

T-R-605b

December 13, 1963

SUPERSEDING

Int. Fed. Spec. T-R-40605a (Army-QMC)

March 22, 1962 and

Fed. Spec. T-R-605

October 31, 1956

FEDERAL SPECIFICATION**ROPE, MANILA AND SISAL**

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 the requirements of manila and sisal rope for general purpose use.

1.2 Classification.

1.2.1 *Types and classes.* Rope covered by this specification shall be of the following types and classes as specified (see 6.3):

Type M—Manila (*Musa textilis*).

Class 1—"Becker" value rope.

Class 2—"Non-Becker" value rope.

Type S—Sisal (*Agave sisalana*).

2. APPLICABLE SPECIFICATIONS AND STANDARDS

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

Federal Specifications:

T-T-616—Treatment: Mildew Resistant, For Rope and Cord.

CCC-T-191—Textile Test Methods.

Federal Standards:

Fed. Std. No. 102—Preservation, Packaging, and Packing Levels.

Fed. Std. No. 123—Marking for Domestic Shipment (Civilian 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, Standards, and Handbooks 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 25, D. C.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Washington, D. C., Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, and Auburn, Wash.

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

Military Specification:

MIL-C-3131—Cordage; Preparation For Delivery of.

Military Standards:

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

MIL-STD-129—Marking for Shipment and Storage.

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(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 The requirements specified in 3.9 and 3.10 apply only to rope purchased directly by the Government. All other requirements apply to rope purchased as a component for an end item by a contractor and to rope purchased directly by the Government.

3.2 Material.

3.2.1 *Type M (Manila)*. Type M rope shall be fabricated from *Musa textilis* fiber.

3.2.1.1 *Class 1*. Type M, class 1 rope shall have a "Becker" value of not less than 43 for rope 5/8 to 2 inches in circumference and not less than 40 for rope 2-1/4 inches in circumference and larger when tested as specified in 4.2.5.

3.2.1.2 *Class 2*. "Becker" value requirements do not apply to type M, class 2 rope; all other requirements for type M rope shall apply.

3.2.2 *Type S (Sisal)*. Type S rope shall be fabricated from *Agave sisalana* fiber.

3.3 *Strand*. Unless otherwise specified, the rope shall be three-strand (see 6.3). Three-strand rope shall be standard or hard-lay, as specified (see 6.3).

3.3.1 *Four-strand rope*. When specified (see 6.3), four-strand rope shall be furnished. Four-strand, medium-laid rope shall be not over 7 percent heavier than three-strand rope of the same size, and shall have at least 95 percent of the strength required for three-strand rope of the same size. Other requirements shall be as specified for the three-strand rope.

3.4 *Turn*. Turn is defined as the distance parallel to the axis of the rope in which a strand makes one complete spiral. The maximum length of one turn of three-strand rope shall not exceed the maximum turn shown in tables I and II for the size specified.

