

**GERDAU****GERDAU STEEL INDIA PVT LIMITED**

PLANT: TADIPATRI. DIST.: ANANTPUR. A.P.: 515411

TEST CERTIFICATE

F/QA-TC/12 Rev. 01

TC No : 2018/00100633	Invoice No. : ST2018000784	Quantity : 20.954 t	Rolling Input : 160X160 mm
Customer : GERDAU STEEL INDIA PVT. LTD	S.O. No. / Date : 56360		
PROCESS ROUTE :- BF>>BOF>>LRF>>VD>>CCM(EMS+AMLC)>>RM	Size : 40 Dia	Truck No.: AP02W 4986	
Heat No:- 37628	Product : Rolled Bar	Colour Code:	WHITE/GREEN
NO OF BUNDLES: 8 NO OF BARS: 351	Grade :- 16MNCR5		
TAS No. : 2738/2017	TDC No :- MGP/TDC/LB-HT/22 as dated @ 17.04.2017	Condition :As Rolled	Reduction Ratio: 20.37 :1

CHEMICAL COMPOSITION

Element	%C	%Mn	%Si	%P	%S	%Cr	%Ni	%Cu	%Mo	%Al	%Pb	%V	%Ti	%Ca
Min.	0.17	1.10	0.15	-	0.015	1.00	-	-	-	0.015	-	-	-	-
Max.	0.19	1.30	0.40	0.035	0.035	1.10	-	-	-	0.040	-	-	-	-
Actual	0.17	1.19	0.26	0.026	0.018	1.05	-	-	-	0.023	-	-	-	-
OTHER ELEMENTS														
Element	%B	%Nb	%As	%Sb	%Sn	%W	%Bi	GAS LEVEL						
								O ₂ PPM	H ₂ PPM	N ₂ PPM				
Min.	-	-	-	-	-	-	-	Min	-	-	-	-	-	-
Max.	-	-	-	-	-	-	-	Max	20	2	90	-	-	-
Actual	-	-	-	-	-	-	-	Actual	16	0.6	65	-	-	-

MECHANICAL PROPERTIES

Requirement	Hardness (BHN)	Impact Strength (IZOD/CHARPY) ft lbs	Yield Strength (N/mm ²)	UTS (N/mm ²)	%Elong.	%RA	JOMINY HARDENABILITY (HRC)					
							J4/16"					
Min.	152	-	25	885	1130	8	Min.	34	-	-	-	-
Max.	201	-	-	-	1420	-	Max.	39	-	-	-	-
Actual	167	-	27.5	924	1186	11	Actual	35.5	-	-	-	-

METALLURGICAL PROPERTIES

Require-ment	Depth of Decarb (mm) (SAE J419 TYPE III)	Macro Etch (ASTM E 381)	Max. Depth of Surface Defect (mm)	Grain Size (ASTM E 112)
Min.	-	-	-	5
Max.	1 % dia	C2R2S2	-	7
Actual	0.21	C1R1S1	-	6.5-7

INCLUSION RATING AS PER ASTM E45 (METHOD A)

A		B		C		D	
T	H	T	H	T	H	T	H
Min.	-	-	-	-	-	-	-
Max.	2.0	1.5	1.5	1.0	0.5	1.5	1.0
Actual	2.0	0.5	1.0	-	-	1.0	0.5

Spark & Spectral Test:	100% OK
Surface Inspection:	100% OK
Ultrasonic Test:	100% OK
MPI:	-

Other Tests:	-
1. MFL:	100% OK
2. Step Turn:	OK
3. Blue Fracture:	-
4. Upset Test:	-

Oil Quenched Core Hardness:

Min. in HRC	-	-
Actual in HRC	-	-

Remarks : Microstructure : Pearlite + Ferrite, Ultrasonic Test: 0.8x15 mm, SDH, MFL: 0.3x10 mm, Material is Free from harmful Banding, Mechanical Properties at QT

Length of Bar :- 6000mm

"We certify that the contents of this report are correct & accurate & meet the requirements of the purchase order, technical delivery conditions, general steel requirements & the material certification requirements". Supplied material is free from radioactive element.

Technical Service 04.05.2018

Corporate Office: 304/305 World Trade Centre, Brigade Gateway Complex, Malleswaram (West), Bangalore, 560046, India

Please contact in case of query e-mail id: inml.techservice@gerdau.com