VARDHMAN SPECIAL STEELS LTD.

C-58, FOCAL POINT, PHASE V, LUDHIANA (PB.) INDIA
Ph. No.: 0161-2670707-09

QF MSD 4.12.06
ISO/TS 16949 : 2009
Certificate : 37659-2008
ISO 14001 : 2004
Certificate : 177315-2015
OHSAS 18001 : 2007
Certificate: 177314-2015

Vardhmān®

TEST CERTIFICATE

IS : 7283
CM/L-9700028216

TEST CERTIFICATE NO. ___2018/04/690 DATE. 30/04/2018

To HAPPY FORGINGS LTD (UNIT-II)

We certify that the material described below fully conforms to IS:7283-1992. Chemical Composition and Mechanical Properties of the product tested in accordance with the Scheme of Testing and Inspection contained in the BIS Certification Marks licence No. CM/L-9700028216 are as indicated below against each order No. etc.

(PLEASE REFER TO IS:7283-1992 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No. & Date	Invoice No.	Grade	Heat No (Cast No)	Finished Section (Nominal Size mm)	Qty	Finish Shape	Cast Section (mm)	Red. Ratio	Supply Cond.	Color Code	Length of Bar	No of Bars
	SA/418/0002 2 48	1E1120	64967	56 mm	1050	Round	200*200	16.23	Hot Rolled	Red Base / White Line	4-6MTR	42

Manufacturing Route: EAF-LRF-VD-CCP With EMS & AMLC

% CHEMICAL COMPOSITION

	C	Si	Mn	S	P	Ni	Cr	Mo	Cu	Sn	Al	Ti	Ca	B	V
Min.	0.19	--	0.80	0.015	--	--	0.45	0.08	--	--	0.020	--	--	--	--
Max.	0.23	0.18	1.10	0.025	0.020	--	0.70	0.25	--	--	--	--	0.0020	--	--
Actual	0.215	0.12	1.05	0.016	0.010	0.060	0.65	0.10	0.10	0.007	0.026	0.0014	0.0014	0.0002	0.003

	O2	N2	H2	Grain Size	Total Decarb (mm)	D.I. Value	Micro Structure
	In PPM			(IS:4748/ASTM E112)	(IS:6396)		
Min.	--	--	--	5	--	43.2 mm	--
Max.	--	--	--	--	--	61.0 mm	
Actual	14	77	1.2	6.5/7.5	--	48.26 mm	--

INCLUSION RATING - IS:4163 / ASTM E45A/ ISO 4967,Method A

	A		B		C		D		JIS			DIN			Hardness BHN IS 1500:1983	
	Thin	Thick	Thin	Thick	Thin	Thick	Thin	Thick	A	B+C	Total	K3	K4		Min	Max
Max.	3.0	2.0	2.0	1.0	0.5	0.5	1.0	1.0							--	220
Actual	2.0	--	0.5	--	--	--	1.0	--							175	195

JOMINY HARDENABILITY (IN HRC) (IS 3848)

MM / Inch	J1/16	J3/16	J8/16
Min.	43	35	--
Max.	48	--	29
Actual	44.0	37.0	22.5

MECHANICAL PROPERTIES (IS 1608)

	Test Condition	Tensile Strength	Yield Strength	Elongation	Reduction Area	Impact Strength
Min.	--	--	--	--	--	--
Max.		--	--	--	--	--
Actual	--	--	--	--	--	--

Supplementary Requirements

Standard	Internal Soundness (ASTM E381 / IS11371)	Step Down (IS 4075) / Blue Fracture Test (IS:10138)	Surface Defects (Visual /MFLT)	Bend Test (IS1599:1985)
Required	C3R3S3 max	As per IS 4075	Depth of defect 0.3 mm max.	---
Actual	C3R3S3 max	OK As per IS 4075	OK	---

	Ultrasonic Test	MFLT	Dimension Tolerance	Ovality / Lobbing
Required	Yes	--	IS:3739	IS:3739
Actual	100% Bars manual ut done & found OK	--	Asper is 3739 gr 1	A s per IS3739 gr 1

Mixup Test: 100% Bars Checked by Spark,Metascope,Ni Spot test,Mobile Spectro - OK

The Material Supplied to the Standard rolling Tolerances

Remarks:- Free from radioactive material or banned substances.

Reference Standard: IS 7283:1992, Customer Specification Caterpillar Inc.CHG NO.17,DT.28.04.2010

For any Technical Support / Quality related issues please contact -
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For any Test Certificate related issues please contact -
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Checked by : Engineer - R&D

Approved by : Authorised Signatory