The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
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AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE AMS 3793A

Issued APR 1986
Revised MAR 1996

Superseding AMS 3793

TAPE AND WEBBING, TEXTILE, PARA-ARAMID
Intermediate Modulus

1. SCOPE:

1.1 Form:

This specification and its supplementary detail specifications cover para aramid in the form of tape and webbing.

1.2 Application:

These products have been used typically in construction of parachutes and their accessories, but usage is not limited to such applications.

1.3 Classification:

Tape and webbing shall be classified by width and weight as shown in the detail specifications.

1.4 Safety - Hazardous Materials:

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

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification 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.

2.1 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 123 Standard Terminology Relating to Textiles

2.2 U.S. Government Publications:

Available from DODSSP Subscription Services Desk, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

FED-STD-191 Textile Test Methods
MIL-W-43334 Webbing and Tape, Textile, Packaging and Packing of

2.3 Other Publications:

Available from Federal Trade Commission, Washington, DC 20580.

Textile Fiber Products Identification Act, Rules and Regulations

3. TECHNICAL REQUIREMENTS:

3.1 Detail Specifications:

The requirements for a specific product shall consist of all requirements specified herein in addition to the requirements specified in the applicable detail specification. In case of conflict between the requirements of this specification and an applicable detail specification, requirements of the detail specification shall govern.

3.2 Material:

Shall be tape and webbing woven from para-aramid, intermediate modulus type of yarn (See 8.3). Warp yarns shall be nominally two turns per inch (25.4 mm). Plied yarns shall be made by twisting together the specified number of zero twist singles, as supplied by the producer. Filling yarns shall have the yarn producer's twist only.

3.3 Properties:

Shall be as specified in the applicable detail specification. Tests shall be performed on the tape and webbing supplied and in accordance with test methods specified in 4.5 insofar as practicable.

3.4 Quality:

Tape and webbing, as received by purchaser, shall be clean, evenly braided, and free from foreign materials and from imperfections detrimental to usage of the tape and webbing or defects exceeding those described in 4.3.1.3.

3.4.1 Imperfections: Refer to ASTM D 123 “Standard Terminology Relating to Textiles” for definitions of terms used herein. Acceptability of each weight of tape and webbing shall be based on faction listed in Table 1.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The manufacturer of the product shall supply all samples and shall be responsible for all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

Tests for all technical requirements are acceptance tests and shall be performed on each lot, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.1 Preproduction Tests: All technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of the manufacturer, when a change in ingredients and/or processing requires approval as in 4.4.2 and when purchaser deems confirmatory testing to be required.

4.2.2 For direct U.S. Military procurement, substantiating test data, and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling and Testing:

Shall be as follows:

4.3.1 For Acceptance Testing: Each lot of tape and webbing shall be visually examined for quality (3.4) and sampled at random for all other tests. The number of determinations for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than three.

4.3.1.1 A lot shall be all product of a single weight and configuration produced in a single production run under the same fixed conditions and presented for manufacturer’s inspection at one time. An inspection lot shall not exceed 5000 yards (4570 m).

4.3.1.2 Properties specified in the applicable detail specifications apply to the average of determinations made on a sample unit. Sample size shall be as shown in Table 1. The sample unit for testing shall be 5 yards (4.5 m). The lot size shall be expressed in units of 1 linear yard (0.9 linear m). The lot shall be unacceptable if one or more units fail to meet any of the specified requirements.

TABLE 1 - Sample Size

Lot Size Yards		Lot Size Meters		Sample Size
Up to	800, incl	Up to	730, incl	2
Over 800 to	5000, incl	Over 730 to	4570, incl	3
Over 5000 to	22,000, incl	Over 4570 to	20,115, incl	5
Over	22,000	Over	20,115	7

4.3.1.3 Yard-by-Yard (0.9 m by 0.9 m) Examination: The required length of each roll shall be examined on both sides and visual defects classified as listed in Table 2 "clearly visible" shall be interpreted as visible at normal inspection distance of approximately 3 feet (1m). All defects found shall be counted regardless of their proximity to one another, except where two or more defects represent a single local condition of the tape or webbing, in which case only the more serious defect shall be counted. A continuous defect shall be counted as one defect for each warpwise yard (0.9 m) or fraction in which it occurs. The acceptance shall be 2.5 defects per 100 units and the lot shall be unacceptable if one or more critical defects appear in the sample. The lot size shall be expressed in units of 1 linear yard (0.9 linear m) each. An approximately equal length shall be examined from each roll selected. The number of rolls or spools from which the sample is to be selected shall be in accordance with Table 3 except that if a lot contains less than three rolls or spools, each roll or spool in the lot shall be examined.

