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MILITARY SPECIFICATION

WINCH, DRUM, ENGINE OR TURRET HOIST, TYPE A-1

This specification is approved for use by the Department of the Air Force and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers one type of engine or turret hoist drum winch, designated Type A-1.

2. APPLICABLE DOCUMENTS

2.1 The following specifications, standards, drawings, and publications, of the issue in effect on date of invitation for bids or requests for proposals form a part of this specification to the extent specified herein:

SPECIFICATIONS

Federal

HH-G-156	Gaskets Material, General Purpose, Rubber Sheets, Strips, and Special Shapes
QQ-Z-325	Zinc Coating, Electrodeposited, Requirements for
PPP-B-601	Boxes, Wood, Cleated-Plywood

Military

MIL-P-116	Preservation, Methods of
DOD-D-1000	Drawing, Engineering and Associated List
MIL-C-5541	Chemical Conversion Coating on Aluminum and Aluminum Alloys
MIL-C-6497	Crane, Engine or Turret, Portable, 5000 lb Cap., Type J-1B
MIL-A-8625	Anodic-Coatings, for Aluminum and Aluminum Alloys
MIL-C-10799	Cloth, Coated, Cotton, Vinyl Coated, Fire and Mildew Resistant
MIL-G-23827	Grease, Aircraft and Instrument, Gear and Actuator Screw

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: HQ AFLC CASO/LODSAC, Federal Center, Battle Creek, MI 49016 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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STANDARDS

Federal

FED-STD-595	Colors

Military

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-143	Standards and Specifications, Order of Precedence for the Selection of
MIL-STD-461	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
MIL-STD-808	Finish, Protective and Codes for Finishing Schemes for Ground and Ground Support Equipment
MIL-STD-810	Environmental Test Methods

DRAWINGS

U.S. Air Force

53J6186	Crane Assembly - Engine or Turret, Portable, 5000 Pounds Capacity, Type J-1B
53J6187	Base - Column, Crane

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

3. REQUIREMENTS

3.1 Component parts. The winch shall consist of at least the following equipment: Cable and fittings, swivel hook assembly, electric and manually operated winch, magnetic and manually operated brakes, cable drum, reduction gearing, input power receptacles, switches, relays, control panel, and manual crank.

3.1.1 Preproduction model. This specification provides for preproduction model inspection (see section 4).

3.2 Materials. Materials used shall be entirely suitable for the purpose. Light-weight alloys shall be used wherever weight saving is possible. The use of dissimilar metals in contact is discouraged when the metals are exposed to the elements.

3.2.1 Recycled and recovered raw material should be used to the maximum extent possible in lieu of virgin raw material as long as these materials do not jeopardize the intended use and fully comply with all contract requirements. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. None of the above shall be interpreted to mean that the use of used or rebuilt products will be allowed.

3.2.1.1 Gasket material used in the winch shall be in accordance with

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Specification HH-G-156.

3.2.2 Protective treatment. When materials are used in the construction of the winch that are subject to deterioration when exposed to climatic and environmental conditions likely to occur during service usage, they shall be protected against such deterioration in a manner that will in no way prevent compliance with the performance requirements of this specification. The use of any protective coating that will crack, chip, or scale with age or extremes of climatic and environmental conditions shall be avoided.

3.2.3 Selection of materials. Specifications and standards for all materials, parts, and Government certification and approval of processes and equipment, which are not specifically designated herein and which are necessary for the execution of this specification, shall be selected in accordance with MIL-STD-143, except as provided in the following paragraph.

3.2.3.1 Standard parts. Standard parts (MS, AN, JAN, etc.) shall be used wherever they are suitable for the purpose, and shall be identified on the drawing by their part numbers. Commercial utility parts such as screws, bolts, nuts, cotter pins, etc, may be used, provided they possess suitable properties and are replaceable by the standard parts without alteration, and provided the corresponding standard part numbers are referenced in the parts list and, if practicable, on the contractor's drawings. In the event there is no suitable corresponding standard part in effect on date of invitation for bids, commercial parts may be used provided they conform to all requirements of this specification.

