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MILITARY SPECIFICATION

MISSILES, GUIDED, DESIGN AND CONSTRUCTION, 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 establishes the requirements for the performance, design, construction, and inspection of guided missiles. Acquisition of guided missiles shall be covered by a detail specification or specification sheet to be prepared by the contractor or acquiring activity.

1.2 Classification. Missiles designed, constructed, and inspected under this specification are classified as follows:

a. Experimental
b. Developmental
   Prototype
c. Production

1.3 Synthesis. The following attributes of the missile shall be specified:

a. Type of guidance system (infrared, active, semi-active, passive, etc).
b. Type of propulsion system (solid rocket, ramjet, turbofan, etc).
c. Type of warhead (nuclear, high explosive, etc).
d. Type of control.

Beneficial comments, (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to the Naval Air Engineering Center, Engineering Specifications and Standards Department (Code 93), Lakehurst, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

1.4 Mission profile. The mission profile of the guided missile shall be specified.

2. APPLICABLE DOCUMENTS

2.1 Government documents,

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

SPECIFICATIONS

Military

MIL-P-116	Preservation - Packaging, Methods of
DOD-D-1000	Drawing, Engineering and Associated List
MIL-M-3947	Weight and Balance Control System for Guided Missiles and Space Launch Vehicles
MIL-B-5087	Bonding, Electrical, and Lightning Protection, for Aerospace Systems
MIL-T-5422	Testing, Environmental, Airborne Electronic and Associated Equipment
MIL-E-6051	Electromagnetic Compatibility Requirements, Systems
MIL-H-6875	Heat Treatment of Steels (Aerospace Practice, process for)
MIL-F-7179	Finishes and Coatings: Protection of Aerospace Weapons Systems, Structures and Parts; General Specification for
MIL-S-7742	Screw Threads, Standard, Optimum Selected Series: General Specification for
MIL-E-8189	Electronic Equipment, Missiles, Boosters and Allied Vehicles, General Specification for
MIL-I-8500	Interchangeability and Replaceability of Component Parts for Aerospace Vehicles
MIL-A-8591	Airbcrne Stores, Associated Suspension Lugs, and Aircraft Store Interface (Carriage Phase), General Design Criteria for
MIL-M-8856	Missiles, Guided, Strength and Rigidity, General Specification for
MIL-A-8868	Airplane Strength and Rigidity Data and Reports
MIL-P-9400	Plastic Laminate Materials and Sandwich Construction, Glass Fiber Base, Low Pressure Aircraft Structural, Process Specification Requirements
MIL-D-18243	Demonstration of Airborne Target and Missile Systems, General specification for

SPECIFICATIONS - Continued.

Military

MIL-T-18303	Test Procedures, Reproduction, Acceptance and Life for Aircraft Electronic Equipment, Format for
MIL-N-18307	Nomenclature and Identification for Electronic, Aeronautical, and Aeronautical Support Equipment Including Ground Support Equipment
MIL-s-23069	Safety Requirements, Minimum, for Air Launched Guided Missiles
MIL-H-46855	Human Engineering Requirements for Military Systems, Equipment and Facilities

STANDARDS

Federal

FED-STD-595	Color (Requirements for Individual Color Chips) (3 x 5 Supplements)

Military

MIL-STD-108	Definitions of and Basic Requirements for Enclosure for Electric and Electronic Equipment
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-167	Mechanical Vibrations of Shipboard Equipment
MIL-STD-176	Height and Balance Data Reporting Forms for Guided Missiles and Space Launch Vehicles
MIL-STD-210	Climatic Extremes for Military Equipment
MIL-STD-454	Standard General Requirements for Electronic Equipment
MIL-STD-461	Electromagnetic Interference Characteristics Requirements for Equipment
MIL-STD-648	Design Criteria for Specialized Shipping Containers
MIL-sTD-681	Identification Coding and Application of Hook Up and Lead Wire
MIL-STD-704	Aircraft Electric Power Characteristics
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-838	Lubrication of Military Equipment
MIL-STD-882	System Safety Program for Systems and Associated Subsystems and Equipment: Requirements for
MIL-STD-965	Parts Control Program
MIL-STD-1316	Fuze, Design Safety, Criteria for
MIL-STD-1367	Packaging, Handling, Storage, and Transportability Program Requirements (For System and Equipments)
MIL-STD-1385	Preclusion of ordnance Hazards in Electromagnetic Fields; General Requirements for

STANDARDS - Continued.

