



# 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

Heat no.	61730	Customer	Forge India		
Grade	SAE8620H	Certificate no.	2017/09/462	Invoice no.	
Finish Size (mm)	52 MM	Certificate date	02/01/2018	Invoice date	
Finish Shape	Round	Colour Code	Blue Base/Black Line	No. of Bars	
Cast Size (mm)	200*200	Length of Bars	4-6 MTRS.	Quantity (MT)	
Reduction Ratio	18.8	Supply Condition	Hot Rolled		

Manufacturing Route EAF-LRF-VD ( TANK DEGASSING )-CCP With EMS & AMLC

### % CHEMICAL COMPOSITION

	C	Si	Mn	S	P	Ni	Cr	Mo	Cu	Sn	Al	Ti	Ca	B	V	
Min.	0.17	0.15	0.60	--	--	0.35	0.35	0.15	--	--	0.020	--	--	--	--	
Max.	0.23	0.35	0.95	0.025	0.025	0.75	0.65	0.25	0.30	--	0.045	--	--	--	--	
Actual	0.195	0.255	0.87	0.016	0.013	0.40	0.47	0.155	0.10	0.004	0.027	0.0035	0.0016	0.0004	0.004	
	O2	N2	H2	Grain Size			As per IS-6396			D.I. Value		Micro Structure				
	As per ASTM E 1019 in PPM			(IS:4748/ASTM E112)			Total Decarb (mm)			INCH.						
Min.	--	--	--	7			--			-- <th colspan="4" rowspan="2">Pearlite+Ferrite</th>		Pearlite+Ferrite				
Max.	15	80	1.5	8			1% of section			--						
Actual	13	68	1.3	7.0/7.5			0.22 mm			--		Pearlite+Ferrite				

### INCLUSION RATING - IS:4163 / ASTM E45A

	A		B		C		D		As per JIS G 0555			DIN 50602			Hardness As per IS 1500	
	Thin	Thick	Thin	Thick	Thin	Thick	Thin	Thick	A	B+C	Total	K3	K4		Min	Max
Max.	2.5	1.5	2.0	1.0	2.0	1.0	2.0	1.0	--	--	--	--	--		--	250
Actual	2.0	--	0.5	--	--	--	1.5	--	--	--	--	--	--		170	190

### JOMINY HARDENABILITY (IN HRC) IS-1586

Mm/Inch.	J1.5MM	J9MM	J13MM	J20MM												
Min.	41	22	--	--												
Max.	48	35	30	20												
Actual	42.5	27.0	23.5	18.0												

### MECHANICAL PROPERTIES IS 1608 : 2005

MM/Inch	Test Condition	Tensile Strength	Yield Strength	Elongation	Reduction Area	Impact Strength	
Min.	--	--	--	--	--	--	
Max.		--	--	--	--	--	
Actual	--	--	--	--	--	--	
	Internal Soundness (ASTM E381)		Step Down Test (IS:4075)		Surface Defects		MPI
Required	C2R2S2 Max.		As per IS:4075		Free from seams,laps ,crack etc.		--
Actual	C2R2S2 Max.		Ok As per IS4075		Ok in visual inspection		100% Bars done-Ok
	Ultrasonic Test		MFLT		Dimension Tolerance		Ovality / Lobbing
Required	YES		--		As per IS3739 Gr1		NA
Actual	100% Bars manual ut done & found OK		100% Bars done- ok		As per IS3739 Gr1		NA

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

### Remarks :-

### Reference Standard

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)**  
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Website : www.vardhmansteel.com

Checked by :  
Engineer - R&D

Approved by :  
Authorised Signatory