3.3 Design and construction. The winch shall be designed as a self-contained (except for external electrical power source) unit suitable for installation on the engine and turret hoists specified by the procuring activity.

3.3.1 The winch shall be designed for intermittent operation while being capable of passing Endurance tests specified herein.

3.3.2 Ease of maintenance. The winch shall be so designed that maintenance can be performed with a minimum of disassembly and in a minimum of time, using common hand tools.

3.3.3 Insofar as practical, the latest technological advances shall be applied to the selection of materials and construction. The winch shall be built to withstand the stresses, jars, vibrations, and other conditions incident to shipping, storage, installation, and service. The winch shall be completely self-contained and constructed as a compact unit. The use of strategic materials shall be restricted to a minimum.

3.3.4 Load capacity. With 28V d-c power at the source end of the junction box, performance of the winch shall be as follows:

3.3.4.1 The normal capacity of the winch shall be 5,000 pounds through a lifting distance equal to that of the specified type of hoist.

3.3.4.2 The overload capacity of the winch shall be such that it will be capable of lifting and supporting a 10,000-pound load without stalling of the drive mechanism or slippage of the brake.

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3.3.4.3 The winch shall be so designed that a load of 5,000 pounds can be raised by one man exerting a force of not more than 30 pounds on the handcrank, with the winch operating on the low-speed range.

3.3.5 Operating speed. With the load supported normally, the powered operating speeds shall be as follows.

3.3.5.1 The speed of lift with 28V power at the source end of the junction box shall be not less than 5 fpm with a load of 5,000 pounds, nor more than 10 fpm with no load.

3.3.5.2 The speed of lowering any load up to 5,000 pounds with 28V at the source end of the junction box shall be not more than 10 fpm.

3.3.5.3 With voltage at the power source terminal of the junction box 10 percent in excess of 28V, the lifting and lowering speed of the hoist with any load up to and including 5,000 pounds shall not exceed the safe operating speed of the winch motor.

3.3.5.4 With the source voltage at 90 percent of 28V, the hoist shall be capable of raising and lowering a 5,000-pound load at a speed of not less than 3.3 fpm through the normal lifting distance of the hoist. The winch shall be able to start under full capacity load with 90 percent of rated voltage applied.

3.3.5.5 The winch shall be provided with a 2-speed drive for hand operation. The handcrank shall be provided with a spring-loaded clutch or similar mechanism, to automatically disengage the handcrank when not in use.

3.3.6 Mechanical brake. A mechanical brake shall be furnished as an integral part of the winch gear train. The brake shall prevent operation of the winch in the lower direction unless power is applied, and shall be independent of any electric brake.

3.3.6.1 Electric brake. The winch shall be equipped with an electric, solenoid-operated shoe or disc-type brake. The brake may be mounted at any position on the motor or winch drive shaft. The winch shall be normally braked when the motor is not energized. The brake shall be magnetically released simultaneously with energizing of the winch motor.

3.3.6.2 The brake shall be capable of stopping a 5,000-pound load within a distance of 1/2 inch during raising, and within a distance of 1 inch during lowering from the full operating speed of the hoist.

3.3.6.3 The brake shall not drag when the motor is in operation in either direction at any load from 0 up to 5,000 pounds, and with source voltage from 90 to 110 percent of 28V.

3.3.6.4 The brake shall have endurance characteristics adequate to pass the tests specified herein. The brake shall retain the required braking power throughout its useful life.

3.3.6.5 A manual release of the brake shall be provided and shall contain a controllable device for holding the brake in the released position for manual crank operation.

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3.3.7 Electrical controls. An electrical junction box with connections for the power cord, control pendant, cord, limit switches, and including a power "ON-OFF" switch, limit switches, and a circuit breaker, shall be provided on the winch assembly. All electrical circuits of the winch shall have a negative ground system.

