McMASTER-CARR®

Certificate

330-995-5500
330-995-9600 (fax)
cle.sales@mcmaster.com

Purchase Order	Order Date	Placed By	McMaster-Carr Number	Number of Certificates
P1482146	5/25/2023	Jane Beattey	3546335-01	1

Line		Product	Ordered	Status	Certificate
2	4437T21	High-Strength 4340 Alloy Steel Rod, 2" Diameter, 6 Feet Long	1 each	1 each delivers May 30	201–1722

Your order is subject only to our terms and conditions, available at www.mcmaster.com or from our Sales Department.

Steel Certificate of Test

1835 Dueber Ave. S.W.
Canton, Ohio 44706

TIMKENSTEEL

ID #0563161-1

8/19/2022

SOLD TO
TW Metals
760 CONSTITUTION DR - THE ARBORETUM SUITE 204
EXTON, PA 19341 USA

SHIP TO
TW METALS - CRANBURY
27 ENGLEHARD DRIVE
MONROE TWP, NJ 08831 USA

Customer Order: M 49459617 **Customer Part Number:** 08209
Mill Order: 17101-G (2284569) **Heat Number(s):** X0796

Description of Material

DIAMETER: 2.000 in (50.800 mm)
Shape: RD
Prod Type: BAR
Sales Type: 4340
Int Quality: ELECTRIC FURNACE-VACUUM DEGAS-AIRCRAFT
Condition: HOT ROLL - ANNEAL - STRAIGHTEN

Specification

- AMS 6415 Rev. U 12/07/2016
- AMS 2301 Rev. L 05/19/2020 D
- AMS 2251 Rev. J 11/05/2018 EXCEPT AS NOTED
- AMS 2259 Rev. F 10/25/2017
- AMS 2370 Rev. L 06/20/2016
- PRATT & WHITNEY LCS 03/07/2019
- UNITED TECHNOLOGIES - PRATT & WHITNEY ASQR-01 Rev. 11 08/31/2018
- PRATT & WHITNEY F-17 SUPP A Rev. B 01/10/2017
- PRATT & WHITNEY PWA 300 Rev. BT 07/30/2021
- PRATT & WHITNEY F-14 Rev. D 06/28/2017
- PRATT & WHITNEY F-MASTER Rev. J 02/06/2020
- PRATT & WHITNEY F-17 Rev. D 10/17/2019
- PRATT & WHITNEY F-22 Rev. C 07/15/2020 SECTION 4.2 ONLY
- PRATT & WHITNEY F-23 Rev. G 04/26/2019
- AMS S-5000 Rev. A 03/01/2007 CANCELLED AND SUPERCEDED BY AMS 6415
- MILITARY MIL S 5000 Rev. E NOTICE 2 08/11/2000 CANCELLED AND SUPERSEDED BY AMS-S-5000
- PRATT & WHITNEY PWA-S-6415 Rev. E 12/13/2011 FOR NON-ROTOR APPLICATIONS ONLY
- ASTM A322 Rev. 13 (Reapproved 2018) e1 09/01/2018
- ASTM A29 / A29M Rev. 20 07/01/2020 EXCEPT AS NOTED
- PRATT & WHITNEY CANADA CPW 100 Rev. R 01/21/2021 COMMENTS APPROVED BY P&W SMC SPECIALIST
- TW METALS CPPP-2000 Rev. 0 03/31/2021 EXCEPT RECORDS RETENTION PERIOD

TW METALS TEST REPORTS SEP 12 2022 ACCEPTED BY

Chemistry Information

	%C	%Mn	%P	%S	%Si	%Cr	%Ni	%Mo	%Cu	%Al	%V	%As	%B	%Ca	%Cb
SPEC Ladle Min:	.38	.65			.15	.70	1.65	.20							
SPEC Ladle Max:	.43	.80	.025	.025	.35	.90	2.00	.30	.35	.050					
X0796 Ladle:	**.42**	**.78**	**.012**	**.007**	**.32**	**.87**	**1.76**	**.26**	**.22**	**.029**	**.006**	**.006**	**.0002**	**.0004**	**.003**
X0796 C2B04:	**.41**	**.78**	**.011**	**.007**	**.32**	**.86**	**1.80**	**.25**	**.21**	**.029**	**.006**	**.005**	**.0002**	**.0004**	**.002**

