

MIL-H-2813A**28 MARCH 1956****SUPERSEDING****MIL-H-2813****1 OCTOBER 1951****MILITARY SPECIFICATION****HOISTS, CHAIN AND WIRE ROPE, PNEUMATIC**

This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.

1. SCOPE

1.1 Scope.—This specification covers pneumatic hoists for effective operation on compressed air lines at all pressures between 80 and 100 pounds per square inch, inclusive. The hoists shall be capable of lifting and lowering any load within their rated capacity.

1.2 Classification.—Pneumatic hoists shall be of the following types and classes as specified (see 6.2):

Class 1—Steel, conventional weight.

Class 2—Steel, aluminum alloy, lightweight.

Type A—Hook suspension.

Type B—Plain-trolley suspension.

Type C—Geared-trolley (hand operated).

Type D—Geared-trolley (air-motor operated).

2. APPLICABLE DOCUMENTS

2.1 The following specifications and standards, of the issue in effect on date of invitation for bids, form a part of this specification:

SPECIFICATIONS**FEDERAL**

FF-B-171	— Bearing, Ball, Annular (General Purpose).
FF-B-185	— Bearings, Roller, Cylindrical; and Bearings, Roller, Self-Aligning.
NN-B-621	— Boxes; Wood, Nailed and Lock-Corner.
QQ-I-652	— Iron Castings, Gray.
QQ-I-666	— Iron Castings, Malleable.
QQ-P-416	— Plating; Cadmium (Electrodeposited).
QQ-Z-325	— Zinc Plating (Electrodeposited).
PPP-B-601	— Boxes; Wood Cleated-Plywood.

FED. SUP. CLASS. 3950

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- JAN-P-100 — Packaging and Packing for Overseas Shipment — General Specification.
- JAN-P-106 — Packaging and Packing for Overseas Shipment — Boxes; Wood Nailed.
- MIL-P-116 — Preservation; Methods, of.
- JAN-P-125 — Packaging and Packing for Overseas Shipment — Barrier-Materials, Waterproof, Flexible.
- MIL-S-890 — Steel: Forgings and Bars for Hulls, Engines and Ordnance (Heat Treated).
- MIL-C-3769 — Crates, Intermediate, Sheathed, Wood, Nailed (for Maximum Net Loads of 3000 Pounds).
- MIL-I-10547 — Liners, Case, Waterproof.
- MIL-S-15083 — Steel; Castings.
- MIL-I-17166 — Iron Castings: Nodular Graphitic (Ductile Iron) (for Shipboard Applications).
- MIL-Z-17871 — Zinc Coating (Hot-Dip Galvanizing).
- MIL-S-20140 — Steel; Forgings for Welding.

STANDARDS**MILITARY**

- 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 U. S. Military Property.

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

2.2 Other publications.—The following documents form a part of this specification. Unless otherwise indicated the issue in effect on date of invitation for bids shall apply.

AMERICAN GEAR MANUFACTURER'S ASSOCIATION PUBLICATION

Std-231.01—Gear Tolerances and Inspection.

(Application for copies should be addressed to the American Gear Manufacturer's Association, Empire Building, Pittsburgh 22, Pa.)

CONSOLIDATED CLASSIFICATION COMMITTEE
Consolidated Freight Classification Rules.

(Application for copies should be addressed to the Consolidated Classification Committee, 202 Chicago Union Station, Chicago 6, Ill.)

3. REQUIREMENTS

3.1 Materials.—The materials shall be as hereinafter specified. Materials not definitely specified shall be of the quality best suited for the purpose intended.

3.1.1 Use of malleable or nodular iron or high strength gray iron castings will be acceptable, but such use shall be restricted to non-load sustaining parts. If used, malleable iron shall conform to Specification QQ-I-666, nodular iron to Specification MIL-I-17166, and gray iron castings to Specification QQ-I-652.

