

**VARDHMAN SPECIAL STEELS LTD.****TEST CERTIFICATE**

QF MSD 4.12 06

ISO/TS 16949 : 2009  
 Certificate :37659-2008  
 ISO 14001 : 2004  
 Certificate : 52070-2009  
 OHSAS 18001 : 2007  
 Certificate : 70060-2010

TEST CERTIFICATE NO. \_\_\_ 2017/11/596

DATE. 29/11/2017


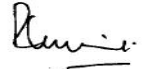
To HAPPY FORGINGS LTD (UNIT-II)



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				
		1E1120	62658	100 mm		RCS	200*200	4.0	Hot Rolled	Red Base/White Line	3-6MTR					
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	0.220	0.13	1.04	0.022	0.012	0.075	0.655	0.105	0.130	0.007	0.028	0.0019	0.0012	0.0003	0.004	
	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	13	77	1.1	6.5/7.5			--			51.05 mm		--				
INCLUSION RATING - IS:4163 / ASTM E45A/ ISO 4967, Method A										JIS			DIN		Hardness BHN	
	A		B		C		D							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	--							170	190
JOMINY HARDENABILITY (IN HRC) (IS 3848)																
MM / Inch	J1/16	J3/16	J8/16													
Min.	43	35	--													
Max.	48	--	29													
Actual	44.0	38.0	22.0													
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 -																
Mr. Dinesh Singh (Sr. Manager - R&D)																
Mobile no. : 081466-25586 , email : met5.vss@vardhman.com																
For any Test Certificate related issues please contact -																
Mr. Rajesh Kalia (Executive - R&D)																
Mobile no. : 075080-02659 , email : met2.vss@vardhman.com																
Website : www.vardhmansteel.com																
<div style="display: flex; justify-content: space-between;"> <div>             Checked by :  <b>Engineer - R&amp;D</b> </div> <div>             Approved by :  <b>Authorised Signatory</b> </div> </div>																
For VARDHMAN SPECIAL STEELS LTD.																