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## MILITARY SPECIFICATION

### LAUNCHERS FOR GUIDED MISSILES, GROUND AND AIRBORNE, GENERAL SPECIFICATION FOR

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

#### 1. SCOPE

- \* 1.1 Scope. This specification covers the general requirements for all ground and airborne guided missile launchers and related equipment.

#### 2. APPLICABLE DOCUMENTS

- \* 2.1 Issues of documents. 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

- FF-B-171 - Bearing, Ball, Annular (General Purpose).
- FF-B-185 - Bearings, Roller, Cylindrical; and Bearings, Roller, Self Aligning.
- FF-B-187 - Bearing, Roller, Tapered.
- VV-G-632 - Grease, Industrial, General Purpose.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Missile Research & Development Command, ATTN: DRDMI-ESD, Redstone Arsenal, AL 35809 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 1440

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VV-L-800 - Lubricating Oil, General Purpose, Preservative, (Water-Displacing, Low Temperature).

## Military

- \* MIL-C-17 - Cable, Radio Frequency, Flexible, and Semirigid, General Specification For .
- \* MIL-P-116 - Preservation-Packaging, Methods of.
- \*  
MIL-L-2105 - Lubricating Oil, Gear, Multipurpose.
- MIL-F-3541 - Fittings, Lubrication.
- MIL-T-5021 - Tests, Aircraft and Missile Welding Operators' Qualification.
- \*  
MIL-F-5509 - Fittings, Flared Tube, Fluid Connection.
- MIL-J-5513 - Joints, Hydraulic Swivel.
- MIL-R-5674 - Rivets, Aluminum and Aluminum Alloy.
- MIL-C-6136 - Conduit, Electrical, Flexible, Shielded, Aluminum Alloy for Aircraft Installations.
- MIL-W-6858 - Welding, Resistance: Aluminum, Magnesium, Non-hardening Steels or Alloys, Nickel Alloys, Heat-Resisting Alloys, and Titanium Alloys, Spot and Seam.
- MIL-I-6869 - Impregnants For Aluminum Alloy and Magnesium Alloy Castings.
- MIL-S-6872 - Soldering Process, General Specification For.
- \* MIL-T-7743 - Testing, Store Suspension and Release Equipment, General Specification For.

- MIL-B-7883 - Brazing of Steels, Copper, Copper Alloys, Nickel Alloys, Aluminum and Aluminum Alloys.
- MIL-I-8500 - Interchangeability and Replaceability of Component Parts For Aircraft and Missiles.
- MIL-W-8604 - Welding of Aluminum Alloys: Process For.
- MIL-W-8611 - Welding, Metal Arc and Gas, Steels, and Corrosion and Heat Resistant Alloys, Process For.
- MIL-H-8794 - Hose, Rubber, Hydraulic, Fuel, and Oil Resistant.
- MIL-H-8795 - Hose Assembly, Rubber, Hydraulic, Fuel and Oil Resistant

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- MIL-G-10924 - Grease, Automotive and Artillery.
- MIL-W-12332 - Welding, Resistance, Spot, Seam and Projection; For Fabricating Assemblies of Low-Carbon Steel.
- MIL-W-18326 - Welding of Magnesium Alloys, Gas and Arc, Manual and Machine Processes For.
- MIL-G-23827 - Grease, Aircraft and Instrument, Gear and Actuator Screw.

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- MIL-S-45743 - Soldering, Manual Type, High Reliability, Electrical and Electronic Equipment.

MIL-F-45764 - Fluid Lines and Fittings for Missiles and Related Ground Equipment; Fabrication and Installation Of.

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MIL-L-46167 - Lubricating Oil, Internal Combustion Engine, Artic

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MIL-S-46844 - Solder Bath Soldering of Printed Wiring Assemblies

#### STANDARDS

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Federal

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FED-STD-151 - Metals; Test Methods.

FED-STD-595 - Colors.

