



# AEROSPACE STANDARD

**AS23190™****REV. D**

Issued 1998-08  
Reaffirmed 2004-02  
Revised 2020-11

Superseding AS23190C

Wiring, Positioning, and Support Accessories

FSC 5975

## RATIONALE

An alternate acceptance method for weather-stabilized nylon 66 is added to allow for qualification of materials not in compliance with PA0191 in ASTM D4066. ASTM A580/A580M is added as there is no current reference specification for stainless steel barbs. Also removed reference revision level to ASTM D4066.

### 1. SCOPE

AS23190 is a procurement specification that covers a series of plastic and metal components and devices used for the tying, positioning, and supporting cable, cable assemblies, wire, and wire bundles in electrical, electronic, and communication equipment, and in interconnection systems.

#### 1.1 Classification

Components for cable harness tying and support shall be of the following types and classes, as specified (see 6.5):

Type I - Strap, Tie Down, Adjustable, Plastic

Type II - Strap, Tie Down, Identification, Adjustable, Plastic

Type III - Clamp, Loop, Plastic, Wire Support

Type IV - Plastic Mounting Hardware for Type I and Type II Straps

Type V - Clamp, Loop, Cushioned, Metal, Wire Support

Type VI - Strap, Tie Down, Adjustable, Metal

Class 1 - Components which conform to all the requirements and the applicable detail specification.

Class 2 - Components which conform to the material, marking and performance requirements, are replaceable by Class 1 components and, where applicable, installed with a tool recommended by the component manufacturer. Class 2 components shall be within the envelope dimensions of the replacement Class 1 components.

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

|            |                                                                                                                                                                                |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AIR1351    | Manufacturers' Identification of Aerospace Electrical and Electronic Wiring Devices and Accessories                                                                            |
| AS14243*   | Clamp, Loop, Nylon, Metric                                                                                                                                                     |
| AS14487*   | Clamp, Loop, Plastic, Wire Support, Metric                                                                                                                                     |
| AS14488*   | Clamp, Loop, Plastic, Wire Support, Ribbed Inner Diameter, Metric                                                                                                              |
| AS23190/1* | Straps, Clamps, and Mounting Hardware, Plastic for Cable Harness Tying and Support Clamp, Loop, Nylon, Adjustable, Wire Support, Type III, Class 1                             |
| AS23190/2* | Straps, Clamps, Plastic and Metal, and Mounting Hardware, Plastic for Cable Harness Tying and Support Clamp, Loop, Metal, Cushioned, Adjustable, Wire Support, Type V, Class 1 |
| AS23190/3* | Straps, Clamps, and Mounting Hardware, Plastic and Metal for Cable Harness Tying and Support Strap, Tie Down, Adjustable, Corrosion Resistant Steel, Type VI, Class 1          |
| AS23190/4* | Mounting Hardware, Cushion Clamp, Metal for Cable Harness Tying and Support, Type V, Class 1                                                                                   |
| AS25281*   | Clamp, Loop, Plastic, Wire Support                                                                                                                                             |
| AS33391*   | Plate, Mounting, Plastic for Use with MS3367 Plastic Tiedown Straps                                                                                                            |
| AS33401*   | Bulkhead Bracket for Use with MS3367 Plastic Tiedown Straps                                                                                                                    |
| AS33411*   | Bracket, Mounting, Plastic for Use with MS3367 Plastic Tiedown Straps                                                                                                          |
| AS33671*   | Strap, Tiedown, Electrical Components, Adjustable, Self-Clinching, Plastic, Type I, Class 1                                                                                    |
| AS33681*   | Strap, Tiedown, Electrical Components, Identification, Adjustable, Self-Clinching, Plastic, Type II, Class 1                                                                   |
| AS50881    | Wiring, Aerospace Vehicle                                                                                                                                                      |
| AS90387    | Wiring Installation Tools for Plastic and Metal Tiedown Straps                                                                                                                 |

\* AS23190 detail specifications (see 3.1).

