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MILITARY SPECIFICATION

SUPPORT EQUIPMENT, AERONAUTICAL, SPECIAL GENERAL SPECIFICATION FOR THE DESIGN OF

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

1. SCOPE

1.1 This specification covers general requirements for design and construction of ground support equipment and provisions to be incorporated in detail specifications for specific items of equipment.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

Federal

GG-G-76 Gages, Pressure and Vacuum, Dial Indicating, (for Air, Steam, Oil, Water, Ammonia, and Chloro-fluoro Hydrocarbon Gases)
ZZ-T-381 Tires, Pneumatic, Vehicular (Highway)

Military

MIL-F-3541 Fittings, Lubrication
MIL-T-5021 Tests: Aircraft and Missile Welding Operators' Qualification
MIL-W-5088 Wiring, Aircraft, Selection and Installation of
MIL-H-5440 Hydraulic Systems, Aircraft Types I and II, Design, Installation and Data Requirements for
MIL-P-5518 Pneumatic Systems, Aircraft, Design, Installation, and Data Requirements for

FSC MISC

MIL-S-8512D

MIL-S-5676 Splicing, Cable Terminal, Process for, Aircraft
 MIL-C-5688 Cable Assemblies, Aircraft, Proof Testing, and
 Prestretching of
 MIL-C-6021 Casting, Classification and Inspection of
 MIL-H-6088 Heat Treatment of Aluminum Alloys
 MIL-I-6866 Inspection; Penetrant, Method of
 MIL-I-6868 Inspection Process, Magnetic Particle
 MIL-S-6872 Soldering Process, General Specification for
 MIL-W-6873 Welding, Flash, Carbon and Alloy Steel
 MIL-H-6875 Heat Treatment of Steels (Aircraft Practice, Process for)
 MIL-N-7284 Nozzle, Oil Servicing, Pistol Grip, Nondrip Type A-24
 MIL-L-7312 Lubricating Unit, Power-operated, Electric, Portable
 MIL-B-7883 Brazing of Steels, Copper, Copper Alloys, Nickel Alloys,
 Aluminum and Aluminum Alloys
 MIL-M-8090 Mobility Requirements, Ground Support Equipment, General
 Specification for
 MIL-G-8402 Gages, Pressure, Dial Indicating, General Specification for
 MIL-A-8421 Air Transportability Requirements, General Specification for
 MIL-W-8604 Welding of Aluminum Alloys, Process for
 MIL-M-8609 Motors, Direct-Current, 28 Volt System, Aircraft General
 Specification for
 MIL-W-8611 Welding, Metal Arc and Gas, Steels, and Corrosion and Heat
 Resistant Alloys; Process for
 MIL-H-8891 Hydraulic Systems, Manned Flight Vehicles, Type II, Design,
 Installation, and Data Requirements for
 MIL-I-8950 Inspection, Ultrasonic, Wrought Metals, Process for
 MIL-B-11188 Battery, Storage, Lead-Acid
 MIL-E-11275 Engine, Gasoline, Industrial Type, General Specification for
 MIL-E-11276 Engine, Diesel, Industrial, Medium and High-Speed, General
 Specification for
 MIL-T-12459 Tire, Pneumatic, for Military Ground Vehicle
 MIL-T-13867 Treatment, Moisture and Fungus Resistant for Fire Control
 Electrical and Electronic Instruments and Equipment
 MIL-C-13984 Can, Water, Military, 5-Gallon
 MIL-P-15024 Plates, Tags, and Bands for Identification of Equipment
 MIL-T-21200 Test Equipment for use with Electronic and Fire Control
 Systems, General Specification for
 MIL-T-21578 Test Equipment, Hazardous Location, Installed, Basic
 Requirements for
 MIL-S-22473 Sealing, Locking, and Retaining Compounds, Single Component
 MIL-E-25499 Electrical System, Aircraft, Design and Installation of,
 General Specification for
 MIL-N-26978 Nozzle, Fuel and Oil Servicing, Over-the-Wing, Shockproof,
 Type MD-1 and MD-2
 MIL-S-38147 Stand, Test, Aerospace Vehicle Hydraulic Systems, General
 Specification for

MIL-S-85121

MIL-N-52110 Nozzles, Fuel and Oil Servicing, Non-Automatic Shutoff
and Nozzles, Fuel Servicing, Automatic Shutoff
MIL-M-81807 Marking of Aircraft Ground Support Equipment with
Retro-Reflective Materials, Process for
MIL-T-83431 Test Stand, Jet Engine Accessory Overhaul, General
Specification for

STANDARDSFederal

FED-STD-595 Colors

Military

MIL-STD-100 Engineering Drawing Practices
MIL-STD-130 Identification Marking of US Military Property
MIL-STD-143 Standards and Specifications, Order of Precedence for
the Selection of
MIL-STD-209 Slings and Tiedown Provisions for Lifting and Tying
Down Heavy Military Equipment
MIL-STD-210 Climatic Extremes for Military Equipment
MIL-STD-453 Inspection, Radiographic
MIL-STD-454 Standard General Requirements for Electronic Equipment
MIL-STD-461 Electromagnetic Interference Characteristics, Requirements
for Equipment
MIL-STD-462 Electromagnetic Interference Characteristics, Measurement of
MIL-STD-470 Maintainability Program Requirements (for Systems and
Equipment)
MIL-STD-471 Maintainability Verification/Demonstration/Evaluation
MIL-STD-704 Electric Power, Aircraft, Characteristics and Utilization of
MIL-STD-721 Definitions of Effectiveness Terms for Reliability,
Maintainability, Human Factors, and Safety
MIL-STD-749 Preparation and Submission of Data for Approval of
Nonstandard Electronic Parts
MIL-STD-781 Reliability Tests Exponential Distribution
MIL-STD-785 Reliability Program for Systems and Equipment Development
and Production
MIL-STD-808 Finish, Protective and Codes for Finishing Schemes for
Ground and Ground Support Equipment
MIL-STD-810 Environmental Test Methods
MIL-STD-851 Test Reports, Preparation of
MIL-STD-838 Lubrication of Military Equipment
MIL-STD-882 System Safety Program for Systems Associated Subsystems
and Equipment, Requirements for
MIL-STD-889 Dissimilar Metals

MIL-S-8512D

MIL-STD-1472 Human Engineering Designs Criteria for Military Systems,
Equipment and Facilities
MIL-STD-1474 Noise Limits for Army Materiel
MS-15367 Battery, Storage, for Electric Powered Industrial Trucks
and Tractors
MS-18069 Compound, Adhesive, Aircraft Design and Usage Limitations
for Threaded Components Retained or Sealed by
MS-21236 Ring, Cargo Tiedown (10,000 Lb.), Type III
MS-21237 Ring, Cargo Tiedown (25,000 Lb.), Type IV
MS-33540 Safety Wiring and Cotter Pinning, General Practices for
MS-33790 Bend Data, Minimum, Hydraulic, Pneumatic, Fuel and Oil Hose
MS-51700 Streamer, Warning