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## Military

- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-130 - Identification Marking of US Military Property.
- \* MIL-STD-143 - Standards and Specifications, Order of Precedence For The Selection Of.
- MIL-STD-171 - Finishing of Metal and Wood Surfaces.
- \* MIL-STD-186 - Protective Finishing Systems for Rockets, Guided Missiles, Support Equipment and Related Materials.
- MIL-STD-210 - Climatic Extremes for Military Equipment.
- \* MIL-STD-403 - Preparation For and Installation of Rivets and Screws, Rocket and Missile Structure.
- \* 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-781 - Reliability Tests Exponential Distribution.
- \* MIL-STD-785 - Reliability Program For Systems and Equipment Development and Production.
- MIL-STD-810 - Environmental Test Methods.
- MIL-STD-889 - Dissimilar Metals
- MIL-STD-1247 - Markings, Functions and Hazard Designations of Hose, Pipe, and Tube Lines for Aircraft, Missile, and Space Systems.
- \* MIL-STD-1250 - Corrosion Prevention and Deterioration Control in Electronic Components and Assemblies.
- \* MIL-STD-1472 - Human Engineering Design Criteria for Military Systems, Equipment and Facilities.

(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.)

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

- \* AMERICAN NATIONAL STANDARDS INSTITUTE
- \* ANSI-B46.1-1962 - Surface Texture
- \* (Application for copies should be addressed to the American Standards Institute 1430 Broadway, New York, NY 10018.

NATIONAL BUREAU OF STANDARDS

Handbook H28 - Screw Thread Standards for Federal Services.

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

### 3. REQUIREMENTS

3.1 Precedence of specifications and standards. Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143.

- \* 3.1.1 Standard parts. Standard parts currently existing in the military supply system shall be used to the maximum extent consistent with the continuing mission of improving performance, simplifying maintenance or operation, and reducing costs. Bolts, rivets, lubrication fittings, and similar small fasteners or service items incorporated into the launcher design shall conform to the appropriate military standards. Where parts in the military supply system are not applicable, standard commercially available parts shall be used wherever practical with approval of design activity.
- \* 3.1.2 Qualified products. The manufacturer shall be responsible for ascertaining that all assemblies and component parts, entering into the construction of the launcher which require product qualification in accordance with a specification, are listed on respective qualified products list (QPL).

### 3.2 Design.

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- \* 3.2.1 Military design. Launchers developed under the supervision and control of the Government shall be constructed as specified herein, on the applicable drawings, MIL-STD-1472 or in the detail specification.
- 3.2.2 Contractor's design. Launchers developed and produced under the the supervision and control of commercial facilities from their own design and drawings, and meeting the desired military requirements without modification or with only minor modification, shall be constructed as specified herein, on the applicable drawings, MIL-STD-1472 or in the detail specification.
- \* 3.2.3 Reliability. The reliability of the assemblies, components and parts, individually and as a group, in the systems and subsystems, shall be designed, manufactured, assembled, and installed in such a manner as to meet the applicable requirements of MIL-STD-781 and MIL-STD-785 and to meet the required reliability of the overall system.
- \* 3.2.4 Safety features. Suitable features shall be incorporated into all launchers to provide protection for personnel and missiles from all moving parts, and against all other hazards encountered in the actual service operation of the equipment in accordance with Requirement 1 of MIL-STD-454. Launchers which handle nuclear weapons shall be in accordance with the additional safety requirements specified by the procuring activity.
- \* 3.2.5 Corrosion. All assemblies and parts, (such as components, parts, and fasteners) shall be designed, manufactured, assembled, installed, and protected in such a manner as to minimize corrosion to the extent consistent with the design of the system. Corrosion prevention and deterioration control for electronic components and assemblies shall be in accordance with MIL-STD-1250.

