

QQ-S-781H – Federal Specification – Strapping, Steel and Seals

Subject/Scope:

This specification covers flat steel strapping and seals, and round steel strapping.

Keywords:

strapping, test, coil, seal, requirements, coating, rolled, pounds, seal, thickness, breaking, strength, grade, steel, test, weight, shipping, heavy, specification, container, std, fed, inspection, federal, classification, strap, package, wood, metal, package, pallet, standard, box, tension, government, uncoated, wire, mil, domestic, band, skids, freight, astm, tensile, packing, shipment, military, plywood, equipment, protection, damage, overseas,

Publish Date:

9/17/1974

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QQ-S-781H
September 20, 1974
SUPERSEDING
Fed. Spec. QQ-S-781G
January 10, 1973 and
Fed. Spec QQ-S-790B
October 4, 1957

FEDERAL SPECIFICATION
STRAPPING, STEEL, AND SEALS

This specification was 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 flat steel strapping and seals, and round steel strapping.

1.2 Classification

1.2.1 Strapping

1.2.1.1 classes, types, and duties

Strapping shall be of the following Classes, types, duties, finishes and grades, as specified (see 6.2).

Class 1 - Flat strapping

Type I - Nailless

Regular duty
Heavy duty

Type II – Nail-on

Type III – Twist-tie

Type IV – Power Machine

Regular duty
Heavy duty

FSC 8135

Class 2 - Round strapping

Type V - 130,000/160,000 Pounds per Square Inch Tensile Strength

Type VI - 90,000/120,000 Pounds per Square Inch Tensile Strength

Finish A - Coated-finish

Finish B - Zinc-coated

Grade 1 – Heavy

Grade 2 - Standard

Finish C - Uncoated

1.2.1.2 Sizes

Strapping shall have the widths and thickness in accordance with the sizes shown in tables II, III, V, and VII and shall be as specified (see 6.2).

1.2.2 Seals

Seals shall be of the following types, styles, and class as specified (see 6.2).

Types D – Double notch
S – Single notch

Styles I – Snap-on or open
II – Thread-on or closed
III – Push-type or overlap
IV – Magazine-feed
V – Intersection

Classes R – Regular
H – Heavy Duty

1.2.2.1 Width

Seals shall have widths in accordance with strapping width shown in applicable tables III and IV and shall be as specified (see 6.2).

2. APPLICABLE DOCUMENTS

2.1 Federal and Military, Specification and Standards

The following documents, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

Federal Specifications:

- [PPP-B-585](#) - Boxes, Wood, Wirebound.
- [PPP-B-591](#) - Boxes, Shipping, Fiberboard, Wood Cleated.
- [PPP-B-601](#) - Boxes, Wood, Cleated Plywood.
- [PPP-B-621](#) - Boxes, Wood, Mailed and Lock Corner.
- [PPP-B-636](#) - Boxes, Shipping, Fiberboard.

Federal Standards:

- [FED-STD-48](#) - Tolerances for Steel Wrought Products and for Centrifugally Cast Steel.
- [FED-STD-101](#) - Preservation, Packaging and Packing Materials: Test Procedure.
- [FED-STD-123](#) - Marking for Domestic Shipment (Civil agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

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

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

Military Specifications:

- [MIL-C-104](#) – Crates, Wood; Lumber and Plywood Sheathed, Nailed and Bolted.
- [MIL-L-10547](#) - Liners, Case, and Sheet, Overwrap, Water-Vaporproof or Waterproof, Flexible.
- [MIL-S-43180](#) - Sealers, Steel Strapping Hand, Non-powered.
- [MIL-S-43361](#) - Stretching and Sealing Machine, Strapping Hand.

Military Standards:

- [MIL-STD-105](#) - Sampling Procedures and Tables for Inspection by Attributes.
- [MIL-STD-129](#) - Marking for Shipment and Storage.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

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:

Uniform Classification Committee, Agent

Uniform Freight Classification

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

National Motor Freight Traffic Association, Inc., Agent

National Motor Freight Classification

(Application for copies should be addressed to the American Trucking Associations, Inc., Tariff Order Section, 1616 P Street, N.W., Washington DC 20036.)

American Society for Testing and Materials (ASTM) Standards

A 90 - Weight of Zinc Coating

A 239 - Preece Test for Uniformity of Zinc Coatings

B 504 - Electric-chemical drop test

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

Association of American Railroads

Rules Governing the Loading of Commodities on Open Top Cars.

(Application for copies and information should be addressed to A.A.R. Committee on Loading Rules Operations and Maintenance Department, American Railroads Building, Washington, DC 20036.)

3. REQUIREMENTS

3.1 Materials

Materials shall be of the quality normally used for this purpose in commercial practice.

3.1.1 Strapping

Strapping shall be made of steel as specified herein.

3.1.1.1 Base metal ductility for class 1 strapping

Strapping of the various thicknesses shall withstand the minimum number of bends in one area, as shown in table 1. The base metal shall not fracture, when tested as specified in 4.3.1.

TABLE 1. Base metal bend requirements for class 1 strapping

Thickness (Inch)	Number of bends
0.010	15
0.012	12
0.015	12
0.018	10
0.020	8
0.023	6
0.025	5
[Illegible]	5
[Illegible]	5
0.035	5
0.044	3
0.050	3
0.065	3

3.2 Lubrication

Type I and IV strapping shall have a coating of wax or wax-like lubricant applied to the surfaces which will render the strapping suitable for application with tension tools of the feed wheel (friction) type, when specified (see 6.2) types II and 111 shall be lubricated. Lubricated strapping shall meet the test specified in 4.3.10 (see 6.3).

3.3 Type 1. Nailless strapping and type IV power machine strapping

3.3.1 Type I, and type IV material

Unless otherwise specified (see 6.2), regular duty strapping in table II shall be cold-rolled steel. Heavy duty strapping in table III shall be either hot-rolled or cold-rolled heat treated steel, as specified (see 6.2) - A cold-rolled, heat treated size strapping may be substituted for a hot-rolled size strapping provided the strapping strengths are equal. Breaking strengths of the strapping shall be as shown in tables II and III, when tested as specified in 4.3.2.1.

TABLE II. Type I, and type IV. Regular duty, cold-rolled strapping, widths, and thickness and breaking strengths
Thickness (inch) 1/

Width (inch)	0.010	0.012	0.015	0.018	0.020	0.023	0.028	0.035
Breaking Strength, pounds (minimum)								
1/4	-	-	300	-	400	-	-	-
5/16	-	300	-	-	-	-	-	-
3/8	300	360	450	-	600	690	-	-
1/2	400	480	600	720	800	920	-	-
5/8	500	600	750	900	1000	1150	-	-
3/4	-	-	900	-	1200	1380	1680	2100

1/ Type IV strapping shall not be furnished in thicknesses below 0.015 inch.