Air Force - Navy Aeronautical

AN2552 Receptacle - External Power, 28 Volt DC

DRAWINGS

Ordnance Corps

B246293 Cap, Radiator, Sealing

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

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

BULLETINS

USAF Specification Bulletin 518 Cargo Aircraft Compartment Dimensional
Data

HANDBOOKS

National Bureau of Standards

MIL-HDBK-5 Metallic Materials and Elements for Aerospace Vehicle
Structures
MIL-HDBK-130 Standardized Gasoline and Diesel Engines

Occupational Safety and Health Act (OSHA) of 1970

Title 29, Code of Federal Regulations, Chapter XVII, Occupational Safety and Health
Part 1910, and Amendments Administration Standards

(Applications for copies should be addressed to Superintendent of Documents,
U.S. Government Printing Office, Washington, D.C. 20402.)

MIL-S-8512D

American Society of Mechanical Engineers

Code for Unfired Pressure Vessels

(Copies of ASME publication may be obtained from the American Society of Mechanical Engineers, 345 E. 47th St., New York, N.Y., 10017.)

National Fire Protection Association Standard

NFPA 70 National Electrical Code (Electric Wiring and Apparatus)

(Copies of NFPA publication may be obtained from the National Fire Protection Association, 60 Batterymarch Street, Boston, Massachusetts 02110.)

Joint Industry Conference Standards

JIC Standards

(Copies of JIC Standards may be obtained from the JIC, 7901 Westpark Drive, McLean, VA., 22101.)

AFSC Design Handbook

DH 1-3 Personnel Subsystems
DH 1-6 Systems Safety
DH 2-6 Ground Equipment and Facilities

(Application for copies should be addressed to 4950/TZH, Wright-Patterson AFB, Ohio 45433.)

American National Standards Institute Inc. (ANSI)

Hydraulic and Pneumatic Standards

(Copies of ANSI Standards may be obtained from American National Standards Institute, Inc., 1430 Broadway, New York, N.Y., 10018.)

3. REQUIREMENTS

3.1 General. The requirements specified herein are general in nature and without regard to functional categories or specific items of ground support equipment. When the design of the equipment or the preparation of specifications for specific categories or items of equipment is concerned, these requirements shall be supplemented by those requirements specified in the general or detail specification for such equipment categories or items.

MIL-S-8512D

3.1.1 Conflict in requirements. Where the requirements of this specification conflict with the requirements of the general or detail specification for specific categories of equipment, the requirements of the detail specification shall govern.

3.1.2 Selection of specifications, standards, and drawings. Specifications, standards and drawings for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143.

3.1.3 First article. When specified in the contract or detail specification (see 6.6), the supplier shall submit equipment for first article inspection, test, and approval (see 4.2 and 6.6).

3.2 Materials and parts

3.2.1 Selection of materials, parts and processes. Materials and parts which are not specified or which are not covered by documents listed herein shall be of the best commercial quality, entirely suitable and readily available to allow compliance with the requirements of this specification. Processes which are not definitely specified or which are not covered by documents listed herein shall be in accordance with Nationally recognized standards (such as AWS, AISC, ANSTDS, etc.)

3.2.2 Magnesium. Magnesium shall not be utilized in the construction of ground support equipment unless specifically approved by the procuring activity.

3.2.3 Dissimilar metals. The use of dissimilar metals, in contact as defined by MIL-STD-889, shall be avoided insofar as practicable. Metal plating or spraying of dissimilar base material shall be permissible.

3.2.4 Fungus resistance. Materials selected shall be fungus resistant or shall be suitably treated to resist fungus. Electrical and electronic components shall be fungus inert in accordance with MIL-STD-454, Requirement 4, or shall be suitably treated to resist fungus in accordance with MIL-T-13867.

3.2.5 Corrosion resistance. Materials selected shall be corrosion resistant or suitably protected in accordance with MIL-STD-808 for Type I equipment, except that:

a. Electrical and electronic components of ground support equipment shall be corrosion resistant or suitably protected in accordance with MIL-STD-454, Requirement 15.

b. Cadmium plate shall not be used on components of ground support equipment used in contact with titanium aircraft components.

3.2.6 Standard parts. Except as otherwise specified herein or authorized by the procuring activity, MS, AN, or MIL standard parts shall be used wherever they are suitable for the purpose, and shall be identified by their part numbers.

MIL-S-8512D

Commercial utility parts such as screws, bolts, nuts, cotter pins, etc., may be used provided they have suitable properties and are replaceable by the AN, or MIL standard parts without alteration, and provided the corresponding MS, AN, or MIL part numbers are referenced on the drawings and in the parts lists.

3.2.6.1 Approval of non-standard electronic parts and materials. Approval for the use of non-standard electronic parts and materials shall be in accordance with MIL-STD-749.

3.2.6.2 Replaceability of standard parts. When authorized by the procuring activity to use non-standard parts in lieu of standard parts, the contractor shall arrange the equipment to permit replacement of the non-standard items in the field with standard items. The contractor shall inform the procuring activity of the type, designation and tolerance of the standard item for which the non-standard item is being substituted.

3.2.6.3 Equipment performance. The use of standard materials, parts and processes shall not relieve the contractor of complying with all equipment performance and other requirements set forth in the detail specification or the contract. The approval granted for use of non-standard materials, parts and processes is further contingent on subsequent satisfactory performance during preproduction, quality conformance, and other equipment tests specified in the equipment specification or contract.

3.2.6.4 Unauthorized use of Government designations. Parts which require qualification approval but have not received such approval shall not be identified by MIL-type, MS or AN- part numbers.

3.2.7 Interchangeability. Interchangeable components as defined by MIL-STD-100 shall be capable of installation in the end item, regardless of manufacturer/supplier.

3.2.8 Government furnished equipment (GFE) identification. Government furnished equipment designated for incorporation in, or which is required for fabrication shall be identified on the drawings and in the parts list by reference to its nomenclature, specification number, part number and Federal Stock Number.

3.3 Design. The design of equipment shall represent the optimum combination of desired characteristics; however, the safety of personnel and operating utility shall be primary considerations. Appearance shall be that dictated by functional utility. Nonfunctional detail shall be omitted.

3.3.1 System safety. All Hazard Category levels to the extent specified by the procuring activity shall be evaluated to eliminate or reduce the existing or potential hazards in the order of precedence outlined in MIL-STD-882.

