456	756	216								
06	0-80-401-07010	FITTING PIPE	SA234WPB SA106GRB	114.3	6.02	TIG& ARC	6.02 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				4	108	84	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURHTY	HARITHA.C	03.12.16	4-80-401-80015	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-401
SYSTEM : CEP DISCHARGE TO DEAERATOR

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	1-80-401-21258	FITTING PIPE	SA234WPB SA106GRB	168.3	7.11	TIG& ARC	7.11 ⌒	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				46	2438	690	506	-								
08	1-80-401-21258	VALVE	WC6	168.3	7.11	TIG& ARC	7.11 ⌒	ER70SA1	E7018-1			1033 REV 04	150	650 TO 670	2.5mtS PER mm minimum 60 min	10% RT 3% HARDNESS	*	*	
		PIPE	SA106GRC				2	106	30	18	-								

NOTES:

01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	03.12.16	4-80-401-80015	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-402
SYSTEM : CEP DISCHARGE TO DEAERATOR

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-402-21204	FITTING PIPE/VALVE	SA234WPB SA106GRB/WCC	457.2	12.7	TIG& ARC	12.7	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				26	4212	884	1456	448								
02	1-80-402-21204	FITTING PIPE/VALVE	SA234WPB SA106GRB/WCC	323.9	9.53	TIG& ARC	9.53	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				14	1456	336	518	-								
03	1-80-402-21204	FITTING PIPE	SA234WPB SA106GRB	508	12.7	TIG& ARC	12.7	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				2	362	80	126	36								
04	1-80-402-21204	FITTING PIPE/VALVE	SA234WPB SA106GRB/WCC	406.4	12.7	TIG& ARC	12.7	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				28	4004	840	1400	392								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	11.08.16	4-80-402-80002	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-403
SYSTEM : CEP DISCHARGE TO DEAERATOR

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-403-21259	FITTING PIPE/VALVE	SA234WPB SA106GRB/WCC	323.9	9.53	TIG& ARC	9.53	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				12	1248	288	444	-								
02	1-80-403-21259	FITTING PIPE/VALVE	SA234WPB SA106GRB/WCC	457.2	12.7	TIG& ARC	12.7	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE/VALVE	SA234WPB SA106GRB/WCC				62	10044	2108	3472	992								
03	1-80-403-21259	FITTING PIPE	SA234WPB SA106GRB	406.4	12.7	TIG& ARC	12.7	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				5	810	170	0	60								
04	1-80-403-21259	FITTING PIPE	SA234WPB SA106GRB	508	12.7	TIG& ARC	12.7	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				5	905	190	0	70								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	11.08.16	4-80-403-80093	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-407
SYSTEM : CONDENSATE TO VALVE GLAND SEALING

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-407-21506	PIPE	SA106GRB	60.3	5.54	ARC	6◺	-	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING	SA105				~54	-	150	-	-								
02	1-80-407-21506	PIPE	SA106GRB	33.4	4.55	ARC	5◺	-	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING	SA105				~200	-	231	-	-								
03	1-80-407-21506	PIPE	SA106GRB	21.3	3.73	ARC	4◺	--	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING	SA105				~230	--	112	-	-								
04	1-80-407-21506	FITTING PIPE	SA234WPB SA106GRB	114.3	6.02	TIG& ARC	6.02 V	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				~16	426	336	-	-								
04	1-80-407-21506	FITTING PIPE	SA234WPB SA106GRB	60.3	5.54	TIG& ARC	5.54 V	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				~17	215	170	-	-								
04	1-80-407-21506	FITTING PIPE	SA234WPB SA106GRB	88.9	5.54	TIG& ARC	5.54 V	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				~6	118	90	-	-								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	11.08.16	4-80-407-80185	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-419
SYSTEM : DEAERATOR SAFETY VALVE EXHAUST TO ATM

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-419-21311	PIPE FITTING	SA106GRB SA234WPB	273	6.35	TIG& ARC	6.35V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		PIPE FITTING/WCB	SA106GRB SA234WPB				7	623	140	77	-								
02	1-80-419-21311	PIPE FITTING	SA106GRB SA234WPB	355.6	9.53	TIG& ARC	9.53V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		PIPE FITTING/WCB	SA106GRB SA234WPB				35	4025	945	1435	-								
03	1-80-419-21310	FITTING PIPE	SA106GRB SA234WPB	60.3	5.54	TIG& ARC	5.54V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				25	315	315	250	-								
04	1-80-419-21310	FITTING PIPE	SA106GRB SA234WPB	114.3	6.02	TIG& ARC	6.02V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				20	532	420	-	-								
05	1-80-419-21311	PIPE FITTING	SA106GRB SA234WPB	457	9.53	TIG& ARC	9.53V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		PIPE FITTING/WCB	SA106GRB SA234WPB				5	750	170	265	-								
06	1-80-419-21311	PIPE FITTING	SA106GRB SA234WPB	406.4	9.53	TIG& ARC	9.53V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		PIPE FITTING/WCB	SA106GRB SA234WPB				2	264	60	94	-								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	07.02.17	4-80-419-80118	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-420
SYSTEM : BOOSTER PUMP DISCHARGE TO BFP SUCTION PIPING

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-420-21218	FITTING PIPE	SA106GRB SA234WPB	406.4	9.53	TIG& ARC	9.53	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				48	6336	1440	2256	-								
02	1-80-420-21218	FITTING PIPE	SA106GRB SA234WPB	355.6	9.53	TIG& ARC	9.53	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		NOZZLE PIPE	GRB EQUIVALENT SA234WPB				6	690	162	246	-								
03	1-80-420-21219	FITTING	SA106GRB	457.2	9.53	TIG& ARC	9.53	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		STRAINER	GRB EQUIVALENT				74	11100	2516	3922	-								
04	1-80-420-21219	PIPE	SA106GRB	559	9.53	TIG& ARC	9.53	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING NOZZLE	GRB EQUIVALENT				6	1215	280	458	-								
05	1-80-420-21219	FITTING	SA106GRB	610	10	TIG& ARC	10	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		STRAINER	GRB EQUIVALENT				6	1215	300	450	-								
06	1-80-420-21219	PIPE	SA106GRB	33.4	4.55	ARC	6 7	-	E7018-1			1022 REV 00	-	-	-	LPI/MPI 10%	*	*	
		FLANGE	SA105				3	-	100	-	-								

NOTES:

01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	07.02.17	4-80-420-80002	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-420
SYSTEM : BOOSTER PUMP DISCHARGE TO BFP SUCTION PIPING

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	1-80-420-21219	PIPE	SA106GRB	60.3	5.54	ARC	6◺ 7◺	-	E7018-1			1022 REV 00	-	-	-	LPI/MPI 10%	*	*	
		FLANGE	SA105				3	-	150	-	-								

NOTES:

01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	07.02.17	4-80-420-80002	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-421
SYSTEM : BFD RECIRULATION PIPING

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
							QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-421-21060	PART-1 FITTING PIPE	PART-1 SA234WPC SA106GRC	323.9	56	TIG& ARC	56 V̂	ER70SA1	E7018-A1			1005 REV 05	100	635±15	2.5mtS PER mm minimum 30 min	RT 100%	*	*	
		PART-2 FITTING PIPE	PART-2 SA234WPC SA106GRC				30	2550	720	1170	5040								
02	1-80-421-21060	PART-1 FITTING PIPE	PART-1 SA234WPC SA106GRC	273	12.7	TIG& ARC	12.7 V̂	ER70SA1	E7018-1			1003 REV 03	10	–	–	RT 10%	*	*	
		PART-2 FITTING PIPE	PART-2 SA234WPC SA106GRC				51	4743	1020	1683	306								
03	1-80-421-21060	PART-1 MATCHING PIECE	PART-1 SA182F12CL2	323.9	56	TIG& ARC	56 V̂	ER80S-B2	E8018-B2			1012 REV 04	150	700±25	2.5mtS PER mm minimum 60 min	RT 100%	*	*	3% HARDNESS
		PART-2 CONTROL VAL	PART-2 SA182F22				6	510	150	240	1008								
04	1-80-421-21060	PART-1 MATCHING PIECE	PART-1 SA182F12CL2	323.9	56	TIG& ARC	56 V̂	ER70S-A1	E7018-1			1033 REV 04	150	660±10	2.5mtS PER mm minimum 60 min	RT 100%	*	*	3% HARDNESS
		PART-2 ELBOW	PART-2 SA234WPC				6	510	150	240	1008								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	10.03.17	4-80-421-79673	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-430
SYSTEM : SPRAY WATER PIPING TO HPBP VALVE

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2-80-430-14091	FITTING PIPE	SA234WPC SA106GRC	168.3	26	TIG& ARC	26 V̂	ER70SA1	E7018-1			1005 REV05	100	635 ±15	2.5mtS PER mm minimum 30 min	RT100%	*	*	
		FITTING PIPE/VALVE	SA234WPC SA106GRC/WCC				20	900	281	500	400								
02	2-80-430-14091	FITTING PIPE	SA234WPC SA106GRC	114.3	17.12 20	TIG& ARC	17.12V̂ 20 V	ER70SA1	E7018-1			1005 REV05	10	635 ±15	2.5mtS PER mm minimum 30 min	RT100%	*	*	
		FITTING PIPE/VALVE	SA234WPC SA106GRC/WCC				12	372	144	168	72								
03	2-80-430-14091	PIPE	SA335P11	114.3	20	TIG& ARC	20 V̂	ER70SA1	E7018-1			1033 REV03	150	660 ±10	2.5mtS PER mm minimum 60 min	RT100%	*	*	3% HARDNESS
		VALVE	WCC				2	62	24	28	12								
04	2-80-430-14091	VALVE(NRV)	WC9	114.3	20	TIG& ARC	20 V̂	ER80SB2	E8018B2			1012 REV04	150	700 ±20	2.5mtS PER mm minimum 60 min	RT100%	*	*	3% HARDNESS
		PIPE	SA335P11				2	62	24	28	12								
05	2-80-430-14091	FITTING PIPE	SA234WP22 SA335P22	114.3	20	TIG& ARC	20 V̂	ER90SB3	E9018-B3			1014 REV 03	150	680 TO 720	2.5mtS PER mm minimum 60 min	RT100%	*	*	3% HARDNESS
		FITTING PIPE/VALVE	SA234WP22 SA335P22/WC9				16	496	192	448	96								
06	2-80-430-14091	FITTING PIPE	SA234WP22 SA335P22	88.9	15.24	TIG& ARC	15.24V̂	ER90SB3	E9018-B3			1014 REV 03	150	680 TO 720	2.5mtS PER mm minimum 60 min	RT100%	*	*	3% HARDNESS
		FITTING PIPE/VALVE	SA234WP22 SA335P22/F22				4	96	32	44	20								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURHTY	HARITHA.C	10.03.2017	4-80-430-80133	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-459
SYSTEM : FLASH TANK-A DRAIN TO CONDENSER

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2-80-459-14061	FITTING PIPE	SA106GRB SA234WPB	323.9	6.35	TIG& ARC	6.35$\hat{V}$	ER70SA1	E7018-1			1003 REV 03	10	-	-	10% RT	*	*	
		FITTING PIPE/NOZZLE	SA106GRB SA234WPB GRB EQUIVALENT				11	1177	264	401	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
RAJESH KUMAR	DHINESH	S.RAMAMURTHY	HARITHA.C	10.03.17	4-80-459-80057	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM–1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80–342
SYSTEM : AUXILIARY STEAM PIPING TO STEAM COIL AIR PRE–HEATER

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART–1	PART–1																
		PART–2	PART–2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1–80–342–21301	FITTING PIPE	SA234WPB SA106GRB	273	9.27	TIG & ARC	9.27V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				49	4263	980	1470	–								
02	1–80–342–21301	PIPE/FITTING	SA106GRB/WPB	219.1	8.18	TIG & ARC	8.18V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				67	4690	1139	1206	–								
03	1–80–342–21301	PIPE/FITTING	SA106GRB/WPB	114.3	6.02	TIG & ARC	6.02V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				44	1171	924	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4–80–342–80186	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM–1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80–343
SYSTEM : AUXILIARY STEAM PIPING TO SOOT BLOWING

