

CGG-T-106F  
April 12, 1993  
 SUPERSEDING  
 CGG-T-106E  
 August 17, 1987

## FEDERAL SPECIFICATION

### TAPE, MEASURING (GENERAL USE)

This specification is approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal Agencies.

#### 1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers measuring tapes suitable for all general measuring work.

1.1.1 Federal specification coverage. Federal specifications do not include all varieties of the commodity as indicated by the title of the specification or which are commercially available, but are intended to cover only those generally used by the Federal Government.

#### 1.2 Classification.

1.2.1 Types, classes, and styles. The tapes covered by this specification shall be of the following types, classes, styles, and sizes as specified (see 6.2):

Type I. Woven (fiber) or unwoven fiberglass: 25, 50, 100, and 150 feet.

Class A. Fractional graduations.

Case L. Leather or heavy vinyl covered case.

Case V. Vinyl covered case.

Class B. Decimal graduations.

Case L. Leather or heavy vinyl covered case.

Case V. Vinyl covered case.

Type II. Steel

Class A. Fractional graduations, automatic winding: 36, 72, and 96 inches.

Style 1. Etched (natural steel colored graduations on a black etched background)

Style 2. Enameled (black graduations on a white or yellow enameled background)

Class B. Fractional graduations, hand winding: 25, 50, 75, and 100 feet.

Case L. Leather or heavy vinyl covered case.

Case V. Vinyl covered case.

Style 1. Etched (natural steel colored graduations on a black etched background).

Style 2. Enameled (black graduations on a white or yellow enameled background).

Style 3. Plated (chrome plated with black graduations).

Class C. Decimal graduations, hand winding: 25, 50, 75, and 100 feet.

Case L. Leather or heavy vinyl covered case.

Case V. Vinyl covered case.

Style 1. Etched (natural steel colored graduations on a black etched background).

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Style 2. Enameled (black graduations on a white or yellow enameled background).

Style 3. Plated (chrome plated with black graduations).

Class D. Decimal and diameter graduations, hand winding: 20 and 50 feet.

Case L. Leather or heavy vinyl covered case.

Case V. Vinyl covered case.

Style 1. Etched (natural steel colored graduations on a black etched background).

Style 2. Enameled (black graduations on a white or yellow enameled background).

Style 3. Plated (chrome plated with black graduations).

Class F. Fractional graduations, square-cornered case for inside measurements: 50 and 100 feet.

Style 2. Enameled (black graduations on a white or yellow enameled background).

Type III. Woven, metallic or unwoven fiberglass: 25, 50, 75, and 100 feet.

Class A. Fractional graduations.

Case L. Leather or heavy vinyl covered case.

Case V. Vinyl covered case.

Style 1. Linen flax, fiber ribbon or unwoven fiberglass ribbon.

Style 2. Synthetic yarn ribbon or unwoven fiberglass ribbon.

Class B. Decimal graduations.

Case L. Leather or heavy vinyl covered case.

Case V. Vinyl covered case.

Style 1. Linen flax, fiber ribbon or unwoven fiberglass ribbon.

Style 2. Synthetic yarn ribbon or unwoven fiberglass ribbon.

Type V. Steel, self-supporting (see 3.10.1.1): 72, 78-3/4, 96, 120, and 144 inches.

Class A. Butt-end case.

Style 1. Automatic Winding.

Style 2. Pull-push.

Class B. Plain case.

Style 1. Automatic Winding.

Style 2. Pull-push.

## 2. APPLICABLE DOCUMENTS

2.1 Specifications and standards. The following specifications and standards of the issues in effect on the date of invitation for bids, or request for proposal, form a part of this specification to the extent specified herein:

### Federal Specifications:

O-L-164 - Leather Dressing; Mildew-Preventive.

CCC-C-700 - Cloth, Coated, Vinyl Coated (Artificial Leather)

PPP-P-40 - Packaging and Packing of Hand Tools.

### Federal Standards:

Fed. Test Method Std. No. 141 - Paint, Varnish, Lacquer, and Related Materials; Methods of Inspection, Sampling, and Testing.

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(Activities outside the Federal Government may obtain copies of Federal Specifications, and Standards as outlined under General Information in the Index of Federal Specifications and Standards. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the General Services Administration, Specifications Unit (WFSIS), 7th and D Street SW, Washington, DC 20407.)

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.)

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Commercial Item Descriptions and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

#### Military Specification:

MIL-T-3530 - Treatment, Mildew-Resistant for Thread and Twine.

#### Military Standard:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

(Copies of Military Specifications and Standards may be obtained from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

**2.2 Other publications.** The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

#### American Society for Testing and Materials (ASTM) Standards:

ASTM-D-1424 - Tear Resistance of Woven Fabrics by Falling-Pendulum (Elmendorf) Apparatus.

ASTM-D-2262 - Tearing Strength of Woven Fabrics by the Tongue (Single Rip) Method (Constant-Rate-Of-Traverse Tensile Testing Machine).

ASTM-D-968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.

(Application for copies of ASTM Standards should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

### **3. REQUIREMENTS**

**3.1 Material.** Material shall be as herein specified and shall be capable of withstanding the tests specified in 4.4.

**3.2 Illustrations.** The illustrations herein are descriptive and not restrictive and are not intended to preclude the purchase of tapes which are otherwise in accordance with this specification.

**3.3 Graduations and figures.** Tapes shall be graduated over the length indicated by the size. Graduations and figures (numbers) shall be permanent and distinct. Graduation lines shall be of a uniform and readily distinguishable width, and free from discontinuities and ragged edges. The maximum variation in width between like types of graduations and in the individual graduation shall be such

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that the maximum width shall not exceed the minimum width by more than 25 percent of the minimum width. Graduations shall be of such relative heights that the individual fractional aliquots are readily distinguishable from the graduations adjacent on each side, except that one-hundredths of a foot graduations of decimally graduated tapes may be of equal lengths. Each graduation shall be accurately located. Unless otherwise specified (see 6.2), tapes shall be graduated for reading left hand to right-hand.

**3.4 Finish.** Unless otherwise specified, all exposed metal parts, other than those of corrosion-resistant material, except the ribbon, shall be plated with zinc, chromium or nickel, or provided with a chemically produced oxide coating, oil treated, suitable for resisting corrosion. All platings and coatings shall be adherent and continuous. Exposed metal parts and steel ribbons shall be free of hazardous sharp edges and burrs. The outer surfaces of die-cast cases shall have as specified (see 6.2), a plating of nickel or nickel and copper followed by chromium, or a plating of nickel or zinc.

**3.5 Case cover, material.** Leather and vinyl for case covering (see 1.2.1), shall be in accordance with 3.5.1 and 3.5.2.

**3.5.1 Case L, leather or heavy vinyl.**

**3.5.1.1 Leather.** The leather cover shall be genuine cattle hide free from imperfections affecting serviceability or appearance and shall weigh not less than 3-1/2 ounces per square foot. The leather shall have not less than 150 pounds breaking strength and shall withstand the test specified in 4.4.15. The seams in the leather cover shall be butted securely and neatly sewed with thread having a minimum breaking strength of 8-1/2 pounds. When specified (see 6.2), the leather cover shall be rendered fungus resistant in conformance with O-L-164, type II, treatment. The leather covering on the assembled tape case shall not crack or scuff to a depth greater than 1/3 of the thickness of the leather when dropped in accordance with 4.4.3.1.

