SAE INTERNATIONAL

AEROSPACE STANDARD

AS23190™ REV. D

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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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https://www.sae.org/standards/content/AS23190D

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.

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.

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.

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.

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	ASTM D4066	
General-Purpose		PA0111
Heat-Stabilized		PA0121
Weather-Stabilized1/		PA0191
612 Nylon		
General-Purpose		PA0611
Ethylene-Tetrafluoroethylene (ETFE)	ASTM D3159	Type 1, Grade 1
Polyetheretherketone (PEEK)	MIL-P-46183	Type I

1/ 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 2/	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 1/	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.

Table 3 - Supplier test requirements

Examination or Test	Requirement Paragraph	Examination or Test Paragraph	Number of Samples
Group I			
Material 1/	3.5.7	4.7.8	10
Moisture Conditioning	3.5.1	4.7.2	10
Group II			
Fluid Immersion	3.5.4	4.7.5	8
Group III			
Corrosion	3.5.5	4.7.6	2

1/ Only required when an alternate to PA0191 is used.

4.5.1.1 Initial Qualification Test Report

The supplier shall furnish the qualifying activity one certified test report containing the following information:

a. The quantitative results for tests specified in Table 3 and the authorization letter. Upon request from the supplier, the qualifying activity will provide certified Table 2 test results for the test report.

b. The virgin material, rework material, and detail specification certifications as applicable (see 3.3).

c. The manufacturing control drawing numbers for Class 1 and 2 components with the latest revision designators and drawing dates.

d. A tabulated comparison of the dimensions specified herein and each manufacturing control drawing for components qualified by similarity.

e. For Class 2 components, the report shall include the manufacturer control drawing numbers with the latest revision designation and date for the tool used to qualify the component. The part number for the tool shall also be included.

4.5.2 Qualification Test Samples

The number of component specimens submitted to qualification inspection for each sample type for which qualification is sought shall be as shown in Group 1 of Tables 2 and 3. The specimen shall then be divided into the various groups as indicated in the tables. Unless otherwise specified in the detail specification or qualifying activity authorization letter, each dash number designated in each Class for which qualification is sought shall be submitted to the Qualification inspection in the tables. For Class 2 samples, the specimens may be prepared by supplier for the Table 2 requirements to avoid the need to submit the Class 2 tool to the qualifying activity for sample preparation.

4.5.3 Qualification by Similarity

Qualification by similarity shall be authorized by the qualifying activity. One component size (designation) may qualify similar component sizes if the dimensions controlled by the supplier for the size being subjected to qualification inspection are insignificantly different from the sizes being qualified by similarity. Additional qualification by similarity may be authorized by the qualifying activity when justified by the supplier. Failure of a component to conform to a requirement shall be cause for refusal to grant qualification approval for that group of components represented by the similarity sample.

4.5.4 Retention of Qualification Inspection

At 36 month intervals, the qualifying activity shall authorize the supplier to begin Retention of Qualification. The qualifying activity may establish an alternate due date to accommodate testing schedules. The supplier shall provide a retention of qualification test report (see 4.5.4.1). The qualifying activity shall perform the Table 2 tests on samples which have passed the Group A inspection. The qualifying activity will provide certified data to the supplier upon request. Failure to submit to Retention of Qualification shall result in loss of qualification for that product.

4.5.4.1 Retention of Qualification Test Report

The supplier shall furnish the qualifying activity one certified test report containing the following information:

a. A summary of the results of Group A tests, including corrective actions performed during the retention period, indicating, as a minimum, the number of lots that passed and the number that failed.

b. The virgin material, rework material, and detail specification certifications (see 3.3 and 3.1).

c. A summary of relative viscosity and maximum moisture content data generated from mixtures of virgin material and reworked material.

d. The manufacturing control drawing numbers for Class 1 and 2 components, with the latest revision designators and drawing dates.

e. For Class 2 components, the report shall include the manufacturer control drawing numbers with the latest revision designation and date for the tool used to qualify the component. The part number for the tool shall also be included.

4.5.5 Qualification Non-Compliance

Failure to pass all qualification requirements shall result in disapproval of the components that failed and the family of components represented by the failed components.

