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. : 246305

Customer Name: RAMAKRISHNA FORGINGS LIMITED

Cust. Address : PLOT NO. M-15, 16 & NS-26,

: 26.04.2018 SO No : 400809775

SO Date : 04.04.2018

Po Number: EMAIL Po date

:04.04.2018 Packing Slip No :705850428

Invoice No :7100822793

20.	JAMSHEDPUR,	Jharkhand-83210	09,India	Truc	k No.: NL01AB1612	Invoice	No :7100822	793	
Heat No	Grade	Size (mm)	Length (mm)	M\L (mm)	No. of Bundles	No. of PCS	Weight	Billet/Bloom Size	
E75020	EN353	125.00 mm DIA	6,000.00 mm	0 mm	9	36	20.871 MT	340MM_400MM	

: RF 14 D 4 01_EN353_VEC,3_0,29.01.2018

Process Route: BF_EOF_LRF_VD_CCM_EMS_BM

Reduction Ratio: 8.00 / - 11.09:1

AL AN	ALYSI	S															Prod S	STD No	: QDQA	06_929
C%	Si%	Mn%	P%	S%	Cr%	Mo%	Ni%	B ppm	V%	Cu%	Pb%	Sn%	Ti%	Nb%	Zr%	As%	Sb%	AI%	Ca ppm	CE%
0.1400		0.500			0.750	0.080	1.000											0.0200		
0.2000	0.350	1.000	0.050	0.0500	1.250	0.150	1.500		0.030	0.250			0.0060	0.150				0.0600	20	
0.190	0.180	0.820	0.010	0.026	1.010	0.130	1.040	3	0.003	0.011	0.001	0.004	0.0039	0.002	0.001	0.003	0.002	0.026	5	0.625
	C% 0.1400 0.2000	C% Si% 0.1400 0.2000 0.350	0.1400 0.500 0.2000 0.350 1.000	C% Si% Mn% P% 0.1400 0.500 0.2000 0.350 1.000 0.050	C% Si% Mn% P% S% 0.1400 0.500 0.2000 0.350 1.000 0.050 0.0500	C% Si% Mn% P% S% Cr% 0.1400 0.500 0.750 0.2000 0.350 1.000 0.050 0.0500 1.250	C% Si% Mn% P% S% Cr% Mo% 0.1400 0.500 0.750 0.080 0.2000 0.350 1.000 0.050 0.0500 1.250 0.150	C% Si% Mn% P% S% Cr% Mo% Ni% 0.1400 0.500 0.750 0.080 1.000 0.2000 0.350 1.000 0.050 0.0500 1.250 0.150 1.500	C% Si% Mn% P% S% Cr% Mo% Ni% B ppm 0.1400 0.500 0.750 0.080 1.000 0.2000 0.350 1.000 0.050 1.250 0.150 1.500	C% Si% Mn% P% S% Cr% Mo% Ni% B ppm V% 0.1400 0.500 0.750 0.080 1.000 0.000 0.030 0	C% Si% Mn% P% S% Cr% Mo% Ni% B ppm V% Cu% 0.1400 0.500 0.750 0.080 1.000 0.030 0.250 0.2000 0.350 1.000 0.050 1.250 0.150 1.500 0.030 0.250	C% Si% Mn% P% S% Cr% Mo% Ni% B ppm V% Cu% Pb% 0.1400 0.500 0.750 0.080 1.000 0.050 0.030 0.050 0.0500 1.250 0.150 1.500 0.030 0.250 0.250	C% Si% Mn% P% S% Cr% Mo% Ni% B ppm V% Cu% Pb% Sn% 0.1400 0.500 0.500 0.750 0.080 1.000 0.000 0.030 0.250 0.050 0.0500 1.250 0.150 1.500 0.030 0.250 0.250 0.000<	C% Si% Mn% P% S% Cr% Mo% Ni% B ppm V% Cu% Pb% Sn% Ti% 0.1400 0.500 0.500 0.750 0.080 1.000 0.000 0.030 0.250 0.0060 0.2000 0.350 1.000 0.050 1.250 0.150 1.500 0.030 0.250 0.0060	C% Si% Mn% P% S% Cr% Mo% Ni% B ppm V% Cu% Pb% Sn% Ti% Nb% 0.1400 0.500 0.500 0.750 0.080 1.000 0.000 0.030 0.250 0.0060 0.150 0.2000 0.350 1.000 0.0500 1.250 0.150 1.500 0.030 0.250 0.0060 0.150	C% Si% Mn% P% S% Cr% Mo% Ni% B ppm V% Cu% Pb% Sn% Ti% Nb% Zr% 0.1400 0.500 0.500 0.750 0.080 1.000 0.000 0.030 0.250 0.0060 0.150 0.2000 0.350 1.000 0.0500 1.250 0.150 1.500 0.030 0.250 0.0060 0.150	C% Si% Mn% P% S% Cr% Mo% Ni% B ppm V% Cu% Pb% Sn% Ti% Nb% Zr% As% 0.1400 0.500 0.750 0.080 1.000 0.000 0.030 0.250 0.0060 0.150 0.2000 0.350 1.000 0.050 1.250 0.150 1.500 0.030 0.250 0.0060 0.150	C% Si% Mn% P% S% Cr% Mo% Ni% B ppm V% Cu% Pb% Sn% Ti% Nb% Zr% As% Sb% 0.1400 0.500 0.500 0.080 1.000 0.000 0.030 0.250 0.0060 0.150 0.0060 0.150 0.0060 0.150 0.0060	C% Si% Mn% P% S% Cr% Mo% Ni% B ppm V% Cu% Pb% Sn% Ti% Nb% Zr% As% Sb% Al% 0.1400 0.500 0.500 0.750 0.080 1.000 0.030 0.250 0.030 0.250 0.0060 0.150 0.0600 0.2000 0.350 1.000 0.0500 1.250 0.150 1.500 0.030 0.250 0.0060 0.150 0.0600	C% Si% Mn% P% S% Cr% Mo% Ni% B ppm V% Cu% Pb% Sn% Ti% Nb% Zr% As% Sb% Al% Ca ppm 0.1400 0.500 0.500 0.050 0.080 1.000 0.030 0.250 0.030 0.250 0.0060 0.150 0.0600 20

