

Trace Element Control  
Nickel Alloy Castings

RATIONALE

AMS 2280B is a Five Year Review and update of this specification.

1. SCOPE

1.1 Purpose

This specification establishes maximum permissible limits for trace elements in nickel alloy castings.

1.2 Application

These products have been used typically 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, but usage is not limited to such applications.

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 shall be indicated by this specification number and a suffix number indicating the class. For example, AMS 2280-1 indicates 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 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), or [www.sae.org](http://www.sae.org).

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 0.0050% (50 ppm) each and the total of all these elements shall not exceed 0.0400% (400 ppm):

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

## 3.2 Analytical Procedures

Determination of conformance to 3.1.1 and 3.1.2 shall be in accordance with ARP1313, methods listed in 3.2.1, or by other analytical methods acceptable to purchaser.

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

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