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GGG-B-485B
July 12, 1978
SUPERSEDING
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April 8, 1964

FEDERAL SPECIFICATION

BLOCK, TACKLE, WIRE ROPE, WITH SWIVEL HOOK;

(FOR CRANE USE)

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 single and multiple sheave wire rope tackle blocks with swivel hook for use with locomotive, crawler-, truck-, and wheel-mounted cranes.

1.2 Classification.

1.2.1 Sizes. Blocks shall be of the following sizes and capacities, as specified (see 6.2):

Size	Capacity
5	5-ton
10	10-ton
15	15-ton
20	20-ton
25	25-ton
35	35-ton
40	40-ton
55	55-ton
70	70-ton
75	75-ton
110	110-ton

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2. APPLICABLE DOCUMENTS

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

Federal Standards:

FED. STD. No. 123 - Marking for 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 Standards from established distribution points in their agencies.)

Military Specifications:

MIL-S-890	- Steel, Forging and Bar for Hull, Engines, and Ordnance (Heat Treated).
MIL-F-3541	- Fittings, Lubrication.
MIL-G-3859	- Grease Guns, Hand Operated, Lever, Push and Screw Type.
MIL-B-3865	- Blocks, Rope, Tackle: Packaging of.
MIL-G-10924	- Grease, Automotive and Artillery.

Military Standards:

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129	- Marking for Shipment and Storage.
MIL-STD-130	- Identification Marking of US Military Property.

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MIL-STD-271	- Nondestructive Testing Requirements for Metals.
MIL-STD-1188	- Commercial Packaging of Supplies and Equipment.

(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.)

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

E 18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials, Test for.

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

NATIONAL BUREAU OF STANDARDS (NBS)

Handbook H28 - Screw-Thread Standards for Federal Services.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, DC 20402.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE Handbook.

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Description. Each block shall consist of one or more steel sheaves, steel side plates, separator plates, swivel hook, bearings, becket, and all other parts necessary for satisfactory operation. Adequate keepers shall be provided to prevent rope from leaving sheaves and being damaged during operation.

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3.2 First article (first-produced block). The contractor shall furnish one or more blocks as specified (see 6.2) for examination and testing within the time frame specified (see 6.2) to prove prior to starting production that his production methods and choice of design detail will produce blocks that comply with the requirements of this specification. Examination and tests shall be as specified in Section 4 and shall be subject to surveillance and approval by the Government (see 6.3).

3.3 Material. Material shall be as specified herein. Materials not specified shall be selected by the contractor and shall be subject to all provisions of this specification (see 6.4).

3.4 Design. The block shall conform to Table I. The number of sheaves for Size 10 block shall be one or two, as specified (see 6.2). The design of the hook shall be based on an ultimate strength safety factor of not less than 4, and that of the block and its applicable fittings not less than 5. When subjected to the applicable proof load specified in Table I, the block, hook, and fittings shall show no evidence of deformation, distortion, cracks, breakage, or permanent set. When tested for ultimate strength, the hook shall fail at not less than 4 times the applicable safe working load (SWL) of the block, shall fail before the block and other associated fittings; and the block and fittings shall fail at not less than 5 times the applicable SWL.

TABLE I. Design characteristics

Capacity/Size (safe working load in tons)*	Proof test load in tons*	Number of sheaves	Maximum overall length (inches)	Minimum gross weight (pounds)	Minimum hook opening (inches)
5	10	1	31	100	2
10	20	1	36	150	2
10	20	2	36	200	2
15	30	1	39	300	2
20	40	2	42	430	3
25	50	3	42	500	3
35	70	3	48	575	3-1/4
40	80	3	56	900	3-1/2
55	110	3	63	1000	4
70	140	3	64	1250	4
75	150	4	65	1300	4
110	220	4	65	2000	6-1/2

* 1 ton = 2000 pounds

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3.4.1 Sheaves. Sheaves shall be of high grade medium carbon cast steel, manganese cast steel, or rolled or welded structural steel. Sheaves shall be designed for use with the wire rope size specified (see 6.2). The outside diameter of the sheave shall be not less than 18 times the diameter of the wire rope for which the sheave is designed. Sheave grooves shall be designed to give the rope a 150-degree arc of support with the sides of the groove tangent to the ends of the bottom arc. The depth of the groove shall be not less than 1.5 rope diameter. Sheave grooves shall be machined true with the sheave bore. When medium carbon cast steel or structural-type steel plate is furnished for sheaves 12 inches in diameter and larger, the sheave groove shall be hardened to a minimum of Rockwell C35 as determined by ASTM E 18. Sheave hubs shall be machined and shall be designed to bear against the side plates and separator plates except where bearings take the end thrust.

