

JSW STEEL LIMITED - SALEM WORKS

Works: pottaneri Village, Mecheri Post - 636 453, salem, india

Registered Office: "JSW CENTRE", Bandra Kurla Complex, Bandra (East), Mumbai - 400 051

TEST CERTIFICATE

Certificate No. : 232203

Customer Name: MM FORGINGS LIMITED

Cust. Address : BUDAKUDI VILLAGE

VIRALIMALAI. Tamil Nadu-621316 India

Date : 09.02.2018 SO No : 400778614

SO Date : 06.02.2018

Po Number: 4500012833

:06.02.2018

Po date Packing Slip No

:705532875

	VIRALIMALAI,T	amil Nadu-62131	6,India	Truc	k No.: TN34B2579	Invoice	Invoice No :7100586072			
Heat No	Grade	Size (mm)	Length (mm)	M\L (mm)	No. of Bundles	No. of PCS	Weight	Billet/Bloom Size		
A5355	42CRMO4	75.0 mm RCS	6,000.00 mm	0 mm	5	35	8.820 MT	280MM_370MM		

TDC NO · MSA 003L0 13108201114012015

MPa MPa % % BHN BHN BHN Max 1,095.00 12.00 48.00 450 327 Actual 780.640 1035.240 21.500 54.600 480.0 302.0 Edge / Corner Radius (mm) Upset Type Upsetability JOMINY HARDENABILITY () Ideal Diameter (DI) : [/] - Distance J1.5 J9 J20 J25 MIN (HRC) 54.0 52.0 47.0 MAX (HRC) 99.9 60.0 99.9 49.0 Actual (HRC) 59.00 57.70 53.20 49.00 METALLURGICAL PROPERTIES & PHYSICAL INSPECTION	TDC NO)	: MSA	_003L	0_1,31	1.08.20	11,14.0	1.2015														
Element C% Si% Mn% P% S% Cr% Mo% Ni% B ppm V% Cu% Pb% Sn% Ti% Nb% Zr% As% Sb% Ai% Cappm Min 0.3800 0.150 0.600 0.020 0.900 0.020 0.900 0.150 0.600 0.020 0.030 0.200 0.030 0.300 0.030 0.030 0.020 0.010 0.010 0.010 0.010 0.0450 Actual 0.408 0.250 0.740 0.009 0.023 1.090 0.202 0.024 2 0.002 0.024 0.001 0.001 0.003 0.002 0.002 0.001 0.002 0.023 5 Gas Levels Nppm : [1 100] -58	Process	Route	: BF_	EOF_L	RF_VD	_CCM	EMS_E	3M								R	eductio	n Ratio	7.00	/ -	18.65 : 1	
MIN	CHEMIC	AL AN	IALYS	IS	_				_										Proc	STD	lo : QDQ	A06_80
MAX 0.4500 0.400 0.900 0.026 0.0350 1.200 0.300 0.030 0.030 0.020 0.010 0.010 0.0450 Actual 0.408 0.250 0.740 0.009 0.023 1.090 0.022 0.024 2 0.002 0.001 0.003 0.002 0.001 0.003 0.002 0.001 0.003 0.002 0.001 0.003 0.002 0.001 0.003 0.002 0.001 0.003 0.002 0.001 0.002 0.001 0.003 0.002 0.001 0.003 0.002 0.001 0.003 0.002 0.001 0.003 0.002 0.001 0.002 0.001 0.003 0.002 0.001 0.003 0.002 0.001 0.002 0.003 0.002 0.003 0.002 0.003 0.002 0.003 0.002 0.003 0.002 0.003 0.002 0.003 0.002 0.003 0.002 0.003 0.002 0.003 0.002 0.003	Element	С%	Si%	Mn%	P%	S%	Cr%	Mo%	Ni%	B ppm	V%	Cu%	Pb%	Sn ⁹	% Ti%	Nb%	Zr%	As%	Sb%	AI%	Ca ppm	CE%
Actual 0.408 0.250 0.740 0.009 0.023 1.090 0.202 0.024 2 0.002 0.001 0.001 0.003 0.002 0.001 0.002 0.003 5	MIN	0.3800	0.150	0.600		0.020	0.900	0.150			L					<u> </u>				0.0200		
Gas Levels N ppm : [/ 100] -58	MAX	0.4500	0.400	0.900	0.025	0.035	1.200	0.300	0.200		0.030	0.300		0.03	0.0200	0.010		0.010	0.010	0.0450		
MECHANICAL PROPERTIES : Tensile Test (ASTM A370 - 16)	Actual	Actual 0.408 0.250 0.740 0.009 0.023 1.090							0.024	2	0.002	0.024	0.001	0.00	0.0033	0.002	0.002	0.001	0.002	0.023	5	0.793
Tensile Test (ASTM A370 - 16)	Gas Lev	Gas Levels : N ppm : [/ 100] -58 O ppm : [/ 20] -11.8 H ppm : [/ 2.00] -1.82																				
Cond Quenched & Tempered Quenched & Tempered Spec.	MECHA	NICAL	PRO	PERTIE	S :																	
Spec. YS		Те	nsile 1	Test (A	STM A	370 - 1	6)		Ha	rdness	Test						Impa	ct Test	t()			
Rolled	Cond.	ond. Quenched & Tempered Quenched & Tempered Spec.																				