Military

MIL-STD-1472	Human Engineering Design Criteria for Military Systems, Equipment and Facilities
MIL-STD-1648	Criteria and Test Procedures for Ordnance Exposed to Aircraft Fuel Fire
MIL-STD-1670	Environmental Criteria and Guidelines for Air-Launched Weapons
MIL-STD-1679	Weapon System Software Development
MIL-STD-1695	Environments, Working, Minimum Standards for

HANDBOOKS

Military

MIL-HDBK-5	Metallic Materials and Elements for Aerospace Vehicle Structures
MIL-HDBK-23	Structural Sandwich Composites
MIL-HDBK-235	Electromagnetic (Radiated) Environment Considerations for Design and Procurement of Electrical and Electronic Equipment PART-1

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications fom a part of this specification to the extent specified herein.

DEPARTMENT OF DEFENSE

DOD 4145.26	DOD Contractor's Safety Manual for Ammunition, Explosives (MRA&L)

NAVAL AIR SYSTEMS COMMAND (NAVAIR)

AS-4449	Safety Requirements for Air Launched Guided Missile, Target Drone, Aircrew Escape, and Rocket Propulsion Systems
WS-6536	Process Specification, Procedures and Requirements for Preparation and Soldering of Electrical Connections
AR-29	Frequency Allocation and Equipment Spectrum Signature, Requirements for
AR-106	Commonality of Digital Computer Hardware and Programming Languages within a Weapon System, Requirements for

Military

MIL-BUL-544	List of Federal/Military/Industry Specifications and Standards and Navair Series Documents Approved by the Naval Air Systems Command

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

2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

AMERICAN NATIONAL STANDARDS INSTITUTE

ANSI B 46.1	Surface Texture (Surface Roughness, Waviness and Lay)

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

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

3. REQUIREMENTS

3.1 Detail specification or specification sheet. The individual item requirements shall be as specified herein and in accordance with the applicable detail specification or specification sheet. In the event of any conflict between the requirements of this specification and the detail specification or specification sheet, the detail specification or specification sheet, as applicable, shall govern. (If a specific requirement specified herein is not required for an item, it shall be so indicated on the specification sheet (eg Shock - N/A.)).

3.2 First article. When specified, a sample shall be subjected to first article inspection (see 4.8. and 6.3).

3.3 Major componets list. Major components which comprise the missile shall be listed as follows (see 3.9):

a. Development missiles: Major component Identification shall be arranged in an indetured relationship.

b. Production missiles: The relationship among major components that make up the missile shall be arranged in a specification tree.

3.4 Government property list.

3.4.1 Government furnished property list. Government furnished equipment, which the missile shall be designed to incorporate, shall be listed. This list shall identify the property by reference to its nomenclature, specification number or part number, quantity per missile, weight, etc.

3.4.2 Government loaned property list. A list of Government property loaned to the contractor for use with the missile shall be complied and listed (see 3.4.1).

3.5 Design disclosure. Engineering drawings and associated data shall be prepared in accordance with DOD-D-1000.

3.6 Materials.

3.6.1 Flammable materials. The use of materials, excluding those used in warheads, which may support combustion, or be capable of causing an explosion, shall be avoided.

3.6.2 Wiring (hook-up). Hook-up wire shall be in accordance with MIL-STD-454, Requirement-20. The size of wire leads supplied integrally with parts shall be controlled by the specifications for those parts. In addition, lightweight insulated wire including shielded and multiconductor construction acceptable to the acquiring activity may be used. wiring size shall be at least 22 American wire Gage (AWG).

3.6.3 Insulation on conductors. Sleeve insulation may be used on conductors provided slippage which would expose the conductor is prevented.

3.6.4 Soldering. Soldering shall be in accordance with MIL-STD-454, Requirement 5 and WS-6536.

3.6.5 Resistance welds for electrical connections. Resistance welds for electrical connections shall be in accordance with MIL-STD-454, Requirement 24.

3.6.6. Electron beam welding. Electron beam welding techniques may be used.

3.6.7 Encapsulation and embedment (potting). Encapsulation and embedment (potting) shall be in accordance with MIL-STD-454, Requirement 47. Polyurethane elastomeric materials, so used, shall have been tested and found suitable for the missile environment.

3.6.8 Elastomeric materials. Elastomeric components shall be fabricated from materials having maximum practicable ozone and aging resistance consistent with performance requirements.

3.5.9 Selection of materials, processes and parts. Selection of materials, processes and parts shall be in accordance with documents listed in MIL-BUL-544. Materials, processes or parts not listed in these documents shall be considered as nonstandard items. Standard components listed on the appl icable Qualified Products List (QPL) shall be used whenever possible. components not listed on QPLs are considered as nonstandard units, and shall be used only when standard components are not suitable for the design application, and when specifically approved by the acquiring activity. Selection of parts shall be conducted in accordance with MIL-STD-965.

