SAE INTERNATIONAL

AEROSPACE STANDARD

AS6279™ REV. C

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Superseding AS6279B

Standard Practice for Production, Distribution, and Procurement of Metal Stock

RATIONALE

AS6279C results from a Five-Year Review and update of this specification with changes to relocate Definitions (see 2.2) and updates to Applicable Documents (see Section 2), Additional Heat Treatment (see 3.1.4), and Producer Identification to MMPDS (see Figure 4).

1. SCOPE

This SAE Aerospace Standard (AS) establishes requirements applicable to metal stock that is ordered and produced in accordance with an SAE Aerospace Material Specification (AMS). Topics include producer requirements, distributor requirements, size and grain orientation nomenclature, and purchaser ordering information to distributors. Requirements of this document have been developed to address titanium and titanium alloys, aluminum and aluminum alloys, carbon and alloy steels, and corrosion- and heat-resistant alloys.

2. REFERENCES

2.1 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.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2772 Heat Treatment of Aluminum Alloy Raw Materials

AS7766 Terms Used in Aerospace Metals Specifications

AS9100 Quality Management Systems - Requirements for Aviation, Space, and Defense Organizations

AS9120 Quality Management Systems - Requirements for Aviation, Space, and Defense Distributors

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

For more information on this standard, visit
https://www.sae.org/standards/content/AS6279C

2.1.2 MMPDS Publications

Available from Battelle, 505 King Avenue, Columbus, OH 43201, Tel: 614-424-6557, https://www.mmpds.org/.

Metallic Materials Properties Development and Standardization Handbook

2.1.3 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.

ASTM E29 Using Significant Digits in Test Data to Determine Conformance with Specifications

2.2 Definitions

Terms used in AMS are defined in AS7766 and the following:

2.2.1 METAL STOCK

This includes the following wrought product forms: bar, rod, wire, plate, sheet, strip, billet, extruded shapes, drawn shapes, and mechanical tube. It does not include castings, sintered powder metal parts, forgings, seamless tubing, or welded tubing. Bar-shaped stock produced by a forging process is defined as bar and addressed by this standard as a metal stock product form.

3. REQUIREMENTS

3.1 General Requirements

3.1.1 Traceability

3.1.1.1 Source of Production

Material shall be traceable to source of production (e.g., producer name and heat number). This traceability shall be maintained throughout the metal production process (including melting of ingot, conversion to billet, production of metal stock, warehousing, and distribution). Material, regardless of form, that cannot be traced back to its producer shall not be certified as compliant to this AS.

3.1.1.2 Product Size and Grain Orientation

Producers, distributors, and purchasers shall maintain traceability to producer's heat and lot, product size, and corresponding grain orientation (see 3.1.7).

3.1.2 Responsibility for Certification

The producer is the organization responsible for operations performed by the processing and testing entities, but it is not required that all or any processing and testing be performed in-house by the producer. The producer takes responsibility that the material meets the specification. Whenever the material owner authorizes thermomechanical processing to change the certified material gauge/condition/specification, they become the producer and are responsible for the testing and certification to that new dimension/condition/specification and become responsible for all producer requirements (see 3.2).

3.1.2.1 The requirements of 3.2.4 apply when heat treatment is the only subsequent process performed (see 3.1.4, 3.3.5, and 3.3.5.1).

3.1.3 Revision of Material Certification

Only the producer that created a material certification document can amend that document (e.g., amend a material certification to an alternate revision).

3.1.4 Additional Heat Treatment

After product is certified to comply with an AMS material specification, it is permitted to perform heat treatment or temper conversion that results in compliance with a different final AMS material specification. Heat-treatment processes shall be in accordance with the applicable final AMS material specification. All acceptance tests of the applicable material specification shall be performed in the final heat-treat condition, except that the following are not required to be retested: composition, macrostructure and ultrasonic inspection. A report shall document processes performed and test results and shall certify compliance with the different AMS material specification. The material owner shall coordinate the final heat treatment, generate a new material certification, and take responsibility for compliance (see 3.1.2, 3.2.2, 3.3.5, 6.2, and 6.3).

3.1.4.1 Applicable to titanium and titanium alloys only: Hydrogen content shall be tested in the final heat-treat condition after chemical processing (e.g., pickling, etching, and chemical milling), hot working, or heat treatment of the product.

3.1.5 Material Substitution

3.1.5.1 Product form shall not be substituted unless specifically authorized in writing by the cognizant engineering organization.

3.1.5.2 Altering the produced and certified short transverse (ST) gauge (e.g., thickness, diameter) is considered a material substitution and is prohibited unless specifically authorized in the material specification or flowed down as a requirement by the cognizant engineering organization.