MIL-S-8512D

3.3.1.1 Guards. Suitable guards shall be provided over moving parts such as belts, chains, gears, and linkages with which the operator may come in contact or entangled. Guards or insulation shall be provided for areas or components with normal operating temperatures of 110°F or higher. All guards shall be designed so as to allow inspection of components within.

3.3.1.2 Sharp edges. Sharp edges, projections, and hinged devices with hazardous characteristics shall be avoided in the design and construction of ground support equipment.

3.3.1.3 Electrical shock. The danger to personnel, from electrical shock, shall be avoided by suitable interlocks, groundings means, enclosures or protective devices conforming to the standards specified in MIL-STD-454 Requirement 1. All contacts, terminals and like devices shall be provided with barriers or guards to prevent personnel from accidental contact with voltages greater than 70 volts. Components carrying over 500 volts shall be completely enclosed and interlocked with no bypass devices permitted and shall be marked in accordance with S.8, Requirement 1, MIL-STD-454.

3.3.1.4 Fire prevention. The danger to personnel from fire and explosions shall be avoided by separation of hazardous substances from heat sources, incorporation of spark arresters, suitable vents and drains, and other fire prevention measures. Where fire may be expected to occur under some circumstances, suitable fire extinguishing means or standard fire extinguisher attachment provisions shall be incorporated.

3.3.1.5 Safetying. All fastening devices and other parts which may cause a hazardous condition by working loose in service shall be safetyed or shall have other approved locking means applied. Safety wiring and cotter pinning shall be in accordance with MS-33540. Chemical retaining or sealing compounds meeting the requirements of MIL-S-22473 shall be used in compliance with MS-18069.

3.3.1.6 Warning streamer. Safety and protective equipment attached to the aircraft while on the ground, and which must be removed before flight, shall have a streamer securely attached conforming to MS-51700.

3.3.1.7 Hazardous location. Installed hazardous location test equipment shall be in accordance with MIL-T-21578.

3.3.1.8 Occupational safety and health standards. The contractor will be required to comply with the Occupational Safety and Health Act as applicable.

3.3.2 Mobility. The design of ground support equipment intended to be towed or manually propelled shall be in accordance with MIL-M-8090 for the applicable type and class of mobility as specified herein.

3.3.3 Transportability. Unless otherwise specified, all items of ground support equipment shall be designed to be air transportable. The design for air transportability shall conform to MIL-A-8421 and USAF Specification Bulletin 518.

MIL-S-8512D

3.3.4 Handling provisions. All complete equipment items of such a weight or size that the items may not be readily handled by two men, as specified in MIL-STD-1472, shall have provisions for lifting by means of materials-handling equipment. For design purposes, these lifting means may be defined as portable cranes having a minimum capacity of 5,000 pounds and forklift trucks having a minimum capacity of 2,000 pounds. Hoisting provisions must also be provided for all equipment components or assemblies which must be maintained and are of such a size, weight or location that they cannot be readily handled by one man as specified in MIL-STD-1472. When specified in the detail specification, provisions shall be made for jack pads and eyelets or lugs for towing and tie-down.

3.3.4.1 Hand-carrying. Equipment designed for hand-carrying shall conform in size and weight to MIL-STD-1472.

3.3.4.2 Forklifting. Equipment designed for forklifting shall be provided with heavy-duty reinforced forklift tine guides. The forklift tine guides shall permit safe and positive insertion. The forklift tine guides shall be positioned to assure proper balancing. The forklift tine guide areas shall be constructed to permit the equipment to be lifted without damage.

3.3.4.3 Attachment fittings. Eyelets and attachments for lifting, towing or tie-down shall be in accordance with MIL-STD-209, MS-21236 Type III-2, or be not less than 3-1/2 inches inside diameter for cargo hook application.

3.3.4.4 Location of single-point hoisting eye. When equipment incorporates an integral single point hoisting eye, it shall be placed directly above the center of gravity of the load and attached to a member capable of withstanding the proof load stated in the detail specification.

3.3.5 Servicing provisions. Equipment servicing provisions shall be accessible and suitably identified in accordance with MIL-STD-1472 and shall be compatible with servicing equipment. A means shall be provided to prevent filling the expansion space of liquid tanks.

3.3.5.1 Fuel servicing provisions. Fuel filler caps shall be painted lusterless red, Color No. 31136 of FED-STD-595. The filler cap shall be permanently attached to the equipment by a corrosion-resistant chain. The filler neck shall have a strainer of corrosion resistant metal capable of preventing particles larger than 50 microns from entering the fuel tank. The strainer shall be protected from damage by the fuel nozzle. The strainer shall be removable for cleaning. The filler neck shall have a minimum inside diameter of 2-1/2 inches. Filler openings shall be located so that rigid spout nozzles conforming to MIL-N-52110 may be used for fueling. Scuppers and drains which permit complete drainage, with overboard discharge, shall be provided around the fuel filler area. Areas of equipment subject to fuel spillage shall be protected in accordance with

MIL-S-8512D

MIL-STD-808. The bottom of the fuel tank shall have a water trap area with external drain discharge, capable of being drained from the outside of the enclosure. The fuel type, as required by the detail equipment specification, and the tank capacity shall be stenciled on the equipment adjacent to the fuel-filler opening. Stenciling color shall be in accordance with MIL-STD-808.

3.3.5.1.1 Fuel nozzle ground. Provision shall be made for electrical grounding of the fuel nozzle to the equipment.

3.3.5.2 Oil servicing provisions. Oil filler caps shall be painted gloss yellow, Color No. 13538 of FED-STD-595. Servicing provisions shall be the same as for fuel tanks except filler opening shall be so located that nozzle conforming to MIL-N-26978 and MIL-N-7284 may be used and the filler neck strainer shall be corrosion-resistant metal mesh of 1/16 inch to 1/4 inch opening size.

3.3.5.3 Water and coolant servicing provision. Coolant filler caps of the pressure type shall conform to Drawing B246293 and be painted gloss white, Color No. 17875 of FED-STD-595. The filler neck shall have a minimum diameter of 1-1/2 inches and shall be so located that it may be serviced with a 5-gallon can conforming to MIL-C-13984. The coolant to be used and the tank capacity shall be stenciled adjacent to the filler opening.

3.3.6 Lubrication provisions. Lubrication provisions shall be accessible and compatible with servicing equipment. Grease fittings shall conform to MIL-F-3541. Access shall be provided for the use of a type A-2 lubricator conforming to MIL-L-7312. A lubrication list in accordance with MIL-STD-838 shall be provided with the equipment.

3.3.7 Maintenance provisions. Simplicity of maintenance shall be a general design objective of major importance. The following features shall be incorporated, as applicable, to obtain particular maintenance objectives.