TABLE I—Physical requirements for standard rope, three-strand

Nominal Inches	Size (circumference)		Diameter (approximate nominal) Inches	Length of coil (mini- mum) Feet	Gross wt. of coil (approx.) Pounds	Length per pound (mini- mum) Feet	Breaking strength (minimum) Pounds		Load P 200 D ² Pounds	Turn X 10 (maxi- mum) Inches
	Minimum Inches	Maximum Inches					Manila Pounds	Sisal Pounds		
6/8	9/16	11/16	3/16 (6 yarns)	8.335	50	66.6	450	360	7	7-3/8
8/4	5/8	7/8	1/4 (6 yarns)	2,500	50	50.0	600	480	12.5	8-3/16
1	7/8	1-1/8	5/16 (9 yarns)	1,725	50	34.5	1,000	800	19.5	11-3/16
1-1/8	1	1-1/4	3/8 (12 yarns)	1,220	50	24.4	1,350	1,080	28.2	12-6/8
1-1/4	1-1/8	1-3/8	7/16 (15 yarns)	1,200	63	19.0	1,760	1,400	38.2	13-13/16
1-1/2	1-3/8	1-5/8	1/2 (21 yarns)	1,200	90	13.3	2,650	2,120	50	16-1/8
1-3/4	1-5/8	1-7/8	9/16	1,200	125	9.61	3,450	2,760	68	18-3/8
2	1-13/16	2-3/16	5/8	1,200	160	7.50	4,400	3,520	78.1	20-1/2
2-1/4	2-1/16	2-7/16	3/4	1,200	200	6.00	6,400	4,320	112.6	22-13/16
2-1/2	2-5/16	2-11/16	13/16	1,200	234	5.13	6,500	5,200	132	24-7/8
2-3/4	2-9/16	2-15/16	7/8	1,200	270	4.45	7,700	6,160	176	27
3	2-8/4	3-1/4	1	1,200	324	3.71	9,000	7,200	200	29-5/16
3-1/4	3	3-1/2	1-1/16	1,200	375	3.20	10,500	8,400	228	31-1/2
3-1/2	3-1/4	3-3/4	1-1/8	1,200	432	2.78	12,000	9,600	253	33-5/8
3-3/4	3-1/2	4	1-1/4	1,200	502	2.40	13,500	10,800	312	35-13/16
4	3-11/16	4-5/16	1-5/16	1,200	576	2.09	15,000	12,000	345	38
4-1/2	4-3/16	4-13/16	1-1/2	1,200	720	1.67	18,500	14,800	450	42-5/16
5	4-11/16	5-5/16	1-5/8	1,200	893	1.34	22,500	18,000	528	46-5/8
5-1/2	5-1/8	5-7/8	1-3/4	1,200	1,073	1.12	26,500	21,200	612	51
6	5-5/8	6-3/8	2	1,200	1,290	.930	31,000	24,800	800	55-3/8
7	6-9/16	7-7/16	2-1/4	1,200	1,752	.685	41,000	32,800	1,018	64
8	7-1/2	8-1/2	2-5/8	1,200	2,290	.524	52,000	41,600	1,380	72-13/16
9	8-7/16	9-9/16	3	1,200	2,900	.414	64,000	51,200	1,800	81-1/2
10	9-3/8	10-5/8	3-1/4	1,200	3,580	.385	77,000	61,600	2,120	90-1/4
11	10-1/4	11-8/4	3-5/8	1,200	4,400	.278	91,000	72,800	2,640	99-1/4
12	11-1/4	12-3/4	4	1,200	5,225	.230	105,000	84,000	3,200	107-7/8

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TABLE II—Physical requirements for manila hard-lay rope, three-strand

Nominal Inches	Size (circumference)		Diameter (approx. nominal) Inches	Length of coil (minimum) Feet	Gross wt. of coil (approx.) Pounds	Length per pound (minimum) Feet	Breaking strength (minimum) Pounds	Load P 200 D ² Pounds	Turn X 10 (maxi- mum) Inches
	Minimum Inches	Maximum Inches							
3-1/2	3-1/4	3-3/4	1-1/8	1,200	460	2.67	11,000	283	31
4	3-11/16	4-5/16	1-5/16	900	460	2.00	14,000	846	36

3.5 Physical requirements. The finished rope shall conform to the requirements specified in tables I and II for circumference, length per pound, and breaking strength for the respective type and sizes when tested as specified in 4.2.5.

3.6 Mildew resistant treatment. Manila and sisal rope requiring mildew resistant treatment shall be treated in accordance with T-T-616.

3.7 Cordage oil. The cordage oil shall be of suitable cordage quality and the percent extractable matter, based on the dry weight of the finished rope, shall be not less than 10 nor more than 15 percent when tested as specified in 4.2.5.

3.8 Markers. Rope of sizes larger than 1-1/2 inches nominal circumference shall be provided with a kraft paper twine or water-repellent cotton tape marker inserted within one-strand and completely enveloped by the covering yarns of the strand. The type and class designation of the rope, year of manufacture, and manufacturer's name shall be printed on the marker in bold, easily read type, which shall remain legible upon exposure to water or mineral oil. Italic or script type print shall not be used.

3.9 Put-up. Unless otherwise specified, rope shall be furnished in coils, in the minimum lengths specified in tables I and II (see 3.9.1 and 3.9.2), within the plus tolerance given in table III. Each coil shall be continuous throughout and shall not contain splices, knots, or loose ends, and shall be so wound that each turn and layer is free from entanglement. The ends of the rope shall be securely served or whipped to prevent unlaying or fraying of rope and all fag ends shall be cut off.