4.6 Quality Conformance Inspections

Quality conformance inspections shall consist of Group A and delivery inspection examinations and tests.

4.6.1 Inspection Lot

An inspection lot shall consist of components of a single type, class, size, and composition manufactured under essentially the same conditions and offered for inspection at one time.

4.6.2 Group A Inspection

Group A inspection shall consist of the examinations and tests specified in Table 4.

Table 4 - Group A inspection

Test	Requirement	Method	AQL (Percent Defective)	
			Major	Minor
a. Dimensions 1/	3.4.1	4.7.1	1.0	4.0
Types I, II, III, V, and VI				
width				
thickness eff. length			x	
or diameter			x	
all other dimensions			x	
				x
Type IV				
opening(s) for strap				
mounting hole dimensions			x	
all other dimensions			x	
				x
b. Materials	3.3	4.7.1	x	
c. Marking	3.4.5	4.7.1		x
d. Workmanship	3.4.6	4.7.1		x
e. Tensile strength 2/	3.5.2	4.7.3	NA	NA

1/ Only six samples shall be inspected for compliance with physical dimensions.
2/ Eight (8) samples shall be inspected from each lot. The lot is rejected if failure occurs (see noncompliance). Tensile strength is not required for metal clamps. A supplier qualifying activity approved in-house process may be used to meet this requirement.

4.6.2.1 Sampling Plan

A random sample shall be selected from each inspection lot in accordance with Level I of ASQC Z1.4 for inspection based on the specified AQL in Table 4. Classification of defects shall be as specified in ASQC Z1.4 and in Table 4. Major and minor defects are defined in Section 6. A supplier's normal quality control tests and production tests may be used to fulfill Group A inspection, provided the tests and sampling are at least equal to the requirements of Table 4.

4.6.3 Noncompliance

If a sample fails to pass tensile strength inspection, the supplier shall take immediate corrective action on the materials or process, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same conditions, with essentially the same materials, processes, etc., and which are considered subject to the same failure. Acceptance of the product shall be discontinued until corrective action has been taken. Group A inspection shall be repeated on additional units, if the corrective action affects the entire lot. Final acceptance shall be withheld until Group A reinspection, as applicable, has shown that the corrective action was successful.

4.6.4 Inspection of Preparation for Delivery

Sample packages or packs shall be selected in accordance with ASQC Z1.4, Inspection Level S-3, AQL 2.5%, and inspected for preservation, packing, and marking for shipment and storage in accordance with the requirements of Section 5 and the documents specified herein.

4.7 Test Methods

4.7.1 Visual and Dimensional Examination (see 3.3 and 3.4)

The component supplier certifications shall be examined to determine compliance with material requirements. The component shall be examined for design and construction, verification of class design and tools when required, and minimum clamp opening when required.

4.7.2 Moisture Conditioning (3.5.1)

The components shall be placed in a chamber maintained at a temperature of 49 -0, +3 °C (120 -0, +5 °F) with a relative humidity of 20% ± 5% for a minimum of 24 hours. Immediately upon removal from the chamber, the samples shall be stored in airtight jars. The components shall be tested or installed immediately on the test fixtures after removal from the airtight jar. Plastic bags may be used as an airtight container in lieu of a jar if the test is performed within 30 minutes after moisture conditioning.

4.7.3 Tensile Strength (3.5.2)

After moisture conditioning, the test sample shall be securely attached and positioned on the tensile test fixture as shown in the applicable Figures 1 through 5. The fixture shall be positioned in a tensile testing machine and sufficient force applied to break the component or, when applicable, to release the locking device or separate the component strap from the component. The heads of the tensile test machine shall move apart at a speed of 1 in/min.

4.7.4 Life Cycle (3.5.3)

After moisture conditioning, the Vibration, Temperature Cycling, Tensile Strength after Life Cycle, and Identification of Product Legibility after Lifecycle tests shall be made on the samples in the order shown.

