

MIL-H-19925D(YD)
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SUPERSEDING
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MILITARY SPECIFICATION

HOISTS, WIRE ROPE, ELECTRIC POWERED

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

1. SCOPE

1.1 This specification covers electrically powered wire rope hoists of up to 10 ton capacity.

1.2 Classification. The hoists shall be one of the following types, drives, classes, speeds, and standardized rated load capacities, as specified (see 6.2):

Type I - Trolley suspended.

Drive M - Electric motor trolley drive.

Drive G - Geared manual trolley drive.

Drive H - Hand pushed load trolley drive.

Type II - Lug suspended.

Type III - Hook suspended.

Type IV - Base mounted.

Class H1 - Standby service and infrequent use.

Class H2 - Light duty.

Class H3 - Moderate duty.

Class H4 - Heavy duty.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer (Code 156), Naval Construction Battalion Center, Port Hueneme, CA 93043, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 3950

Speed 1 - Single speed [alternating current (ac) or direct current (dc)].

Speed 2 - 2 speed, ac.

Speed 3 - Variable speed (ac or dc).

1/2 ton capacity.

1 ton capacity.

2 ton capacity.

3 ton capacity.

5 ton capacity.

7-1/2 ton capacity.

10 ton capacity.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. Unless otherwise specified (see 6.2), the following specifications and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation, form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

RR-W-410 - Wire Rope and Strand.

PPP-B-636 - Boxes, Shipping, Fiberboard.

PPP-B-1055 - Barrier Material, Waterproofed, Flexible.

PPP-T-60 - Tape, Packaging, Waterproof.

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MIL-P-116 - Preservation, Methods of.

MIL-V-173 - Varnish, Moisture- and Fungus-Resistant
(for treatment of Communications, Electronic, and
Associated Equipment).

MIL-T-22085 - Tapes, Adhesive, Preservation and Sealing.

STANDARDS

MILITARY

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

MIL-STD-794 - Parts and Equipment, Procedures for packaging of.

MIL-STD-1186 - Cushioning, Anchoring, Bracing, Blocking and
Waterproofing, with Appropriate Test Methods.

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

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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 the date of invitation for bids or request for proposal shall apply.

AMERICAN GEAR MANUFACTURERS ASSOCIATION (AGMA)

Gear Standards.

(Application for copies should be addressed to the American Gear Manufacturers Association, 1901 North Ft. Meyer Drive, Suite 1000, Arlington, VA 22209.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

B29.1 - Transmission Roller Chains and Sprocket Teeth.

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A275 - Magnetic particle Examination of Steel Forgings.
D3951 - Standard Practice For Commercial Packaging.

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

HOIST MANUFACTURERS INSTITUTE (HMI)

100 - Electric Wire Rope Hoists.

(Application for copies should be addressed to the Hoist Manufacturers Institute, 1326 Freeport Road, Pittsburgh, PA 15238.)

NATIONAL ELECTRIC MANUFACTURERS ASSOCIATION (NEMA)

ICS 1 - General Standards for Industrial Controls and Systems.
ICS 2 - Industrial Control Devices, Controllers and Assemblies.
ICS 6 - Enclosures for Industrial Controls and Systems.
MG 1 - Motors and Generators.

(Application for copies should be addressed to the National Electrical Manufacturers Association, 2101 L Street, N. W., Washington, D. C. 20037.)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

No. 70 - National Electrical Code.

(Application for copies should be addressed to the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269)

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

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Description. Hoists shall be of the grooved drum wire rope type, complete with controls and electrical power connections, and ready for immediate use after servicing. Types I, II, and III shall be of the unit packaged shelf-item type. Type IV shall be in accordance with schematic arrangement drawings (see 6.4) furnished with the contract, and shall be either a hoisting unit with envelope installation dimensions, or installed by the contractor, as directed in the contract.

3.2 First article. When specified (see 6.2) the contractor shall furnish a hoist, complete with controls and accessories for first article inspection and approval (see 4.2.1 and 6.5).

3.3 Standard commercial product. The electric powered wire rope hoist shall, as a minimum, be in accordance with the requirements of this specification and shall be the manufacturer's standard commercial product. Additional or better features which are not specifically prohibited by this specification but which are a part of the manufacturer's standard commercial product, shall be included in the hoist being furnished. A standard commercial product is a product which has been sold or is currently being offered for sale on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model.

3.4 Materials. Materials shall be as specified herein and in applicable specifications and standards, and other referenced documents. Materials not specified shall be selected by the contractor and shall be subject to all provisions of this specification. Materials shall be free of defects which adversely affect performance or serviceability of the finished product.

3.5 Interchangeability. All units of the same classification furnished with similar options under a specific contract shall be identical to the extent necessary to insure interchangeability of component parts, assemblies, accessories, and spare parts.