TABLE III—Length tolerance

Circumference	Plus tolerance
Inches	Percent
5/8 through 1-1/2	10
1-3/4 through 9	5
10 and over	3

3.9.1 For Naval purchases, rope 4 inches in circumference and larger shall conform to table IV.

TABLE IV—Length and weight for rope 4 inches and larger

Nominal size (circumference)	Minimum length of coil	Approximate coil weight (gross)
Inches	Feet	Pounds
4	900	432
4-1/2	900	540
5	900	670
5-1/2	900	805
6	600	645
7	600	875
8	600	1,145
9	600	1,450
10	600	1,795
11	600	2,200
12	600	2,610

3.9.2 For Coast Guard purchases, rope of the sizes listed in table V shall conform to the length and weight specified therein.

TABLE V—Length and weight

Nominal size (circumference)	Minimum length of coil	Approximate coil weight (gross)
Inches	Feet	Pounds
3/4	2,750	55
1	2,250	65
1-1/8	1,620	66
1-1/2	2,700	203
6	900	972
8	900	1,719
10	1,200	3,588
12	1,500	6,540

3.10 Identification ticket. Each coil of rope shall have a ticket attached with string or wire. The tickets shall be made of paperboard not less than 0.020 inch in

thickness and the color shall be Manila or light in intensity to permit easy reading of printed or penciled markings. The finish on the paperboard shall be suitable for pencil marking. The ticket shall have clipped corners at the end where a reinforcing patch (with or without a metal eyelet) is firmly affixed for attaching the tying string or wire. The ticket shall be legibly printed with the following information:

Stock number
Nomenclature
Specification number
Length
Contract number and date
Contractor's name

3.11 Basis of purchase. Rope shall be purchased on a price-per-pound basis gross weight with 1.0 percent tare limitations.

3.12 Workmanship. The finished rope shall be clean, free from objectionable odor and shall conform to the quality and grade of product established by this specification. The occurrence of defects shall not exceed the applicable acceptable quality levels established by this specification.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Contractor's inspection responsibility. Unless otherwise specified the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities acceptable to 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.

4.2 Inspection for acceptance. Sampling and inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated.

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4.2.1 *Inspection of components.* Quality assurance provisions for components described shall be in accordance with subsidiary specifications and drawings referenced to the extent applicable, except that this specification shall govern in the event of conflict.

4.2.2 *Examination of the end item for visual defects.* The defects listed below in Table VI shall be counted regardless of their proximity to each other, except where two or more defects represent a single local condition, in which case only the more serious defect shall be counted. The sample unit for this examination shall be one coil. Ten percent of the length contained on each sample unit, but not less than 100 feet shall be subjected to the visual examination. The lot size for this examination shall be expressed in units of coils each. The acceptable quality level shall be 1.5 major defects and 4.0 total defects (major and minor combined) per 100 units. The inspection level shall be level I.

4.2.3 *Examination for length and winding.* The sample unit for this examination shall be one coil. The inspection level shall be level G and the acceptable quality level shall be 4.0 percent defective. For lots con-

sisting of 500 or fewer units, the sample size shall be 10 and the acceptance number 1. The lot size shall be the number of units in the inspection lot. Defects shall be as listed in 4.2.3.1 and 4.2.3.2.

4.2.3.1 Defects with regard to length shall be considered to exist if any of the following are determined during inspection:

(a). Length of coil less than specified or exceeding the allowable plus tolerance specified in 3.9.

(b). Length of coil less than marked on ticket.

4.2.3.2 Defects with regard to winding shall be considered to exist if any of the following are determined during inspection:

(a). Improperly or not firmly wound resulting in kinks, knots, entangling or slippage during unwinding, or otherwise free, unhampered unwinding of rope.

(b). Knot, splice or otherwise joining of ends to make a continuous length.

(c). Rope not in a continuous length.

