An ISO 9001
Company

Bharat Heavy Electricals Limited
(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
MATERIALS MANAGEMENT

TITLE **CORRIGENDUM for NIT_20561**	Phone: +91 431 257 7630 Fax : +91 431 252 0719 Email : **nnithya@bheltry.co.in** **geetha@bheltry.co.in**

	Reference Number: **Enquiry** 1401400122	**Enquiry Date:** **01.12.2014**	**Due date for submission of quotation: 24.12.2014**
You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order			

CORRIGENDUM

Details of Corrigendum
The TDC 437/00 is revised to TDC 437/01 and revised TDC attached for reference. The Due date for submission of TENDERS has been extended from 24.12.2014 to 19.01.2015
All other terms and conditions as published in the NIT 20561 remain unaltered.

BHEL commercial terms & conditions with Price Bid formats and all annexure can be downloaded from BHEL web site http://www.bhel.com or from the Government tender website http://tenders.gov.in (public sector units) Bharat Heavy Electricals Limited) under enquiry reference "1401400122"	
Tenders should reach us before 14:00 hours on the due date Technical bid will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present.	Yours faithfully, For **Bharat Heavy Electricals Limited**

Record of Revision:
Rev 00: 06/10/14: Fresh Issue
Rev 01: 10/12/14: Cl 2, 4, 5, 6 and 9 corrected

1. **Material:**

Specification	:	ASME SB564 (Latest on the date of Purchase Order)
Material	:	UNS N06617
Additional Requirement	:	As listed below (Supplementary to Specification)
Size and Qty.	:	As per Purchase order

2. **Chemical Composition and Process:**
Material shall be produced by using vacuum induction melting (VIM) followed by vacuum arc re-melting (VAR) or electro slag refining (ESR). Any other suitable melting and re-melting process shall be used only after approval from the purchaser.
Forged bar shall be ensured for uniform structure & strength with reduction ratio in area: 3:1 min. from ingot to finished forging. Forgings shall be manufactured as close to the final shape as possible.
Product Analysis: As per spec
Heat Analysis in weight %: Test method as per ASTM E1473

Element	Cr	Fe	Mn	Mo	Co	Al	C	Cu	B	Si	S	N	Ti	Ni
Wt %	21-23	1.5 max	0.3 max	8-10	11-13	0.8-1.3	0.05-0.08	0.05 max	0.002-0.005	0.3 max	0.008 max	0.05 max	0.3-0.5	Bal.

Raw materials used in making of forged bars including incoming scrap shall be checked by supplier to ensure freedom from radioactivity.

3. **Dimensions and Tolerances:**
i) Dimensions and tolerances: As per BHEL purchase order and relevant drawings.
ii) The forged pipes shall not deviate from straightness by more than 1mm in any one shall not be more than 6mm over the entire length. A sharp bend at the end or kink and twist are not acceptable. These limitations are applicable for any given plane

4. **Heat Treatment on Forging:**
UNS N06617 – solution annealed in the range 1150°C to 1175°C.

5. **Mechanical Tests:**
Extent of test: one sample/for each size/heat/HT batch; on final heat treated condition samples:
UNS N06617: Tensile Strength: Min 655 MPa, Yield Strength (0.2% off set): Min 241 MPa, Elongation ($L_o=5.65\sqrt{A}$), min 35%
Macrostructure: Grain size ASTM No 2 to 5.

6. **Non-destructive testing & Hydro testing:**
UT: 100% for all diameters. Notch depth 3% of max thickness. Testing method and acceptance shall be as per supplementary requirement in ASME SB-564.

Reference hole as per table: UT testing reference hole for inspection in radial direction		
Dia of forging, mm	Dia of ref flat bottom hole, mm	Remarks
D ≤ 150	3.2	
150 < D ≤ 400	6.4	
400 < D ≤ 600	6.4	
600 < D ≤ 1200	6.4	1. Sensitivity of 6.4mm hole shall be ensured at 600mm depth and the scan should be carried out from throughout the circumference to cover the complete diameter. 2. Dual element transducer shall be used to inspect the near surface areas within the dead zone of the single element transducer used for inspection as described in point 1.