3.3.7.1 The control pendant shall include 20 feet of electrical cord and a small control box suitable for holding and operating with one hand. The pendant control box shall have two momentary-contact switches, marked for "UP" and "DOWN" operation. Stowage for the control pendant shall be provided on the winch.

3.3.7.2 The manufacturer may use an Underwriter's approved weatherproof control box adapted for this installation. It shall be provided with a convenient hook for hanging the box to the hoist frame when not in use.

3.3.8 Winch motor. The winch motor shall be a 28V weatherproof motor entirely suitable for incorporation in this winch.

3.3.8.1 Thermal protection within the motor shall be at the contractor's option. In the event automatic thermal switches are used, the brake circuit shall be energized simultaneously with the motor circuit.

3.3.9 Cable and accessories.

3.3.9.1 Sufficient cable shall be provided for all positions and conditions of operation and erection of the hoist specified. A regular lay galvanized cable of 6 by 37 improved plow steel or a nonrotating cable suitable for the application shall be used.

3.3.9.2 Hook. A weighted hook of suitable capacity shall be provided. The hook shall incorporate a safety lock and ball-bearing swivel capable of eliminating cable twist of any load under all operating conditions.

3.3.9.3 A double cable (two-part line) arrangement between the main boom and the cable hook shall be employed.

3.3.9.4 Cable drums. Cable drums shall have machine-cut grooves and rounded corners. The drums shall be fitted on each end with flanges to prevent cable jamming. The drum diameter shall be not less than 8 inches.

3.3.10 Winch cover. A waterproof cover in accordance with Specification MIL-C-10799 Type II, Class 3, Color No. 13538 of FED-STD-595, complete with lacing grommets and mildew-proof rope, to adequately protect the winch in inclement weather, shall be provided.

3.3.11 Radio interference suppression. Equipment procured under this specification shall conform to the requirements of MIL-STD-461.

3.3.12 Replaceable parts. All component parts of each winch shall be so designed and constructed that any part can be replaced, properly fitted, and adjusted without requiring modification and with the use of a minimum of special tools.

3.3.13 Adjustment. Suitable provisions shall be included for making necessary

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adjustments and for performing all necessary service operation. Adjustment mechanisms shall operate smoothly and without interference and shall maintain secure adjustments under all conditions of service.

3.3.14 Load shafts. Load shafts and all other turning shafts shall be supported in ball or roller bearings.

3.3.15 Gearing. All gears shall be of the spur or helical type. The gears shall be manufactured and accurately cut in accordance with the American Gear Manufacturers' Association practice.

3.4 Interchangeability. All parts having the same manufacturer's part number shall be directly and completely interchangeable with each other with respect to installation and performance. Changes in manufacturer's part numbers shall be governed by the drawing number requirements of Specification MIL-D-1000.

3.5 Lubrication. The winch gearcase and all moving parts shall be lubricated in accordance with applicable specifications specified herein. The gearcase shall be sealed against loss of lubricant and against entrance of lubricant into electrical windings of the motor. All slip points and threads shall be lubricated with grease conforming to Specification MIL-G-23827.

3.6 Dimensions. The dimensions of the winch shall be held to the minimum possible within the practical limits of good design, stability, and accessibility. The winch shall readily mount on the winch mount of a Type J-1B crane in accordance with Drawing 53J6186. The base of the winch shall be drilled for bolting to the angle mounting support of the crane column base in accordance with Drawing 53J6187.

3.7 Weight. The weight of the winch and all components shall be a minimum consistent with adequate design.

3.8 Finishes and protective coatings.

3.8.1 Surface finish. All coatings, forgings, molded or welded parts, shall be thoroughly cleaned and free of sand, dirt, fins, sprues, scale, flux, or other harmful materials. External surfaces shall be smoothed, and all edges shall be rounded of beveled. All bearing surfaces between matching parts shall be finished by machining, grinding, or scraping to the necessary tolerances to provide the required accuracy and stability in operation. Surface roughness of bearing surfaces shall be such as not to reduce bearing areas to any appreciable extent not to detract from the appearance of the winch.