TABLE III. Type I, and type IV. Heavy duty (high tension), hot-rolled or heat treated cold-rolled strapping, widths, thickness and breaking strengths
Thickness (inch) 1/

Width (inch)	0.020 2/	0.023 2/	0.025 2/	0.028	0.031 2/	0.035	0.044	0.050	0.065
Breaking Strength, pounds (minimum)									
1/2	1,280	1,470	-	-	1,950	-	-	-	-
5/8	1,600	1,840	-	-	-	-	-	-	-
3/4	-	-	2,280	2,280	2,850	2,850	4,050	4,050	-
1-1/4	-	-	-	-	4,750	4,750	6,750	6,750	8,900
2	-	-	-	-	-	-	10,600	10,600	13,800

1/ Type IV strapping shall not be furnished in thicknesses greater than 0.035 inch.

2/ Type I, hot-rolled strapping shall not be used for these thickness.

3.3.2 Type 1 and type IV elongation

The elongation in 6 inches for type I and type IV regular duty cold-rolled strapping shall be 0.5 to 4.0 percent inclusive and 6.5 to 16.0 percent inclusive for heavy duty, hot-rolled or cold-rolled strapping when tested as specified in 4.3.3.1.

3.3.3 Tolerances, type I and type IV strapping

3.3.3.1 Type I and type IV widths

The width of the strapping shall not vary from that shown in table II or III by more than the following.

- (a) Plus or minus 0.005 inch for all cold-rolled strapping widths and hot-rolled strapping 3/4 inch in width and less.
- (b) Plus or minus 0.05 inch for hot-rolled strapping over 3/4 inch in width

3.3.3.2 Type I and type IV thickness

The thickness of strapping shall not vary from that shown in tables II or III by more than the following:

- (a) Plus or minus 0.002 inch for cold-rolled strapping 0.023 inch and less in thickness.
- (b) Plus or minus 0.003 inch for cold-rolled strapping over 0.023 and for hot-rolled strapping under 0.050 inch in thickness.
- (c) Plus or minus 0.004 inch for hot-rolled, nailless strapping 0.050 inch or over in thickness.

3.3.4 Type I and type IV coils

Type I strapping, except type I, finish B, grade 1 and type IV strapping (see 3.3.5.1), shall be oscillated (mill) wound coils weighing not less than 90 pounds or more than 110 pounds and ribbon wound coils weighing not less than 50 pounds nor more than 125 pounds when put up as specified in table XI (see table IV). Each coil shall consist of one continuous piece of strapping. Coils with two or more pieces welded together shall be considered as one piece coil. Welded joints shall have a joint efficiency of not less than 75 percent based on the breaking strengths shown in tables II and III when tested as specified in 4.3.4. There shall be not more than three welded joints in any coil of type I strapping, nor more than two welded joints in any coil of type IV strapping. Welded joints shall be subject to the same width dimensional requirements as the rest of the strapping. Welds for type IV strapping shall be of the mash type. The maximum thickness at a mash weld shall be not more than one and one-half times the thickness of the strap welded. The width of the strapping at the mash weld shall be subject to the same dimensional requirement as the remainder of the strapping. Metal spattering or extruded points causing additional thickness are not permissible. Only machine welds shall be acceptable.

Table IV. Number of feet per pound of type I and type IV strapping 1/
Thickness (inch) 2/

Width (Inch)	0.01	0.012	0.015	0.018	0.02	0.023	0.025	0.028	0.031	0.035	0.044	0.05	0.065
Feet per pound													
1/4	-	-	78.6	-	58.9	-	-	-	-	-	-	-	-
5/16	-	78.5	-	-	-	-	-	-	-	-	-	-	-
3/8	78.5	65.4	52.4	-	39.3	34.1	-	-	-	-	-	-	-
1/2	59.9	49.1	39.3	32.7	29.4	25.6	-	-	19.0	-	-	-	-
5/8	47.1	39.3	31.4	26.2	23.6	20.5	-	-	-	-	-	-	-
3/4	-	-	26.2	-	19.6	17.1	15.7	14.0	12.7	11.2	-	-	-
1-1/4	-	-	-	-	-	-	-	-	7.6	6.6	5.3	4.7	3.6
2	-	-	-	-	-	-	-	-	-	-	3.3	2.9	2.2

1/ Commercial tolerances apply.

2/ Type IV strapping shall not be furnished in thickness below 0.015 inch nor above 0.035 inch.

3.3.5 Type 1 and type IV coil core liners

Type I and type IV strapping in oscillated-wound coils shall be wound on core liners. Strapping in ribbon-wound coils shall not require core liners.

3.3.5.1 Type I, finish B, grade 1 strapping

Type I, finish B, grade 1 strapping, 5/8-Inch wide and 0.015 and 0.020-inch thick shall be oscillate-wound in not less than 200-foot or more than 300-foot coils unless otherwise specified (see 6.1 and 6.2).

3.3.6 Style of edges

Edges of type I and type IV strapping shall be as cu milled, or formed in accordance with current commercial practice.

3.4 Type II, nail-on strapping

Unless otherwise specified (see 6.2), type II strapping shall have no nail holes. Strapping shall be pierceable by drive nails, when specified (see 6.2), strapping snail have nail holes at spaced intervals not more than 3 inches apart.

3.4.1 Type II, material

Type II strapping shall be made of either hot-rolled or cold-rolled steel. A cold-rolled, heat treated size strapping may be substituted for a hot-rolled size strapping provided the strapping strengths are equal (see 6.2).

3.4.2 Type II, breaking strength

The breaking strength of the strapping shall be as specified in table V when tested as specified in 4.3.2.1.

3.4.3 Type II, tolerance

The tolerance on width and thickness of the strapping shall be as specified in table V for the applicable strapping size.

Table V. Type II, strapping sizes, tolerances, breaking strengths and feet per pound

Sizes	Tolerances Plus and Minus		Breaking Strength minimum 1/ Pounds	Feet Per Pounds 2/
	Width (inch)	Thickness (Inch)		
5/8 inch wide 0.018-inch thick	0.005	0.002	500	26
3/4-inch wide 0.028-inch thick	0.005	0.003	940	14

1/ The minimum breaking strength of strapping ordered with nail holes, in all sizes, shall be based on the metal area of the strapping taken across the hole and a minimum ultimate tensile strength of 45,000 pounds per square inch.

2/ Commercial tolerances apply

3.4.4 Type II, Coils

Type II strapping shall be in small or large coils (see 6.2). Small coils shall be in one piece, not less than 200 feet and no more than 400 feet in length. Large coils, oscillated (mill) wound shall weigh not less than 90 pounds nor more than 110 pounds, and large coils, ribbon wound, shall weigh not less than 50 pounds nor more than 125 pounds when put up as specified in table XI (see table V). No large coil shall have more than three pieces joined by welded joints.

3.5 Type III, twist-tie strapping

The type III strapping shall be made of cold-rolled steel. The breaking strengths of the strapping shall be as specified in table VI when tested as specified in 4.3.2.1. Tolerances and coil sizes shall be as specified in table VI.