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART–1	PART–1																
		PART–2	PART–2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2–80–343–14097	FITTING PIPE	SA234WPB SA106GRB	168.3	7.11	TIG & ARC	7.11$\widehat{V}$	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				61	3233	915	671	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4–80–343–80145	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM–1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80–351
SYSTEM : AUXILIARY STEAM PIPING TO MILL INERTING

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms) ø2.4	ARC SPEC. QTY(NOS.) ø2.5	ø3.2	ø4.0	W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
01	1–80–351–21397	FITTING PIPE	SA234WPB SA106GRB	355.6	9.53	TIG & ARC	9.53V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				12	1380	324	492									
02	1–80–351–21397	PIPE/FITTING	SA106GRB/WPB	219.1	8.18	TIG & ARC	8.18V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				54	3780	918	972	–								
03	1–80–351–21397	FITTING PIPE	SA234WPB SA106GRB	273	9.27	TIG & ARC	9.27V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				80	6960	1600	2400	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4–80–351–80307	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM–1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80–370
SYSTEM : FLASH TANK AND FLASH TANK DRAIN TANK VENT TO ATMOSPHERE

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART–1	PART–1																
		PART–2	PART–2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1–80–370–21212	PIPE	SA515GR70	1868	20	TIG & ARC	20 V̂	ER70SA1	E7018–1			1004 REV 03	10	610±10	2.5mtS PER mm minimum 30 min	RT 10%	*	*	
		PIPE/NOZZLE MITRE BEND	SA515GR70				19	12662	2714	4458	3295								
02	1–80–370–21212	PIPE	SA106GRB/WPB	273	9.27	TIG & ARC	9.27 V̂	ER70SA1	E7018–1			1004 REV 03	10	610±10	2.5mtS PER mm minimum 30 min	RT 10%	*	*	
		PIPE/FITTING NOZZLE	SA106GRB/WPB				13	1131	260	390	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4–80–370–80016	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM–1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80–395
SYSTEM : AUXILIARY STEAM PIPING TO FUEL OIL ATOMISATION

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART–1	PART–1				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
		PART–2	PART–2																
01	3–80–395–32971	FITTING	SA234WPB	114.3	6.02	TIG & ARC	6.02V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		PIPE	SA106GRB																
		PIPE/FITTING	SA106GRB/WPB				8	213	168	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4–80–395–80089	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM–1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80–451
SYSTEM : BOILER INTEGRAL PIPING DRAINS

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART–1	PART–1																
		PART–2	PART–2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1–80–451–21369	FITTING PIPE	SA234WP22 SA335P22	60.3	11.07	TIG & ARC	11.07V	ER90S–B3	E9018–B3			1014 REV 03	150	680 TO 720	2.5mts PER mm MINIMUM 60 MIN	RT 10% HARDNESS 3%	*	*	
		VALVE PIPE/FITTING	SA182F22 SA335P22/WP22				64	583	832	448	–								
02	1–80–451–21357 1–80–451–21358 1–80–451–21359 1–80–451–21360 1–80–451–21365	FITTING PIPE	SA234WP22 SA335P22	60.3	5.54	TIG & ARC	5.54V	ER90S–B3	E9018–B3			1013 REV 02	150	–	–	RT 10% HARDNESS 3%	*	*	
		VALVE PIPE/FITTING	SA182F22 SA335P22/WP22				107	1349	1070	–	–								
03	1–80–451–21361 1–80–451–21362	FITTING PIPE	SA234WP22 SA335P22	88.9	15.24	TIG & ARC	15VV	ER90S–B3	E9018–B3			1014 REV 03	150	680 TO 720	2.5mts PER mm MINIMUM 60 MIN	RT 10% HARDNESS 3%	*	*	
		VALVE PIPE/FITTING	SA182F22 SA335P22/WP22				41	984	328	410	205								
04	1–80–451–21369 1–80–451–21361 1–80–451–21362	PIPE	SA335P22	33.4	9.09	TIG & ARC	9.09V	ER90S–B3	E9018–B3			1014 REV 03	150	680 TO 720	2.5mts PER mm MINIMUM 60 MIN	RT 10%	*	*	
		PLATE	SA387 Gr22				84	303	1176	–	–								
05	1–80–451–21358 1–80–451–21359	PIPE	SA335P22	33.4	4.55	TIG & ARC	4.55V	ER90S–B3	E9018–B3			1013 REV 02	150	–	–	RT 10%	*	*	
		PLATE	SA387 Gr22				28	180	140	–	–								
06	1–80–451–21370 1–80–451–21371 1–80–451–21363 1–80–451–21364	PIPE/FITTING	SA106GRB/WPB	73.0	14.02	TIG & ARC	14V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				142	3550	1136	1420	284								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.17	4–80–451–80272	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM–1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80–451
SYSTEM : BOILER INTEGRAL PIPING DRAINS

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART–1	PART–1																
		PART–2	PART–2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	1–80–451–21357	PIPE/FITTING	SA106GRB/WPB	88.9	15.24	TIG & ARC	15⌒V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				8	192	64	80	40								
08	1–80–451–21374	PIPE/FITTING	SA106GRB/WPB	168.3	27.5	TIG & ARC	27.5⌒V	ER70SA1	E7018–1			1004 REV 03	100	595 TO 625	2.5mts PER mm MINIMUM 30 MIN	RT 100%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				24	1080	336	576	480								
09	1–80–451–21373	PIPE/FITTING	SA106GRB/WPB	60.3	11.07	TIG & ARC	11⌒V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				10	91	130	70	–								
10	1–80–451–21370 1–80–451–21371 1–80–451–21363 1–80–451–21364	PIPE	SA106GRB	33.4	9.09	TIG & ARC	9.09⌒V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		PLATE	SA515 Gr70				176	634	2464	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.17	4–80–451–80272	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM–1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80–453
SYSTEM : LP PIPING DRAINS

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART–1	PART–1																
		PART–2	PART–2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	3–80–453–33105	PIPE	SA106GRB	21.3	3.73	TIG& ARC	3.73⌒	ER70SA1	E7018–1			1003 REV 03	–	–	–	10% RT	*	*	
		PIPE	SA106GRB				~15	203	–	–	–								
02	3–80–453–33105	PIPE	SA106GRB	33.4	4.55	TIG& ARC	4.55⌒	ER70SA1	E7018–1			1003 REV 03	–	–	–	10% RT	*	*	
		PIPE	SA106GRB				~100	640	500	–	–								
03	3–80–453–33105	PIPE	SA106GRB	21.3	3.73	ARC	4◺	–	E 7018–1			1022 REV 00	–	–	–	10% MPI/LPI	*	*	
		FITTING	SA105				15	–	7	–	–								
04	3–80–453–33105	PIPE	SA106GRB	33.4	4.55	ARC	5◺	–	E 7018–1			1022 REV 00	–	–	–	10% MPI/LPI	*	*	
		FITTING	SA105				305	–	305	–	–								
05	3–80–453–33105	PIPE	SA106GRB	60.3	5.54	ARC	6◺	–	E 7018–1			1022 REV 00	–	–	–	10% MPI/LPI	*		
		FITTING	SA105				2	–	6	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4-80-453-80336	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM–1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80–454
SYSTEM : SCAPH DRAIN TO FLASH TANK MANIFOLD

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART–1	PART–1																
		PART–2	PART–2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2–80–454–14208	FITTING PIPE	SA234WPB SA106GRB	114.3	6.02	TIG & ARC	6.02V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		PIPE/FITTING	SA106GRB/WPB				18	479	378	–	–								
02	2–80–454–14208	PIPE/FITTING	SA106GRB/WPB	88.9	5.49	TIG & ARC	5.49V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		PIPE/FITTING	SA106GRB/WPB				24	471	360	–	–								
03	2–80–454–14208	PIPE/FITTING	SA106GRB/WPB	60.3	5.54	TIG & ARC	5.54V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		PIPE/FITTING	SA106GRB/WPB				16	202	160	–	–								
04	2–80–454–14208	PIPE/FITTING	SA106GRB/WPB	48.3	5.08	TIG & ARC	5.08V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				250	2475	1990	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.17	4–80–545–80267	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM–1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80–455
SYSTEM : DRAIN FROM UNLISTED EQPT/VESSEL–SG SCOPE

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART–1	PART–1																
		PART–2	PART–2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2–80–455–14239	FITTING PIPE	SA234WPB SA106GRB	609.6	9.53	TIG & ARC	9.53V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		NOZZLE PIPE/FITTING	WCB SA106GRB/WPB				9	1822	416	654	–								
02	1–80–455–21318	PIPE/FITTING	SA106GRB/WPB	457.2	9.53	TIG & ARC	9.53V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				17	2550	578	901	–								
03	1–80–455–21318 1–80–455–21412	PIPE/FITTING	SA106GRB/WPB	323.9	9.53	TIG & ARC	9.53V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				49	5096	1176	1813	–								
04	1–80–455–21412	PIPE/FITTING	SA106GRB/WPB	219.1	8.18	TIG & ARC	8.18V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				28	1960	476	504	–								
05	1–80–455–21386 1–80–455–21387	PIPE/FITTING	SA106GRC/WPC	273	15.09	TIG & ARC	15.09V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		PIPE/FITTING	SA106GRC/WPC				33	2904	660	1089	330								
05	1–80–455–21386 1–80–455–21387	PIPE	SA106GRC	273	15.09	TIG & ARC	15.09V	ER70SA1	E7018–1			1033 REV 04	150	650 TO 670	2.5 mts PER mm MINIMUM 60 min	RT 10% HARDNESS 3%	*	*	
		PIPE	SA335P11				8	704	160	264	80								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4–80–455–80272	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM–1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80–455
SYSTEM : DRAIN FROM UNLISTED EQPT/VESSEL–SG SCOPE

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms) ø2.4	ARC SPEC. QTY(NOS.) ø2.5	ø3.2	ø4.0	W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
07	2–80–455–14237	PART–1: FITTING PART–2: PIPE	PART–1: SA234WPB PART–2: SA106GRB	508	9.52	TIG & ARC	9.52V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		PART–1: NOZZLE PART–2: PIPE/FITTING	PART–1: WCB PART–2: SA106GRB/WPB				22	3674	836	1320	–								
08	2–80–455–14238	PART–1: PIPE/FITTING PART–2: VALVE	PART–1: SA106GRB/WPB PART–2: WCB	88.9	5.49	TIG & ARC	5.49V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		PART–1: PIPE/FITTING	PART–1: SA106GRB/WPB				19	373	285	–	–								
09	2–80–455–14147	PART–1: PIPE/FITTING PART–2: PIPE/FITTING	PART–1: SA106GRB/WPB PART–2: SA106GRB/WPB	406.4	9.53	TIG & ARC	9.53V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
							5	660	150	235	–								
10	2–80–455–14147	PART–1: PIPE/FITTING PART–2: VALVE	PART–1: SA106GRB/WPB PART–2: WCB	273	9.27	TIG & ARC	9.27V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		PART–1: PIPE/FITTING	PART–1: SA106GRB/WPB				18	1566	360	540	–								
11	1–80–455–21412	PART–1: PIPE/FITTING PART–2: VALVE	PART–1: SA106GRB/WPB PART–2: WCB	60.3	5.54	TIG & ARC	5.54V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		PART–1: PIPE/FITTING	PART–1: SA106GRB/WPB				23	290	230	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4–80–455–80272	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM-1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-460
SYSTEM : SG AUX. COOLING WATER UNIT SYSTEM

