MIL-W-18242B(SH) <u>13 October 1987</u> SUPERSEDING MIL-W-18242A(SHIPS) 9 November 1965 (See 6.5)

MILITARY SPECIFICATION

WIRE ROPE AND WIRE ROPE ASSEMBLIES; SINGLE LEG-CORROSION RESISTING STEEL, MINESWEEPING

This specification is approved for use within the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 <u>Scope</u>. This specification covers nonmagnetic wire rope and wire rope assemblies.

1.2 <u>Classification</u>. Wire rope shall be of the following types as specified (see 6.2):

Type III - 7 by 19 Warrington, type 305 corrosion resisting steel, right hand or left hand lay.
Type IV - 6 by 19 Warrington, type 305 corrosion resisting steel, 7 by 7 independent wire rope core, right hand or left hand lay.
Type V - 4 by 8 serrated, type 305 corrosion resisting steel, wire strand core, right hand or left hand lay.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 <u>Specifications and standards</u>. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 1075 DISTRIBUTION STATEMENT A Approved for public release; distribution unlimited

SPECIFICATIONS

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FEDERAL
TT-P-320 - Pigment, Aluminum: Powder and Paste for Paint.
TT-V-119 - Varnish, Spar, Phenolic-Resin.
MILITARY
MIL-I-17214 - Indicator, Permeability; Low-Mu (Go-No Go).
MIL-F-17280 - Fittings, Marine, Minesweeping, Nonmagnetic.
MIL-W-18142 - Wood Preservative Solutions, Oil-Soluble, Ship and
Boat Use.
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STANDARDS

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MILITARY	
MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-163	- Steel Mill Products Preparation for Shipment and Storage.

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unleas otherwise specified, the issues of documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

> AMERICAN IRON AND STEEL INSTITUTE Steel Products Manual for Stainless and Heat Resisting Steels.

(Application for copies should be addressed to the American Iron and Steel Institute, 150 East 42nd Street, New York, NY 10017.)

> UNIFORM CLASSIFICATION COMMITTEE AGENT Uniform Freight Classification Ratings, Rules and Regulations

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

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 <u>Material</u>. All strands shall be fabricated from AISI type 305 corrosion resisting steel wire conforming to the AISI Steel Products Manual. The wires shall have a minimum tensile strength of 210,000 pounds per square inch (1b/in²).

3.1.1 <u>Permeability</u>. The completed wire rope and wire rope assemblies shall have a permanent magnetic permeability not greater than 2.0 (see 4.2.2.8 and 4.3.2.3).

3.1.2 <u>Joints</u>. The strands of wire rope shall contain no joint made after fabrication. If joints are made in individual wires before fabrication of the strands, the distance between a joint in one wire and a joint in any other wire in the same strand shall be not less than 18 inches.

3.1.3 <u>Recovered materials</u>. Unless otherwise specified herein, all material incorporated in the products covered by this specification shall be new and may be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

3.2 Lays. Wire rope lays shall be either right or left hand as specified (see 6.2).

3.3 Wire rope.

3.3.1 <u>General</u>. Wire ropes shall be fabricated in continuous lengths with the bitter ends seized and shall be furnished on non-returnable wooden reels in the lengths specified (see 6.2).

3.3.2 Type III (7 by 19 Warrington, type 305 corrosion-resisting steel, right hand or left hand lay).

3.3.2.1 <u>Construction</u>. Each strand, including the center strand, shall be fabricated in one operation and shall be of the Warrington construction.

3.3.2.2 Preforming. Preforming of the outer strands shall be required.

3.3.2.3 Additional requirements. The wire ropes shall conform to table I for the size specified (see 6.2).

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Rope diameter					
Nominal and minimum	Maximum	Approximate weight	Minimum breaking strength	Rope	pitch
Inch	Inch	Pounds per foot	Pounds	Minimum	Maximum
3/16	0.206	0.065	2,900	1.125	1.500
1/4	- 268	.11	5,600	1.725	1.775
5/16	.334	.17	8,700	2.094	2.156
3/8	.401	.24	12,200	2.462	2.538

TABLE I. Requirements for type III wire rope.

3.3.3 Type IV (6 by 19 Warrington, type 305, corrosion resisting steel, 7 by 7 independent wire rope core, right hand or left hand lay).

3.3.3.1 <u>Construction</u>. All outer strands shall be Warrington construction. The independent wire rope core shall be of 7 by 7 construction.