### 3.3 Characteristics.

- \* 3.3.1 Minimum weight. To the maximum extent consistent with military service requirements, the launchers shall be of light-weight construction to provide the minimum practicable weight consistent with system transportation requirements.
- \* 3.3.2 Launcher height. The height or silhouette of the launchers and all portions thereof shall be the minimum practicable consistent with system transportation requirements.
- 3.3.3 Vibration and shock. Ground launchers shall be capable of withstanding 30 impact shocks at 15g, each shock having a time duration of  $11 \pm 1$  milliseconds. Airborne launchers shall be capable of withstanding vibration and shock as specified in MIL-T-7743 or the detail specification. Additional or substitute vibration and shock requirements for launchers which handle nuclear weapons shall be as specified by the procuring activity.

\* 3.3.4 Environment. The launchers shall be capable of withstanding the environmental conditions as hereinafter specified. Environmental conditions for launchers which handle nuclear weapons shall be in accordance with the detail requirements of the procuring activity if other than specified herein.

3.3.4.1 Storage and transit. Unless otherwise specified by the procuring activity, the launchers and launching equipment shall be capable of safe storage and transportation without the impairment of their required capabilities from the effects of the climatic extremes as specified for world-wide storage and transit in MIL-STD-210 and MIL-STD-810.

\* 3.3.4.2 Operating temperatures. Ground launchers shall be capable of efficient operation over a temperature range of -54° Celsius (C) (-65° Fahrenheit (F) to + 54°C (+ 125°F) and relative humidities up to 95 percent or as specified in the detail specification. Operating temperatures for airborne launchers shall be as specified in the detail specifications.

3.3.4.3 Wind. Ground launchers shall be capable of operating without system operation degradation in winds of 60 miles per hour, with maximum gusts of 90 miles per hour.

3.3.4.4 Dust, sand and snow. Ground launchers shall be adequately protected against damage so that performance is not impaired by dust, sand, or snow being driven by winds of 60 miles per hour. Airborne launchers shall be capable of operation without degradation after subjection to 60 minutes of air blown sand as specified in MIL-T-7743, applicable requirements of MIL-STD-810 and the detail specification.

\* 3.3.4.5 Salt laden air. Ground launchers shall not be damaged nor have their performance impaired by salt laden air as encountered in coastal areas. Airborne launchers shall be capable of satisfactory operation after subjection to 120 hours salt spray as specified in FED-STD-151, MIL-STD-810 or in the detail specification.

\* 3.3.4.6 Waterproofness. Launchers shall not be damaged nor have their performance impaired by entrance of casual water during heavy rains, or from such causes as splash, spray, or condensation in accordance with MIL-STD-810.

\* 3.3.4.7 Humidity. Launchers shall be capable of withstanding humid conditions as set forth in MIL-STD-810 or the detail specification.

3.3.4.8 Acceleration. Airborne launchers shall be capable of withstanding acceleration as specified in MIL-STD-810 or the detail specification.

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3.3.4.9 Temperature and altitude. Airborne launchers shall perform satisfactory at altitude and under high and low temperature conditions in accordance with MIL-STD-810 and the detail specification.

3.3.4.10 Static load. Airborne launchers shall be capable of performing without degradation under the static loading conditions specified in the detail specification.

3.3.4.11 Power supplies. Environmental test requirements on power supplies contain in applicable airborne launchers shall be in accordance with MIL-STD-810 and detail specification.

\* 3.3.4.12 Fungus. Launchers shall be capable of withstanding conditions which produce fungus as set forth in MIL-STD-810.

\* 3.3.4.13 Vibration, shocks, and transportability. Launchers shall be capable of withstanding vibration, shock, and transportability conditions as set forth in MIL-STD-810 or the detail specification.

\* 3.3.5 Maintainability. Maintainability shall be in accordance with MIL-STD-470. The installation of parts requiring special tools shall be minimized.

3.3.5.1 Ease of maintenance. All maintenance points shall be conveniently located for ease of maintenance per MIL-STD-1472. The design shall reduce to a minimum the frequency of required servicing and maintenance operations and replacement time of major assemblies, and shall facilitate general maintenance, repair and servicing operations. Maximum organizational and field level repair with a minimum of special skills and facilities shall be provided.

