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Sandvik Materials Technology
Product Area Tube
982 Griffin Pond Rd, Clarks Summit, PA US 18411, Ph: 570-585-7500

MATERIAL CERTIFICATE

Cert#: 2000007123

Plant Location: 982 Griffin Pond Road, Clarks Summit, PA 18411

Sold To: 10000503
SOUTHERN ALBERTA FLUID SYSTEM
CALGARY AB

Ship To:
SOUTHERN ALBERTA FLUID SYSTEM
CALGARY AB

Customer Order No: 767371
Sandvik Order No: 372861/1

Certification Date: 20200901

Work Order/Lot: 0002014385 SS-T2-S-028-20

SWAGELOK SMS-00333 Rev. D, ASTM A632-04, SWAGELOK SQS-00012 Rev. Z

Cold Finished BRIGHT ANNEALED Seamless Tube
Type MT 316/MT 316L/TP316/TP316L

Size: .125" OD X .028" AW
Heat: 558649

ANALYSIS %

	C	Si	Mn	P	S	Cr	Ni
Heat	.019	.38	1.55	.029	.006	17.50	13.13
Prod	.017	.38	1.55	.030	.007	17.50	13.14

	Fe	Mo	Cu	Al	Pb
Heat		2.62		.005	
Prod		2.64			

Mechanical Tests:

Yield Strength 0.2%		Yield Strength 1.0%		Tensile Strength		Elongation in %				Reduction Of Area
psi	MPa	psi	MPa	psi	MPa	E2"	E10"	E4d	E5d	%
47850	330.0	N/A		83370	575.0	45	N/A	N/A	N/A	N/A
45530	314.0			82790	571.0	45				
46110	318.0			82940	572.0	45				
47560	328.0			82940	572.0	45				
45960	317.0			82790	571.0	47				
44660	308.0			82500	569.0	46				
45670	315.0			82790	571.0	46				
45380	313.0			81630	563.0	46				

Hardness Test Results: 81HRBW, 75HRBW, 79HRBW

Flattening Test per ASTM A450/A1016 and ASME SA450/SA1016:
0
Tensile Test sample width (1=Full-Size 2=1/2" Strip): 1
Country Of Origin: Germany
100% Positive Material Identification performed
All material subjected to a final solution annealing heat treatment with material at a temperature of 1900 deg. F minimum followed by rapid quenching to below 800 deg. F in less than three (3) minutes.
The material has not come in contact with Mercury or Mercury containing compounds.
No welding has been performed on this material.
Material was 100% eddy current tested in accordance with ASTM A450, ASTM A1016 and is acceptable.
Material is capable of passing the ASTM A262 Practice "E".
Inspection certificate produced in accordance with

PO# 767371

per QCS-000062
E. Piccio
Oct 28-2020

EN 10204 3.1 (formerly EN 10204 3.1.B).
No unauthorized alterations. The contents of this Inspection Certificate may not be modified or revised in any way without the prior written approval of Sandvik Materials Technology. Unauthorized alterations to the Inspection Certificate, including introduction of false, fictitious or fraudulent statements or entries, may be punishable by fines, imprisonment, or both. This Inspection Certificate may be copied only in the manner and for the purposes specified in EN 10204:2004, Section 6. Contravention of this notice will be prosecuted to the fullest extent of the applicable law(s).
Material has been manufactured/supplied in accordance with Sandvik Materials Technology Quality Manual-Commercial Products Revision 2 dated June 18, 2019. Quality system has been approved to ISO 9001:2015 (Cert# 10213298, 31AUG19)
No unauthorized alterations. The content of this inspection certificate may not be modified or revised in any way without the prior written approval of Sandvik Materials Technology. Unauthorized alterations to the inspection certifiate, including introduction of false, ficticious or fraudulent statements or entries, may be punishable by fines, imprisonment, or both.
Contravention of this notice will be prosecuted to the fullest extent of the applicable laws.
This is to certify that the contents of this certificate are correct and accurate as contained in Sandvik's records, and that all above test results and operations performed are in compliance with the requirements of the purchase order and the specification(s) listed above.