Min 705.00 900.00 12.00 48.00 450 264 Max 1,095.00 327 Actual 780.640 1035.240 21.500 54.600 480.0 302.0 Edge / Corner Radius (mm) Upset Type: Upsetability: JOMINY HARDENABILITY () Ideal Diameter (DI): [/]- Distance J1.5 J9 J20 J25 Ideal Diameter (DI): [/]- MIN (HRC) 54.0 52.0 47.0 Ideal Diameter (DI): [/]- MAX (HRC) 99.9 60.0 99.9 49.0 Ideal Diameter (DI): [/]- MAX (HRC) 59.00 57.70 53.20 49.00 Ideal Diameter (DI): [/]- METALLURGICAL PROPERTIES & PHYSICAL INSPECTION Surface Inspection Step Down Test BFT Test MPI Test Segregation Test Spark Test Spectra Test Metascope	Spec.	Spec. YS UTS Elong. RA			٩				ed	As Q	Temp		Value	1		2		3	A	Avg.		
Max 1,095.00 327 Actual 780.640 1035.240 21.500 54.600 480.0 302.0 Edge / Corner Radius (mm) Upset Type: Upsetability: JOMINY HARDENABILITY () Distance J1.5 J9 J20 J25 MIN (HRC) 54.0 52.0 47.0 J25		MP	a _	MPa	%	%			B⊦	IN		BHN							\perp			
Actual 780.640 1035.240 21.500 54.600 480.0 302.0 Upset Type: Upsetability: JOMINY HARDENABILITY () Ideal Diameter (DI): [/] - Distance J1.5 J9 J20 J25 J25 <td>Min</td> <td>705.0</td> <td>00 9</td> <td>900.00</td> <td>12.0</td> <td>0 4</td> <td>8.00</td> <td></td> <td>45</td> <td>0</td> <td></td> <td>264</td> <td></td> <td></td> <td>ļ</td> <td></td> <td></td> <td>- </td> <td></td> <td></td> <td></td> <td>ļ</td>	Min	705.0	00 9	900.00	12.0	0 4	8.00		45	0		264			ļ			-				ļ
Edge / Corner Radius (mm)	Max		1	095.00	ļ							327	_									
JOMINY HARDENABILITY () Distance J1.5 J9 J20 J25 Ideal Diameter (DI) : [/] - MIN (HRC) 54.0 52.0 47.0 Ideal Diameter (DI) : [/] - MAX (HRC) 59.9 60.0 99.9 49.0 Ideal Diameter (DI) : [/] - MAX (HRC) 59.9 60.0 99.9 49.0 Ideal Diameter (DI) : [/] - MAX (HRC) 59.9 60.0 99.9 49.0 Ideal Diameter (DI) : [/] - METALLURGICAL PROPERTIES & PHYSICAL INSPECTION Surface Inspection Step Down Test BFT Test MPI Test Segregation Test Spark Test Spectra Test Metascope	Actual	780.6	40 10	035.240	21.50	00 54	.600		480	0.0		302.0	302.0							<u> </u>		
Distance J1.5 J9 J20 J25 J2	Edge / C	Corner	Radius	(mm)	<u> </u>				,_			Upset	Туре	· ·			Ups	etabilit	y:			
MIN (HRC) 54.0 52.0 47.0	JOMINY	HARE	ENA	BILITY	υ_,			· .								ldeal D	amete	r (DI) :	[/]-			····
MAX (HRC) 99.9 60.0 99.9 49.0 49.00 49.00 49.00 49.00 49.00 57.70 53.20 49.00 <td< td=""><td>Distance</td><td><u>.</u></td><td>11.5</td><td>J9</td><td>J20</td><td>J25</td><td></td><td></td><td>_</td><td></td><td>]</td><td></td><td></td><td></td><td><u> </u></td><td><u> </u></td><td>1</td><td><u> </u></td><td></td><td></td><td></td><td><u> </u></td></td<>	Distance	<u>.</u>	11.5	J9	J20	J25			_]				<u> </u>	<u> </u>	1	<u> </u>				<u> </u>
Actual(HRC) 59.00 57.70 53.20 49.00 METALLURGICAL PROPERTIES & PHYSICAL INSPECTION Surface Inspection Step Down Test BFT Test MPI Test Segregation Test Spark Test Spectra Test Metascope	MIN (HR	(O)	54.0	52.0	47.0				_				-	<u> </u>				ļ		_		
METALLURGICAL PROPERTIES & PHYSICAL INSPECTION Surface Inspection	MAX (H	RC) s	9.9	60.0	99.9	49.0			_					<u> </u>		<u> </u>		ļ				<u> </u>
Surface Inspection Step Down Test BFT Test MPI Test Segregation Test Spark Test Spectra Test Metascope	Actual(H	IRC)	59.00	57.70	53.20	49.00										<u> </u>		<u> </u>	Д			
	METAL	URGI	CAL P	ROPE	RTIES	& PHY	SICAL	NSPEC	CTION													
Actual OK 100 % OK 100 % OK 100 % OK 100 % O	 	Surfa	ce Ins	pection		Step Do	wn Tes	t	BFT Test MF			est	Segre	gation	Test	Spark Test		Sr	Spectra Test		Metascope Test	
	Actual		ок					_			100 %	ок				100 %	6 OK		100 % C	ж	100%	OK.