3.3.3.2 Preforming. Preforming of the outer strands shall be required.

3.3.3.3 <u>Additional requirements</u>. The wire ropes shall conform to table II for the size specified (see 6.2).

Rope diameter					
Nominal and minimum	Maximum	Approximate weight	Minimum breaking strength	Rope	pitch
Inch	Inches	Pounds per foot	Pounds	Minimum	Maximum
1/2	0.531	0.46	21,000	.3.075	3.175
5/8	.656	.72	32,000	4.187	4.313
3/4	.781	1.05	45,700	4.900	5.438
7/8	.922	1.43	62,250	5.663	6.344
1	1.047	1.87	.80,000	6.650	7.250

TABLE II. Requirements for type IV wire rope.

3.3.4 Type V (4 by 8 serrated, type 305, corrosion resisting steel, wire strand core, right hand or left hand lay).

3.3.4.1 Construction.

3.3.4.1.1 <u>Strands</u>. The rope shall consist of four eight-wire strands closed in a regular lay, right hand or left hand helix, around a wire strand core. Each of the four eight-wire strands shall consist of a center wire around which shall be stranded in one layer five single wires of the same diameter and two smaller wires twisted together into a pair with the same direction lay as that of the rope (see figure 1 for construction of strands only).

3.3.4.1.2 <u>Wire strand core</u>. The wire strand core shall be a seven-wire strand consisting of six 0.050 inch diameter wires and one 0.055 inch diameter center wire. The lay of the core shall be the same direction as for the rope which is opposite to the outside strands.

3.3.4.2 <u>Additional requirements</u>. The wire rope shall conform to the following for the size specified (see 6.2).

Rope diameter:	
(1) Nominal and minimum	/64 inch
(2) Maximum0.8	325 inch
Approximate weight	2 pound per foot
Minimum breaking strength	
Pitch:	
(1) Rope	570 minimum
4.8	830 maximum
(2) Strand2.7	717 minimum
2.7	783 maximum
(3) Pair	740 minimum
-	760 maximum
(4) Core	500 minimum
1.6	550 maximum
	(1) Nominal and minimum 51, (2) Maximum 0.8 Approximate weight 0.8 Minimum breaking strength 32 Pitch: 4.4 (1) Rope 4.4 (2) Strand 2.5 (3) Pair 2.5 (4) Core 1.6

3.4 Wire rope assemblies.

3.4.1 General. Wire rope assemblies shall be fabricated from one continuous piece of new wire rope. Minimum lengths, measured between thimble pulls, shall be as specified (see 6.2). Lengths of wire rope assemblies 300 feet and under shall be coiled and boxed. Lengths over 300 feet shall be furnished on nonreturnable wooden reels. Maximum lengths shall not exceed those specified in the contract or order by more than 5 percent.

3.4.1.1 <u>Thimble</u>. Wire rope assemblies shall have a thimble on one or both ends as specified (see 6.2).

3.4.1.2 <u>Seizing strand</u>. One by 7 AISI type 305 corrosion resisting steel seizing strand shall be used. The strand shall have one wire center and six outer wires. All wires in the outer layer shall be one diameter. The strands shall be fabricated in one operation and shall have seven wires. A left hand lay shall be used. The strand shall be in accordance with table III.

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Strand d	liameter		Approxi-				Annowi-
Nominal and minimum	Maximum	Applicable wire rope diameter			Approximate weight	Minimum breaking strength	
Inch	Inch	Inch	Inch	Inches	Pounds per foot	Pounds	Feet
1/16	5/64	3/16, 1/4, 5/16, 3/8		3/4	0.010	140	5,000
3/32	7/64	1/2	.032	1-1/8	.020	300	2,500
1/8	9/64	5/8, 3/4, 51/64	-042	1-1/2	.033	530	1,500
5/32	11/64	7/8	.052	1-7/8	•050	810	1,000

TABLE III. Seizing strand_requirements.

3.4.1.3 <u>Splicing</u>. All splices shall be the full strand five tuck type, with the core buried in the splice. After the first tuck all splicing strands shall be untwisted to remove the lay of the strand. All tucks shall be pulled tight. Spliced ends shall be cut by methods other than burning. The splice shall be lightly taped to remove high spots and allow the strands to mesh.

3.4.1.4 <u>Seizing</u>. The seizing shall cover the splice and adjacent strands which were unlaid during the splicing. Seizing shall be tightly wound, each strand of seizing laying against the preceding strand, the ends shall be twisted together and laid against the rope. Wire rope assemblies having a thimble at one end only shall also be seized at the bitter end.

