



<b>AEROSPACE MATERIAL SPECIFICATION</b>	<b>AMS2770™</b>	<b>REV. R</b>
	Issued	1974-06
	Revised	2020-08
Superseding AMS2770P		
Heat Treatment of Wrought Aluminum Alloy Parts		

#### RATIONALE

AMS2770R adds back alloy 2004, revises Temperature Uniformity Test Recovery Requirements, Calibration of Refractometers, Method B, and Parts and Aging of 2219 (Table 7).

#### NOTICE

ORDERING INFORMATION: The following information shall be provided to the heat-treating processor by the purchaser. Purchase order and/or purchaser supplied documents shall specify not less than the following:

- AMS2770R
- Quantity of parts
- Part number or part identity
- Material (alloy) designation of parts, including mill heat/lot number
- Heat treating operations required, including:
  - Heat treat condition, as delivered
  - Final heat treatment condition required
- Processing variables not defined in or different from AMS2770 requirements, such as:
  - Processing temperatures, times, and other parameters
  - Part type
  - Allowance for straightening
  - Post straightening thermal operations requirements
  - Any pre-cleaning and post-cleaning requirements
  - Post heat treatment corrosion protection requirements
  - Any restriction to options allowed within this specification (e.g., salt bath only, polymer quenchant only)

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<https://www.sae.org/standards/content/AMS2770R>

## 1. SCOPE

### 1.1 Purpose

This specification specifies the engineering requirements for heat treatment, by part fabricators (users) or their vendors or subcontractors, of parts (see 8.6.1). It also covers heat treatment by warehouses or distributors converting raw material from one temper to another temper (see 1.3 and 8.5). It covers the following aluminum alloys:

1100, 2004, 2014, 2017, 2024, 2098, 2117, 2124, 2195, 2219, 2224, 3003, 5052, 6013, 6061, 6063, 6066, 6951, 7049, 7050, 7075, 7149, 7178, 7249, and 7475.

1.1.1 This specification may be used for heat treatment of parts made from other alloys provided the temperatures, temperature uniformity tolerances, times, and quenchants are specified or approved by the cognizant engineering organization (see 8.6.7).

1.2 Castings and parts made from castings shall be heat treated in accordance with AMS2771.

### 1.3 Temper Conversion

When a warehouse, distributor, or similar organization converts raw material to a different temper, it shall be heat treated and tested to the requirements of this specification. The marking, testing, and reporting requirements shall also be in accordance with AMS2772 and the raw material specification.

## 2. 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 supplier 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.

### 2.1 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](http://www.sae.org).

AMS2658	Hardness and Conductivity Inspection of Wrought Aluminum Alloy Parts
AMS2750	Pyrometry
AMS2771	Heat Treatment of Aluminum Alloy Castings
AMS2772	Heat Treatment of Aluminum Alloy Raw Materials
AMS3025	Polyalkalene Glycol Heat Treat Quenchant
ARP1917	Clarification of Terms Used in Aerospace Metals Specification
ARP1962	Training and Approval of Heat-Treating Personnel

### 2.2 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](http://www.astm.org).

ASTM D445	Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
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## 2.3 ANSI Accredited Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ANSI H35.1/H35.1M Alloy and Temper Designation Systems for Aluminum

## 3. TECHNICAL REQUIREMENTS

### 3.1 Equipment

#### 3.1.1 Pyrometry

Shall be in accordance with AMS2750. Furnaces shall have a minimum of Type D instrumentation.

3.1.1.1 Solution heat treating and O1 (formerly T411) temper furnaces shall be a minimum of Class 2.

3.1.1.2 AMS2750 furnace classifications for aging shall be as follows:

3.1.1.2.1 Aging ovens operating at or below 300 °F (149 °C) shall be a minimum of Class 2.

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.

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.

3.1.1.3 Annealing and stress relieving furnaces shall be a minimum of Class 5.

#### 3.1.2 Furnaces

##### 3.1.2.1 Heating Media

Shall be air, molten salt bath, oil bath, or fluidized bed. The products of combustion and other materials that could contaminate parts shall not come into contact with parts during solution heat treating, annealing or stress relieving. Electrical heating elements and radiant tubes shall be shielded to prevent parts from being exposed to direct radiation. Shield construction and placement shall be such as to prevent parts from being exposed to re-radiation of heat from electrical elements or radiant tubes. Composition and maintenance of salt baths and fluidized beds shall be such as to prevent attack of the parts.

##### 3.1.2.2 Temperature Uniformity Test Recovery Requirements (see 8.6.9)

For all solution heat treat and aging furnaces, the lag time between recovery of the first test thermocouple and the last test thermocouple to within 10 °F (6 °C) or 5 °F (3 °C), as applicable, of the set temperature during furnace uniformity tests shall not exceed the following:

###### 3.1.2.2.1 Furnaces Tested without a Load

20 minutes.

###### 3.1.2.2.2 Furnaces Tested with a Load

40 minutes.

##### 3.1.2.3 Furnaces Used for Alclad Material

Heat input of furnaces used for solution heat treating of parts made from Alclad product shall be sufficient to ensure conformance to 3.3.4.