

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					PO No/ Date	4718007177/04.12.2017		
TC No	50000001862	Tax nvoice No	9010006778	Quantity	24.320 MT	Rolling Input	150 X 150 mm	
Batch No.	B2574901							
Heat No	B25749	Grade	16MNCR5H		Product	ROUND BAR FINISHED		
Spec code	MAIL/SADHU/16MNCR5H		Date	07-12-2016	Issue No: 0	Rev: 0	Condition	AS ROLLED
Prodt Dt	07-JAN-2018	Nom Size	56.00 mm		Colour Code	BLUE+BLACK DOT		

CHEMICAL COMPOSITION

Elements	%C	%Mn	%Si	%P	%S	%Cr	%Ni	%Cu	%Mo	%Al	%Pb	%V	%Ti	%Ca
Min.	0.14	1.00	0.15	-	0.020	0.80	-	-	-	0.020	-	-	-	-
Max.	0.19	1.30	0.35	0.035	0.035	1.10	0.30	0.25	0.050	0.060	-	-	-	-
Actual	0.17	1.23	0.23	0.011	0.022	1.09	0.01	0.02	0.024	0.023	-	-	-	-

OTHER ELEMENTS

Elements	%Sn	%As	%Sb	%Nb	%B	%Te	%W	CARBON	GAS LEVEL		
								EQV	O2 PPM	H2 PPM	N2 PPM
Min.	-	-	-	-	-	-	-	-	-	-	70
Max.	-	-	-	-	-	-	-	-	20	2.0	100
Actual	-	-	-	-	-	-	-	-	15	1.6	82


MECHANICAL PROPERTIES

Requirement	Hardness BHN	Impact Strength (IZOD/CHARPY) (Joule)	Yield Strength (Kg/mm2)	UTS (Kg/mm2)	%E	%RA	JOMINY HARDENABILITY (HRC)				
Min.	-	-	-	-	-	-	J-10 MM	-	-	-	-
Max.	250	-	-	-	-	-	Min.	30.0	-	-	-
Act.Min.	154.00	-	-	-	-	-	Max.	34.0	-	-	-
Act.Max.	160.00	-	-	-	-	-	Act.	31.0	-	-	-

METALLURGICAL PROPERTIES

Specific ation	Depth of Decarb (mm)	Macro Etch (ASTM E381)	Max. Depth of Surface Defect(mm)	Grain Size (ASTM E112)	Spherodised (%)	INCLUSION RATING AS PER ASTM E-45							
						A		B		C		D	
						T	H	T	H	T	H	T	H
	-	-	-	5	-	-	-	-	-	-	-	-	-
Max	-	C2R2S2	0.50	8	-	2.5	1.0	2.0	0	2.0	0	2.0	0
Actual	-	C2R1S1	NIL	7-8	-	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	9.13 : 1	PROCESS ROUTE	BF>EAF>LRF>VD>CCP>SBM		
Remarks: DIMENTION : +0.50/-0.00 ; OVALITY : 0.25					
LENGTH OF BAR- 5.00 MTRS. TO 6.00 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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