3.4.2 Wire rope assemblies using types III and IV wire rope.

3.4.2.1 Thimbles. Thimbles shall be type II, style a, austenitic corrosionresisting steel or nickel modified Hadfield steel, in accordance with MIL-F-17280.

3.4.2.2 Tensile requirements. Assemblies shall conform to table IV.

TABLE IV. Tensile requirements of assemblies for types III and IV wire rope.

Wire rope type	Rope diameter	Minimum breaking strength
	Inch	Pounds
111	3/16	2,750
111	1/4	5,300
III	5/16	8,250
111	3/8	11,000
IV	1/2	19,000
IV	5/8	29,000
IV	3/4	41,000
IV	7/8	56,000
IV	1	68,000

3.4.3 Wire rope assemblies using type V wire rope.

3.4.3.1 <u>Thimbles</u>. Thimbles shall be austenitic corrosion-resisting steel, or nickel modified Hadfield steel, 3/4-inch size, type II, style'a, in accordance with MIL-F-17280, modified as follows:

- (a) Overall width across score 31/32 inch maximum.
- (b) Overall width of score 25/32 inch maximum.

3.4.3.2 <u>Tensile requirements</u>. Assemblies fabricated from 51/64 inch diameter wire rope shall have a minimum breaking strength of 28,800 pounds.

4. QUALITY ASSURANCE PROVISIONS

4.1 <u>Responsibility for inspection</u>. 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 supplies and services conform to prescribed requirements.

4.1.1 <u>Responsibility for compliance</u>. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Wire rope.

4.2.1 Sampling.

4.2.1.1 <u>Short sample</u>. From each 18,000 feet of wire rope, or each continuous run, whichever is shorter, there shall be taken a short sample, not less than 3 feet in length. The short sample shall be used for the tensile test of individual wires, preforming tests of the individual wires and the fabrication tests of the strands.

4.2.1.2 Long sample. From each 18,000 feet of wire rope, or each continuous run, whichever is shorter, there shall be taken a long sample not less than 7 feet in length. The long sample shall be used for the tensile test of the complete wire rope. The ends of the long sample shall be seized.

4.2.2 Inspection.

4.2.2.1 <u>Material certification</u>. The contractor shall certify in writing that the materials used in the construction of the wire rope, and wire rope assemblies, conform to the material requirements outlined herein. Such certification shall document actual tests, examination or other verifiable quality data.

4.2.2.2 Tensile test of individual wires.

4.2.2.2.1 <u>Specimens</u>. From each short sample (see 4.2.1.1), not less than one specimen of each diameter of wire from each strand and not less than six specimens from each sample shall be tested to determine conformance to 3.1.

4.2.2.2.2 <u>Procedure</u>. The free length of the wire shall be not less than 10 inches. The speed of the movable head of the testing machine under no load shall not exceed 1 inch per minute.

4.2.2.2.3 <u>Retests</u>. If only one of the specimens does not pass the test, two additional like positioned wires may be taken from the same strand and tested. Each additional specimen shall conform to 3.1.

4.2.2.3 Fabrication tests.

4.2.2.3.1 <u>Specimens</u>. One strand of the short sample (see 4.2.1.1) shall be selected to determine that fabrication is in accordance with the requirements of this specification.

4.2.2.3.2 Procedure.

4.2.2.3.2.1 Types III and IV. One of the outside wires shall be unlaid for a distance of 1 foot, holding the remaining outside wires in their original position. If the wires which are unlaid are in contact and running parallel with the same wires in the next layer inside, these two layers were fabricated in one operation. All the outside wires shall be removed to determine whether the layer of wires next inside the outside layer was fabricated in the same or in separate operations as the layer of wires next inside.

4.2.2.3.2.2 Type V. The pitch of the outer single wires and of the pair in each strand shall be determined by measuring five pitches, the average of which will be the pitch of the strand. The pitch of the wires in the pair shall be determined by marking the length of ten pitches of the pair of wires on one of the adjacent single wires, then unlaying and measuring this wire to determine the average pitch of the wires in the pair.

4.2.2.4 <u>Diameter of wire rope</u>. When measuring the diameter there shall be no load on the wire rope. The diameter of three places not less than 5 feet apart, beginning not less than 5 feet from the end of the wire rope, shall be measured with a suitable device such as a machinist's caliper square (see figures 2 and 3). The average of these diameters is the diameter of the rope.

