



# GERDAU STEEL INDIA PVT LIMITED

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

## TEST CERTIFICATE

F/QA-TC/12 Rev. 01

TC No : 2017/00089909	Invoice No. : ST2017003757	Quantity : 14.687 t	Rolling Input : 160X160 mm
Customer : GERDAU STEEL INDIA PVT. LTD.	S.O. No. / Date : 49301	Truck No.: AP04TW 2345	
PROCESS ROUTE :- BF>>BOF>>LRF>>VD>>CCM(EMS+AMLC)>>RM	Size : 36 Dia	Product : Rolled Bar	Colour Code: HALF GREEN/WHITE
Heat No:- 32965	Grade :- 16MNCr5H	Condition : As Rolled	Reduction Ratio: 25.15 :1
NO OF BUNDLES: 6 NO OF BARS: 304	TDC No :- VEPL_Steel_16MnCr5H_Rev00 dated 25.08.2007		
TAS No. : 2747/2017			

### CHEMICAL COMPOSITION

Element	%C	%Mn	%Si	%P	%S	%Cr	%Ni	%Cu	%Mo	%Al	%Pb	%V	%Ti	%Nb
Min.	0.15	1.00	-	-	-	0.80	-	-	-	0.020	-	-	-	-
Max.	0.19	1.30	0.25	0.035	0.035	1.10	0.20	0.25	0.15	0.040	-	-	-	-
Actual	0.17	1.04	0.22	0.012	0.012	0.86	0.02	0.02	0.01	0.020	-	-	-	-
OTHER ELEMENTS														
Element	%B	%Nb	%As	%Sb	%Sn	%W	%Bi	GAS LEVEL						
Min.	-	-	-	-	-	-	-	O <sub>2</sub> PPM	H <sub>2</sub> PPM	N <sub>2</sub> P				
Max.	-	-	0.03	-	0.025	-	-	Min	-	-	-	-	-	-
Actual	-	-	0.00	-	0.00	-	-	Max	30	2.5	10			
								Actual	16	0.8	7			

### MECHANICAL PROPERTIES

Requirement	Hardness (BHN)	Impact Strength (IZOD/CHARPY)	Yield Strength (N/mm <sup>2</sup> )	UTS (N/mm <sup>2</sup> )	%Elong.	%RA	JOMINY HARDENABILITY (HRC)						
Min.	-	-	350	510	20	60	J3 mm	-	-	-	-	-	-
Max.	220	-	-	-	-	-	Min.	38	-	-	-	-	-
Actual	166	-	394	589	33	66	Max.	42	-	-	-	-	-
							Actual	41.6	-	-	-	-	-

### METALLURGICAL PROPERTIES

Requirement	Depth of Decarb (mm) (SAE J419 TYPE III)	Macro Etch (ASTM E 381)	Max. Depth of Surface Defect (mm)	Grain Size (ASTM E 112)	INCLUSION RATING AS PER ASTM E45 (METHOD A)							
Min.	-	-	-	6	A	B	C	D				
Max.	1 % dia	C2R2S2	-	8	T	H	T	H	T	H	T	H
Actual	0.21	C1R1S1	-	6.5-7	Min	-	-	-	-	-	-	-
					Max	2.0	0.5	2.0	0.5	1.0	0.5	2.0
					Actual	1.0	-	1.0	-	-	-	1.0

Spark & Spectral Test:	100% OK	Other Tests:	-	Oil Quenched Core Hardness:	
Surface Inspection:	100% OK	1. MFL:	100% OK	Min. in HRC	-
Ultrasonic Test:	100% OK	2. Step Turn:	OK	Actual in HRC	-
MPL:		3. Blue Fracture:	-		
		4. Upset Test:	-		

Remarks: Microstructure : Pearlite + Ferrite

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 13/11/2017
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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

139





M/S. ANISH FORGE PVT. LTD.

Doc No : ML/JHT/01

## Jominy Hardness Test Report

CUSTOMER

M/S. VECVL LTD , DEWAS .

Metallurgical Lab

Jominy Pin No. : 2

Rev No : 00

Material Grade &amp; Section

16MnCr5 / Ø 36

Heat No

32965

HEAT CODE

AA2

Distance (mm)

Side A Hardness (HRC)

Side B Hardness (HRC)

3

41

40

6.35

32

31

8

28

29

10

27

27

12

25

24

14

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APPROVED BY