3.6 Performance. The class of the hoist shall be based on the frequency of its intended use with the rated load. Class shall be defined identically with HMI 100. The hoist shall be specifically designed to perform all functions specified. Electrical components including hoist motor, trolley motor and controls shall be designed to operate at the duty cycle required by the Service Classification without exceeding the temperature limits of the design in accordance with NEMA Standards MG-1 and ICS 1 and 2. Measured steady running speeds shall not vary from specified values by more than 10 percent. Response to controls shall be smooth and without jerk. Safety limit switches (see 3.8.9) shall be provided so that the load hook, either loaded or empty, shall not exceed the upper limit of travel. Brakes shall perform the functions as specified (see 3.7.3).

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3.7 Design and construction. Design shall be based on the maximum number of hours of duty cycle operation per year which can be performed without parts replacement and maintenance other than routine service, such as lubrication, brake relining, and worn rope replacement. Class H1, and H2 hoists shall be designed for a minimum service life of 200 hours; class H3 hoists of 400 hours; and class H4 hoists of 1,000 hours without major overhaul. Parts subject to replacement and service shall be readily accessible. When specified (see 6.2), hoists shall be designed for special service, such as protected indoor, all weather outdoor, hazardous dust and fumes, and extreme hot or cold working conditions.

3.7.1 Hook lift. Unless otherwise specified (see 6.2), the maximum safe vertical distance through which the load hook can travel (lift) shall be as recommended by the manufacturer for types I, II, and III, and as indicated on schematic arrangement drawings as part of the contract for type IV.

3.7.2 Speeds. Unless otherwise specified (see 6.2), the nominal rated maximum speeds of hoist shall be the manufacturer's standards within the limits of table I. For higher lifts than those tabulated, and for special uses of type IV hoists as indicated on schematic arrangement drawings, lifting and lowering speeds shall be as specified (see 6.2). Unless otherwise specified (see 6.2), type I, drive M maximum trolley travel speeds shall be the manufacturer's standard within the limits of table I. For type I trolleys to be used on monorail hoist systems, as indicated on schematic arrangement drawings, trolley speeds shall be as specified (see 6.2).

Table I. Standardized rated lifting speed ranges, and trolley travel speed ranges

Rated load capacity (tons)	Hoist lifting speed range (fpm)		Trolley travel speed range (fpm)	
	Low	High	Low	High
1/2	10	60	30	100
1	10	60	30	100
2	10	40	30	100
3	10	35	30	100
5	10	35	30	100
7-1/2	8	35	30	100
10	7	30	30	100

3.7.2.1 Speed 1. Speed 1 hoists shall be single speed, designed to attain steady rated lifting speed with rated load within the first foot of the lift.

3.7.2.2 Speed 2. Speed 2 hoists shall be two speed, with the low speed either 1/2, 1/3 or 1/4 of the maximum rated speed with rated load. The hoists shall be designed to reach steady running rated speed with rated load, in either high or low speed control, within the first foot of the lift.

3.7.2.3 Speed 3. Speed 3 hoists shall have variable speed control as specified in 3.8.1. Speed 3 hoists shall be designed to attain the rated load lifting speed for which the control is held, except in the first speed position, within the first three feet of the lift. Each stepped motion control shall provide not less than five speed points in each direction. Not less than three speed points (first, second, and last) shall be running points and the other points shall be timed automatic accelerating points.

3.7.2.4 Trolley travel speeds. Type I drive M trolleys shall be single speed. Unless otherwise specified herein, the trolley shall be designed to attain steady running speed in not less than 1 foot nor more than 5 feet of travel when carrying rated load. Trolleys with other than single speed shall be as specified herein.

3.7.3 Hoist brake. Under normal operation with rated loads, and under test conditions with 125% of rated load the hoist brake shall arrest and hold the load promptly when controls are released, it shall limit the speed of load during lowering to the maximum of 120% of the rated lowering speed for the load being handled and it shall arrest and hold the load promptly in the event of complete power failure.

3.7.3.1 Trolley brakes. Trolley brakes, when specified (see 6.2), may be actuated by mechanical, electrical, pneumatic, hydraulic, or gravity means. Brakes for stopping the motion of trolleys shall be of sufficient capacity to stop the trolley within a distance equal in length to 10 percent of the rated speed when traveling at rated speed with rated load.

3.7.3.2 Heat dissipation. All brakes shall have ample heat dissipation capacity for the frequency of operation required by the class of service.

3.7.3.3 Wear compensation. All brakes shall have provision for adjustments where necessary to compensate for wear.

3.7.4 Bearings. Bearings shall be of the ball or roller types, with life ratings in accordance with table II, based on the applicable duty cycle. Hook bearings shall be thrust type, rated for continuous operation of 10 revolutions per minute (rpm). All bearings shall be the products of manufacturers specializing in commercially standardized bearings, with Anti-Friction Bearings Manufacturers Association coded identification numbers. Design loading for all bearings shall be based on dead load, direct reactions of the hook load applied on a dead load, and torque reactions during operation with rated load.