3.8.2 Surface treatment of aluminum and aluminum alloys. All aluminum and aluminum alloy parts shall be anodized in accordance with Specification MIL-A-8625, or shall receive an approved chemical film in accordance with Specification MIL-C-5541.

3.8.3 Steel parts in contact with aluminum or aluminum alloys shall be plated in accordance with the following method. .

3.8.3.1 Zinc plating shall be in accordance with specification QQ-Z-325.

3.8.4 Surfaces of the winch not otherwise finished or plated shall be finished in accordance with MIL-STD-808. The color shall be yellow conforming to color

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No. 13538 of FED-STD-595.

3.9 Performance. The winch shall be capable of satisfactorily meeting the test requirements specified in Section 4 after being subjected to the following conditions:

a. Temperature: Ambient temperatures ranging from -55° to +71°C.

b. Sand and dust: Sand and dust particles as will be encountered in desert areas.

c. Humidity: Relative humidity up to 100 percent with condensation.

d. Fungus: Fungus growth as encountered in tropical climates.

e. Salt spray: Exposure to salt sea atmosphere.

f. Operation immediately after being subjected to adverse weather such as snow, sleet, and rain.

g. Operation under any combination of the above conditions.

h. Dielectric: The Dielectric test as specified in Section 4.

i. Radio noise suppression: Suppression requirements of MIL-STD-461.

3.10 Identification of product. Equipment, assemblies, and parts shall be marked for identification in accordance with Standard MIL-STD-130.

3.11 Workmanship.

3.11.1 General. The winch, including all parts and accessories, shall be constructed and finished in a thoroughly workmanlike manner. Particular attention shall be given to neatness and thoroughness of painting, welding, brazing, riveting, machine-screw assemblies, and freedom of parts from burrs and sharp edges.

3.11.2 Dimensions and tolerances. Dimensions and tolerances not specified shall be as close as is consistent with the best shop practices. Where dimensions and tolerances may affect the interchangeability, operation, or performance of the winch, they shall be held or limited accordingly.

3.11.3 Welded joints. All welded joints shall be sound and free from cracks, injurious porosity, or oxide inclusions.

4. QUALITY ASSURANCE PROVISIONS

4.1 Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the suplier may utilized his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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4.2 Classification of inspection. Inspection shall be classified as follows:

a. Preproduction inspection

b. Quality conformance inspection.

4.2.1 Preproduction inspection. Preproduction inspection shall be applied to the preproduction sample. Failure of the preproduction sample to pass the examination or one or more preproduction tests shall be cause for rejection. Preproduction inspection shall consist of the examination in 4.3 and all tests in 4.4 and 4.5.1.

4.2.2 Quality conformance inspection. Quality conformance inspection shall be applied to each item prior to being prepared for delivery under the terms of the contract or purchase order. Failure of the machine to pass the examination or one or more tests shall be cause for rejection. Quality conformance inspection shall consist of the following:

a. Examination (4.3)

b. Quality conformance tests (4.5)

c. Requirements of para 4.6 and 4.7 herein.

4.3 Examination. The winch and all its equipment shall be examined for design, construction, materials, components, electrical equipment, and workmanship to determine compliance with the requirements of this specification. Any deviation from these requirements shall be cause for rejection.

4.4 Preproduction tests.

4.4.1 Sampling instructions. One winch as specified in the contract will be tested for design approval by the procuring activity, or when so specified in the contract at the contractor's plant under the supervision of a government inspector.

4.4.2 Tests. The Preproduction tests shall consist of all the tests specified under 4.5.1 and, in addition, the following tests. The tests specified under 4.5.1 shall be conducted prior to the Preproduction tests, and the following tests shall be conducted in the sequence presented.

4.4.2.1 Load test. The winch shall be completely assembled and a load of 5,000 pounds shall be lifted without stop to a height equal to the cable drum capacity. After a 10-minute rest, the load shall be lowered to the ground level.

