

**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. : 206924

Customer Name: MM FORGINGS LIMITED

Cust. Address : BUDAKUDI VILLAGE

VIRALIMALAI, Tamil Nadu-621316, India

Date : 17.09.2017

SO No : 400677946

SO Date : 25.07.2017

Truck No.: TN61E5006

Po Number: 4500011614

Po date : 10.06.2017

Packing Slip No : 704935396

Invoice No : 7100195975

Heat No	Grade	Size (mm)	Length (mm)	ML (mm)	No. of Bundles	No. of PCS	Weight	Billet/Bloom Size
E69596	42CRMO4	75.0 mm RCS	6,000.00 mm	0 mm	3	32	7 570 MT	250MM 250MM

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 / - 11.25 : 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	0.416	0.248	0.750	0.010	0.024	1.090	0.205	0.025	2	0.002	0.020	0.001	0.005	0.0036	0.002	0.001	0.002	0.001	0.024	3	0.803

Gas Levels : N ppm : [ / 100 ] -46

O ppm : [ / 20 ] -11.2

H ppm : [ / 2.00 ] -1.22

**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	817.450	1022.140	18.000	53.100		510.0	292.0						

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)	60.00	54.70	47.00	42.70																

**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	0.450 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 - 01(2012)

Grain Size Standard: ASTM E112 - 13

Banding Test Standard:

Decarb Standard: SAE J419\_198312

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 &amp; QAD)