3.1.2 Steel castings shall be in accordance with Specification MIL-S-15083.

3.1.3 Steel forgings shall be in accordance with Specification MIL-S-20140 or Specification MIL-S-890.

3.1.4 All ball or roller bearings used shall be in accordance with Specification FF-B-171 and FF-B-185 as applicable.

3.2 Design.

3.2.1 *General.*—The pneumatic hoists shall be simple and compact in construction, reliable in operation, and shall be designed in accordance with the best modern practice. They shall operate satisfactorily under low temperature conditions. The hoists shall be capable of lifting and lowering any load within their rated capacity without jerks, jars, or vibration. The hoists shall be properly adjusted, balanced and free from excessive noise in operation. All working parts of the hoists shall be properly housed and enclosed so as not to be affected by dust, dirt or exposure to the weather. The hoists shall be composed primarily of a frame or housing, an air motor, gear train from motor to hoisting drum, brake, throttle control, cable drum, load block, cable, bottom hook, and a top hook or trolley. All wearing parts shall be readily accessible for replacement. All parts of the same type, class and make of hoist shall be interchangeable.

3.2.2 *Factor of safety.*—All hoist parts shall be designed so that stresses under normal full-load condition shall not exceed 35 percent of the minimum yield point of the material used and, in parts subject to shock loading, stresses shall not exceed 25 percent of the minimum yield point of the material.

3.2.3 *Frame or housing.*—The frame or housing shall be made of steel or aluminum alloy, designed for maximum strength and rigidity. It shall contain the hoisting drum with gears compactly mounted, and the air motor held securely in position. The maximum overall dimensions shall not exceed the dimensions specified (see 6.2).

3.2.4 *Motor.*—The motor shall be of the rotary vane, or counterbalanced piston type, reversible, of adequate power and high starting torque. It shall operate without percepti-

ble vibration at any load or speed within the rated capacity of the hoist.

3.2.5 *Control.*—The hoist motor shall be controlled by a self-seating valve connected to an operating lever which may be activated by remote control devices or by hand chains of suitable length which shall be properly attached to the hoists. The speed of the motor shall be regulated by the valve opening. The valve shall be fitted with a self centering device which shall automatically restore the valve to the closed position when the hand chains are released.

3.2.6 *Gears.*—All gears used shall be of spur, helical or worm type. Gears shall be manufactured and accurately cut in accordance with American Gear Manufacturers Association practice.

3.2.7 *Bearings.*—The load shaft shall be supported in high grade anti-friction ball or roller bearings as applicable. Other bearings shall be of the bronze bushed, and ball or roller bearing type.

3.2.8 *Hoist brake.*—The brake shall be so designed that it will be applied automatically when the motor stops, and shall hold the load positively at any position, should the air supply to the motor be cut off. In addition to stopping and safely holding 150 percent of rated load of the hoist, the brake shall be capable of holding a static load equal to 200 percent of rating of the hoist.

3.2.9 *Lubrication.*—Means shall be provided for lubrication of all moving parts of the hoist and trolley. Arrangement for lubrication shall be such as to require infrequent attention.

3.2.10 *Automatic stops.*—An automatic stop shall be provided which shall prevent over-run in the hoisting direction of the load block. A lower limit stop shall also be provided which shall automatically stop the hoist when the bottom hook has been lowered to its lowest permissible position.

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3.2.11 Cable drum.—The cable drum shall have machine-cut grooves and rounded corners. The drum shall be fitted on each end with flanges to prevent cable jamming, and shall have protected top and sides. The drum diameter shall be not less than 20 times the diameter of the cable used except that for extra flexible cable, the diameter of the drum may be 15 times the diameter of the cable.

3.2.12 Cable load block.—The cable load block shall have housing and load sheave made of steel, with bottom hook made of forged steel, and mounted on ball or roller thrust bearings at its lower end. The housing shall shroud the load sheave as a protection to the operator. The sheave shall be mounted on a steel axle of substantial design and means shall be provided for ample lubrication between the sheave and the axle at all times.

3.2.13 Cable.—The cable, where used, shall be of the best quality flexible crucible or open-hearth steel hoisting cable of sufficient size to provide a factor of safety of 5 based on ultimate strength of the material used.

3.2.14 Bottom blocks.—Bottom blocks shall be of the enclosed safety type, constructed of steel, with rounded corners, and protecting the bottom sheave or sheaves.

3.2.15 Chains.—Both load and hand chains, where used, shall be free from scale or burrs at the welds. Each link shall be of uniform size and shape so as to fit the seats of the sheave pockets.