3.3.7.1 Accessibility. Equipment components and systems requiring frequent inspection and maintenance shall be made as accessible as possible. This may be accomplished by incorporation of access doors or removal of the enclosures. Access plates shall be secured to the equipment item by a chain to prevent loss.

3.3.7.2 Storage provisions. For complex equipment items, suitable provisions shall be made for the storage of handbooks or operating and servicing instructions, parts catalogs, and special tools required for field and organization maintenance. Provisions shall be made for the storage of spare expendable parts necessary to maintain operation.

MIL-S-8512D

3.3.7.3 Disassembly provisions. Provisions shall be made for ready disconnection, removal, and replacement of major assemblies or components, such as engines, pumps, and motors which may require replacement, major repair, or overhaul. Whenever possible, this disassembly shall not require removal of other components, assemblies, or draining of fuel, oil, and coolant systems. Pilot guides, slides, and other similar features shall be used where they will facilitate replacement of assemblies or components. The design and selection of disconnecting means for wires, tubing, control cables, etc., shall be such that incorrect assembly is avoided. Disconnection points shall be suitably identified.

3.3.7.4 Operating time provisions. An elapsed time indicator, conforming to the requirements of 3.4.6.4.1 shall be provided when one or more of the following requirements must be met:

- a. Reliability measurement
- b. Maintainability evaluation
- c. Equipment must be inspected and maintained on the basis of hours of operation.
- d. Equipment components must be replaced based on the hours of operation.

3.3.8 Human engineering. In the design of ground support equipment, human engineering provisions shall be in accordance with MIL-STD-1472.

3.3.8.1 Acoustical noise. Acoustical noise limits shall be in accordance with the requirements of MIL-STD-1472, MIL-STD-1474, and AFSC DH 1-3, paragraph entitled, Application of Bioacoustical Criteria.

3.3.9 Structural design criteria

3.3.9.1 General design considerations. The design of ground support equipment shall incorporate acceptable design practices and shall provide for the safe and efficient use by all operating personnel.

3.3.9.2 Rated load. The rated load is defined as that load or combination of forces that the basic equipment must support or resist in a static condition.

3.3.9.3 Design load. The loads used to initiate the design of equipment shall be based on the rated load multiplied by a factor of three (3), unless higher factors are required by the following:

- a. The acceleration encountered during air transport, as defined by MIL-A-8421.

MIL-S-8512D

b. The acceleration and vibration requirements, as defined by MIL-STD-810.

c. The acceleration and loads encountered during towing operations as defined by MIL-M-8090.

3.3.9.4 Stress levels. The stress level, under the static rated load condition, at any point in the structure shall be limited to a level that provides a factor of safety of three (3) against permanent deformation. Where dynamic factors induce loads that exceed 1.5 times the rated load, as defined in 3.3.9.2, then the stress level at any point in the structure shall be limited to a level that provides a factor of safety of two (2) against permanent deformation induced by dynamic loads.

3.3.9.5 Allowable stress for materials. The allowable stress to be used shall be selected in accordance with Government publications and Nationally recognized standards, such as MIL-HDBK-5, ASTM, ASE, etc., as applicable.

3.3.9.6 Proof test load. All equipment, unless otherwise specified shall be subjected to a proof test load to two (2) times the rated load. Equipment that lifts or supports personnel shall be capable of performing all of the design functions under a proof test load. Should the equipment yield, resulting in permanent deformation, it shall be considered a failure.

3.3.10 Jet engine accessory overhaul test stands. Jet engine accessory overhaul test stands shall be designed in accordance with MIL-T-83431.

3.4 Construction. All ground support equipment shall be constructed to withstand all normal conditions of service use without loss of loosening of parts, permanent deformation, or loss of serviceability.

3.4.1 Shock and vibration resistance. Equipment shall be so constructed that it will withstand self-induced vibrations or shock, as well as shock or vibration encountered during shipment, air and ground transport, sea transport and other service conditions.

3.4.2 Wind resistance. Equipment shall be constructed to withstand winds up to 70 mph without damage, when secured or moored. Equipment shall be functional and able to operate in winds up to 40 mph.

3.4.3 Snow loads. Unless otherwise specified, ground support equipment shall be constructed to withstand snow loads of 40 psf.

3.4.4 Fastener. Quick release fasteners and latches shall incorporate suitable locking means to prevent their working loose in service.

MIL-S-8512D

3.4.5 Enclosures. When the nature of a ground support equipment requires that an enclosure be provided, the enclosure shall be designed and constructed to facilitate packing, maintenance, and general utility of the equipment.

3.4.5.1 Access features. Doors shall be provided, as necessary, for access to controls, instruments, servicing provisions, and items requiring frequent maintenance. These doors shall lock securely in the open position and, whenever possible, doors which are open during operation shall not project beyond the outline of the equipment. The enclosure or major partitions shall be readily removable for major maintenance operations and replacement of components. Suitable handling means shall be provided for this removal.

3.4.5.2 Utility features. All enclosures shall be so designed and constructed that permanent damage will not result if the enclosures are used as stands by personnel. Wherever possible, the top surfaces shall be designed with a slope toward the outside to prevent water accumulation. Suitable drip troughs shall be provided to prevent water from draining on the operator, instrument panel, or into the enclosure. The bottom of enclosures shall be provided with necessary drains in order that fluids do not accumulate within the enclosure. Protection shall be provided for equipment lines and wiring by routing the lines and wiring close to structural members where they can be secured if necessary, and by providing suitable protection or clearance where they pass through panels and bulkheads.

3.4.5.3 Enclosure thickness. The enclosure thickness shall be great enough to give panels, primary and secondary structures, sufficient structural rigidity so that they will not lose their shape during extended use. Panels shall be of sufficient thickness to prevent warpage and distortion when welded in place.

3.4.6 Details of components and systems

3.4.6.1 Engines. Engines for vehicular use shall be selected from commercial sources subject to the approval of the procuring activity. Engines currently in use on commercial vehicles shall be given first consideration. Engines for industrial type application shall be selected in accordance with MIL-E-11275 and MIL-E-11276, as applicable from those listed in MIL-HDBK-130. Power requirements for engine driven components shall not exceed 75 percent of the rated continuous horsepower of the engine at the operating rpm.

3.4.6.2 Electric motors. Motors for operation from commercial sources or alternating current ground power plants shall conform to MIL-STD-454, Requirement 46. The motors shall have an adequate rating to operate the driven components continuously at rated capacity under the operating conditions specified herein without exceeding the National Electrical Manufacturers Association recommended temperature limits for the class of insulation used. Twenty-four volt D-C motors shall conform to MIL-M-8609.