TABLE VI. Type III, strapping sizes, tolerances, breaking strength, and coil sizes

Size (inches)	Tolerances		Breaking Strength minimum pounds	Coil Size				
	Width (inches)	Thickness (inches)		Feet per pound 2/	Length feet	Width	Inside Diameter	Outside Diameter
0.063 wide x 0.024 thick	+0.001 -0.001	+0.002 -0.001	190	208	10,000	3	11	15
0.075 wide x 0.020 thick	+0.005 -0.000	-0.001 -0.000	220	208	10,000	3-3/4	3-3/4	10
0.083 wide x 0.032 thick	+0.003 -0.001	+0.002 -0.005	320	120	5,700	3	11	15
0.100 wide x 0.024 thick	+0.005 -0.000	+0.001 -0.000	350	130	7,500	3-3/4	3-3/4	11
0.138 wide x 0.025 thick	+0.005 -0.000	+0.001 -0.000	450	88	4,000 7,500 1/	3 3-3/4	13-3/4 8	16-1/2 13-1/4
0.140 wide x 0.031 thick	+0.005 -0.000	+0.001 -0.000	650	71	5,000	3-3/4	8	13-1/4
0.140 wide x 0.038 thick	+0.005 -0.000	+0.001 -0.000	800	55	4,500	3-3/4	8	13-1/4
0.150 wide x 0.050 thick	+0.005 -0.000	+0.001 -0.000	1,000	40	3,500	3	16	20

1/ For use with twist-tie strapping automatic equipment, when specified (See 6.2)

2/ Commercial tolerances apply

3.6 Type V and type VI round strapping

The type V and type VI strapping shall be carbon steel wire. The dimensions, breaking strength, and elongation of strapping shall conform to table VII and the tolerances shall be as specified in FED-STD-48.

Table VII. Type V and type VI strapping sizes, breaking strength, elongation, and feet per pound

Size (steel wire gage) No.	Diameter (inch)	Breaking Strength minimum pounds		Elongation in 10 in. Minimum percent		Feet per pound 1/
		Type V	Type VI	Type V	Type VI	
8	0.1620	2,680	1,855	7	9	14.3
9	0.1483	2,245	1,555	7	9	17.1
10	0.1350	1,860	1,290	7	9	20.5
11	0.1205	1,485	1,025	7	10	25.8
12	0.1055	1,135	790	6	10	33.7
12-1/2	0.0990	1,000	695	6	10	38.3
13	0.0915	855	590	6	10	44.8
13-1/2	0.0860	755	525	6	10	50.7
14	0.0800	655	455	6	10	58.6
15	0.0720	530	365	6	10	72.3
16	0.0625	400	275	6	10	96.0
16-1/2	0.0580	345	240	6	10	111.3
17	0.0540	300	205	5	10	128.6
17-1/2	0.0510	265	185	5	10	144.2
18	0.0475	230	160	5	10	166.2
18-1/2	0.0443	200	140	5	10	191.0
19	0.0410	170	120	5	10	223.0

1/ Commercial tolerances apply.

3.6.1 Type V and type VI coils

3.6.1.1 Sizes 8 to 15 gage

Sizes 8 to 15 gage strapping shall be in coils weighing not less than 75 pounds nor more than 225 pounds. The coils shall have an inside diameter of 18 to 22 inches.

3.6.1.2 Sizes 16 to 19 gage

Sizes 16 to 19 gage strapping shall be in coils weighing not less than 70 pounds nor more than 90 pounds. The coils shall have an inside diameter of 12 to 16 inches.

3.6.2 Splicing of coils

Each coil shall consist of strapping of one piece, with no more than two splices.

3.7 Seals for class 1 strapping

Seals shall be made of steel and lengths in accordance with the manufacturer's commercial practice. Seal lengths shall be adequate for single notch joint (with one pair of notches) or a double notch joint (with 2 pairs of cut notches). Unless otherwise specified, seals shall be suitable for a double notch joint (see 6.1.3 and 6.2).

3.7.1 Seal width

The seal width shall be adequate to allow the seal to slip on the applicable strapping. The inside seal width dimension should not more than 1/32 inch over the maximum strapping width applicable.

3.7.2 Regular and heavy duty

Seals shall be in thickness suitable to use with regular or heavy duty strapping (see 6.1.4).

3.7.3 Application of seals

3.7.3.1 Style I

Style I seals shall have one or both sides open the seal shall slip on the overlapping bands of strapping either during or after tensioning the strapping.

3.7.3.2 Style II

Style II shall have sides partially closed bottom of the seal so that, this seal shall be pre-threaded with the bands of strapping before the tensioning tool is applied.

3.7.3.3 Style 111

Style 111 seals shall have the sides completely by overlapping at the bottom of the seal so that pre-threading with the overlapping bands of strapping and bending of the bottom band under the seal can be accomplished. The seal shall permit the tensioning tool to tension the strapping as the tool butts against the seal.

3.7.3.4 Style IV

Style IV seals shall have sides opened to allow and stacking of the seals for hand or power tools with magazine feed, shall fit and form joints with the seal manufacturer's tool model as specified (see 6.1.5 and 6.2). Means provided on style IV seals to facilitate are acceptable.

3.7.3.5 Style V

Style V seals shall have one or both sides open so the seal shall slip on the crossing bands of strapping either during or before tensioning of the straps.

3.7.4 Joints

Seal joints, made with hand tools conforming to [MIL-S-43361](#), or power tools recommended by the supplier, shall be made applicable strapping, without cracking and tearing of the seal metal, tested as specified in 4.3.5. The seal joints above shall have a joint efficiency of 75 percent for double notch joints and 50 percent for a notch joint, based on breaking strengths of strapping shown in tables II and III, as applicable, when tested as specified in 4.3.5.

3.8 Marking

Seals and strapping shall be marked as specified (see 6.2).

3.8.1 Special marking

Each coil of type I and IV, heavy duty, 1-1/4 and 2 inch wide, strapping shall be marked in accordance with the Association of American Railroads General Rule 15. The marking shall consist of the letters "AAR", the manufacturers' or distributors' name, or abbreviated name, or registered trademark, or symbol, or A.A.R. code consisting of two digits. Marking shall be spaced not more than 5 feet apart.

3.9 Finish

The finished coat of strapping shall be adherent, free of scratches, runs, embedded foreign matter, uncoated areas, rust areas, or oxide scale. Unless otherwise specified (see 6.2), seals shall be finished in accordance with commercial practice.

3.9.1 Finish A

Finish A strapping shall have surfaces and edges coated with an organic coating (see 6.1.6) that shall yield a file that is hard to the touch and will not rub off or accumulate at the edge of the test instrument when tested as specified in 4.3.7. On type 1 and II cut-length strapping, cuts and nail holes or slots may be made after the application of the finish coating.

3.9.2 Finish B

Finish B strapping shall have surfaces coated with zinc by either the hot-dipped or electro deposit process.

