



AEROSPACE MATERIAL SPECIFICATION

AMS5917™

Issued 2011-08
Reaffirmed 2022-05

Metal Injection Molded Nickel Based
Alloy 718 Parts
Hot Isostatically Pressed, Solutioned and Aged

RATIONALE

AMS5917 has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

1.1 Form

This specification covers a corrosion and heat-resistant nickel alloy in the form of metal injection molded (MIM) parts.

1.2 Application

Metal injection molding has been used typically for parts that require high strength levels to 1200 °F (650 °C) but usage is not limited to such applications. The MIM process is best suited for small sized, moderate to high geometry complexity parts with moderate to high production volumes.

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 724-776-4970 (outside USA), www.sae.org.

AMS2269	Chemical Check Analysis Limits, Nickel, Nickel Alloys, and Cobalt Alloys
AMS2750	Pyrometry
AMS2774	Heat Treatment, Wrought Nickel Alloy and Cobalt Alloy Parts
ARP1313	Determination of Trace Elements in High Temperature Alloys
ARP1917	Clarification of Terms Used in Aerospace Metals Specifications

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For more information on this standard, visit
<https://www.sae.org/standards/content/AMS5917/>

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.

ASTM B 311	Test Method for Density Determination for Powder Metallurgy (P/M) Materials Containing Less Than Two Percent Porosity
ASTM E8/E 8M	Tension Testing of Metallic Materials
ASTM E 18	Rockwell Hardness of Metallic Materials
ASTM E 21	Elevated Temperature Tension Tests of Metallic Materials
ASTM E112	Determining Average Grain Size
ASTM E 139	Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials
ASTM E 292	Conducting Time-for-Rupture Notch Tension Tests of Materials
ASTM E 354	Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys
ASTM E 1417	Liquid Penetrant Testing
ASTM E 1742	Radiographic Examination

2.3 MPIF Publications

Available from MPIF, 105 College Road East, Princeton, NJ, 08540, Tel: 609-452-7700, info@mpif.org.

MPIF 42	Determination of Density of Compacted or Sintered Powder Metallurgy (PM) Products
MPIF 50	Preparing and Evaluating Metal Injection Molded (MIM) Sintered/Heat Treated Tension Test Specimens
MPIF 63	Density Determination of Metal Injection Molded (MIM) Components (Gas Pycnometer)

3. TECHNICAL REQUIREMENTS

3.1 Composition

Metal powder and parts shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 354, by spectrochemical methods, by the methods of ARP1313 for lead, bismuth, and selenium, or by other analytical methods acceptable to purchaser. When a powder lot contains more than one powder heat, each powder heat shall conform to the composition requirements.

TABLE 1 - COMPOSITION

Element	min	max
Carbon (3.1.4)	--	0.08
Manganese	--	0.35
Silicon	--	0.35
Phosphorus	--	0.015
Sulfur	--	0.015
Chromium	17.00	21.00
Nickel	50.00	55.00
Molybdenum	2.80	3.30
Columbium (Niobium)	4.75	5.50
Titanium	0.65	1.15
Aluminum	0.20	0.80
Cobalt	--	1.0
Tantalum (3.1.3)	--	0.05
Boron	--	0.006
Copper	--	0.30
Lead (3.1.3)	--	0.0005 (5 ppm)
Bismuth (3.1.3)	--	0.00003 (0.3 ppm)
Nitrogen (3.1.4)	--	0.02
Oxygen (3.1.4)	--	0.06
Selenium (3.1.3)	--	0.0003 (3 ppm)
Iron	remainder	

3.1.1 Supplier may test for any element not otherwise listed in Table 1 and include this analysis in the report of 4.3.1.

3.1.2 Check Analysis

Composition variations shall meet the applicable requirements of AMS2269.

3.1.3 Determination not required for routine analysis.

3.1.4 Only carbon, nitrogen and oxygen are required to be determined from fully processed parts.

3.2 Processing

3.2.1 Feedstock for Metal Injection Molding

Shall be a mixture of metal powder and binder(s). The metal powder for the metal injection molding process shall be produced by inert gas atomization. Metal powder and feedstock shall be packaged, stored, and transported such that contamination with foreign materials is prevented.

3.2.1.1 Regrind

Regrind material shall not be used to make parts or test specimens unless approved by the purchaser.

3.3 Condition

Metal injection molded parts shall be supplied in the hot isostatically pressed plus solution and precipitation heat treated condition.