

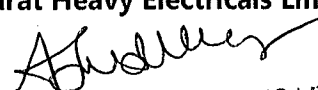


An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

TITLE CORRIGENDUM FOR ENQUIRY 9602100001		Phone: +91 431 257 6186 / 4204 Fax : +91 431 252 0719 Email : <u>sudheer@bhel.in</u>	
Reference Number Enquiry 9602100001	Enquiry Date: 21/06/2021	Due date for submission of quotation 19/07/2021	
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			
Details of Corrigendum			
<i>Creep testing with the stated parameters in TDC:BAR: GEN:CA:02 Rev 10 by the suppliers is also acceptable in place of creep parameters stated in TDC/BAR/SPL/02, Rev.00 that is issued along with tender. TDC:BAR: GEN:CA:02 Rev 10 is attached with this corrigendum and Creep details of the same is reproduced as below,</i>			
<i>Creep report required as per TDC:BAR: GEN:CA:02 Rev 10</i>			
Specification/Grade	Test duration in Hrs.	Temp in ° C	Stress in MPa. (min.)
SA213 T11	1000	550	100
SA213 T12	1000	600	70
SA213 T22	1000	625	55
SA213 T91	1000	665	75
The Creep report shall be submitted before the completion of technical evaluation.			
<i>Except the above all other conditions of the tender remain the same</i>			
BHEL commercial terms & conditions and all annexures can be downloaded from BHEL web site http://www.bhel.com or from website http://eprocurebhel.gov.in against Enquiry reference "9602100001"			
		Yours faithfully, For Bharat Heavy Electricals Limited  SUDHEER APPIREDDY Senior Engineer / Purchase Materials Management / Steel BHEL, TRICHY - 620 014.	

**1. MATERIAL:**

- a) Specification : ASME {Latest on date of Purchase Order (PO)}:
CS: SA 106 Gr.B & Gr.C, SA 179, SA 192, SA 210 Gr.A1 & Gr.C, SA 333 Gr6
AS: SA 209 T1, SA 213 T11, T12, T22, T91
- b) Additional Requirement : As listed below (Supplementary to Specification)
- c) End Product : For Manufacture of Hot and Cold finished Seamless Steel Tubes / Pipes as per Indian Boiler Regulations (IBR)
- d) Material Source : Supply of Alloy Steel grades shall be from IBR approved overall Creep Resistance Steel makers. The creep testing shall have been done in National Metallurgical Laboratory at Jamshedpur or BHEL corporate R&D at Hyderabad or well known steel makers or any other material testing laboratory recognised by the Central Boilers Board for creep testing of alloy steel produced indigenously or from a Nationally recognised or accredited testing laboratory for creep testing in the country of manufacture for alloy steel produced out side India.

Table -1: Creep Property requirements: For Both Indian and Foreign Manufacturers.

Specification & Grade	Test Duration in Hrs.	Temp. in° C	Stress in MPa (min.)
SA 213 T 11	1,000	550	100
SA 213 T12	1,000	600	70
SA 213 T 22	1,000	625	55
SA 213 T 91	1,000	665	75

2. CHEMICAL COMPOSITION AND PROCESS OF MANUFACTURE:

Fully Killed, Vacuum de-gassed Bars in Concast / Rolled or Forged form. Ladle analysis to suit end product.

Max. Carbon 0.25% for SA 210 A1 and 0.30% for SA 210 Gr C.

Product analysis and maximum trace elements: Al: 0.02%, Cu: 0.25%, Total: 0.50% for CS and 0.30% for AS.

SA 213 T12: Si : 0.20% min.

SA 213 T91: Ti:0.01%,Zr:0.01%,Cu:0.10%,Sb:0.003%, Sn:0.010%, As:0.010%, B:0.001%

3. DIMENSIONS AND TOLERANCES:

- a) Diameter : 200 mm. + 4.0 mm - 2.0 mm; Ovality : < 4.0 mm
- b) Length : As per Enquiry /Purchase Order.
- c) Straightness : Permissible deviation is 2.5 mm / meter or 25 mm on the entire length of the bars which ever is less.
- d) End Surface : 3.0 mm from the perpendicular

4. SUPPLY CONDITION:

As Cast / As Rolled.

In every despatch schedule , the lot Quantity shall be atleast 20 MT per Melt/ Heat Number.

Each consignment of bloom despatches shall have the quantity bulked melt/Heat wise.

Forged.

Material is to be forged to ensure uniformity of structure & strength

In every despatch schedule , the lot Quantity shall be atleast 20 MT per Melt/ Heat Number.

Each consignment of bloom despatches shall have the quantity bulked melt/Heat wise.

Material supply in cast/rolled/forged condition shall be heat treated to ensure uniformity of structure & strength for T91 specification requirement.

5. FINISH AND REPAIR:

Free from mill scales and defects like laps, seams, folds, cracks, undue segregation, piping etc. Repairs by welding is prohibited. The Surface defects can be removed mechanically subject to meeting minimum diameter.

6. NON-DESTRUCTIVE TESTING:

Ultrasonic testing shall be carried out for Rolled or Forged round bars as per ASTM A 388.

Acceptance Standard in accordance with Clause 3.3.4 of ASME Sec VIII Div.2.