4.2.2.5 <u>Pitch test of wire rope</u>. When measuring the pitch, there shall be no axial load on the wire rope. The total length of five or more pitches shall be measured, beginning not less than 10 feet from the end of the wire rope. The distance measured, divided by the number of pitches, shall be the pitch of the wire rope.

4.2.2.6 Preforming test of wire rope types 111 and 1V.

4.2.2.6.1 Specimen. The short sample (see 4.2.1.1) shall be used to determine if the applicable wire ropes have been preformed.

4.2.2.6.2 <u>Procedure</u>. The original actual diameter of the specimen shall be measured as close as possible to the cut end. The strands shall be separated sufficiently at the end, to break any bond between the strands that may exist due to the method of cutting the wire rope. The final diameter shall be measured at the same place the original diameter was measured. The increase in diameter shall not exceed 1/32 inch for any wire rope up to and including 3/4 inch in diameter, and shall not exceed 3/64 inch for any other diameter of wire rope.

4.2.2.7 Tensile test of wire rope.

4.2.2.7.1 <u>Specimen</u>. The long sample (see 4.2.1.2) shall be used to determine that the tensile strength of wire rope meets the requirements of this specification. In this test the free length of the wire rope shall be not less than 3 feet.

4.2.2.8 <u>Permeability</u>. Each long sample (see 4.2.1.2) shall be checked with a permeability indicator conforming to MIL-I-17214 to verify that the requirements of 3.1.1 have been met.

4.2.2.9 <u>Classification of defects</u>. Classification of defects shall be as specified in 4.4.

4.3 Wire rope assemblies.

4.3.1 Sampling.

4.3.1.1 Lot. For purposes of sampling for examination and tests, a lot shall consist of all assemblies of the same type and size rope offered for delivery at one time but not exceeding 800.

4.3.1.2 <u>Sampling for visual and dimensional examination and tensile</u> <u>strength test</u>. From each lot of wire rope assemblies a random sample shall be selected in accordance with table V for the examination of 4.3.2.1 and the tensile strength test as specified in 4.3.2.2. Classification of defects shall be as specified in 4.4. If any assembly in the sample is found to be defective the entire lot shall not be offered for delivery.

TABLE V. Sample size for inspection of wire rope assemblies.

Lot size	Sample size A	Sample size B
2 to 8	2	1
9 to 65 66 to 110	4	1
111 to 180 181 to 300	6 9	1
301 to 500 501 to 800	12 15	I 1

4.3.2 Inspection.

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4.3.2.1. <u>Visual and dimensional examination</u>. Each sample wire rope assembly selected in accordance with 4.3.1.2, sample size A, shall be examined to verify conformance to all of the requirements of this specification not involving tests.

4.3.2.2 <u>Tensile strength tests</u>. Wire rope assemblies selected for visual and dimensional examination (see 4.3.2.1) may also be used for the tensile strength tests. The sample (using sample size B of 4.3.1.2) shall be placed in a tensile testing machine. If the length of the assembly is such that both ends will not fit within the machine, the spliced ends shall be cut from the assembly; the cut being made not less than 5 feet from the thimble pull. All spliced ends of the samples shall be tested. Load shall be applied through the movable mandrel at a uniform rate.

4.3.2.3 <u>Permeability</u>. Each sample examined and tested in accordance with 4.3.2.1 and 4.3.2.2 shall be checked with a permeability indicator conforming to MIL-I-17214 to verify that the requirements of 3.1.1 have been met.

4.4 <u>Classification of defects</u>. Classification of defects as defined in MIL-STD-105 shall be as shown in table VI.

Category	Defect			
Critical				
1	Failure to meet tensile strength and permeability requirements.			
Major	· · · · ·			
101	One or more severed wires.			
102	One or more broken wire joints.			
103	Corrosion.			
104	Kinked rope.			
105	Improperly made splices.			
Minor				
201	One or more flattened wires due to peening (when visually examined).			
202	Failure to attach identification marking.			
203	Gaps between winds of seizing.			

TABLE VI. Classification of defects.

4.5 <u>Inspection of packaging</u>. Sample packages and packs, and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

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(The packaging requirements specified herein apply only for direct Government acquisition).