\* 3.3.5.2 Continuous operation. Ground launchers shall be capable of 23 hours continuous operation without routine servicing. Airborne launcher requirements shall be in accordance with the detail specification.

3.3.5.3 Ease of operation. Operating controls shall be conveniently located and shall be capable of being operated by an operator wearing artic type mittens in accordance with MIL-STD-1472.

\* 3.3.5.4 Ease of adjustment. Necessary adjustment points shall be conveniently located so as to provide ease of adjustment for proper operation in accordance with the requirements of MIL-STD-1472.

\* 3.3.6 Interchangeability. Interchangeability requires that a given item be functionally and physically replaceable by the exchange item. All parts having the same part number shall be interchangeable without modification with each other with respect to installation and performance in accordance with MIL-I-8500.



- \* 3.3.7 Human engineering. Human engineering requirements shall be in accordance with MIL-STD-1472 and as specified herein.

#### 3.4 Manufacture.

##### 3.4.1 Materials.

- \* 3.4.1.1 Specified materials. Except as modified in 3.4.1.3, all materials shall be as specified in the detail specification or on the Government approved documentation.

3.4.1.2 Conflict. In any case of conflict between procurement documents regarding material specification, the discrepancy shall be referred to the procuring activity for resolution.

- \* 3.4.1.3 Commercial quality. When the material specified as commercial quality, first quality, or by name in general commercial use, such as steel, forged steel, bronze, cast iron, brass, or drill rod; the requirement shall be defined to mean material having properties which are thoroughly known and understood by the trade, and that such properties quality the material, without reasonable doubt, for the intended purpose.

3.4.1.4 Critical and strategic materials. Materials shall be selected on the basis of suitability and relative availability, taking into account the additional restrictions created during time of national emergency. Subject to satisfactory operations of the particular equipment, the design shall incorporate the least critical and strategic material.

- \* 3.4.1.5 Reclaimed materials. Reclaimed materials shall be used to the maximum extent possible without jeopardizing the intended use or reliability of the equipment.

##### 3.4.2 Construction.

3.4.2.1 Processes. To the maximum extent practicable, design shall utilize fabrication processes standard to domestic production of similar items. Processes requiring highly specialized equipment and labor shall be minimized and used only where alternative methods providing a completely interchangeable part are not possible.

3.4.2.2 Metal forming. Consideration shall be given to the use of casting, forging, stamping, extruding, and other processes in which the relative advantages of economy and efficient use of materials may be obtained and which are capable of greatly accelerated production without severe manpower or facilities limitations.

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3.4.2.3 Welding.

3.4.2.3.1 Welding of steels. Welding of steels, corrosion and heat resistant alloys shall be in accordance with MIL-W-8611.

3.4.2.3.2 Spot welding. Spot and projection resistance welding of low-carbon steel shall be in accordance with MIL-W-12332.

\* 3.4.2.3.3 Nonferrous metals. Welding of nonferrous metals shall be in accordance with MIL-W-6858 for spot and seam welding, or MIL-W-8604 and MIL-W-18326, as applicable, for other processes.

3.4.2.4 Brazing. Brazing of steel, copper, copper alloy, aluminum, aluminum alloys, and nickel alloys shall be in accordance with MIL-B-7883.

\* 3.4.2.5 Soldering. Soldering nonelectrical (structural) joints or seams shall be in accordance with MIL-S-6872. Manual soldering and printed wiring soldering of electrical and electronic connections shall be in accordance with MIL-S-45743, MIL-S-46844, or Requirement 5 of MIL-STD-454. MIL-S-6872 shall in no case be used for electrical or electronic soldering.

\* 3.4.2.6 Certification. Welding shall be performed by welders certified in accordance with class A of MIL-T-5021.

3.4.3 Construction techniques.

3.4.3.1 Threaded fasteners.

\* 3.4.3.1.1 Bolting. Bolts and screws that may be subject to high stress shall be made of alloy-steel and shall be heat treated as required to produce the necessary physical properties.