3.9.2.1 Flat strapping

The coating of class 1 strapping shall be tested as specified in either 4.3.8 or 4.3.8.1, as applicable. The coating weight shall be not less than the following (see 6.1.7):

Grade 1 - 0.30 ounce per square foot of surface, or 0.0005 inch thick
Grade 2 - 0.18 ounce per square foot of Surface, or 0.0003 Inch thick

Edges shall not show signs of copper sulfate when tested in accordance with 4.3.8.3.

3.9.2.2 Round strapping

The coating of class 2 strapping shall be not less than 0.18 ounce of zinc per square foot of uncoated surfaces for sizes down to and including 0.076 inch and not less than 0.10 ounce of zinc per square foot of uncoated surface for sizes smaller than 0.076 inch when tested in accordance with 4.3.8.2.

3.9.3 Finish C

Finish C strapping shall be finished a natural black or blued, browned, or bright, as resulting from the manufacturing process (see 6.1.8).

3.10 Ductility of strapping coating

Finish A, coated-finish, and finish Bi, zinc-coated, strapping shall not crack or flake on the outside of the bent portion except that cracks on class 1 strapping shall be disregarded within a distance from the edge of the strapping equal to one fourth of the width when tested as specified in 4.3.9.

3.11 Workmanship

Strapping shall be free of burrs or slivers. Strapping shall be straight, smooth, and clean and shall be free from kinks, grooves, waves, edge curvature, indentations, excessive oils, cracks. Camber in the strapping shall be not more than 1/2 inch per 8-foot length. Seals shall be free of dents, burrs and slivers, and not be deformed.

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 inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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 supplies and services conform to prescribed requirements.

4.1.1 Certificate of compliance

When certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certification (see 5.1.1.2).

4.2 Inspection

Sampling for inspection shall be performed in accordance with H1L-SID-105, except where otherwise indicated hereinafter.

4.2.1 Material inspection

In accordance with 4.1, materials shall be inspected and tested in accordance with the requirements of referenced subsidiary specifications, drawings, and standards unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document.

4.2.2 End item inspection

The lot shall consist of all strapping of class, type, finish, grade, duty and size, or seals of one type, style, class and width offered for acceptance at one time. The sample unit for this inspection shall be one coil, or one seal. Examination of the coil defects, as applicable, shall be made on eight consecutive feet of the class provided that the condition of the rest of the coil is representative of length of strapping inspected. When the rest of the coil is not represented examination for defects shall be made in the remaining unwrapped coil. For permissible number of welded joints and tests for strength of joints as applicable, shall be made on the entire length of the coil regardless of the condition of the coil.

4.2.2.1 Visual examination

Examination of the steel strapping and seals shall be made in accordance with classification of defects in table VIII as applicable. The inspection level for strapping or seals shall be level II with an acceptable quality level (AQL) of 2.5 for major defects and 10.0 for total defects, expressed in terms of defects per hundred units.

TABLE VIII. Classification of defects

Examine	Defect	Classification	
		Major	Minor
Finish Applicable to all classes	Coating, missing, not adherent, not free of scratches, blisters, runs, embedded, foreign matter or uncoated areas. Not free of rust or oxide scale	X	X
Workmanship Applicable to strapping of all types	Burred or slivered Camber in 8-foot length in excess of 1/2 inch Not straight, smooth, and clean Kinked, grooved, pitted or containing foreign matter Waves, indentations or cracks	X X X X	X
Applicable to strapping type as noted	Types I and IV not lubricated or waxed Type I, Type II – large coil, and type IV having number of joints in coil exceeding permissible maximum Type II – small coil not in one piece Type II with nail hole spacings not as specified Type IV welds not made by machine	X X X X X	
Seals	Dented, burred, slivered or deformed	X	
Marking Applicable to seals when specified	Missing, not as specified or not legible	X	

4.2.2.2 Dimensional and weight examination

Examination shall be made of the end item to determine compliance with dimensional, weight, and tolerance requirements. Determination of dimensions on strapping shall be made on base metal after the paint, wax, zinc, or oxide scale has been removed. Any nonconforming dimension or weight shall be classified as a defect. The inspection level for strapping or seals shall be S-3 with an AQL of 6.5 defects, expressed in terms of defects per hundred units.

4.2.2.3 Testing of the end item

The strapping and seals shall be tested as specified in 4.3.1 through 4.3.10, as applicable. Any non-conformance shall be considered a defect. The inspection level for strapping of seals shall be S-2 with an AQL of 6.5 defects, expressed in terms of defects per hundred units.

4.2.3 Examination of preparation for delivery

An examination shall be made to determine that applicable packaging, packing, and marking requirements are complied with. Defects shall be scored in accordance with the list below. The sample unit shall be one shipping container fully prepared for delivery with the exception that it

need not be sealed. Defects of closure listed below shall be examined on shipping containers fully prepared for delivery. The lot shall be the number of shipping containers offered at one time. The inspection level shall be S-2 and the AQL shall be 4.0 defects, expressed in terms of defects per hundred units.

Examine	Defect
Marking (exterior and interior)	Tag or label missing, not waterproof, not securely attached; marking incomplete, missing, not in proper sequence. Marking of shipping container, when applicable, illegible, incomplete, missing, incorrect, not in proper sequence.
Materials	Any component missing or damaged. Inadequate application of components such as incomplete and undersized straps, skids not notched, protectors missing
Content	Number of packages is more or less than required
Weight	Gross weight less than specified

4.3 Tests

4.3.1 Base metal bend test for class 1 strapping.

A test specimen from a sample unit of strapping shall be fastened in the jaws of a vise and bent over a radius of 1/8 inch plus or minus 1/64 inch and checked to determine compliance with 3.1.1.1. Formed edges may be removed before testing. One bend shall consist of a 90-degree bend in one direction and return to the original position. Successive bends shall be made in opposite directions. Cracking or flaking of the coating during testing shall be disregarded. Nonconformance to the requirements shall constitute failure of this test.

4.3.2 Breaking strength test

4.3.2.1 Class 1, flat strapping

A specimen from a sample unit of strapping shall be tested to determine compliance with the breaking strength requirements of 3.3.1, 3.4.2, and 3.5, as applicable, in accordance with Method 2044 of FED-STD-101, except that the test specimen shall be 6 inches effective length between jaws, and the breaking strength equal to the maximum load on the strapping. Nonconformance to the requirements shall constitute failure of this test. This test may be conducted in conjunction with test in 4.3.3.1.

4.3.2.2 Class 2, round strapping

A specimen from a sample unit of round strapping shall be tested to determine compliance with the breaking strength requirements of table VII, in accordance with Method 2044 of FED-STD-101, except that the test specimen shall be 12 inches, plus or minus 1 inch, between the jaws of the testing machine. Nonconformance to the requirements shall constitute failure of this test. This test may be conducted in conjunction with test in 4.3.3.2.

4.3.3 Elongation test

4.3.3.1 Class 1, flat strapping

A specimen from a sample unit of strapping shall be tested to determine compliance with the elongation requirements of 3.3.2, as applicable. In accordance with Method 2044 of FED-STD-101, except that the test specimen shall be 6 inches effective length between jaws. Nonconformance to the requirements shall constitute failure of this test. This test may be conducted in conjunction with test in 4.3.2.1.