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	--	PIPE	IS3589-410MPA	323.9	6	ARC	6 V	-	E7018-1			1213 REV 00	-	-	-	RT 10%	*	*	
		PIPE FITTING	IS3589-410MPA SA 234 WPB				~30	-	720	450	-								
02	--	PIPE	IS3589-410MPA	219.1	6	ARC	6 V	-	E7018-1			1213 REV 00	-	-	-	RT 10%	*	*	
		PIPE FITTING	IS3589-410MPA SA 234 WPB				~200	-	7400	-	-								
03	--	PIPE	IS1239 BLACK	150	5.4	ARC	5.4 V	-	E 6013 E 7018			1001 REV 01	-	-	-	RT 10%	*	*	
		PIPE FITTING	IS1239 BLACK IS1239 BLACK				~140	-	7560 3780	-	-								
04	--	PIPE	IS1239 BLACK	100	5.4	ARC	5.4 V	-	E 6013 E 7018	E 7018		1001 REV 01	-	-	-	RT 10%	*	*	
		PIPE FITTING	IS1239 BLACK IS1239 BLACK				~122	-	3246 2196	-	-								
05	--	PIPE	IS1239 BLACK	80	4.8	ARC	4.8 V	-	E 7018			1001 REV 01	-	-	-	RT 10%	*	*	
		PIPE FITTING	IS1239 BLACK IS1239 BLACK				~530	-	18000	-	-								
06	--	PIPE	IS1239 BLACK	15	3.2	ARC	3.2 V	-	E 7018			1001 REV 01	-	-	-	RT 10%	*	*	
		FITTING	SA 105				~360	-	126	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4-80-460-80690	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM-1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-460
SYSTEM : SG AUX. COOLING WATER UNIT SYSTEM

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	--	PIPE	IS1239 BLACK	50	4.5	ARC	4.5 V̂	-	E7018-1			1001 REV 01	-	-	-	RT 10%	*	*	
		PIPE	IS1239 BLACK				~130	-	1300	-	-								
08	--	PIPE	IS1239 BLACK	25	4.0	ARC	4.0 V̂	-	E7018-1			1001 REV 01	-	-	-	RT 10%	*	*	
		PIPE	IS1239 BLACK				~125	-	625	-	-								
09	--	PIPE	IS1239 BLACK	15	3.2	ARC	3.2 V̂	E 6013	E7018-1			1001 REV 01	-	-	-	RT 10%	*	*	
		PIPE	IS1239 BLACK				~140	896	700	-	-								
10	--	PIPE	IS1239 BLACK	50	4.5	ARC	4.5 V̂	-	E7018-1			1001 REV 01	-	-	-	RT 10%	*	*	
		FITTING	SA 105				~500	-	778	-	-								
11	--	PIPE	IS1239 BLACK	25	4.0	ARC	4.0 V̂	-	E7018-1			1001 REV 01	-	-	-	RT 10%	*	*	
		FITTING	SA 105				~160	-	112	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4-80-460-80690	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-471
SYSTEM : BOILER WATER WASH TO AND FROM UNIT

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	--	PIPE	IS 3589	406.4	6	ARC	6 V	–	E 7018			1213 REV 00	–	–	–	RT 10%	*	*	
		PIPE FITTING	IS 3589 SA234WPB				~85	–	2550	1785	–								
02	--	PIPE	IS 3589	273	6	ARC	6 V	–	E 7018			1213 REV 00	–	–	–	RT 10%	*	*	
		PIPE FITTING	IS 3589 SA234WPB				~30	–	600	270	–								
03	--	PIPE	IS1239BLACK	40	4.0	ARC	4.0 V	–	E 7018			1001 REV 01	–	–	–	RT 10%	*	*	
		FITTING	SA 105				~10	–	22	–	–								
04	--	PIPE	IS1239BLACK	25	4.0	ARC	4.0 V	–	E 7018			1001 REV 01	–	–	–	RT 10%	*	*	
		PIPE FITTING	IS1239BLACK IS1239BLACK				~110	–	130	–	–								
08	--	PIPE	IS1239BLACK	25	4.0	ARC	4.0 V	E 6013	E 7018			1001 REV 01	–	–	–	RT 10%	*	*	SMAW ONLY
		PIPE FITTING	IS1239BLACK IS1239BLACK				~50	280	350	–	–								
06	--	PIPE	IS 3589	219.1	6.4	ARC	6.4 V	–	E 7018			1213 REV 00	–	–	–	RT 10%	*	*	
		FITTING	SA234WPB				~30	–	5550	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4-80-471-80178	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-471
SYSTEM : BOILER WATER WASH TO AND FROM UNIT

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG	ARC SPEC.			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1					QTY(gms)	QTY(NOS.)										
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
06	--	PIPE	IS1239BLACK	100	6.4	ARC	6.4 V	E 6013	E 7018			1001 REV 01	-	-	-	RT 10%	*	*	SMAW ONLY
		PIPE FITTING	IS1239BLACK IS1239BLACK				~35	931	770	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4-80-471-80178	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-480
SYSTEM : FIRE WATER-OTHER AREAS

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	--	PIPE	IS 3589	406.4	6	ARC	6 V	-	E 7018			1213 REV 00	-	-	-	RT 10%	*	*	
		PIPE FITTING	IS 3589 SA234WPB				~50	-	1500	1050	-								
02	--	PIPE	IS 3589	273	6	ARC	6 V	-	E 7018			1213 REV 00	-	-	-	RT 10%	*	*	
		PIPE FITTING	IS 3589 SA234WPB				~35	-	700	315	-								
03	--	PIPE	IS1239BLACK	40	4.0	ARC	4.0 V	E 6013	E 7018			1001 REV 01	-	-	-	RT 10%	*	*	
		PIPE	IS1239BLACK				~65	644	520	-	-								
04	--	PIPE	IS1239BLACK	25	4.0	ARC	4.0 V	E 6013	E 7018			1001 REV 01	-	-	-	RT 10%	*	*	SMAW ONLY
		PIPE	IS1239BLACK				~110	616	770	-	-								
05	--	PIPE	IS1239BLACK	50	4.5	ARC	4.5 V	E 6013	E 7018			1001 REV 01	-	-	-	RT 10%	*	*	SMAW ONLY
		PIPE	IS1239BLACK				~40	504	400	-	-								
06	--	PIPE	IS 3589	219.1	6.4	ARC	6.4 V	-	E 7018			1213 REV 00	-	-	-	RT 10%	*	*	
		FITTING	SA234WPB				~10	-	1080	1620	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	03.12.2016	4-80-480-80191	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-480
SYSTEM : FIRE WATER-OTHER AREAS

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
06	--	PIPE	IS1239BLACK	50	4.5	ARC	5 V	-	E 7018			1001 REV 01	-	-	-	RT 10%	*	*	
		FITTING	SA 105				~80	-	167	-	-								
07	--	PIPE	IS1239BLACK	40	4.0	ARC	4 V	-	E 7018			1001 REV 01	-	-	-	RT 10%	*	*	
		FITTING	SA 105				~400	-	642	-	-								
08	--	PIPE	IS1239BLACK	25	4.0	ARC	4 V	-	E 7018			1001 REV 01	-	-	-	RT 10%	*	*	
		FITTING	SA 105				~275	-	248	-	-								
09	--	PIPE	IS1239BLACK	15	3.2	ARC	3 V	-	E 7018			1001 REV 01	-	-	-	RT 10%	*	*	
		FITTING	SA 105				~30	-	14	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	03.12.2016	4-80-480-80191	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM–1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80–545
SYSTEM : CONDENSATE PUMP A AND B DISCHARGE TO HP FLASH TANK

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART–1	PART–1																
		PART–2	PART–2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2–80–545–14159	FITTING PIPE	SA234WPB SA106GRB	457.2	9.53	TIG & ARC	9.53V	ER70SA1	E7018–1			1003 REV 03	–	–	–	RT 10%	*	*	
		VALVE PIPE/FITTING	WCB SA106GRB/WPB				36	5400	1224	1908	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4–80–545–80222	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-612
SYSTEM : SERVICE AIR PIPING

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG	ARC SPEC.			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1					QTY(gms)	QTY(NOS.)										
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	--	PIPE	IS1239 BLACK	150	5.4	ARC	5.4 V	E 6013	E 7018			1001 REV 01	–	–	–	RT 10%	*	*	SMAW ONLY
		PIPE FITTING	IS1239 BLACK IS1239 BLACK				~100	5400	3100	–	–								
02	--	PIPE	IS1239 BLACK	80	4.8	ARC	4.8 V	E 6013	E 7018			1001 REV 01	–	–	–	RT 10%	*	*	SMAW ONLY
		PIPE FITTING	IS1239 BLACK IS1239 BLACK				~105	2058	1785	–	–								
03	--	PIPE	IS1239 BLACK	50	4.5	ARC	4.5 V	E 6013	E 7018			1001 REV 01	–	–	–	RT 10%	*	*	SMAW ONLY
		PIPE	IS1239 BLACK				~100	1260	1000	–	–								
04	--	PIPE	IS1239 BLACK	25	4.0	ARC	4.0 V	E 6013	E 7018			1001 REV 01	–	–	–	RT 10%	*	*	SMAW ONLY
		PIPE	IS1239 BLACK				~130	728	910	–	–								
05	--	PIPE	IS1239 BLACK	15	3.2	ARC	3.2 V	E 6013	E 7018			1001 REV 01	–	–	–	RT 10%	*	*	SMAW ONLY
		PIPE	IS1239 BLACK				~600	3360	4200	–	–								
06	--	PIPE	IS1239 BLACK	50	4.5	ARC	4.5 V	–	E 7018			1001 REV 01	–	–	–	RT 10%	*	*	
		FITTING	SA 105				~140	–	291	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4-80-612-80691	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-612
SYSTEM : SERVICE AIR PIPING

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS		PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT)				W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT		NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
				SIZE OD mm	THICK mm			TIG	ARC SPEC.					TEMP. °C	HOLD TIME				
		PART-1	PART-1					QTY(gms)	QTY(NOS.)										
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	--	PIPE	IS1239 BLACK	25	4.0	ARC	4.0 V̂	–	E 7018			1001 REV 01	–	–	–	RT 10%	*	*	
		FITTING	SA 105				~250	–	225	–	–								
08	--	PIPE	IS1239 BLACK	15	3.2	ARC	3.2 V̂	–	E 7018			1001 REV 01	–	–	–	RT 10%	*	*	
		FITTING	SA 105				~1270	–	540	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4-80-612-80691	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-616
SYSTEM : INSTRUMENT AIR PIPING

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.) ø2.5	ø3.2	ø4.0	W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4											
01	--	PIPE	SA312TP304H	114.3	3.05	TIG& ARC	3.05V	ER347	E347			1016 REV02	20	–	–	RT 100%	*	*	
		PIPE FITTING	SA312TP304H SA413WP304H				~180	4788	2880	–	–								
02	--	PIPE	SA312TP304H	88.9	3.05	TIG& ARC	3.05V	ER347	E347			1016 REV02	20	–	–	RT 100%	*	*	
		PIPE FITTING	SA312TP304H SA413WP304H				~110	2310	1430	–	–								
03	--	PIPE	SA312TP304H	60.3	3.91	TIG& ARC	3.91V	ER347	E347			1016 REV02	20	–	–	RT 100%	*	*	
		PIPE FITTING	SA312TP304H SA413WP304H				~225	13680	–	–	–								
04	--	PIPE	SA312TP304H	48.3	3.68	TIG& ARC	3.68V	ER347	E347			1016 REV02	20	–	–	RT 100%	*	*	
		PIPE FITTING	SA312TP304H SA413WP304H				~670	6633	5360	–	–								
05	--	PIPE	SA312TP304H	33.4	3.38	TIG& ARC	3.38V	ER347	E347			1016 REV02	20	–	–	RT 100%	*	*	
		PIPE FITTING	SA312TP304H SA413WP304H				~1460	9344	7300	–	–								
06	--	PIPE	SA312TP304H	21.3	3.73	TIG& ARC	3.73V	ER347	E347			1016 REV02	20	–	–	RT 100%	*	*	
		PIPE FITTING	SA312TP304H SA413WP304H				~4280	57780	–	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4-80-616-80692	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM (1X800MW)
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-363
SYSTEM : EXHAUST STEAM FROM PRIME MOVERS

REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-363-21299	FITTING PIPE	SA106GRB SA234WPB	60.3	5.54	TIG& ARC	5.54	ER70SA1	E7018-1			1003 REV 03	–	–	–	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				40	520	400	–	–								
02	1-80-363-21297	PIPE	SA515GR70	2032	16	TIG& ARC	16	ER70SA1	E7018-1			1003 REV 03	–	–	–	10% RT	*	*	
		FITTING	SA515GR70				28	20636	4368	7168	2408								
03	1-80-363-21299	FITTING PIPE	SA106GRB SA234WPB	168.3	7.11	TIG& ARC	7.11	ER70SA1	E7018-1			1003 REV 03	–	–	–	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				12	640	180	110	–								
04	1-80-363-21298	FITTING PIPE	SA106GRB SA234WPB	323.9	9.53	TIG& ARC	9.53	ER70SA1	E7018-1			1003 REV 03	–	–	–	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				36	3744	864	1332	–								
05	1-80-363-21299	FITTING	SA234WPB	114.3	6.02	TIG& ARC	6.02	ER70SA1	E7018-1			1003 REV 03	–	–	–	10% RT	*	*	
		FITTING	SA234WPB				2	54	42	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL KUMAR	I BISWAS	SRM	HARITHA.C	03.02.2017	4-80-363-80181	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-370
SYSTEM : HP DRAIN FLASH TANK VENT TO ATMOSPHERE

DOC.NO. : NA
REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-370-21212	PIPE	SA515GR70	1870	20	TIG & ARC	20V	ER70SA1	E7018-1			1003 REV 03	–	–	–	RT 10%	*	*	
		PIPE/NOZZLE MITRE BEND	SA515GR70				17	11133	2387	3920	2916								
02	1-80-370-21212	PIPE	SA106GRB	273	9.27	TIG & ARC	9.27V	ER70SA1	E7018-1			1003 REV 03	–	–	–	RT 10%	*	*	
		PIPE FITTING	GRB/WPB				13	1170	260	390	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	SRM	C.HARITHA	03.02.2017	4-80-370-80016	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-371
SYSTEM : UNIT FLASH TANK VENT

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2-80-371-14207	FITTING PIPE	SA234WPB SA106GRB	508	12.7	TIG& ARC	12.7 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE/NOZZLE	SA234WPB SA106GRB SA516GR60				8	1320	320	520	144								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	SRM	HARITHA.C	03.02.17	4-80-371-80266	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM (1X800MW)
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-373
SYSTEM : AUX STEAM HDR SV EXHAUST PIPING

DOC.NO. : –
REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-373-21262	PIPE	SA106GRB	273	6.35	TIG & ARC	6.35V	ER70SA1	E7018-1			1003 REV 03	–	–	–	RT 10%	*	*	
		FITTING	WPB				8	900	220	120	–								
02	1-80-373-21262	PIPE	SA106GRB	355.6	9.53	TIG & ARC	9.53V	ER70SA1	E7018-1			1003 REV 03	–	–	–	RT 10%	*	*	
		FITTING	WPB				16	2300	475	722	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	SRM	HARITHA.C	03.02.2017	4-80-373-80100	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM, 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-375
SYSTEM : LP HEATERS SAFETY VALVE DISCHARGE TO LP FLASH PIPE

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2-80-375-14142	PIPE	SA106GRB	219.1	6.35	TIG& ARC	6.35 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING	SA234WPB																
		PIPE	SA106GRB				33	2343	1221	-	-								
		FITTING	SA234WPB																
02	2-80-375-14142	PIPE	SA106GRB	168.3	7.11	TIG& ARC	7.11 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING	SA234WPB				2	106	30	18	-								
03	2-80-375-14142	PIPE	SA106GRB	168.3	7.11	ARC	7◺ 8◺	ER70SA1	E7018-1			1022 REV 00	-	-	-	LPI/MPI 10%	*	*	
		FLANGE	SA515GR70				2	-	50	-	-								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	SRM	HARITHA.C	03.02.2017	4-80-375-80200	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-379
SYSTEM : HP HEATERS SAFETY VALVE DISCHARGE TO HP FLASH PIPE

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
							QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-379-21334	PART-1: PIPE FITTING PART-2: PIPE FITTING	PART-1: SA106GRB SA234WPB PART-2: SA106GRB SA234WPB	168.3	7.11	TIG& ARC	7.11 V 100	ER70SA1 5300	E7018-1 1497	898	-	1003 REV 03	-	-	-	10% RT	*	*	
02	1-80-379-21334	PART-1: PIPE PART-2: FLANGE	PART-1: SA106GRB PART-2: SA515GR70	114.3	6.02	ARC	6 ◺ 7 ◺ 6	ER70SA1 -	E7018-1 80	-	-	1022 REV 00	-	-	-	LPI/MPI 10%	*	*	

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	SRM	HARITHA.C	03.02.2017	4-80-379-80242	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-381
SYSTEM : HP HEATERS VENTS

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	--	PIPE	SA106GRB	60.3	5.54	ARC	6◺	--	E7018-1			1022 REV 00	-	-	-	10% MPI/LPI	*	*	
		FITTING	SA105				~150	--	564	-	-								
02	--	PIPE	SA106GRB	33.4	4.55	ARC	5◺	--	E7018-1			1022 REV 00	-	-	-	10% MPI/LPI	*	*	
		FITTING	SA105				~25	--	33	-	-								
03	--	PIPE	SA106GRB	33.4	4.55	TIG& ARC	4.55V̂	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE	SA106GRB				~20	146	105	-	-								
04	--	PIPE	SA106GRB	60.3	5.54	TIG& ARC	5.54V̂	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE	SA106GRB				~100	1300	1000	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	SRM	HARITHA.C	03.02.2017	4-80-381-80232	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-382
SYSTEM : AIR EXTRACTION FROM LP HEATERS TO CONDENSER

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-382-21325	FITTING PIPE	SA234WPB SA106GRB	OD114.3	6.02	TIG& ARC	6.02 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE/VALVE	SA234WPB SA106GRB/WCB				7	160	125	-	-								
02	1-80-382-21324	FITTING PIPE	SA234WPB SA106GRB	OD168.3	7.11	TIG& ARC	7.11 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				52	2756	792	476	-								
03	1-80-382-21325 1-80-382-21326	PIPE	SA106GRB	OD88.9	5.49	TIG& ARC	5.49 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		NOZZLE(COND)	GRB EQUIVALENT				80	1600	1200	—	-								
04	1-80-382-21326	BEND PIPE	SA106GRB SA106GRB	OD33.4	4.55	TIG& ARC	4.55 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		BEND PIPE	SA106GRB SA106GRB				~40	260	200		-								
05	1-80-382-21326	PIPE	SA106GRB	OD33.4	4.55	ARC	5 ◺	-	E7018-1			1022 REV 00	-	-	-	LPI/MPI 10%	*	*	
		SW STUB	SA105				6	-	33	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	SRM	C.HARITHA	03.02.2017	4-80-382-80239	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-385
SYSTEM : SAFETY VALVE ESCAPE PIPING FROM EXTRACTION LINE TO BFPT

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-385-21263	FITTING PIPE	SA234WPB SA106GRB	355.6	9.53	TIG& ARC	9.53V̂	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
	2-80-385-14469	FITTING PIPE	SA234WPB SA106GRB				43	4472	1032	1591	-								
02	1-80-385-21263	FITTING PIPE	SA234WPB SA106GRB	273	6.35	TIG& ARC	6.35V̂	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				4	360	80	36	-								
03	2-80-385-14469	FITTING PIPE	SA234WPB SA106GRB	60.3	5.54	TIG& ARC	5.54V̂	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				6	78	60	-	-								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	SRM	C.HARITHA	03.02.2017	4-80-385-80101	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-388
SYSTEM : CONDENSER AIR EVACUATION PIPING

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
							QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-388-21384 1-80-388-21385	FITTING PIPE	SA234WPB SA106GRB	219.1	6.35	TIG& ARC	6.35V̂	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE/VALVE	SA234WPB SA106GRB/WCB				60	5325	2442	-	-								
02	1-80-388-21384 1-80-388-21385	FITTING PIPE	SA234WPB SA106GRB	323.9	9.53	TIG& ARC	9.53V̂	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE/VALVE	SA234WPB SA106GRB/WCB				25	3250	660	1018	-								
03	1-80-388-21384 1-80-388-21385	FITTING PIPE	SA234WPB SA106GRB	273	6.35	TIG& ARC	6.35V̂	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE/VALVE	SA234WPB SA106GRB/WCB				50	5563	1100	495	-								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	SRM	C.HARITHA	19.09.16	4-80-388-80300	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-408
SYSTEM : CONDENSATE DUMP FROM HEADER

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-408-21307	PIPE FITTING/VALVE	SA106GRB SA234WPB/WCB	219.1	8.18	TIG& ARC	8.18 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING	SA106GRB SA234WPB				4	273	66	66	-								
02	1-80-408-21307	PIPE FITTING/VALVE	SA106GRB SA234WPB	219.1	6.35	TIG& ARC	6.35 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING	SA106GRB SA234WPB/WCB				42	2982	1554	-	-								
03	1-80-408-21307	FITTING	SA234WPB	168.3	7.11	TIG& ARC	7.11 ◊	ER70SA1	E7018-1			1033 REV 04	150	660±10	2.5mtS PER mm minimum 60 min	RT 100%	*	*	
		CONTROL VAL	WC6				2	106	30	18	-								
04	1-80-408-21307	FITTING	SA234WPB	168.3	7.11	TIG& ARC	7.11 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING	SA234WPB				2	106	30	18	-								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL KUMAR	BISWAS	SRM	HARITHA.C	08.02.2017	4-80-408-80203	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-412
SYSTEM : CONDENSER EMERGENCY MAKE UP FROM CST

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG	ARC SPEC.			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
								QTY(gms)	QTY(NOS.)										
		PART-1	PART-1				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
		PART-2	PART-2																
01	1-80-412-21317	FITTING PIPE	SA312TP304 SA403WP304H	114.3	3.05	TIG& ARC	3.05V̂	ER347	E347			1016 REV 02	10	-	-	RT10% LPI100%	*	*	
		FITTING PIPE	SA312TP304 SA403WP304H				60	1596	960	-	-								
02	1-80-412-21317	FITTING PIPE	SA312TP304 SA403WP304H	88.9	3.05	TIG& ARC	3.05V̂	ER347	E347			1016 REV 02	10	-	-	RT10% LPI100%	*	*	
		FITTING PIPE	SA403WP304H				30	630	390	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL KUMAR	BISWAS	SRM	HARITHA.C	08.02.2017	4-80-412-80219	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-433
SYSTEM : SPRAY WATER PIPING TO RE-HEATER ATTEMPERATION

REV. NO. : 00
WELDING CODE : IBR / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-433-21286	PIPE FITTING/VALVE	SA106GRC SA234WPC/WCC	114.3	13.49	TIG& ARC	13.49	ER70SA1	E7018-1			1003 REV 03	10	–	–	10% RT	*	*	
		PIPE FITTING	SA106GRC SA234WPC				40	1360	440	600	–								
02	1-80-433-21286	PIPE FITTING/VALVE	SA106GRC SA234WPC/WCC	168.3	21.95	TIG& ARC	21.95	ER70SA1	E7018-1			1004 REV 03	10	610±10	2.5mtS PER mm minimum 30 min	100% RT	*	*	
		PIPE FITTING	SA106GRC SA234WPC				52	3528	2541	1245	675								
03	1-80-433-21286	PIPE FITTING/VALVE	SA106GRC SA234WPC/WCC	114.3	17.12	TIG& ARC	17.12	ER70SA1	E7018-1			1003 REV 03	10	–	–	10% RT	*	*	
		PIPE FITTING	SA106GRC SA234WPC				20	640	240	280	60								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	SRM	HARITHA.C	04.02.2017	4-80-433-80136	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-435
SYSTEM : CEP DISCHARGE TO APRDS