Table II. Anti friction bearing ratings

Class	*Minimal B-10-life rating (hours)
H1	1250
H2	2500
H3	5000
H4	10000

*Bearing loads for life computation purposes will be determined using a mean effective load factor of 0.65.

3.7.5 Gearing. All gears shall be designed to meet the standards of the AGMA with strength horsepower rating equal to or exceeding the motor horsepower rating of the hoist.

3.7.6 Wire rope. The wire rope shall be adequate for the speeds, lift range, capacity, and duty class of the hoist. The static load stress shall not exceed 20 percent of the nominal breaking strength of the rope. The wire rope shall conform to the requirements of RR-W-410. When specified (see 6.2), the wire rope shall be in accordance with RR-W-410, type I, class 3, 6 by 37 for general hoist use. The rope ends shall be attached to the hoist in a manner to prevent disengagement throughout rated hook travel.

3.7.7 Rope drums and sheaves. Rope drums shall be grooved with edges rounded to minimize wear on the rope. The cross-sectional radius at the bottom of the groove shall form a close fitting saddle for the size of rope used. Flanges or other means shall be provided to guard against jamming of the rope. Drums shall be proportioned to store all the rope required for the lift in one layer on the drum, with not less than two wraps of rope remaining on the drum when the hook is in the lowest elevation of the lift range. When a lower limit device is provided, no less than one wrap shall remain in each anchorage of the hoist drum. Minimum drum and sheave pitch diameters shall be in accordance with table III for the applicable class.

Table III. Minimum drum and sheave pitch diameter (rope diameter units)

Class	Drums	Running Sheaves	Equalizer Sheaves
All classes (H1 through H4)	18	16	12

Unless otherwise specified (see 6.2), rope drums shall be right-hand and left-hand grooved for true vertical lift. Sheaves shall be of steel, nodular or ductile cast iron, or gray cast iron, and shall have contoured rope grooves concentric with the axle. Grooves shall have a uniform roughness not greater than 200 microinches. Sheaves shall be fitted with bearings.

3.7.8 Load block and hook. The block shall be an enclosed safety type with sheave protection to guard against rope jamming during normal operating conditions. The hook shall be plain or equipped with a latch to bridge the throat opening, as specified (see 6.2). The hook shall be of drop forged steel, designed for the rated load capacity of the hoist. The hook shall be suspended by the block through a shielded ball or roller thrust bearing designed to swivel freely through 360 degrees of rotation with the rated load hook. All hooks shall be magnetic-particle inspected over the entire area in accordance with ASTM A275.

3.8 Electrical design. The hoist motor, and the drive M trolley motor, when applicable, shall operate on the same electrical current characteristics from the same control station circuit. Hoists shall be designed to operate on dc at the voltage as specified (see 6.2), or on ac at the voltage, frequency, and phase, as specified (see 6.2). The design for wiring, insulation, allowable voltage drop, current collectors, control, overcurrent protection, and grounding shall be in accordance with NFPA No. 70, as applicable, and as specified herein.

3.8.1 Hoist and trolley motors. Speed 1 and speed 2 ac hoists shall be designed for operation with a motor designed for hoisting services. Speed 3 ac hoist shall be designed for operation with variable speed motor. Hoist and trolley motors shall conform to NEMA standard MG1 and the following:

- a. Motor mounting, shaft, and key dimensions shall conform to the hoist manufacturer's standard.
- b. Temperature rise shall be in accordance with NEMA Standard MG1, for the motor type and insulation used.
- c. Enclosure: totally enclosed.
- d. Maximum rated speed: 3600 rpm (nominal).
- e. Bearings: ball or roller.
- f. Insulation: NEMA Standard MG1, part 1, class A, B, F, or H.
- g. Time temperature ratings: Classes H1, H2, H3, 30 minutes. Class H4, adequate for continuous cycle operation, but not less than 30 minutes. The manufacturers shall certify the motors to be rated at not less than 30 minutes, based on test record, in accordance with NEMA Standard MG-1, as applicable.

3.8.2 Resistors. Resistors, when furnished, shall be in accordance with the applicable class ratings as specified in NEMA Standard ICS, part 2-213.

3.8.3 Controllers. Controllers shall be provided with a definite purpose contactor specifically rated for crane and hoist service. Contactor application shall not exceed the contactor manufacturer's published ratings. Controllers shall be enclosed in enclosures conforming to NEMA Standard ICS 6-110, type as applicable to the hoist characteristics and use. When resistors are mounted in the same enclosure as controllers, the air circulation by natural convection, or a ventilated type of enclosure shall be provided.