MIL-S-8512D

3.4.6.3 Winterization means. Equipment shall be capable of starting and operating at temperatures down to -29°C (-20°F) without external heat being applied. Ground support equipment which is required to operate at -54°C (-65°F) shall incorporate a suitable winterization system to provide heating of equipment for starting and operating with the temperature range of -29°C (-20°F) to -54°C (-65°F). Unless otherwise specified, the winterization system shall be supplied in the form of a kit. The kit may be one of two types. Type I shall be for installation in equipment whose operational usage requires the ability to attain full capability on short notice. Type II shall be for installation when operating conditions allow a preheat interval prior to operation.

3.4.6.3.1 Type I winterization kit. The type I winterization kit shall include all components and materials such as weather seals on compartment doors, insulation where this may be included as a kit installation, heaters, ducting, blowers, heat exchangers, pumps, etc., as are required to meet the performance requirements for the equipment.

3.4.6.3.2 Type II winterization kit. The type II winterization kit shall include all components and materials such as seals, connectors, covers for enclosure openings, adapters, etc., required to meet the performance requirements for the equipment by utilization of a ground heater.

3.4.6.4 Instruments. Selection of instruments shall be governed by the accuracy required in the measurement being made. Panel instruments for primary indications shall be of the best quality available for the purpose. Instruments for secondary indications such as engine and operating instruments need not have this high degree of accuracy.

3.4.6.4.1 Elapsed time indicator. When required (see 3.3.7.4) an elapsed time indicator in accordance with MIL-STD-454, Requirement 51 shall be provided. The indicator shall have a range of 0 to 9,999 hours.

3.4.6.4.2 Electrical instruments. Electrical instruments for primary indications shall conform to MIL-STD-454, Requirement 51.

3.4.6.4.3 Pressure gages. Pressure gages for primary indications shall be of the flush-mounted dial type with a minimum dial diameter of 2-1/2 inches and an accuracy of at least ± 2 percent of full-scale range and shall conform to MIL-G-8402 or GG-G-76, as applicable.

3.4.6.4.4 Temperature gages. Temperature gages for primary indications shall be of the flush mounted dial type with a minimum dial diameter of 2-1/2 inches and with an accuracy of ± 2 percent of full-scale range.

MIL-S-8512D

3.4.6.5 Pressure vessels. Pressure vessels used in ground support equipment shall meet the requirements of the American Society of Mechanical Engineers publications entitled, Code for Unfired Pressure Vessels.

3.4.6.6 Electrical systems. Electrical systems which are connected to aircraft electrical systems shall meet the applicable requirements of MIL-E-25499, MIL-W-5088 and MIL-STD-704. Electrical systems which are used in conjunction with commercial power sources shall conform to the National Electrical Code, NFPA 70, applicable standards of the Joint Industry Conference Standards for electrical equipment, and the National Machine Tool Builders Association machine tool electrical standards. Electrical system components shall conform to standards specified for aircraft hangars as specific occupancy in Article 513 of the National Electrical Code. Vehicle electrical systems shall conform to applicable Ordinance standards for tactical vehicles and to SAE standards for commercial vehicles. Equipment designed for flight line use shall incorporate a 24V dc starting and ignition system and shall be equipped with an external power receptacle conforming to AN2552 for engine starting. Other voltage and phase requirements for electrical equipment shall be as specified in table I. Equipment control systems shall operate on 110V, or less.

Table I. Voltage and phase requirements

Horsepower or full-load current		Voltage	Phase
Hp	Amperes		
1.....	20	28 dc	1
		115 ac	1
		115/230 ac	1
		208 to 230 ac	1
		208 ac	3
		220/440 ac	3
1 to 3	10 to 20	230 ac	1
	5 to 10	208 to 230 ac	3
	5 to 10/2.5 to 5 ..	220/440 ac	3
3 to 10	10 to 20	208 to 236 ac	3
	10 to 30/5 to 15 ..	220/440 ac	3
10 to 100 ...	30 to 250/15 to ...	220/440 ac	3
	125.		

MIL-S-8512D

3.4.6.6.1 Grounding and power return in electrical system. Slip joints, bearings, bearing surfaces, (such as telescoping tubes, sleeve bearings, ball bearings, roller bearings, fifth wheel, lunette, pintle, hydraulic or pneumatic cylinder etc.,) shall not be used as part of the ground circuit or power return. This also applies to communication systems, including ground power telephones. All noncurrent-carrying metal parts shall be grounded by noncurrent-carrying conductors. The grounded circuit conductor (neutral) shall be insulated from the grounding conductors and from equipment enclosures and other grounded parts. Neutral power conductors shall be white and equipment grounding wires shall be green.

3.4.6.6.7 Electronic test equipment. The design and construction of equipment for testing electronic and fire control equipment shall conform to the requirements of MIL-T-21200.

3.4.6.6.8 Hydraulic systems. Hydraulic systems which are connected to an aircraft hydraulic system for testing, trouble-shooting, and servicing purposes shall mate with the ground connections, use fluids specified and be compatible with the vehicle detail specification performance and functional requirements. Such aircraft hydraulic systems are designed and conform to MIL-H-5440 or MIL-H-8891. Reservoirs shall be provided with adequate clearance for filling from one-gallon cans. One (1) or more access plates, at least 6 inches in diameter, shall be provided to permit inspection and cleaning of the reservoirs. Ground equipment with hydraulic systems that are not connected to an aircraft, shall conform to American National Standard Institute, Inc. (ANSI) standards. All hydraulic systems shall be subjected to a proof pressure (leak test) of 1.5 times the system maximum allowable pressure, unless other requirements of tests are specified in the detail specification.

3.4.6.6.9 Pneumatic systems. Pneumatic systems which are connected to an aircraft pneumatic system for testing, trouble shooting and servicing purposes shall mate with ground connections and be compatible with the vehicle detail specification performance and functional requirements. Such aircraft pneumatic systems are designed and conform to MIL-P-5518. Ground equipment connected to aircraft systems shall conform to American National Standards Institute, Inc. (ANSI) standards. All pneumatic systems shall be subject to a proof pressure (leak test) of 1.5 times the system maximum allowable pressure, unless other requirements or tests are specified in the detail specification.

3.4.6.6.10 Tires. Ground support equipment intended to be mobile shall incorporate pneumatic, semi-pneumatic, or solid rubber tires as defined by the detail specification. Pneumatic tires in the larger sizes (6,000 by 16 ply and above), shall be special purpose (FOD) type, with non-directional mud and snow treads in accordance with MIL-T-12459. Pneumatic tires in the remaining smaller sizes shall be vehicular highway type, with any open tread in accordance with ZZ-T-381 (see 6.2.1). Semi-pneumatic and solid tires shall be either rib tread or smooth as appropriate.