### 2.1.2 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

|                |                                                                     |
|----------------|---------------------------------------------------------------------|
| TT-I-735       | Isopropyl Alcohol                                                   |
| MIL-DTL-5624   | Turbine Fuel, Aviation, Grades JP-4 and JP-5                        |
| MIL-PRF-5606   | Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance    |
| MIL-P-46183    | Plastic Molding and Extrusion Material, Polyetheretherketone (PEEK) |
| MIL-PRF-7808   | Lubricating Oil, Aircraft Turbine Engine, Synthetic Base            |
| MIL-STD-129    | Military Marking for Shipment and Storage                           |
| MIL-STD-202    | Test Methods for Electronic and Electrical Components Parts         |
| MIL-STD-2073-1 | Military Packaging, Standard Practice for                           |
| SD-6           | Provisions Governing Qualification                                  |

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

|                   |                                                                                                                       |
|-------------------|-----------------------------------------------------------------------------------------------------------------------|
| ASTM A240/A240M   | Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications |
| ASTM A580/A580M   | Standard Specification for Stainless Steel Wire                                                                       |
| ASTM A666         | Annealed or Cold Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar                                   |
| ASTM D1974/D1974M | Standard Practice for Method of Closing, Sealing, and Reinforcing Fiberboard Shipping Containers                      |
| ASTM D3159        | Modified ETFE-Fluoropolymer Molding and Extrusion Materials                                                           |
| ASTM D3951        | Standard Practices Commercial Packaging                                                                               |
| ASTM D4066        | Nylon, Injection and Extrusion Materials (PA)                                                                         |

### 2.1.4 National Conference of Standards Laboratories (NCSL) Publications

Available from NCSL International, 2995 Wilderness Place, Suite 107, Boulder, CO 80301, Tel: 303-440-3339, [www.ncsli.org](http://www.ncsli.org).

NCSL Z540.3 General Requirements for Calibration Laboratories and Measuring and Test Equipment

### 2.1.5 ASQ Publications

Available from American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203, Tel: 800-248-1946 (United States or Canada), 001-800-514-1564 (Mexico), or +1-414-272-8575 (all other locations), [www.asq.org](http://www.asq.org).

ASQC Z1.4 Sampling Procedures and Tables for Inspection by Attributes

## 2.1.6 ISO Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ISO 4892-2      Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc

## 2.2 Definitions

The following definitions apply to this specification:

**REWORKED PLASTIC:** Reworked plastic is defined as plastic from a processor's own production that has been reground, pelletized, or solvated after having been previously processed by molding, extrusion, or other manufacturing processes.

**CRITICAL DEFECTS:** A critical defect is a defect that judgment and experience indicate would result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the product, or a defect that judgment and experience indicate is likely to prevent performance of the actual function of a major end item such as a ship, aircraft, tank, missile, or space vehicle.

**DEFECT:** A defect is any nonconformance of the unit of product with specified requirements.

**MAJOR DEFECT:** A major defect is a defect, other than critical, that is likely to result in failure, or to reduce the usability of the unit of product for its intended purpose.

**MINOR DEFECT:** A minor defect is a defect that is not likely to reduce materially the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.

**QUALIFICATION INSPECTION:** Qualification Inspection is a process that demonstrates that a component is capable of fully conforming to all the requirements defined in a standard. Qualification Inspection includes definition of the measurements, tests, analysis, and associated data which provides consistent rationale for acceptance of a particular supplier's design as meeting the standard requirements, typically prior to acquisition by the Purchaser.

**QUALIFIED PRODUCTS LIST:** A Qualified Products List is a list of suppliers whose products have been evaluated to a defined process and who are authorized to provide those products to a purchaser upon request. When a Qualified Products List is specified, only approved suppliers are authorized to provide products under the part number defined in the component standard. A Qualified Products List is established and maintained by a Qualifying Activity.

**QUALIFYING ACTIVITY:** A Qualifying Activity is a function established by a Purchaser or group of Purchasers that has a defined process used to consistently evaluate all Suppliers' products in accordance with the component standard.

**QUALITY CONFORMANCE INSPECTION:** Quality Conformance Inspection is a process which includes measurements, non-destructive tests, analysis, and associated data that will provide verification that a particular individual component continually conforms to the requirements defined in the standard.

**QUALIFICATION BY SIMILARITY:** An alternative Qualification Inspection process accomplished without completing all of the measurements, tests, and analysis requirements defined in the standard. Acceptance, and the extent of similarity, is determined by the qualifying activity, and is established through rationale that verifies that certain design features are identical to those being required to be tested or of a previously qualified component to the extent necessary to assure that the component, if tested, would meet all of the required criteria. When a Qualified Products List is being established the qualification by similarity rationale shall be approved by the purchaser or qualifying activity prior to initiation of the remaining portions of the Qualification Inspection process.

**PURCHASER:** A purchaser is an activity that can issue a purchase order or contract.

**SUPPLIER:** A supplier is a manufacturer or a value added manufacturer which has design and production control of the processes used to produce the final component in accordance with the standard.

### 3. REQUIREMENTS

#### 3.1 Detail Specification Requirements

The components requirements shall be as specified herein and in accordance with the applicable detail specification. In the event of any conflict between the requirements of this specification and the detail specification, the latter shall govern (see 2.1).