3.8.4 Pendant pushbutton control station. Controls shall be pushbutton operated and fully enclosed in a metal, shock resistant plastic, or neoprene case with rounded corners. Unless otherwise specified (see 6.2), the control station shall be suspended from the hoist by a chain or stranded wire strain lead which shall support the weight of the control station and the operator imposed load. Control stations shall carry not more than 125 volts ac or 250 volts dc. Pushbutton control stations for type I drive M hoists shall be legibly and permanently marked, and shall be vertically arranged in the following top to bottom grouped order: STOP-START (OFF-ON, POWER OFF-POWER ON), HOIST, TROLLEY, or any other functions as required. The STOP (OFF, POWER OFF) control actuator shall be red. The reset and stop control shall be connected to the main line contactor. When specified (see 6.2), a light to indicate that power is available shall be furnished as an integral part of the pushbutton case. Controls for weatherproof hoists shall conform to NEMA Standard ICS 6-110, type 3R, with access cover.

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3.8.5 Fixed control station. Fixed control stations shall be located as indicated on schematic arrangement drawings, when provided. When location is not indicated, the type IV hoist control station shall be suitable for surface mounting. When specified (see 6.2), dual control stations shall be provided. Control stations shall be mounted in NEMA Standard ICS 6-110 for type I enclosures for indoor installations, and type 3R enclosures for outdoor installations.

3.8.6 Wiring. Wiring and insulation shall be in accordance with NFPA No. 70. Power conductor sizes shall conform to the short-time duty rating of NFPA No. 70. Voltage drop from runway collectors to any motor shall not exceed 4 percent. Wiring shall be stranded copper except within integral pieces of equipment. Flexible leads used for weatherproof hoists shall either be enclosed in moistureproof flexible metal conduit, polyvinyl plastic or neoprene jacketed electric cable.

3.8.7 Current collectors. Current collectors for type I hoists shall be of the sliding shoe type, festoon type, or reel type, as specified (see 6.2). Festoon and reel type current collectors shall be as indicated on schematic arrangement drawings. Type II and III hoists used in fixed locations and all type IV hoists shall be directly connected to the power supply. Current collectors on type I drive M hoists shall be arranged either in accordance with the manufacturer's standard pattern and adjustment range, or prespaced as indicated on schematic arrangement drawings when furnished with the contract. Complete illustrations covering pattern, cross section, adjustment range, and dimensional fit between current collectors and conductor bus bars shall be furnished with the manufacturer's standard pattern when schematic arrangement drawings are not furnished with the contract.

Contact conductor system collector shoes shall be used for heavier loads. Totally enclosed insulated conductors shall be furnished. Sliding shoes shall be of graphited bronze or bronze with graphite inserts. Current collectors shall have adequate current-carrying capacity for the 30 minute rated loads of all motors.

3.8.8 Undervoltage and overload protection. Each hoist shall be provided with undervoltage and running overload protection in accordance with NFPA No. 70. Protection shall be provided as applicable to the control. Main line magnetic contactor incorporating undervoltage protection and main overcurrent protection shall be provided. Thermal overload protection shall be provided for each phase of a 3-phase motor. Operation of any protective device shall stop affected motions.

3.8.9 Limit switches. For type I, II, and III hoists, upper limit switches shall be provided. The upper limit switch shall be arranged to stop the hoist motor and apply the motor brake when the hook reaches its upper limit of travel. Unless otherwise specified (see 6.2), type IV hoists shall be provided with drum rotation oriented for upper and lower limit switches. When specified (see 6.2), a lower limit shall be provided for Type I, II, and III hoists.

3.9 Type I, trolley suspended hoist. The type I hoist shall be complete with controls as applicable to the class and drive, and contact current collectors and electrical connections as required for operation, as specified (see 6.2), and as otherwise indicated on schematic arrangement drawings.

Control stations shall be pendant pushbutton suspended from the hoist or crane bridge, fixed and installed as indicated on schematic arrangement drawings, or both, as specified (see 6.2). The reach of the pushbutton control station, measured as the distance from the underside of the track beam to the top control button(s), shall be as specified (see 6.2). Headroom as measured by the distance between the underside of the track beam and the saddle of the hook in the highest elevation, shall be as indicated on schematic arrangement drawings, or as specified (see 6.2). The hoist shall be suspended from the trolley with the long horizontal dimension either parallel to, or perpendicular to the track beam, as specified (see 6.2), or as indicated on schematic arrangement drawings, to provide travel side clearances.

3.9.1 Drive M, electric motor trolley drive. Drive M trolley shall incorporate not less than two pairs of opposed wheels, with not less than two driving wheels arranged to travel without twist, in alignment with the track beam. Class H1, H2, and H3 trolleys may be driven one side only. Class H4 trolleys shall be driven from both sides. The trolley shall be driven by the load bearing trolley wheels, or by a spring loaded drive wheel bearing against the underside of the track beam and centrally rotating in the plane of the track beam web.

Drive wheels shall be directly geared to the motor, or propelled by roller chain in accordance with ANSI Standard B29.1. When specified (see 6.2), the spring loaded driving wheel shall be equipped with a pneumatic or semipneumatic rubber tire. When the spring tension is set for capacity load drive, the tire shall drive the trolley without slippage. When specified (see 6.2), the trolley wheels shall have an adjustment provision for alternative use with various width beams of the same type, or for a curvature radius range when used on monorail trackage as indicated on schematic arrangement drawings.

