

AEROSPACE MATERIAL SPECIFICATION



AMS 2280A

Issued JUN 1975
Revised JUL 1992
Reaffirmed SEP 2000

Superseding AMS 2280

Trace Element Control Nickel Alloy Castings

1. SCOPE:

1.1 Purpose:

This specification establishes maximum permissible limits for elements not normally specified but which may occur in trace amounts in nickel alloy castings.

1.2 Application:

Primarily for limited use to achieve premium-quality material for highly-stressed rotating parts, such as turbine blades, where control of trace elements is required to maintain elevated-temperature tensile, stress-rupture, creep, and low-cycle fatigue properties.

1.2.1 It is intended that this specification be invoked only for selected applications by stipulation on drawings, purchase orders, or other documentation supplementing the material specification or in material specifications.

1.3 Classification:

This specification covers two classes of trace element control, defined by the elements to be controlled as follows:

Class 1 - Lead, Bismuth, Selenium, Tellurium, and Thallium

Class 2 - Lead, Bismuth, Selenium, Tellurium, Thallium, and Others (See 3.1.2)

Class 3 - Cancelled, use Class 1

Class 4 - Cancelled, use Class 2

1.3.1 When trace element control is required, the elements to be controlled will be indicated by this specification number and a suffix number indicating the class. For example, AMS 2280-1 will indicate that control of lead, bismuth, selenium, tellurium, and thallium is required. If no class is indicated, Class 1 shall apply.

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2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

ARP1313 Determination of Trace Elements in High-Temperature Alloys

3. TECHNICAL REQUIREMENTS:

3.1 When this specification is invoked, the elements for which control is required shall not exceed the limits shown in Table 1, as applicable to the class specified. These requirements supplement those of the applicable material specification. No check analysis limits apply to these elements.

3.1.1 Both Classes:

TABLE 1 - Trace Element Control

Element	Max Limit Percent	Max Limit ppm
Lead	0.0005	5
Bismuth	0.00005	0.5
Selenium	0.0003	3
Tellurium	0.00005	0.5
Thallium	0.0005	5

3.1.2 Class 2: When this class is specified, the following additional elements shall not exceed 0.005% (50 ppm) each and the total of all these elements shall not exceed 0.040% (400 ppm):

Antimony	Gold	Sodium
Arsenic	Indium	Thorium
Cadmium	Mercury	Tin
Gallium	Potassium	Uranium
Germanium	Silver	Zinc

3.2 Analytical Procedures:

The analytical procedures for determining conformance of a product to the requirements of this specification and the methods of obtaining or producing standards on which the analytical results are based shall be as agreed upon by purchaser and vendor (See 8.4). ARP1313 details methods which may be used for determining the elements listed in 3.1.1 and 3.1.2.

3.2.1 The following methods, not detailed in ARP1313, may also be considered acceptable (See 8.5); these procedures are not listed in any order of preference:

- Emission spectrography by other techniques
- Mass spectrography techniques
- Polarographic techniques
- Ultraviolet or visible spectrophotometry

4. QUALITY ASSURANCE PROVISIONS:

Shall be as specified in the applicable material specification and as follows:

4.1 Reports:

The report of composition required by the material specification shall also include the actual amounts found for each trace element required to be determined by the class specified.

4.2 Approval:

The method to be used for determination of each trace element in each alloy shall be established by agreement between purchaser and vendor. Once established, no change in analytical technique or detailed procedure shall be made without reapproval by purchaser.

5. PREPARATION FOR DELIVERY:

Not applicable.

6. ACKNOWLEDGMENT:

A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS:

Product not conforming to this specification, or to modifications authorized by purchaser, will be subject to rejection.