4.3.3.2 Class 2, round strapping

Compliance with the requirements for elongation in table VII shall be determined from the test specimens employed in the breaking strength test in 4.3.2.2 in accordance with Method 2044 of FED-STD-101. Elongation shall be the permanent increase in length, due to the breaking of the strapping in tension, measured between gage marks placed upon the strapping originally 10 inches apart. If the fracture is not between the gage marks or is closer than 1 inch from either gage mark, the results shall be disregarded, an additional test specimen shall be taken from the same sample of strapping, and the test repeated. Nonconformance to the requirements shall constitute failure of this test.

4.3.4 Welded joint efficiency test

A welded joint of sample coil shall be tested to determine compliance with the joint efficiency requirements of 3.3.4, as applicable, in accordance with Method 2044 of PED-STD-101, except that joint efficiency shall be equal to the ratio of maximum load on the joint to the specified breaking strength of the strapping times 100. Nonconformance to the requirements shall constitute failure of this test.

4.3.5 Seal joint test

A seal joint with a sample seal shall be made with a single or double notch, as applicable, joining two pieces of applicable class I strapping. The joint shall then be checked to determine compliance with the joint making requirements of 3.7.4. Nonconformance to the requirements shall constitute failure of this test. This test may be conducted in conjunction with test in 4.3.6.

4.3.6 Seal joint efficiency test

A single or double notch seal joint, as applicable, made with a sample seal shall be tested to determine compliance with joint efficiency requirements of 3.7.4 in accordance with Method 2044 of FED-STD-101, except that the joint efficiency shall be equal to the ratio of the maximum load on the joint to the specified breaking strength of the strapping times 100. Nonconformance to the requirements shall constitute failure of this test.

4.3.7 Organic-coating test

A 6-inch specimen from a sample unit of strapping shall be; (1) rubbed with firm pressure of fingers on both sides, (2) scraped on one side within the edges of the strapping, with sharp edged instrument and (3) checked at a minimum magnification of 10x for coating accumulation at the sharp edges to determine compliance with 3.9.1. Non-conformance to the requirements shall constitute failure of this test.

4.3.8 Zinc-coating weight loss test

A 6-inch test specimen from a sample unit of finish B strapping shall be tested in accordance with ASTM A90 for loss of coating weight. Loss of weight less than that shown in table IX applicable to strapping width shall constitute failure of the specimen to meet the zinc coating requirements of 3.9.2.1.

TABLE IX. Weight loss of zinc coating

Minimum Weight Loss (milligrams per 6-inch specimen)			
Strapping	Finish A	Finish B	
Width	Light zinc coating	Grade 1	Grade 2
0.138	5	116	69
1/4	9	175	105
3/8	13	263	158
1/2	18	350	210
5/8	22	438	262
3/4	26	525	315
1	35	700	420
1-1/4	44	875	525
2	70	1,400	840

4.3.8.1 Zinc-coating thickness test

A 6-inch test specimen from a sample-unit of class 1, finish B strapping shall be^j tested for thickness of zinc coating with a magnetic type gage or an electric chemical drop test in accordance with ASTM B 504. One reading shall be taken on each side of each 6-inch specimen. Nonconformance to the requirements shall constitute failure of this test.

4.3.8.2 Zinc-coating weight loss test, class 2

A 12-inch test specimen from a sample unit of class 2 strapping shall be tested in accordance with ASTM A 90 for weight of zinc-coating requirements in 3.9.2.2. Nonconformance to the requirements shall constitute failure of this test.

4.3.8.3 Edge test

A sample unit of strapping shall be tested in accordance with ASTM A239 for the presence of zinc coating and absence of copper sulphate on the edges; one Preece-Test dip for grade 2 and two Preece-Test dips for grade 1 (see 3.9.1). Nonconformance to the requirements shall constitute failure of this test.

4.3.9 Ductility test, coating

A 12-inch test specimen from a sample unit of strapping shall be tested for ductility of coating, to determine compliance with 3.10. Determination of cracking or flaking of coating shall be by visual examination without magnification. The tests shall be performed at a temperature of 77° +/- 10°F. Care shall be taken during the tests to avoid scratching or abrading the coating in the area of the bend. Nonconformance to the requirements shall constitute failure of this test. Tests shall be performed as follows:

- (a) Strapping 0.025 inch thick or less shall be bent cold, once through 180 degrees, over two thicknesses of the strapping material. A vise with smooth jaws shall be used for this test.
- (b) Strapping 0.028, 0.031, 0.035, 0.044, 0.050, and 0.065 inch thick shall be bent cold, once through 180 degrees, over the rounded end of a steel plate of convenient size and of a thickness within plus and minus 1/64 of that shown in table X. The bend shall be made by clamping the specimen against the plate in a vise, bending the specimen slowly by hand over the rounded end of the plate as far as possible, then completing the bend by inverting the plate and specimen and tightening the vise until the specimen is tight against the plate.
- (c) The round strapping shall be wrapped at a rate of more than 15 turns per minute in a closed helix of at least 2 turns around a cylindrical mandrel having a nominal diameter equal to 6 times the nominal diameter or thickness of the strapping under test.

TABLE X. Thickness of steel plate

Strapping thickness, inch	Finish A, Strapping, inch	Finish B Strapping, inch
0.028	3/8	3/16
0.031	3/8	3/16
0.035	3/8	3/16
0.044	1/2	3/16
0.050	1/2	3/16
0.065	1/2	3/16

4.3.10 Lubrication test

Using the strapping manufacturer’s automatic or powered machine, apply strapping to three containers at least one foot cubed. The strap shall be tightened to at least 50% of its rated breaking strength and seals applied. Failure of the strapping to feed smoothly without binding shall constitute failure of the test (see 3.2).

5. PREPARATION FOR DELIVERY

5.1 Packaging

Packaging shall be level A or C, as specified (see 6.2).

5.1.1 Level A

Type I, II, and IV strapping, oscillated or ribbon wound as specified (see 3.3.5), shall be packaged in sizes and quantities shown in table XI. Type III strapping shall be coiled as specified in table VI.

5.1.1.1 Wire tying

Each coil, of oscillated-wound 3/4-inch by 0.035 inch, or under class 1 strapping or class 2 strapping shall be tied by means of four double wire ties of not less than 0.054 inch diameter

annealed wire or equivalent. Each coil, of ribbon-wound 3/4-inch by 0.028 inch and over, shall be tied by means of two wire ties of not less than 0.080 inch diameter annealed wire or equivalent.

5.1.1.2 Wrapping

Each coil or multiple of coils, as specified in table XI, shall be wrapped with paper by means of a coil-wrapping machine using a tensioning and edge folding device. Wrapping paper shall be either creped or hard-sized non-creped paper at the option of the supplier. The composition and construction of the wrapping paper may be accepted on the supplier's certificate of compliance (see 4.1.1). Alternatively, the type III strapping in quantity specified in table VI may be packaged in a fiberboard box confirming to type CF or SF, class domestic, minimum grade 200, style FTC or RSC of [PPP-B-636](#).