3.6.10 Moisture and fungus resistance. Materials in compliance with MIL-STD-454, Requirement 4 shall be used which shall resist damage from moisture and fungus. Protective coatings shall not be acceptable as moisture and fungus preventatives on parts which lose the coating during the normal course of inspection, maintenance, periodic tests, and normal operations.

3.6.11 Fibrous composite construction. The specific acceptance by the acquiring activity of the use of fibrous-composite construction for missile structures, and the acceptance of all contractor-prepared process specifications for such construction shall be based on the demonstrated suitability of construction when used in missile structures, which are in all respects representatives of production design and construction, and are subjected to the required operating environments. These requirements pertain to all airframe structures which are required to sustain loads under take-off, flight, landing, ground handling, and laboratory test conditions, and which, if failed or excessively deformed, would cause uncontrollable motions of the missiie within the flight envelope. Specific test and data requirements shall be as specified in applicable contractual specifications. All reinforced plastic construction, including laminates and sandwich, shall be in conformance with the contractor's process specifications, prepared in accordance with MIL-HDBK-23 and MIL-P-9400 and requires approval by the acquiring activity. Each structure made of composites shall be bonded (electrically, mechanically, etc) to the main structure (see 4.7.1).

3.6.12 Selection of the composite materials. The selection of the materials to be used for structural applications shall take into account all factors which affect required strength, rigidity, and structural reliability. Such factors shall include, but are not limited to, manufacturing processes: static, repeated, transient, vibratory, and shock loads; end specific effects of operating environment associated with reduced and elevated temperatures, repeated exposure to climatic, erosive, and scuffing conditions, the use of protective finishes, the effects of stress concentrations, and the effects of fatigue loads on composite endurance limit and ultimate strength. The actual values of properties used for structural design shall include such effects. Appropriate repair procedures shall be established for accepted applications of fibrous-composite construction in missile structures for subsequent incorporation in pertinent structural repair manuals.

3.6.13 Properties for structural design of composite materials. In general, reliable materials with mechanical and physical properties suitable for use in structural design of fibrous composites-shall be of the type which would be obtained from MIL-HDBK-5 for the design of conventional counterpart metallic structures consistent with the required operating environments, and such properties shall be developed in accordance with procedures described in MIL-HDBK-5. However, properties which are unique for fibrous composites, due to their special characteristics associated with directionality of fibers and construction variables, shall be included.

3.6.14 Missile skin. The missile skin shall be approved by the acquiririg activity (see 3.21).

3.6.15 Lubricants. Missile lubricants shall be selected and employed in accordance with MIL-STD-838.

3.6.16 Recycled, virgin and reclaimed materials. There is no exclusion to the use of recycled or reclaimed materials and no mandate for the use of virgin materials provided it meets the requirements of this specification.

3.7 Parts.

3.7.1 Electron tubes and semiconductor devices. Electron tubes shall be avoided whenever possible; however, when avoidance is not possible, the electron tubes shall be in accordance with MIL-STD-454, Requirement 29 and semiconductor devices shall be in accordance with MIL-STD-454, Requirement 30. Metallic oxide rectifiers shall not be used, except as applied to metal oxide semiconductor field effect transistors and integrated circuits.

3.7.2 Connections. Printed wiring boards utilizing edge board contacts may be used, provided they do not prevent meeting the equipment performance requirements.

3.7.3 Threaded parts. Threaded parts for electronic equipment shall be in accordance with MIL-E-8189. Threads shall conform to MIL-S-7742. Inserts shall be provided for internal threads in soft metals and nonmetallic materials subject to frequent disassembly or adjustment.

3.7.4 Electrical connectors. Electrical connectors shall be in accordance with MIL-STD-454, Requirement 10. To minimize personnel hazard and prevent shorting of live circuits, "live" or "hot" contacts, where practical, shall be socket-type rather than pin type. Electrical connectors shall be "scoop proof."

3.7.5 Seals and Connections. Seals and connections subject to deterioration shall be minimized and readily replaceable.

3.8 Design and construction.

3.8.1 Loads. Deflections caused by free flight, captive flight, catapult and arrested landing, handling and fatigue loads shall not degrade the performance of the missile.

3.8.2 Interfaces. The missile shall be dimensionally, physically, electrically, operationally and functionally compatible with the following interfaces:

a. Between missile subsystems (guidance, stabilization, armament, power, propulsion and airframe).
b. Between missile and missile launch system.
c. Between missile and aircraft fire control system.
d. Between missile and ground support equipment.
e. Between missile and missile test equipment.
f. Between contractor furnished missile components and Government furnished missile components.

Physical and functional interfaces shall be specified under both static and dynamic conditions.