MIL-S-8512D

3.4.6.11 Ignition service. Ignition and starting batteries used shall conform to MIL-B-11188.

3.4.6.12 Power service. Power batteries for mobile electrically driven equipment shall conform to MS-15367.

3.5 Performance and product characteristics

3.5.1 General. Performance and product characteristics for ground support equipment shall be based on the functional requirements of the air vehicle which it is intended to support, service conditions under which it is to be used, duration of each use, expected service life, number and capability of personnel who will be available to operate and maintain the equipment, and other operations which will be performed concurrently with use of equipment.

3.5.2 Functional performance. Operating characteristics of ground support equipment shall match the functional requirements of the aircraft to be supported. Sufficient performance margin shall be available for use under the most severe combinations of conditions to be expected for a responsible growth of the aircraft functional requirements and to allow for reduction in performance over the service life of the equipment.

3.5.3 Environmental performance. Equipment shall operate as specified herein and in the detail equipment specification under those extreme climate conditions, defined by MIL-STD-210, as are specified in the detail specification.

3.5.4 Operation in tilted position. Equipment shall be capable of functioning satisfactorily while its plane of operation is no less than 11 degrees from the horizontal plane in any direction.

3.5.5 Undesirable operating characteristics. Equipment shall not exhibit operating characteristics which do not conform to the human engineering requirements of MIL-STD-1472.

3.5.6 Service life. Service life of the equipment shall be not less than that of the aircraft system or component that it supports. However, due to obsolescence and maintenance considerations, this period may be limited to 5 years in operation or 10 years in storage. Shorter service life may be specified for relatively low cost items, such as wing covers, wheel chocks, etc., where service use is unusually severe for the type of materials involved.

3.5.7 Reliability program. The contractor shall conduct a reliability program in accordance with MIL-STD-785. The program plan shall be approved by the procuring activity.

MIL-S-8512D

3.5.7.1 Reliability in MTBF (Mean Time Between Failures). Reliability of the equipment, as defined in MIL-STD-721, shall be in accordance with the minimum acceptable MTBF requirements of the contract or the detail specification.

3.5.8 Maintainability program. The contractor shall conduct a maintainability program in accordance with MIL-STD-470. The maintainability program plan and the maintainability demonstration plan shall be submitted in accordance with MIL-STD-470 and MIL-STD-471 to the procuring activity for approval.

3.5.8.1 Preventive maintenance actions. Substantiating data concerning schedule replacement of parts and components and recommended preventive maintenance actions shall be submitted to the procuring activity for approval.

3.5.8.2 Maintenance times. The equipment, including any built-in test provisions, shall meet the following maintainability requirements in accordance with the contract or the detail specification.

a. A specified maximum time to repair ($M_{max_{ct}}$).

b. A specified maximum preventive maintenance time (M_{pt}).

c. A specified maximum total maintenance time (M) for a specific operating period.

3.5.8.3 Maintenance manhours per maintenance action. The equipment shall be designed to provide a total maintenance manhour per corrective maintenance action not to exceed the requirements of the contract or detail specification.

3.5.8.4 Required technical skill level. Skill level to perform preventive and corrective maintenance action for the equipment shall be at the skill level designated by the contract or detail specification.

3.5.9 Availability. Availability of the equipment, as defined in MIL-STD-721, shall be as required by the detail specification or contract when calculated using the results of the reliability testing and maintainability demonstrations. The following general formula shall be used in determining availability.

$$\text{Availability} = \frac{\text{MTBF}}{\text{MTBF} + \text{MTTR}}$$

when

MTTR = Average time required to restore the system to operational status following a failure or initiation of a preventive maintenance task.

NOTE: If no failure occurs in arriving at the specified availability, one failure shall be assumed.

MIL-S-8512D

3.5.10 Electromagnetic interference. Equipment shall conform to applicable electromagnetic interference requirements of MIL-STD-461 as specified in the detail specification.

3.5.11 Explosion proofing. Equipment and components shall be designed and selected to prevent an explosion if the equipment is intended to be operated within a hazardous location, as defined by the National Electrical Code, NFPA 70.

3.6 Size and weight

3.6.1 General. Size and weight of ground support equipment shall be as small as possible consistent with the requirements specified herein. Except as specified in MIL-STD-1472, maximum size and weight shall be governed by the limitations imposed by the modes of transportation to be employed.

3.6.2 Air movement. Equipment to be moved by air shall have dimensions and allowable weight governed by the requirements of MIL-A-8421, and USAF Specification Bulletin 518.

3.6.3 Rail movement. Unless otherwise specified, equipment prepared for rail shipment shall not exceed the dimensions defined in the International Loading Gauge; not exceeding 124 inches in width and 72 inches in height for transport on a standard 40-foot flat car. Shipping weight shall not exceed 80,000 pounds.

3.6.4 Road movement. The maximum weight of the equipment and the vehicle used to transport it, shall comply with the State regulations that the vehicle will be traveling in. In general, the maximum weight will not exceed 73,280 pounds for a five (5) axle vehicle, or 67,400 pounds for a four (4) axle vehicle.

3.7 Surface finish

3.7.1 Painted surfaces. All painted surfaces shall be finished in accordance with MIL-STD-808.

3.7.1.1 Color. Unless otherwise specified, the color of paint shall be in accordance with FED-STD-595.

3.7.1.2 Color coding. Types of equipment shall be color coded in accordance with MIL-STD-808.

3.7.2 Plated surfaces. Plated finishes for application to equipment or parts thereof shall be in accordance with table V of MIL-STD-808.

MIL-S-8512D

3.7.2.1 Cadmium plate on ground equipment. Cadmium plating shall not be used on jet engine ground equipment or equipment that comes in contact with titanium aircraft components. For unsheltered (Type I, as defined by MIL-STD-808) equipment, nickel plating will be used when painting is unsatisfactory. For sheltered (Type II, as defined by MIL-STD-808) equipment, black oxide treatment will be used when painting is unsatisfactory.

3.8 Nameplate and product markings

3.8.1 Identification of product. Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130. Each item of ground support equipment shall be identified with a permanently attached nameplate, legibly marked with the following information in accordance with MIL-P-15024:

Item name

Type (type designation, if any, otherwise leave blank)

Pertinent characteristics

Specification no.

Manufacturer's part no.

Manufacturer's serial no.

Order no.

Stock no.

Manufacturer's name or trademark

3.8.1.1 Patent information. Patent numbers, patent license notices, or any reference to either shall not appear on a nameplate. If the contractor considers it necessary to apply such a patent notice to the equipment because of some contractual obligation to a licensor, or because of the contractor's interpretation of the patent statutes, the notice may be applied. However, for classified articles of equipment the following conditions apply:

a. The notice shall be supplied as part of a tag, label or sticker which may be easily removed or torn off by the Government inspector.

b. The appearance and location of the tag or sticker shall be such as to render unlikely the overlooking of its removal by the Government inspector at time of quality conformance inspection.