3.1.5.3 Requirements applicable to produced size dimensions versus supplied cut size dimensions are provided in 3.3.6.

3.1.6 Dimensional Limits

When product gauge (i.e., thickness, diameter, etc.) establishes the requirements for tensile properties or other properties required by technical requirements (e.g., Section 3) of the material specification, the size shall be determined by the size certified by the producer.

3.1.7 Grain Orientation Requirements

3.1.7.1 Grain nomenclature (e.g., ST, LT, and L) shall be assigned by the producer and maintained by distributors and subsequent purchasers to the applicable dimension (example: 2 inches ST x 3 inches LT x 120 inches L). For round, square, hexagonal, and similar shapes, T and L are the applicable grain orientations. Other designations, such as DIA, SQ, HEX, or similar, are acceptable as equivalent to T.

3.1.7.2 Product size and corresponding grain orientations shall be reported on certifications and reports (see Figure 5). Dimensions shall be in inches unless specified otherwise.

3.2 Producer Requirements

3.2.1 Documented Practices

The producer shall ensure that each key operation is performed to a documented process in accordance with AS9100.

3.2.1.1 Process control parameters are considered proprietary and may be assigned a code designation. Each variation in such parameters shall be assigned a modified code designation. Evidence of the process control shall be available for purchaser's review/audit at the processor's facility.

3.2.2 Quality System Accreditation

Producers shall be accredited to AS9100 or otherwise approved by the cognizant engineering organization.

3.2.3 Inspection and Test Records

The producer shall maintain records of inspections and tests for material certified as compliant to this AS. This data shall be available for purchaser's review for a minimum of 5 years from date of shipment.

3.2.4 MMPDS Participation

Producers shall identify themselves to MMPDS (see 2.1.2) at a frequency not to exceed 5 years (see Figure 4). A copy of the email sent to the MMPDS secretariat is an acceptable record of compliance with this requirement.

3.3 Distributor Requirements

3.3.1 Quality System Accreditation

Distributors shall be accredited to AS9100 or AS9120, or otherwise approved by the cognizant engineering organization.

3.3.2 Each material certification received by a distributor shall be reviewed to verify that all required acceptance tests as specified in the material specification and any additional requirements flowed down from the cognizant engineering organization are acceptable prior to shipment to the purchaser. Review of material certifications shall include examination for conformance to traceability requirements (see 3.1.1).

3.3.3 Distributor Report

The distributor report shall include the items listed in Figure 1.

3.3.4 Ordering Information Required from Purchasers

In addition to the details itemized in the applicable AMS material specification, the distributor shall request complete ordering information (see Figure 2) from the purchaser.

3.3.5 Distributor Reporting

3.3.5.1 The material certification report that attests compliance to an AMS material specification shall not be altered and shall be created only by the producer (see 3.1.2). Distributors shall not create an AMS material certification report unless the company is taking complete responsibility as the material producer.

3.3.5.2 Exception: A distributor taking responsibility as the producer.

3.3.5.2.1 The distributor shall take responsibility as a producer when they coordinate heat treatment performed in accordance with 3.1.4.

3.3.5.2.2 When the distributor takes responsibility as a producer where material processing results in compliance with a different AMS material specification, product shall be identified to remain traceable to the original certified melt number or heat number and also traceable to the subsequent producer material certification report.

3.3.6 Distributor Responsibility

3.3.6.1 The distributor is permitted to perform and separately certify the following operations to satisfy requirements specified by the purchaser of the material:

3.3.6.1.1 The distributor may straighten or level to produce straight or flat product from coil stock (i.e., produce straight rod from coiled stock, produce flat sheet from coil stock, etc.). The distributor shall comply with dimensional tolerance requirements of the material specification, including flatness tolerance of product straightened or leveled from coiled stock.

3.3.6.1.2 Altering the produced and certified short transverse (ST) gauge (e.g., thickness, diameter) by cutting in a plane perpendicular to the ST dimension (perpendicular to the ST direction) or any other operation to achieve the ordered thickness is prohibited unless the operation is permitted by the material specification (e.g., 3.X Condition section in the applicable AMS material specification) or is flowed down as a requirement by the cognizant engineering organization. (See example in Figure 5C.) This restriction applies to all ST designations, including thickness, diameter, hex, and other similar designations.

3.3.6.1.3 The distributor may cut the L and LT dimensions (perpendicular to the longitudinal and long transverse directions) to produce the as-ordered size, subject to restrictions in the following paragraphs. (See examples in Figures 5B and 5D.)

3.3.6.1.3.1 Grain orientation shall be marked on cut sizes of flat stock (e.g., plate, sheet, and rectangular bar).

3.3.6.1.3.2 Product form shall not be substituted. Examples include, but are not limited to:

3.3.6.1.3.2.1 Cut plate shall not be supplied when bar is specified or required by the AMS specification.

3.3.6.1.3.2.2 Bar shall not be supplied when plate is specified or required by the AMS specification.

3.3.6.1.3.2.3 Cast material shall not be supplied when wrought product (i.e., bar, plate, rolled plate, hot-finished plate, etc.) is specified or required by the AMS specification.