4.4.2.1.1 The winch shall be tested by lifting a load of 10,000 pounds a distance of 2 feet. Failure of welded joints or other defects of material or workmanship disclosed by this test shall be cause for rejection.

4.4.2.1.2 Manual operation. With a load of 5,000 pounds suspended from the winch cable hook, the load shall be raised and lowered manually through at least 10 complete cycles. The force on the hand crank necessary for operation shall not exceed 30 pounds.

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4.4.2.2 Operating speed. The winch shall be operated to determine the lifting speed with a 5,000 pound load. The lifting speed shall be not less than 5 fpm with 28V at the source end of the junction box.

4.4.2.2.1 The winch shall be operated to determine the speed of lowering any load up to 5,000 pounds with 28V at the source end of the junction box. The lowering speed shall be not more than 10 fpm.

4.4.2.2.2 The winch shall be operated to determine the speed of lift without load. This speed shall be not less than 5 fpm, nor more than 10 fpm, with 28V at the source end of the junction box.

4.4.2.2.3 The winch shall be operated to determine that it does not exceed safe operating limits of the motor. With voltage at the power source terminal of the junction box 10 percent in excess of 28V, the lifting and lowering speed of the winch with any load up to and including 5,000 pounds shall not exceed the safe operating speed of the motor.

4.4.2.2.4 The winch shall be operated to determine that it is capable of starting under capacity load from 90-percent normal voltage. With the source voltage at 90-percent of 28V, the hoist shall be capable of raising and lowering a 5,000-pound load at a speed of not less than 3.3 fpm.

4.4.2.3 Current requirements. The winch shall be operated to determine that current requirements are not exceeded. With 28V power source and a 5,000-pound load on the winch cable hook, the current required for steady lifting of the load shall not exceed 64 amp.

4.4.2.4 The winch shall be operated to determine that the brake is effective within the required limits. With a 5,000 pound load on the winch cable hook, the brake shall be capable of stopping the load within a distance of 1/2 inch during raising, and 1 inch during lowering from the full operating speed of the hoist.

4.4.2.5 Environmental. The winch shall be subjected to and shall be operational after exposure to the applicable test procedure of Table I, Group IB, of MIL-STD-810. Upon completion of each test, the winch shall be subjected to and satisfactorily meet the requirements specified in paragraphs 4.4.2.6 and 4.5.

4.4.2.6 Dielectric. Each winch shall be subjected to a Dielectric test of 60 cycles ac, 1,000V, rms for a period of 1 minute between electrical circuits of the winch motor and metal parts of the frame. For this test, the Ideal Industries, Incorporated Insulation Tester Model 41, or equal, shall be used. This test shall be performed before and after each Environmental test.

4.4.2.7 Test for radio interference suppression. The winch shall be tested for compliance with MIL-STD-461.

4.4.2.8 Endurance. After all Environmental tests, the winch shall be subjected to the following cycle of tests and shall be capable of proper operation after 100 complete cycles. Power source shall be 28V, and the surrounding air temperature shall be 21° ± 10°C:

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a.	No load	Raise to maximum height Rest 3 minutes
b.	No load	Lower to ground Rest 10 minutes
c.	5,000-lb load	Raise to maximum height Rest 10 minutes
d.	5,000-lb load	Lower to ground Rest 20 minutes. (Rest period may be increased 1/2 minute per degree Centigrade over 21°C of ambient air temperature) Repeat cycle, (alternating main boom angle setting for rated and maximum overhand when an integral part of a hoist.)

4.4.2.8.1 Brake lift. After completion of the tests specified in paragraph 4.4.2.8 and without readjustment or replacement of brake parts, the winch shall be subjected to the following test. With 5,000 pounds on the winch cable hook, the winch shall be brought up to uniform speed in the upward direction, the winch stopped and rested 15 seconds, then brought to uniform speed in the downward direction, stopped, rested 15 seconds, and the cycle repeated. The winch shall be capable of 200 cycles without failure to meet the braking requirements of paragraph 4.2.2.5. A rest period of 10 minutes shall be permitted after each 25 cycles.