TABLE 2 - Classification of Defects

Defect	Description	Classification Critical	Minor
Abrasion Marks	Resulting in rupture of yarns or in nap sufficient to obscure the identity of any yarn over 10% of width or 1 inch (25 mm) in length.	X	
Yarns (filling)	Two yarns per shed.	X	
Broken or Missing End	Two or more regardless of length or a single end over 6 inch (152 mm) in length.	X	
	Single end under 6 inch (152 mm) but over 0.25 inch (6 mm).		X
Broken or Missing Pick	Two or more regardless of extent. The filling tie-in or joining shall not be	X	

TABLE 2 - Classification of Defects (continued)

Defect	Description	Classification Critical	Classification Minor
Coarse or Light Filling Bar	Resulting in visible difference in stiffness or thickness of webbing and extending over 0.25 inch (6 mm) in the length direction.	X	
	Resulting in visible difference in stiffness or thickness of webbing and extending 0.25 inch (6 mm) or under in the length direction.		X
Twist or Distortion	Webbing will not lie flat upon application of manual pressure due to twist or distortion.		X
Cut, Hole, or Tear	Any cut, hole, or tear.	X	
Drop-ply	Clearly visible on more than 2 ends within the same length and extending 9 linear inch (229 linear mm) or over.	X	
	Clearly visible on 1 or 2 ends within the same length and extending under 9 linear inch (229 mm).		X
Edges	Frayed, slack, or otherwise poorly constructed and over 0.25 inch (6 mm) in length.	X	
Floats or Skips	Three or more, 0.5 inch (13 mm) or over in combined warp and filling directions or single float or skip over 1 inch (25 mm).	X	
	Three or more, under 0.5 inch (13 mm) in combined warp or filling directions or single float or skip over 0.5 inch (13 mm) but not over 1 inch (25 mm), if in warp; or over 0.25 inch (6 mm) of width but not over 1 inch (25mm) if in filling.		X

TABLE 2 - Classification of Defects (continued)

Defect	Description	Classification Critical	Classification Minor
Hitchback Crack	Clearly visible opening between adjoining picks, or warpwise tension area over part of the width resulting in visible light and heavy places.		X
Jerked-in Filling, Slough-off, Slug	A clearly visible loop of filling pulled in at the edges.		X
Kinks	More than three kinks in any 9 linear inch (225 linear mm).	X	
Knots	More than one knot in 9 linear inch (229 mm).		X
	One knot every 2 yards (1.8 m) with untrimmed ends extending from the surface of the webbing.		X
Mispick, Double Pick	Two or more across the full width.	X	
	Single across the full width.		X
Slack End	Two or more in the same length, jerked in between the picks, or forming clearly visible loops on the surface.	X	
	Single jerked in between picks or forming clearly visible loops on the surface.		X
Slub, Slug, or Gout	More than twice the thickness of the yarn (or ply, if plied).		X
Smash	Any smash.	X	
Spot, Stain, or Streak	Any clearly visible.		X
Tight End	Clearly visible up to 12 inch (305 mm) in length.	X	

TABLE 2 - Classification of Defects (continued)

Defect	Description	Classification Critical	Minor
Wrong Draw	Extending over 9 inch (229 mm).	X	
Width	Beyond specified tolerances		X

4.3.1.4 Overall Examination: The following defects shall be counted no more than once in each roll or spool examined. The sample unit for this examination shall be one roll or spool. Sample size and acceptance number shall be as in Table 3.