4.7.4.1 Vibration Test (3.5.3.1)

The component shall be installed on the wire bundle, then mounted to the text fixture in the position indicated by the applicable Figures 6 through 10. The wire bundle may be taped together on each end of the bundle to prevent wire slippage during vibration. The assembly (component, wire bundle and fixture) shall be called the fully loaded vibration test fixture. The fully loaded vibration test fixture shall be vibrated in accordance with Method 214, Test Condition II, Letter J of MIL-STD-202, unless otherwise specified in the specification, in each of two mutually perpendicular directions. The duration shall be 8 hours in each direction. The direction of vibration shall be along the axis of the bundle and perpendicular as specified in Figures 6 through 10. Following the vibration test, the component will be inspected for cracks, distortions, breaks, or releasing of the locking device. The fully loaded vibration test fixture shall then be subjected to the Temperature Cycling test.

4.7.4.2 Temperature Cycling (3.5.3.2)

The component mounted to the wire bundle in the position indicated by the applicable Figures 6 through 10 shall be subjected to the Thermal Shock Method 107, Test Condition B of MIL-STD-202. The time duration for steps 2 and 4 shall not be more than 2 minutes. Unless otherwise specified in the detail specification, the high temperature for step 3 shall be 135 +3, -0 °C (275+ 5,-0 °F) for nylon; 185 +3, -0 °C (365 +5, -0 °F) for ETFE and 265 +3, -0 °C (527 +5,-0 °F) for polyetheretherketone. The component shall be inspected for cracks, distortions, breaks or releasing of the locking device, then subjected to the Tensile Strength after Life Cycle test.

4.7.4.3 Tensile Strength after Life Cycle (3.5.2)

The life cycle samples shall be prepared for the tensile strength test by removing the wire bundle from the test fixture, then removing the center wire(s) from the bundle, permitting the wire bundle to collapse. Slip the component or component assembly off the collapsed bundle and remount to the test fixtures indicated in the applicable Figures 1 through 5. Perform the Tensile Strength test.

4.7.4.4 Product Identification Legibility after Life Cycle (3.5.5)

The product identification shall be examined for Identification of Product Legibility.

4.7.5 Fluid Immersion (3.5.4)

After moisture conditioning, individual components shall be installed on the respective tensile test fixtures as specified in applicable Figures 1 through 5. Two samples of each type and dash number shall be immersed for 4 hours in each of the following fluids maintained at a temperature of 48 to 50 °C (118 to 122 °F).

WARNING

The following fluids are highly toxic to skin, eyes and respiratory tract. They are also flammable. Eye and skin protection is required. Good general ventilation is normally adequate.

a. MIL-PRF-5606 Hydraulic Fluid

b. MIL-DTL-5624 Turbine Fuel

c. MIL-PRF-7808 Lubricating Oil

d. TT-I-735 Isopropyl Alcohol

Upon removal from the fluids, the components shall be wiped dry (excluding the locking mechanism) and shall remain for 1 hour in free air at room temperature. The components shall then pass the Tensile Strength test and Product Identification Legibility.

4.7.6 Corrosion (3.5.5)

After moisture conditioning, the component shall be installed on the applicable tensile test fixture in accordance with Figures 1 and 2 and shall be subjected to a salt spray test in accordance with MIL-STD-202, Method 101, Condition A. The component shall be dried for 12 hours in a circulating air oven at a temperature of 38 °C ± 3 °C (100 °F ± 5 °F). Upon removal from the oven the component shall be examined for Corrosion then tested for Tensile Strength and Product Identification Legibility.

4.7.7 Identification of Product Legibility (3.5.6)

The product identification shall be examined for legibility with the unaided eye.

4.7.8 Ultraviolet Resistance (3.5.7)

The following test shall be performed in equipment conforming with ISO 4892-2

Ten test samples shall be installed hand tightened on a non-oxidizing alloy of aluminum or stainless-steel mandrel. The mandrel diameter shall be 0.375 inches (9.5 mm) for straps with the minimum length requirements equal to or less than 5 inches. For straps with minimum length requirements greater than 5 inches (127 mm), the mandrel diameter shall be 1.5 inches (38.1 mm).A non-oxidizing alloy of aluminum or stainless steel rod with 0.125 inch (3.175 mm) diameter may be placed between the test samples and the mandrel to facilitate removal of the test sample from the mandrel.

