

JSW STEEL LIMITED - SALEM WORKS

QR : QA : 04

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. : 234476

Customer Name: HAPPY FORGINGS LIMITED UNITII

Cust. Address : BXXIX22541 AND OPP.HINDUSTAN TYRES

LUDHIANA,Punjab-141120,India

Date : 21.02.2018

SO No : 400783750

SO Date : 16.02.2018

Truck No.: TN52J8078

Po Number:HAPPY F

Po date :16.02.2018

Packing Slip No :705564279

Invoice No :7100626058

Heat No	Grade	Size (mm)	Length (mm)	ML (mm)	No. of Bundles	No. of PCS	Weight	Billet/Bloom Size
A5580	20MNCR5	110.0 mm RCS	6,000.00 mm	0 mm	5	20	11.450 MT	280MM 370MM

TDC NO : HFL_TDC_108,0_0,28.06.2013,28.06.2013

Process Route : BF_EOF_LRF_VD_CCM_EMS_BM

Reduction Ratio : / - 8.67 : 1

CHEMICAL ANALYSIS

Prod STD No : QDQA06_612

Element	C%	Si%	Mn%	P%	S%	Cr%	Mo%	Ni%	B ppm	V%	Cu%	Pb%	Sn%	Ti%	Nb%	Zr%	As%	Sb%	Al%	Ca ppm	CE%
MIN	0.1700	0.150	1.100		0.020	1.000													0.0200		
MAX	0.2200	0.300	1.400	0.035	0.0350	1.300	0.060	0.250		0.010	0.250	0.010	0.020				0.010	0.010	0.0400		
Actual	0.175	0.227	1.226	0.011	0.022	1.223	0.009	0.022	3	0.001	0.014	0.001	0.004	0.0030	0.002	0.002	0.002	0.001	0.028	6	0.626

Gas Levels : N ppm : [/ 80] -56

O ppm : [/ 20] -11.7

H ppm : [/ 2.00] -1.38

MECHANICAL PROPERTIES :

Tensile Test ()					Hardness Test			Impact Test ()					
Cond.								Spec.					
Spec.	YS	UTS	Elong.	RA	As Rolled	As Quenched	As Q&T	Test Temp	Imp. Value (min)	1	2	3	Avg.
			%	%									
Min													
Max													
Actual													

Edge / Corner Radius (mm) :

Upset Type :

Upsetability:

JOMINY HARDENABILITY (IS 3848 : 1981)

Ideal Diameter (DI) : [/] -

Distance	J6/16																				
MIN (HRC)	35.0																				
MAX (HRC)	39.0																				
Actual(HRC)	38.00																				

METALLURGICAL PROPERTIES & PHYSICAL INSPECTION

	Surface Inspection	Step Down Test	BFT Test	MPI Test	Segregation Test	Spark Test	Spectra Test	Metascope Test
Actual	OK	Pass		100 % OK		100 % OK	100 % OK	100% OK.
	Macro Etch Test	Micro Structure	CN	CZ Looser	CZ Closer	GBC Level	DEG. SPH	Distortion
Spec	C2R2S2	F_P	/	/	/			
Actual	C2R2S2	Ferrite - Pearlite						

	Grain Size	Decarb (mm)	Banding (µm)	A		B		C		D		DOS µm	Ultrasonic Test
Spec	5.0 / 8.0	/ 0.50	/	2.5	2.0	2.0	0.0	2.0	0.0	2.0	0.0	38.1 µm	20% / 80% Back Wall Echo
Actual	7.00	0.360 mm		2.00	1.00	0.50	0.00	0.00	0.00	0.50	0.00		100% Pass

Inclusion Rating Test Standard: ASTM E45 - 13, A

Macro Etch Test Standard: ASTM E381 - 17

Grain Size Standard: ASTM E112 - 13

Banding Test Standard:

Decarb Standard: SAE J419_198312

UT Standard: ASTM A388/A388M - 16

JSW COLOR CODE :

CUSTOMER COLOR CODE : WHITE BASE + 1 RED DOT

INSPECTION CERTIFICATE 3.1 ACCORDING TO EN 10204 : 2004

Supply Condition : AS ROLLED

Remarks :

Reference : WE HEREBY 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 AND THE 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

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