3.2.15.1 Load chain.—When specified (see 6.2), load chain shall be furnished in lieu of cable. The hoist load chain shall be manufactured from a steel alloy suitable in all respects for the purpose intended and shall be of a size selected by the contractor. The chain shall provide a safety factor of at least 4 based on the elastic limit of the material. The chain shall be free from any tendency to snarl. Elongation of load chain

before failure shall be a minimum of 5 percent. Each load chain shall withstand a load of twice the designed capacity without failure or permanent distortion. The chain shall be made corrosion-resistant by plating with zinc, cadmium, or a hot dip galvanizing process conforming to Specification QQ-Z-325, QQ-P-416, or MIL-Z-17871, respectively.

3.2.16 Load chain wheels.—The load chain wheels shall be made of steel, with deep pockets accurately shaped to fit the links of the load chain, which shall operate freely and smoothly over the load wheel without excessive wear. Guides shall be provided to assure that chain enters the chain wheel in proper position.

3.2.17 Hand chains.—Unless otherwise specified in the contract or order, hand chains shall be manufactured from steel. They shall be of the endless long or close link coil type and shall have a drop which is approximately two feet less than the standard lift of the hoist.

3.2.18 Hand chain wheels.—Hand chain wheels shall be made of steel, malleable iron, or aluminum alloy, and shall be provided with deep, accurately shaped pockets for the reception of the hand chain. The wheels shall be equipped with a chain guide that will permit operation of the hand chain from an angle 10 degrees out from either side of the chain wheel without slipping or jumping.

3.2.19 Manual operation.—Means shall be provided for operating the hoists by hand chain, or other equally suitable means, in case of power failure.

3.2.20 Hooks and swivels.—All hooks and swivels shall be drop-forged steel, properly machined at the bearing surfaces so as to permit easy turning or rocking action of the load without twisting the chain. When machining the shank of the hook, other means than the use of a centering hole at the bottom of the hook shall be employed.

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3.2.21 Types B, C and D.

3.2.21.1 *Trolleys*.—Unless otherwise specified herein, all load-sustaining parts of the trolley shall be made of steel, designed for maximum strength. Axles shall be made from the best quality of steel. Track wheel bearings shall be of either the ball or roller bearing type, properly heat-treated, hardened and ground. Grease chambers shall be provided, so designed as to prevent dust from reaching the bearings. Trolleys shall be of the plain or geared type; geared trolleys shall be of the hand or air motor powered type, as specified in the contract or order. The trolley shall be suitable for operating on "I" beams or girders of the size specified (see 6.2).

3.2.21.2 *Trolley brake*.—Unless otherwise specified in the contract or order, trolleys shall be equipped with a trolley brake. Design of the brake shall be such as to insure that the trolley, when stopped, will hold its position on the trolley track under any condition.

3.3 Type A, hook suspension hoists.—Hoists of this type shall be fitted with forged-steel top and bottom hooks, having ball or roller thrust bearings to facilitate turning the hoist or the load under service conditions.

3.3.1 *Class 1, hook suspension hoists*.—Class 1 hoists shall comply, unless otherwise specified (see 6.2), with the requirements of table I.

TABLE I. *Class 1 hook suspension hoists.*

Capacity	Weight ¹ (maximum)	Standard lift	Lifting speed (minimum) rated load, 100 pounds air pressure	Distance between hooks, raised position (maximum)
Pounds	Pounds	Feet	Feet per minute	Inches
1,000	285	15	30	32
2,000	375	15	20	36
4,000	510	15	15	41
6,000	550	12	14	45
10,000	890	12	10	50
20,000	1400	12	4	60

¹ Tolerance of ± 5 percent will be permitted.

3.3.2 *Class 2 hook suspension hoists*.—Class 2 hoists shall comply, unless otherwise specified (see 6.2), with table II.

TABLE II. *Class 2 hook suspension hoists.*

Capacity	Weight ¹ (maximum)	Standard lift	Lifting speed (minimum) rated load, 100 pounds air pressure	Distance between hooks, raised position (maximum)
Pounds	Pounds	Feet	Feet per minute	Inches
500	65	8	17	20
1,000	75	8	10	20

¹ Tolerance of ± 5 percent will be permitted.