3.3.6.1.3.3 Requirements of the material specification apply to the as-produced product cross section, not to the cross-section dimensions of the distributor-supplied product.

3.3.6.1.3.4 Rectangular bar may be cut in the LT dimension (perpendicular to the long transverse direction) to supply smaller-width bar unless it is restricted by material specification because of width or cross-sectional area. (See example in Figure 5B.)

3.3.6.1.4 Cutting processes that result in a heat-affected zone (i.e., EDM, laser cutting, flame cutting, plasma cutting, or other thermal cutting processes) are permitted only when it is confirmed that subsequent metal removal will exceed 0.100 inch or is otherwise approved by the cognizant engineering organization.

3.3.6.1.5 Applicable to titanium and titanium alloys only:

3.3.6.1.5.1 Chemical milling, etching, or pickling shall not be used for applications other than alpha case removal or for pre-penetrant etch unless approved by the cognizant engineering organization.

3.3.6.1.5.2 Final hydrogen test requirement applies after chemical processing (see 3.1.4.1).

3.4 Purchaser Requirements

3.4.1 Flow Down of Requirements

Purchasers shall flow down any applicable requirements received from their upper-tier customer(s).

3.4.2 Requests for quotation and purchase orders shall contain complete ordering information (see 5.1 and 5.2).

3.4.3 Each material certification received by a purchaser shall be reviewed to verify that all requirements of the purchase order and any additional requirements flowed down from the cognizant engineering organization are acceptable. Review of material certifications shall include examination for conformance to traceability requirements (see 3.1.1).

4. CERTIFICATIONS AND REPORTS

4.1 Producer Certifications

4.1.1 Certification Responsibility

The producer is the entity that certifies compliance to an AMS material specification. No other organization has the authority to create or alter the producer certification report.

4.1.2 AMS producer certifications shall clearly distinguish “supplied-condition” data from “response to heat treat” data.

4.1.3 Producer Certification

The producer shall certify: “[Business Name] has complied with all producer requirements of AS6279.”

4.2 Distributor Reports

The distributor shall provide a report that contains the information listed in Figure 1.

4.3 Purchaser Report

Purchasers, including parts fabricators, that are required to comply with this document shall certify: “[Purchaser Business Name] has complied with all purchaser requirements of AS6279.”

5. PURCHASER ORDERING INFORMATION

5.1 Orders from purchasers to producers shall contain the ordering information listed in the applicable AMS.

5.2 Orders from purchasers to distributors shall contain the ordering information listed in Figure 2.

1. AMS material specification number (or other material specification) and revision identifier.
2. Alloy.
3. Temper or heat-treat condition, as supplied.
4. Data that establishes traceability to producer certification (producer name, lot number, etc.).
5. Product form (i.e., bar, plate, etc.).
6. Produced size, as stated on producer certification.
7. Distributor's supplied size, quantity, unit of measure (i.e., linear feet, square feet, number of pieces for cut sizes, etc.), and grain orientation nomenclature, as applicable, and the process used to produce this size.
8. Purchaser name and address.
9. Statement that material complies with the purchaser's as-ordered requirements.
10. Statement that material is traceable to heat/lot and grain direction through receipt from producer through delivery to purchaser.
11. Copy of the original unaltered AMS material certification report from the producer.
12. Certification of the following processes, if performed (or subcontracted) by the distributor:
    a. When heat treatment is performed, a copy of the heat-treat process certification and a copy of the test report for heat-treated material shall be provided.
    b. When nondestructive inspection or materials testing is performed, a copy of the test results shall be provided.
    c. Other special processes performed, when specified.
13. Statement: "[Distributor Business Name] has complied with all distributor requirements of AS6279" and [select one] "ST cutting, grinding, or other gauge altering operation has been performed" or "ST gauge has not been altered."

Figure 1 - Information on distributor reports

1. Material specification, including revision identifier when a compliance with a specific revision is required.
2. Alloy.
3. Temper or heat-treat condition.
4. Product form.
5. Quantity and unit of measure (i.e., linear feet, square feet, number of pieces for cut sizes, etc.).
6. The purchaser shall flow down any applicable requirements received from the CEO, including any applicable engineering definition requirements.
7. Size to be supplied and grain orientation. When grain orientation is not applicable, the order shall state “No grain orientation requirements apply.”
8. Maximum allowable gauge per CEO requirements. When maximum allowable gauge is not specified, the material supplied shall be the mill-produced gauge.
9. When the specified size exceeds the size range covered by the AMS, the order shall include the following:
    a. Mechanical property requirements.
    b. All other supplemental test requirements applicable to the order or the statement “No other tests are required.”
10. Other services to be provided by the distributor.

Figure 2 - Purchaser ordering information