3.4.3.1.2 Thread form and dimensions. Threads of bolts, screws, and other threaded parts, unless otherwise required on the applicable drawings, shall be American National form of dimensions as set forth in Handbook H28. Unless otherwise specified, threads shall not be swaged, peened, staked, or otherwise permanently fixed.

\* 3.4.3.1.3 Thread extension. Bolts and screws shall extend not less than one full thread beyond the nut; and shall extend not more than two full threads where excessive projection of the thread may be hazardous to personnel or may jeopardize the operation of the equipment.

- \* 3.4.3.1.4 Metals parts. When metal parts are to be bolted together and locking features are deemed necessary considering service life, personnel safety factors, etc., they shall be secured by the use of safety wire or self-locking nuts. Bolts or machine screws, when not intended for use with nuts and when not suitably locked by other means, shall have drilled heads for locking wires, or shall be secured with lock washers. Requirements for dissimilar metals used in combination and surfaces of dissimilar metals shall be in accordance with MIL-STD-889.
- \* 3.4.3.1.5 Wood parts. When wood parts are bolted to metal parts with the nut against a metal surface, the bolt shall be secured by the use of self-locking nuts. When wood parts are bolted to other wood parts, or when wood parts are bolted to metal parts with the nut against the wood part, a suitable flat washer shall be used under the nut, and the end of the bolt shall be staked or lightly peened.
- \* 3.4.3.1.6 Rivets. Rivets shall not be used to mount parts when they may require removal for maintenance of the equipment. When riveting is to be performed by the pressure method, ferrous rivets 3/8 inch in diameter and smaller may be driven cold. Ferrous rivets larger than 3/8 inch diameter shall be driven hot, as required for its intended purpose.
  - 3.4.3.1.6.1 Rivets for aluminum and magnesium alloys. Rivets for aluminum and magnesium alloys shall be in accordance with MIL-R-5674.
  - \* 3.4.3.1.6.2 Preparation and installation of rivets (for Army only). Unless otherwise specified in the detail specification or other approved documentation, preparation and installation of rivets for rocket and missile structural applications shall be in accordance with MIL-STD-403.

#### 3.4.4 Dimensions and finishes.

3.4.4.1 Dimension tolerance. Dimension tolerances shall strictly conform to the applicable specifications and drawings unless changes are approved by the procuring activity. Unless otherwise specified, dimensional requirements and tolerances shall apply plating or other surface treatment has been applied; except that when paint or other organic coating is specified, dimensional requirements and tolerances shall apply before the application of the coating.

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3.4.4.2 Surfaces. Surface finishes of metal parts shall be as indicated on the applicable drawing or detail specification by numerical values in accordance with ANSI B46.1- 1962.

\* 3.4.4.3 Corners and edges. Unless otherwise specified, metal parts shall have corners and sharp edges broken, except that sheet metal parts 1/8 inch or less thick may beveled. Requirements shall be in accordance with detail documentation.

3.4.5 Gears. Gear assemblies shall be properly aligned and meshed, and shall be capable of operation without interference, tight spots, loose spots, or other irregularities. Where required for accurate adjustment, gear assemblies shall have a minimum of backlash consistent with design requirements.

3.4.6 Removable covers. Captive fasteners shall be used on all covers to be removed during maintenance. In addition, a chain shall be used on removable covers for which no convenient location for depositing the cover is expected to be available during maintenance.

\* 3.4.7 Bearings. Wherever practicable, permanently sealed and lubricated bearings shall be used throughout the equipment. Where lubricated sleeve type bearings are required, they shall be constructed of oil-impregnated phosphor bronze. Provisions in accordance with bearing manufacturers' recommendations shall be made for replenishing lubricating reserves as required by intended service. Installation of grease and oil seals shall provide maximum accessibility for replacement and, where feasible, wearing surfaces shall be replaceable.

3.4.7.1 Ball bearings. Ball bearings shall be in accordance with FF-B-171, and shall be applied as specified therein.

3.4.7.2 Roller bearings. Roller bearings shall be in accordance with FF-B-185 and FF-B-187, and shall be applied as specified therein.