Uncleanliness throughout
Uneven weaving throughout
Not labeled in accordance with Textile Fiber Products Identification Act

TABLE 3 - Sampling Plan

Lot Size Yard	Lot Size Meters	Sample Size in Rolls or Spools	Number of Defects Acceptable, Maximum
Up to 1200, incl	Up to 1095, incl	3	0
Over 1200 to 3200, incl	Over 1095 to 2925, incl	5	0
Over 3210 to 10,000, incl	Over 2925 to 9145, incl	8	0
Over 10,000 to 35,000, incl	Over 9145 to 32,005, incl	13	0
Over 35,000 to 150,000, incl	Over 32,005 to 137,160, incl	20	1
Over 150,000	Over 137,160	32	2

4.3.1.5 Length Examination:

4.3.1.5.1 Individual Rolls or Spools: Each roll or spool in the sample shall be examined for the defects listed below. The sample unit for this examination shall be one roll or spool. The sample size and acceptance number shall be as specified in Table 3.

Gross length more than 2 yards (1.8 m) less than the length marked on the piece ticket
Any piece less than 20 yards (18 m) in length
Any roll containing more than three pieces

4.3.1.5.2 Total Yards (m) in Sample: The lot shall be unacceptable if the total of the actual gross lengths of rolls or spools in the samples selected in accordance with Table 3 is less than the total of gross lengths marked on the roll or spool tickets.

4.3.1.6 A statistical sampling plan acceptable to purchaser may be used in lieu of sampling as in 4.3.1.

4.3.2 For Preproduction Tests: Acceptable to purchaser.

4.4 Approval:

4.4.1 Sample tape and webbing shall be approved by purchaser before tape and webbing for production use is supplied, unless such approval be waived by purchaser. Results of tests of production tape and webbing shall be essentially equivalent to those on the approved sample tape and webbing.

4.4.2 Manufacturer shall use ingredients, manufacturing procedures, processes, and methods of inspection on production tape and webbing which are essentially the same as those used on the approved sample. If necessary to make any change in material or processing, in type of equipment for processing, or in manufacturing procedures, manufacturer shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and, when requested, sample tape or webbing. Production tape or webbing made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Test Methods:

Shall be as specified in Table 4 and in 4.5.1; a certificate of compliance from the vendor will be acceptable for material identification and denier:

TABLE 4 - Test Methods

Property	FED-STD-191 Test Method
Breaking Strength	4108 (Except for strain-rate, See 4.5.1)
Denier (See 4.5)	4021
Twist	4052
Weight	5041
Texture	
Ends, Face and Back Warp	5050
Picks per inch (25.4 mm)	5050
Width	5020
Weave	Visual

4.5.1 Breaking Strength: Speed of pulling jaw shall be 2 inch ± 0.5 (51 mm ± 12) per minute. Testing shall be performed using the double pin jaw design as specified in 4.5.1.1 . In case of dispute of the test values, the higher values obtained with either the double pin jaws or the split drum jaws, separately, are acceptable. The lot is not acceptable if any single determination is below the specified minimum.

4.5.1.1 Double Pin Jaw Design:

4.5.1 .11 Alternate Jaw Design: Shall be identified as the double pin jaws as specified in Figure 1 through Figure 7.

4.5.1 .1.2 Machine Adjustment: Mount the jaws with careful attention to rotational and axial alignment. Set the speed of the moving jaw at 1.000 inch ± 0.250 (25.0 mm ± 6.35) per min and the initial jaw separation such that the distance between the tangent points where the specimen first touches the primary (large diameter) pins is 12.000 inch ± 0.100 (305.00 mm ± 2.54).

4.5.1 .1.3 Specimen Size and Number: Each specimen shall be the full width of the tape or webbing and 5 feet (1.5 m) long. Test 5 specimens or enough to get 5 acceptable breaks. An acceptable break is defined as one which occurs in the unsupported length of the specimen between the primary pin tangent contact points or at the contact points, but not within the material which is wrapped around each double pin jaw.

4.5.1.1.4 Specimen Mounting: Wrap the specimen around the primary and secondary pins of each jaw as shown in Figure 8. Be careful to keep all legs of the specimen in alignment with the direction of stress application, and successive wraps exactly in line. For materials having a strength of less than 500 pounds (2225 N) per inch (87,565 N/m) of width, or for stronger materials which are not breaking acceptably, insert a double layer of cotton fabric between two layers of aramid fabric which pass around the primary pin on both top and bottom jaws.

