AN AMERICAN NATIONAL STANDARD

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 2280

Issued 6-15-75
Revised

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 four 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 3.1.3)
Class 3 - Lead and Bismuth
Class 4 - Lead, Bismuth, and Others (See 3.1.3)

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.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Recommended Practices (ARP) shall apply.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pennsylvania 15096.

2.1.1 Aerospace Recommended Practices:

ARP 1313 - 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 specified herein, as applicable to the class specified. These requirements supplement those of the applicable material specification. No check analysis limits apply to these elements. The elements requiring control and the limit for each shall be as follows for the classes shown:

REAFFIRMED
APR 1984

Printed in U.S.A.

3.1.1 All Classes:

Element	Limit Percent	Limit ppm
Lead	0.0005	5
Bismuth	0.00005	0.5

3.1.2 Classes 1 and 2:

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

3.1.3 Classes 2 and 4: When either of these classes is specified, the following 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 8.3). ARP 1313 details methods which may be used for determining the elements listed in 3.1.1 and 3.1.2.

3.2.1.1 The following methods, not detailed in ARP 1313, may also be considered acceptable (See 8.4); these procedures are not listed in any order of preference:

Flame atomic absorption techniques
Emission spectrography by other techniques
Mass spectrography techniques
X-Ray fluorescence 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 the purchaser.

5. PREPARATION FOR DELIVERY: Not applicable.

6. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.