

AMS Aluminum heat treatment process specifications

Aerospace Material Specifications can be purchased from SAE International (previously known as the Society of Automotive Engineers (www.sae.org))

OEM's may have their own pyrometric and heat treatment process specifications. Examples: BAC 5621 (Boeing), RPS 953 (Rolls Royce), NADCAP AC 1702, CQI-9 (automotive), MIL-SPEC (US military specifications)

All AMS process specifications refer to the pyrometric thermal equipment specification AMS 2750 which is the most widely known pyrometric specification in the thermal processing world. Originally published in April 1980, AMS 2750 continues to be the "bible" for all pyrometric processes connected with the aerospace industry, and it is often recognized as the standard in many other industries as well. In its latest revision, AMS 2750F released in 2020, SAE clarifies issues with the previous version (AMS 2750E) which caused confusion and has been a source of findings during NADCAP 1702 audits.

AMS 2770 Rev P: Heat Treatment of Wrought Aluminum Alloy Parts

It covers the following aluminum alloys: 1100, 2014, 2017, 2024, 2098, 2117, 2124, 2195, 2219, 2224, 3003, 5052, 6013, 6061, 6063, 6066, 6951, 7049, 7050, 7075, 7149, 7178, 7249, 7475

Section	Topic	Comments
3.1.1.1	Solution heat treating furnaces shall be a minimum of Class 2 (± 10 °F or ± 6 °C)	See AMS 2750F
3.1.1.2.1	Aging ovens operating at or below 300 °F (149 °C) shall be a minimum of Class 2 (± 10 °F or ± 6 °C)	See AMS 2750F
3.1.1.2.2	For alloys 7049, 7149, 7249 and 7050, aging ovens or aging furnaces operating above 300 °F shall be a minimum of Class 1 (± 5 °F or ± 3 °C)	See AMS 2750F
3.1.1.2.3	For aging all other alloys, all ovens or furnaces operating above 300 °F (149 °C) shall be a minimum of Class 2 (± 10 °F or ± 6 °C)	See AMS 2750F
3.1.1.3	Annealing and stress relieving furnaces shall be a minimum of Class 5 (± 25 °F or ± 14 °C)	See AMS 2750F
3.4.2	At the start of quench, quenchant temperature shall not exceed 90 °F (32 °C) except when water quenching parts made from forgings. When quenching parts made from forgings, the starting temperature of quench water shall conform to Table 1. (130°F to 180°F)	Depends on forging alloy
3.4.4	Maximum quench delay times (between 5 to 15 seconds), shall conform to table 5	Depends on part thickness
Table 8	Annealing temperatures, soak times, cooling medium	

AMS 2771 Rev E: Heat Treatment of Aluminum Alloy Castings

201.0 203.0 206.0 222.0 242.0 242.0 295.0 296.0
333.0 336.0 354.0 355.0 356.0 357.0 358.0 319.0 359.0
705.0 707.0 712.0 713.0
850.0 851.0 852.0

Section	Topic	Comments
3.1.2.2.1	Solution Heat Treating and Aging Furnaces shall be class 2 minimum as defined in AMS2750	See AMS 2750F
3.1.2.2.2	Annealing Furnaces shall be class 5 minimum	See AMS 2750F
3.1.3	Quenching in heated or cooled medium can be water, air blast, oil or polymer quenchants (Glycol). Residual quenchant needs to be removed after solution heat treating.	
3.2.6	Soaking time starts when all temperature control sensing elements and load thermocouples (if used) are within 10 °F (6 °C) of the set or offset temperature. Soak times shall conform to Table 1.	
3.2.9.4.1	During the quench, the quenchant temperature shall not rise more than 25 °F (14 °C)	
3.2.9.4.2	The quench delay time shall not exceed 15 seconds	
3.2.12	Heating, soaking, and cooling parameters in Table 3 are recommended for annealing of castings	

AMS 2772 Rev F: Heat Treatment of Aluminum Alloy Raw Materials

This specification covers requirements and recommendations for the heat treatment of wrought aluminum alloy raw materials (See 8.2.1) by producers. It supersedes AMS-H-6088 and replaces MIL-H-6088.

Raw materials: e.g sheet, plate, wire, rod, bar, tubing, forging, extrusion

Section	Topic	Comments
3.2.1.4.2	30 °F (17 °C) range for furnaces used only for solution heat treatment of those 6xxx alloys for which Table 1 specifies a range of 30 °F (17 °C) degrees or more.	
3.2.1.4.3	20 °F (11 °C) range for furnaces used for solution heat treatment of 6xxx alloys for which Table 1 specifies a range of less than 30 °F (17°C).	
3.2.1.4.4	20 °F (11 °C) range for furnaces used for solution heat treatment of other alloys except 10 °F (6 °C) range for furnaces used for solution heat treatment of 8090 sheet.	
3.2.1.4.5	20 °F (11 °C) range for furnaces used for aging treatments.	
3.6.4	Restrictions on Alclad products	

AMS 3025 Polyalkylene Glycol heat treat quenchant

This specification covers single and multiple polymers used as quenching medium for solution heat treatment of aluminum alloys when minimum distortion is required.