

**JSW STEEL LIMITED - SALEM WORKS**

QR / QA / 54

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. : 228367

Customer Name: MM FORGINGS LIMITED

Cust. Address : BUDAKUDI VILLAGE

VIRALIMALAI, Tamil Nadu-621316, India

Date : 17.01.2018

SO No : 400737786

SO Date : 23.11.2017

Truck No.: TN52E3866

Po Number: 4500012827

Po date : 13.01.2018

Packing Slip No : 705421672

Invoice No : 7100516716

Heat No	Grade	Size (mm)	Length (mm)	ML (mm)	No. of Bundles	No. of PCS	Weight	Billet/Bloom Size
E71505	42CRMO4	75.0 mm RCS	6,000.00 mm	0 mm	4	28	7.060 MT	280MM_370MM

TDC NO : MSA_003L_0_1,31.08.2011,14.01.2015

Process Route : BF_EOF_LRF_VD_CCM_EMS_BM

Reduction Ratio : 7.00 / - 18.65 : 1

CHEMICAL ANALYSIS

Prod STD No : QDQA06_80

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	0.3800	0.150	0.600		0.020	0.900	0.150												0.0200		
MAX	0.4500	0.400	0.900	0.025	0.0350	1.200	0.300	0.200		0.030	0.300		0.030	0.0200	0.010		0.010	0.010	0.0450		
Actual	0.402	0.227	0.742	0.011	0.023	1.110	0.215	0.024	2	0.002	0.013	0.001	0.005	0.0032	0.001	0.002	0.001	0.002	0.025	7	0.794

Gas Levels : N ppm : [/ 100] -60

O ppm : [/ 20] -11.2

H ppm : [/ 2.00] -1.10

MECHANICAL PROPERTIES :

	Tensile Test (ASTM A370 - 16)				Hardness Test			Impact Test ()											
Cond.	Quenched & Tempered				Quenched & Tempered			Spec.											
Spec.	YS	UTS	Elong.	RA	As Rolled	As Quenched		As Q&T	Test Temp	Imp. Value (min)	1		2		3		Avg.		
	MPa	MPa	%	%		BHN		BHN											
Min	705.00	900.00	12.00	48.00		450		264											
Max		1,095.00						327											
Actual	767.000	978.000	22.000	56.000		463.0		283.0											

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)	59.50	55.50	47.00	40.50																

METALLURGICAL PROPERTIES & PHYSICAL INSPECTION

	Surface Inspection		Step Down Test		BFT Test		MPI Test		Segregation Test		Spark Test		Spectra Test		Metascope Test	
Actual							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			
				Thin	Thick	Thin	Thick	Thin	Thick	Thin	Thick					
Spec	5.0 / 8.0	/	/	2.0	1.0	2.0	1.0	0.5	0.5	1.0	1.0		3mm FBH			
Actual	7.00	0.400 mm		2.00	0.50	0.50	0.00	0.00	0.00	0.50	0.00		100% Pass			

Inclusion Rating Test Standard: ASTM E45 - 13, A

Grain Size Standard: ASTM E112 - 13

Decarb Standard: SAE J419_198312

Macro Etch Test Standard: ASTM E381 - 17

Banding Test Standard:

UT Standard:

JSW COLOR CODE : YELLOW

CUSTOMER COLOR CODE :

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)