

Steel Certificate of Test

1835 Dueber Ave. S.W.
Canton, Ohio 44706
ID #0551027-1



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Customer Order: 18934-A (2261923) Customer Part Number: Y7829
Mill Order: 18934-A (2261923) Heat Number(s): Y7829

Description of Material

DIAMETER: 7.000 in (177.800 mm)
Shape: RD
Prod Type: BAR
Sales Type: 1517VCbCa2
Int Quality: VACUUM DEGAS
Condition: HOT ROLL - NORMALIZE - STRAIGHTEN

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- LF2-HN Rev. 4 09/04/2013 EXCEPT AS NOTED
- ASME SA-350/SA-350M Rev. 2019 EDITION GRADE LF-2 CLASS 1 FOR CHEMISTRY AND PROPERTIES ONLY
- ASTM A 105 / A 105M Rev. 21 01/01/2021 FOR CHEMISTRY & MECHANICAL PROPERTIES ONLY
- ASME SA-105/SA-105M Rev. 2019 EDITION FOR CHEMISTRY & MECHANICAL PROPERTIES ONLY
- ASTM A 675 / A 675M Rev. 14 (REAPPROVED 2019) 09/01/2019 GRADE 70 FOR CHEMISTRY AND PROPERTIES ONLY
- ASME SA-675/SA-675M Rev. 2019 EDITION GRADE 70 FOR CHEMISTRY AND PROPERTIES ONLY
- ASTM A 696 Rev. 17 11/01/2017 GRADE C FOR CHEMISTRY AND PROPERTIES ONLY
- ASME SA-696 Rev. 2019 EDITION GRADE C FOR CHEMISTRY AND PROPERTIES ONLY
- CAMERON MR-005 Rev. D1 01/03/1989 EXCEPT AS NOTED
- EUROPEAN STANDARD EN 10204 12/17/2004 TYPE 3.1 INSPECTION CERTIFICATE
- ASTM A 370 Rev. 20 09/01/2020
- NACE NACE MR0175/ISO 15156 PARTS 1-3 Rev. 2015 11/23/2015
- NACE MR0103 / ISO 17495 Rev. 2015 11/23/2015
- ASTM A 350 / A 350M Rev. 18 05/01/2018 GRADE LF-2 CLASS 1 FOR CHEMISTRY AND PROPERTIES ONLY
- ASTM A 961 / A 961M Rev. 20 07/01/2020 AS APPLICABLE TO RAW MATERIAL - EXCEPT AS NOTED
- ASTM A 29 / A 29M Rev. 20 07/01/2020 EXCEPT AS NOTED

Chemistry Information

	%C	%Mn	%P	%S	%Si	%Cr	%Ni	%Mo	%Cu	%Al	%V	%Cb	%N
SPEC Ladle Min:	.15	.90			.15						.020	.010	.0150
SPEC Ladle Max:	.19	1.23	.030	.010	.30	.15	.15	.05	.25	.060	.030	.020	.0200
Y7829 Ladle:	.18	1.19	.008	.008	.26	.07	.06	.02	.15	.011	.023	.014	.0163

Testing of elements performed at TimkenSteel Chemistry Labs except where noted.

Metallurgy Information

SPEC: Chemistry CR+MO 0.319 Max CR+NI+MO+CU+V 0.999 Max
Heat Y7829 CR+MO: 0.090 CR+NI+MO+CU+V: 0.323
SPEC: Chemistry CE ASTM C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15 0.45 Max
Heat Y7829 CE ASTM C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15: 0.42

When shipping document is attached it becomes part of this certification.

We certify the above materials have been inspected and tested in accordance with the methods prescribed in the governing specifications and consistent with our Standard Commercial Terms and Conditions for Sale, Manufacture, and Shipping, which are incorporated into and made part of this certification. The results of such inspections and tests conform with the applicable requirements including the purchase order, specification(s) and exception(s). This certificate or report shall not be reproduced except in full, without the written approval of TimkenSteel Corporation.

Notarized: _____ by *Lisa Bucklew*
NOTARY PUBLIC Lisa Bucklew, METALLOGRAPHER

TimkenSteel Corporation

ANS

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Mill Order: Heat Number(s):

Metallurgy Information

SPEC: Grain Size SIZE 5/FINER
Heat Y7829 SIZE: 7

SPEC: Hardness ASTM E10 UOM BRINELL HARDNESS 180 Max LOCATION MID FREQUENCY PER CUST SAMPLE PLAN

Heat	Piece#	1	UOM
Y7829	3505040	HARDNESS 158	BRINELL
	3505040	LOCATION MID	BRINELL
	3505041	HARDNESS 158	BRINELL
	3505041	LOCATION MID	BRINELL

SPEC: Impacts ASTM E23 DIRECTION LONGITUDINAL ENERGY AVERAGE 25 Min ENERGY INDIVIDUAL 15 Min
ENERGY UOM FT-LBS EXPANSION UOM IN LOCATION MID TEMPERATURE -50 TEMPERATURE SCALE F TYPE
CHARPY SPECIMEN SIZE FULL

Heat	Piece#	Temp	FT-LBS			Shear %			Lateral Expansion IN			Direction	Location	Type	Specimen Size	
			1	2	3	Avg.	1	2	3	1	2					3
Y7829	3505038	-50 F	41	53	43	46	35	35	35	.030	.042	.031	LONG.	MID	CHARPY FULL	
	3505039	-50 F	57	98	96	84	50	75	75	.038	.061	.063	LONG.	MID	CHARPY FULL	

8MM RADIUS STRIKER USED FOR IMPACT TESTING

SPEC: Tensile ASTM E8 TENSILE 70,000 Min 85,000 Max STRENGTH UOM PSI YIELD .2 40,000 Min MIN
ELONGATION 22.0 Min GAUGE LENGTH 2 IN MIN REDUCTION IN AREA 30.0 Min SPECIMEN SIZE .505"
SHAPE ROUND DIRECTION LONGITUDINAL TEMPERATURE ROOM LOCATION MID

Heat	Piece#	Tensile		.2% Yld		Gauge		%Red	Specimen	Direction	Temp	Location
		Strength	UOM	Strength	Elong	Length	Length					
Y7829	3505038	75,956	PSI	51,961	30.1	2 IN	62.3	.505"	RD	LONG.	RT	MID
	3505039	76,602	PSI	54,658	30.4	2 IN	64.0	.505"	RD	LONG.	RT	MID

All Hardness and Tensile testing performed at TimkenSteel Metallurgical Lab except where noted.

Heat Treatment

Heat: Y7829 Lot: 1
NORMALIZED - 1330 F - 3.02 hour(s)

Heat Y7829 Melt Source: USA
Manufacturing: USA
Heat Y7829 - Strand Cast Process
REDUCTION RATIO - 11.2:1

TimkenSteel certifies that there is no mercury or radio-active material used in the melting or processing.

Material melted and produced in the USA

MATERIAL WAS ELECTRIC FURNACE MELTED, VACUUM DEGASSED AND LADLE REFINED

No welding of this material has occurred.

In reference to Section 1502 ("Conflict Minerals") of the Dodd-Frank Wall Street Reform and Consumer Protection Act, no tantalum, tin, tungsten or gold was intentionally added to this material.