4.2.4 *Examination of preparation for delivery requirements.* An examination shall be made to determine that packaging, packing and marking requirements of section 5 of this specification are complied with. The sample unit shall be one shipping

Examine	Defect	Classification	
		Major	Minor
Appearance and Workmanship	Cut any	X	
	Chafed or damaged, affecting serviceability	X	
	Kinks, broken or loose ends, bulged strands, strand knots, loose ends	X	
	Ends not securely served to prevent fraying or untwisting		X
	Fag ends not cut-off squarely		X
Type Clearance	Other than specified	X	
	Spot or stain, clearly visible ¹		X
Identification marked	Objectionable odor		X
	Omitted, incorrect, illegible, incomplete		X
	Not completely covered by cover yarns		X
Identification ticket	Italic or Script type used		X
	Omitted, incorrect, illegible, insecurely attached..		X
	Not as specified		X

¹ Clearly visible at normal inspection distance (approximately 8 feet).

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 size shall be the number of containers in the end item inspection lot. The inspection level shall be L4 and the AQL shall be 4.0 defects per hundred units.

4.2.5 *Testing of the end item.* The methods of testing specified in CCC-T-191, wherever applicable and as listed in table VIII shall be followed. The physical and chemical values specified in section 3 apply to the average of the determinations made on a sample unit for test purposes as specified in the applicable test methods. The sample size and acceptance and rejection number shall be in accordance with ta-

ble VII. The sample unit for testing shall be 50 feet of rope. The lot size shall be expressed in units of coils.

Examine	Defect
Marking (exterior and interior)	Omitted, incorrect, illegible, of improper size, location, sequence, or method of application.
Materials	Any component missing. Any component damaged.
Workmanship	Inadequate application of components, such as: incomplete closure of case liners, container flaps, loose strapping, inadequate stapling. Bulging or distortion of containers.
Packaging	Not as specified. Coils not secured as specified.
Packing	Not as specified
Weight	Gross weight exceeds requirements.

TABLE VII—Sampling for tests

Number of coils in lot	Number of samples	Acceptance number for each test characteristic	Rejection no. for each test characteristic
15 and under	2	0	1
16 to 40	3	0	1
41 to 110	5	0	1
111 to 300	7	0	1
301 to 500	10	0	1
501 and over	15	1	2

TABLE VIII—Test methods,¹

Characteristic	Spec. Ref.	Test Method	No. deter. per sample unit	Results reported as:
Material, identification	3.2.1 and 3.2.2	1240 and 1250	1	Pass or fail
Becker value (type I, class 1 only)	3.2.1.1	3810	4	Avg. of 4 deter. to nearest whole number.
Strand	3.3	Visual	1	Pass or fail
Turn	3.4	4.2.F.1	1	Pass or fail
Length per pound	3.5	4.2.E.2	2	Avg. of 2 deter. to nearest 1 percent of specified requirement.

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TABLE VIII—Test methods (cont'd.)

Characteristic	Spec. Ref.	Test Method	No. deter. per sample unit	Results reported as:
Breaking strength: Rope under 3-inch circumference	3.5	4106 ¹	3	Avg. of 3 deter. to nearest 1 percent of specified requirement.
Rope 3-inch circumference and over	3.5	4106 ²	3	Avg. of 3 deter. to nearest 1 percent of specified requirement.
Circumference	3.5	4.2.5.3	3	Avg. of 3 deter. to nearest 1/16 inch
Extractable matter (percent)	3.7	4.2.5.4	2	Avg. of 2 deter. to nearest 0.1 percent
Identification marker:				
Material	3.8	Commercial	1	Pass or fail
Fastness to oil and water	3.8	Commercial	1	Pass or fail

¹ Test to determine compliance with specification requirements including quantity of delivery may be made under prevailing atmospheric conditions except in settlement of dispute, in which case the tests shall be made upon material which has reached equilibrium under standard conditions as defined in CCC-T-191.

² Method 4106 shall be followed except that the load "P" shall be as specified in tables I and II for the respective sizes.

4.2.5.1 *Turn*. The coils shall be placed with the core vertical in such a way that the rope will uncoil down from the outside, and the bands then removed. The outer end shall then be grasped firmly and carried around the coil until a length of more than 10 feet has been unwound. This length shall be laid straight on the floor and the end released. Starting not less than 10 feet from the end, the length of 10 complete spirals of one strand shall be measured. The turn is one tenth of this measurement, but for convenience 10 times the turn is given in tables I and II.