3.9.1.1 Trolley tractive effort. The tractive effort shall be sufficient to operate the trolley without slippage under rated load conditions.

3.9.1.2 Wheel loading. The individual trolley wheel design load shall be the gross weight of the trolley, hoist, reeving, and rated load divided by the total number of trolley supporting wheels. When a spring loaded drive wheel bearing on the bottom surface of the track beam is integral with the load carrying trolley, the pressure of the driving wheel(s) shall be included in the gross load for calculation purposes.

3.9.1.3 Wheel construction. Trolley wheels shall be designed to run on the beam or track as specified (see 6.2). Convex section trolley wheels shall be so designed that bearing points are midway between the wheel face and the wheel flange. Trolley wheels may be fabricated from cast iron, ductile iron, forged, wrought, rolled to shape, or machined steel as required for the type, class, and speed specified herein. The treads of all wheels on the same trolley shall have a uniform wearing surface hardness. Unless otherwise specified, the Brinell hardness number shall be not less than 225 (see 6.2).

3.9.1.4 Trolley bumpers. When specified (see 6.2), drive M trolleys shall be equipped with bumpers. The bumpers shall be aligned as indicated on schematic arrangement drawings.

3.9.2 Drive G, geared manual trolley drive. The drive G trolley drive wheel or wheels shall be connected by a gear or roller chain drive with a slotted or chain link contoured drive pulley. A hand operated drive chain, and chain guide or guard to insure engagement with the pulley shall be provided. The reach, as measured by the distance from the lowest link of the hand chain to the bottom face of the track beam shall be as specified (see 6.2). Traversing effort applied to the drive chain to move the trolley on a straight and level track beam shall not exceed 65 pounds of rated load to start, and 1 pound for each 300 pounds of rated load to traverse.

3.9.3 Drive H, hand pushed load type trolley drive. Drive H trolleys shall have four ball or roller bearing wheels, and shall be self centering and self aligning with rated load on the track beam. The trolley wheels shall be of adequate size to roll smoothly without jerk or chatter when transporting a hoist with a hand pushed rated load. When specified (see 6.2), a trolley brake or locking device with pull chain control shall be provided. The chain shall have a reach or length from the underside of the track beam to the lower tip of the chain, as specified (see 6.2).

3.9.4 Design stresses. The hoist and the means of suspension supplied with the hoist shall be designed to withstand all stresses imposed under normal operating conditions while handling loads within the rated load range. Load suspension parts shall be designed so that the static stress calculated for the rated load shall not exceed 20 percent of the average ultimate material strength. Elements specifically provided to give a visual warning of severe overload by structural deformation shall be designed so that the static stress calculated for the rated load shall not exceed 35 percent of the average ultimate strength. Power transmission parts shall be designed so that the dynamic stresses calculated for the rated load shall not exceed the fatigue and endurance limit established by the manufacturer.

3.10 Type II, lug suspended hoist. The type II hoist shall be provided with drilled lugs on top for suspension by bolts or pins. The headroom, as measured by the distance between the centerline of the supporting pin or bolt and the saddle of the hook in maximum elevation position, shall be as specified (see 6.2). Lift and control details shall be as specified (see 6.2), and as otherwise indicated on schematic arrangement drawings.

3.11 Type III, hook suspended hoist. The type III hoist shall be provided with an inverted top mounted hook(s), designed to support the hoist with rated load, plus the deceleration load of stopping by automatic mechanical load lowering brake on shutoff of power during rated speed lift. The headroom, measured as the distance between the saddles of the opposing hooks, shall be the manufacturer's standard. The electrical power supply characteristics on which the type III hoist shall operate shall be as specified (see 6.2). A power supply cable connection, and a pushbutton control station with a reach as measured from the upper hook saddle to the top button(s) on the pendant control case, shall be as specified (see 6.2).

3.12 Type IV, base mounted hoist. The type IV hoist shall be either a complete unit with mounting and installation drawings, and assembly and servicing instructions; or a separate hoist, control panel, and control station for remote installation complete with site assembly and installation instructions as specified (see 6.2). When specified (see 6.2), the type IV

hoist shall be erected, serviced, and checked for proper operation on the bridge crane or at the fixed site of operation as shown on the schematic arrangement drawings. The electrical characteristics, connectors, controls, lift, and clearances shall be as specified (see 6.2), and as shown on schematic arrangement drawings.

3.13 Treatment and painting. Unless otherwise specified (see 6.2), the hoist shall be treated and painted in accordance with the manufacturer's standard practice. All surfaces of the hoist other than corrosion-resisting steel shall be protected against corrosion and present a neat appearance, except hook(s), wire rope, and wheel treads shall not be painted.