4.6 Reports:

The supplier of tape and webbing shall furnish with each shipment a report from the manufacturer showing the results of tests to determine conformance to the acceptance test requirements and stating that the tape and webbing conforms to the other technical requirements. This report shall include the purchase order number, AMS 3793A, manufacturer's identification lot number and quantity.

4.7 Resampling and Retesting:

(R)

If any specimen used in the above tests fails to meet the specified requirements, disposition of the tape or webbing may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the tape or webbing represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Identification:

Each spool or roll shall be identified with a durable label or tag legibly marked with not less than the following information and attached in such a manner as to remain in place until all tape or webbing has been removed from the roll or spool:

TAPE AND WEBBING, TEXTILE, PARA-ARAMID, Intermediate Modulus
AMS 3793A*
MANUFACTURER'S IDENTIFICATION _____
QUANTITY _____
WIDTH _____
LOT NUMBER _____
WIDTH _____
LOT NUMBER _____
ROLL OR SPOOL NUMBER (if used) _____
DATE OF MANUFACTURE _____

* Insert applicable detail specification number.

Each roll or spool of tape or webbing shall be labeled or ticketed for fiber content in accordance with the Textile Fiber Products identification Act.

5.2 Packaging:

5.2.1 Length and Put-up: Tape and webbing 9/16 inch (14 mm) and under in width shall be furnished on double headed rolls or spools. Tape and webbing 5/8 inch (15.5 mm) and over in width shall be furnished in rolls. No roll or spool shall contain more than three pieces and no piece shall be under 20 yards (18 m) in length.

5.2.2 A lot may be packaged in small quantities and delivered under the basic lot approval provided lot identification is maintained.

5.2.3 Individual rolls or spools shall be wrapped in a protective film and packaged in an exterior shipping container in such a manner that the rolls or spools, during shipment and storage, will be protected from exposure to moisture, weather, or any other normal hazard.

5.2.4 Each exterior shipping container shall be legibly marked with not less than the following information in such a manner that the markings will not smear or be obliterated during normal handling or use:

TAPE AND WEBBING, TEXTILE, PARA-ARAMID, Intermediate Modulus
AMS 3793A*
PURCHASE ORDER NUMBER _____
MANUFACTURER'S IDENTIFICATION _____
LOT NUMBER _____
NET WEIGHT _____

*Insert applicable detail specification number.

5.2.5 Containers of tape or webbing shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the tape or webbing to ensure carrier acceptance and safe delivery.

5.3 For direct U.S. Military procurement, packaging shall be in accordance with MIL-C-43334, Level A, Level B, or Level C, as specified in the request for procurement. Commercial packaging, as in 5.1.1, 5.1.4, and 5.1.6 will be acceptable if it meets the requirements of Level C.

6. ACKNOWLEDGMENT:

A supplier shall mention this specification number and their revision letters in all quotations and when acknowledging purchase orders.

7. REJECTIONS:

Tape and webbing not conforming to this specification or to modifications authorized by purchaser will be subject to rejection.

8. NOTES:

8.1 The (R) symbol is for convenience of the user in locating areas where technical revisions have been made to the previous issue of this specification. If the symbol is next to the specification title, it indicates a complete revision of the specification.

8.2 Kevlar 29, a product of E. I. duPont de Nemours & Company, has been found to be an acceptable yarn for this application.

8.3 Precautions:

8.4 Twisting:

8.4.1 Slightly heavier travelers than those used for nylon yarn should be used.

8.4.2 High humidity should be maintained to minimize electrostatic charge between filaments.

8.4.3 Winding: Anti-wear tension gates (Leesona Corp.), or the equivalent, should be used.

8.4.4 Weaving:

8.4.4.1 PFTE coated heddles (Precision Coating Co., Inc., Dedham, MA 02026), or the equivalent, should be used.

8.4.4.2 Harness tines should be 2 inch (51 mm) front center for 1/2 inch (12.5 mm) wide webbing when using 400 denier yarn and 3/4 inch (19 mm) before front center for 1 inch (25 mm) and wider webbings.

8.4.4.3 Warp line should be level.

8.4.4.4 Loom(s) selected for weaving must be in good running condition with minimum wear or "play" in the various mechanical components. Loom(s) should be operated at a reduced speed (90 to 100 picks per min) when weaving 200 or 400 denier yarn into narrow webbing.