MIL-S-8512D

c. The contractor shall institute a checkup as part of the procedure of packing for shipment to assure that the notice has been removed, and shall point out to the Government inspector any articles from which the notice has not been removed.

3.8.1.2 Pertinent characteristics. Pertinent data with regard to equipment, such as electrical, communications, engines, pumps, etc., should include as applicable, but not limited to, one or more of the following characteristics.

Voltage, alternating or direct current, amperes, watts, rpm horse power, gallons per hour, pounds per square inch, range, etc. If no pertinent data applies, this requirement shall be omitted from the nameplate. The words, pertinent characteristics, shall not be included in the nameplate setup.

3.8.1.3 Manufacturer's part number. When the item is covered by a service production drawing, delete, Manufacturer's Part No., and substitute, Part No. _____, and insert the applicable service assembly drawing number covering the item.

3.8.1.4 Manufacturer's serial number. In those cases where serial numbers are assigned, change Manufacturer's Serial No. _____ to Serial No. _____.

3.8.2 Ways of marking

3.8.2.1 Stencils. Markings for various purposes shall be applied to painted surfaces by stenciling in accordance with the color scheme specified in MIL-STD-808. Stenciled lettering shall be at least 1/2 inch in height.

3.8.2.2 Informative placards. Informative placards shall be provided on complex equipment to give essential operation, servicing and maintenance data. These plates shall be made of metal or engraved plastic. They shall be attached by screws or rivets.

3.8.2.3 Plated or unpainted surfaces. Markings on plated or unpainted surfaces shall be made by embossing, stamping, engraving, or by use of placards.

3.8.3 Special markings

3.8.3.1 Piping and wiring. Piping and wiring diagrams shall be included as necessary, to facilitate identification of components and systems.

3.8.3.2 Mobility. Markings pertaining to mobility shall be provided in accordance with MIL-M-8090.

MIL-S-8512D

3.8.3.3 Air transportability marking. Marking pertaining to air transportability and associated handling operations shall be provided in accordance with MIL-A-8421.

3.8.3.4 Safety marking. Precautionary markings shall be provided as necessary to warn personnel of hazardous conditions and precautions to be observed to insure the safety of personnel and equipment. Electrical equipment shall be marked as required in accordance with Article 510 of the National Electrical Code.

3.8.3.4.1 Retro-reflective markings. Equipment used on or near flight line areas shall be marked with retro-reflective material in accordance with MIL-M-81807.

3.8.3.5 Identification markings. Compartments and storage provisions for removable items shall be identified with the name and quantity of the items stored therein.

3.8.3.6 Servicing markings. Servicing markings shall be identified in accordance with 3.3.5.

3.9 Workmanship. The workmanship displayed in fabrication and assembly of ground support equipment shall be such as to assure, within design limitation, ability of ground support equipment to meet requirements specified herein and in the detail specifications under all applicable conditions. Unauthorized repair, welding, loose rivets, heavy burrs, indiscriminate placement of fasteners or parts introducing high stresses not prescribed in design, are typical signs of inferior workmanship. The standards of workmanship exhibited in any approved sample, subject to any qualification stated in the procuring activity's notice of approval, shall be determinative of the requirements on the contract relative to workmanship insofar as not specifically cover by applicable documents. Applicable specifications for various processes shall be as specified in table II.

Table II. Production processes

<u>Process</u>	<u>Specification</u>
Casting of metals	MIL-C-6021
Splicing of cable	MIL-S-5676
Testing of cable	MIL-C-5688
Welding (Steel)	MIL-W-8611
Tests, A/C welding operator's art	MIL-T-5021
Flash welding (steel)	MIL-W-6873
Brazing	MIL-B-7883
Soldering	MIL-S-6872
Welding (Aluminum)	MIL-W-8604
<u>Inspection</u>	<u>Specification</u>
Magnetic particle	MIL-I-6868
Penetrant	MIL-I-6866
Radiographic	MIL-STD-453
Ultrasonic	MIL-I-8950
<u>Heat treatment</u>	<u>Specification</u>
Steel	MIL-H-6875
Aluminum	MIL-H-6088

3.9.1 Certification of welders. All welding shall be performed by welders certified in accordance with MIL-T-5021 or American Welding Society requirements.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. 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 in the contract or order, the supplier 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.

MIL-S-8512D

4.5.2 Sampling plan and tests. Unless otherwise specified (see 6.2), the contractor shall establish a sampling plan to select random production items and subject them to appropriate tests, or portions thereof, described under 4.6. The sampling plan and test quantity shall be approved by the procuring activity prior to commencing production.

4.5.3 Rejection and retest. When an item selected from a production run fails to meet the specification requirements, no items still on hand or later produced shall be accepted until the extent and cause of failure have been determined and appropriately corrected. The contractor shall explain to the Government representative the cause of failure and the action taken to preclude recurrence. After correction, all tests shall be repeated.

4.5.4 Defects in items already accepted. The investigation of a test failure could indicate that defects may exist in items already accepted. If so, the contractor shall advise the procuring activity of all defects likely to be found and the method of correcting them.

4.6 Test methods. Test methods shall be as specified herein, and as selected from the applicable military specifications, and as specified in the detail specification. During all testing, suitability of safety provisions shall be verified and any hazardous conditions noted.

4.6.1 Examination of equipment. Examination of equipment shall be conducted to confirm adherence to such requirements as, use of specified components, assemblies, materials finish and marking; adherence to dimensional and weight provisions, workmanship, safety, human engineering and maintainability provisions. This examination shall consist of visual inspection of equipment, components and assemblies, simple measurement of dimensions and weight, inspection of production methods, processes, examination of certificates of compliance on purchased materials and components.

4.6.2 Operational demonstration. Equipment with moving parts (such as, steering mechanisms, lifting mechanisms, wheels), engines, electric motors, hydraulic systems, or pneumatic systems, shall be operated to demonstrate a satisfactory performance capability.

4.6.3 Proof test. The equipment shall be loaded to two (2) times the rated load. The equipment shall conform to the requirements established by 3.3.9.

4.6.4 Hydraulic and pneumatic system pressure test. Unless otherwise specified, hydraulic and pneumatic systems shall be subjected to a proof pressure (leak test) of 1.5 times the system's maximum allowable pressure. The equipment shall conform to the requirements established by 3.4.6.8 for hydraulic systems and 3.4.6.9 for pneumatic systems.

