



**PLANT PURCHASING
SPECIFICATION
HYDERABAD**

HY 12765

REV. NO: 00

PAGE 1 OF 4

NICKEL-CHROMIUM MOLYBDENUM IRON TUNGSTEN ALLOY BARS
GR: HASTELLOY X

1.0 GENERAL:

This specification governs the quality requirements of Nickel base super alloy for high temperature of grade HASTELLOY. 'X'.

2.0 APPLICATION :

For combustion liner and transition piece components.

3.0 CONDITION OF DELIVERY:

Hot rolled, solution heat treated and descaled condition.

4.0 COMPLIANCE TO NATIONAL STANDARD:

This specification complies with ASTM B572 (the latest edition), UNS-N06002.

5.0 DIMENSIONS AND TOLERANCES:

5.1 Size: The sizes shall be as specified in the order.

5.2 Tolerances on length, width, thickness, camber and flatness shall be as per ASTM B 572.

6.0 MANUFACTURE:

The material shall be manufactured by basic electric furnace process or any other process mutually agreed upon.

7.0 HEAT TREATMENT:

The bars shall be solution heat treated by heating to $1176 \pm 15^{\circ}\text{C}$ (2150°F) for a maximum by 30 min. followed by rapid cooling in air.

8.0 FREEDOM FROM DEFECTS:

The sheets shall be free from cracks, seams, fissures and other defects harmful to the parts during fabrication or operation.

Revisions:			Issued : STANDARDS ENGINEERING DEPARTMENT		
Rev.No.	Rev.Date:	Revised:	Prepared:	Approved:	Date:
00	Dt.	Year	MANAGER MATLS. ENGG.	GM (E&CC)	JUNE, '92

**9.0 FINISH:**

Sheet shall be furnished with either No.1 or a No.2 D finish (as specified). When a No.1 finish is supplied it shall be a smooth matte surface free of scale roughness that is caused by imbedded scale.

10.0 TEST SAMPLES:

10.1 Chemical Analysis: One test sample for chemical analysis shall be taken from each melt.

10.2 Mechanical Tests: One test sample for lot, comprising of bars of the same size, melt and heat treatment batch shall be taken for mechanical testing.

11.0 CHEMICAL COMPOSITION:

Element		C	Mn	P	S	Si	Cr	W	Co	Mo	Fe	B	Ni
Ladle Analysis	% Min.	0.05	-	-	-	-	20.50	0.20	0.50	8.00	17.00	-	Bal.
	% Max.	0.15	1.00	0.040	0.030	1.00	23.00	1.00	2.50	10.00	20.00	0.010	-

Product Analysis: Permissible variation in product analysis shall be as per ASTM B 572.

12.0 MECHANICAL PROPERTIES:

The mechanical properties of the material shall be as follows:

Tensile Strength N/mm ² min.	Yield Strength N/mm ² min.	Elongation on L = 50mm % min.	Hardness BHN max.
655	275	35	241

Note: Tensile test shall be carried out as per IS:-1608 or any reputed national standard.

13.0 STRESS RUPTURE TESTS:

The material shall be tested in accordance with ASTM E 139 for stress rupture and the tests shall have the following parameters.

Stress N/mm² (Ksi) min. : 103 (15)
 Temperature, °C (°F) : 816 (1500)
 Life, hours, minimum : 24
 %Elongation in l=4D, minimum, : 10
 or = 50mm



PLANT PURCHASING SPECIFICATION HYDERABAD

HY 12765

Rev. No.00

PAGE 3 OF 4

Stress rupture testing may be carried out at a higher stress provided no other test parameters is changed.

14.0 GRAIN SIZE:

When tested in accordance with ASTM E112, the average grain size of the material shall be ASTM No.3 or finer with occasional grains of ASTM No.1 allowable.

15.0 RETESTS:

15.1 If, any of the test specimen fails to meet the requirement specified, the sample sheet from which the test specimen are taken shall be rejected and two further sample sheet from the same lot shall be taken for retests.

15.2 If, any of the retests also fails, manufacturer is at liberty to heat treat the sheet in question. However, not more than two heat treatments are allowed.

15.3 If, after heat treatment, the mechanical properties are not complied with, the entire lot shall be rejected.

16.0 INSPECTION AT SUPPLIER'S WORKS:

16.1 BHEL representative/BHEL appointed Inspection Agency shall have free entry and access to all areas where the manufacture of the bars is carried out. All reasonable facilities shall be extended to him including labour wherever necessary.

16.2 BHEL representative/BHEL appointed Inspection Agency shall be given sufficient advance intimation to witness the various processes, tests, etc. punching and identification of test coupons and execution of various tests shall be done in presence of BHEL representative/BHEL appointed Inspection Agency.

17.0 TEST CERTIFICATE:

Five copies of the test certificates shall be supplied furnishing the following details:

- (a) HY 12765
- (b) Material Grade : HASTELLOY 'X'
- (c) BHEL Order No.
- (d) Size
- (e) Melt No.
- (f) Process of Manufacture
- (g) Heat treatment details and Batch No.
- (h) Results of chemical analysis, mechanical properties and any other tests stipulated.

18.0 PACKING AND MARKING:

18.1 **Marking:** Sheets shall be bundled together as per size and each bundle shall have a metal tag with following information.

HY 12765	PLANT PURCHASING SPECIFICATION HYDERABAD	
Rev. No.00		
PAGE 4 OF 4		

- (a) HY 12765
- (b) BHEL Order No.
- (c) Melt No./Heat treatment batch
- (d) Size/Weight
- (e) Manufacturer's Trade Mark.

18.2 Packing: The sheet shall be suitably packed to prevent corrosion and damage during transit.

19.0 REJECTION AND REPLACEMENT:

In the event of the bar material proving defective in the course of further processing at BHEL, the same shall be rejected notwithstanding any previous acceptance.

The supplier shall replace the material forging at his own cost and the rejected bars shall be returned after all the commercial conditions are satisfied.