8.4.4.5 Warp beam should be not more than 1/2 inch (12.5 mm) wider than the required width of the finished webbing.

8.4.4.6 Fine sand rolls should be used for webbing take-up.

8.4.4.7 Due to the low extensibility of para aramid yarn, it is important that uniform yarn length be maintained at all times across the entire set of warp yarns.

8.4.4.8 Avoid contact of yarn with rough surfaces or sharp edges wherever possible in order to minimize damage.

8.5 For direct U.S. Military procurement, purchase documents should specify not less than the following:

Title, number and date of this specification
Width and weight of tape or webbing desired
Quantity of tape or webbing desired
Level A packaging, if required (See 5.1.7)

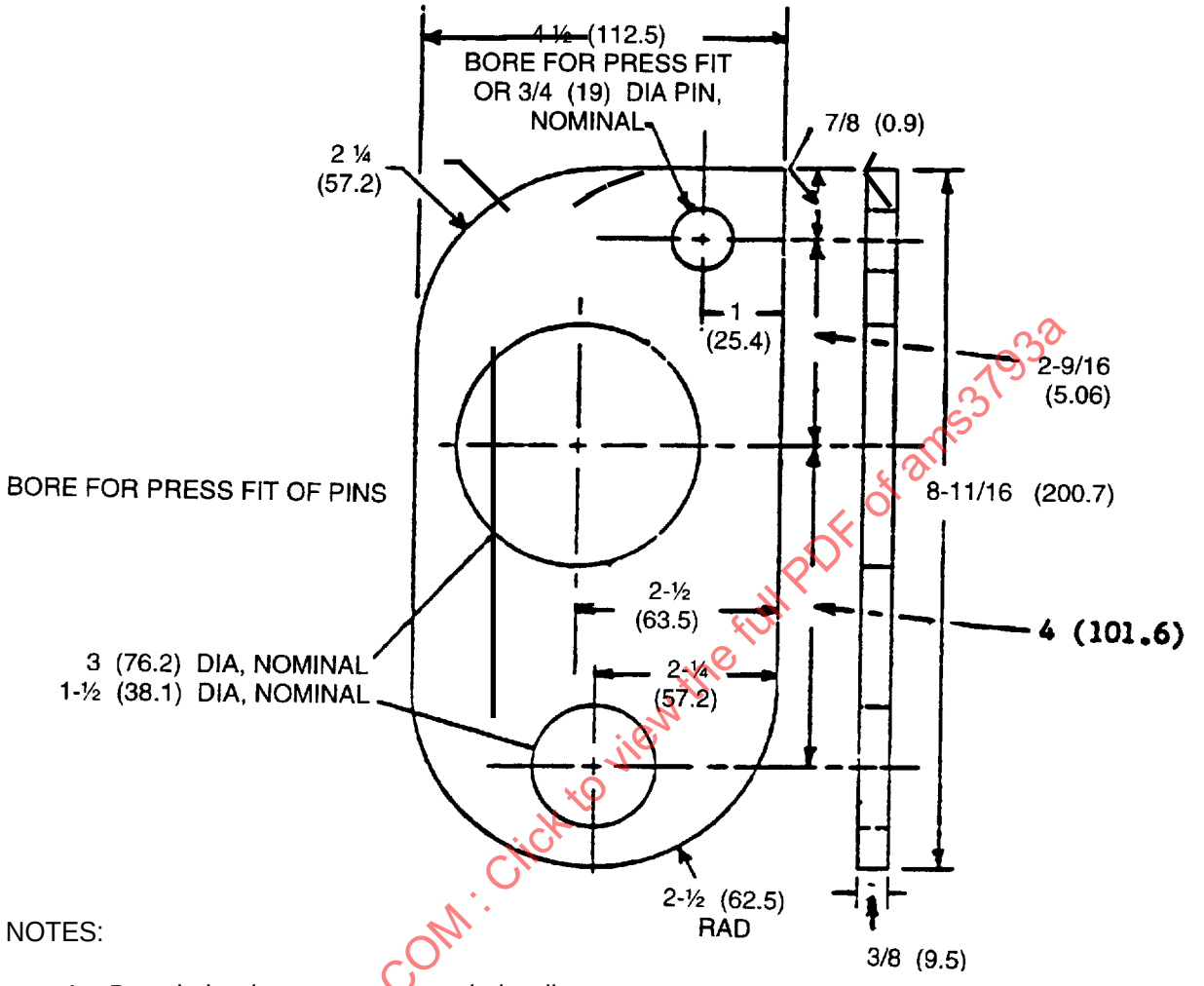
8.6 Similar Specifications:

This specification is the equivalent of MIL-C-87130 (USAF), Amendment 2, dated 6 April 1981, as follows:

Draft 3793/1 = MIL-T-87130, Type I
Draft 3793/2 = MIL-T-87130, Type II
Draft 3793/3 = MIL-T-87130, Type IV
Draft 3793/4 = MIL-T-87130, Type VI
Draft 3793/5 = MIL-T-87130, Type VII
Draft 3793/6 = MIL-T-87130, Type VII
Draft 3793/7 = MIL-T-87130, Type IX
Draft 3793/8 = MIL-T-87130, Type X
Draft 3793/9 = MIL-T-87130, Type XI

8.7 Tape and webbing meeting the requirements of this specification and its applicable detail specifications have been classified under Federal Supply Classification (FSC) 8305.

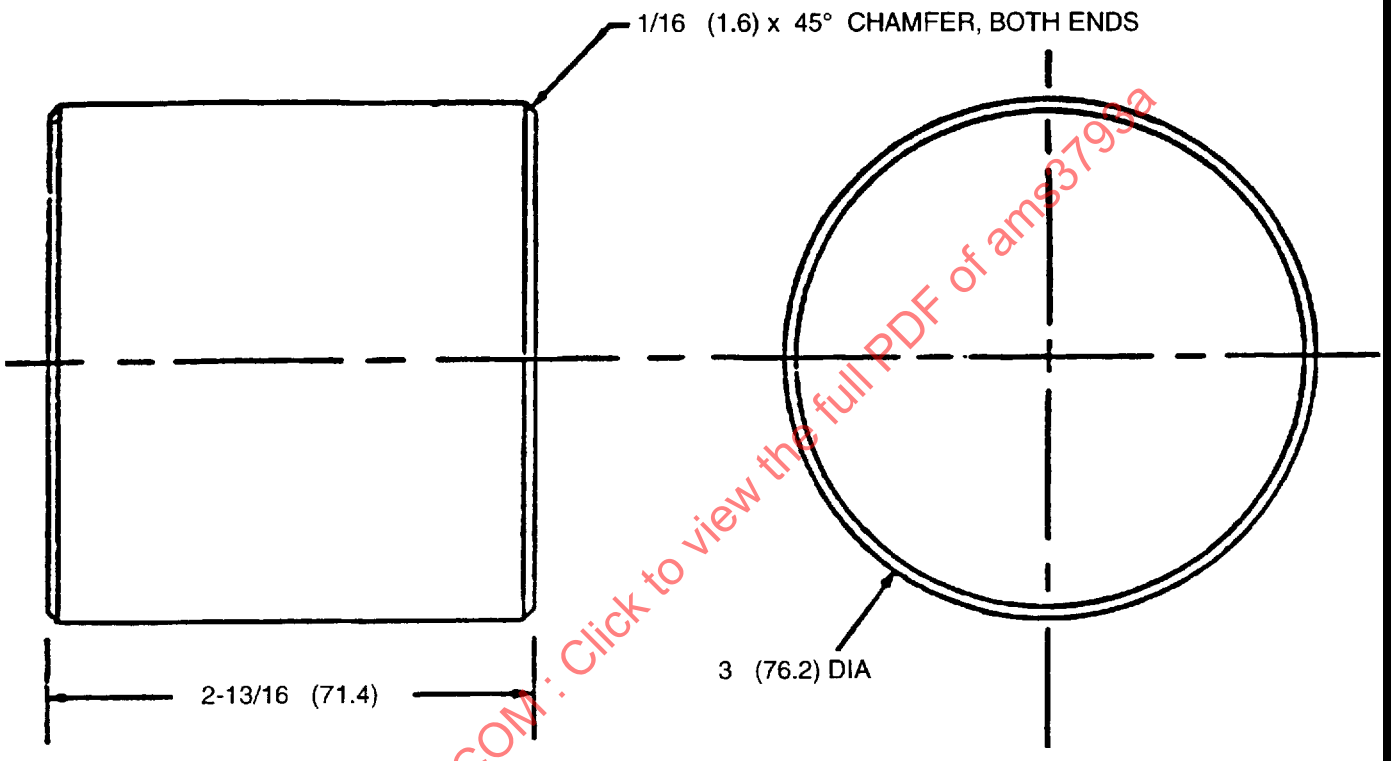
THIS SPECIFICATION AND ITS DETAIL SPECIFICATIONS ARE UNDER THE JURISDICTION OF AMS COMMITTEE "P"