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	0-80-435-07038	PIPE FITTING/VALVE	SA106GRB SA234WPB	168.3	7.11	TIG& ARC	7.11 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING	SA106GRB SA234WPB				17	901	255	153	-								
02	0-80-435-07038	PIPE FITTING/VALVE	SA106GRB SA234WPB	88.9	5.49	TIG& ARC	5.49 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING	SA106GRB SA234WPB				48	960	720	-	-								
03	0-80-435-07038	PIPE	SA335P11	88.9	5.49	TIG& ARC	5.49 ◊	ER80SB2	E8018B2			1011 REV 01	150	-	-	RT 100%	*	*	
		VALVE	WC9				1	20	15	-	-								
04	0-80-435-07038	PIPE FITTING/VALVE	SA335P22 SA234WP22/WC9	88.9	5.49	TIG& ARC	5.49 ◊	ER90SB3	E9018B3			1014 REV 03	150	680 -720	2.5 Mts PER mm 60 min	RT 100%	*	*	3% HARDNESS
		PIPE FITTING	SA335P22 SA234WP22				6	120	90	-	-								
05	0-80-435-07038	PIPE	SA106GRB	60.3	5.54	ARC	6 ◺	--	E 7018-1			1022 REV 00	-	-	-	10% MPI/LPI	*	*	
		FITTING	SA105				~20	--	90	-	-								
06	0-80-435-07038	FITTING	SA234WPB	88.9	5.49	TIG& ARC	5.49 ◊	ER70SA1	E7018-1			1033 REV 04	150	650 -670	2.5 Mts PER mm 60 min	RT 100%	*	*	
		PIPE	SA335P11				1	20	15	-	-								

NOTES:

01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.2017	4-80-435-80213	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-436
SYSTEM : CONDENSER LP BYPASS SPRAY PIPING

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2-80-436-14069	PIPE FITTING	SA106GRB SA234WPB	323.9	9.53	TIG& ARC	9.53	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING	SA106GRB SA234WPB				30	3120	720	1110	-								
02	2-80-436-14069	PIPE FITTING/VALVE	SA106GRB SA234WPB/WCB	273	9.27	TIG& ARC	9.27	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING	SA106GRB SA234WPB				8	700	160	240	-								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.2017	4-80-436-80084	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-439
SYSTEM : UFT DRAIN TO TRENCH

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	3-80-439-33074	FITTING PIPE	SA234WPB SA106GRB	219.1	6.35	TIG& ARC	6.35V̂	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				8	568	296	-	-								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	SRM	HARITHA.C	04.02.2017	4-80-439-80194	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-442
SYSTEM : GSC DRAIN TO FLASH TANK-B

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-442-21303	PIPE FITTING/VALVE	SA106GRB SA234WPB/WCB	88.9	5.49	TIG& ARC	5.49	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING	SA106GRB SA234WPB				30	600	450	-	-								
02	1-80-442-21303	PIPE FITTING/VALVE	SA106GRB SA234WPB/WCB	60.3	5.54	TIG& ARC	5.54	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING	SA106GRB SA234WPB				15	100	75	-	-								
03	1-80-442-21303	PIPE FITTING	SA106GRB SA234WPB	33.4	4.55	TIG& ARC	4.55	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING	SA106GRB SA234WPB				5	30	25	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.2017	4-80-442-80192	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-443
SYSTEM : LPH-2 DRAIN PIPING TO LPH-1 AND ALTERNATE DRAIN TO FLASH TANK-B

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-443-21272 1-80-443-21273 1-80-443-21274	PIPE FITTING/WCB	SA106GRB SA234WPB/WCB	323.9	9.53	TIG& ARC	9.53 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING/NOZZ	SA106GRB SA234WPB/CS				27	2808	648	1000	-								
02	1-80-443-21272 1-80-443-21273 1-80-443-21274	PIPE FITTING/WCB	SA106GRB SA234WPB/WCB	219.1	6.35	TIG& ARC	6.35 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING/NOZZ	SA106GRB SA234WPB/CS				80	5680	2960	-	-								
03	1-80-443-21272 1-80-443-21273 1-80-443-21274	PIPE FITTING/WCB	SA106GRB SA234WPB/WCB	168.3	7.11	TIG& ARC	7.11 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING/NOZZ	SA106GRB SA234WPB/CS				43	2280	645	430	-								
04	1-80-443-21272	REDUCER	SA234WPB	219.1	6.35	TIG& ARC	6.35 ◊	ER70SA1	E7018-1			1033 REV 04	150	660±10	2.5mtS PER mm minimum 60 min	RT 100%	*	*	
		CONTROL VAL (DRV-78,81)	WC6				4	284	148	-									

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.17	4-80-443-80120	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-444
SYSTEM : LP HEATER DRAINS

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-444-21278	PIPE FITTING/VAL	SA106GRB SA234WPB/WCB	219.1	6.35	TIG& ARC	6.35 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING	SA106GRB SA234WPB				13	3220	782	736	-								
02	1-80-444-21278	PIPE FITTING/VAL	SA106GRB SA234WPB/WCB	168.3	7.11	TIG& ARC	7.11 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING	SA106GRB SA234WPB				46	106	30	18	-								
03	1-80-444-21278	REDUCER	SA234WPB	168.3	7.11	TIG& ARC	7.11 ◊	ER70SA1	E7018-1			1033 REV 04	150	660±10	2.5mtS PER mm minimum 120 min	RT 100%	*	*	
		CONTROL VAL (DRV-43)	WC6				2	106	30	18	-								
04	1-80-444-21278	REDUCER	SA234WPB	88.9	5.49	TIG& ARC	5.49 ◊	ER70SA1	E7018-1			1033 REV 04	150	660±10	2.5mtS PER mm minimum 120 min	RT 100%	*	*	
		CONTROL VAL (DRV-40)	WC6				2	106	30	18	-								
05	1-80-444-21488	PIPE FITTING/VAL	SA106GRB SA234WPB/WCB	219.1	8.18	TIG& ARC	8.18 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING	SA106GRB SA234WPB				48	3220	782	736	-								
06	1-80-444-21488	PIPE FITTING/VAL	SA106GRB SA234WPB/WCB	273	6.35	TIG& ARC	6.35 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE FITTING	SA106GRB SA234WPB				48	4717	1060	477	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.17	4-80-444-80123	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-444
SYSTEM : LP HEATER DRAINS

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	1-80-444-21488	FITTING	SA106GRB	323.9	9.53	TIG& ARC	9.53 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		LP HEATER NOZLLES	SA106GRB				6	208	48	75	-								
08	1-80-444-21488	PIPE FITTING	SA106GRB SA234WPB	273	6.35	TIG& ARC	6.35 ◊	ER70SA1	E7018-1			1033 REV 04	150	660±10	2.5mtS PER mm minimum 120 min	RT 100%	*	*	
		VALVE (DRV-58)	WC6				2	180	40	18	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.2017	4-80-444-80123	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-446
SYSTEM : DEAERATOR DRAIN TO UFT AND OVER FLOW DRAIN TO F/T-B

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG	ARC SPEC.			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1					QTY(gms)	QTY(NOS.)										
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-446-21280	FITTING PIPE	SA106GRB SA234WPB	323.9	9.53	TIG& ARC	9.53◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				5	520	120	185	-								
02	1-80-446-21280	FITTING PIPE	SA106GRB SA234WPB	219.1	6.35	TIG& ARC	6.35◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				54	3834	2000	-	-								
03	1-80-446-21280	FITTING	SA234WPB	168.3	7.11	TIG& ARC	7.11 ◊	ER70SA1	E7018-1			WT412 REV01				RT 100%	*	*	
		VALVE (DRV-73)	WC9				2	106	30	18	-								
04	1-80-446-21280	FITTING PIPE	SA106GRB SA234WPB	168.3	7.11	TIG& ARC	7.11 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				63	53	3339	567	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	S. RAMAMURTHY	C.HARITHA	04.02.17	4-80-446-80126	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : WANAKBORI 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7266
PGMA : 80-447
SYSTEM : HIGH PRESSURE HEATER DRAINS

REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG	ARC SPEC.			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
								QTY(gms)	QTY(NOS.)										
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-447-21245 1-80-447-21246	FITTING PIPE	SA106GRB SA234WPB	168.3	10.97	TIG& ARC	10.97◊	ER70SA1	E7018-1			1003 REV 03	–	–	–	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				112	5712	1680	2576	–								
02	1-80-447-21245 1-80-447-21246 1-80-447-21247 1-80-447-21248	FITTING PIPE	SA106GRB SA234WPB	219.1	12.7	TIG& ARC	12.7 ◊	ER70SA1	E7018-1			1003 REV 03	–	–	–	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				100	6700	1700	2500	800								
03	1-80-447-21245 1-80-447-21246	FITTING	SA335P11	88.9	7.62	TIG& ARC	7.62 ◊	ER80SB2	E8018-B2			1011 REV 01	150	–	–	RT 100%	*	*	
		CONTROL VAL (DRV-5,11)	WC9				4	80	32	24	–								
04	1-80-447-21245 1-80-447-21246	FITTING	SA335P11	88.9	7.62	TIG& ARC	7.62 ◊	ER80SB2	E8018-B2			1011 REV 01	150	–	–	RT 100%	*	*	
		CONTROL VAL (DRV-2,8)	WC9				4	80	32	24	–								
05	1-80-447-21247 1-80-447-21248	FITTING PIPE	SA106GRB SA234WPB	323.9	12.7	TIG& ARC	12.7 ◊	ER70SA1	E7018-1			1003 REV 03	–	–	–	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				10	1030	240	550	–								
06	1-80-447-21247 1-80-447-21248	FITTING	SA234WPB/WPC	168.3	7.11	TIG& ARC	7.11 ◊	ER70SA1	E7018-1			1033 REV 04	150	660±10	2.5mtS PER mm minimum 60 min	RT 100%	*	*	
		CONTROL VAL (DRV-14,20,27,34)	WC6				8	424	120	72	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4-80-447-80137	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : WANAKBORI 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7266
PGMA : 80-447
SYSTEM : HIGH PRESSURE HEATER DRAINS

REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART–1	PART–1																
		PART–2	PART–2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	1–80–447–21247 1–80–447–21248 1–80–447–21249 1–80–447–21250	FITTING	SA335P11	168.3	7.11	TIG& ARC	7.11 ◊	ER80SB2	E8018B2			1011 REV 01	150	–	–	RT 100%	*	*	
		CONTROL VAL (DRV–17,23,30,37)	WC9				8	424	120	72	–								
08	1–80–447–21249 1–80–447–21250	FITTING PIPE	SA106GRB SA234WPB	273	6.35	TIG& ARC	6.35 ◊	ER70SA1	E7018–1			1003 REV 03	–	–	–	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				150	13500	3000	1500	–								
09	1–80–447–21249 1–80–447–21250	FITTING PIPE	SA106GRB SA234WPB	323.9	9.53 12.7	TIG& ARC	9.53 ◊	ER70SA1	E7018–1			1003 REV 03	–	–	–	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				14	1456	336	518	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	R.SESHAGIRI	HARITHA.C	08.08.16	4-80-447-80137	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-448
SYSTEM : DRAIN FROM UNLISTED EQPT/VESSEL-TG SCOPE

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-448-21344	FITTING PIPE	SA234WPB SA106GRB	273	6.35	TIG& ARC	6.35 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				10	900	200	100	-								
02	1-80-448-21344	FITTING PIPE	SA234WPB SA106GRB	508	12.7	TIG& ARC	12.7 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				11	1815	418	693	198								
03	1-80-448-21344	FITTING PIPE	SA234WPB SA106GRB	323.9	6.35	TIG& ARC	6.35 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				12	1248	288	444	-								
04	1-80-448-21343 1-80-448-21508	FITTING PIPE	SA234WPB SA106GRB	219.1	6.35	TIG& ARC	6.35 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE/NOZZ	SA234WPB SA106GRB				50	3550	1850	-	-								
05	1-80-448-21343	FITTING PIPE	SA234WPB SA106GRB	168.3	7.11	TIG& ARC	7.11 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				75	3975	1125	675	-								
06	1-80-448-21343 1-80-448-21508	FITTING PIPE	SA234WPB SA106GRB	114.3	6.02	TIG& ARC	6.02 ◊	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				50	1350	1050	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.2017	4-80-448-80265	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-449
SYSTEM : TG CYCLE PIPING DRAINS AND VENTS

