



AEROSPACE RECOMMENDED PRACTICE

ARP1313**REV. D**

Issued	1975-06
Reaffirmed	2000-10
Revised	2009-07
Stabilized	2014-11

Superseding ARP1313C

Determination of Trace Elements in High Temperature Alloys

RATIONALE

ARP1313D stabilizes this document because equivalent technical requirements are contained in AMS2280.

STABILIZED NOTICE

ARP1313D has been declared "STABILIZED" by AMS Committee F. This document will no longer be updated and may no longer represent standard industry practice. This document was stabilized because it contains requirements which are no longer state of the art and are also contained in other documents that contain equivalent requirements. Previously this document was "REVISED". The last technical update of this document occurred in July, 2009. Users of this document should refer to the cognizant engineering organization for disposition of any issue with reports/certifications to this recommended practice, including exceptions listed on the certification. NOTE: In many cases, the purchaser may represent a sub tier supplier and not the cognizant engineering organization.

AMS Committee F recommends that the following technically equivalent specification be used for future procurement. This listing does not constitute authority to substitute this specification for the "STABILIZED" document.

AMS2280 Trace Element Control, Nickel Alloy Castings

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1. SCOPE

This SAE Aerospace Recommended Practice (ARP) describes procedures for the determination of trace elements listed in AMS2280 for Nickel, Cobalt, and Iron-based high temperature alloys.

1.1 Safety-Hazardous Materials

While the materials, methods, applications and processes described or referenced in this procedure may involve the use of hazardous materials, this document does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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.

AMS2280 Trace Element Control, Nickel Alloy Castings

2.2 The following literature is cited as background on the development of the analytical procedures described herein:

2.2.1 Background Correction Techniques

Slavin, W., Carnick, G. R., "CRC Critical Rev. Anal. Chem." 19 (1988) 95-134

2.2.2 Solution GFAAS Method

Welcher, G. G., Kriege, O. H., Marks, J. Y., "Anal. Chem." 46 (1974) 1227-1231

Sotera, J. J., Cristiano, L. C., Conley, M. K., Kahn, H. L., "Anal. Chem." 55 (1983) 204-208

2.2.3 Solid GFAAS Method

Marks, J. Y., Welcher, G. G., Spellman, R. J., "Applied Spectroscopy" 31 (1977) 9-11

Irwin, R., Mikkelsen, A., Michel, R. G., Dougherty, J. P., Preli, F. R., "Spectrochim Acta, Part B" 45B (1990) 903-915

2.2.4 Relevant 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.

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| ASTM E50 | Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals |
| ASTM E135 | Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials |
| ASTM E353 | Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys |
| ASTM E354 | Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys |
| ASTM E1184 | Electrothermal (Graphite Furnace) Atomic Absorption Analysis |
| ASTM E1361 | Correction of Inter-element Effects in X-Ray Spectrometric Analysis |
| ASTM E1473 | Chemical Analysis of Nickel, Cobalt, and High-Temperature Alloys |
| ASTM E1621 | X-Ray Emission Spectrometric Analysis |
| ASTM E1770 | Practice for Optimization of Electrothermal Atomic Absorption Spectrometric Equipment |
| ASTM E1834 | Determination of Lead in Nickel Alloys by Electrothermal Atomic Absorption Spectrometric Method |
| ASTM E1835 | Analysis of Nickel Alloys by Flame Atomic Absorption Spectrometry |

3. INSTRUMENT AND TEST METHOD REQUIREMENTS

3.1 Known methods of measuring the elements listed in AMS2280, at trace levels, are listed below. Other analytical methods acceptable to purchaser may be used.

- 3.1.1 Atomic Absorption (Graphite Furnace and Flame)
- 3.1.2 Inductively Coupled Plasma Optical Emission Spectrometry
- 3.1.3 Inductively Coupled Plasma Mass Spectrometry
- 3.1.4 Glow Discharge Mass Spectrometry
- 3.1.5 Glow Discharge Optical Emission Spectrometry
- 3.1.6 Hollow Cathode Optical Emission Spectrometry