

# AEROSPACE MATERIAL SPECIFICATION

AMS 2248F

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Superseding AMS 2248E

Chemical Check Analysis Limits  
Corrosion and Heat-Resistant Steels and Alloys, Maraging and  
Other Highly-Alloyed Steels, and Iron Alloys

## RATIONALE

AMS 2248F is a Five Year Review and update of this specification.

### 1. SCOPE

1.1 This specification defines limits of variation for determining acceptability of composition of cast and wrought corrosion and heat-resistant steels and alloys, maraging and other highly alloyed steels, and iron alloy parts and materials acquired from a producer.

1.1.1 Check limits for elements or for ranges of elements not listed herein shall be as specified in the applicable material specification or as agreed upon by purchaser and producer.

### 1.2 Application

1.2.1 When specifically referenced in the material specification, the purchaser may apply check analysis limits to determine the acceptability of parts and materials at purchaser's final acceptance or verification testing operation.

1.2.2 Check analysis limits are not for producer's use at producer's acceptance testing.

### 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 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](http://www.astm.org).

ASTM E 1806 Standard Practice for Sampling Steel and Iron for Determination of Chemical Composition

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### 3. TECHNICAL REQUIREMENTS

#### 3.1 Analytical Procedures

Referee analysis shall be by any method acceptable to purchaser and vendor.

#### 3.2 Check Analysis Limits

Shall be as shown in Table 1.

TABLE 1 - CHECK ANALYSIS VARIATION LIMITS

Element	Upper Limit or Max of Specified Range, %	Variation Under min	Variation Over max
Carbon	Up to 0.010, incl	0.002	0.002
	Over 0.010 to 0.030, incl	0.005	0.005
	Over 0.030 to 0.20, incl	0.01	0.01
	Over 0.20 to 0.60, incl	0.02	0.02
	Over 0.60 to 1.20, incl	0.03	0.03
Manganese	Up to 1.00, incl	0.03	0.03
	Over 1.00 to 3.00, incl	0.04	0.04
	Over 3.00 to 6.00, incl	0.05	0.05
	Over 6.00 to 10.00, incl	0.06	0.06
	Over 10.00 to 15.00, incl	0.10	0.10
	Over 15.00 to 20.00, incl	0.15	0.15
Silicon	Up to 1.00, incl	0.05	0.05
	Over 1.00 to 3.00, incl	0.10	0.10
Phosphorus	Up to 0.040, incl	0.005	0.005
	Over 0.040 to 0.20, incl	0.010	0.010
Sulfur	Up to 0.040, incl	0.005	0.005
	Over 0.040 to 0.20, incl	0.010	0.010
	Over 0.20 to 0.50, incl	0.020	0.020
Chromium	Up to 0.90, incl	0.03	0.03
	Over 0.90 to 2.10, incl	0.05	0.05
	Over 2.10 to 10.00, incl	0.10	0.10
	Over 10.00 to 15.00, incl	0.15	0.15
	Over 15.00 to 20.00, incl	0.20	0.20
	Over 20.00 to 30.00, incl	0.25	0.25
Nickel	Up to 1.00, incl	0.03	0.03
	Over 1.00 to 5.00, incl	0.07	0.07
	Over 5.00 to 10.00, incl	0.10	0.10
	Over 10.00 to 20.00, incl	0.15	0.15
	Over 20.00 to 30.00, incl	0.20	0.20
	Over 30.00 to 40.00, incl	0.25	0.25
	Over 40.00	0.30	0.30

TABLE 1 - CHECK ANALYSIS VARIATION LIMITS (CONTINUED)