3.4.2 Sheave pin. Sheave pins shall be precision-type alloy or carbon steel shafting, turned, ground, and polished, except that when an inner bearing race is used, the sheave pin need not be polished. The pin shall be designed to transmit the load to the frame. Suitable means shall be provided to prevent rotation of the pin.

3.4.3 Swivel hook. The swivel hook shall be forged steel. The steel shall conform to any class specified in MIL-S-890 with a longitudinal elongation in 2 inches of not less than 20 percent. Unless otherwise specified (see 6.2), the hook shall be the safety type fitted with a safety latch actuated by a stainless steel or other corrosion-resistant spring. The hook shall be suspended from the block by means of a yoke or cross-head and shall swivel freely through 360 degrees with not less than the applicable safe working load specified in Table I suspended from the hook. There shall be no cracks or other discontinuities in the finished hook. The narrowest part of the hook opening shall be not less than that shown in Table I. When specified (see 6.2), the material designation and heat treatment shall be legibly stamped on the hook using combinations of the following applicable symbols and appropriate numbers:

SAE - Society of Automotive Engineers.
AISI - American Iron and Steel Institute.
TS - Tensile strength.
H - Heat with degrees given.
N - Normalized.
A - Anneal.
OQ - Oil quench.
WQ - Water quench.
AQ - Air quench.
RH - Reheat with degrees given.
FC - Furnace cool.
AC - Air cool.

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3.4.4 Bearings.

3.4.4.1 Sheave bearings. Each sheave shall be mounted on ball bearings or two rows of short roller bearings or a full roller bearing. Bearings shall have suitable retainers or seals for retention of lubricant and exclusion of foreign matter.

3.4.4.2 Swivel hook bearings. Hooks shall swivel on one or more ball or roller bearings. Bearings shall be of such size and quantity so as to permit swiveling of the applicable safe working load specified in Table I without twisting or opening up the wire rope. The bearings shall be adequately sealed for retention of lubricant and exclusion of foreign matter.

3.4.5 Becket. Each block shall be supplied with a suitable becket. The becket shall show no evidence of breakage or permanent distortion with the rope dead-ended at the becket and the applicable proof load specified in Table I suspended from the hook.

3.4.6 Cheek-plate weights. When utilized, cheek-plate weights shall be of steel or cast iron for blocks having sheaves of a 12-inch or less diameter. Plates shall be designed with recesses for boltheads and nuts.

3.4.7 Threads. Screw threads for all thread-securing or -attaching devices and threaded parts shall be in conformance with NBS Handbook H28 as follows:

(a) Machine threads shall be the standard National Coarse or Fine thread series.
(b) Pipe threads shall be the standard National Taper pipe thread series.

3.5 Lubrication. Blocks shall be lubricated with grease conforming to MIL-G-10924. Sheave and swivel hook bearings shall be provided with suitable means for lubrication. Lubrication fittings shall conform to MIL-F-3541, Type I, II, or III. Fittings shall be located in protected positions and shall be accessible to a hand-operated grease gun conforming to MIL-G-3859 with a 10-inch flexible extension. Accessibility to fittings shall be provided without the removal or adjustment of accessories or parts. Each sheave bearing shall have an independent lubricating line located within the sheave pin. The blocks shall be assembled, tested, and delivered with the above grease. The bearings shall be cleaned before lubrication, because military greases are not always compatible with other greases. A tag shall be attached in a conspicuous place to indicate that the MIL-G-10924 military grease has been used.

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3.6 Identification marking. The blocks shall be identified in accordance with MIL-STD-130. Marking shall be permanently and legibly stamped on a shell plate indicating the safe working load (swl), size of wire rope to be used with the block, and the manufacturer's code.

3.7 Treatment and painting. All metal surfaces except bearing surfaces and hooks shall be cleaned, treated, and painted in accordance with the manufacturer's standard practice, color as specified (see 6.2).

3.8 Interchangeability. All parts having the same part number shall be functionally and dimensionally interchangeable. Interchangeable parts are defined as two or more like parts possessing such functional and physical characteristics as to be equivalent in performance and durability, and capable of being exchanged one for the other without alteration of the parts themselves or of adjoining parts, except for adjustment, and without selection for fit or performance.