Table XI. Size of coils and packages (see 6.4)

Type coils	Size of strapping (inches)	Inside diameter (inches) (commercial tolerance)	Outside dia. max. (inches)	Coils per package
Oscillated	0.063 x 0.024	11	15	1
	0.075 x 0.020	3-3/4	10	1
	0.083 x 0.032	11	15	1
	0.100 x 0.024	3-3/4	11	1
	0.138 x 0.025	13-3/4	16-1/2	1
	0.140 x 0.031	8	13-3/4	1
	0.140 x 0.038	8	13-1/4	1
	0.150 x 0.050	16	20	1
	1/4 x 0.015 thru 3/4 x 0.035	16	23-1/2	1
Ribbon	3/4 x 0.025	16	25-7/8	2
	3/4 x 0.028	16	25-7/8	2
	3/4 x 0.031	16	25-7/8	2
	3/4 X 0.035	16	25-7/8	2
	1-1/4 x 0.031	16	25-7/8	1
	1-1/4 x 0.035	16	25-7/8	1
	1-1/4 x 0.044	16	25-7/8	1
	1-1/4 x 0.050	16	25-7/8	1
	1-1/4 x 0.065	16	25-7/8	1
	2 x 0.044	16	25-7/8	1
	2 x 0.050	16	25-7/8	1
	2 x 0.065	16	25-7/8	1

5.1.1.2.1 Creped material

Each package that is wrapped in accordance with 5.1.1.2 shall be spiral-wrapped with 45/40/30 duplex reinforced waterproof kraft paper. The paper shall consist of two sheets of kraft paper, 45 and 30 pound basis weight (24 by 36-500) respectively, laminated together with asphalt in which are embedded reinforcing cords or strands of fiber running in the machine direction of the paper, not more than 3/8 inch apart, having the 45-pound sheet saturated, coated, or infused with asphalt. Creping shall be in the machine direction. The minimum construction before creping shall be 45/40/30. When applying the paper, the tension shall be adjusted so that not over 8 percent stretch will be left in the paper. The edge-folding device shall fold either

one or both edges of the web of paper to give a rolled edge with a minimum of two thicknesses. Each wrap shall overlap each preceding layer or wrap at least 50 percent. The saturated, coated or infused 45 pound kraft shall be on the outside of the wrapped coil or coils. Wrapping shall be accomplished in such a manner as to provide a neat and compact package (see figure 1).

5.1.1.2.2 Hard size non-creped material

Alternatively, each package, that is wrapped in accordance with 5.1.1.2 shall be spirally wrapped using a hard-size non-creped paper. 2-1/2 inches wide, having a basis weight (24 by 36-500) of 105 pounds +/- 5 pounds. The paper may be of natural kraft color. The dry tensile strength shall be 105 pounds per inch of width in the machine direction with a plus or minus tolerance of 5 pounds. The wet tensile strength shall be not less than 25 pounds per inch of width in the machine direction when measured under standard laboratory conditions after 20 minutes immersion. In applying this material, the individual turns of the spiral wrapping shall be held under tension by spot gluing at intervals along the length of the spiral wrapping in such a way that each individual turn is firmly adhered to the preceding turn in several places along the circumference of each turn. Wrapping material shall be fed into the coil-wrapping machine in continuous strips 2-1/2 inches wide. The strips, when glued in cross sections, shall resemble a modified letter S, with 1/4 inch of material folded back on itself 180 degrees along the entire length of each edge. The exposed edge of the wrap shall be folded under. The edges of the wrapping material shall be a maximum of 3/4 inch apart on the outer circumference of the package. The use of three equally spaced steel straps on the outside of the package as specified in 5.1.1.3 does not apply.

5.1.1.3 Strapping

Each wrapped package of oscillated wound steel strapping, (see 5.1.1.2) 3/4 inch by 0.035 or under shall be strapped with a minimum of three equally spaced steel straps not less than 3/8 inch by 0.020 inch. Each package of ribbon wound steel strapping shall be strapped with a minimum of three equally spaced steel straps not less than 5/8-inch by 0.020 inch. The straps may be applied either under or over the outer wrap, however, when straps are applied under the outer wrap, the wrap shall be secured by means of two flat straps not less than 3/8 inch by 0.020 inch. Strapping shall conform to types I or IV finish B, grade 2 as specified herein (see figure 1).

5.1.2 Level C

Strapping shall be packaged to afford adequate protection against physical damage during shipment from the supply source to the first receiving activity. The package and the quantity per package shall be the same as that normally used by the supplier for retail distribution.

5.2 Packing

Packing shall be level A, B, or C, as specified (see 6.2).

5.2.1 Level A

5.2.1.1 Coils, strapping, double stack

Unless otherwise specified (see 5.2.1.2), coils wrapped as specified in 5.1, except coils having an OD less than 16 inches (see 5.2.1.3) shall be stacked in two stacks adjacent to each other

on base of a crate conforming to type I or II, class 2, style A of MIL-C-104 except that the headers shall be the same thickness as the load bearing members, bolting of the headers to the skids and bolting of the skids may be waived when the base is provided with diagonals having the same dimensions as those on the base of the skid shown in figure 2. The top shall be made from one piece of minimum 1/2 inch plywood of the type and class specified for sheathing for reusable crates, and end ventilation shall not be required. The maximum height of ribbon wound coils shall be 24 inches and 32 inches for oscillate wound coils. The two stacks of packaged coils shall be secured to the base with no less than 7 equally spaced straps not less than 3/4 inch by 0.025 or 0.028 inch and conforming to this specification for type I or IV finish B, grade 2 strapping. Each strap on sides shall encircle the inside and outside of the stacked coils and the skid of the crate. Each strap on the ends shall encircle the inside and outside of the stacked coils and an adjacent load bearing member. The center strap shall encircle the inside of the two adjacent stacks and an adjacent load bearing member. The underside of each skid or rubbing strip shall be notched out to eliminate damage to the strapping by rubbing.

5.2.1.2 Coils, strapping, single stack

When specified (see 6.2), strapping, wrapped as specified in 5.1, except coils having an outside diameter less than 16 inches (see 5.2.1.3), shall be securely strapped to a single-faced pallet or skid conforming to figure 2. The height of the stacked coils of strapping (not including the pallet) shall not exceed 24 inches for the ribbon wound coils and 32 inches for oscillate-wound coils.

5.2.1.3 Coils with OD less than 16 inches

Coils with an OD less than 16 inches shall be packed in shipping containers conforming to overseas type, style A or J of PPP-B-601, class 2, style 2 or 4 of PPP-B-621 or style 1 or 2 class 3 use, type 3 load of [PPP-B-585](#). The gross weight of wood or wood-cleated shipping containers shall not exceed 200 pounds. Shipping containers with coils packaged in fiberboard shall be provided with type I or II, grade C case liner conforming to [M1L-L-10547](#). Each shipping container shall be closed and strapped in accordance with the applicable container specification.