Element	Upper Limit or Max of Specified Range, %	Variation Under min	Variation Over max
Cobalt	Over 0.05 to 0.50, incl	0.01	0.01
	Over 0.50 to 2.00, incl	0.02	0.02
	Over 2.00 to 5.00, incl	0.05	0.05
	Over 5.00 to 10.00, incl	0.10	0.10
	Over 10.00 to 15.00, incl	0.15	0.15
	Over 15.00 to 22.00, incl	0.20	0.20
	Over 22.00 to 30.00, incl	0.25	0.25
Molybdenum	Over 0.20 to 0.60, incl	0.03	0.03
	Over 0.60 to 2.00, incl	0.05	0.05
	Over 2.00 to 7.00, incl	0.10	0.10
	Over 7.00 to 15.00, incl	0.15	0.15
	Over 15.00 to 30.00, incl	0.20	0.20
Tungsten	Up to 1.00, incl	0.03	0.03
	Over 1.00 to 2.00, incl	0.05	0.05
	Over 2.00 to 5.00, incl	0.07	0.07
	Over 5.00 to 10.00, incl	0.10	0.10
	Over 10.00 to 20.00, incl	0.15	0.15
Columbium (Niobium)	Up to 1.50, incl	0.05	0.05
	Over 1.50 to 5.00, incl	0.10	0.10
	Over 5.00	0.15	0.15
Titanium	Up to 1.00, incl	0.05	0.05
	Over 1.00 to 3.00, incl	0.07	0.07
	Over 3.00	0.10	0.10
Tantalum	Up to 0.10, incl	0.02	0.02
Aluminum	Up to 0.15, incl	0.005	0.01
	Over 0.15 to 0.50, incl	0.05	0.05
	Over 0.50 to 2.00, incl	0.10	0.10
	Over 2.00 to 5.00, incl	0.20	0.20
	Over 5.00 to 10.00, incl	0.35	0.35
Nitrogen	Up to 0.02, incl	0.005	0.005
	Over 0.02 to 0.19, incl	0.01	0.01
	Over 0.19 to 0.25, incl	0.02	0.02
	Over 0.25 to 0.35, incl	0.03	0.03
	Over 0.35 to 0.45, incl	0.04	0.04
Boron	0.001 to 0.010, incl	0.0004	0.001
	Over 0.01 to 0.12, incl	0.005	0.01
Selenium	All	0.03	0.03
Iron	Up to 1.00, incl	0.03	0.03
	Over 1.00 to 2.50, incl	0.05	0.05
	Over 2.50 to 5.00, incl	0.07	0.07
	Over 5.00 to 10.00, incl	0.10	0.10
	Over 10.00 to 15.00, incl	0.15	0.15
	Over 15.00 to 30.00, incl	0.25	0.25

TABLE 1 - CHECK ANALYSIS VARIATION LIMITS (CONTINUED)

Element	Upper Limit or Max of Specified Range, %	Variation Under min	Variation Over max
Copper	Up to 0.50, incl	0.03	0.03
	Over 0.50 to 1.00, incl	0.05	0.05
	Over 1.00 to 3.00, incl	0.10	0.10
	Over 3.00 to 5.00, incl	0.15	0.15
	Over 5.00 to 10.00, incl	0.20	0.20
Vanadium	Up to 0.50, incl	0.03	0.03
	Over 0.50 to 1.50, incl	0.05	0.05
Zirconium	Up to 0.10, incl	0.000	0.02
	Over 0.10	0.05	0.05
Tin	Up to 0.05, incl	0.005	0.01
Oxygen	Up to 0.010, incl	--	0.005

#### 4. QUALITY ASSURANCE PROVISIONS

##### 4.1 Sampling

For the purpose of determining conformance to the material specification composition requirement, each heat or lot in a shipment shall be considered separately. All samples shall be taken from product in the condition in which it is received except that all protective surface treatments shall be removed before sampling finished parts. Sample material shall be free from scale, grease, dirt, and other foreign materials, and shall be taken in a manner to prevent alteration of the chemical composition of the sample. If finished parts are too hard for machining, they may be tempered in a protective atmosphere prior to sampling. Sampling shall be in accordance with ASTM E 1806, insofar as practical.

#### 5. PREPARATION FOR DELIVERY

Not applicable.

#### 6. ACKNOWLEDGMENT

Not applicable.

#### 7. REJECTIONS

Not applicable.

#### 8. NOTES

8.1 A change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this specification. An (R) symbol to the left of the document title indicates a complete revision of the specification, including technical revisions. Change bars and (R) are not used in original publications, nor in specifications that contain editorial changes only.

8.2 In the analysis of finished parts, check limits do not apply to elements whose percentage can be varied by fabricating techniques employed by purchaser (for example, carbon in steel) unless sample is taken in a manner which excludes such changes.