3.14 Fungus resistance. When specified (see 6.2), electrical components and circuit elements, including terminal and circuit connections, shall be coated with varnish conforming to MIL-V-173, except that:

- a. Components and elements inherently inert to fungi or in hermetically sealed enclosures need not be coated.
- b. Current-carrying contact surfaces, such as relay contact points, shall not be coated.

3.15 Identification marking. Unless otherwise specified (see 6.2), identification shall be permanently and legibly marked directly on the hoist at the source of manufacture. Identification shall include the manufacturer's model and serial number, name and trademark to be readily identifiable to the manufacturer.

3.16 Instruction plates. A complete electrical schematic diagram, complete lubrication chart and safety warnings and other information normally furnished by the manufacturer shall be furnished. They may be printed or encapsulated plastic, etched plastic or metal, or engraved plastic or metal and shall be legible and durable.

3.17 Lubrication. Unless otherwise specified, (see 6.2), means for lubrication shall be provided for all moving parts requiring lubrication. Pressure lubrication fittings shall not be used where normal lubricating pressure may damage grease seals or other parts, unless pressure relief is provided. The hoist shall be lubricated prior to delivery, and conspicuously tagged to identify the lubricants used and their temperature range. Enclosed reduction gearing and automatic mechanical load lowering brakes shall be lubricated in an oil bath and provided with a means for checking the oil level, filling and draining. Gear reduction at trolley wheels for hoists of class H1, H2, and H3, of open design, may be grease lubricated. No lubricant shall be permitted to contact motor windings. Exposed bearings, except tapered roller bearings, shall be fitted with dust-tight seals. The lubricating points shall be easily visible and accessible.

3.18 Workmanship. Workmanship shall be in accordance with the best standard practices of the hoist industry. Hoist installations, when required in the contract as indicated on schematic arrangement drawings, shall be consistent with the location where installed, and acceptable to the contracting officer.

3.18.1 Steel fabrication. The steel used in fabrication shall be free from kinks, sharp bends, and other conditions which would be deleterious to the finished product. Manufacturing processes shall not reduce the strength

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of the steel to value less than intended by the design. Manufacturing processes shall be done neatly and accurately. All bends shall be made by controlled means to insure uniformity of size and shape.

3.18.2 Bolted connections. Boltholes shall be accurately punched or drilled and shall have the burrs removed. Washers or lockwashers shall be provided in accordance with good commercial practice, and all bolts, nuts, and screws shall be tight.

3.18.3 Riveted connections. Rivet holes shall be accurately punched or drilled and shall have the burrs removed. Rivets shall be driven with pressure tools and shall completely fill the holes. Rivet heads, when not countersunk or flattened, shall be of approved shape and of uniform size for the same diameter of rivet. Rivet heads shall be full, neatly made, concentric with the rivet holes, and in full contact with the surface of the member.

3.18.4 Welding. Welding procedures shall be in accordance with a nationally recognized welding code. The surface of parts to be welded shall be free from rust, scale, paint, grease, or other foreign matter. Welds shall be of sufficient size and shape to develop the strength to resist the forces imposed at rated load. Welds shall transmit stress without permanent deformation or failure when the parts connected by the weld are subjected to proof and service loadings.

3.18.5 Castings. All castings shall be sound and free from patching, misplaced coring, warping, or other defect which reduces the castings ability to perform its intended function.

4. QUALITY ASSURANCE PROVISIONS

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

4.1.1 Component and material inspection. Components and materials shall be inspected in accordance with all the requirements specified herein and in applicable referenced documents.

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

- a. First article inspection (see 4.2.1).
- b. Quality conformance inspection (see 4.2.2).

4.2.1 First article inspection. The first article inspection shall be performed on one hoist when a first article is required (see 3.2 and 6.2). This inspection shall include the examination of 4.3 and the tests of 4.4.2. The first article may be either a first production item or a standard production item from the supplier's current inventory, provided the item meets the requirements of the specification and is representative of the design, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract.

4.2.2 Quality conformance inspection. The quality conformance inspection shall include the examination of 4.3, the tests of 4.4.1, and the packaging inspection of 4.5.

4.3 Examination. Each hoist shall be examined for compliance with the requirements specified in section 3 of this specification. Any redesign or modification of the contractor's standard product to comply with specified requirements, or any necessary redesign or modification following failure to meet specified requirements shall receive particular attention for adequacy and suitability. This element of inspection shall encompass all visual examinations and dimensional measurements. Noncompliance with any specified requirements or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection. A defect for the magnetic particle inspection in 3.7.8 is defined as a linear indication that is greater than 1/8 inch long whose length is equal to or greater than three times its width.

4.4 Tests. Production hoists shall be tested in accordance with 4.4.1. First article hoists (see 3.2) shall be tested in accordance with 4.4.2.

4.4.1 Production hoist tests. Unless otherwise specified (see 6.2), all production hoists shall be tested with real or simulated load equal to 125 percent of rated load for smooth performance of all controlled powered and braking motions and speeds for the hoist to demonstrate the ability of the trolley to move. Unloaded trolleys may be operated to demonstrate conformance to speed requirements. Not less than one out of each ten production hoists shall have rated load speed measurements to determine deviations from the designed speed ratings. Evidence of failure, permanent deformation, or excessive wear of parts shall be cause for rejection.