The test samples shall be placed in an ultraviolet light chamber for 1000 hours. The samples shall be installed on the mandrel so that the fastener is facing the UV source and rotated axially 90 degrees, so an opposing side of the test sample is facing the UV source at 250 hour intervals within the chamber. Periodic repositioning of samples is not necessary if the irradiance at positions furthest from the point of maximum irradiance is at least 90% of the maximum measured irradiance. The equipment settings shall be in accordance with method A, cycle 1 of ISO4892-2 which consists of cycles of 102 minutes without water spray and 18 minutes with water spray. The chamber shall operate with a water-cooled or air-cooled xenon-arc lamp, borosilicate glass inner and outer optical filters, and a spectral irradiance of 0.162 Btu(h·ft^2·nm) 0.51 W(m^2·nm) at a wave length of 340 nm and a black panel temperature of 65 °C ± 3 °C (149 °F ± 5 °F). The temperature of the chamber shall be 45 °C ± 3 °C (113 °F ± 5 °F). The relative humidity in the chamber shall be 50% ± 5%.

Following this exposure, the test samples shall be subject to moisture conditioning. The moisture conditioning shall be at a temperature of 23 °C ± 5 °C (73 °F ± 5 °F) and at a relative humidity of 50% ± 5%. The length of conditioning will be based on the thickness of the strap of the test samples as follows. For a strap thickness of less than or equal to 0.05 inches (1.2 mm), samples should be conditioned for 7 days. For a strap thickness between 0.05 inches (1.2 mm) and up to 0.06 inches (1.5 mm), the conditioning time should be 21 days. For samples with a strap thickness over 0.06 inches (1.5 mm), moisture conditioning should be for 35 days. If it is determined the samples have reached a point of stabilization prior to the full conditioning time, the conditioning cycle can be concluded.

Upon completion of moisture conditioning, the tensile strength of the test samples shall be evaluated per 3.5.2 and 4.7.3.

5. PACKAGING

5.1 Preservation

Components shall be commercially preserved in accordance with ASTM D3951. Military preservation, if specified, shall be per Method 30 of MIL-STD-2073-1 (see 6.5).

5.2 Packing

5.2.1 Unit Packaging

The unit packages shall be commercially packaged per ASTM D3951 in suitable packaging material that will protect the components from damage during shipment, handling, and storage.

5.2.2 Shipping Packaging

The unit packages shall be commercially packed in snug-fitting fiberboard shipping containers conforming to ASTM D3951, ASTM D1974/D1974, and the Uniform Freight Classification rules and regulations, or other carrier regulations as applicable to the mode of transportation. Military packing, if required, shall be per MIL-STD-2073-1.

5.3 Marking of Shipments

5.3.1 Special commercial marking of unit packages and shipping containers, if required, shall be as specified on the contract or order.

5.3.2 Military marking of unit packages and shipping containers shall be in accordance with MIL-STD-129. The identification shall include, but not be limited to the information listed in the following order:

Name of Component
Type
* Component SAE Part Number
Class
Specification AS23190
Manufacturer’s Part Number

* Not applicable to Class 2.

Special military marking, if required, shall be as specified on the contract or order.

6. NOTES

6.1 Revision Indicator

A change bar (l) 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 document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications nor in documents that contain editorial changes only.

6.2 Intended Use

The components are intended for wire mounting and harnessing or guiding wire bundles with the diameters as shown on the applicable detail specification sheet but are not limited to only those applications. How the components are applied is application dependent. For aircraft applications, refer to AS50881.

6.3 Solid Dielectric Coaxial Cable Application

Straps may be used on wire bundles containing solid dielectric coaxial cables if the tension setting on the AS90387 installing tool is not greater than that required to prevent axial slippage.

6.4 Weather-Stabilized Material

The Weather-Stabilized material containing 1.90 to 2.25% carbon black according to ASTM D4066 has been accepted as UV Resistant as determined by the historic performance of carbon black found in the material. The Weather-Stabilized material that does not meet the carbon black requirements is determined to be UV resistant by the test method found in section 4.7.8. The UV test is not intended to define equivalency or superiority between the two Weather-Stabilized materials, but to determine an acceptable alternative material. UV testing is not intended to correlate to product life expectancy in the field as there is no known standard that reliably correlates to actual field conditions and life. Due to specific applications and various environmental factors, service life may differ between the Weather-Stabilized materials.

