



# 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

QR / QA / 54

## TEST CERTIFICATE

Certificate No. : 223649				Date : 22.12.2017		Packing Slip No : 705318244		
Customer Name: JSW Steel Ltd- Depot - Ludhiana				SO No : 400752984		Invoice No : 7100437747		
Cust. Address : c/o Shiva Steel Industries				SO Date : 20.12.2017				
Ludhiana,Punjab-141020,India				Truck No.: RJ07GC1441				
Heat No	Grade	Size (mm)	Length (mm)	M/L (mm)	No. of Bundles	No. of PCS	Weight	Billet/Bloom Size
E71771	20MNCR5	100.0 mm RCS	6,000.00 mm	0 mm	16	64	30.070 MT	340MM 400MM

Process Route : BF\_EOF\_LRF\_VD\_CCM\_EMS\_BM

Reduction Ratio : 6.00 / -13.60 : 1

CHEMICAL ANALYSIS														Prod STD No : QDQA06_506														
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	0.1900	0.150	1.300		0.020	1.200													0.0200									
MAX	0.2200	0.350	1.400	0.025	0.0350	1.300	0.100	0.250		0.020	0.350		0.050	0.0100	0.020				0.0500									
Actual	0.200	0.300	1.324	0.011	0.023	1.255	0.008	0.021	3	0.003	0.017	0.001	0.003	0.0042	0.002	0.001	0.001	0.002	0.026	5	0.676							
Levels :	N ppm : [ / 100 ] -60														O ppm : [ / 20 ] -12.0							H ppm : [ / 2.00 ] -1.09						

## MECHANICAL PROPERTIES :

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

Edge / Corner Radius (mm) :

Upset Type :

Upsetability :

JOMINY HARDENABILITY ( ASTM A255 - 10(2014) )

Ideal Diameter (DI) : [ / ] -

Distance	J5	J10	J20	J30																	
MIN (HRC)	42.0	38.0	32.0	29.0																	
MAX (HRC)	46.0	43.0	37.0	34.0																	
Actual(HRC)	45.70	42.70	35.70	32.50																	

## 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. SPI		Distortion	
Spec	C2R252		F.P		/		/		/							
Actual	C2R252		Ferrite - Pearlite													
	Grain Size	Decarb (mm)	Banding (µm)	A		B		C		D		DOS		Ultrasonic Test		
				Thin	Thick	Thin	Thick	Thin	Thick	Thin	Thick	µm				
Spec	5.0 / 8.0	/	/	3.0	2.0	2.5	1.5	1.0	1.0	1.0	1.5	1.0	38.1 µm	% / 80% Barx Wall Echo		
Actual	7.00	0.300 mm		2.00	1.00	0.50	0.05	0.00	0.00	0.00	0.50	0.00		100% Pass		

Inclusion Rating Test Standard: IS 4163 : 2004

Grain Size Standard: ASTM E112 - 13

Decarb Standard: SAE J419\_198312

Macro Etch Test Standard: ASTM E381 - 17

Banding Test Standard:

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 : Tested in Auto Inspection Line.

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 CONTAMINATION 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)