4.4.2 First article hoist tests. First article hoists shall be tested with 125 percent of the rated load to determine holding security of all braking systems, and capacity to withstand proof test loading without damage. When specified (see 6.2), the ability of the hoist to conform to NEMA standards MG1 and ICS for temperature rise in the hoist motors, trolley motors, or controls shall be demonstrated. Rough and noisy operation, poor and unsafe response to controls, and failure of parts shall be cause for rejection.

4.5 Packaging inspection. The preservation, packing, and marking of the item shall be inspected to verify conformance to the requirements of section 5.

5. PACKAGING

5.1 Preservation. Preservation shall be level A or C as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Methods of preservation. Cleaning processes, drying procedures, preservatives, and methods of preservation specified in the following paragraphs are listed in MIL-P-116 and shall conform to the requirements of MIL-P-116 and any applicable specifications.

5.1.1.2 Disassembly. Disassembly shall be the minimum necessary to protect parts subject to damage or loss, and to accomplish reduction in cube. Removed bolts, nuts, pins, screws, and washers shall be reinstalled in mating parts and secured to prevent their loss.

5.1.1.3 Matchmarking. Parts removed and mating parts on the equipment and attachments shall be matchmarked to facilitate reassembly. Parts and accessories removed, and mating parts on the equipment, shall be identified with weatherproof tags attached to matching parts and locations. Markings shall be applied to the tags with waterproof material.

5.1.1.4 Cleaning and drying. Prior to application of preservative compounds or paint, surfaces shall be cleaned by process C-1 and dried by any applicable procedure of MIL-P-116.

5.1.1.5 Unprotected surfaces. Unprotected exterior metal surfaces requiring application of a contact preservative in accordance with MIL-P-116 and not specifically provided for herein shall be preserved with P-1.

5.1.1.6 Hoist and trolley. All openings in the hoist and trolley shall be sealed with tape conforming to PPP-T-60, class IV, or MIL-T-22085, type II, or covered with barrier material conforming to PPP-B-1055, class E-1 or E-2, secured in place with tape as specified herein.

5.1.1.7 Electric motors and controls. All openings in electric motors and any openings in electric controls not detached from the hoist, shall be sealed with tape conforming to PPP-T-60, class IV or MIL-T-22085, type II. Detached electrical controls shall be preserved in accordance with MIL-P-116, method 1A.

5.1.1.8 Enclosed gears. Enclosed gears shall be filled to the operating level with the approved lubricant required for operation. The gear housing shall be identified with a weatherproof tag to indicate "The housing is filled to the operating level with lubricant required for operation. Do not drain until first required lubrication change." Markings shall be applied to the tags with a waterproof material. The tags shall be attached in a conspicuous location.

5.1.1.9 Technical publications. Technical publications for each piece of equipment shall be preserved in accordance with MIL-P-116, IC-1 or IC-3.

5.1.1.10 Repair parts. The preservative application criteria and applicable methods of preservation of MIL-P-116 shall be used to preserve repair parts.

5.1.1.11 Consolidation. Repair parts and publications for each hoist shall be consolidated in containers conforming to PPP-B-636, class weather-resistant. Contents shall be cushioned, blocked, and braced to prevent movement in accordance with MIL-STD-1186.

5.1.2 Level C. The hoists shall be packaged in accordance with ASTM D3951.

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

5.2.1 Levels A and B. Packing shall be in accordance with MIL-STD-794. Containers shall be selected from Table I for the appropriate level. Only closed containers shall be used.

5.2.2 Level C. The hoists shall be packed in accordance with ASTM D3951.

5.3 Marking. Marking shall be in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The hoists covered by this specification may be used on trestles, jib cranes, overhead traveling cranes, and monorail track beam systems for a variety of traveling hoist applications; and in fixed locations as a functional hoisting unit in a shop building location; or as an auxiliary hoist in a traveling bridge crane where one or more small hoists of capacities up to 10 tons are required to supplement the operations of the main hoist of the crane. Type I, drive M trolleys have extensive monorail track beam system applications. Drives G and H are used in local shop work. Type II, III, and IV hoists have fixed hoisting unit applications.

