AEROSPACE MATERIAL SPECIFICATION

AMS5570™	REV. R
Issued 1939-12 Revised 2022-06 Superseding AMS5570Q	

Steel, Corrosion- and Heat-Resistant, Seamless Tubing
18Cr - 11Ni - 0.40Ti (321)
Solution Heat Treated
(Composition similar to UNS S32100)

RATIONALE

AMS5570R is the result of a Five-Year Review and update of the specification. The revision prohibits unauthorized exceptions (3.7, 4.4.1, 5.2.1, 8.4), updates composition testing and reporting (3.1, 3.1.1), updates condition and fabrication requirements (3.2, 3.3) updates tensile testing (3.4.1.1), provides notes and size limits for Table 2, updates inspection (3.5), adds NDT acceptance testing (4.2.1, 4.4), clarifies tolerances and identification (3.6, 5.2), and allows prior revisions (8.3).

1. SCOPE

1.1 Form

This specification covers a corrosion- and heat-resistant steel in the form of seamless tubing.

1.2 Application

This tubing has been used typically for parts requiring both corrosion and heat resistance, especially when such parts are welded during fabrication, and also for parts requiring oxidation resistance up to 1500 °F (816 °C), but useful at that temperature only when stresses are low, but usage is not limited to such applications.

2. REFERENCES

2.1 Applicable Documents

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The producer may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

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2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2243 Tolerances, Corrosion- and Heat-Resistant Steel Tubing

AMS2248 Chemical Check Analysis Limits, Corrosion- and Heat-Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys

AMS2371 Quality Assurance Sampling and Testing, Corrosion- and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock

AMS2700 Passivation of Corrosion-Resistant Steels

AMS2807 Identification, Carbon and Low-Alloy Steels, Corrosion- and Heat-Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft Tubing

AS7766 Terms Used in Aerospace Metals Specifications

2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM A262 Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels

ASTM A370 Mechanical Testing of Steel Products

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

ASTM A751 Chemical Analysis of Steel Products

ASTM A1016/A1016M General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel, and Stainless Steel Tubes

2.2 Definitions

Terms used in AMS are defined in AS7766 and the following:

BORE CONDITIONING: Any mechanical method that is used in the bore of tubing to improve the final surface appearance, with no resultant change in tubing size beyond the allowable tolerances.

SOLUTION HEAT TREATMENT: Heating of an alloy to a suitable temperature, holding it at that temperature long enough to cause one or more constituents to enter into a solid solution and then cooling it rapidly enough to keep these constituents in solution. AMS2761 provides guidance but refers to this process as annealing with a quenching treatment.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM A751 or by other analytical methods acceptable to purchaser.

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Table 1 - Composition

Element	Min	Max
Carbon	--	0.08
Manganese	--	2.00
Silicon	0.25	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	17.00	19.00
Nickel	9.00	13.00
Titanium	5x(C+N)	0.70
Molybdenum	--	0.75
Copper	--	0.75
Nitrogen	--	0.10

3.1.1 Producer may test for any element not listed in Table 1 and include this analysis in the report of 4.4. Reporting of any element not listed in the composition table is not a basis for rejection, unless limits of acceptability are specified by the purchaser.

3.1.2 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

3.2 Condition

Solution heat treated (see 2.2). Solution heat treatment shall be performed in an atmosphere yielding a bright finish. Alternately, product shall be passivated in accordance with AMS2700 to produce a uniform finish. It is permissible to pickle prior to passivation. Passivation may take place after any final finishing (see 3.3.3).

3.3 Fabrication

3.3.1 Tubing shall be produced by a seamless process. Finishing operations for removal of surface blemishes shall be performed prior to final solution heat treatment. A light polish to improve external surface appearance may be employed after solution heat treatment and if performed, the product shall be subsequently passivated.

3.3.2 Bore conditioning (see 2.2) is permitted after final anneal provided the tubing is not sized by metal removal methods beyond the allowable tolerances. If bore conditioning is used, 100% visual inspection of each tube shall be performed. The tube ID shall be uniformly shiny with no evidence of remnant material, neither metallic nor nonmetallic in nature.

3.3.3 Tubing shall be passivated in accordance with AMS2700 after any ID or OD finishing that occurs after solution heat treatment.

3.4 Properties

Tubing shall conform to the following requirements; tensile testing shall be performed in accordance with ASTM A370:

3.4.1 Tensile Properties

Shall be as shown in Table 2.

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