**3.5.1.2 Heavy vinyl.** The heavy vinyl cover shall be vinyl coated cloth and shall meet the minimum requirements of class 5, CCC-C-700. The covering on the assembled tape case with ribbon shall have sufficient hardness so that it will not crack to expose the base cloth when dropped in accordance with 4.4.3.1. Identification of the coated cloth will not be required. A stainless steel or plated steel furling ring shall be used to cover and securely hold the edges of the vinyl coated cloth to the case. When specified (see 6.2), the vinyl cover shall be mildew resistant in accordance with CCC-C-700, class 5, treatment (b) (mildew resistant). The cloth shall withstand the test specified in 4.4.16.

**3.5.2 Case V, vinyl.**

**3.5.2.1 Vinyl.** The vinyl cover shall be vinyl coated cloth in accordance with class 2 of CCC-C-700, except that identification of the coated cloth will not be required. A stainless steel or plated steel furling ring shall be used to cover and securely hold the edges of the vinyl coated cloth to the case. When specified (see 6.2), the vinyl cover shall be mildew resistant in accordance with CCC-C-700, class 2, treatment (b) (mildew resistant). The cloth shall withstand the test specified in 4.4.16.

**3.6 Identification marking.** Each item (including all items within a set or kit) shall be marked with the manufacturer's name or identifying symbol, and the state or country of manufacture, unless otherwise specified. All marking shall be engraved, etched, molded, or stamped directly on the item's surface in such a manner that it remains clearly legible throughout the life of the item.

**3.7 Type I, woven (fiber) or unwoven fiberglass tapes.**

**3.7.1 Class A, fractional graduations.** Class A tapes shall consist of a ribbon, reel, handle, and case.



**3.7.1.1 Ribbon.** The ribbon shall be woven with either a linen fiber or synthetic fiber, or shall be unwoven fiberglass, polyvinyl coated, or as specified (see 3.11 and 6.2). When specified (see 6.2), all threads used in the fabrication of the ribbon shall be rendered fungus resistant in conformance with class 1 treatment of MIL-T-3530. The ribbon shall be not less than 1/2 and not more than 7/8 inch wide, and the woven tapes shall have a selvage at each edge. The ribbon shall be completely covered with a moisture resistant coating, and shall have a minimum breaking strength of 80 pounds for linen fiber and 150 pounds for synthetic fiber, and unwoven fiberglass, polyvinyl coated. When specified (see 6.2), the ribbon shall have a moisture-resistant plastic coating; for example, a vinyl chloride acetate copolymer which is inert to fungus attack. Synthetic fiber ribbons shall have a minimum tearing resistance of 18 pounds when tested in accordance with 4.4.9. There shall be a stainless steel or plated steel ring attached to the outer end of the ribbon, the ring being fastened to the ribbon by a stainless steel, plated steel or plated brass strip of the same width as the ribbon. The outer end of the ribbon shall be reinforced for not less than 4 inches by a strip of leather, plastic, or other suitable abrasion resistant material of the same width as the ribbon. When specified (see 6.2), the leather or plastic shall be fungus resistant in conformance with 3.5.1.1. The thread used in the fabrication of the ribbon shall have a minimum breaking strength of 8-1/2 pounds. The reinforcement shall pass around the ring and under the clip. The ribbon shall be removable from the reel without damage to ribbon, case, or winding reel by means of an ordinary hand tool such as a screwdriver. The finger ring shall withstand the test specified in 4.4.6.

**3.7.1.2 Reel.** The reel shall be of nickel plated steel, nickel plated brass, die cast zinc, aluminum or plastic, shall rotate freely, and shall be constructed to comply with the test requirements of 4.4.7.

**3.7.1.3 Handle.** The handle shall be suitable for winding the ribbon on the reel, fold against the reel, and shall have a crank of not less than 1 inch. The handle shall be of stainless steel, nickel plated steel, or nickel plated brass, or aluminum, or a combination of these metals, or die cast zinc.

**3.7.1.4 Case.** The case shall be of corrosion-resisting metal or a metal with a corrosion-resistant finish, and shall be not less than 0.025 inch thick. The opening in the case for the ribbon shall be provided with a durable eyelet with rollers for bearing on each side of the opening. The rollers shall revolve freely. The case shall be of such construction as to be capable of withstanding the drop test specified in 4.4.3.

**3.7.1.5 Graduations.** The ribbon shall be graduated on one side in feet, inches, and one-quarter inches. The ribbon shall be numbered at the inch graduations, as specified in 3.7.1.5.1 and 3.7.1.5.2. The ribbon may have additional graduations of 1/8 inch. The graduation lines and inch indication numerals shall be in black, and the foot indication numerals shall be in red. When specified (see 6.2), the zero or point of beginning of measurements shall be at the outside end of the ring.

**3.7.1.5.1 First foot of ribbon.** Each graduation shall be numbered to indicate inches, up to and including 11 inches and the twelfth graduation numbered to indicate feet. When specified (see 6.2), first end markings up to approximately 2 inches may be obliterated by end fitting.

**3.7.1.5.2 Second and each successive foot of ribbon.** First graduations shall be numbered to indicate inches only, second to eleventh graduations numbered to indicate feet and inches, and twelfth graduation numbered to indicate feet.

**3.7.1.6 Accuracy.** The error in the length of the ribbon on a horizontal surface with a tension of 2 pounds at a temperature of 68 degrees Fahrenheit (F) or 20 degrees Celsius (C) shall not exceed 2 inches per 100 feet. The error due to change in humidity shall not exceed 0.75 percent for linen fiber or 0.25 percent for synthetic fiber and unwoven fiberglass, polyvinyl coated when tested in

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accordance with 4.4.10.

3.7.1.7 Sizes. These tapes shall be furnished with ribbons 25, 50, 100, or 150 feet long, as specified (see 6.2).

3.7.1.8 Type I, class A tape shall be similar to figure 1.

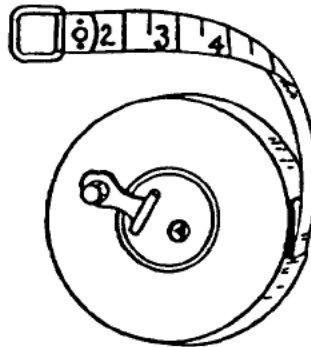


FIGURE 1. Type I, classes A and B woven or unwoven fiberglass tapes.

3.7.2 Class B, decimal graduations. Class B tapes shall conform to the requirements of 3.7.1, except for graduations.

3.7.2.1 Graduations. The ribbon shall be graduated in feet, tenths, and half tenths of a foot. The ribbon may also have additional graduations of hundredths of a foot and/or graduations of one-eighth inch. The graduation lines and tenth of a foot indication numerals shall be in black, and the foot indication numerals shall be in red. Each graduation shall be numbered to indicate tenths of a foot up to and including nine-tenths of a foot. The tenth graduation shall be numbered to indicate feet. The second to ninth graduations of each successive foot of tape shall be numbered to indicate feet and tenths of a foot. Tenth graduations shall be numbered to indicate feet. First end marking up to approximately 2/10 of a foot may be obliterated by end fitting.