5.1 Domestic shipment and early installation.

5.1.1 Wire rope and wire rope assemblies.

5.1.1.1 <u>Preservation and packaging</u>. Preservation and packaging which may be the contractor's commercial practice, shall afford adequate protection against deterioration and physical damage during shipment from the supply source to the using activity and until early installation. Wire rope, and wire rope assemblies when applicable (wire rope assemblies 300 feet and under shall be coiled and boxed), shall be furnished on non-returnable wooden reels. Assemblies on reels having only one thimble shall have the thimble end on the inside.

5.1.1.2 Packing. Packing for wire rope and wire rope assemblies shall be accomplished in a manner which will insure acceptance by common carrier, at lowest rate, and will afford protection against physical damage during shipment from the supply source to the using activity for early installation. The shipping containers or method of packing shall conform to the Uniform Freight Classification Ratings, Rules and Regulations or other carrier regulations as applicable to the mode of transportation and may conform to the contractor's commercial practice.

5.1.1.3 <u>Marking</u>. Shipment marking information shall be provided on exterior shipping containers in accordance with the contractor's commercial practice. The information shall include nomenclature, National stock number, contract or order number, contractor's name and destination.

5.2 <u>Domestic shipment and storage or overseas shipment</u>. The requirements for preservation, packaging, and marking for shipment shall be as specified (see 6.2).

5.2.1 The following provides requirements for protection during domestic shipment and storage or overseas shipment.

5.2.1.1 Preservation, packaging and packing shall be in accordance with MIL-STD-163, as specified, and the following:

- (a) Preservative coating will not be required for the wire rope and assemblies since they are fabricated from corrosion resisting steel.
- (b) Length of wire rope assemblies 300 feet and under shall be coiled and boxed. Lengths over 300 feet shall be reeled.
- (c) Reels shall receive the following preservative treatment:
 (1) A dip coating of preservative conforming to type B of MIL-W-18142 (a brush coat will be acceptable if
 - facilities for dip coating are not readily available). (2) One coat of aluminum paint (2 pounds of aluminum paste,
 - type II, class B, in accordance with TT-P-320, per gallon of phenolic varnish in accordance with TT-V-119).

- (3) Two brush coats of exterior type gray paint.
- (4) After the preservative costing application, a 72-hour drying period shall be required before application of the paint coatings. A 24-hour drying period shall be required between the required paint applications.

5.2.1.2 <u>Marking</u>. Marking for shipment shall be in accordance with MIL-STD-163.

6. NOTES

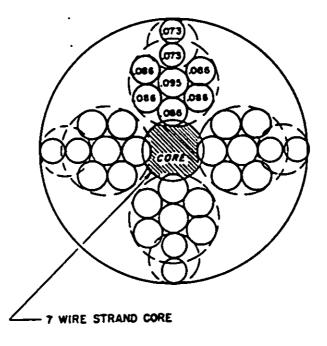
6.1 Intended use. The wire rope and wire rope assemblies covered by this specification are intended for use in minesweeping applications.

- 6.2 Ordering data. Acquisition documents should specify the following:
 - (a) Title, number, and date of this specification.
 - (b) Type required (see 1.2).
 - (c) Direction of lay (see 3.2).
 - (d) Length of wire rope, and wire rope assemblies measured between thimble pulls (see 3.3.1 and 3.4.1).
 - (e) Diameter of wire rope required (see 3.3.2.3, 3.3.3.3 and 3.3.4.2).
 - (f) Whether thimbles are to be on one end or on both ends of wire rope assemblies (see 3.4.1.1).
 - (g) Preservation, packaging, packing and marking requirements other than those required by 5.1 (see 5.2).
- 6.3 Types I and II of MIL-W-18242(SHIPS) have been deleted.
- 6.4 Subject term (key word) listing.

Left hand lay Right hand lay Serrated Wire strand core

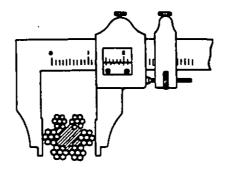
6.5 <u>Changes from previous issue</u>. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Preparing activity: Navy - SH (Project 1075-N046)



SH 2831A

FIGURE 1. Type V wire rope (51/64 inch diameter).



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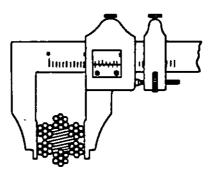
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FIGURE 2. Correct way to measure the diameter of wire rope. Use a machinist's caliper square.



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FIGURE 3. Incorrect way to measure the diameter of wire rope.

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