LPI: 100% - test method & acceptance as per supplementary requirements in ASME SB-564.
All the chemicals used for LPI shall meet the requirement that total halogen and sulphur of each material shall not exceed 1% by weight of residue. Recommended for NP grade (nuclear purpose) LPI consumables.

Hydro: On all pipes as per B 829 Cl 5.2 with S = 163MPa.

7. **Workmanship and Finish:**
The Inside & outside surfaces shall be free from any imperfections. The material shall be plain, uniform in quality and condition, smooth, straight or flat and free of wrinkles, overlaps, tears, cracks, seams, folds, pitting etc. Localised imperfections, if any, may be removed by skin machining only to a surface finish of </= 6.3 microns ensuring the wall thickness. Local depressions or ground spots are not acceptable. Loose scales shall be removed by blast cleaning in surfaces after heat treatment. No repairs/weld repairs permitted.

8. Marking & Packing:

Details of stamping on front face of each item with low stress stamps and border by oil paint: (1) Heat number, (2) Specification & grade, (3) Size, (4) Maker's emblem/code, (5) Identification details as per drawing. Work inspectors stamp next to heat number. The Forgings are to be properly packed and despatched to avoid damage during transit.

9. Inspection & Certification:

The inspection and tests to be witnessed by an IBR approved inspecting agency, in case the Forge shop is not recognised as a "Well known Forger" under IBR.

IBR Form IIIG countersigned by applicable inspection agency and Test certificate with following details, shall accompany the product (including proof machined). Well known Forger shall provide IBR Form IIIF and Test certificate with following details, shall accompany the product (including proof machined). Also Manufacturer Test Certificate shall be provided with the following details: -

1. Purchase Order No. (BHEL), TDC No. & Test certificate number.
2. Specification, Grade with applicable year of code, Heat Number, Drawing No., Quantity & Size
3. Supplier TC of the steel used in making the finished product – Well known steel maker IBR Form IV & others Form IVA.
4. Details of steel ingot, Melting & forging process, Chemistry including incidental elements - Heat wise.
5. Heat treatment details of the material and test bars, Mechanical test results with reference & acceptance standard.
6. NDE examination test results with reference & acceptance standard.
7. Results of dimensional data sheet

Survey meter shall be used to measure radioactive contamination at 5cm near the surface. Acceptance limits: Shall be less than 0.1 milli Rontgen (MR) per hr or 1 micro Sievert per hr. The Measured Radioactivity levels shall be reported in the Mill Test Certificate. (Not to be recorded in IBR Form).

All the tests specified here shall be carried out at works and the test results shall be furnished in the test certificates (4 copies). The bars shall be inspected and certified by the inspecting agency authorised by BHEL, wherever specified in the purchase order.

10. Quality Plan:

Before start of production the manufacturer shall submit a Manufacturing and Inspection plan (MIP) to **BHEL prodcut QA** for approval. The MIP shall constitute of:

i) melting & refining,
ii) ingot weight and type,
iii) forging process, press rating,
iv) top bottom end discard percentages,
v) position of the part in ingot,
vi) sketch of the forging process and its forging ratios,
vii) preliminary heat treatment,
viii) internal tests and inspection before final heat treatment,
ix) quality heat treatment along with parameters,
x) test and inspections after heat treatment,
xi) test certificate requriements,
xii) marking preservation and dispatch,
xiii) test instructions for NDE examinations along with sketches
xiv)type of machinining and examinations.

11. Audit Checks at BHEL:

BHEL reserves the right to carry out audit checks for chemistry, HT condition, mechanical test and NDT on representative test bars or job. Supplies found defective during check or subsequent processing at BHEL are liable for rejection.

12. End Use

To be used in forgings for Advanced Ultra-Super Critical (AUSC) boiler applications.

		10/12/14		
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