4.4.2.9 Disassembly inspection. The winch shall be disassembled to the maximum practical extent for a thorough examination of all parts to disclose failure, distortion, excessive wear, untidiness, or other unsatisfactory conditions.

4.4.2.10 Serviceability. The winch shall be inspected and evaluated from the standpoint of ease of maintenance, servicing, and operation. Particular note shall be made with regard to provisions to prevent accumulation of dirt, snow, ice, etc, which may hinder servicing and operation.

4.5 Quality conformance inspection. Quality conformance inspection shall consist of Individual tests (4.5.1) and Sampling tests (4.5.2) as follows.

4.5.1 Individual tests. Each winch shall be subjected to the following tests.

4.5.1.1 Preliminary run-in. Any preliminary run-in of the winch as may be recommended by the manufacturer shall be performed by the manufacturer prior to submission of the winch for Preproduction of Quality conformance tests.

4.5.1.2 Radio interference. Each production unit shall be subjected to a visual examination to determine conformance with radio interference suppression requirements (see 4.4.2.7).

4.5.2 Sampling tests. In addition to the Individual tests specified above, the first winch and 1 from each lot of 50 winches or fraction thereof of the total quantity on contract or order shall be selected at random and subjected to 20 percent of the Endurance test time specified in para 4.4.2.8.

4.6 Rejection and retest. When Sampling tests are specified on a number of

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winches that are selected as representative of a certain lot, and one or more of this number fails to meet the specified tests, acceptance of all winches shall be withheld until the extent and cause of failure is determined. For operational reasons, Individual tests may be continued pending investigation of a Sampling test failure, but the final acceptance of the winch is contingent upon the Inspector's decision regarding the overall conformance of the winch to specification requirements. If investigation indicates that the defects may exist on winches previously accepted, full particulars concerning the defects found, including recommendations for correction, shall be furnished to the procuring activity.

4.7 All parts, specimens, or assemblies destroyed in making tests required by this specification or drawings, to determine compliance with the specification or drawings, shall be in addition to the quantity specified in the contract or purchase order and shall be furnished without increasing the cost of the contract or order.

5. PREPARATION FOR DELIVERY

5.1 Application. The requirements of Section 5 apply only to direct purchases by or direct shipments to the Government.

5.2 Preservation and packaging.

5.2.1 The winch, including the electric motor, clutch, reduction gearing, brakes, and cable shall be packaged and preserved for shipment in accordance with specification MIL-P-116.

5.2.2 Unless otherwise specified by the procuring activity,.the winch and accessories shall be packaged and preserved for overseas shipment and long-term storage.

5.3 Packing.

5.3.1 Domestic and overseas shipment. Unless otherwise specified by the procuring activity, exterior packing shall be for overseas shipment. The winch shall be packed in a shipping container in accordance with Specification PPP-B-601. Each exterior shipping container shall be provided with a waterproof liner.

5.4 Marking of shipment. The interior packages and exterior shipping containers shall be marked in accordance with Standard MIL-STD-129. The nomenclature shall be as follows: Winch, Drum, Engine or Turret Hoist, Type A-1, Specification MIL-W-6496B, Manufacturer's Part No. __*__, Federal Stock No. ____*____, (if no FSN available, leave space therefor).

*Applicable data to be entered by the contractor.

6. NOTES

6.1 Intended use. The Type A-1 winch covered by this specification is intended for use as the power component for the type J-1B crane (MIL-C-6497).

Custodian:
Air Force - 99

Preparing Activity:
Air Force - 99

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

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DOCUMENT IDENTIFIER AND TITLE
MIL-W-6496B (USAF) Revision Winch, Drum, Engine or Turret Hoist, Type A-1

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A
☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
   A. GIVE PARAGRAPH NUMBER AND WORDING.

   B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

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   [ ] YES [ ] NO *(If "Yes", in what way?)*

4. REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

TELEPHONE NO.

DATE

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