6.5 Classification

6.5.1 Class 1

Only Class 1 components are intended for use by military activities. Class 1 components will be the only class stocked by the services and supplied to their activities. Original equipment manufacturers are authorized to use either Class 1 or Class 2 components (see 1.2).

6.5.2 Class 2

Only original equipment manufacturers are authorized to use Class 2 components. Class 2 components are not to be used for replacement purposes (see Classification in Section 1).

6.5.3 Government Acquisition

Class 2 components will not be stocked or supplied to the military services. When a military acquisition activity receives a request for Class 2 components, the acquisition activity shall acquire the Class 1 component in lieu of the Class 2 request.

6.5.3.1 Class 2 Usage

Where Class 2 components are used, the installation will be such that Class 1 components will be adequate as a replacement without rework of the installation. Parts list will indicate the Class 1 component that will be used for service replacement of Class 2 components.

6.6 Hand Installation Tools

Hand installation tools (when applicable) conforming to the detail specifications and as approved by the qualifying activity will be stocked by the military for field maintenance.

6.7 Ordering Data

The acquisition document should specify the following:

a. Nomenclature - Title, specification number, and date.

b. Part Number - As specified in the detail specification.

c. Class - Failure of the acquisition document to specify the class will automatically result in a Class 1 order. Only Class 1 components are to be ordered by the government for delivery to the military services.

d. Preparation for Delivery - The contract should specify the type of packaging.

6.8 Toxicity

Any questions regarding toxicity should be referred to the cognizant medical authority.

6.9 Qualification

With respect to products requiring qualification by the government, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in the applicable Qualified Products List (QPL), whether or not such products have actually been so listed by that date. The attention of the contractors (purchasers) is called to these requirements, and manufacturers (suppliers) are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts for the products delineated in this specification. Qualification is required for U.S. Government procurement.

6.9.1 QPL Evaluating Activity

The QPL Evaluating Activity (qualifying activity) for U.S. Department of Defense procurement purposes is the Naval Air Systems Command (Code 4.4.5.3), 48298 Shaw Road, Bldg. 1461, Patuxent River, MD 20670-1900. Application for qualification tests shall be made in accordance with provisions governing qualification in SD-6 (see 2.2).

6.9.2 QPL Publication

The qualifying activity is required to provide a summarized list of all qualified sources on a public accessible electronic site. The summary shall include but is not limited to the supplier approved part number and related specification part number, a dedicated approval reference number, a supplier location where purchases may be requested and the manufacturing location of the component. The suppliers and products qualified to this specification are available on the qualifying activity website (http://www.navair.navy.mil/qpl/).