NOTES:

1. Bore holes in sets to ensure hole alignment.
2. Heat treat 3/4 (19) D pin before boring. (See Figure 4)
3. Minimum interference fit between pin and hole; 0.001 per inch (25 mm) diameter.
4. Material is Type 303 corrosion-resistant steel.
5. Quantity required is 4.
6. Dimensions are in inches (millimeters). Tolerances:
   Fractions ± 1/64 inch ((0.4 mm)
   Decimals ± 0.005 inch (0.12 mm)
   Angles ± 1/4 deg
7. Deburr and break all edges to 0.005 inch (0.12 mm) maximum.
8. Concentricity on common diameter within 0.003 tir.
9. All surfaces to be machined to RMS 125.
10. Threads are Class 2.
11. Normality, squareness, and parallelism of all surfaces are to be within 0.005 per inch (0.12/mm) to a maximum of 0.010 inch (0.25 mm) per surface.

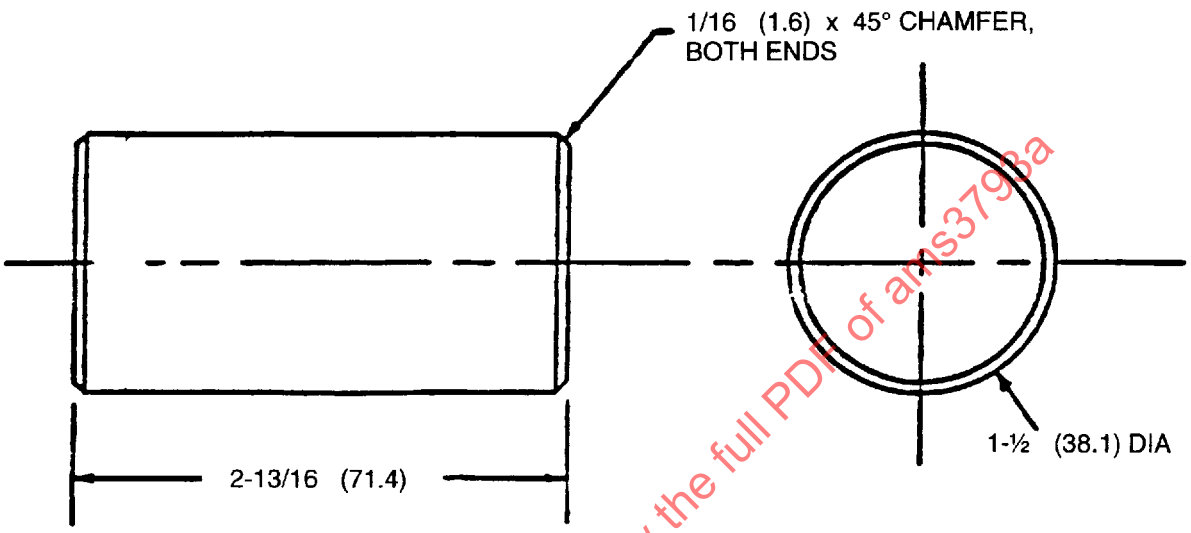
Figure 1- Side Plate



NOTES:

1. Material is Type 303 corrosion-resistant steel.
2. Quantity required is 2.
3. See Figure 1, Notes 6, 7, 8, 9,10, and 11.
4. Dimensions are in inches (millimeters).

Figure 2 - Primary Pin



NOTES:

1. Material is Type 303 corrosion-resistant steel.
2. Quantity required is 2.
3. See Figure 1, Notes 6, 7, 8, 9, 10, and 11.
4. Dimensions are in inches (millimeters).

Figure 3 - Secondary Pin