\* 3.4.8 Lubricants. Lubricants shall conform to the following specifications as best suited for the particular application: VV-G-632, VV-L-800, MIL-L-2105, MIL-G-23827, MIL-G-10924, and MIL-L-46167. (For example, "sealed-for-life" antifriction bearings shall be lubricated with material conforming to MIL-G-23827). If a proprietary lubricant is proposed, its use shall be justified. Lubricants for exposed, machined or polished surfaces shall be of a type that does not collect dirt or other foreign particles.

3.4.8.1 Lubrication fittings. Unless otherwise specified, the lubrication fittings shall be in accordance with MIL-F-3541.

\* 3.4.9 Castings. All casting shall be sound, dense, and free from castings defects. Castings for launchers which handle nuclear weapons shall be in accordance with the detail requirements of the procuring activity.

\* 3.4.9.1 Casting inserts. Inserts, when required in castings, shall be grooved to provide satisfactory bonds and shall be fabricated from higher melting alloys than the casting alloy. Defects in connection with the use of inserts such as partial alloying, poor bonds, and shrinkage cracks shall not be present.

3.4.9.2 Casting pinholes. Castings which "weep" or "sweat" when employed as fluid containers or under hydrostatic or pneumatic pressures shall be impregnated. Aluminum-alloy or magnesium alloy castings shall be impregnated in accordance with method C of MIL-I-6869.

3.4.9.3 Finishing of castings. All castings whether impregnated or not shall be given satisfactory conditioning treatments and shall be able to withstand corrosion.

\* 3.4.10 Hydraulics. Unless otherwise specified, herein or in the detail specification, the design and installation of hydraulic systems shall be in accordance with Requirement 49 of MIL-STD-454.

3.4.10.1 Hydraulic lines. Hydraulic lines shall be of the hose or rigid tubing type as applicable. They shall be of high quality material, suitable for the intended purpose, and shall meet all requirements of the applicable Government material specification for the item.

3.4.10.2 Rigid tubing. Rigid tubing shall be either corrosion-resistant steel or aluminum-alloy and shall be fabricated and installed in accordance with MIL-F-45764 and as specified herein.

\* 3.4.10.3 Installation of small size tubing. Tubing of 3/16 inch or less in outside diameter shall not be used in the hydraulic system unless it is approved by the procuring activity.

3.4.10.4 Straight tube lines. Straight tube lines shall not be used in the hydraulic system when installed between two rigid connections. Loops shall be provided in the tubing as necessary to insure proper alignment or installation. Relative motion may be permitted between the two ends of the tubing without the use of swivel joints or hose, if the calculated stress in the tubing due to this relative motion is less than 10 percent of the ultimate strength of the tubing and vibration effects of the tubing mass are not detrimental.

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3.4.10.5 Hoses. The use of hose in launcher hydraulic systems shall be kept to a minimum. However, where there is relative motion between two points in a line, except as otherwise specified herein for rigid tubing and less swivel joints are used, there shall be a hose connection between the two points. Unless otherwise specified, the hose assemblies used in pressure lines shall be in accordance with MIL-H-8794 and MIL-H-8795.

3.4.10.6 Fittings. Fittings used with aluminum-alloy lines may be either aluminum-alloy or steel fittings. Aluminum-alloy fittings shall not be used with stainless lines. Only straight-thread fittings shall be used in hydraulic systems. Fittings other than swivel joints and self-sealing couplings shall be in accordance with MIL-F-5509. Swivel joints shall be in accordance with MIL-J-5513.

#### 3.4.11 Supports.

3.4.11.1 Rigid tubing. Unless otherwise specified, all hydraulic rigid shall be rigidly supported by tube supports. Provisions shall be made for the change in tubing length due to contraction and expansion. Multiple block type tube supports may be used. Tube supports shall be designed and installed so as to prevent injury to the tubing.