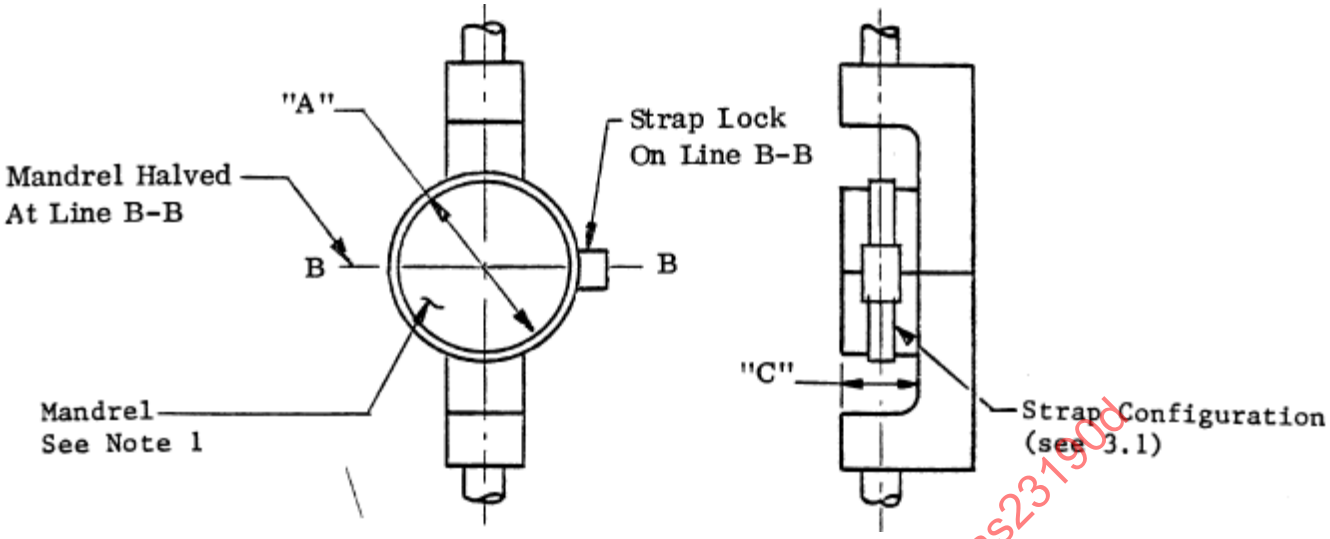
6.10 Metric Equivalents

Dimensions in the specification sheets are shown in inches and after plating. In some cases, metric equivalents are provided in "(x.xx)", to the nearest 0.01 mm. Metric equivalents are calculated based on 1 inch equals 25.4 mm. The following inch-to-metric equivalent is provided for information only:

INCH	MM
0.003	0.08
0.005	0.13
0.010	0.25
0.015	0.38
0.018	0.46
0.022	0.56
0.025	0.64
0.026	0.66
0.029	0.74
0.032	0.81
0.033	0.84
0.0335	0.85
0.035	0.89
0.0355	0.90
0.036	0.91
0.037	0.94
0.039	0.99
0.041	1.04
0.042	1.07
0.044	1.12
0.045	1.14
0.046	1.17
0.048	1.22
0.050	1.27
0.051	1.30
0.055	1.40
0.057	1.45

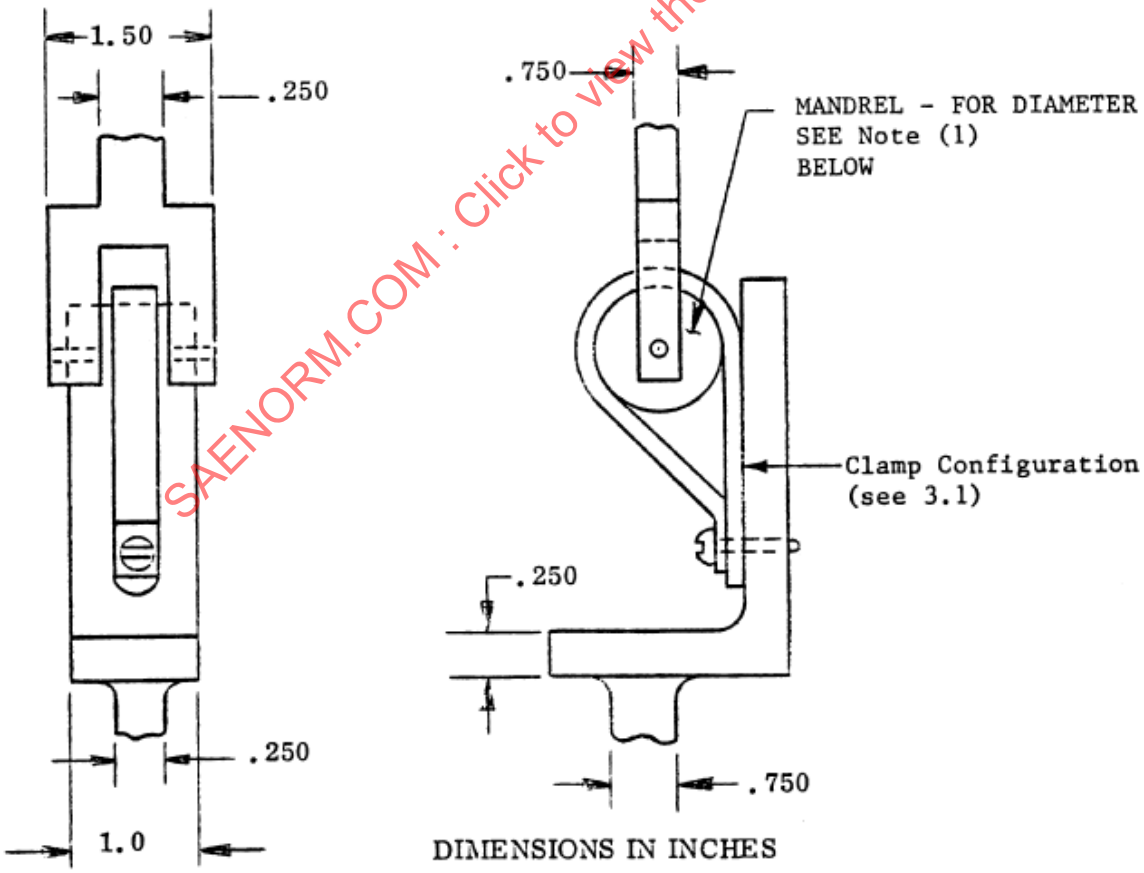
INCH	MM
0.060	1.52
0.061	1.55
0.062	1.57
0.063	1.60
0.064	1.63
0.065	1.65
0.066	1.68
0.068	1.73
0.073	1.85
0.075	1.91
0.076	1.93
0.078	1.98
0.079	2.01
0.080	2.03
0.083	2.11
0.085	2.16
0.086	2.18
0.090	2.29
0.092	2.34
0.093	2.36
0.095	2.41
0.098	2.49
0.101	2.57
0.102	2.59
0.103	2.62
0.105	2.67
0.115	2.92