MIL-S-8512D

4.6.5 Endurance test. The equipment shall be tested under simulated service conditions, on an accelerated basis, to verify the operational capability. The duration of the test shall be indicative of the operational life of the operation time before scheduled maintenance.

4.6.6 Reliability assurance. It shall be demonstrated that the equipment conforms to the reliability requirements of 3.5.7. The demonstration tests shall follow the contractor's approved test procedures in accordance with MIL-STD-781.

4.6.7 Maintainability assurance. It shall be demonstrated that the equipment conforms to the maintainability requirements established by 3.5.8. The demonstration tests shall follow the contractor's approved tests procedures in accordance with MIL-STD-471.

4.6.8 Mobility. Mobility tests shall conform to MIL-M-8090 for the applicable type of mobility specified.

4.6.9 Air transportability. Air transportability tests shall conform to MIL-A-8421.

4.6.10 Environmental performance. Tests for environmental performance shall be conducted in accordance with appropriate methods of MIL-STD-810. These tests shall include or be followed by, as applicable, suitable performance tests to determine that the equipment withstands and operates satisfactorily in the particular environment.

4.6.11 Operation in tilted position. Equipment shall be operated in the four attitudes attained by tilting it a minimum of 11 degrees in each direction about the longitudinal and lateral axes.

4.6.12 Electromagnetic interference measurement. Equipment shall be subjected to applicable electromagnetic interference test in accordance with MIL-STD-462 as is necessary to demonstrate compliance with electromagnetic interference requirements specified in the detail specification.

4.6.13 Human engineering and safety. Equipment shall be observed during all first article tests to verify that it conform to all human engineering requirements.

4.6.14 System safety. Identification of System Safety hazards shall be accomplished by conducting System Safety analysis as defined in MIL-STD-882 and DH 1-6, Chapter 2, Safety Analysis Procedure. The procuring activity shall specify the required analyses (such as Preliminary Hazard Analysis, Operating Hazard Analysis) with a minimum requirement being an Operating Hazard Analysis. The results of these analysis shall be included in applicable documents.

MIL-S-8512D

4.6.15 Explosion proofing. Equipment and components shall be inspected and evaluated to verify the incorporation of explosion proofing, when so required, in accordance with the applicable requirements of the National Electrical Code, NFPA 70.

5. PREPARATION FOR DELIVERY

5.1 General. Preparation for delivery shall be as specified in the contract or detail specification. Cases covered by this specification are primarily designed to protect the equipment during service usage and storage. Therefore, additional packaging may be necessary when shipment by common carrier is required.

6. NOTES

6.1 Intended use. This specification provides the general requirements for ground equipment used for servicing, maintenance, ground handling, assembly, and other operations which must be performed on aircraft while the aircraft is on the ground being prepared for flight or storage. This does not include training equipment or the ground-based portion of guidance systems. In addition, it provides a guide to provisions to be incorporated in detail specification for specific items of equipment.

6.2 Ordering data. Procurement documents should specify the following as applicable.

6.2.1 Procurement requirements.

- a. Title, number, and date of this specification
- b. When equipment is not required to be air transportable (see 3.3.3)
- c. Whether the equipment shall have provisions for jack pads and eyelets or lugs for towing and tie down (see 3.3.4)
- d. When the stress analysis of the equipment is not required (see 3.3.9.4)
- e. When a proof test load of other than 2 times the rated load is required and the rating thereof (see 3.3.9.6)
- f. When a snow load of other than 40 psf is required and value thereof (see 3.4.3)
- g. When an integral winterization system is required in lieu of a kit type (see 3.4.6.3)
- h. When ZZ-T-381 is specified, the issue to be used shall be ZZ-T-00381L (4) dated 1 September 1971 or later (see 3.4.6.10)

MIL-S-8512D

- i. Minimum acceptable MTBF requirements (see 3.5.7.1)
- j. Skill level(s) to perform preventive and corrective maintenance actions (see 3.5.8.4)
- k. Equipment availability (see 3.5.9)
- l. Applicable electromagnetic interference requirements (see 3.5.10)
- m. Quantity of preproduction test items to be subjected to the preproduction tests
- n. Quantity of items to be subjected to the first article tests (see 4.4.1)
- o. Conditions for submitted and approval of the sampling plan and test quantity (see 4.5.2).

6.2.2 Data requirements. Deliverable data required by this specification is cited as follows when applicable:

- a. System safety analysis (see 3.3.1)
- b. Stress analysis (see 3.3.9.4)
- c. Reliability program and plan (see 3.5.7)
- d. Maintainability program and plans (see 3.5.8)
- e. Maintenance data (see 3.5.8.1)

Such data will be delivered when specified on DD Forms 1423 (Contract Data Requirements Lists) and incorporated into applicable contracts.

6.3 Definitions

6.3.1 Ground support equipment. Ground support equipment is defined as all equipment required on the ground to make a system, support system, subsystem, or end item of equipment operational in its intended environment. This includes all equipment required to install, launch, arrest (except Navy shipboard and shorebased launching and arresting equipment), guide, control, direct, inspect, test, adjust, calibrate, appraise, gauge, measure, assemble, disassemble, handle, transport, safeguard, store, actuate, service, repair, overhaul, maintain, or operate the system, subsystem, end item, or component. This definition applies regardless of the method of development, funding, or procurement. For the purpose of this document the following equipment are excluded from the definition of Ground Support Equipment:

- a. Common powered and nonpowered handtools

MIL-S-8512D

- b. Housekeeping items
- c. Office furniture and equipment and items common to all activities defined in applicable tables of allowance which are required as indirect support.
- d. Common production tools and tooling such as lathes, drills, presses, plating equipment, grinders, induction heaters, etc.
- e. Items which are used only by the contractor.
- f. Personnel equipment (headsets, microphones, etc.).

6.4 Use of industrial standards. Standards of industrial associations, engineering societies, and other Nationally recognized non-governmental standardizing agencies may be used wherever they are applicable and do not conflict with Government or military requirements or standards.

6.5 Use of AFSC Design Handbook. General design criteria, guidance, and background information suitable for use in the design and development of ground support equipment may be obtained from AFSC Design Handbook DH 2-6.

6.6 First article. When a first article is required, it shall be tested and approved under the appropriate provisions of the Armed Services Procurement Regulations (ASPR). The first article should be a first production item. The procuring activity should include specific instructions in all procurement instruments regarding arrangements for examination, test, quantity and approval of the first article.

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

Custodian:
 Army - AV
 Navy - AS
 Air Force - 11

Preparing activity:
 Air Force - 11
 Project No. MISC-0969

Reviewer activity:
 Army -
 Navy -
 Air Force -

User
 Army -
 Navy - MC
 Air Force -

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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)*

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