3.4.11.2 Hose supports. The support of a flexible line shall be such that it will never tend to cause deflection of the rigid lines under any possible relative motion that may occur. Flexible hose between two rigid connections may have excessive motion restrained where necessary but shall never be rigidly supported.

3.4.12 Power supply. The primary power supply shall be as specified in the detail specification.

\* 3.4.13 Electrical and electronic equipments. Unless otherwise specified herein, radio frequency cables, multiconductor cables, and interconnection wires and cables shall be in accordance with Requirements 65, 66, and 71, respectively of MIL-STD-454.

3.4.13.1 Cable and cable assemblies. Various components and systems shall be interconnected in so far as possible with individual preassembled cable assemblies, keeping the number of such assemblies to a minimum. These assemblies shall utilize proper grounding and shielding where necessary to minimize noise pickup and undesirable coupling between circuits.

3.4.13.2 Protection. Wires and cables shall be so placed and protected as to avoid contact with rough or irregular surfaces or sharp edges, under specified services conditions. Wires shall not be bent sharply where they enter insulation material. Where wires run through holes in metal partitions, shields, and the like, they shall be protected by suitable grommets or bushings. Wiring shall be clamped to the launcher structure as required.

3.4.13.3 Clearance. Clearance between solder connections or bare connections, on terminal boards or other parts, shall be at least 1/4 inch unless use of specified parts makes such clearance impracticable.

3.4.13.4 Splicing. Wires in a continuous run between two terminals shall not be spliced during assembly of the equipment.

3.4.13.5 Insulating sleeving. Insulating sleeving shall not be used unless specified for a particular application or specifically approved by the procuring agency. Approval will not be granted when other means of insulation are practicable or when the maximum instantaneous potential across the insulation may exceed 600 volts.

\* 3.4.13.6 Connections. Soldering leads, lugs, and terminals shall be constructed of a material, or a material with plating or coating, such that they will be entirely suitable for the intended use. All electrical connections shall be mechanically secure and electrically continuous. Wires subject to breakage at the connections shall be provided with terminals that grip the wire insulation. Solderless terminals may be used on tinned, stranded wire in power or audio circuits, but other wire connections shall be soldered. Where practicable, wires soldered to terminals shall be looped at least once and not more than twice around the terminals before soldering.

3.4.13.7 Grounding. Ground connections to shields and to other mechanical parts, except the chassis or frame, shall not be made to complete electrical circuits but only to eliminate high-potential A.C. points. Ground connections to the chassis or frame shall be made mechanically secure by soldering to a spotwelded terminal lug or to a portion of the chassis or frame that has been bent up to form a soldering lug, or by using a terminal on the ground wire and securing the terminal by a screw, flat washer, and lock washer. When the chassis or frame is of steel, the metal around the screw hole shall be masked when the chassis or frame is given a protective finish.

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3.4.13.8 Radio Frequency. Radio frequency interference shall be controlled in accordance with MIL-STD-461 and MIL-STD-462.

\* 3.4.13.9 Safety and protective devices. Unless otherwise specified herein, safety and protective devices for personnel and equipment shall be in accordance with Requirement 1 of MIL-STD-454.

3.4.14 Transmission lines and fittings.

3.4.14.1 Radio-frequency cables. Unless otherwise specified, all inter-connecting cables carrying pulse or radio-frequency signals shall be of the coaxial type conforming to MIL-C-17 and shall be terminated in the characteristic impedance of the cable used.

3.4.14.2 Power and control cables. All power and control cables shall be terminated in the lowest impedance practical for the particular application.

3.4.14.3 Fittings. Disconnect plugs, receptacles, and multiple line connectors, as applicable, shall be utilized where practicable in the electrical system of launchers.

\* 3.4.14.4 Hazardous circuits. All hazardous circuits such as those involved in fuze arming, warhead detonation, command destruct, and propulsion system ignition shall be completely isolated from all other circuits and shall be clearly marked in a distinctive manner to indicate that they are hazardous circuits. Wherever practicable, these circuits shall be carried in an isolated conduit and through connectors where so used, shall be clearly marked or color coded to indicate that hazardous circuits are being carried therein. Test points or connectors to test plugs shall not be made to any hazardous circuits.