Spec	Spec C2R2S2			F_P Ferrite - Pearlite		I I		1		1			
Actual	C:	C2R2S2											
	Grain	Decarb	Banding	Α		В		С			D		Ultrasonic
	Size	(mm)	(µm)	Thin	Thick	Thin	Thick	Thin	Thick	Thin	Thick_	μm	Test
Spec	5.0 / 8.0	,	,	2.0	1.0	2.0	1.0	0.5	0.5	1.0	1.0		3mm FBH

0.300 mm 0.00 100% Pass Grain Size Standard: ASTM E112 - 13 Inclusion Rating Test Standard: ASTM E45 - 13, A Decarb Standard: SAE J419_198312 Macro Etch Test Standard: ASTM E381 - 17 Banding Test Standard:

JSW COLOR CODE: YELLOW CUSTOMER COLOR CODE

INSPECTION CERTIFICATE 3.1 ACCORDING TO EN 10204: 2004

Micro Structure

Supply Condition: AS ROLLED

Remarks :

Reference : WE HERE BY CERTIFY THAT THE MATERIAL SHIPPED UNDER THIS TEST CERTIFICATE DID NOT COME IN DIRECT CONTACT WITH ANY MERCURY, CADMIUM HEXAVALENT CHROMIUM CONTAINING DEVICES, FREE FROM RADIOACTIVE CONTAMINATION EMPLOYING A SINGLE BOUNDARY OF CONTAINMENT DURING THE MANUFACTURING PROCESS, TESTS,

INSPECTION AND STORAGE

WE CERTIFY THAT CONTENTS OF THIS REPORT ARE CORRECT AND ACCURATE AND MEET THE REQUIREMENTS OF THE PURCHASE ORDER, TECHNICAL DELIVERY CONDITION, GENERAL STEEL REQUIREMENTS ANDTHE MATERIAL CERTIFICATION REQUIREMENTS.

NOTE

1. THE RESULTS RELATES ONLY TO THE ITEM TESTED. 2. CERTIFICATE SHALL NOT BE REPRODUCED EXCEPT IN

FULL WITHOUT THE WRITTEN APPROVAL OF ISSUING AUTHORITY.

For JSW STEEL LIMITED

DEG. SPH

Distortion

GBC Level

CZ Closer

S. M. KUMAR - AVP (PC & QAD)