

USHA MARTIN LIMITED
(STRAIGHT BAR & WIRE MILL DIVISION)

P.O. GAMHARIA, DIST.-SARAIKELA KHARASWAN, JAMSHEDPUR-832108 JHARKHAND. PHONE 0657-3295772/773

QUALITY ASSURANCE TEST CERTIFICATE

Customer/SP	RAMKRISHNA FORGINGS LTD				PO No/ Date	Jan'17/		
TC No	50000001914	Tax Invoice No	9010006928	Quantity	7.850 MT	Rolling Input	150 X 150 mm	
Batch No.	B2593801,A01				+ 29.26 mt = 37.11 mt			
Heat No	B25938	Grade	EN353		Product	ROUND BAR FINISHED		
Spec code	RF/14/D-401/39C		Date	17-05-2016	Issue No: 0	Rev: 03	Condition	AS ROLLED
Prod Dt	17-JAN-2018	Nom Size	60.00 mm		Colour Code	WHITE + RED+GREEN		

CHEMICAL COMPOSITION														
Elements	%C	%Mn	%Si	%P	%S	%Cr	%Ni	%Cu	%Mo	%Al	%Pb	%V	%Ti	%Ca
Min.	0.16	0.80	0.15	-	0.020	0.80	1.00	-	0.100	0.020	-	-	-	-
Max.	0.20	1.00	0.35	0.035	0.035	1.20	1.20	-	0.150	-	-	-	-	-
Actual	0.17	0.95	0.22	0.013	0.028	1.18	1.08	-	0.140	0.028	-	-	-	-

OTHER ELEMENTS								CARBON	GAS LEVEL		
Elements	%Sn	%As	%Sb	%Nb	%B	%Te	%W	EQV	O2 PPM	H2 PPM	N2 PPM
Min.	-	-	-	-	-	-	-	-	-	-	-
Max.	-	-	-	-	-	-	-	-	20	2.0	80
Actual	-	-	-	-	-	-	-	-	14	1.5	69

MECHANICAL PROPERTIES							JOMINY HARDENABILITY (HRC)					
Requirement	Hardness BHN	Impact Strength (IZOD/CHARPY) (Joule)	Yield Strength (Kg/mm2)	UTS (Kg/mm2)	%E	%RA						
Min.	-	-	-	-	-	-	J-11 MM	J-13 MM				
Max.	250	-	-	-	-	-	Min.	36.0	36.0	-	-	-
Act. Min.	224.00	-	-	-	-	-	Max.	41.0	40.0	-	-	-
Act. Max.	229.00	-	-	-	-	-	Act.	39.0	37.0	-	-	-

METALLURGICAL PROPERTIES						INCLUSION RATING AS PER ASTM E-45							
Specification	Depth of Decarb (mm)	Macro Etch (ASTM E381)	Max. Depth of Surface Defect (mm)	Grain Size (ASTM E112)	Spheroidised (%)	A		B		C		D	
	-	-	-	5	-	T	H	T	H	T	H	T	H
Max.	-	C2R2S2	0.40	8	-	2	1	2	0	2	0	2	1
Actual	-	C2R1S1	NIL	6-7	-	1.5	0.5	1	0	0	0	1	0
Micro structure		Ferrite Pearlite											

Spark & Spectral Test/PMI	OK	MPI	100 % OK	Blue Fracture	NA	Hardness after Heat treatment of sample.	
Surface Inspection: (as per Spec.)	100% OK	Step Turn	No Streak	Cold Upset	NA	Requirement	
Ultrasonic Test:(as per Spec.)	100 % Satisfactory					Actual in BHN	

REDUCTION RATIO	7.95:1	PROCESS ROUTE	BF>EAF>LRF>VD>CCP>SBM				
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Remarks: DIMENSION : +0.70/-0.00 , OVALITY 0.58		
LENGTH OF BAR- 4.00 MTRS. TO 5.00 MTRS.	Test certificate meets TDC Results based on sample testing	USHA MARTIN LIMITED (USHA ALLOYS & STEELS DIVISION)
MATERIAL IS FREE FROM RADIOACTIVE ELEMENTS		

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