REV. NO. : 00
WELDING CE : – / ASME
PAGE NO : 01 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METH/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	--	PIPE	SA106GRB	33.4	4.55	TIG& ARC	4.55◊	ER70SA1	E7018-1			1003 REV 03	–	–	–	10% RT	*	*	
		PIPE	SA106GRB				~350	2524	1802	–	–								
02	--	PIPE	SA106GRB	33.4	4.55	ARC	5◺	–	E 7018-1			1022 REV 00	–	–	–	10% MPI/LPI	*	*	
		FITTING	SA105				~920	–	1062	–	–								
03	--	PIPE	SA106GRB	60.3	5.54	TIG& ARC	5.54◊	ER70SA1	E7018-1			1003 REV 03	–	–	–	10% RT	*	*	
		PIPE	SA106GRB				~25	340	260	–	–								
04	--	PIPE	SA106GRB	60.3	5.54	ARC	6◺	–	E 7018-1			1022 REV 00	–	–	–	10% MPI/LPI	*	*	
		FITTING	SA105				~150	–	430	–	–								
05	--	PIPE	SA106GRB	48.3	5.08	ARC	5◺	–	E 7018-1			1022 REV 00	–	–	–	10% MPI/LPI	*	*	
		FITTING	SA105				~10	–	22	–	–								
06	--	PIPE	SA312TP304H	33.4	3.38	TIG& ARC	3.38◊	ER347	E 347			1016 REV 02	10	–	–	RT10% LPI100%	*	*	
		PIPE	SA312TP304H				~50	300	250	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.17	4-80-449-80693	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-449
SYSTEM : TG CYCLE PIPING DRAINS AND VENTS

REV. NO. : 00
WELDING CE : - / ASME
PAGE NO : 02 OF 02

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METH/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	--	PIPE	SA312TP304H	60.3	3.91	TIG& ARC	3.91 ⌒	ER347	E 347			1016 REV 02	10	-	-	RT10% LPI100%	*	*	
		PIPE	SA312TP304H				~14	200	126	-	-								
08	--	PIPE	SA106GRB	48.3	5.08	TIG& ARC	5.08 ⌒	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		PIPE	SA106GRB				~10	100	60	-	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.17	4-80-449-80693	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-457
SYSTEM : DRAIN MANIFOLD TO FLASH TANKS

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	1-80-457-21418	FITTING PIPE	SA234WPB SA106GRB	219.1	8.18	TIG& ARC	8.18	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				10	770	170	160	-								
02	1-80-457-21418	FITTING PIPE	SA234WPB SA106GRB	355.6	9.53	TIG& ARC	9.53	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE	SA234WPB SA106GRB				8	805	189	287	-								
03	1-80-457-21418	FITTING PIPE	SA234WP22 SA335P22	323.9	9.53	TIG& ARC	9.53	ER90S-B3	E9018-B3			1014 REV 03	150	680 - 720°	2.5MIN PER 2.5MM 60 min	RT 100%	*	*	3% HARDNESS
		FITTING PIPE	SA234WP22 SA335P22				4	416	96	148	-								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	HARITHA.C	04.02.2017	4-80-457-80378	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-459
SYSTEM : FLASH TANK-A DRAIN TO CONDENSER

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2-80-459-14061	FITTING PIPE	SA106GRB SA234WPB	323.9	6.35	TIG& ARC	6.35V̂	ER70SA1	E7018-1			1003 REV 03	-	-	-	10% RT	*	*	
		FITTING PIPE/NOZZLE	SA106GRB SA234WPB GRB EQUIVALENT				11	1144	264	401	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.17	4-80-459-80057	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-463
SYSTEM : TG AUX COOLING WATER

REV. NO. : 00
WELDING CODE : -/ ASME
PAGE NO : 01 OF 03

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	--	FITTING PIPE	IS 3589 IS 3589	610	8	ARC	8 V	-	E 7018			1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING PIPE	IS 3589 IS 3589				15	-	630	660	-								
02	--	FITTING PIPE	IS 3589 IS 3589	508	6	ARC	6 V	-				1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING PIPE	IS 3589 IS 3589				25	-	950	750	-								
03	--	FITTING PIPE	IS 3589 IS 3589	457	6	ARC	6 V	-				1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING PIPE	IS 3589 IS 3589				55	-	1530	990	-								
04	--	FITTING PIPE	IS 3589 IS 3589	406.4	6	ARC	6 V	-				1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING PIPE	IS 3589 IS 3589				15	-	450	315	-								
05	--	FITTING PIPE	IS 3589 IS 3589	355.6	6	ARC	6 V	-				1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING PIPE	IS 3589 IS 3589				40	-	810	600	-								
06	--	FITTING PIPE	IS 3589 IS 1239	323.9	6	ARC	6 V	-				1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING PIPE	IS 3589 IS 1239				56	-	1344	840	-								

NOTES: 01 * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.2017	4-80-463-80087	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-463
SYSTEM : TG AUX COOLING WATER

REV. NO. : 00
WELDING CODE : -/ ASME
PAGE NO : 02 OF 03

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
07	--	FITTING PIPE	IS 3589 IS 1239	OD273	6	ARC	6 V̂		E 7018			1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING PIPE	IS 3589 IS 1239				65	-	1320	884	-								
08	--	FITTING PIPE	IS 3589 IS 1239	OD219.1	6	ARC	6 V̂		E 7018			1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING PIPE	IS 3589 IS 1239				20	-	800	-	-								
09	--	FITTING PIPE	IS 3589 IS 1239	NB150	5.4	ARC	5.4 V̂		E 7018			1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING PIPE	IS 3589 IS 1239				80	-	1200	800	-								
10	--	FITTING PIPE	IS 3589 IS 1239	NB100	5.4	ARC	5.4 V̂		E 7018			1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING PIPE	IS 3589 IS 1239				20	-	3505	-	-								
11	--	FITTING PIPE	IS 3589 IS 1239	NB80	4.85	ARC	4.85 V̂		E 7018			1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING PIPE	IS 3589 IS 1239				50	-	1050	-	-								
12	--	PIPE	IS1239	NB50	4.5	ARC	4.5 V̂	-	E 7018			1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING	IS1239				~100	-	1100	-	-								

NOTES:

01 * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.2017	4-80-463-80087	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-463
SYSTEM : TG AUX COOLING WATER

REV. NO. : 00
WELDING CODE : -/ ASME
PAGE NO : 03 OF 03

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
13	--	PIPE	IS1239	NB50	4.5	ARC	4.5V̂	-	E 7018			1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING	IS1239				~100	-	800	-	-								
14	--	PIPE	IS1239	NB25	4.05	ARC	4 V̂	-	E 7018			1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING	IS1239				~100	-	500	-	-								
15	--	PIPE	IS3589	813.0	10	ARC	10 V̂	-	E 7018			1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING	IS3589				~6	-	367	577	-								
16	--	PIPE	IS3589	711.2	10	ARC	10 V̂	-	E 7018			1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING	IS3589				~10	-	550	850	-								
17	--	PIPE	IS3589	914	10	ARC	10 V̂	-	E 7018			1213 REV 00	10	-	-	RT 10%	*	*	
		FITTING	IS3589				~15	-	630	990	-								

NOTES: 01 * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.2017	4-80-463-80087	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80–473
SYSTEM : CONDENSER NORMAL MAKE UP PIPING.

REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG	ARC SPEC.			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
								QTY(gms)	QTY(NOS.)										
		PART–1	PART–1				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	–	FITTING PIPE	SA312TP304 SA403WP304H	114.3	3.05	TIG& ARC	3.05◊	ER347	E 347			1016 REV 02	10	–	–	RT10% LPI100%	*	*	
		FITTING PIPE	SA312TP304 SA403WP304H				170	4522	2720	–	–								
02	–	FITTING PIPE	SA312TP304 SA403WP304H	168.3	3.4	TIG& ARC	3.4 ◊	ER347	E347			1016 REV 02	10	–	–	RT10% LPI100%	*	*	
		FITTING PIPE	SA312TP304 SA403WP304H				85	4675	2040	–	–								
03	–	FITTING PIPE	SA312TP304 SA403WP304H	33.4	3.38	TIG& ARC	3.38◊	ER347	E347			1016 REV 02	10	–	–	RT10% LPI100%	*	*	
		FITTING PIPE	SA312TP304 SA403WP304H				80	512	400	–	–								
04	–	FITTING PIPE	SA403WP304H	21.3	3.73	TIG& ARC	3.73◊	ER347	E347			1016 REV 02	10	–	–	RT10% LPI100%	*	*	
		FITTING PIPE	SA312TP304 SA403WP304H				50	675	–	–	–								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. – QA	DATE	DRAWING NO.	REV .
EZHIL	BISWAS	SRM	HARITHA.C	08.02.2017	4-80-473-80337	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-477
SYSTEM : SERVICE WATER PIPING

REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	--	PIPE	IS 1239	NB80	5.4	ARC	5.4	–	E 7018			1213 REV 00	10	–	–	RT 10%	*	*	
		FITTING	IS 1239				~40	–	600	–	–								
02	--	PIPE	IS 1239	NB50	4.8	ARC	4.8	–	E 7018			1213 REV 00	10	–	–	RT 10%	*	*	
		FITTING	IS 1239				~70	–	650	–	–								
03	--	PIPE	IS 1239	NB150	5.4	ARC	5.4	E 6013	E 7018			1001 REV 01	–	–	–	RT 10%	*	*	
		FITTING	IS 1239				~40	2160	1080	–	–								
04	--	PIPE	IS 1239	NB25	4.0	ARC	4.0	–	E 7018			1213 REV 00	–	–	–	RT 10%	*	*	
		FITTING	IS 1239				~25	–	125	–	–								

NOTES: 01 * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

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ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-493
SYSTEM : FLASH TANK-A VENT TO CONDENSER

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2-80-493-14062	TANK-A NOZZLE	SA516GR70	1118	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		BELLOW	SA515GR70				1	368	84	132	-								
02	2-80-493-14062	PIPE/BEND BELLOWS	SA515GR70	1118	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE/BEND BELLOWS	SA515GR70				5	1840	420	660	-								
03	2-80-493-14062	CONDENSER NOZZLE	GRB EQUIVALENT	1118	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		BELLOW	SA516GR70				1	368	84	132	-								

NOTES: 01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

PREPARED	DESIGN/CHD.	DESIGN/APPD.	CHD./APPD. - QA	DATE	DRAWING NO.	REV.
EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.17	4-80-493-80058	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-494
SYSTEM : FLSH TANK-B VENT TO CONDENSER

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2-80-494-14063	TANK-B NOZZLE	SA516GR70	1118	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE	SA515GR70				1	368	84	132	-								
02	2-80-494-14063	PIPE/BEND BELLOWS	SA515GR70 SA515GR70 SA516GR70	1118	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE/BEND BELLOWS	SA515GR70 SA515GR70 SA516GR70				8	2944	672	1056	-								
03	2-80-494-14063	CONDENSER NOZZLE	GRB EQUIVALENT	1118	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE	SA515GR70				1	368	84	132	-								

NOTES:

01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

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EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.2017	4-80-494-80059	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-495
SYSTEM : FLASH TANK-B DRAIN TO CONDENSER

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	2-80-495-14064	TANK-B NOZZLE	SA516GR70	610	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE	SA515GR70				1	201	46	72	-								
02	2-80-495-14064	PIPE FITTING	SA515GR70 SA234WPB	610	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE FITTING	SA515GR70 SA234WPB				10	2010	460	720	-								
03	2-80-495-14064	CONDENSER NOZZLE	GRB EQUIVALENT	610	10	TIG& ARC	10 V̂	ER70SA1	E7018-1			1003 REV 03	10	-	-	RT 10%	*	*	
		PIPE	SA515GR70				1	201	46	72	-								

NOTES:
01. * REFER NDE MANUAL DOC NO. AA/CQ/GL/011 REV 00 dtd 24.10.16

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ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-601
SYSTEM : LP DOSING PIPING

REV. NO. : 00
WELDING CODE : - / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART-1	PART-1																
		PART-2	PART-2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	--	FITTING PIPE	SA312TP304 SA403WP304H	33.4	3.38	TIG& ARC	3.38V	ER347	E 347			1016 REV 02	10	-	-	RT10% LPI100%	*	*	
		FITTING PIPE	SA312TP304 SA403WP304H				~225	1440	1125	-	-								
02	--	FITTING PIPE	SA312TP304 SA403WP304H	48.3	3.68	TIG& ARC	3.38V	ER347	E 347			1016 REV 02	10	-	-	RT10% LPI100%	*	*	
		FITTING PIPE	SA312TP304 SA403WP304H				~100	990	800	-	-								