3.4 Type B, classes 1 and 2, plain trolley suspension hoists.—Type B, plain trolley suspension hoists shall be of the built-in trolley style, the trolley forming an integral part

of the hoist. The hoists shall comply, unless otherwise specified (see 6.2), with the requirements of table III.

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TABLE III. *Types B and C.*

Capacity	Weight ¹ (maximum)	Standard lift	Lifting speed (minimum) rated load, 100 pounds air pressure	Distance, bottom of runway to hook in raised position (maximum)
Pounds	Pounds	Feet	Feet per minute	Inches
1000	300	15	30	30
2000	450	15	20	35
4000	640	15	15	38
6000	700	12	14	40

¹ Tolerance of ± 5 percent will be permitted.

3.5 Type C, classes 1 and 2, geared-trolley, (hand operated).—Type C, geared-trolley (hand operated) shall be fitted with a chain sheave and hand operated chain (see 3.2.15.1 and 3.2.16). The chain sheave shall be connected with pinions having machine cut teeth meshing with cut gears on the track wheels as a medium for moving the trolley back and forth on the track as required. The mechanism shall be such that the trolley is easily movable in either direction. Trolley suspen-

sion hoists shall also comply, unless otherwise specified (see 6.2), with table III.

3.6 Type D, classes 1 and 2, geared-trolley, (air-motor powered).—If air-motor powered geared trolley is specified, it shall be equipped with an air motor and control especially designed for the purpose intended.

3.6.1. Trolley suspension hoists with air-motor powered geared trolleys shall also

TABLE IV. *Type D.*

Capacity	Weight ¹ (maximum)	Standard lift	Lifting speed (minimum) rated load, 100 pounds air pressure	Distance, bottom of runway to hook in raised position (maximum)
Pounds	Pounds	Feet	Feet per minute	Inches
6000	660	12	14	43
10000	1100	12	10	49
20000	2000	12	4	66

¹ Tolerance of ± 5 percent will be permitted.

comply, unless otherwise specified (see 6.2), with the requirements of table IV.

3.7 Identification marking.—Each hoist shall be plainly marked in accordance with Standard MIL-STD-130 with the name of the manufacturer, the rated capacity of the hoist, and any other markings that will facilitate the ordering of repair parts.

3.8 Technical publications. — Manufacturer's printed or typewritten technical publication together with repair parts books or lists shall be furnished as specified (see 6.2).

3.8.1 Technical publications shall be placed in a waterproof envelope marked "Instruction Data". Envelope shall be attached securely to machine. For Level C shipments, waterproof envelopes will not be required.

3.9 Workmanship.—Workmanship shall be first class in every respect and free from all defects which may affect serviceability of the hoists.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling.

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4.1.1 *Lot*.—A lot shall consist of all hoists of the same type and class offered for delivery at one time.

4.1.2 *Sampling for inspection and tests*.—A sample of hoists shall be selected from each lot offered for Government inspection and tests in accordance with Standard MIL-STD-105 at Inspection Level III. If any sample has one or more defects or fails any test, the lot shall be rejected.

4.2 Inspection and tests.

4.2.1 Each sample hoist shall be inspected for adjustment, balance, workmanship, excessive noise, vibration and other requirements of this specification.

4.2.2 *No-load (hoisting)*.—Pneumatically, operate the hoist at no-load in the hoisting direction. The load block shall stop when it engages the automatic stop.

4.2.3 *No-load (lowering)*.—Pneumatically, operate the hoist at no-load in the lowering direction. The hoist shall stop when the bottom hook has been lowered to its lowest permissible position.

4.2.4 The tests specified in 4.2.2 and 4.2.3 shall also be accomplished manually.

4.2.5 *Hoisting speed*.—With rated load on the hook, the hoist shall be operated to verify conformance with the requirement of tables I, II, III or IV, as applicable.

4.2.6 *Overload*.—The hoist shall hoist and lower a load equal to one and one-half times its rated capacity. This operation shall be continued for 20 minutes.

4.2.7 *Extreme load*.—The hoist shall sustain a load equal to twice its rated capacity without permanent distortion of any of its parts.

4.2.8 The tests specified in 4.2.6 and 4.2.7 shall also be accomplished manually.

4.3 *Rejection*.—Rejected hoists may be resubmitted for Government inspection, provided the contractor, after having been informed of the reason for rejection, has made all necessary changes to eliminate the causes for rejection.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging.

