MATERIAL STANDARDS DIESEL LOCO MODERNISATION WORKS PATIALA	NUMBER	D 80370
	INDEX	
TITLE : LOW CARBON STEEL BARS & FORGINGS	SHEET	1 OF 2
	DATE	21-6-2006

1. SCOPE :

This specification covers Magnaflux Inspection Quality, Normalized, Steel Bars & Forgings. The Steel shall be Electric Furnace made, Fully Killed and VAD treated / Secondary Refined or through in Blast Furnace — Basic Oxygen Furnace & finally ladle refining Furnace route. (A4)

2. CHEMICAL COMPOSITION (%)

Carbon	:	0.18-0.25	Manganese	:	0.60-0.90
Phosphorous	:	0.03 max.	Sulphur	:	0.03 max.
Silicon	:	0.10-0.30			

2.1 TOLERANCE LIMITS IN CHEMISTRY (±%)

Carbon	:	0.02	Manganese	:	0.04
Phosphorous	:	0.008	Sulphur	:	0.008
Silicon	:	0.02			

3. SURFACE DEFECTS:

Total depth of surface defects (like Seams, Forging Bursts, Scur marks, Folds, Laps Decarburization or any other harmful defect) shall be as per the relevant ASTM Standards (Latest versions); against the Corresponding Diameter or Thickness across Flats (Bars) and Average Thickness (Forgings).

4. MACRO STRUCTURE :

(a)Macro. examination of Deep Acid Etched sections of Bars / Forgings (in-as received condition) shall not reveal any defect like Dendrites, Shrinkage-cavity, Blow-hole, Porosities, Cluster of Pin-holes, Piping , Hairline-cracks, Seams, Bursts Laps, Folds, Harmful Segregations or any other harmful defect; that would adversely effect the end use / further Processing-if any; beyond the above permissible limit.
(ref. clause-3).

(b)Forgings shall reveal optimum flow lines ; for which, adequate & wise Reduction Ratio is to be maintained by the manufacturer.

4.1 MICRO STRUCTURE:

Microstructure shall reveal Polyhedral Grains of 'Ferrite' & 'Pearlite' (colonies). The grain size shall be of ASTM NO.5 or finer. The Micro structure shall be free from any Banding / Lamination .Harmful Segregation Dendritic Pattern or any other Detrimental Defect; that may adversely effect the subsequent Chemical. Mechanical and / or Thermal Processings.

4.2 HARDNESS & MECHANICAL PROPERTIES:-

HARDNESS.= 120 BHN (Min.)

VALIDATED DY.CME PSD							
		A4	SCOPE REVISED (VIDE CME'S APPROVAL ON DATED 4-8-2011)	—			25 8/11
SUPER CHD SSE/D	DLW	A3	REVISED & REDRAWN, VIDE DLW ALT. R2 DT. 23 5/06	—			21 6/06
CHD SE/D	—	ALT. NO.	ALTERATION	CHD SE/D	SUPERCHD. SSE/D	VALIDATED DY.CME	PSD DATE

BASED ON DLW SPECN. NO. D 80370 ALT. R2 DT. 23-5-06

U.T.S.: - 430 Mpa (Min.)
Y.S. : - 230 Mpa (Min.)
%E: - 24 (Min.) on G.L.=5.65 $\sqrt{\text{Area}}$

5 CLEANLINESS STANDARD:-

The inclusion ratings shall not be worse than the following limits, when checked as per IS: 4163:-

Type	Thick Series	Thin Series
A	1.0	1.5
B	0.5	1.5
C	0.5	1.0
D	0.5	1.0

6. PURCHASE CONDITION:
Hot-Worked, Normalized Forgings/ Machine-Straightened Bars with Sawn / Machine-cut ends, with Scale-free surfaces (Adequately provided with Anti-rust compound).

7. DIMENSIONAL TOLERANCES:
As per ASTM standards (Latest versions) for the corresponding Size or as specified by purchaser.

8. INSPECTION :
(a)Two copies of Certified Test Reports shall be forwarded to The Chief Inspecting Officer, DMW/ PATIALA. The report shall furnish Chemical Composition, Cleanliness- Status, Heat-treatment rendered with, Hardness. Mech. Properties, Macro & Micro structural details, including Grain size. Depth of Decarburization, Surface condition etc; in terms of the above stipulated requirements.
(b) Truly Representative Test Bars, per H/T batch involved, are essentially required to be submitted to CIO/DMW, against each supplied lot.
9. Marking: Vendor Identification color-code shall be provided with: as per DMW Specification No. Misc. 92, on each Bar; with Heat –treatment Batch no. / Month / Year of Manufacture, etc. adequately and legibly marked
10. All other conditions, not specified herein (like 'Workmanship and finish', 'Magnetic particle inspection' etc.); must meet the relevant AISI/ASTM Standard / Standards

VALIDATED Dr. [illegible] P&D	
SUPER CHD SSE/D	
CHD SE/D	