Electronically Generated Certificate-Valid without signature
John Scherer, Quality Mgr-Tube
10 (SWINST=1/8-316 R3) (10) CF (PL1406)

1.0 SCOPE

This specification defines the minimum suggested ordering requirements for 316/316L dual certified tubing intended for use with Swagelok tube fittings. *Please note that tubing purchased for welding applications shall invoke supplemental requirement S1.*

2.0 REFERENCES (latest revisions at time of order apply)

2.1. ASTM A213 / ASME SA213, Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes
2.2. ASTM A269, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
2.3. ASTM A632, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing (Small-Diameter) for General Service.
2.4. ASTM A1016, General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel, and Stainless Steel Tubes

3.0 GENERAL REQUIREMENTS

3.1. UNS S31600/S31603 stainless steel tubing shall be supplied as average wall thickness ± 10%, and in accordance with the following:
- ASTM A213 / ASME SA213 (Ref. 2.1)
- ASTM A269 (Ref. 2.2)
- ASTM A1016 (Ref. 2.4)
- ASTM A632 (1/8 inch tubing and smaller, 3 mm tubing and smaller) (Ref. 2.3)

3.2. Tubing shall be suitable for bending and flaring.
3.3. Tubing shall be manufactured free of mercury contamination.

4.0 CHEMICAL COMPOSITION

4.1. Material shall meet the following chemical requirements for UNS S31600/S31603 listed in ASTM A213 (Ref. 2.1) or ASTM A269 (Ref. 2.2). Carbon content 0.035% max.

5.0 MECHANICAL PROPERTIES

5.1. Tubing larger than 1/8 inch shall meet the mechanical properties requirements for UNS S31600/S31603 listed in ASTM A213 (Ref. 2.1) or ASTM A269 (Ref. 2.2). Tensile minimum 75 ksi, Yield minimum 30 ksi.
5.2. 1/8 inch and smaller tubing shall meet the mechanical requirements for UNS S31600/S31603 listed in ASTM A632. Tensile minimum 75 ksi, Yield minimum 30 ksi.
5.3. The hardness shall not exceed 90 HRB (200 HV).

6.0 INSPECTION AND TESTING REQUIREMENTS

6.1. Each lot of tubes shall be tested in accordance with the requirements listed in ASTM A213 (Ref 2.1) or A269 (Ref. 2.2) or A632 (Ref 2.3) as appropriate and A1016 (Ref 2.4)

7.0 FINISH

7.1. Tubing shall be cold drawn or pilgered, fully annealed, and straightened (straightened not applicable to coiled tubing).
7.2. All tubes shall have a uniformly polished OD (may not be applicable to coiled tubing).
7.3. Tubes shall be pickled free of scale. When bright annealing is used, pickling is not necessary.

7.4. Finished tubes shall have ends free of burrs and the inside surface shall be free of dirt, chips, oil, scale or corrosion.
7.5. Tubing shall be free of scratches.

8.0 MARKING

8.1. Tubing shall be line marked in accordance with the requirements of ASTM A213 (Ref. 2.1) or ASTM A269 (Ref. 2.2) and ASTM A1016 (Ref. 2.4), including original melt heat number.
8.2. All tubing sizes shall be line marked, with the exception that tubing smaller than ¼" and 6mm in diameter may be tagged in lieu of line marking.
8.3. Line mark country of origin if not made in the USA.

9.0 CERTIFICATION

9.1. A Certified Material Test Report from the tube manufacturer shall be furnished with each shipment.

10.0 SUPPLEMENTAL REQUIREMENTS

S1: Chemical Composition

Sulfur	All other elements
0.005 – 0.015	As listed in ASTM A213 / ASME SA213 (Ref. 2.1) or ASTM A269 (Ref. 2.2)