5.2.1.4 Seals

Seals of one type, style, class, finish, and size only, packaged in fiberboard boxes in accordance with the supplier's commercial practice, shall be overpacked in quantities as specified in table XII and in snug-fitting shipping containers conforming to overseas type of PPP-B-601, or class 2, style 2, 4 or 4-1/2 of PPP-B-621. Each shipping container shall be provided with a type- I or II, grade C case liner conforming -to [MIL-L-10547](#). Closure and strapping shall be in accordance with the appendix of the applicable container specification.

Regular duty seals		Heavy duty seals	
Size (inches)	Quantity	Size (inches)	Quantity
1/4 thru 3/8	20,000	3/4	5,000
1/2	15,000	1-1/4	1,000
5/8	10,000	2	1,000
3/4	10,000		

5.2.2 Level B

5.2.2.1 Strapping

Strapping packaged as specified in 5.1, except coils having an outside diameter less than 16 inches shall be securely strapped to a single faced pallet or skid. The height of the stacked coils of strapping (not including the pallet) shall not exceed 24 inches for the ribbon wound coil and 32 inches for the oscillate-wound coils. Where the weight of the specified bundles per pallet (unit load) does not exceed 1,000 pounds, the pallet shall be constructed of nominal 1-inch floor boards and two 3-inch by 4-inch skids as shown on figure 1: where the weight of the bundles per pallet exceeds 1,000 pounds, the pallet shall be constructed of nominal 2-inch boards and diagonal, and two 3-inch by 4-inch skids as shown on figure 2. Packages shall be fastened in place by means of not less than four equally spaced flat steel straps, not less than 5/8 inch wide 1600 lbs. breaking strength and conforming to type I or IV, finish A strapping, as specified herein. The underside of each skid (runner) shall be notched out to eliminate damage to the strapping by rubbing. Metal protectors shall be placed under each tie strap on heavy duty pallet. Cut-length strapping and coils having an outside diameter less than 15 inches shall be packed in shipping containers conforming to domestic type, style A or B of [PPP-B-591](#) or [PPP-B-601](#); class 1, style 2 or 4 of [PPP-B-621](#); or style 1, 2, 2A, class 1 use, type 3 load of [PPP-B-585](#). The gross weight of wood or wood-cleated shipping containers shall not exceed 200 pounds. Each shipping container shall be closed and strapped in accordance with the appendix of the applicable specification.

5.2.2.2 Seals

Five thousand seals of one type, style, class, finish and grade only, 3/8 inch through 3/4 inch wide, or one thousand seals 1-1/4 inches wide, shall be packed in a snug-fitting full telescope shipping container made from two half slotted containers without covers. Each half slotted container shall be made in accordance with the applicable requirements of type CF, or SF, class domestic, style RSC of [PPP-B-636](#). All flaps of each half slotted container shall be securely sealed with an adhesive commercially used for the specific product being packed by application throughout the entire area of contact between the flaps. Each shipping container shall be agitated from time to time to assure a compact and well filled container. Alternatively, shipping containers may be used that conform to type CF or SF, class domestic, style FTC of [PPP-B-636](#), or class 1, style 2 or 4 of [PPP-B-621](#). Each fiberboard shipping container shall be strapped in accordance with the appendix of the container specification for class 2 boxes.

5.2.2.2.1 Weather-resistant containers

When specified (see 6.2), the shipping container for seals shall be a grade V3c, V3s, or V4s fiberboard box fabricated in accordance with [PPP-B-636](#) and closed in accordance with the appendix thereto.

5.2.3 Level C

Strapping or seals, packaged as specified in 5.1, shall be packed in a manner to insure carrier acceptance and safe delivery at destination at the lowest transportation rate for such supplies. The quantity per shipping container shall be the same as that normally used by the supplier for retail distribution. Containers shall be in accordance with Uniform Freight Classification Rules or National Motor Freight Classification Rules, as applicable.

5.3 Marking

5.3.1 Civil agencies

In addition to any special marking required by the contract or order, strapping shall be marked in accordance with [FED-STD-123](#).

5.3.2 Military requirements

In addition to any special marking required by the contract or order, each coil or bundle of strapping and each unit load shall be marked in accordance with [MIL-STD-129](#).

6. NOTES

6.1 Intended use

The strapping and seals covered by this specification are intended to make joined strapping wraps for reinforcement or closure, or both, of shipping containers; for securing the holding of compressed materials in bales for securing multiple units on skids or pallets; for bundling together loose or packaged material (generally not compressed) into bundles or lifts; for internal bracing of materials in containers, or light-duty and heavy-duty work in containers, or light-duty and heavy-duty work in power machines, and for securing or bracing packages or loose materials in or on vehicles. Type I, finish B, grade 1, 5/8 inch wide, and 0.015 and 0.020 inch thick is intended to support electric cables in ships.

6.1.1 Strapping Composition

Heavy-duty (high tension) hot-rolled and heat treated cold-rolled strapping is the only strapping intended for use with carloading.

6.1.2 Hot or Cold Rolled Strapping

Whether type IV, heavy-duty strapping shall be hot or cold rolled is dependent on the particular power machine requirements.

6.1.3 Fastening Methods

Other methods of fastening flat steel strapping in use commercially are crimped seal joints, and sealless joints made by die cutting or spot welding the overlapping bands of the strapping. These methods are acceptable provided that the joint made meets the efficiency requirements (see 3.7.4) and is intended for use in domestic shipment and storage. Intended use of the various methods is as follows:

- a. Crimped seal joints are intended for use with dry (unwaxed) strapping, primarily in, carloading when severe impact loads may be encountered and the full strength of the strapping may be attained by the addition of more crimps in the seal.

- b. Die cut sealless joints are intended for use with lubricated (waxed) strapping in all types of packages and packs, except those with rounded configurations such as a bundle of pipes. These joints are made on light-duty strapping ranging in widths from 3/8 to 3/4 inch and in thicknesses from 0.012 to 0.023 inch.
- c. Spot welded sealless joints are intended for use on paint free strapping primarily to increase life of welding tips and die blocks of the welding machine and on all types of packages and packs limited only by the machine application. These joints are made on light-duty strapping ranging in widths from 1/4 to 3/4 inch and in thicknesses from 0.010 to 0.023 inch.

6.1.4 Match seals to strapping quality

Regular-duty seals should be used with regular-duty strapping and heavy-duty seals with heavy-duty strapping.

6.1.5 Style IV seals

Style IV seals are commonly designed for use with the seal manufacturer's tool and are not adaptable for other manufacturers' tools.

6.1.6 Finish A coated strapping

Finish A coated strapping is intended for use where moderate corrosion protection is desired and should be used in place of finish B for Army shipments of general supplies.