INCH	MM
0.122	3.10
0.125	3.18
0.129	3.28
0.130	3.30
0.133	3.38
0.136	3.45
0.141	3.58
0.147	3.73
0.153	3.89
0.155	3.94
0.157	3.99
0.158	4.01
0.186	4.72
0.190	4.83
0.200	5.08
0.210	5.33
0.211	5.36
0.215	5.46
0.217	5.51
0.223	5.66
0.249	6.32
0.250	6.35
0.253	6.43
0.281	7.14
0.294	7.47
0.298	7.57
0.418	10.62
0.456	11.58
0.501	12.73



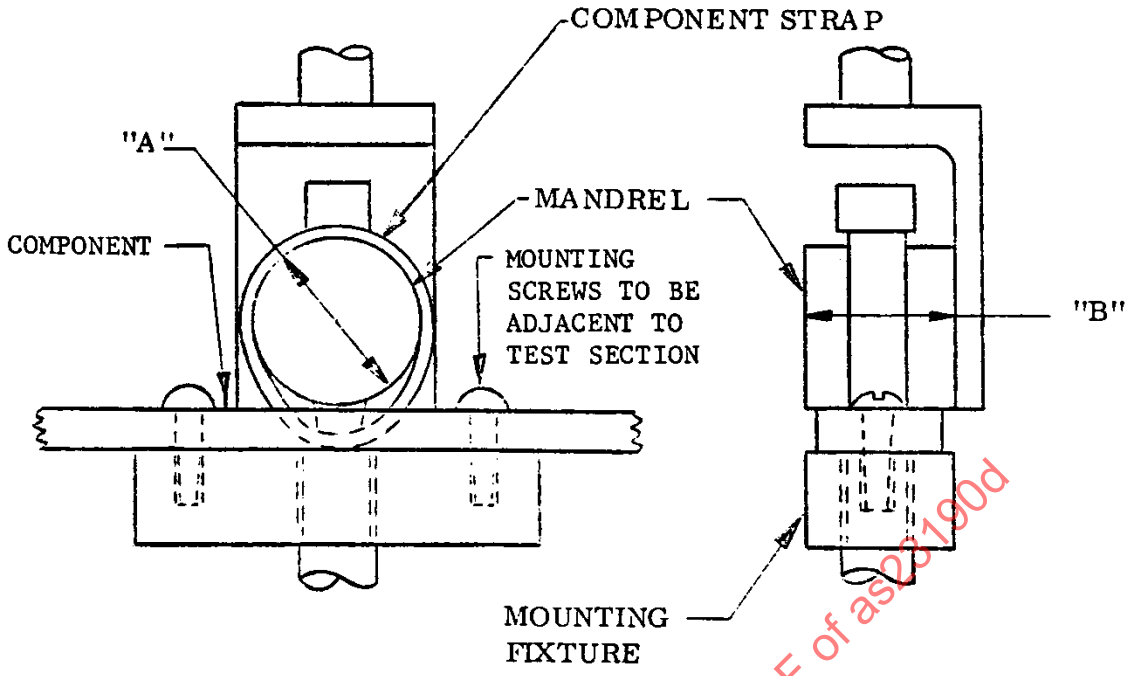
NOTE 1: The mandrel diameter, dimension A, shall be 0.375 inches for straps with the minimum length requirements equal to or less than 5 inches. For straps with minimum length requirements greater than 5 inches, the mandrel diameter shall be 1.5 inches.