3.7.2.2 Type I, class B tape shall be similar to figure 1.

### 3.8 Type II steel tapes.

3.8.1 Class A, fractional graduations, automatic winding. Class A tapes shall consist of a ribbon, and automatic-spring winding device with center push button and ratchet stop or similar device, and a case. Class A tapes shall withstand the applicable tests specified in 4.4.

3.8.1.1 Ribbon. The ribbon shall be of spring tempered steel not less than 1/4 inch wide and not less than 0.003 and not more than 0.007 inch thick. After the ribbon has been encircled around a rod 1/2 inch in diameter, there shall be no permanent deformation of the ribbon. The ribbon shall be permanently attached to the reel or be attached to allow for easy removal. The outer end of the ribbon shall be equipped with a stainless steel or plated steel ring for inserting the tip of the finger. The ring shall be fastened to the ribbon by a stainless steel, plated steel or plated brass strip of the same width as the ribbon. The finger ring shall withstand the test specified in 4.4.6.

3.8.1.2 Winding device. The winding device shall be constructed that when the ribbon is withdrawn by hand to any point up to the limit of its measuring capacity, it will hold at the length withdrawn, and when the button or finger

release device is pressed, the ribbon will automatically rewind into the case. The winding device shall comply with the requirements of the test specified in 4.4.7.

**3.8.1.3 Case.** The ribbon shall be fitted into a metal case. The case shall be not less than 0.015 inch thick and shall be plated with nickel or nickel and chromium. The case shall be composed of two sides (independent of winding mechanism) that shall butt together with edges (corners) rounded.

**3.8.1.4 Graduations.** One side of the ribbon shall be subdivided to sixteenths of an inch on one edge. Each inch graduation shall be marked with the number of inches. When specified (see 6.2), the opposite face of the ribbon shall be graduated to read diameters to sixty-fourths or hundredths of an inch when the tape is applied to the circumference of a circle. When specified (see 6.2), the opposite face of the ribbon shall be graduated to read in feet, and tenths and hundredths of feet; and marked in feet and tenths of a foot, with the foot marks repeated (after the first foot) at each tenth of a foot. When specified (see 6.2), tapes of a 72 inch length as used by the Army Medical Department shall be graduated on the opposite face of the ribbon to read in millimeters for a length of either 200 centimeters or 2.0 meters. Each centimeter graduation shall be marked with the number of centimeters. Graduation lines shall be not more than 0.030 inch in width. There shall be a clear space of at least one inch between the metal ring and the zero graduation.

**3.8.1.5 Accuracy.** The error in the length of the ribbon when supported on a horizontal surface with a tension of 3-1/2 pounds at a temperature of 68 degrees F, or 20 degrees C, shall not exceed 1/64 inch.

**3.8.1.6 Sizes.** The tape shall be furnished with ribbons 36, 72, or 96 inches long, as specified (see 6.2).

**3.8.1.7 Type II, class A steel tapes** shall be similar to figure 2.

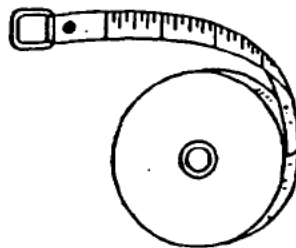


FIGURE 2. Type II, class A steel tapes.

**3.8.1.8 Style 1, etched tapes.** Style 1 tapes shall have natural steel color graduations, and figures clean cut, legible, and raised not less than 0.0005 inch on a black etched background. The graduation lines shall extend to, and be square with, the edges. The tapes shall be coated with a protective clear coating and shall be capable of withstanding the test specified in 4.4.12.

**3.8.1.9 Style 2, enameled tapes.** Style 2 tapes shall have bonderized ribbon with a durable, flexible, tightly adherent white or yellow baked-enamel coating on both sides. The graduations and figures shall be black baked-enamel, legible, free from ghost lines. The graduation lines shall extend to, and be square with,



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the edges. Combined black and red numerals, black or red foot flags with white or yellow numerals are acceptable. The tapes shall be coated with a protective clear coating and shall be capable of withstanding the tests specified in 4.4.12, 4.4.13, and 4.4.14.

3.8.1.10 Type II, class A tape shall be similar to figure 2.

**3.8.2 Class B, steel tapes, fractional graduations, hand winding.** Class B tapes shall consist of a ribbon, reel, handle, and case. The class B tapes shall withstand the applicable tests specified in 4.4. The tape shall be so designed as to facilitate removal of the ribbon without damage to the ribbon, reel, or case by means of an ordinary hand tool such as a screwdriver. The finger ring shall withstand the test specified in 4.4.6.

**3.8.2.1 Ribbon.** The ribbon shall be spring tempered steel, and shall be not less than 3/8 inch wide, and not less than 0.005 inch thick after etching, or before enameling. When specified (see 6.2), the ribbon shall be of stainless steel and shall conform to the requirements of 3.8.1.8. After the ribbon has been circled around a rod 1 inch in diameter, there shall be no permanent deformation of the ribbon. Stainless steel ribbon shall be circled around a rod 2 inches in diameter without permanent set. The outer end of the ribbon shall be equipped with a stainless steel or plated steel ring for inserting the tip of the finger, the ring being fastened to the ribbon by a stainless steel, plated steel or plated brass strip of the same width as the ribbon. When specified (see 6.2), the ring shall be provided with a folding hook.

**3.8.2.2 Reel.** The reel shall be of nickel plated steel, nickel plated brass, die cast zinc, aluminum, or plastic, and shall rotate freely. The winding drum of the reel shall be provided with a rugged frictional device to prevent spin of the drum, and to reduce to a minimum the back lash of the ribbon. The reel including the winding drum and its mechanisms shall withstand the test specified in 4.4.4 and 4.4.7.

**3.8.2.3 Handle.** The handle shall be stainless steel, nickel plated steel, or nickel plated brass, or aluminum, or a combination of these metals, or die cast zinc. The handle shall fold against the reel and shall have a crank length of not less than 1 inch. The handle shall be released from its locked position by pressing on a pin or button on the side of the case opposite the handle or clearance shall be provided between the case and the end of the handle to allow for release of the handle.

**3.8.2.4 Case.** The case shall be of corrosion-resisting metal or a metal with a noncorrosive finish and shall be not less than 0.025 inch thick. The opening in the case for the ribbon shall be provided with a durable eyelet with freely revolving rollers for bearing on each side of the opening. The case shall be constructed to withstand the drop test specified in 4.4.3.

**3.8.2.5 Graduations.** Graduations shall be on one side in feet, inches, and eighths of an inch. Unless otherwise specified (see 6.2), the zero or point of beginning measurement shall be at the outside end of the ring. Graduation lines shall extend fully to the edge of the ribbon and shall be 0.030 inch or less in width. The ribbon shall be numbered at the inch graduations as follows.

**3.8.2.5.1 First foot of tape.** Each graduation shall be numbered to indicate inches up to and including 11 inches and the twelfth graduation numbered to indicate feet. First end marking up to approximately 1-1/4 inches may be obliterated by end fitting.

**3.8.2.5.2 Second and each successive foot of ribbon.** Second through tenth graduations, inclusive, shall be numbered to indicate feet and inches. First and eleventh graduations shall be numbered to indicate feet and inches or inches only.