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EZHIL	BISWAS	RAMAMURTHY	C.HARITHA	04.02.17	4-80-601-80467	00

ERECTION / FIELD WELDING SCHEDULE

PROJECT : KOTHAGUDAM 1X800MW
CONTRACTOR : M/S BHEL

CUST. NO : 7268
PGMA : 80-673
SYSTEM : LUBE OIL PIPING SYSTEM

REV. NO. : 00
WELDING CODE : – / ASME
PAGE NO : 01 OF 01

SL. NO.	DRG NO. FOR WELD LOCATION IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATL.SPEC. (ATT)	DIMENSIONS SIZE OD mm	DIMENSIONS THICK mm	PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC. (ATT) TIG QTY(gms)	ARC SPEC. QTY(NOS.)			W.P.S NO.	MIN. PRE HEAT TEMP. °C	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC. NORM REF.	REMARKS
		PART–1	PART–1																
		PART–2	PART–2				QTY	ø2.4	ø2.5	ø3.2	ø4.0								
01	--	FITTING PIPE	SA106GRB SA234WPB	88.9	5.49	TIG& ARC	5.49◊	ER70SA1	E7018–1			1003 REV 03	10	–	–	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				~250	5000	3750	–	–								
02	--	FITTING PIPE	SA106GRB SA234WPB	60.3	5.54	TIG& ARC	5.54◊	ER70SA1	E7018–1			1003 REV 03	10	–	–	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				~6	78	60	–	–								
03	--	FITTING PIPE	SA106GRB SA234WPB	33.4	4.55	TIG& ARC	4.55◊	ER70SA1	E7018–1			1003 REV 03	10	–	–	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				~32	224	160	–	–								
04	--	FITTING PIPE	SA106GRB SA234WPB	48.3	5.08	TIG& ARC	4.55◊	ER70SA1	E7018–1			1003 REV 03	10	–	–	10% RT	*	*	
		FITTING PIPE	SA106GRB SA234WPB				~2	20	15	–	–								
05	--	FITTING	SA105	60.3	5.54	ARC	6◺	--	E 7018–1			1022 REV 00	10	–	–	LPI/MPI 10%	*	*	
		PIPE	SA106GRB				~24	--	75	–	–								
06	--	FITTING	SA105	33.4	4.55	ARC	5◺	--	E 7018–1			1022 REV 00	10	–	–	LPI/MPI 10%	*	*	
		PIPE	SA106GRB				~30	--	28	–	–								

NOTES:

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GUIDELINES FOR SELECTION OF NDE AND HEAT TREATMENT AGENCIES AT SITE

(to be deployed by BHEL's E&C Associates)

Bharat Heavy Electricals Limited

Power Sector Eastern Region

Kolkata - 700091

Doc. No. : PP-QLY-AA-DC-106/01-20

Rev. No. : 0

Title : Guidelines for Selection of NDE and Heat Treatment Agencies at Site
(to be deployed by BHEL's E&C Associates)

Prepared By Committee	Smarak Kumar Sahoo / Dy Engr. (Member)	On behalf of the committee
	Sontosh Pal / Addl. Engineer Gr.II (Co-opted)	
	Subhradip Joarder / Engineer (Co-opted)	
	Saurav Srivastava / Dy. Manager (Member)	
	Tathagata Dutta / Dy. Manager (Member)	
	Rajesh Das / Dy. Manager (Member)	
	Arup Ratan Paul / Engineer (Convener)	Arup Ratan Paul अरुप रतन पाल / Arup Ratan Paul अभियंता (गुणवत्ता) : Engineer (Quality) बी. एच. ई. एल. : बी.एच.ई.आर. मुख्यालय : BHEL : PSER : H.Q. डी जे - 9/1, सॉल्ट लेक : DJ-9/1, SALT LAKE कोलकाता-700 091 : KOLKATA-700 091 Digitally signed by ARUP RATAN PAUL DN: c=IN, o=BHARAT HEAVY ELECTRICALS LIMITED, ou=BHEL-PSER-HQ, postalCode=700091, st=West Bengal, 2.5.4.20=b6355c0e40c2ad6bdcd8b74cad57fe91a7d353fa88668809cbf74a564865593, cn=ARUP RATAN PAUL Date: 2020.09.14 17:24:20 +05'30'
	Mridul Taisum / Sr. Manager (Chairman of the committee)	
Approved By	Head/ QLY & BE	Digitally signed by SUMANTA CHATTERJEE DN: c=IN, o=BHARAT HEAVY ELECTRICALS LIMITED, ou=BHEL-PSER-HQ, postalCode=700091, st=West Bengal, 2.5.4.20=b8585eb2e62f6511c82073907e19d5fa875666724bfa32fed52c3c0d8bcded, cn=SUMANTA CHATTERJEE Date: 2020.09.14 17:25:36 +05'30'

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STATUS OF REVISIONS

SL. NO.	REFERENCE OF SHEETS REVISED	REVISION NO. & DATE	REMARKS
01	All	0, Dtd.: 14/09/20	New guidelines developed. Valuable comments / guidelines from CQ&BE and QA-Trichy incorporated in the document.

1.0 Object

Object of the guidelines is to enable BHEL engineers to make informed decision regarding selection/acceptance of NDE & Heat Treatment agencies; those are deployed by BHEL's E&C associates at site and to evaluate the performance of the agencies.

2.0 General Guidelines

A. BHEL's E&C associates have to take prior permission/approval before deployment of NDE & Heat Treatment agencies at site. All relevant documents along with the filled-up format as per Annex-A & Annex-B to be submitted by BHEL's E&C associates.

B. The personnel, proposed by the agency for NDE, should have sufficient experience in testing of welds/castings/forgings/plates and should be capable to interpret the given procedure and carry out the test. Trained, experienced and certified personnel qualified as Level I / II / III (as required) as per SNT-TC-1A of ASNT or BSEN 473 of EN through ASNT / ISNT / CSWIP or its Accredited Agencies should only be deployed.

C. The personnel, proposed by the agency for Heat Treatment job, should have sufficient experience in heat treatment of welds/castings/forgings/plates and should be capable to interpret the given procedure and carry out the test.

D. On receipt of proposal along with all necessary supporting documents from E&C associates at site, concerned BHEL Erection engineer & BHEL FQA engineer shall jointly review the proposal and record the details of the accepted agencies as per Annex-C and share with the Construction manager and Head/ Quality & BE/ BHEL-PSER HQ.

E. The FQA engineer shall also take necessary clearance / acceptance from customer, if required, before acceptance of the proposed agency and maintain a record for that. If customer approval is not required, prior intimation shall be given to the customer through memo.

F. The NDE / Heat Treatment agency shall meet the requirements of this document plus any additional qualification requirements specified in latest revision of the BHEL NDE Manual (AA/CQ/GL/011 Part III-NDEM), as applicable.

G. Based on the feedback from BHEL FQA engineers, a controlled list (with revision number & date) of accepted NDE & Heat Treatment agencies with their BHEL-approved personnel shall be maintained by PSER-HQ Quality department and this list shall be uploaded in PSER intranet portal.

H. Monthly performance of the accepted agency/s shall be monitored by BHEL FQA Engineer and the evaluation report to be sent to Head/ Quality & BE/ BHEL-PSER HQ, in MSQR.

I. The agency may be disqualified/debarred on following grounds:

   i. if a re-inspection of material or a recheck of NDE / Heat Treatment data shows significant variation from the agency's report, as determined by BHEL FQA engineer

   ii. if a significant discrepancy or issue (*viz.* or malpractices like usage of modified/ manipulated Reports/ Charts, other fraudulent activity) is noted during the process audit / routine site inspection..

   iii. if any of the agency's BHEL-approved personnel has changed without taking prior approval from BHEL FQA In-charge.

iv. if the equipment mobilised by the agency no longer meets the requirements for approved usage.

v. if the Agency is not able to ensure re-qualification of his personnel/ equipment on expiry of certification or is not able to replace such personnel/ equipment in time with permission of the FQA.

J. The debarred / disqualified agency may apply for re-acceptance only after three months with a written clarification of its previous misconduct and corrective action taken to avoid occurrence of the same incidence. A standing committee of FQA Engineers shall be constituted by Head/Quality & BE/PSER, which shall scrutinise the documents

K. If, for any of the above reasons, the agency is debarred / disqualified, the same shall be immediately intimated by BHEL FQA engineer to Head/ Quality & BE/ BHEL-PSER Site CM and Main Sub-Contractor with intimation for immediate replacement.. The same shall be updated in controlled list of accepted agencies.

L. This guideline does not specifically provide any recommendation for safety measures to be taken during NDE & Heat Treatment work. Suitable safety analysis & hazard identification is to be done at site as per the project HSE manual & standard OCP.

3.0 Specific Guidelines for selection of NDE Agency for PAUT (Phase Array UT)

A. The NDE agency should have executed at least 30% of the proposed work quantity in a single job. In case, multiple agencies are proposed to be deployed, each agency should have executed at least 30% of proposed quantity in a single job. The necessary documents (*viz.* copy of Work Order, End User Performance Certificate, *etc.*) for above to be produced by agency.

B. The Agency to submit their organizational setup, supervision arrangement and list of resources to be deployed at site.

C. For PAUT, the agency shall be capable of mobilising the PAUT equipment & accessories and manpower as follows –

i. **PAUT equipment**: Omni scan MX/MX2/X3 or equivalent Phased Array equipment shall be used coupled with Scanner (16:68 or higher configuration), having

- Weld inspection features including setting up of weld profile.
- Multi grouping capability.
- Capability of using two PAUT probes simultaneously. Necessary adapter/splitter (if required) for attaching two probes for simultaneously working should be available for inspection.
- Operation with battery.
- A-scan, B-scan, C-scan, S-scan, Linear scan, Sectional scan
- Calibration: Velocity, Wedge delay, Sensitivity, TCG, DAC, Encoder calibration features.
- Data analysis and report building
- Encoder recognition.

- Probes: At least two numbers of low profile suitable PAUT probes for (MS and Alloy Steel) of 7.5 -10 Mhz frequency,16-32 element with more than 2 meters of cable length. The probes shall have couplant supply mechanism (passage of couplant) to test surface & required accessories for the same.
- Suitable probes for SS to be made available for inspection of SS joints.
- For Circumferential weld Inspection of Small-Diameter Pipes Advanced semi-automated scanning equipment/ Cobra scanner

ii. **Wedges:** Specially designed wedges to fit in the above probes and having reference angle of 50 to 60 Degree sheer wave in steel will be required. Wedges should have suitable contour to fit around required range of tubes OD (NORMALLY 25 TO 100mm).

iii. **Scanner:** A manual/automated scanner capable for scanning of required OD (normally 25 mm to 100 mm) tubes. The scanner should have encoder with it for precise data acquisition. The scanner should be able to hold two low profile phased array probes and wedges, as mentioned above for complete inspection of the weld in one rotation of the scanner. The design of scanner, probe & wedges shall allow complete inspection of circumferential weld on tube having gap more than 15 mm with any adjacent tubes, supports and structures etc.

iv. **Manpower**: The NDE agency shall deploy minimum two persons for performing non-destructive testing. They shall be qualified and certified in accordance with NDE written practice for Training, Examination, and Qualification & Certification of NDE Personnel as PAUT Level-II. The personnel who acquires the data, scan the job, does the calibration and analyse Phased Array data shall be trained on same specific technique and certified as PAUT level II. However, data evaluation and analysis shall be performed by a PAUT Level II or UT Level III. The necessary document/certificate for above to be produced by agency.

D. **Test Plan / Scan Plan:** The agency shall be capable of submitting the written inspection procedure for PAUT of weld complying with the requirement of latest BHEL NDE Manual (AA/CQ/GL/011 Part III-NDEM), duly approved by a UT Level-III person. The procedure / test plan shall be qualified at site as per latest BHEL NDE Manual (AA/CQ/GL/011 Part III-NDEM).