Gas Levels : N ppm : [/ 80] -80 O ppm: [/ 20] -11.9 H ppm: [/ 2.00] -1.40

MECHANICAL PROPERTIES :

		Tensile	e Test ()			Hardne	ss Test		Impact Test ()								
Cond.									Spec.								
	YS	UTS	Elong.	RA	As Rolled	As Quenched		As Q&T	Test Temp	Imp. Value (min)	1	2		3		Avg.	
			%	%					and T								
Min							*										
Max																	
Actual			Time							18				-LAN			

Upsetability: Upset Type: Edge / Corner Radius (mm) :

JOMINY HARDENABILITY (SAE J406_200903) Ideal Diameter (DI): [/] -Distance J11 MIN (HRC) 37.0 33.0 MAX (HRC) 44.0 37.0 Actual(HRC) 44.00 34.25

METALLURGICAL PROPERTIES & PHYSICAL INSPECTION BFT Test MPI Test Segregation Test Spark Test Surface Inspection Step Down Test

	Odilaco	mopodio	Otop	D 0 1111 1			-		3 3					
Actual		ОК		Pass			10	0 % OK			100	% OK	100 % OK	100% OK.
	Macro	Etch Test	Micr	o Structi	ure	CN	CZ	Looser	CZ	Closer	GB	C Level	DEG. SPH	Distortion
Spec	C2	2R2S2		F_P		1		1		1				
Actual	C2R2S2		Ferr	Ferrite - Pearlite										
	Grain	Decarb	Banding		A		В	(D	DOS	Ultrasonic	
	Size	(mm)	(µm)	Thin	Thick	Thin	Thick	Thin	Thick	Thin	Thick	μm	Test	
Spec	50/80	/040	1	2.0	1.0	2.0	0.0	2.0	0.0	2.0	1.0		20% / 80% Back Wall Echo	

Actual 7.00 0.360 mm 2.00 0.00 0.00 0.00 0.50 0.00 100% Pass Grain Size Standard: ASTM E112 - 13 Decarb Standard: Inclusion Rating Test Standard: ASTM E45 - 13, A

UT Standard: ASTM A388/A388M - 16 Macro Etch Test Standard: ASTM E381 - 17 Banding Test Standard: CUSTOMER COLOR CODE JSW COLOR CODE

INSPECTION CERTIFICATE 3.1 ACCORDING TO EN 10204 : 2004

Supply Condition: AS ROLLED Remarks

. WE HERE BY CERTIFY THAT THE MATERIAL SHIPPED UNDER THIS TEST CERTIFICATE DID NOT COME IN DIRECT CONTACT WITH ANY MERCURY, CADMIUM HEXAVALENT. Reference 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 AND THE MATERIAL CERTIFICATION REQUIREMENTS

NOTE:

AUTHORITY

1. THE RESULTS RELATES ONLY TO THE ITEM TESTED. 2. CERTIFICATE SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF ISSUING

For JSW STEEL LIMITED

Spectra Test | Metascope Test

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

M- 5896 GGD