

Steel Certificate of Test

1835 Daeber Ave. S.W.
Canton, Ohio 44706
ID #0523383-1



9/17/2020

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Customer Order: Customer Part Number:
Mill Order: 12974-A (2223500) Heat Number(s): Y0768

Description of Material

DIAMETER: 6.000 in (152.400 mm)
Shape: RD
Prod Type: BAR
Sales Type: 1517VCbCa2
Int Quality: VACUUM DEGAS
Condition: HOT ROLL - NORMALIZE - STRAIGHTEN

- ASME SA-350/SA-350M Rev. 2017 EDITION EXCEPT AS NOTED - GRADE LF-2 CLASS 1 FOR CHEMISTRY AND PROPERTIES ONLY
- ASTM A 105 / A 105M Rev. 18 09/01/2018 EXCEPT AS NOTED - FOR CHEMISTRY & MECHANICAL PROPERTIES ONLY
- ASME SA-105/SA-105M Rev. 2019 EDITION EXCEPT AS NOTED - FOR CHEMISTRY & MECHANICAL PROPERTIES ONLY
- ASTM A 675 / A 675M Rev. 14 05/01/2014 EXCEPT AS NOTED - GRADE 70 FOR CHEMISTRY AND PROPERTIES ONLY
- ASME SA-675/SA-675M Rev. 2017 EDITION EXCEPT AS NOTED - GRADE 70 FOR CHEMISTRY AND PROPERTIES ONLY
- ASTM A 696 Rev. 17 11/01/2017 GRADE C FOR CHEMISTRY & MECHANICAL PROPERTIES ONLY
- ASME SA-696 Rev. 2017 EDITION GRADE C FOR CHEMISTRY & MECHANICAL PROPERTIES ONLY
- CAMERON MR-005 Rev. D1 01/03/1989 EXCEPT AS NOTED
- EUROPEAN STANDARD EN 10204 12/17/2004 EXCEPT AS NOTED - TYPE 3.1 INSPECTION CERTIFICATE
- ASTM A 29 / A 29M Rev. 16 02/02/2017 EXCEPT AS NOTED
- ASTM A 370 Rev. 19e1 09/01/2019
- NACE MR0103 / ISO 17495 Rev. 2015 11/23/2015
- NACE MR0175/ISO 15156 PARTS 1-3 Rev. 2015 11/23/2015
- ASTM A 350 / A 350M Rev. 18 05/01/2018 EXCEPT AS NOTED - GRADE LF-2 CLASS 1 FOR CHEMISTRY AND PROPERTIES ONLY
- ASTM A 961 / A 961M Rev. 19 03/01/2019 AS APPLICABLE TO RAW MATERIAL - 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
Y0768 Ladle:	.18	1.15	.006	.006	.24	.05	.10	.03	.13	.034	.022	.014	.0156

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 Y0768 CR+MO: 0.080 CR+NI+MO+CU+V: 0.332
SPEC: Chemistry CE ASTM C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15 0.45 Max
Heat Y0768 CE ASTM C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15: 0.41

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 Vinicius Silva
NOTARY PUBLIC Vinicius Silva, METALLOGRAPHER

TimkenSteel Corporation

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Customer Order:
 Mill Order:
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Metallurgy Information

SPEC: Grain Size SIZE 5/FINER
Heat Y0768 SIZE: 7

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

Heat	Piece#	1	UOM
Y0768	3348829	HARDNESS 158	BRINELL
	3348829	LOCATION MID	BRINELL
	3348922	HARDNESS 151	BRINELL
	3348922	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
Y0768	3348828	-50 F	88	78	54	73	50	50	55	.062	.058	.044	LONG.	MID	CHARPY FULL	
	3348921	-50 F	47	39	67	51	50	50	55	.056	.054	.070	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 Strength UOM	.2% Yld Strength UOM	Elong% Gauge	%Red	Specimen	Direction	Temp	Location
Y0768	3348828	76,228 PSI	53,031	31.8	2 IN	64.9	.505" RD	LONG.	RT MID
	3348921	75,838 PSI	50,696	31.8	2 IN	63.3	.505" RD	LONG.	RT MID

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

Heat Treatment

Heat: Y0768 Lot: 1
NORMALIZED - 1675 F - 3.34 hour(s)

Heat Y0768 Melt Source: USA
Manufacturing: USA
Heat Y0768 - Bottom Pour Ingot Cast Process
REDUCTION RATIO - 27.7:1

Material melted and produced in the USA

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

No welding of this material has occurred.

MATERIAL WAS ELECTRIC FURNACE MELTED, VACUUM DEGASSED AND LADLE REFINED

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.

TimkenSteel Corporation

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