**3.8.2.6 Accuracy.** The error in the length of the ribbon, when supported on a horizontal surface with tension of 10 pounds at a temperature of 68 degrees F, or 20 degrees C, shall not exceed 0.050 inch for lengths 50 feet and under, 0.075 inch per 75-foot length, and 0.100 inch per 100-foot length. For tapes having metric graduations, the error in the length of the ribbon shall not exceed 2.5 mm for lengths of 30 meters and under.

**3.8.2.7 Sizes.** The tape shall be furnished with ribbons 25, 50, 75, or 100 feet long, as specified (see 6.2).

**3.8.2.8 Type II, class B steel tapes shall be similar to figure 3.**

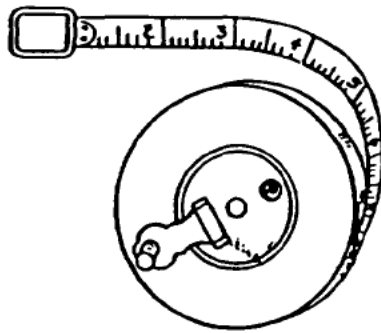


FIGURE 3. Type II, class B and C steel tapes.

**3.8.2.9 Style 1, etched tapes.** Style 1 tapes shall conform to the requirements of 3.8.1.8.

**3.8.2.10 Style 2, enameled tapes.** Style 2 tapes shall conform to the requirements of 3.8.1.9.

**3.8.2.11 Style 3, chrome plated tapes.** Style 3 tapes shall be chrome plated on both sides and the graduations and figures shall be black, legible, durable and permanent. The tapes shall be coated with a protective clear coating and shall be capable of withstanding the tests specified in 4.4.12, 4.4.13, and 4.4.14.

**3.8.3 Class C, steel tapes, decimal graduations, hand winding.** Class C tapes shall conform to the requirements of 3.8.2.1 through 3.8.2.11, except for graduations. Class C tapes shall withstand the applicable tests specified in 4.4.

**3.8.3.1 Graduations.** The ribbon shall be graduated in feet, tenths, and hundredths of a foot. If specified (see 6.2), one side of the ribbon shall be graduated in feet, tenths, and hundredths of a foot and graduated on the other side in centimeters with the first decimeter graduated in millimeters and marked to indicate consecutive centimeters and meters; there shall be a blank space on each end of the tape.

**3.8.3.1.1 First foot of tape.** First foot of ribbon shall be numbered to indicate tenths of a foot, up to and including 9/10 of a foot. Tenth graduation shall be numbered to indicate feet. First end markings up to approximately 1/10 foot may be obliterated by end fitting.

**3.8.3.1.2 Second and each successive foot of ribbon.** Second through eighth graduations, inclusive, shall be numbered to indicate feet and tenths of a foot.

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First and ninth graduations shall be numbered to indicate feet and tenths of a foot or tenths only.

**3.8.4 Class D steel tapes, decimal and diameter graduations, hand winding.** Class D tape shall consist of a ribbon with hinged spike or hook on end, reel, handle, and case. The Class D tapes shall withstand the applicable tests specified in 4.4.

**3.8.4.1 Ribbon.** The ribbon shall conform to requirements of 3.8.2.1, except the first end shall be fitted with a hinged spike or hook for catching and holding the tape in the bark of trees, and shall comply with the test requirements specified in 4.4.6.

**3.8.4.2 Reel.** The reel shall comply with the requirements of 3.8.2.2.

**3.8.4.3 Handle.** The handle shall comply with the requirements of 3.8.2.3.

**3.8.4.4 Case.** The case shall comply with the requirements of 3.8.2.4, except it shall have a provision for receiving the metal hook, and when specified (see 6.2), the case shall be steel 0.020 inch minimum thickness exclusive of the case cove (see 3.5).

**3.8.4.5 Graduations.** Graduations shall comply with the requirements of 3.8.3.1, except there shall be a blank space before zero point of beginning of measurement of at least 1 inch. The tape shall be graduated on the reverse side to give diameter equivalents in feet, inches, and tenths of an inch on 50-foot lengths, and diameter equivalents in consecutive inches and tenths of inches on 20 foot lengths, direct from a circumference measurement. The zero points on both sides shall coincide. When specified (see 6.2), a 50-foot length shall be graduated to give diameter equivalents in consecutive inches and tenths of inches, direct from a circumference measurement.

**3.8.4.6 Accuracy.** Accuracy shall be the same as required in 3.8.2.6.

**3.8.4.7 Size.** The tape shall be furnished with ribbons 20 or 50 feet long, as specified (see 6.2).

**3.8.4.8 Type II, class D tape shall be similar to figure 4.**

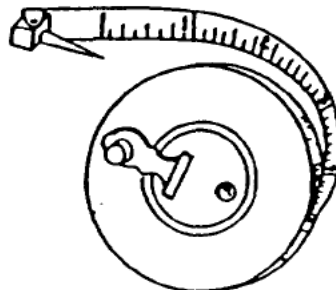


FIGURE 4. Type II, class D steel tapes.

**3.8.4.9 Style 1 etched tapes.** Style 1 tapes shall conform to the requirements of 3.8.1.8.

**3.8.4.10 Style 2, enameled tapes.** Style 2 tapes shall conform to the requirements of 3.8.1.9.

**3.8.4.11 Style 3, chrome plated tapes.** Style 3 tapes shall conform to the requirements of 3.8.2.11.

**3.8.5 Class F, steel tapes, fractional graduations, square-covered case for inside measurements.** Class F tape shall consist of a ribbon, reel, handle, and case. The tape shall have black graduations and figures on a white or yellow enameled background and shall conform to 3.8.1.9 and shall be similar to figure 5. Class F tapes shall withstand the applicable tests specified in 4.4.

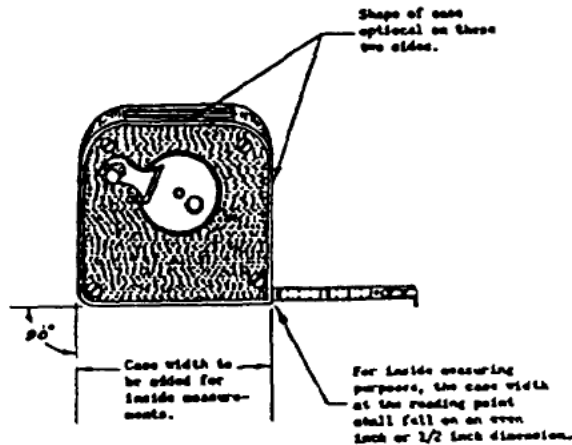


FIGURE 5. Type II, class F steel tapes, square-covered for inside measurements.

**3.8.5.1 Ribbon.** The ribbon shall be in accordance with 3.8.2.1, except that the outer end of the ribbon shall be equipped with either a fixed or compensating type steel hook 0.040 - 0.045 inch thick.

**3.8.5.2 Reel.** The reel, winding drum, and its mechanism shall be in accordance with 3.8.2.2.

**3.8.5.3 Handle.** The handle shall turn parallel with the case and shall be provided with swiveling hand grip of adequate design for gripping and for easy turning. The handle shall be of stainless steel, nickel plated steel or nickel plated brass, or aluminum, or a combination of these metals, or die cast zinc or impact resistant plastic.

**3.8.5.4 Case.** The case shall be of corrosion resisting metal or a metal with a noncorrosive finish or impact resistant plastic. The case shall be not less than 0.025 inch thick.