4.2.5.2 *Length per pound*. The specimen shall be subjected to a load, "P", in pounds, equal to 200 times the square of the nominal diameter of the rope in inches, ($P=200D^2$). (See tables I and II). While the specimen is under this load the length specified in table IX shall be marked off, and this length cut out of the specimen. This length shall be weighed and the length per pound, using the length measurement determined under load, shall be calculated.

TABLE IX—Length required for length per pound specimens

Circumference (inches)	Length (minimum)
Below 3	10
3 to 6, inclusive	5
Over 6	3

4.2.5.3 *Circumference*. Circumference shall be measured with the specimen under the load "P" (see 4.2.5.2). A fiber shall be passed snugly around the rope and cut where it overlaps. This method of measurement shall be repeated at least three times in different positions not less than two turns of the rope apart. The average of these lengths shall be regarded as the circumference of the rope.

4.2.5.4 *Extractable matter*. A sample of the rope weighing approximately 5 grams shall be placed in a tared weighing bottle and dried to constant weight at 105° to 110° C. After the bone dry weight has been determined, the specimen shall be transferred to a Soxhlet extraction apparatus for a

minimum of 20 extractions using reagent grade petroleum ether (boiling point range 30° to 65°C.) as the solvent. The petroleum ether shall then be evaporated from the extract in the tared flask at a temperature of 105° plus or minus 5°C. to constant weight, cooled in a desiccator and weighed. This is the weight of the extractable matter. The percentage of extractable matter present is calculated by use of the following formula:

$$\text{Percent extractable matter} = \frac{\text{Weight extractable matter}}{\text{Weight of dry specimen}} \times 100$$

Two specimens shall be tested from each sample unit and the average of the results obtained shall be reported to the nearest 0.1 percent.

5. PREPARATION FOR DELIVERY

(For civil agency procurement, the definitions and applications of the levels of packaging and packing shall be in accordance with Fed. Std. No. 102.)

5.1 Packaging. Packaging shall be level A or C, as specified (see 6.3).

5.1.1 Levels A and C. The rope, put-up as specified, shall be packaged in accordance with the applicable requirements of MIL-C-3131.

5.2 Packing. Packing shall be level A, B, or C, as specified (see 6.3).

5.2.1 Levels A, B, or C. The rope shall be packed in accordance with the applicable requirements of MIL-C-3131.

5.3 Marking.

5.3.1 Civil agencies. In addition to any special markings required by the contract or order, interior containers and shipping containers shall be marked in accordance with Fed. Std. No. 123.

5.3.2 Military agencies. In addition to any special markings required by the contract

or order, interior containers and shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 International interest. Provisions of this specification are the subject of international standardization agreement as cited in ABC-ARMY-STD-92. When amendment, revision, or cancellation of this specification is proposed, the departmental custodians will inform their respective Departmental Standardization Offices so that appropriate action may be taken respecting the international agreement concerned.

6.2 Department of defense procurements. As a result of Interdepartmental Standardization, the Department of Defense, when procuring type M rope, will utilize type M, class 2 Non-Becker value rope only.

6.3 Ordering data. Purchasers should exercise any desired options offered herein and procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type, class, and size required (see 1.2 and applicable table).
- (c) Whether standard or hard-lay rope is required (see 3.3).
- (d) When 4-strand rope is required (see 3.3.1).
- (e) Whether mildew-resistant treatment is required (see 3.6).
- (f) Length of coil to be furnished, if other than specified (see 3.9).
- (g) Selection of applicable levels of packaging and packing (see 5.1 and 5.2).
- (h) That purchaser will accept at original weight, any unit which has been shortened or cut for test purposes, if in compliance with this specification.

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6.4 Transportation description. The transportation description and minimum weights applicable to this commodity are:

Rail:

Rope, not otherwise indexed by name.
Carload minimum weight 30,000 pounds.

Motor:

Rope, not otherwise indexed.
Truckload minimum weight 30,000 pounds, subject to Rule 115, National Motor Freight Classification.

Notice. When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Gov-

ernment procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

MILITARY INTERESTS:

Army—MO

Navy—Sh

Air Force—MOA

Copies of this specification may be purchased for 10 cents each.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER		2. DOCUMENT TITLE	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one) <input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify): _____	
b. ADDRESS (Street, City, State, ZIP Code)			
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional		8. DATE OF SUBMISSION (YYMMDD)	

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