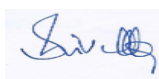
 <b>GERDAU STEEL INDIA PVT LIMITED</b>																										
PLANT: TADIPATRI. DIST.: ANANTPUR. A.P.: 515411																										
<b>TEST CERTIFICATE</b>										F/QA-TC/12 Rev. 01																
TC No : 2018/00095017					Invoice No. :					Quantity : t		Rolling Input : 160X160 mm														
Customer : Sample TC										S.O. No. / Date :																
PROCESS ROUTE :- BF>>BOF>>LRF>>VD>>CCM(EMS & AMLC)>>RM										Size : 38 Dia			Truck No.:													
Heat No:- 35319										Product : Rolled Bar		Colour Code: PURPLE BASE/WHITE DOT														
NO OF BUNDLES: NO OF BARS:					Grade :- 16MNCR5																					
TAS No. :2280/2016					TDC No :- MAC-TS-043B, Rev: 00, Dated: 20.04.2017					Condition :As Rolled		Reduction Ratio: 22.57:1														
<b>CHEMICAL COMPOSITION</b>																										
Element	%C	%Mn	%Si	%P	%S	%Cr	%Ni	%Cu	%Mo	%Al	%Pb	%V	%Ti	%Ca												
Min.	0.14	1.00	-	-	-	0.80	-	-	-	-	-	-	-	-												
Max.	0.19	1.30	0.40	0.035	0.035	1.10	-	-	-	0.040	-	-	-	-												
Actual	0.16	1.11	0.27	0.020	0.016	0.98	-	-	-	0.021	-	-	-	-												
<b>OTHER ELEMENTS</b>										<b>GAS LEVEL</b>																
Element	%B	%Nb	%As	%Sb	%Sn	%W	%Bi			O <sub>2</sub> PPM	H <sub>2</sub> PPM	N <sub>2</sub> PPM														
Min.	-	-	-	-	-	-	-			Min	-	-	-													
Max.	-	-	-	-	-	-	-			Max	20	2	100													
Actual	-	-	-	-	-	-	-			Actual	16	0.9	75													
<b>MECHANICAL PROPERTIES</b>																										
Requirement	Hardness (BHN)	Impact Strength (IZOD/CHARPY)	Yield Strength (N/mm <sup>2</sup> )	UTS (N/mm <sup>2</sup> )	%Elong.	%RA	<b>JOMINY HARDENABILITY ( HRC )</b>																			
							J1/16"	J3/16"	J4/16"	-	-	-														
Min.	-	-	-	600	800	9	35	Min.	-	-	30	-	-	-												
Max.	240	-	-	-	1100	-	-	Max.	42	-	34	-	-	-												
Actual	163	-	-	794	1041	12.5	38.5	Actual	41.4	33.8	30.7	-	-	-												
<b>METALLURGICAL PROPERTIES</b>																										
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)	<b>INCLUSION RATING AS PER ASTM E45 (METHOD A)</b>																					
					A		B		C		D															
					T	H	T	H	T	H	T	H														
Min.	-	-	-	6	Min	-	-	-	-	-	-	-	-	-												
Max.	1% of dia max	-	-	8	Max	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5													
Actual	0.21	C1R1S1	-	6.5-7.5	Actual	1.5	0.5	1.0	-	-	-	1.0	0.5													
<table border="1"> <tr> <td>Spark &amp; Spectral Test:</td> <td>100% OK</td> <td rowspan="5"> <b>Other Tests:</b>            1. MFL: 100% OK            2. Step Turn: Found Satisfactory            3. Blue Fracture: -            4. Upset Test: -         </td> <td rowspan="5">           Oil Quenched Core Hardness:             Min. in HRC -            Actual in HRC -         </td> </tr> <tr> <td>Surface Inspection:</td> <td>100% OK</td> </tr> <tr> <td>Ultrasonic Test:</td> <td>100% OK</td> </tr> <tr> <td>MPI:</td> <td>-</td> </tr> <tr> <td></td> <td></td> </tr> </table>															Spark & Spectral Test:	100% OK	<b>Other Tests:</b> 1. MFL: 100% OK 2. Step Turn: Found Satisfactory 3. Blue Fracture: - 4. Upset Test: -	Oil Quenched Core Hardness:  Min. in HRC - Actual in HRC -	Surface Inspection:	100% OK	Ultrasonic Test:	100% OK	MPI:	-		
Spark & Spectral Test:	100% OK	<b>Other Tests:</b> 1. MFL: 100% OK 2. Step Turn: Found Satisfactory 3. Blue Fracture: - 4. Upset Test: -	Oil Quenched Core Hardness:  Min. in HRC - Actual in HRC -																							
Surface Inspection:	100% OK																									
Ultrasonic Test:	100% OK																									
MPI:	-																									
Remarks	Microstructure : Pearlite + Ferrite Mechanical Properties is in H&T condition.																									
Length of Bar :-	"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.																									
<div style="text-align: right;">             Technical Service 29.01.2018         </div>																										
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																										