6.1.7 Finish B zinc-coated (galvanized) strapping

Finish B zinc-coated (galvanized) strapping should be specified where it is intended to be used for overseas shipments or extended periods of equipment or materials storage under adverse climatic conditions. The choice between grades 1 and 2, finish B, zinc coated strapping should be guided by the service expected, considering that the protection afforded by the coating is proportional to the weight of the coating. Grade 1, with a coating weight of 0.30 ounce per square foot of surface, has coating thickness of 0.0005 inch, and grade 2, with a coating weight of 0.18 ounce per square foot of surface has coating of 0.0003 inch. For applications for which finish B (one Preece-test dip) strapping previously procured has proved satisfactory, grade 2 of this specification should be ordered. For applications for which it has been necessary to require strapping to withstand two Preece-test dips, grade 1 should be ordered.

6.1.8 Finish C uncoated strapping

Finish C uncoated strapping is intended for use where the effect of corrosion in short-time service is inconsequential.

6.2 Ordering data

Purchasers should select the preferred options permitted herein and include the following in procurement documents:

- (a) Title, number and date of this specification.
- (b) Strapping, class, type, duty, finish, grade, and size (See 1.2.1.1 and 1.2.1.2)
- (c) Seal type, style, class and width (see 1.2.2 and 1.2.2.1).
- (d) When wax or wax-like coating is required for type II and III strapping (see 3.2).
- (e) Whether type I, or type IV regular duty strapping shall be other than cold-rolled steel (see 3.3.1).
- (f) Whether type I or type IV heavy duty strapping shall be hot-rolled or cold-rolled steel (see 3.3.1).
- (g) Whether coils shall be oscillated or ribbon wound (see 3.3.5.1).
- (h) Whether type I, finish B, grade 1 strapping shall be in other than coil lengths specified (see 3.3.6.1).
- (i) Whether type II strapping with nail holes is required (see 3.4)
- (j) Whether type II strapping shall be hot-rolled, cold-rolled or heat treated cold-rolled (see 3.4.1)
- (k) Whether small or large coil for type II strapping is required (see 3.4.4).
- (l) When type III, 0.138 x 0.025 strapping for automatic twist-tie strapping equipment is required (see 3.5.2, table VI)
- (m) Whether seals for other than a double notch joint are required (see 3.7).
- (n) Manufacturer's tool model for which type IV seal is required (see 3.7.3.4).
- (o) Marking, if required (see 3.8)
- (p) When other than commercial finish is required for seals (see 3.9)
- (q) Selection of applicable levels of packaging and packing (see 5.1 and 5.2)
- (r) When other than containerized loads are required for level A (see 5.2.1.2).
- (s) When weather-resistant fiberboard is required for level B (see 5.2.2.2.1)

6.3 Strapping lubrication

Lubrication of the strapping, as required in 3.2, is intended to facilitate the use of strapping tools in which the two bands of the strapping are held in contact with each other under pressure by frictional grips, and sliding of the faces of the strapping is necessary during the stretching operations. The wax is not intended to be a corrosion-preventive coating.

6.4 Determining the appropriate Strapping Dispenser

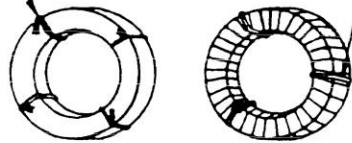
Oscillated and ribbon wound coils of strapping are used in different type of dispensers. The coil sizes specified in table XI are designed for the particular type of dispenser.

6.5 Supersession data

Class 1 of this specification covers flat strapping of QQ-S-781G. Class 2 covers the round strapping of QQ-S-790B as follows.

TIE WRAP WITH THREE STEEL STRAP TIES SPACED 120° APART AS SHOWN. ONE OF THE TIES IS TO BE PLACED OVER OUTSIDE END OF SPIRAL WRAP.

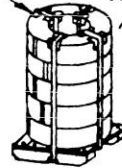
WIRES FLATTEN DOWN TWISTED JOINTS.



WRAPPING

METAL PROTECTOR UNDER EACH TIE STRAP.

TIE EACH PALLET WITH FOUR 3/4" x .028" FLAT STEEL STRAPS



ALL DETAILS FOR COIL TYING, PALLET LOADING APPLY UNIFORMLY FOR MATERIAL INTENDED FOR BOTH DOMESTIC AND EXPORT SHIPMENT.

PALLET LOADING

PALLET FOR DOMESTIC SHIPMENT OF LOADS UP TO 1000 LB.



PALLET

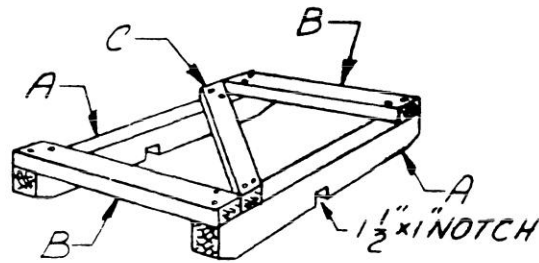
	22" x 22"	24" x 24"	25" x 25"
A	22" x 2 1/2" x 3 1/2"	24" x 2 1/2" x 3 1/2"	25" x 2 1/2" x 3 1/2"
B	22" x 3 1/2" x 3/4"	24" x 3 1/2" x 3/4"	25" x 3 1/2" x 3/4"
C	14 3/4" x 2 1/2" x 3/4"	16 3/4" x 2 1/2" x 3/4"	17 3/4" x 2 1/2" x 3/4"

NOTE:

ASSEMBLE PALLET WITH 12, 12D CEMENT COATED SINKER NAILS.

FIGURE 1 - PALLET LOAD DETAILS

FOR DOMESTIC SHIPMENT WEIGHTS EXCEEDING 1000 LB
AND FOR OVERSEAS SHIPMENT ALL WEIGHTS
ASSEMBLE PALLET WITH 12, 16D CEMENT COATED
SINKER NAILS



PALLET

	22" x 22"	24" x 24"	25" x 25"
A	22" x 2 1/2" x 3 1/2"	24" x 2 1/2" x 3 1/2"	25" x 2 1/2" x 3 1/2"
B	22" x 3 1/2" x 1 1/2"	24" x 3 1/2" x 2 1/2"	25" x 3 1/2" x 1 1/2"
C CUT TO FIT	* x 3 1/2" x 1 1/2"	* x 3 1/2" x 1 1/2"	* x 3 1/2" x 1 1/2"

NOTE:

ACTUAL PALLET SIZE SHALL BE COMPATABLE WITH
THE DIAMETER OF THE COIL BEING ATTACHED.
ALL DIMENSIONS ARE ACTUAL.

FIGURE 2. HEAVY DUTY PALLET

QQ-S-781H

Class 2, type V
Class 2, type VI
Finish B
Finish C

Custodians:

Army – CL
Navy – SA
Air Force – 69

Review activities

Army – SM
Navy – YD, OS
Air Force – 71, 80, 82

User activities:

Navy – SH, MC
Air Force – 70

QO-S-790B

Class A
Class B
Finish 2
Finish 1

Preparing activity

Army - CL

Civil Agency Coordinating Activities

GSA - FSS
AGR - AFS
DC – DCC
JUS – GPI

Instructions and form for submitting changes has been removed.

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