

D.M.W.
PATIALA

डीजल रेलइजन आधुनिकीकरण कारखाना, पटियाला
DIESEL LOCO MODERNISATION WORKS, PATIALA

NUMBER:D-87018

TITLE:HARDENED & TEMPERED STEEL BARS
AISI-E-4150 H

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Date : 30-1-2006

1. SCOPE :

This specification covers Magnaflux Inspection Quality, Hardened & Tempered Round Bars. The steel shall be made in Electric-arc Furnace, Fully Killed, VAD treated (with secondary refining) or through in Blast Furnace — Basic Oxygen Furnace & finally ladle Refining Furnace route. (A5)

2. CHEMICAL COMPOSITION (%) :- (as of AISI- E -4150H with restricted S & P)

Carbon	Manganese	Phosphorus	Sulphur	Silicon	Chromium
0.47- 0.54	0.65- 1.10	0.025 max.	0.025 max.	0.20-0.35	0.75-1.20
Molybdenum					
0.15-0.25					

2.1 TOLERANCE LIMITS IN CHEMISTRY: (%)

Carbon	Manganese	Phosphorus	Sulphur	Silicon	Chromium	Molybdenum
0.03	0.03	0.005	0.005	0.02	0.06	0.03

3. SURFACE DEFECTS:

Total depth of surface defects (like Seams, Laps, Scar-marks, Folds Total Decarburization or any other harmful defect) shall be 0.50 mm (max.) per radius.

4. MACRO STRUCTURE :

Macro. examination of deep acid etched sections of bars (in as received condition) shall show no evidence of abnormalities like shrinkage-cavity blow-hole. porosity, pin-holes, piping , hairline-cracks, Pin-holes, seams or any other harmful defect that would adversely effect the end use; beyond the above permissible limit (ref. clause-3).

4.1 MICRO STRUCTURE:

Microstructure shall be of uniformly Tempered Matensite. The Micro Structure shall be free from any Banding / Lamination /Harmful Segregation and other detrimental defects [that may adversely effect end the end -use.

BASED ON DLW SPECN. No. D-87018 ALT. R10/R11

Validated DY. CME/P&D	<i>[Signature]</i>	(A5)	SCOPE REVISED (VIDE CME'S APPROVAL ON DATED 4-8-2011)	—	<i>[Signature]</i>	<i>[Signature]</i> W.M/D	25/11
Super Chd SSE/D	<i>[Signature]</i>	(A4)	CLAUSE-II ADDED. (VIDE DLW Rev - R11).	—	<i>[Signature]</i>	<i>[Signature]</i> ADE	19/11/09
CHD SE/D	<i>[Signature]</i>	(A3)	SPECIFICATION REVISED VIDE DLW ALT-R-10	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	30/1/06
		ALT. NO.	ALTERATION	CHD SE/D	SUPER CHD SSE/D	VALIDATED DY. CME/P&D	DATE

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4.2 MECHANICAL PROPERTIES

Tensile Strength : 133,000 – 160,000 Psi
Yield Strength : 118,000 Psi (min.)
% Elongation in (2" GL) : 15%(min.)
% Reduction in Area : 45 (min.)
HARDNESS : 285- 321 (BHN)/ 30-40 (RC)

4.3 Reduction ratio:

At least 3:1 , from Billet to finished size.

4.5 Hardenability :

Jominy end quench test should produce the standard hardenability band of the precise grade of steel. This test is, however, to be performed as a 'type Test ' in accordance with SAE method of determining hardenability; as and when required.

5 CLEANLINESS:

The inclusion rating shall not be worse than the following limits (as per IS: 4163):-

Type	Thin Series	Thick Series
A	1.5	1.0
B	1.5	1.0
C	1.5	1.0
D	1.5	1.0

6. PURCHASE CONDITION:

Hardened & Tempered, Machine Straightened, and with Sawn /Machine cut ends.

7. DIMENSIONAL TOLERANCES:

As specified by purchaser

8. INSPECTION :-

Two copies of certified test reports shall be sent to the Chief Inspecting Officer, DMW/ Patiala. The report shall furnish Chemical Composition, Cleanliness- Status of the Product, Heat-treatment rendered with, Hardness & Micro structural details including, Depth of Decarburization, etc; as per the above mentioned clauses.

9. Marking: Vendor Identification color code shall be provided as per DMW Specification No. Misc. 92, on each Bar with Heat treatment batch no. / Month / Year, of Manufacture, etc.

10. All other conditions, not specified herein, (like 'Workmanship and finish, Magnetic particle inspection etc.), must meet the relevant AISI/ASTM Standards.

(A4) 11. Raw material/ Bar supplied should have identification code as per DMW specification no. MISC-153.

VALIDATED
BY
DY.CME/PS

[Signature]

SUPER
CHD.
SSE

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CHD
SE/D

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D87018