Figure 1 - Tensile test fixture for strap components



NOTE 1: The mandrel diameter shall be the nominal cable bundle size specified for each dash number listed in the detail specification.

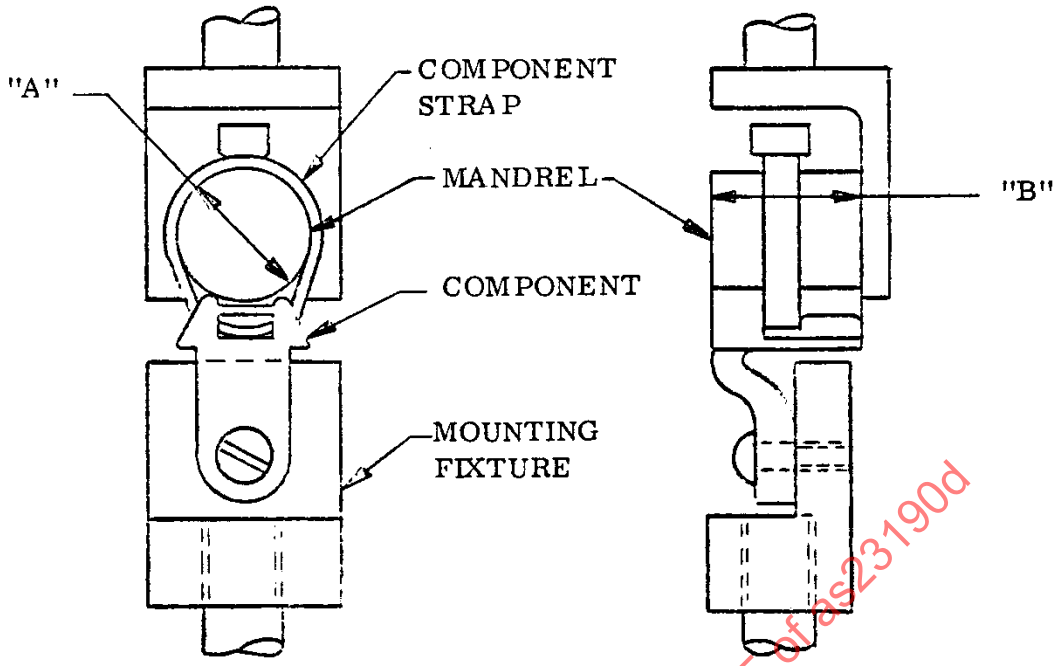
Figure 2 - Tensile test fixture for clamps



DIMENSIONS IN INCHES

Component	Component Strap Number	Mandrel Dimensions		Tensile Strength
		A +.000, -.125	B Min	Lb. Min.
MS 3339-1 thru -5	MS 3367-1	0.687	0.50	50
MS 3339-6 thru -11	MS 3367-3	0.875	0.75	120

Figure 3 - Tensile test fixture for Type IV plastic mounting plate



DIMENSIONS IN INCHES

Component	Component Strap Number	A +.000 -.125	B Min	Tensile Strength Lb. Min.
MS 3340-1	MS 3367-1	0.687	0.75	50

Figure 4 - Tensile test fixture for Type IV bulkhead bracket