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
P1527777	12/5/2024	Jonathan Wood	6312595-01	1

Line		Product	Ordered	Status	Certificate
1	4437T16	High-Strength 4340 Alloy Steel Rod, 1-1/4" Diameter, 6 Feet Long	1 each	1 each delivers December 6	252–8731

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

ID #0596000-2

9/13/2024

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

SHIP TW Metals - Carol Stream
235 Tubeway
Carol Stream, IL 60188 USA

Customer Order: M 49488887 **Customer Part Number:** 08199
Mill Order: 29193-A (2341416) **Heat Number(s):** X8724

Description of Material

DIAMETER: 1.250 in (31.750 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. V 11/22/2022
- AMS 2301 Rev. L 05/19/2020
- AMS 2251 Rev. J 11/05/2018 EXCEPT AS NOTED
- AMS 2370 Rev. L 06/20/2016
- PRATT & WHITNEY F-14 Rev. D 06/28/2017
- PRATT & WHITNEY F-17 Rev. E 09/27/2023
- 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 A 03/01/2007 CANCELLED AND SUPERCEDED BY AMS 6415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 E NOTICE 2 08/11/2000 CANCELLED AND SUPERSEDED BY AMS-S-5000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
- PRATT & WHITNEY CANADA CPW 100 Rev. R 01/21/2021
- ASTM A29 / A29M Rev. 23 07/14/2023
- AMS 2259 Rev. G 01/17/2023
- PRATT & WHITNEY F-MASTER Rev. K 12/07/2023
- RAYTHEON ASQR-01 Rev. 14 02/01/2024
- ASTM A751 Rev. 21 11/01/2021
- PRATT & WHITNEY F-23 REV. H (2024/01/10)
- PRATT & WHITNEY PWA 300 REV. BV (2024/06/26)
- TW METALS CPPP-2000 REV.1 (2023/04/30) EXCEPT RECORDS RETENTION PERIOD

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					
X8724 Ladle:	**.41**	**.78**	**.007**	**.021**	**.28**	**.88**	**1.68**	**.26**	**.19**	**.016**	**.005**	**.005**	**.0002**	**.0002**	**.003**
X8724 1:	**.42**	**.78**	**.007**	**.025**	**.28**	**.88**	**1.70**	**.26**	**.19**	**.016**					

	%Co	%Pb	%Sb	%Sn	%Ti	%W	%Zr
SPEC Ladle Min:							
SPEC Ladle Max:		.0010		.015			
X8724 Ladle:	**.012**	**.0010**	**.001**	**.010**	**.002**	**.004**	**.001**

TW METALS TEST REPORTS ACCEPTED BY SEP 18 24

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 Metallus, Inc.

Notarized: _____
NOTARY PUBLIC

by Ashley Langdon

Ashley Langdon, Met Lab Technician

Metallus, Inc.

Steel Certificate of Test

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

METALLUS

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Customer Order: M 49488887 Customer Part Number: 08199
Mill Order: 29193-A (2341416) Heat Number(s): X8724

	%Co	%Pb	%Sb	%Sn	%Ti	%W	%Zr
X8724 1:		.0010		.010			

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

Metallurgy Information

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

Heat X8724 SIZE: 7 TYPE: P

SPEC: Decarb LEVEL 0.045 Max UOM IN

Heat	Sample	LEVEL	UOM
X8724	3767257	0.004	IN

SPEC: Hardness UOM BRINELL HARDNESS 235 Max LOCATION MID

Heat	Piece#		1	UOM
X8724	3767257	HARDNESS	221	BRINELL
	3767257	LOCATION	MID	BRINELL
	3767258	HARDNESS	222	BRINELL
	3767258	LOCATION	MID	BRINELL

SPEC: Jominy English 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:																										
X8724 ACF1:	59	58	58	58	57	57	57	57	57	57	57	57	57	57	57	57	56	56	56	56	56	55	55	55	53	52

SPEC: Mag Std (AMS 2301)

Heat X8724 AMS 2301 FREQUENCY: 0.000 SEVERITY: 0.000

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

Heat X8724 Melt Source: USA
Manufacturing: USA

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

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

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

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

TESTING PERFORMED IN ACCORDANCE WITH MCL MANUAL SECTION F-23

TW METALS TEST REPORTS SEP 18 24 ACCEPTED BY

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

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

For Metallus' quality certifications, see website metallus.com.

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

Material has not been exposed to radioactivity.

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.

Metallus, Inc.