



F/QA/04

USHA MARTIN LIMITED
(USHA ALLOYS & STEEL DIVISION)

P.O. GAMHARIA, DIST.-SARAIKELA KHARASWAN, JAMSHEDPUR-832108 JHARKHAND. PHONE 0657-3982200

QUALITY ASSURANCE TEST CERTIFICATE

Customer/SP	RAMKRISHNA FORGINGS LTD				PO No/ Date	Dec'17/	
TC No	40000004841	Tax nvoice No	9000070833	Quantity	3.237 MT	Rolling Input	300 X 360 mm
Batch No.	C4032703						
Heat No	C40327	Grade	SCM420H		Product	ROUND BAR FINISHED	
Spec code	RF/14/D-401/99A	Date	19-05-2016	Issue No: 0	Rev: 03	Condition	HOT ROLLED
Prod Dt	06-JAN-2018	Nom Size	95.00 mm		Colour Code	BROWN	


CHEMICAL COMPOSITION														
Element	%C	%Mn	%Si	%P	%S	%Cr	%Ni	%Cu	%Mo	%Al	%Pb	%V	%Ti	%Ca
Min.	0.18	0.60	0.15	-	-	0.90	-	-	0.150	-	-	-	-	-
Max.	0.23	0.85	0.35	0.030	0.030	1.20	-	-	0.300	0.040	-	-	-	-
Actual	0.21	0.81	0.22	0.013	0.006	1.14	0.03	0.010	0.185	0.029	-	-	-	-

OTHER ELEMENTS								CARBON	GAS LEVEL		
Element	%Sn	%As	%Sb	%Nb	%B	%Te	%W	EQV	O2 PPM	H2 PPM	N2 PPM
Min.	-	-	-	-	-	-	-	-	-	-	-
Max.	-	-	-	-	-	-	-	-	20	2.0	90
Actual	-	-	-	-	-	-	-	-	16	1.5	74

MECHANICAL PROPERTIES							JOMINY HARDENABILITY (HRC)					
Requirement	Hardness BHN	Impact Strength (IZOD/CHARPY) (Joule)	Yield Strength (Kg/mm2)	UTS (Kg/mm2)	%E	%RA						
Min.	-	-	-	-	-	-	J-5 MM	J-9 MM	J-13 MM			
Max.	250	-	-	-	-	-	Min.	41.0	33.0	29.0	-	-
Act.Min.	180	-	-	-	-	-	Max.	47.0	38.0	35.0	-	-
Act.Max.	185	-	-	-	-	-	Act.	46.0	37.0	34.0	-	-

METALLURGICAL PROPERTIES						INCLUSION RATING AS PER ASTM E-45							
Specific ation	Depth of Decarb (mm)	Macro Etch (ASTM E381)	Max. Depth of Surface Defect(mm)	Grain Size (ASTM E112)	Spheroidised (%)	A		B		C		D	
Min	-	-	-	6	-	T	H	T	H	T	H	T	H
Max	0.50	C2R2S2	-	8	-	2.5	1.0	2.0	0.5	2.0	0.5	2.0	0.5
Actual	0.23	C2R1S1	-	7-8	-	1.5	0.5	1	0	0	0	1	0
Micro structure		Ferrite Pearlite Bainite											

Spark & Spectral Test/PMI	100%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	15.24 : 1	PROCESS ROUTE	BF>EAF>LRF>VD>CCP>BM		
Remarks: SIZE TOLERANCE -- (+1.00) (-0.0), OUT OF ROUNDNESS --0.70,					
LENGTH OF BAR :- 3.0 TO 6.0MTRS		Test certificate meets TDC Results based on sample testing	<div> USHA MARTIN LIMITED (USHA ALLOYS & STEELS DIVISION)</div>		
MATERIAL IS FREE FROM RADIOACTIVE ELEMENTS					
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