	%Co	%Pb	%Sb	%Sn	%Ti	%W	%Zr
SPEC Ladle Min:							
SPEC Ladle Max:		.0010		.015			

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** Ashley Langdon
NOTARY PUBLIC

Ashley Langdon, Met Lab Technician

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Mill Order: 17101-G (2284569) **Heat Number(s):** X0796

	%Co	%Pb	%Sb	%Sn	%Ti	%W	%Zr
X0796 Ladle:	.011	.0010	.001	.010	.002	.006	.001
X0796 C2B04:	.011	.0010	.001	.010	.002	.005	.001

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

Metallurgy Information

SPEC: Grain Size ASTM E112 SIZE 5/FINER - REP ACTUAL TYPE MCQUAID EHN (POTTED)

Heat X0796 SIZE: 8 TYPE: P

SPEC: Decarb E1077 LEVEL 0.025 Max UOM IN

Heat	Sample	LEVEL	UOM
X0796	3571599	0.014	IN

SPEC: Hardness ASTM E10 UOM BRINELL HARDNESS 235 Max LOCATION MID

Heat	Piece#		1	UOM
X0796	3571598	HARDNESS	215	BRINELL
	3571598	LOCATION	MID	BRINELL
	3571599	HARDNESS	207	BRINELL
	3571599	LOCATION	MID	BRINELL

SPEC: Jominy English NORMALIZING TEMPERATURE 1600 F / 871 C SAMPLE TYPE CAST

Location:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	22	24	26	28	30	32	36	40
SPEC Min:												53						50								
SPEC Max:																										
X0796 ACF1:	57	57	57	56	56	56	55	55	55	55	55	55	55	55	55	55	55	54	54	54	54	54	54	54	54	53

SPEC: Mag Std (AMS 2301)

Heat X0796 AMS 2301 FREQUENCY: 0.000 SEVERITY: 0.000

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

Heat X0796 Melt Source: USA
Manufacturing: USA
Heat X0796 - Strand Cast Process
REDUCTION RATIO - 59.5:1

TESTING PERFORMED IN ACCORDANCE WITH MCL MANUAL SECTION F-23

FAR & DFARS STATEMENTS - SEE HTTPS://www.sam.gov/portal/public/SAM/ and ENTER DUNS #079236657 FOR TIMKEN SUBMISSIONS

MATERIAL IS INTENDED FOR PRATT WHITNEY NON-ROTOR APPLICATIONS

MATERIAL HAS BEEN CONTROLLED TO P&W REQUIREMENTS FOR LCS PER MCL MANUAL SECTION F-17

PRODUCED AND CONTROLLED IN ACCORDANCE WITH MCL/LCS SUPPLIER AGREEMENT

DFARS 252.225-7008 AND 252.225-7009 COMPLIANT (FORMERLY DFARS 252.225-7014)

Material complies with DFAR BAA (DFARS 252.225-7001 Buy American Act & Bal of Payments Prog)

Macroetch equal to or better than S2 R1 C2 in accordance with ASTM E381

Material complies with FAR BAA (FAR 52.225-1 Buy American Act - Supplies)

Material complies with FAR TAA (FAR 52.225-5 Trade Agreements)

For TimkenSteel's quality certifications, see website timkensteel.com.

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

TimkenSteel Corporation

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8/19/2022

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Mill Order:	17101-G (2284569)	Heat Number(s):	X0796

Material melted and produced in the USA

USMCA - YES

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.