3.4.14.5 Conduit and conduit fittings. All sharp edges, burrs, and rough surfaces of threads shall be removed from conduit and any other part with which the insulation of electrical wiring comes in contact. Flexible shielded conduit shall be in accordance with MIL-C-6136.

3.4.15 Treatment and paintings. Unless otherwise specified on the applicable drawings or detail specification, metal and wood surfaces shall be treated and painted in accordance with MIL-STD-171 or MIL-STD-186, as applicable.

3.4.15.1 Color. Color of paint shall be in accordance with FED-STD-595.



3.4.16 Identification of products. Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130. Identification of pipe, hose, tubing and conduits for launchers and facilities shall be in accordance with MIL-STD-1247.

- \* 3.4.17 Workmanship. Workmanship shall be high quality throughout to insure proper operation and service life. Workmanship shall conform to the requirements of MIL-STD-454 Requirement 9 for all electrical/electronic equipment which is a part of the launcher.

#### 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, the supplier may utilize 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 specifications where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

- \* 4.2 Sampling. Requirements and procedures for first article, qualification and acceptance test sampling shall be as specified in the detail specification or approved Government document.
- \* 4.3 Classification of defects. The classification of defects and the associated AQL's shall be as specified in the detail specification.
- \* 4.4 Test methods and procedures. The methods and procedures for performing required tests shall be as specified in the detail specification, MIL-STD-810, or other approved Government documents.

#### \* 5. PACKAGING

5.1 Preservation and packaging. Preservation and packaging of each launcher and component parts shall be as specified in the detail specification or approved Government document. Methods of preservation shall be in accordance with MIL-P-116, as applicable.

5.2 Marking. Marking for shipment shall be in accordance with MIL-STD-129, as applicable.

#### 6. NOTES

- \* 6.1 Intended use. This specification is intended for use in specifying general requirements for ground and airborne launchers for guided missiles and related equipment.
- \* 6.2 Ordering data. Procurement documents should specify the following:

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- (a) Title, number, and date of this specification.
- (b) Title, number, and date of the detail specification or drawing for the equipment (see 6.5).
- (c) Other applicable documents required.
- (d) The tailored requirements of this specification and all other documents referenced herein, as applicable (see 6.6).

\* 6.3 Definitions.

6.3.1 Approval by procuring activity. For purpose of this specification, approval by procuring activity is defined as release or approval by the Government technical activity having cognizance of, or jurisdiction over, a particular launcher design.

6.4 Contractor responsibility concerning prototype equipment. When equipment is to be manufactured from drawings, sketches, or other material furnished by the procuring activity, or patterned after prototype or other equipment furnished by the procuring activity as a model, the furnishing of any such item does not constitute a waiver to any requirements of this related specification. It shall be the responsibility of the bidder or contractor to determine whether or not the use of such material conflicts in any manner with the requirements of the applicable specifications, and to notify the procuring activity in writing of any changes that are considered to be necessary in either materials or specifications.

\* 6.5 Detail specification and drawings. Since this specification covers only the general requirements for design characteristics, materials, construction, dimensions, finishes, hydraulic lines and fittings, supports, and electrical and electronic equipment; the detail specification and drawings (see 6.2.b), contract or order should specify the specific requirements from the multiple choices or exceptions specified herein, and all additional requirements.

\* 6.6 Tailored requirements. The requirements of this specification should be evaluated so as to include in the contract only those minimum necessary provisions required for the specific application, assembly, or system.

\* 6.7 Changes from previous issue. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

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## Preparing activity:

Army - MI

(Project No. 1440-0050)

## Review Activity:

Army - AT  
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MIL-L-11992C		LAUNCHERS FOR GUIDED MISSILES, GROUND AND AIRBORNE,	
NAME OF ORGANIZATION AND ADDRESS		CONTRACT NUMBER	
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