Test shall be certified by NDT Level II qualified personnel as per SNT-TC-1A

7. METALLURGICAL TEST:**7.1 MACRO ETCH TEST: (CONCAST & ROLLED BLOOMS)**

1) One sample of complete cross-section of a bloom (Bar) for each Heat / Melt Number shall be examined in accordance with ASTM E 381. The reference plates shall be as follows.

- For the blooms made by Concast Method (Plate – II & III) and
- For the blooms made by Rolled & Forged Method. (Plate I & II).
- The Macro structure shall be better than or equal to C2 R2 S2 of ASTM E381 (Plate I & II)



- 2) Injurious defects of any category like Surface cracks, Pipe/center void, Star crack, center unsoundness, Dark center, Pin holes, White bands, Chill structure, and Dendritic structure (strong) - are not allowed.
- 3) Photo of Macrograph shall be provided along with test certificates per Heat/ Melt.

7.2 MICRO EXAMINATION FOR ROLLED BLOOMS.

The Specimen for Testing shall be taken on longitudinal plane, midway between the center and surface of the material. The 'Inclusion content of the steel,' measured as per ASTM E 45 shall not exceed the following.

Table - 2

Classification							
Type 'A'		Type 'B'		Type 'C'		Type 'D'	
Thin	Heavy	Thin	Heavy	Thin	heavy	Thin	Heavy
2	1	2	1	2	1	2	1

7.3 MICRO EXAMINATION FOR FORGED BLOOMS

1. Thick series 0.5 allowed.
2. Thin series 2 max.
3. Grain size shall be 6 or finer.

8.0 MARKING:

- a) On each bar longitudinal color coding to be done by paint for entire length by a band of 50.0 mm width and also both End faces.
- b) Melt number & Specification shall be paint stenciled with white color on both the faces.

Table-3

Specification. & Grade	Color	Specification. & Grade	Color
SA 192	WHITE	SA 333 Gr 6	BLUE, GREEN, RED
SA 210 Gr. A1	YELLOW	SA 209 Gr. T1	BROWN, RED
SA 210 Gr. C	BLUE	SA 213 Gr. T11	BROWN, WHITE
SA 106 Gr. B	RED	SA 213 Gr. T12	BROWN, YELLOW
SA 106 Gr. C	BLUE	SA 213 Gr. T22	GREEN, RED
SA 179	GREEN	SA 213 Gr. T91	GREEN, YELLOW

9. INSPECTION AND CERTIFICATION:

FOREIGN SUPPLIERS:

a. IBR Well Known Steel Makers:

Product shall be inspected at works and certification shall be IBR Form IV signed by both maker & maker's representatives.

b. IBR Approved Steel Makers:

Product shall be inspected at works and certification shall be IBR Form IV countersigned by Inspecting authority approved by IBR for the country of origin. (To be concurred by BHEL before placing PO).

INDIAN SUPPLIERS:

a. IBR Well Known Steel Makers:

Product shall be inspected at works and certification shall be IBR Form IV signed by both maker & maker's representatives.

b. IBR Approved Steel Makers:

Product shall be inspected at works and certification shall be IBR Form IV countersigned by Boiler inspectorate / Directorate of respective State.

TC shall essentially contain:

1. BHEL Order No., TDC No. & Test certificate number, Size & Quantity- Heat / Melt No wise
2. Specification and Grade with year of code, Heat Number, Steel & bar making process.
3. Chemistry including trace elements - Ladle and Product analysis.
4. Metallurgical Test results, NDE results with reference and acceptance standards as applicable.
5. Identification Mark on the Product.
6. Photo of Macro Etch Test.
7. The size of ingot used and forging reduction ratio for forged blooms
8. Reference to Creep test results performed as per Table-1 of this TDC.



Quality Assurance and Control / SSTP

No.: **TDC: BAR: GEN:CA:02 Rev.: 10**

Product: **Carbon and alloy steel round bars**

Technical Delivery Conditions

Effective date: **23/01/2021**

Page 3/ 3

			
S. Manojkumar DM/QA&C	K. Athimoolam Sr.DGM/OP&C/SSTP	M. Nadanakumar AGM/MM/RM	R. Kaliappan AGM/QA&C
Prepared By	Reviewed By		Approved By

Revision Records:

Revision Record: rev:00: Re-numbered and re-written from TDC:E :S: 04//00

Revision Record: rev: 01: Modified: Cl. 1.0, 3.0, 4.0, 7.0, 8.0 & 9.0.

Revision Record rev 02; Modified: Cl 1.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0 & 9. 0.

Metallurgical Test introduced in Cl no 7 instead of Mechanical Test

Revision Record rev 03; Deleted: Cl 3.0(d)

Revision Record: Rev. 04: Modified Cl.: 1.a), 2.0, 3.0 a), c) & 8.0 to included SA 213 T23 & T91 & T92

Revision Record: Rev. 05: Modified Cl.: 1.d), 3.0, 4.0, 8.0 & 9.0 included Cl.3 (d)

Revision Record: Rev. 06: Modified Cl.: 1.a), d), 2.0, 3.0 a), c), 8.0 b), 9.0, & included Creep test requirements for alloy steel.

Revision Record: Rev. 07: Modified Cl.: 4.0, 6.0, 7.1, 7.3, 9.0

Revision Record: Rev. 08: Modified Cl.: 3.0 a), 6.0

Revision Record: Rev. 09: Modified Cl.: 1.0 creep value for T91

Revision Record: Rev. 10: Modified Cl.: 1.0, 2.0, 4.0, 8.0 & 9.0