**3.8.5.5 Graduations.** The graduations shall be as specified in 3.8.2.5, 3.8.2.5.1, and 3.8.2.5.2, except that 1/16 inch increments may be furnished at the option of the contractor. The zero mark shall be at the midpoint between the inside and outside measuring surfaces of a fixed type hook, and at the inside and outside measuring surfaces of a compensating type hook.

**3.8.5.6 Sizes.** The tape shall be furnished with ribbons 50 or 100 feet long, as specified (see 6.2).

**3.8.5.7 Shape of case.** The case shall have a square (90 degree) corner from which an inside measurement can be taken by adding the case width measurement to the tape reading. The case width dimension shall fall either on an inch or 1/2 inch dimension. The case width dimension (for measuring purposes) shall be legibly and permanently marked on the outside of the case.



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**3.8.5.8 Quick hand-rewinding tape.** When specified (see 6.2), the type II, class F steel tape shall be furnished with gears or other quick rewinding mechanism whereby the tape can be rewound by hand operation at a rate of at least 50 feet in 8 seconds.

**3.9 Type III woven metallic or unwoven fiberglass tapes.**

**3.9.1 Class A tape, fractional graduations.** Class A tapes shall conform to the requirements of 3.7.1.2 through 3.7.1.7. Class A tapes shall withstand the applicable tests specified in 4.4.

**3.9.1.1 Ribbon.** The ribbon shall be either unwoven fiberglass or polyvinyl coated meeting the applicable requirements of 3.7.1.1. The ribbon may also be made of woven metallic containing not less than four longitudinal threads having a metallic tinsel strand spiraled lengthwise around each thread. The tinsel strand shall extend the entire length of the ribbon thread. The tinsel strand need not be continuous; but if it is not continuous, the ends of the strand shall overlap. (For replacement tapes, see 3.11.)

**3.9.1.2 Type III, class A woven metallic or unwoven fiberglass tapes shall be similar to figure 6.**

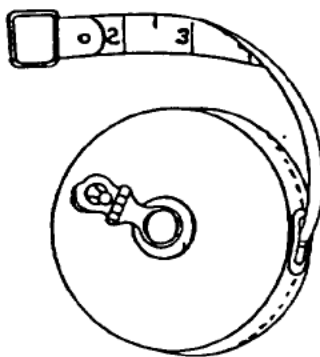


FIGURE 6. Type III, class A and B woven metallic or unwoven fiberglass tapes.

**3.9.2 Class B tape, decimal graduations.** Class B tapes shall conform to the requirements of 3.7.2 and 3.7.2.1, except for the ribbon which shall conform to 3.9.1.1. Class B tapes shall be similar to figure 6.

**3.10 Type V, steel, self-supporting.** Type V, class A and B tapes shall be 6, 8, 10, or 12 feet long in English measure, as specified (see 6.2). If metric measuring tapes are specified (see 6.2), the tapes shall be 2 meters long.

**3.10.1 Class A, butt end case.** Class A tapes shall consist of a blade which shall be replaceable and an enclosing case which provides protection for the blade against damage. The case shall have one flat end surface and one flat rest surface. The flat end surface shall be arranged so that inside measurements may be made between flat surfaces of openings by extending the blade to one surface of the opening and butting the flat end surface of the case against the opposite surface of the opening. The flat rest surface shall be arranged so that with the blade extended and lying virtually flat on a horizontal surface, the case will rest upright without tipping more than 6 degrees on the same horizontal surface. The tape shall be either of the direct reading style or addition style. An index pointer or gage mark shall be provided on the case or blade which shall either indicate inside measurement directly or be arranged so that a fixed number of integral units of length are to be added by the operator to the index indication

to obtain the correct length. The case of the addition style shall be permanently and legibly marked in broad and readily noticeable characters to indicate the fixed number of integral length units which are to be added when the case is included in the measurements. The end and rest surfaces of the case may have draft angles of not more than 6 degrees perpendicular to the side surfaces of the case.

**3.10.1.1 Blade.** The blade shall be spring tempered steel or when specified (see 6.2), stainless steel. The blade shall be not less than 0.0045 inch thick and when specified,  $1/2 \pm 1/64$  inch or  $3/4 \pm 1/64$  inch wide (see 6.2). The blade shall be flexible and stiffened by forming so that it may be used either for measuring along curved surfaces and around sharp corners or as an unsupported tape in measuring along plane surfaces. The blade shall support itself without collapsing when extending horizontally 42 inches and held by the case, except that if the blade is arranged to be automatically drawn back in the case, the horizontal extension without collapsing shall be not less than 36 inches. The blade shall not crack, take permanent set, or separate from the finished coating when tested as specified in 4.4.8.1. The free end of the blade shall be provided with a substantial flat surfaced metal hook member, fastened centrally with metal rivets, except the swiveling type hook shall have a single rivet, and so arranged that the hook thickness will not interfere with obtaining the same reading when taking an inside or an outside measurement of identical length, also arranged to permit easy withdrawal of blade from case. The blade shall be so designed that it may be withdrawn from the case the full graduated length of the tape with normal effort.

**3.10.1.2 Case.** The case shall be brass, steel, die-cast or durable plastic, and shall have rounded edges. When specified (see 6.2), the case shall be provided with a suitable spring tempered steel belt hook. The case shall not crack or show a permanent deformation in the overall thickness of the case in excess of 10 percent of the original overall thickness or a permanent deformation in the outside height or width of the case in excess of 5 percent of the original, respective dimensions when tested as specified in 4.4.3.2.

**3.10.1.3 Graduations and figures.** The top face shall be graduated; the bottom face may be either with or without graduations. Each edge of the top face shall be subdivided to sixteenths of an inch, except that at least the first 6 inches of the top or bottom edge shall be subdivided to thirty-seconds of an inch. Figures shall read either consecutively in inches the entire specified length, or consecutively in inches through the first eleven inches with the remaining specified length reading consecutively in inches on one edge and feet and inches on the other edge. If metric measuring tapes are specified (see 3.10), one edge of the top face shall be subdivided to sixteenths of an inch and the other edge of the same face subdivided to thousandths of a meter (millimeters) with the figures of each edge reading consecutively in inches and millimeters, respectively. If engineers' (surveyors' or road builders') tapes are specified (see 6.2), either one edge of the top face shall be subdivided to hundredths of a foot and the other edge of the same face subdivided to sixteenths of an inch, or the top face shall be subdivided to hundredths of a foot and the opposite face to sixteenths of an inch. The hundredths foot scale or engineers' (surveyors' or road builders') tapes shall have each tenth-foot graduation marked to indicate both feet and tenths of a foot, except that the first 9/10 of a foot of the rule shall be marked to indicate tenths of a foot only and each numbered foot shall be followed by the letter "F". The sixteenth inch scale of engineers' (surveyors' or road builders') tapes shall have each inch graduation marked to indicate both feet and inches, except that the first 11 inches of the rule shall be marked to indicate inches only and each numbered foot shall be followed by the letter "F". Blades shall be graduated over the full length indicated by the size of tape and shall be suitable for making measurements over such full length.

