



AEROSPACE MATERIAL SPECIFICATION

AMS7000™**REV. A**Issued 2018-06
Revised 2022-05

Superseding AMS7000

Laser-Powder Bed Fusion (L-PBF) Produced Parts, Nickel Alloy,
Corrosion- and Heat-Resistant, 62Ni - 21.5Cr - 9.0Mo - 3.65Nb
Stress Relieved, Hot Isostatic Pressed and Solution Annealed
(Composition similar to UNS N06625)

RATIONALE

New paragraph added to align specification requirements with AMS additive manufacturing metal powder feedstock specification.

1. SCOPE

1.1 Form

This specification covers a corrosion and heat-resistant nickel alloy in the form of parts produced by laser-powder bed fusion (L-PBF) that are subjected to post-deposition stress relief (SR), hot isostatic press (HIP) and solution anneal operations. Parts may require subsequent machining or surface finishing to meet specific application requirements.

1.2 Application

1.2.1 Typically, these parts are used for complex-shaped, statically loaded, aerospace products made to near net shape dimensions, requiring corrosion and oxidation resistance up to 1800 °F (982 °C), but usage is not limited to such applications.

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.

AMS2269	Chemical Check Analysis Limits, Nickel, Nickel Alloys, and Cobalt Alloys
AMS2774	Heat Treatment, Wrought Nickel Alloy and Cobalt Alloy Parts
AMS7001	Nickel Alloy, Corrosion- and Heat-Resistant, Powder for Additive Manufacturing, 62Ni - 21.5Cr - 9.0Mo - 3.65Nb

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For more information on this standard, visit
<https://www.sae.org/standards/content/AMS7000A>

Documents

Document Sharing Hub

AMS7002	Process Requirements for Production of Metal Powder Feedstock for Use in Additive Manufacturing of Aerospace Parts
AMS7003	Laser Powder Bed Fusion Process
ARP1917	Clarification of Terms Used in Aerospace Metals Specifications

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 E3	Standard Guide for Preparation of Metallographic Specimens
ASTM E8	Tension Testing of Metallic Materials
ASTM E29	Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
ASTM E112	Determining Average Grain Size
ASTM E354	Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys
ASTM E1834	Standard Test Method for Analysis of Nickel Alloys by Graphite Furnace Atomic Absorption Spectrometry
ASTM E3047	Standard Test Method for Analysis of Nickel Alloys by Spark Atomic Emission Spectrometry
ASTM 52921	Standard Terminology for Additive Manufacturing - Coordinate Systems and Test Methodologies
ISO/ASTM 52900:2015	Standard Terminology for Additive Manufacturing - General Principles - Terminology

2.3 Definitions

Terms used in AMS7000 are clarified in ARP1917 and ISO/ASTM 52900:2015 and as follows:

2.3.1 ACCEPTABLE TO CEO

Does not require prior written approval from CEO prior to implementation into production. Any changes require notification to the CEO prior to part shipment. This allows the supplier to decide and CEO the right to disapprove the decision.

2.3.2 AUTHORIZED BY CEO

Requires prior written approval from the CEO.

2.3.3 PRODUCER

Source that provides product manufactured and certified in accordance with this specification.

2.3.4 PROCESS CONTROL DOCUMENTATION (PCD)

A collection of procedures and requirements that are used to document and to control variation of the product.

2.3.5 LASER POWDER BED FUSION (L-PBF)

Additive manufacturing process in which thermal energy supplied by one or more laser(s) selectively fuses regions of a powder bed.

2.3.6 TECHNICAL DATA PACKAGE (TDP)

A technical description of an item adequate for supporting an acquisition, production, engineering, and logistics support (e.g., engineering data for provisioning, training, and technical manuals). The description defines the required design configuration or performance requirements, and procedures required to ensure adequacy of item performance. It consists of applicable technical data such as models, drawing, associated lists, specifications, standards, performance requirements, QAP, software documentation, and packaging details.

2.3.7 WITNESS SPECIMEN

A test specimen produced during the build cycle with representative feedstock materials and process parameters that is used to determine if a specific build yields similar mechanical properties compared to the original qualification build cycle.

2.3.8 KEY PROCESS VARIABLES

Aspects of the manufacturing process that may impact the capability to meet the specified requirements. These include physical, chemical, metallurgical, mechanical property, or dimensional requirements (see 3.3.2).

3. TECHNICAL REQUIREMENTS

3.1 Composition of Parts

Shall conform to the percentages by weight shown in Table 1, determined by chemical analysis in accordance with ASTM E2465, ASTM E1834, ASTM E2594, ASTM E2823, ASTM E3047, or by other analytical methods acceptable to the purchaser. Carbon, sulfur, oxygen, and nitrogen content shall be determined by ASTM E1019. Significant digits shall be as specified in ASTM E29.

Table 1 - Composition

Element	Min	Max
Carbon	-	0.10
Manganese	-	0.50
Silicon	-	0.50
Phosphorus	-	0.015
Sulfur	-	0.015
Chromium	20.00	23.00
Molybdenum	8.00	10.00
Niobium	3.15	4.15
Cobalt	-	1.00
Titanium	-	0.40
Aluminum	-	0.40
Iron	-	5.00
Oxygen	-	0.030
Nitrogen	-	0.025
Nickel		remainder

3.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS2269.

3.2 Condition

Laser-powder bed fusion (L-PBF) produced parts shall be supplied in the solution annealed (SA) condition.