E. **Calibration:** Velocity, wedge delay, sensitivity, TCG, encoder calibration shall be performed by PAUT operator before inspection and as per frequency of code. Verification shall be done by BHEL FQA engineer regarding competency of the personnel deployed by the agencies, prior to start of job.

F. **Reference block:** Tubes with similar dia & wall thk (within 10% as per code) and circumferential notches/groves shall be used as reference block. The reference block should have length not less than 200 mm. It should have two circumferential grooves/notches (one each on ID & OD) having depth of 10% of wall thickness. 1 to 1.5 mm width & length between 25 to 50 mm. These two grooves should be located at opposite ends of the tube. The notches should be separated from adjacent tube edge by about 50 mm. These two grooves should be located at opposite ends of the tube. The notches should be separated from adjacent tube edge by about 50 mm. The length of reference block and

location of reflectors (notches/grooves) should comply the requirement of calibration for angle beams. Agency to take tube samples in advance so that Machine calibration work can be completed before start of work.

G. **Data Storage:** The calibration data and inspection data should be in the equipment and should be available for verification. Inspection data file to be stored by giving identifiable marking for reporting & interpretation. Agency must be capable to hand over data in suitable media (DVD / Flash Drive).

H. **Test Result:** The test result submitted by the agency for each tested tube should provide information on type of defects (like lack of penetration, porosity, lack of fusion etc), their location, length, height, depth etc. The final report with above information to be given in an excel sheet along with PAUT inspection data file & images for all the tested joints. Sample copy of test result of previous job to be submitted by the agency.

4.0 Specific Guidelines for selection of NDE Agency for RT (Radiography Test)

A. The NDE agency should have executed at least 30% of the proposed work quantity in a similar single job. In case, multiple agencies are proposed to be deployed, each agency should have executed at least 30% of proposed quantity in a similar single job. The necessary documents (*viz.* copy of Work Order, End User Performance Certificate, *etc.*) for above to be produced by agency.

B. Agency will submit their organizational setup, supervision arrangement and list of radiography sources to be deployed at site.

C. Agency to submit the documents of BARC / AERB Level- I & II personnel for doing RT & Interpretation of films, respectively. Personnel's skill & capability will be reviewed by FQA before engaging them in job.

D. The agency shall comply with all safety norms as per BARC/AERB & agency must submit source movement authorization for the subject site from BARC/AERB before start of work. The source movement within the site shall also be maintained by the agency in the log book. The agency shall fulfil all the safety precautions as per statutory requirements including Radiological safety at their own cost.

E. Manpower & Resources:

i. For a single unit, The agency shall deploy one BARC/AERB certified site in-charge and minimum of two numbers of BARC/AERB qualified Level-I radiographers for deployment of each number of source and one number of Trained, experienced and BARC/AERB qualified RT Level-II film interpreter. Personnel's skill & capability will be reviewed by FQA before engaging them in job.

ii. Agency shall mobilize one full time Radiation Safety Officer (RSO) and one site in-charge at site and maintained as per BARC and BHEL OCP guidelines.

iii. For a single unit, the NDE agency shall have permission from BARC/AERB for mobilizing a minimum of two radioactive sources (as per contractual guidelines) of sufficient strength all the time (minimum of 10 Curie). The source should be replaced immediately after decay to 10 Curie. Agency shall be capable to arrange additional source on emergency.

iv. The Agency has to submit the decay chart and all records regarding movement of the source.

v. The agency should be responsible for security of their source in the plant or during movement of camera at site.

vi. All employees of the agency to use TLD badges & pocket dosimeters while doing radiography testing at site. Also submit annual dose report of radiation workers.

vii. The agency to calculate cordon-off distance & provide 'Radiography warning sign boards & symbols' with cordon-off rope & warning alarm while carrying out the radiography.

viii. Radiography team to be available at site round the clock

ix. Equipment, Film and other consumables used shall be BHEL approved brands.

F. Agency has to demonstrate and establish various parameters for the quality of radiograph (*e.g.* Image density, sensitivity, source size, source to film distance, geometric unsharpness etc.,) to the satisfaction of BHEL.

5.0 Specific Guidelines for selection of NDE Agency for UT & MPI

A. The NDE agency should have executed at least 30% of the proposed work quantity in a similar single job. In case, multiple agencies are proposed to be deployed, each agency should have executed at least 30% of proposed quantity in a similar single job. The necessary documents (viz. copy of Work Order, End User Performance Certificate, etc.) for above to be produced by agency.

B. Agency will submit their organizational setup, supervision arrangement and list of resources to be deployed at site.

C. For a single unit, the NDE agency shall deploy a minimum of two number Digital type Pulse Echo A Scan UT equipment (preferably of OLYMPUS, EINSTEIN-II & Krautkramer) along with required calibration block at site.

D. For a single unit, the NDE agency shall deploy a minimum of two numbers of Trained, experienced and certified Level-I UT technicians and one number of Trained, experienced and certified Level-II Interpreter in UT.

E. For a single unit in MPI work, the NDE agency shall deploy a minimum of two sets of magnetic yokes, pie indicators, iron oxide particles, colour contrast, etc. Should have portable AC/HWAC equipment delivering current of minimum of 1000 amps and portable AC/DC electromagnetic yokes. Calibrated Equipment/ Ammeters shall be used for testing. The equipment should be capable of testing with visual and fluorescent magnetic particles.

F. The agency shall deploy a minimum of two numbers of Trained, experienced and certified Level-I technician in MPI and one number of Trained, experienced and certified Level-II Interpreter in MPI.

6.0 Specific Guidelines for selection of Heat Treatment Agency

A. The NDE agency should have executed at least 30% of the proposed work quantity in a similar single job. In case, multiple agencies are proposed to be deployed, each agency should have executed at least 30% of proposed quantity in a similar single job. The necessary documents (viz. copy of Work Order, End User Performance Certificate, etc.) for above to be produced by agency.

B. Agency will submit their organizational setup, supervision arrangement and list of resources to be deployed at site. This must coresponf to the requirement mentioned in Sl. No. F

C. The T & P's for Resistance Heating being deployed by Heat Treatment agency at site *viz.* PID Control Heating panels, Thermocouples, heating elements, Recorders shall be of renowned make/ branded having provision for digital display (*e.g.* temperature, Amp/ Voltage *etc.*), calibrated and in good working condition. Also to be noted that insulation being used should be in workable condition.

D. The T & P's for Induction Heating being deployed by Heat Treatment agency at site *viz.* Induction Heating equipment, induction cables, Thermocouples, auto-recorders shall be of renowned make/ branded having provision for digital display (e.g. temperature, Amp/ Voltage etc.),calibrated and in good working condition. The Induction heating equipment should be inverter type (IGBT H Bridge) and output frequency should be 7.5-10 KHz. Also, to be noted that insulation being used should be in workable condition.

E. Guidelines of BHEL Heat Treatment manuals shall also be referred.

F. The agency shall be capable of mobilising required number of machines and against each machine one experienced operator & one technician-cum-electrician must be deployed. One experienced supervision staff must be engaged by the agency exclusively for HT job. Qualification of the supervision staff shall be minimum Diploma in Mechanical/ Metallurgical engineering. The competency of operator & condition of equipment must be verified at site, as elaborated in Sl. No. H.

G. The agency should have capability of mobilising flexible ceramic pads as & when advised by BHEL.

H. One trial Heat Treatment must be conducted by BHEL engineers before acceptance of the HT equipment and the manpower, to assess the competency of the deployed persons and the condition of the machinery. The thickness & material to be selected based on the maximum thickness & material to be heat treated at site. All results to be recorded by BHEL engineer for future reference. The following are to be monitored and assessed -

1) For resistance heating process:
   i. Equipment's condition and calibration documents
   ii. Competency of the operator to follow SR job card instruction/ WPS instruction
   iii. Competency of the operator for selection of Resistance coil gauge
   iv. Wrapping skill of the operator for single tube/pipe
   v. Wrapping skill of the operator for bunching of tubes
   vi. Insulating skill of the operator
   vii. Competency of the operator for Thermocouple fixing skill
   viii. Competency of the operator for Programming of PID controller
   ix. Competency of the operator for selection of ROH/ROC
   x. Performance after completion of PWHT

2) For Induction heating process:
   i. Equipment's condition and calibration documents
   ii. Competency of the operator to follow SR job card instruction/ WPS instruction
   iii. Competency of the operator for Induction coil/ annealing cable rotation

iv. Wrapping skill of the operator for single tube/pipe
v. Insulating skill of the operator
vi. Competency of the operator for Thermocouple fixing skill
vii. Competency of the operator for programming in auto controller of IHE
viii. Competency of the operator for selection of ROH/ROC
ix. Performance after completion of PWHT
x. Competency of the operator to download PWHT graph from auto controller recorder

One mock power failure shall be staged during the trial process to verify readiness of the agency & BHEL's E&C associate for contingency. Acceptability shall depend on the hardness achieved (as measured by UCI machine)

7.0 Revision of this Guidelines

A. Revision in this Guideline, as may be felt from time to time, shall be decided by the standing committee of FQA Engineers constituted by Head/Quality & BE/BHEL-PSER.

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Annex-A

Application for approval of NDE / Heat Treatment Agency at …….

(Name of Project)

Name of the NDE / Heat Treatment Agency : ……

Address : ……

Name of the Proprietor : ……

PAN / TIN of agency : ……

Contact No. : ……

Email address : ……

1. Details of Qualified / Certified NDT Personnel (ASNT / ISNT)
   (*Including BARC certified Radio grapher-RT-1, Site In-charge-RT-2, RSO*)

Sl. No.	Name	NDT Method	Level	Date of first Certification	Certificate Valid upto	Certifying Authority

2. Details of Heat Treatment Personnel

Sl. No.	Name	Qualification	Previous Experience

3. Details of NDE / HT Equipment proposed to be mobilised

Sl. No.	Equipment (Make/Model)	Type (RT/ UT/ MPI/ PAUT/ HT)	Quantity	Specification / Rating	Calibration Status	Capacity of the Equipment

4. Details of Previous work done (in past 3 years):

Sl. No.	Project Name & Customer	Type of Job (RT/ UT/ MPI/ PAUT/ HT)	Number Tube Joints completed	Number of Pipe Joints Completed

…… ……

Signature of the Owner of the Agency & seal Signature of BHEL's E&C Associate & seal

Note : Applicant shall submit supporting documents along with this application and fill the Annex-B

SAMPLE FORMAT

Annex-B

Check list for Annex-A

Note : Applicant shall fill the following details and no column shall be left blank		
Sl. No.	***Description***	
A.	Name of the Proposed Agency	
B.	Quantum of job being proposed for the agency	
C.	Copy of agencies Govt. Registration	Page no.
D.	Duly filled in Annex-A	Page no.
E.	Certificates for Individuals as mentioned in Sl. No. 1 of Annex-A (Not applicable for HT agency)	Page no. from ….. to …..
F.	AERB approval certificate (for RT agency Only)	Page no. from ….. to …..
G.	Supporting documents for previous work Experience as mentioned in Sl. No. 2 of Annex-A	Page no. from ….. to …..
H.	Supporting documents for previous work Experience as mentioned in Sl. No. 3 of Annex-A	Page no. from ….. to …..

SAMPLE FORMAT

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Signature of BHEL's E&C Associate & seal

Annex-C

Agencies Authorised for conducting NDE / Heat Treatment at ……..……

(Name of Project)

Date : ……

Proposed By (Name of BHEL E&C Associate) : ……..

SL. No	Name & Address of Agency	Type of Job (RT/ UT/ MPI/ PAUT/ HT)	Name of the Persons	Method	Level	Certificate Valid upto	Contact Person, Contact number

SAMPLE FORMAT

Tick (√) applicable

1. Credentials of the above agencies have been reviewed as per Guideline and found acceptable.
2. Trial Heat Treatment has been performed by the HT agency and found to be satisfactory
3. The agencies' personnel have been interviewed and found to possess knowledge of the process & equipment

…… ……

(BHEL Erection Engineer) (BHEL FQA Engineer)

Distribution:

1. Construction Manager / BHEL Site
2. Head / Quality & BE, BHEL-PSER