3.9 Workmanship.

3.9.1 Metal fabrication. Metal used in fabrication shall be free from kinks and sharp bends. The straightening of material shall be done by methods that will not cause injury to the material. Corners shall be square and true. Flame-cutting, using tips suitable for the thickness of the steel, may be employed instead of shearing and sawing. All bends shall be made with controlled means to insure uniformity of size and shape. Precaution shall be taken to avoid overheating. Heated steel shall be allowed to cool slowly. External surfaces shall be free of burrs, sharp edges, and corners, except when sharp edges or corners are required or where they are not detrimental to safety.

3.9.2 Welding. The surfaces of parts to be welded shall be free from rust, scale, paint, grease, mill scale that can be removed by chipping and wire brushing, and other foreign matter. Welds shall transmit stress without permanent deformation or failure when the parts connected by the welds are subjected to proof and service loading. Parent materials, weld filler metals, and fabrication techniques shall be as required to enable the block to conform to the examination and test requirements specified in Section 4. Parts to be joined by fillet welds shall be brought into as close contact as possible and in no event shall be separated by more than 3/16 inch unless appropriate bridging techniques are used. Unless otherwise specified (see 6.2), the welding process used in fabrication of the block shall be at the option of the contractor.

3.9.3 Bolted connections. Boltholes shall be accurately formed and shall have the burrs removed. Washers or lockwashers shall be provided where necessary. Matching thread areas securing bolts conforming to SAE J429 or

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capscrews shall be of sufficient strength to withstand the tensile strength of the bolt. All fasteners shall be correctly torqued and shall have full thread engagement. Bolts shall protrude not more than 2 full threads.

3.9.4 Riveted connections. Rivets shall fill the holes completely. The upset rivet heads shall be full, neatly made, concentric with the rivet holes, and in full contact with the surface of the member, and shall be in accordance with SAE J492.

3.9.5 Machine work. Tolerances and gages for metal fits shall conform to the limitations specified herein. When limitations are not specified herein, tolerances and gages shall conform to the contractor's standard practice.

3.9.6 Castings and forgings. All parts, components, and assemblies of the block which include castings and forgings shall be clean of harmful extraneous material such as sand, dirt, sprues, scale, and flux. Rework shall be limited to procedures which do not reduce mechanical properties or affect function.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements specified herein. Except as otherwise specified in the contract, 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 Component and material inspection. The contractor is responsible for insuring that components and materials used are manufactured, examined, and tested in accordance with referenced specifications and standards as applicable.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

(a) First-produced block inspection (see 4.3).
(b) Quality conformance inspection (see 4.4).
(c) Inspection of packaging (see 4.6).

4.3 First-produced block inspection. Prior to examination and test of the block, each hook shall be tested as specified in 4.5.2.1.

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4.3.1 Examination. The first-produced block shall be examined as specified in 4.5.1. Presence of one or more defects shall be cause for rejection.

4.3.2 Tests. The first-produced block shall be tested as specified in 4.5.2.2 through 4.5.2.5. Failure of any test shall be cause for rejection.

4.4 Quality conformance inspection.

4.4.1 Sampling. Sampling for examination and tests shall be in accordance with MIL-STD-105.

4.4.2 Examination.

4.4.2.1 Samples. Samples selected in accordance with 4.4.1 shall be examined for the defects specified in 4.5.1. AQL shall be 2.5 percent defective.

4.4.3 Tests.

4.4.3.1 Individual.

4.4.3.1.1 Hooks. Each hook shall be tested as specified in 4.5.2.1.

4.4.3.1.2 Blocks. Each block shall be tested as specified in 4.5.2.2 and 4.5.2.3.

4.4.3.2 Samples. Samples selected in accordance with 4.4.1 shall be tested as specified in 4.5.2.4.

4.5 Inspection procedure.

4.5.1 Examination. The blocks shall be examined as specified herein for the following defects:

Major

101. Material not as specified.
102. Design not as specified.
103. Components and fittings not as specified, missing, or improperly assemblied.
104. Center pin rotates in frame (shell).
105. Swivel hook not as specified, does not swivel freely when loaded, or hook opening less than specified.
106. Material designation and heat treatment identification data for hook missing, incomplete, or not legible.

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107. Threaded parts not as specified.
108. Lubrication (i.e., grease, fittings, accessibility, or grease tag) not as specified or missing.
109. Identification marking of block missing, incomplete, or not legible.
110. Treatment and painting not as specified.
111. Parts not interchangeable.
112. Workmanship not as specified.

4.5.2 Tests.

4.5.2.1 Hooks. Prior to assembly of the block, each hook shall be subjected to a magnetic particle test in accordance with MIL-STD-271. Nonconformance to 3.4.3 shall constitute failure of this test.