3.1.1 The maximum operating temperature for the component shall be as specified in the applicable detail specification.

#### 3.2 Qualification (see 4.5)

The components shall be a product that has been tested and has passed the qualification tests specified herein, and has been listed on or approved for listing on the applicable Qualified Products List (see 6.9).

#### 3.3 Materials (see 4.7.1)

Materials shall be fungus resistant, noncorrosive, and as specified in the detail specification. When a definite material is not specified, a material shall be used which will enable the component to meet the performance requirements. Acceptance or approval of any constituent material shall not be construed as a guarantee for acceptance of the finished product.

##### 3.3.1 Material

The manufacturer shall obtain certification from the material supplier that the material furnished is the virgin plastic that satisfies the requirements of Table 1 or approved alternative .

**Table 1 - Material**

| Material                                                                           | Material Specification | Type                       |
|------------------------------------------------------------------------------------|------------------------|----------------------------|
| 66 Nylon<br>General-Purpose<br>Heat-Stabilized<br>Weather-Stabilized <sup>1/</sup> | ASTM D4066             | PA0111<br>PA0121<br>PA0191 |
| 612 Nylon<br>General-Purpose                                                       |                        | PA0611                     |
| Ethylene-Tetrafluoroethylene (ETFE)                                                | ASTM D3159             | Type 1, Grade 1            |
| Polyetheretherketone (PEEK)                                                        | MIL-P-46183            | Type I                     |

<sup>1/</sup> Acceptance of a weather-stabilized material not conforming to the carbon black requirements in ASTM D4066 is allowable and shall be determined by 3.5.7.

##### 3.3.2 Reworked Material

When reworked material is added to virgin material, the new mixture shall be verified to the appropriate requirement for viscosity number and shall have a maximum moisture content for Nylon of 0.35% and for PEEK of 0.02% by weight. The frequency of measurement based on a batch or continuous process shall be specified in the supplier in-house documentation. The supplier's Quality Conformance requirements shall confirm each batch of reworked material prior to usage.

##### 3.3.3 Toxic or Injurious Gases (see 6.8)

The component material shall not give off toxic or injurious gases when subjected to the rated temperature of the component.

##### 3.3.4 Plastic Tiedown Straps

Plastic tiedown straps may use a metal barb as part of their locking mechanism. The barb shall be in accordance with ASTM A240/A240M, ASTM A580/A580M, or ASTM A666 unless otherwise specified in the applicable specification sheet.

### 3.4 Component Design and Construction (see 4.7.1)

Components shall be designed for guiding and harnessing wire, cable, or wire bundles that are used for the interconnection of electrical and electronic equipment.

#### 3.4.1 Dimensions

Components shall comply with all dimensional requirements specified herein and the applicable detail specification.

#### 3.4.2 Class 1 Design

A Class 1 component shall be designed to perform with a standardized tool specified in the detail specification.

#### 3.4.3 Class 2 Application

A Class 2 component shall be designed to perform with a tool specified by the component's manufacturer control drawing. A Class 2 component shall be within the envelope dimensions and replaceable with a Class 1 component. The Class 2 component is approved for usage only with those tools used for assembly of the component at the time of qualification. The Class 2 components and tools shall be listed on the Qualified Product List and clearly designated as Class 2 components.

#### 3.4.4 Clamps (Types III and V)

Unless otherwise specified in the detail specification, clamps in the relaxed condition shall be formed through a minimum of 270 degrees of the opening circumference.

#### 3.4.5 Identification of Product

##### 3.4.5.1 Manufacturer's Identification

The manufacturer's name or symbol shall be permanently and legibly marked on the outer surface of the component. If a symbol or abbreviation is used, it shall be listed in AIR1351.

##### 3.4.5.2 Detail Specification Part Number

The detail specification shall specify a part number for each component when specified in the applicable detail specification.

#### 3.4.6 Workmanship

The components shall be uniform in quality and shall be free from irregularities or defects that could adversely affect performance, reliability, or durability. Workmanship shall be in accordance with the most current, highest quality manufacturing practices.

### 3.5 Performance

#### 3.5.1 Moisture Conditioning (see 4.7.2)

Type I, II, III, and IV components shall be subjected to the moisture conditioning test prior to any performance test. The moisture conditioning test is not required for Type V and VI.

#### 3.5.2 Tensile Strength (see 4.7.3)

The component shall meet the minimum tensile strength requirements specified on the applicable detail specification without breaking the component or releasing the locking device.