6.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type, drive when applicable, class, speed, and capacity hoist required. (see 1.2)
- c. When first article is required for inspection and approval (see 3.2 and 4.2.1).
- d. Environmental or special service for which the hoist shall be designed (see 3.7).
- e. If the hook lift is other than specified (see 3.7.1).
- f. Hook and trolley travel speeds required (see 3.7.2).
- g. When wire rope shall be other than as specified (see 3.7.6).
- h. If rope drums shall be other than right handed and left handed grooved for true vertical lift (see 3.7.7).
- i. Type of hook required (see 3.7.8).
- j. Whether the hoist shall operate on dc or ac, and the voltage, frequency, and phase of the electrical power supply (see 3.8).
- k. When a power supply indicating light is required on the pushbutton control station (see 3.8.4).
- l. When dual control stations are required (see 3.8.5).
- m. If control station shall be suspended other than specified (see 3.8.4).
- n. Type of current collector required (see 3.8.7).
- o. When drum oriented limit switch is required (see 3.8.9).
- p. When a lower limit switch is required (see 3.8.9).
- q. Type of trolley drive, control station(s), and electrical connections required (see 3.9).
- r. Reach of pushbutton control station (see 3.9).
- s. Headroom required for type I hoist (see 3.9).
- t. Whether the type I hoist shall be suspended with its long dimension at 90 degrees, or parallel to the track beam (see 3.9).

- u. When the spring loaded drive wheel shall be rubber tired, and trolley wheel adjustment provisions (see 3.9.1).
- v. Track beam section or track on which trolley wheels shall be designed to run (see 3.9.1.3).
- w. If Brinell hardness is other than specified (see 3.9.1.3).
- x. When trolley bumpers are required (see 3.9.1.4).
- y. Reach of drive G drive train (see 3.9.2).
- z. When drive H trolley shall have a brake or locking device and the reach of the control chain required (see 3.9.3).
- aa. Headroom for type II hoist (see 3.10).
- bb. Lift and controls required for type II hoist (see 3.10).
- cc. Electrical power characteristics, length of pushbutton control station strain lead, and lift required for type III hoist (see 3.11).
- dd. Whether the type IV hoist shall be a unit or an assembly; when the type IV hoist shall be installed by the contractor; the electrical characteristics, controls, and the lift required (see 3.12).
- ee. When treatment and painting shall be other than as specified (see 3.13).
- ff. When fungus resistance treatment is required (see 3.14).
- gg. If identification marking is other than specified (see 3.15).
- hh. If lubrication is other than specified (see 3.17).
- ii. When temperature rise is to be demonstrated (see 4.4.2).
- jj. Level of preservation and level of packing required (see 5.1 and 5.2).

6.3 Data requirements. When this specification is used in an acquisition which incorporates a DD form 1423, Contract Data Requirements List (CDRL) and invokes the provisions of paragraph 7-104.9(n) of the Defense Acquisition Regulations (DAR), the data requirements will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL (DD Form 1423) incorporated into the contract. When the provisions of DAR 7-104.9(n) are not invoked, the data shall be delivered in accordance with the contract requirements.

6.4 Schematic arrangement drawings. When hoist characteristics require delineation for adequate description, the acquisition documents should include detailed schematic arrangement drawings covering not less than the following:

- a. Hook travel range for type IV hoist (see 3.7.1).
- b. Monorail hoist track beam systems, when applicable (see 3.7.2).
- c. Extra long lifts where speeds for type IV hoist differ from table I (see 3.7.2).
- d. Location of type IV control station and wiring layout (see 3.8.5).
- e. Dimensional pattern and details of fit between type I drive M hoist current collectors and conductor bus bars (see 3.8.7).
- f. Details for reach and support or reel and festoon type current collectors when furnished with the hoist (see 3.8.7).
- g. Details of trolley suspension, control station strain lead reach, clearances, trolley wheel adjustment provisions, controls and electrical connections, as applicable (see 3.9).
- h. Details of special type I hoist headroom conditions when required (see 3.9).
- i. Details for alignment of trolley bumpers (see 3.9.1.4).

- j. Lift, control, and pin support requirement details when applicable for type II hoist (see 3.10).
- k. List of parts, details of location, range of operation, clearance pattern details, and details for installation and connection for type IV hoists (see 3.12).

6.5 First article. When a first article inspection is required, the item will be tested and should be a first production item or it may be a standard production item from the contractor's current inventory as specified in 4.2.1. The first article should consist of one hoist. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

6.6 Cross-reference. The following changes including deletions and revisions and additions to the classification system have been made.

MIL-H-19925C(YD)

Class A1 - Standby Service.
Class A2 - Infrequent use.
Class B - Light Duty.
Class C - Moderate duty.
Class D - Heavy duty.

MIL-H-19925D(YD)

H1 - Infrequent or Standby.
H1 - Infrequent or Standby.
H2 - Light.
H3 - Standard.
H4 - Heavy.

6.7 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

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(Project 3950-0249)

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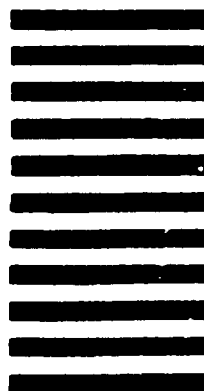
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1. DOCUMENT NUMBER MIL-H-19925D(YD)	2. DOCUMENT TITLE HOISTS, WIRE ROPE, ELECTRIC POWERED
3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION (Mark one) <input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify): _____
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