4.5.2.2 Proof test. Unless otherwise specified (see 6.2), each complete block shall be reeved, without using the becket, with wire rope of the size recommended for use thereon. The applicable proof test load specified in Table I shall be suspended from the hook for a period of not less than 10 minutes. The block shall then be reeved with the wire rope dead-ended at the becket and the load reapplied for not less than 10 minutes. Nonconformance to 3.4 shall constitute failure of this test.

4.5.2.3 Overload test. When specified (see 6.2), the block shall be reeved, without using the becket, and a load equal to 1-1/2 times the applicable safe working load specified in Table I suspended from the hook. The load shall then be raised and lowered not less than 20 feet at speeds selected by the manufacturer. Nonconformance to 3.4 shall constitute failure of this test.

4.5.2.4 Service test. When specified (see 6.2), the sample block shall be subjected to the following service test: With the block reeved as specified in 4.5.2.3, a load equal to the applicable safe working load specified in Table I shall be raised and lowered not less than 20 feet. The cycle shall be repeated not less than 10 times at speeds approximating those encountered in crane service. The line speed shall be not less than 120 feet per minute. The load shall be rotated through 360 degrees not less than three times. Nonconformance to 3.4 shall constitute failure of this test.

4.5.2.5 Ultimate strength. When specified (see 6.2), the first-produced block, with the applicable hook and fittings, shall be installed in a testing machine. A steadily increasing load shall be applied until failure of the hook occurs. The hook shall be removed and the block with fittings shall be further tested to destruction. Any of the following shall constitute failure of this test:

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(a) The hook fails at less than 4 times the SWL of the block.
(b) The block or the fittings fail at less than 5 times the applicable SWL.
(c) The block or the fittings fail before the hook fails.

4.6 Inspection of packaging. Inspection of packaging requirements shall be in accordance with the quality assurance provisions of applicable specifications and standards referenced in Section 5 of this specification.

5. PREPARATION FOR DELIVERY

5.1 Preservation. Preservation shall be Level A, Level C, or Commercial, as specified (see 6.2).

5.1.1 Level A. Blocks shall be preserved in accordance with MIL-B-3865, Level A.

5.1.2 Level C (civil agencies). Blocks shall be packaged in accordance with the Level C requirements of MIL-B-3865.

5.1.3 Commercial (military). Blocks shall be preserved in accordance with MIL-STD-1188.

5.2 Packing. Packing shall be Level A, B, Level C, or Commercial, as specified (see 6.2).

5.2.1 Level A. Blocks shall be packed in accordance with MIL-B-3865, Level A.

5.2.2 Level B. Blocks shall be packed in accordance with MIL-B-3865, Level B.

5.2.3 Level C (civil agencies). Blocks shall be packed in accordance with the Level C requirements of MIL-B-3865.

5.2.4 Commercial (military). Blocks shall be packed in accordance with MIL-STD-1188.

5.3 Marking.

5.3.1 Civil agencies. Marking shall be in accordance with FED. STD. No. 123.

5.3.2 Commercial packaging. Marking shall be in accordance with MIL-STD-1188.

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5.3.3 Military packaging. Marking shall be in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The blocks are intended for crane use in hoisting and hauling operations. Blocks are general purpose blocks recognized as a standard product by the crane industry.

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

(a) Title, number, and date of this specification.
(b) Size of block required; and if size 10, number of sheaves required (see 1.2.1 and 3.4).
(c) Time frame required for submission of first-produced blocks and number of blocks required (see 3.2).
(d) Wire rope size required for sheaves (see 3.4.1).
(e) When safety-type hook is not required (see 3.4.3).
(f) When material designation and heat treatment markings are required on the hook (see 3.4.3).
(g) Color required (see 3.7).
(h) When the welding process shall be other than at the option of the contractor (see 3.9.2).
(i) When proof test is not required (see 4.5.2.2).
(j) When overload test is required (see 4.5.2.3).
(k) When service test is required (see 4.5.2.4).
(l) When ultimate strength test is required (see 4.5.2.5).
(m) Degree of preservation and degree of packing required (see 5.1 and 5.2).

6.3 First-produced block. Any changes or deviations of production blocks from the approved first-produced block during production will be subject to the approval of the contracting officer. Approval of the first-produced block will not relieve the contractor of his obligation to furnish blocks conforming to this specification.

6.4 Recycling material. It is encouraged that recycled material be used when practical as long as it meets the requirements of the specification (see 3.3).

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