### 3.5.3 Life Cycle (see 4.7.4)

Unless otherwise specified, life cycle shall be a sequential requirement of vibration, temperature cycle, tensile strength, identification of product legibility.

#### 3.5.3.1 Vibration (see 4.7.4.1)

The component shall meet the vibration requirement without cracking, distorting, breaking, or releasing the locking device. When not performed in sequence, tensile strength and identification of product legibility is required.

#### 3.5.3.2 Temperature Cycling (see 4.7.4.2)

The component shall pass the temperature cycling requirement without cracking, distorting, breaking, or releasing the locking device. When not performed in sequence, tensile strength and identification of product legibility is required.

### 3.5.4 Fluid Immersion (see 4.7.5)

The component shall be immersed in the designated fluids without cracking, distorting, breaking, or releasing the locking device. Tensile strength and identification of product legibility is required after fluid exposure.

### 3.5.5 Corrosion Exposure of Metallic Materials (see 4.7.6)

The component that contains metallic materials shall show no evidence of basic metal corrosion. Tensile strength and identification of product legibility is required after corrosion exposure.

### 3.5.6 Identification of Product Legibility (see 4.7.7)

The component identification of product shall be legible after completion of each performance requirement except tensile strength.

### 3.5.7 UV Resistance Requirement (see 4.7.8)

The component shall pass the resistance to ultraviolet light requirement without cracking, distorting, breaking, or releasing the locking device. This requirement is an alternate method for validating performance if the material requirement from 3.3.1 is not met. The detail specification shall establish different part numbers for the Weather-Stabilized components made with and for components made without carbon black per ASTM D4066 (see 5.5).

## 4. QUALITY ASSURANCE PROVISIONS

### 4.1 Responsibility for Inspection

Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all contract inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the supplier may use any qualifying activity approved facilities suitable for the performance of the inspection requirements specified herein. The Qualifying Activity has the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

### 4.2 Responsibility for Compliance

All items must meet all technical requirements of the product specification. The inspection set forth in this specification shall become a part of the supplier's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the supplier of the responsibility of assuring that all products comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the purchaser to acceptance of defective material.

#### 4.3 Test Equipment and Inspection Facilities

Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspection shall be established and maintained by the supplier. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with NCSL Z540.3 or equivalent standards approved by the qualifying activity.

#### 4.4 Classification of Inspections

The inspections conditions specified herein are classified as follows:

- a. Initial Qualification Inspection (see 4.5.1)
- b. Retention of Qualification Inspection (see 4.5.4)
- c. Quality Conformance Inspection (see 4.6)

#### 4.5 Inspection Conditions

The conditions for the inspections are specified as applicable and all test data shall be compiled in accordance with SD-6.

##### 4.5.1 Initial Qualification Inspections (see 6.9)

Initial qualification inspection shall be in accordance with Tables 2 and 3. Sequential testing is not required except as specified. A request for qualification shall be made to the qualifying activity prior to initiating testing. Testing cannot begin until the supplier has received an authorization letter. The supplier shall provide the qualifying activity a test plan based on the authorization letter to ensure the supplier and qualifying activity maintain communication and document changes as needed. The qualifying activity has the authority to modify the specification test requirements to resolve test failures/discrepancies and to wave testing to verify specific product manufacturing changes or qualifications by similarity. For each component tested, the supplier shall use the same materials, manufacturing procedures, and methods of inspection as would be used to provide the component to a purchaser. Any change in the supplier's process control inspections, quality conformance inspections, or manufacturing control drawings (editorial changes are acceptable) without the express approval of the qualifying activity may result in loss of qualification for that product. The qualifying activity shall perform the tests specified in Table 2 and supplier shall perform the tests specified in Table 3 in a laboratory of their choice. All test laboratories require qualifying activity approval.

**Table 2 - Qualifying activity test requirements**

| Examination or Test     | Requirement Paragraph | Examination or Test Paragraph | Number of Samples |
|-------------------------|-----------------------|-------------------------------|-------------------|
| Group I                 |                       |                               |                   |
| Materials <u>2/</u>     | 3.3                   | 4.7.1                         | 6                 |
| Design and Construction | 3.4                   |                               |                   |
| Group II                |                       |                               |                   |
| Moisture Conditioning   | 3.5.1                 | 4.7.2                         | 14                |
| Group III               |                       |                               |                   |
| Tensile Strength        | 3.5.2                 | 4.7.3                         | 10                |
| Group IV                |                       |                               |                   |
| Life Cycle <u>1/</u>    | 3.5.3                 | 4.7.4                         | 4                 |

1/ Vibration required only for initial qualification.

2/ Acceptance of an alternate to PA0191 is only required for initial qualification.