



R. L. STEELS & ENERGY LTD.

Regd. Office: Gut No. 78 to 81, Pangra Shiver Chitengaon, Paithan Road, Aurangabad - 431 107
Maharashtra, India. Phone : 02431-661231, 251163 Fax : 02431-251879
E-mail : qc@rlsteels.com, Website : www.rlsteels.com

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TEST CERTIFICATE

Customer: M/S VARDHAMAN PRECISION WORKS

K-78, MIDC WALUJ, AURANGABAD.

General Information & Material Details

TC NO.	Date	Invoice No.	Date	Truck No.	No. of Bund./ Pcs	Quantity in MT	Length	Supply Condition	Colour code
19-2089	13-08-2019	RLS19-20-SI-1790	13-08-2019	MH 21 8947	1 Bdis	2.940	5.0 TO 6.0 MTR	AS ROLLED	GREEN+RED+ WHITE+GREEN
Process Route		Heat No.	Grade	As Cast Size		Product Size		Reduction Ratio	Customer TDC
EAF/LRF/VD/CCM with MEMS & AMLC Rolling		2-FQT-3	16MnCr5	130X130		30DIA		23.92:1	TDC for RM 16MnCr5, Rev no: 00, date: 15.06.2019

Chemical Composition & Tramp Elements

Element	%C	%Si	%Mn	%P	%S	%Cr	%Mo	%Ni	%Cu	%V	%Al	%Ti	%B	%Ca	%As
Min.	0.14	-	1.00	-	-	0.80	-	-	-	-	-	-	-	-	-
Max.	0.19	0.40	1.30	0.025	0.035	1.10	-	-	-	-	-	-	-	-	-
Actual	0.175	0.30	1.04	0.022	0.022	0.93	0.008	0.047	-	-	0.024	-	-	-	-

Tramp Elements (Contd.) & DI / CE

Element	%Sn	%Pb	%Sb	CE	DI Value	Gas Analysis.				Dimension Tolerance	
						Gas (PPM)	O2	H2	N2	Specification	Actual
Min	-	-	-	-	-		Min	-	-	As per IS 3739, Grade -1	OK
Max	-	-	-	-	-		Max	20.00	2.00		
Actual	-	-	-	-	-		Actual	15.00	1.20		

Mechanical Properties

Test Code	Hardness As Rolled (BHN)	Hardness (H&T Condition) (BHN)	TEST CONDITION : H & T Condition				Impact Values (Joules)		Macrostructure As per ASTM E-381	Microstructure
			YS (Mpa)	UTS (Mpa)	%El.	%RA	Izod	Charpy		
Spec.	160-240	-	800 Min.	1050 Min.	7 Min.	-	-	-	Better Than C2R2S2	-
Actual Value	170-178	-	970.45	1088.56	12.00	-	-	-	C2R2S2	Ferrite + Pearlite

Metallurgical Properties

Test Code	Decarburisation SAE J419 (mm)	Grain Size as per ASTM E112	Inclusion Rating (As per IS 4163/ ASTM-E45A)					Other Test Results				
			Series	A	B	C	D	Magnetic Particle Inspection Test (100% Bars)	UT Test (100% Bars)	Spark/Spectral Test (100% Bars)	Upset Test	Step Down Test
Spec.	-	5.0 / 8.0	T / H	2.0 / 1.0	2.0 / 1.0	0.5 / 0.5	2.0 / 1.5	-	-	-	-	As per IS 4075
Actual Value	0.18 mm	6.5 / 7.0	T / H	1.0 / 0.5	0.5 / 0.0	0.0 / 0.0	1.5 / 0.5	OK	OK	OK	OK	OK

Hardenability Test Result

Jominy Distance (mm/inch)	J 1/16"	J 1/8"	J 3/16"	J 1/4"	J 5/16"	J 3/8"	J 1/2"	J 5/8"	J 3/4"	J 7/8"	J 1"
Spec (HRC)	42 Max.	30-34									
Actual Hardness (HRC)	42.00	33.00									

Remarks : Material is conforming to the customer specification

DECLARATION : TEST RESULTS ARE BASED ON ACTUAL TESTS CARRIED OUT ON SAMPLES DRAWN AS PER QUALITY ASSURANCE PLAN. TEST CERTIFICATE CONFORMS TO THE CUSTOMER TDC.

For R.L. Steels & Energy Ltd.





S. N. METALLURGICAL SERVICES

A Complete Materials Testing Lab & Heat Treatment Shop

AN ISO 9001 : 2015 COMPANY
NABL Accredited Laboratory

Plot No.B-70, M.I.D.C. Area,
Waluj, Behind BKT Tyres,
Aurangabad - 431 136. (M.S.)
(Fact.: 2555253, 2244530
Cell : 9823134922
e-mail : shyamchoudhari@rediffmail.com
website : www.snmet.com

FM/SNM/07

Date: 14/08/2019

Lab Ref.No.: L-10207



To,

M/s. Vardhaman Precision Works K

Plot No. K - 78,

MIDC, Waluj

Aurangabad-431136

Your Reference Ch No 780 DT 14/08/2019

Part Name : Steel Bar Dia 30.0mm Sample

Part Code : Heat Code C 4

Lot Desc : Heat No 2-FQT-3

Supplier :

Test Results:

Sr. No.	Test Conducted	Observations	Specified for 16MnCr5 H grade		
1	Chemical Analysis				
	% C	0.17	0.16 - 0.19		
	% Mn	1.06	1.00 - 1.30		
	% Cr 0	0.91	0.80 - 1.10		
	% Ni	0.04	---		
	% Mo	0.023	---		
	% S	0.023	0.015 - 0.035		
	% P	0.017	0.035 max		
	% Si	0.18	0.25 max		
	%Al	0.026	0.015 - 0.035		
2	Inclusion Test	The inclusion level is as follows :			
Sr.N o.	Type--- Size of Inclusion as Per ASTM	A Type (Sulphide Inclusion)	B Type (Alumina Inclusion)	C Type (Silicate Inclusion)	D Type (Oxide Inclusion)
1	Thin	0.5	1.0	0.5	1.5
2	Thick	Nil	0.5	0.5	1.0

Remarks : The checked parameters of given sample conforms to 16MnCr5H grade , as per DIN 17210 : 1969 , Inclusion findings are as above.

JOSLAV

For S N Metallurgical Services
Proprietor



JOMINY REPORT

Date 19.8.19

SHREE RAM ENTERPRISES

Off- Shivaji Nagar, C-43/14, Aurangabad.

Work Off- Dinde Udyog D 51/78, MIDC, Waluj, Aurangabad.

Tel: +91 9371724838

GSTIN: 27BIBPS1719Q1ZP

SR NO	081960												
PARTY NAME	Vardhaman Precision	K78											
TC REORT NO	19-2089												
BAR DIA	Φ30.0mm												
HEAT CODE	e-4												
CHALN NO /DATE	805/18/8												
HEAT NO	2F87-3												
MATERIAL GRADE	16MnGr5P												
Mill t c Name	R.L. Steels & Energy Ltd												
PROCEDURE													
TEMPRUTARE	860 DEC CC												
TIME (LOAD)	16.00 Am												
TIME (UNLOAD)	11.00 Am												
WATER QUANTCHING	30 MIN												
JOMINY HARNABILITY IN HRC													
INCH	1	51/16	54/16										
MIN		30	30										
MAX		42	34										
ACTUAL		42	30										
REMARK		OK											
CUSTOMER SIGN													
CHECKED BY													