



Bharat Heavy Electricals Limited

High Pressure Boiler Plant, Tiruchirappalli - 620 014 India.

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BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPALLI 620 014 INDIA

TECHNICAL
DELIVERY
CONDITION

FOR

STEEL BARS
FOR USE IN
GATE & DAMPER SHAFTS

TDC: 0:305/00
PAGE 1 of 4

EFFECTIVE DATE

01.04.94

PREPARED BY

QA

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DATE

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SIGNATURE

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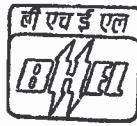
01.04.94 SM/QA

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PAGE 2 of 4

1.0 SCOPE

- 1.1 This Technical Delivery Condition specifies the additional requirements for the delivery of steel bars conforming to the following specifications to their latest edition.

Carbon steel : ASTM A108 G10450
Stainless steel : ASTM A564 Gr. XM-25

- 1.2 This TDC is supplementary to the mandatory requirements covered in the specification.

- 1.3 The size and quantity shall be as specified in the purchase order.

2.0 CHEMICAL COMPOSITION AND PROCESS

- 2.1 The steel shall be manufactured by basic oxygen or electric furnace process and shall be fully killed.

- 2.2 The chemical composition of the steel shall be tested for each melt and shall conform to the specification requirements

- 2.3 The carbon steel bars shall be cold rolled and stainless steel bars shall be hot finished.

3.0 DIMENSIONAL TOLERANCES

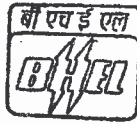
- 3.1 The bars shall strictly conform to the dimensions indicated in the relevant drawings/Purchase order.

- 3.2 The bars shall be supplied in proof machined condition wherever called for in the drawing.

4.0 HEAT TREATMENT

- 4.1 A 108 bars can be supplied in cold rolled condition. However, the test bars shall be stress relieved at 600 to 650 °C for a soaking of 2.5 minutes per mm of thickness before mechanical testing.

- 4.2 A 564 bars shall be supplied in solution annealed condition with a maximum hardness of 321 BHN as per specification. However, the test bars shall be age hardened at 565 °C for a soaking of 4 hours followed by air cooling before mechanical testing.



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PAGE 3 of 4

5.0 MECHANICAL TESTING

- 5.1 The testing for mechanical properties shall be conducted at room temperature in accordance with ASTM A370 for each size per melt. The properties shall be as given below:

Material	Yield strength in PSI (min)	Tensile strength in PSI (min)	% Elongation on 2" GL (min)	% Reduction in area (min)	Hardness in BHN, if not specified in drawing
A108 G10450 90000		105000	15	--	--
A564 XM-25 135000		145000	12	45	321 min.

6.0 VISUAL INSPECTION

- 6.1 The bars shall be examined visually and shall be free from scales, laps, seams, folds, cracks or other injurious defects.

7.0 NON DESTRUCTIVE TESTING

- 7.1 100% ultrasonic test shall be conducted on Rolled/forged shafts according to A 388 and the acceptance standard shall be as given below:

- 1.1 Bars shall be acceptable if examination result shows no indication larger than 10% of the reference back reflection and no area showing loss of back reflection larger than 10% of the reference back reflection.

8.0 REPAIR

- 8.1 Surface defects can be removed by machining or chipping and grinding and the defective areas shall be smoothly dressed up with the adjacent surface. The minimum thickness after repair shall meet the drawing requirements.

- 8.2 Repairs involving fusion welding are prohibited.

9.0 MARKING AND PACKING

- 9.1 All bars shall be legibly marked by hard stamping with melt number, specification and maker's emblem/code.

- 9.2 All solid shafts shall be coated with a rust preventive coating before despatch.

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TDC:0:305/00

PAGE 4 of 4

- 9.3 The bars shall be suitably packed and despatched to avoid damage during transit.
- 10.0 INSPECTION AND CERTIFICATION
- 10.1 All the tests specified here shall be carried out at works and the test results shall be furnished in the test certificates.
- 10.2 The bars shall be inspected and certified by the inspecting agency authorised by BHEL, wherever specified in the purchase order.
- 10.3 The test certificate shall contain the following details in English language only.
1. Purchase Order Number.
 2. Test Certificate Number.
 3. TDC Number.
 4. Quantity and Size.
 5. Specification and Melt Number.
 6. Chemistry - Meltwise.
 7. Heat treatment details of bars and test bars, like Temperature, soaking time, cooling medium etc.
 8. Mechanical test results.
 9. NDT results with reference and acceptance standards.
 10. Steel making process.
- 11.0 AUDIT CHECKS AT BHEL
- 11.1 BHEL reserves the right to carry out audit checks for chemistry, heat treated condition, mechanical testing and NDT on bars at their discretion.
- 11.2 If any bar is found to be defective during check tests as per Cl. 11.1 or during subsequent processing at BHEL, such bars are liable for rejection.
- 12.0 END USE
- 12.1 These bars are intended for use in the shafts of gates and dampers in boilers.

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