**3.10.1.4 Accuracy.** The scale error of any graduated edge having inch graduations shall not exceed  $1/32$  inch, except that if the tape has a 6 inch length and subdivided to thirty-seconds of an inch, the scale error in such 6 inch length

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shall not exceed  $1/64$  inch. The scale error of any graduated edge having thousandth-meter (millimeter) graduations shall not exceed 0.800 millimeter. If the tape has a hundredths-foot scale, the scale error of the edge so graduated shall not exceed  $1/32$  inch.

**3.10.1.5 Finish.** The blade, except stainless steel blades, shall have either a bonderized ribbon with a durable, flexible, tightly adherent, white or yellow enamel coating on both sides, or when specified (see 6.2), nickel plated or chromium plated finish on both sides, suitable for preventing corrosion. Figures and graduations shall be black enamel, distinct and easy to read, free from ghost lines, and shall extend to and be square with the edge. Combined black and red numerals, black or red foot flags with white or yellow numerals are acceptable. The figures and graduations shall not become illegible from friction inside the case or in the case opening, or from normal use. Brass cases shall have a polished and lacquered finish. The blades shall be coated with a protective clear coating and shall be capable of withstanding the test of 4.4.12. The enameled and plated blades shall be capable of withstanding the tests of 4.4.13 and 4.4.14. If the cases are made of steel other than corrosion resisting, they shall be plated in accordance with the best commercial practice with nickel, nickel and chromium, or other metallic substance equally suitable for the purpose.

**3.10.1.6 Class A tapes** shall be similar to figure 7.



FIGURE 7. Type V, class A tape, butt-end case.

**3.10.1.7 Style 1 tapes, automatic winding.** Style 1 tapes shall be provided with a stop and self-winding device so that the blade may be extended from the case by hand, held automatically or by a positive locking device at any desired position, and by finger pressure on a button or similar device, or by release of a positive locking device, caused to be automatically drawn back into the case.

**3.10.1.8 Style 2 tapes, pull-push winding.** The blade of style 2 tapes shall be arranged to be extended from the case by hand. The tapes shall not have a stop or release mechanism for the blade.

**3.10.2 Class B, plain case.** Class B tapes shall consist essentially of a tape type blade and an enclosing case for the blade. The case shall be so arranged that the blade is withdrawn through an opening (slot) in the periphery of the case.

**3.10.2.1 Blade.** The blade shall conform to the requirements of 3.10.1.1, except that it shall be  $5/8 + 1/64$ -inch wide. The zero reading of the blade shall coincide with the inside face of the hook.



that it shall be  $5/8 + 1/64$ -inch wide. The zero reading of the blade shall coincide with the inside face of the hook.

3.10.2.2 Case. The case shall conform to the requirements of 3.10.1.2. When specified (see 6.2), the case shall be of stainless steel.

3.10.2.3 Graduations and figures. Graduations and figures shall conform to the requirements of 3.10.1.3.

3.10.2.4 Accuracy. Accuracy shall conform to the requirements of 3.10.1.4.

3.10.2.5 Finish. Finish of the blade shall conform to the requirements of 3.10.1.5.

3.10.2.6 Class B tapes shall be similar to figure 8.

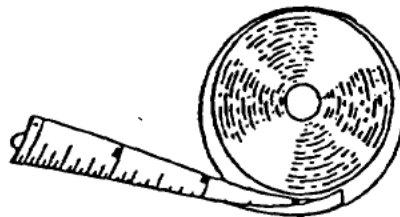


FIGURE 8. Type V, class B, tape, plain case.

3.10.2.7 Style 1 tapes. Style 1 tapes shall conform to the requirements of 3.10.1.7.

3.10.2.8 Style 2 tapes. Style 2 tapes shall conform to the requirements of 3.10.1.8.

3.11. Replacement ribbons or blades. If specified (see 6.2), the ribbon or blade shall be furnished without reel, handle, or case. As specified (see 6.2), types I and III replacement ribbons shall be either woven fiber, woven metallic fiber or fiberglass polyvinyl coated.

3.12 Workmanship. Tapes and cases shall be smoothly finished, clean, and free from rust, oxide scale, fins, burrs, pits, cracks, cuts or tears, blisters, external rough edges, corners, or surfaces, and any defect which may affect their serviceability, durability or appearance.

3.13 Metric Products. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pound units, providing they fall within the tolerances specified using conversion tables contained in the latest revision of FED STD-376, and all other requirements of this federal specification are met. If a product is manufactured to metric dimensions and those dimensions exceed the tolerances specified in the inch-pound units, a request should be made to the specification preparing activity for changes to this document.

3.14 Regulatory Requirements. The offeror/contractor is encouraged to use recovered material in accordance with public law 94-580, as amended to the maximum extent possible.

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**4. QUALITY ASSURANCE PROVISIONS**

**4.1 Responsibility for inspection.** Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

**4.1.1 Inspection of materials and components.** In accordance with 4.1 above, the contractor is responsible for insuring that materials and components used were manufactured, tested, and inspected in accordance with requirements of referenced subsidiary specifications and standards to the extent specified herein, or, if none, in accordance with this specification.

**4.2 Sampling for conformance.** Sampling shall be performed in accordance with MIL-STD-105. Data for sampling shall be as stated in table I.

TABLE I. Sampling data.

Category	Sample unit	Inspection level	Acceptable quality level (AQL)	AQL Expressed in terms of	Reference
Visual examination	1 each	S-3	1.5 Major 2.5 Minor	Percent defective	4.3.1
Dimensional examination	1 each	S-3	2.5	Percent defective	4.3.2
Testing (Group A)	1 each	S-2	2.5	Percent Defective	4.4.1
Testing (Group B)	---	---	---	---	4.4.2
Preparation for delivery	one container	S-2	4.0	Defects per hundred units	4.5

**4.3 Examination.**

**4.3.1 Visual examination.** Each sample unit shall be examined for any nonconformance in design, material, finish, coating, construction, workmanship, and marking. Defects are listed in table II.

TABLE II. Classification of defects.

**Categories Defects****Critical:** None defined.**Major:**

101	Type, class, style, or size not as specified.
102	Incomplete, component parts missing.
103	Tape inoperative, cannot be readily withdrawn, evidence of binding, or tape fails to remain at the length withdrawn.
104	Ribbon material not as specified; evidence of torn or frayed edges, salvage missing; ribbon broken, cracks, (steel) not free of sharp edges and burrs.
105	Ring or hook not securely attached to ribbon, not reinforced as specified.
106	Graduations and figures incomplete, illegible, on wrong side of tape, difference in size of fractional graduations not readily distinguishable, graduations not in feet, inches, fraction of an inch, tenths, and hundredths of a foot as specified.
107	Case thickness less than the minimum specified; case not coated (or covered) as specified.
108	Leather covering (as applicable) not securely sewn, seams not butted, evidence of broken threads.
109	Vinyl cover incomplete, evidence of uncoated spots, furling ring nonconforming.
110	Ribbon width nonconforming; thickness not within the specified tolerance.
111	Opening for ribbon not provided with an eyelet as specified; rollers do not revolve, rollers not smooth, evidence of burrs.
112	Ribbon not attached to the reel as specified.
113	Ring or hinged spike nonconforming.
114	Reel winding device, ratchet stop, drum device, not as specified.
115	Handle fails to fold against the reel, crank length nonconforming; pin or button fails to release handle from locked position.
116	Evidence of hazardous sharp edges or burrs on exposed metal parts.