5.1.1 *Level A*. Cleaning, preservation and packaging of all components shall be in accordance with Specification MIL-P-116, as applicable. All unpainted external metal surfaces and components parts shall be preserved by method I using type P-1 or P-2 preservative compound. Type P-1 shall be applied to surfaces where its removal is not required to put the equipment in service or where removal by solvent can be accomplished without damage to the surface or adjacent surfaces. Internal metal surfaces shall be coated with type P-10 preservative. Anti-friction bearings shall be service lubricated. No cleaning solution, lubricant or preservative shall be applied to self-lubricating bearings.

5.1.2 *Level C*.—Cleaning and preservation shall be in accordance with the manufacturer's standard practice.

5.2 Packing.

5.2.1 *Level A*.—Unless otherwise specified in the contract or order, hoists and trolleys shall be packed in wood-created plywood, nailed wood boxes or crates conforming to Specification PPP-B-601 (overseas type), JAN-P-106, or MIL-C-3769, respectively. Crates shall be used for gross weights exceeding 500 pounds. Boxes shall be modified by the addition of 2 by 4 inch (nominal) skids for gross weights exceeding 200 pounds. Boxes shall be lined with sealed case liners conforming to Specification MIL-L-10547 or the equipment within the containers shall be shrouded with barrier material conforming to Specification JAN-P-125.

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5.2.2 *Level B.*—The hoists and trolleys shall be packed in wood-cleated plywood nailed wood boxes, or crates conforming to Specification PPP-B-601 (domestic type), NN-B-621 and MIL-C-3769, respectively. Crates shall be used for gross weights exceeding 500 pounds. Boxes shall be modified by the addition of 2 by 4 inch skids for gross weights exceeding 200 pounds.

5.2.3 *Level A and B shipments.*—Blocking and bracing shall be in accordance with Specification JAN-P-100.

5.2.4 *Level C.*—The hoist and trolleys shall be packed in a manner to insure carrier acceptance and safe delivery at destination. Containers shall be in accordance with Consolidated Freight Classification Rules or other carrier regulations as applicable to the mode of transportation.

5.3 *Marking.*—Unless otherwise specified in the contract or order, interior packages and exterior shipping containers shall be marked in accordance with Standard MIL-STD-129.

6. NOTES

6.1 *Intended use.*—The hoists covered by this specification are intended for handling material at all Military activities.

6.2 *Ordering data.*—Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type, class, and capacity of hoist required (see 1.2, 3.3, 3.4, 3.5 and 3.6).
- (c) Maximum overall dimensions of hoist housing if this feature is important to provide clearance on the runway (see 3.2.3).
- (d) Whether cable or chain hoist is required (see 3.2.15.1).
- (e) Size of I beam for trolley hoists, to include nominal width of

flange and amount of slope on face of runway of flange (see 3.2.21.1). (NOTE—Slope usually 0.90 inch per inch of width).

- (f) Height of lift if other than required herein (see tables I, II, III and IV).
- (g) Speed of lift if other than required herein (see tables I, II, III and IV).
- (h) Additional cable required, if any (extra dead turns on drum or cable required for reaving).
- (i) Maximum distance between hooks or between under side of track and load hook, if less than required herein (see tables I, II, III and IV).
- (j) Requirements for technical publications (see 3.8).
- (k) Whether preservation and packaging shall be by Level A or C and whether packing shall be by Level A, B, or C (see 5.1 and 5.2).

6.3 Bidders shall submit with bids a technical description including weights, and sketches of the equipment being offered to aid in bid evaluation.

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

Custodians:

Army—Corps of Engineers
Navy—Bureau of Ships
Air Force

Other Interest:

Army—QT
Navy—AOY.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER

2. DOCUMENT TITLE

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION *(Mark one)* VENDOR USER MANUFACTURER OTHER *(Specify):* _____b. ADDRESS *(Street, City, State, ZIP Code)*

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI) – Optional*b. WORK TELEPHONE NUMBER *(Include Area Code) – Optional*c. MAILING ADDRESS *(Street, City, State, ZIP Code) – Optional*8. DATE OF SUBMISSION *(YYMMDD)*