





TECH CMCR SPECIFICATION

FOR COILED SEAMLESS 316L STAINLESS STEEL TUBING FOR USE IN BULK GAS, VACUUM AND INSTRUMENT PIPING SYSTEMS FOR THERMOCOUPLE CLEAN APPLICATIONS.

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The following documents must be reviewed when this specification is revised:

Control Plan

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SCOPE

- 1.1 This specification will establish criterion for passivated seamless tubing for use and installation in bulk gas, vacuum, and instrumentation piping systems that require thermocouple clean tubing
- 1.2 This specification is applicable to tubing with outside diameter of 1/8" through 1/2" inclusive.
- 1.3 This specification applies to single wall and the carrier tubing for dual contained products.

2 REFERENCE DOCUMENTS

ASTM A213-EAW† Standard Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes

† Exception for Average Wall – Nominal wall thickness is used, not minimum wall thickness.

ASTM A262 Standard Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels

ASTM A269 Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service

ASTM A632 Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing (Small-Diameter) for General Service

ASTM A 1016/A 1016M Standard Specification for General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel, and Stainless Steel Tubes

EN 10204 3.1 Inspection Documents for metallic products

ASME SA213 Seamless ferritic and austenitic alloy steel boiler superheater and heat exchanger tubes

ISO 9001-2015 Quality Management System.

3 MATERIAL REQUIREMENTS

- 3.1 All tubing shall be produced from TP 316L stainless steel raw material. The chemical composition will follow Table 1 of ASTM A269 for 1/2" OD tubing and ASTM A632 for all tubing less than 1/2" OD.
- 3.2 Tubing shall conform to ASTM A632 for sizes less than 1/2" OD and ASTM A269 for 1/2" OD, unless otherwise provided herein.
- 3.3 All tubing shall be bright annealed in a dry hydrogen atmosphere (dew point \leq -40 degrees C), or vacuum annealed (10 micron Hg), at the producing mill.
- 3.4 All 316L material shall have a sulfur range of 0.005 to 0.012% except for tubing less than 1/4". Tubing less than 1/4" OD can have a Sulfur content from 0.005 to 0.017%.
- 3.5 Tubing shall be seamless.

4 TRACEABILITY AND MARKING REQUIREMENTS

- 4.1 All raw material and finished products shall be mill and heat traceable back to the original mill test report.
- 4.2 The size, wall thickness, the grade, the heat number, the lot number, the mill order number, and ASTM-A213/A269/1016 (for sizes less than 1/2" OD and greater than or equal to 1/4" OD ASTM-A632 shall replace A269) shall be stenciled continuously on the OD of each tube with indelible ink.
- 4.3 For tubing sizes less than 1/4" OD, there will be stenciling and/or tagging. In addition marking will be by tag or label located on the bag or protective package. Labeling will contain at a minimum the following information size, wall thickness, the grade, the heat number, the lot number, the mill order number, and ASTM-A213/A632/1016.

5 FITTINGS

- 5.1 Use Tech 10 fittings with Tech CM tubing.

6 SURFACE FINISHING, CLEANING, AND PACKAGING PROCEDURES

- 6.1 Mercury or ozone depleting chemicals are not used in the processing of Tech CMCR products.
- 6.2 All tubing will be thermocouple cleaned and capped in accordance with ASTM A632 - S3
- 6.3 Tubing shall be passivated in acid for a minimum of 30 minutes at ambient temperature.
- 6.4 After the passivation bath, tubing shall be rinsed in deionized water baths and dried.
- 6.5 After final cleaning, tubing shall be purged with 0.005 micron filtered nitrogen and capped with LDPE caps pressed over polyamide nylon film.
- 6.6 The OD and ID of tubing shall be provided with a mill finish and mill finished ends.

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7 TESTING AND INSPECTION STANDARDS AND PROCEDURES

7.1 The nitrogen gas, utilized for purging and drying is procured to the following, minimum purity specifications:

Moisture: < 1 ppm
Oxygen: < 1 ppm

Total Hydrocarbons: < 1 ppm
Carbon Dioxide: < 1 ppm

7.2 Tubing shall be measured with calipers, micrometers, or other acceptable methods, to certify that the finished products conform to the following dimensional requirements:

PARAMETER	COMPONENT	VARIATION FROM NOMINAL
Length	Tubing	-0, +5%
Outside Diameter	Tubing	
	Up to ¼"	+/- 0.003
	¼" – 3/8" inc.	+ 0.004"/-0.002"
Wall Thickness	½"	+/- 0.005"
	Tubing	
	Up to – ½" inc.	+/- 10%
Ovality	Tubing	
	Up to ½"	Per ASTM A632
	½" OD	Per ASTM A269

7.3 The following documentation shall be supplied with all Tech CMCR orders—

7.3.1 Mill Test Reports

7.3.2 Certificate of Conformance: for the following measurements

- Dimensional Tolerances

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