**Minor:**

201	Ribbon (as applicable) not coated to prevent moisture or corrosion.
202	Finish of exposed metal parts not as specified.
203	Marking, country of origin, manufacturer's name or trademark missing, incorrect, illegible, or not permanent.

4.3.2 Dimensional examination. Each sample unit shall be examined for any nonconformance with dimensional requirements.

4.4 Testing. Each sample unit shall be tested in accordance with 4.4.1 and 4.4.2.

4.4.1 Group A tests. Each of the sample tapes shall be subjected to all the applicable tests specified in 4.4.2 through 4.4.9.

4.4.2 Group B tests. A random sample of two tapes shall be selected from the tapes having passed the group A tests and shall be subjected to the applicable tests specified in 4.4.10 through 4.4.14 for First Article Tests only.



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**4.4.3 Drop test.**

**4.4.3.1 Types I, II, and III.** Each of the sample tapes (types I, II, and III) shall be dropped three times from a height of 4 feet on a concrete surface. The assembled tapes shall be freely dropped to land on the rounded corners of the periphery of the case. The tapes shall then be examined to determine whether the winding mechanism operates satisfactorily or if any permanent distortion which would affect the tape has taken place, or if any breaking or cracking of the case has taken place. The vinyl covered cases shall be examined to determine if there is a separation of the vinyl from the furling ring and if the heavy vinyl (Case L) has cracked so as to expose the base cloth. The leather covered cases shall be examined to determine if the cracking or scuffing exceeds the requirements of 3.5.1.1.

**4.4.3.2 Type V.** Each of the type V, classes A and B sample tapes shall be dropped, edgewise, from a height of 5 feet onto a 1 inch thick, flat steel plate, weighing at least 30 pounds, lying flat on a solid foundation such as a concrete floor. The tape shall undergo a free drop, except for a sidewise restraint which shall be imposed by the flat surfaces of two vertical guides, so mounted as to form a passage slightly wider than the thickness of the case, through which the tape shall be dropped, to insure that the case will strike edgewise against the plate. The tape shall be dropped by hand. Class A tapes shall be held with the flat rest surface up in order that the rule shall tend to strike the plate on the curved sections of the case. Class B tapes shall be held with the tape slot up, in order that the tape shall tend to strike the plate on the edge of the case opposite the tape slot. The tape shall be subjected to a total of 10 drops, after which it shall be inspected to determine conformance with 3.10.1.2 or 3.10.2.2, as applicable.

**4.4.4 Spinning of reel (type II, classes B, C, D, and F steel, all sizes).** Approximately half of the length of the ribbon shall be pulled out from the case and then the ribbon shall be given a short, quick pull (snap) by hand so as to release approximately two more feet of ribbon. Immediately after movement of the hand has ceased, the reel shall not oscillate but may continue to rotate a maximum of two revolutions. When the ribbon is tightly rewound to its full limit within the case and the crank snapped shut, there shall be no looseness in the reel which permits any unwinding of the ribbon.

**4.4.5 Accuracy.** The sample tapes shall be tested for accuracy as specified under detail requirements for the individual types and sizes.

**4.4.6 Finger ring test.** Each sample tape shall be supported at approximately 4-1/2 inches from the tip of the finger ring and the load listed in table III applied across the finger ring approximately 75 percent of its width, for not less than five minutes. The tape shall not break or be pulled out of the clip which fastens the finger ring, and the finger ring shall not break or deform. Provisions shall be made for suspending weight when testing hook or spike tapes.

TABLE III. Test load for finger ring test

Type	Class	Size	Test Load (pounds)
I	A and B	25, 50, 100, and 150 feet.	40
II	A	36, 72, and 96 inches.	10
II	B and C	25, 50, 75, and 100 feet.	50
II	D	20 and 50 feet.	50
II	F	50 and 100 feet.	50
III	A and B	50 and 100 feet.	40

**4.4.7 Holding strength at reel.** Each sample tape shall be supported at the reel and, with the ribbon and connecting strip fully pulled out, the load listed in table IV shall be applied to the ribbon for not less than five minutes. The ribbon shall not be loosened from the reel.

**TABLE IV. Test load for holding strength at reel.**

Type	Class	Size	Test Load (Pounds)
I	A and B	25, 50, 100, and 150 feet.	25
II	A	36, 72, and 96 inches.	10
II	B and C	25, 50, 75, and 100 feet.	50
II	D	20 and 50 feet.	50
II	F	50 and 100 feet.	50
III	A and B	50 and 100 feet.	25
V	A and B	72, 78-3/4, 96, 120, and 144 inches	10

**4.4.8 Permanent deformation of ribbon (type II).** The ribbon shall be tested for permanent set by encircling over a rod of the diameter specified in 3.8.1.1 or 3.8.2.1, as applicable to the class of tape.

**4.4.8.1 Bend test for type V tapes.** Each sample tape under a pull of 25 pounds shall be wrapped around a 3-inch cylinder and then wrapped over a sharp-edge corner under normal tension use having an included angle of not more than 80 degrees and not less than 70 degrees. The sample shall be inspected for compliance with the requirements of 3.10.1.1 or 3.10.2.1, as applicable, after having been subjected to the above tests.

**4.4.9 Tensile strength of ribbon (type I, classes A and B, and type III, classes A and B).** The tensile strength of the ribbon shall be determined by testing two tapes only at the start of each contract period in accordance with ASTM-D-2262.

**4.4.10 Error due to change in humidity (type I, classes A and B; type III, classes A and B).** A specimen approximately 20 inches in length shall be removed from each sample tape under test and conditioned for 48 hours in circulating air of  $30 \pm 2$  percent relative humidity at a temperature of 70 degrees to 80 degrees F. The specimen shall be hung in a vertical position under no other load than its own weight during the conditioning period. At the end of the 48 hours, a 10 pound load shall be hung on the lower end of each specimen and after a period of 10 minutes, the distance between the gage marks measured. The load shall then be removed and the specimen conditioned for 48 hours in circulating air  $95 \pm 2$  percent relative humidity and at a temperature of 70 degrees to 80 degrees F. At the end of 48 hours of conditioning, the distance between gage marks shall again be measured as described above. The difference between the measurements taken shall be considered as the change in linear dimensions due to humidity.

**4.4.11 Abrasion test, types I and III.** Three specimens approximately 21 inches long shall be cut from the ribbon of each sample type I and III tapes. The specimens are to be tested as follows using the apparatus described in Federal Test Method Std. No. 141, method 6142: Immerse the brush bristles in water at 77 degrees to 86 degrees F for 30 minutes to a depth of one-half inch, and then rub Bon Ami cake soap into the brush for about 30 seconds, working the soap well up into the bristles by using the corners and edges of the cake. The brush should be turned on its back during this operation so that no more than minimum amount of water is lost. Mount the three specimens on the glass washability panel with waterproof tape, insert the brush in its holder and start the motor. After each 150 cycles, wash and resoap the brush. After a total of 1000 cycles, the outline of any number or graduation in the center eight inches of scrub stroke of each specimen shall be completely discernible.

