

BHEL, Tiruchirapalli-620 014	SSTP / Tool Engineering	Technical Delivery Conditions	
Product : ALLOY STEEL MANDREL BAR FOR PUSH BENCH			
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Revision Record	1. Size revised in clause 1.0		

1.0 Product :

Forged / Rolled Alloy steel bar. Size & Length as per Tender/Purchase Order

2.0 Application :

The alloy steel bars are used as mandrel bars at Push Bench mill making Seamless Steel Tube & Pipes. The alloy steel bars will be further finish machined at our shop to use in the mill. The bars have to exert 60-120 MT pushing force at 600 °C max. working temperature. It undergoes cyclic thermal stress (axial impact force) while carrying along the hollow in hot condition while pushing through series of calibers having cross sectional reduction.

3.0 Raw Material :

28 Ni Cr Mo V 10 of DIN No. 1.2740 (Forged / Rolled)

Conduct Ultrasonic test on all the mandrel bars in accordance with SA 388. Acceptance Standard in accordance with ASME Sec VIII Div.2. Cl.3.3.4 Shall be certified by NDT Level II qualified personnel.

Chemical Composition :

C	Mn	Si	S	P	Ni	Cr	Mo	V
0.24	0.20	0.30	0.030 max	0.030 max	2.30	0.60	0.50	0.25
0.32	0.40	0.50			2.60	0.90	0.70	0.32

4.0 Condition of supply : The bars shall be prepared either from Forged or Rolled rounds and Forging/Rolling condition shall be as per points 4.1 & 4.2 given below.

4.1 IF Forged :

Raw material is to be forged to ensure uniformity of structure & strength with reduction ratio in cross section area of 4:1 from ingot to final forging, close to final shape and size. Flow lines to be parallel to the axis of product and shall meet requirements of IS : 13387(latest). The forging supplier shall furnish TC clearly indicating the size of ingot (cross section X length) used and the forging reduction ratio achieved.

Forging shall undergo post forge Stress Relieving at 650 ° C for 24 Hrs. with furnace cooling, further Spheroidizing Annealing at 800 ° C for 20 – 30 Hrs. and cooled in furnace. Heat treatment chart to be furnished along with the supply.

4.1.1 Melting process : Electric Arc Furnace – Ladle Refining Furnace – Vacuum De-gassed.

4.1.2 Inclusion rating shall be as per ASTM E45 – Thick series 0.5 max acceptable. Thin series : 2max.

4.1.3 Grain size shall be 6 or finer.

4.2 IF Rolled :

The raw material supplier shall furnish TC clearly indicating the size of ingot (cross section X length) used for the rolling.

4.2.1 Melting process : Electric Arc Furnace – Ladle Refining Furnace – Vacuum De-gassed.

5.Dimension& Tolerance:

a)Diameter : + 0.20 mm / - 0.00

b)Length : + 0, + 20 mm

c)Straightness : The bars shall be straight and the deviation from the straightness shall not exceed max. 1 mm per meter and a maximum of 5 mm for the entire length.

d)Surface finish : 1.60 μ.

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6. Heat Treatment :

Hardened and tempered to **1000 – 1200 N/mm²**. Heat Treatment chart to be furnished along with supply.

A test sample of size **Ø 25 mm X 500 mm** length in the same heat treated condition shall be sent with the bars to test the tensile value & micro structure at our lab.

7. Non Destructive Test

Ultrasonic Testing :

Ultrasonic testing shall be done on all the pre finished mandrel bars in accordance with **SA 388**. Acceptance Standard in accordance with **ASME Sec.VIII Div.2. CI 3.3.4** Shall be certified by **NDT Level II** qualified personnel.

8. Freedom from defects :

The bars shall be free from surface marks, dents, laps and cracks. This shall be ensured by LPI or MPI.

The bars must be free from internal defects such as pores, cracks, blow holes and macroscopic non-metallic inclusions that could have a significant effect on workability and usability.

9. Test Certificate

The bars shall be supplied with Test Certificate from the manufacturer indicating the heat number, ladle analysis, method of manufacture, heat treatment condition and test results of hardness & ultrasonic testing. In case, raw material is procured from outside by the supplier, the original Test Certificate of raw material manufacturer shall be furnished.

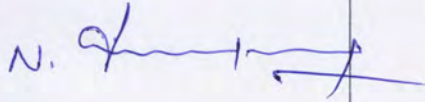
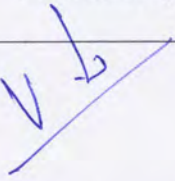
10. Marking and packing:

Rust preventive coating shall be over the entire surface of the mandrels and shall be easily removed by kerosene. Bars shall be protected /wrapped suitably to avoid any scratches/damages to the machined surface after coating.

The heat number and steel grade shall be punched on both cross section of each bar. The bars shall be rigidly bundled with rolled steel strips **IN A SPAN OF 1 METRE AND FOR THE ENTIRE LENGTH** to avoid any damage during transit. Each bundle shall have a maximum of 3 bars and minimum of 2 bars. The packing shall be sea worthy.

11. Inspection and Supplier's Works :

The mandrel bars are subjected to inspection at supplier's works, by inspectors authorized by BHEL/SSTP if required. This requirement will be indicated in the purchase order. The Inspector shall be provided with all inspection facilities to ensure that the material is supplied in accordance with this TDC.

Prepared By	Reviewed By	Approved By
		
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