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4.4.12 Abrasion test, types II and V. Three specimens approximately 6 inches long shall be cut from the ribbon of each sample type II and V tapes, from each end and from the center section. Each specimen is to be tested by ASTM D-968, Method A. Each specimen is to be positioned so that the sand falls on the graduations and figures, 4 liters of sand shall be applied to the etched tapes, 8 liters of sand to the plated tapes, and 16 liters of sand to the enameled tapes. If the graduations or figures are no longer readable, the specimen is considered to have failed the test. Failure of any of the specimens shall be cause for rejection.

4.4.13 Flexibility test, types II and V, enameled and plated tapes. Four specimens approximately 8 inches long shall be cut from the ribbon of each type II and type V enameled or plated sample tapes from each end and from 1/3 of the distance from each end of the tape, except type II, class A and type V where only 1 specimen is required. The specimens shall be exposed to an atmosphere of 40 degrees  $\pm$  5 degrees F for 10 minutes. While at this temperature, the specimen shall be bent over upon itself and there shall be no cracks evident in the coating or plating up to the time the tape-steel snaps.

4.4.14 Corrosion-resistance test, types II and V, enameled and plated tapes. Four specimens approximately 4 inches long shall be cut from the ribbon of each type II and type V enameled or plated sample tapes from each end and from 1/3 of the distance from each end of the tape, except type II, class A and type V where only 2 specimens are required. Diagonal scratches shall be made from corner to corner of the specimens, and shall penetrate the coating or plating to the base on metal. The specimens shall be placed in a 20 percent salt fog for a period of 96 hours at a temperature of 95 plus 2, minus 3 degrees fahrenheit. During this time, the specimens shall be rinsed free of collected salt and subjected to 10 strokes of a nylon bristle brush under a weight of 2 pounds at intervals of 24 hours. At the end of 96 hours there shall be no visible signs of corrosion or flaking of the coating or plating, except immediately adjacent to the scratch marks.

4.4.15 Breaking strength of leather. The leather shall be tested for breaking strength, method 2031 of Fed. Test Method Std. No. 311.

4.4.16 Breaking and tearing strength of vinyl coated cloth. Vinyl coated cloth shall be tested for the breaking and tearing strengths of CCC-C-700 by method 5100 of Fed. Test Method Std. No. 191 and ASTM-D-1424, respectively.

Note: As it is not practicable to obtain suitable test pieces of the required size from the finished article, (see 4.4.15 and 4.4.16), the manufacturer shall, upon request, furnish for this test one or more test pieces one foot square which he guarantees to be of the same material as that in the article furnished (see 6.2).

4.4.17 Breaking strength of thread, type I, classes A and B; type III, classes A and B, and case covers (see 3.5.1.1). The breaking strength of the thread before stitching shall be determined by method 4100 of Fed. Test Method Std. No. 191.

Note: As the tensile strength is that of the thread before stitching, the manufacturer shall, upon request, furnish for this test one or more test pieces of unused thread at least 10 yards long which he guarantees to be the same material as that used in the article furnished (see 6.2).

4.5 Inspection of preparation for delivery. An inspection shall be made to determine that the preservation, packaging, packing, and marking requirements comply with section 5.

## 5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, packing, and marking. Preservation, packaging,



packing, and marking shall be in accordance with PPP-P-40.

## 6. NOTES

### 6.1 Intended use.

6.1.1 Type I. Type I woven tapes are for use for power and utility work or around high-tension lines (see 6.1.5), when a high degree of accuracy is not required.

6.1.2 Type II. Type II, classes A, B, C, and F steel tapes are for use by machinists and mechanics where a high degree of accuracy is required. Class D tapes are for use by lumbermen and mechanics where average direct diameter equivalents from a circumference measurement are required (see 3.8.4).

6.1.3 Type III. Type III woven metallic tapes are for use similar to type I, (see 6.1.1), but shall never be used around electric circuits (see 6.1.5).

6.1.4 Type V. Steel, self-supporting tapes are for use as rules or tapes.

6.1.5 Caution. Attention is directed to the National Electric Safety Code, paragraph 433-F-5, cautioning against the use of hand lines of measuring tapes containing metal strands when working around electric circuits.

6.1.6 Exact measurements. Type I woven and type III woven metallic tapes are liable to stretch or shrink, hence, these tapes should not be used for exact measurements. Type II steel tapes should be employed for more exact measurements.

6.2 Ordering data. Purchasers should select the preferred options permitted and include the following information in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Type, class, case, style, size and direction of reading (see 3.5, 3.7.1.7, 3.8.1.6, 3.8.2.4, 3.8.2.7, 3.8.4.7, 3.8.6.6 and 3.10).
- (c) Kind of plating required for die-cast cases (see 3.4).
- (d) When fungus-resistant treatment is required (see 3.5.1.1 and 3.7.1.1).
- (e) When mildew-resistant treatment is required (see 3.5.1.2 and 3.5.2.1).
- (f) When linen-fiber ribbons are required (see 3.7.1.1).
- (g) When synthetic-fiber ribbons are required (see 3.7.1.1).
- (h) Zero point of ribbon (see 3.7.1.5).
- (i) When diameter, or feet and tenths and hundredths of feet graduations, are required (see 3.8.1.4).
- (j) When metric graduations are required (see 3.8.1.4 and 3.8.3.1).
- (k) When stainless steel ribbons are required for type II, classes B, C, and D (see 3.8.2.1).
- (l) Whether a folding hook is required (see 3.8.2.1).
- (m) When type II, class D cases shall be 0.020 inch thick steel (not covered) (see 3.8.4.4).
- (n) When 50-foot lengths shall be graduated to give diameter equivalents in consecutive inches and tenths of inches, direct from a circumference measurement (see 3.8.4.5).
- (o) If type II, class F steel tapes are to be of the quick-rewinding type, so state (see 3.8.5.8).
- (p) If "metric" tape is required for type V (see 3.10).
- (q) If stainless steel blade is required for type V (see 3.10.1.1).
- (r) Width of tape required (see 3.10.1.1).
- (s) Whether belt hook is required (see 3.10.1.2).
- (t) If nickel or chromium-plated blade is required for type V (see 3.10.1.5).
- (u) If stainless-steel case is required for type V (see 3.10.2.2).
- (v) If engineers' (surveyors' or road builders') tapes are required for type

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- consecutive inches and tenths of inches, direct from a circumference measurement (see 3.8.4.5).
- (o) If type II, class F steel tapes are to be of the quick-rewinding type, so state (see 3.8.5.8).
  - (p) If "metric" tape is required for type V (see 3.10).
  - (q) If stainless steel blade is required for type V (see 3.10.1.1).
  - (r) Width of tape required (see 3.10.1.1).
  - (s) Whether belt hook is required (see 3.10.1.2).
  - (t) If nickel or chromium-plated blade is required for type V (see 3.10.1.5).
  - (u) If stainless-steel case is required for type V (see 3.10.2.2).
  - (v) If engineers' (surveyors' or road builders') tapes are required for type V (see 3.10.1.3).
  - (w) If replacement ribbons or blades shall be furnished without reel, handle or case, and style of ribbon required for type I and III tapes (see 3.11).
  - (x) That samples of vinyl or leather used for covering the cases and thread used for stitching the leather are to be furnished by the contractor for tests (see notes under 4.4.16 and 4.4.17).

MILITARY COORDINATING ACTIVITIES:

Air Force - 99  
Navy - YD

Review activity:

Air Force - 84

PREPARING ACTIVITY:  
GSA/FSS