3.8.2.1 Air launching. The missile design shall be coordinated with the launching aircraft and the associated launching equipment. The missile design shall be coordinated with the launching aircraft with respect to aerodynamic and dynamic compatibility and critical dimensions and shall require a minimum of modifications to the launching aircraft. The missile shall be capable of rapid installation with respect to the launching aircraft. Launching positions shall be selected to provide minimum problems with respect to the

effect of missile propulsion exhaust and eject on aircraft engine performance, aircraft skin and structure, canopy, wing characteristics, surface controls, etc. Missile installations adjacent to jet engines or after burners shall be avoided if possible. Where adjacent installations are made, proper cooling, insulation and other techniques to limit environmental temperature and other effects shall be used.

3.8.2.2 Surface launching {ground or water). The missile design shall be coordinated with the launching equipment to assure satisfactory performance under all the conditions encountered in operational use and shall be capable of withstanding all motions of the launcher or undercarriage in catapult take-off and arrested landing.

3.8.3 Strength and rigidity. Strength and rigidity shall be provided in accordance with MIL-M-8856 except as noted for composites (see 3.8.4). Weight variations of government furnished equipment (GFE) and government responsible changes shall not increase or decrease the design gross weight specified herein unless specifically stated otherwise by a contractual change. In the event of overweight of government furnished equipment, strength shall be provided for the actual weight of the government furnished equipment. Any weight increase incurred by providing strength for Government furnished equipment overweight shall be considered as government responsibility and shall be negotiated with the acquiring activity.

3.8.4 Composite. The design and construction of the composite shall be such as to assure that fatigue loads consistent with the planned operational employment shall not reduce structural strength and rigidity below levels required for adequate performance during the lifetime required for the structure. The strength and structural reliability of adhesives shall be substantiated for the effects of static, fatigue, and vibratory loads, and reduced and elevated temperatures.

3.8.5 Structural sandwich composites. The fabrication of sandwich construction shall be in accordance with provisions of MIL-HDBK-23 and shall be such as to preclude the entrance, accumulation and entrapment of water or other contaminants within the core structure. Perforated core (metallic or otherwise) shall not be used.

3.8.6 Special working provisions. Special working provisions shall be in accordance with MIL-STD-1695.

3.8.7 Watertightness. The missile shall meet the requirements for spraytight enclosures as defined in MIL-STD-108. If necessary, blow out plugs shall be used in rocket motors to prevent water intrusion.

3.8.8 Jettisoning or separating of parts. The missile design shall provide that material jettisoned or separated in flight shall be kept to a minimum in number, size, and weight. Where necessary and practicable, means of disintegrating such parts upon their leaving the missile shall be used.

3.8.9 Physical references. Physical references shall be provided for measuring and leveling-each missile for weighing and assembly alignment. Structural members which are parallel to the reference planes shall preferably be used as jig points for taking measurements. Alternatively, leveling lugs and jig point fittings shall be provided. If such fittings are externally located, they shall be readilY detachable, where necessary, to prevent adverse affects on missile performance.

3.8.10 Assembly and handling. The missile design shall allow attachment of removable surfaces in 1 minute or less by four men without special tools or use of detachable screws. The missile design shall provide a handling break between the missile armament and propulsion sections, forming two handling pieces which shall be disassembled or reassembled within 15 minutes. Assembly of parts shall be accomplished such that damage is not incurred by any part of the assembly. Threaded parts shall show no evidence of cross threading or other damage. The missile design shall be coordinated with the design of the shipboard, aircraft, or land-based handling equipment to allow ease of handling missile sections and assembled missiles. Handling provisions shall not adversely affect missile performance. The missile shall be clearly marked showing the proper location of support when the missile or missile sections are normally placed on supports such as dollies or slings to prevent damage tc fragile sections or components. All external provisions subject to damage in shipping and handling shall be protected by substantial, easily removable guards, or shall themselves be easily removable and replaceable. The design for handling shall include provisions for towing, hoisting, jacking, retrieving, and similar operations, as required.

3.8.11 Sectionalization. When necessary to facilitate handling, transportation, and storage, missiles shall be of sectionalized construction adaptable to rapid field or fleet assembly. In general, sectionalization shall allow separate storage of explosives or hazardous materials. Where practicable, each operating system shall be contained within a single section to facilitate storage, assembly, handling, maintenance, and periodic test.

3.8.12 Access and inspection. Access doors or removable covers shall be provided and located as required for inspection, test, lubrication, drainage, fuzing, and adjustment and replacement of parts consistent with the mission of the missile. The airframe shall avoid (1) use of structural doors through which loads must be transferred, and (2) airframe sag which may present a door-to-opening alignment difficulty. Access openings shall be of sufficient size to furnish an adequate view of the parts to be inspected, to provide ample access to parts involved, and to permit disconnection and removal of a part without having to remove other parts or units not affected. The doors or covers shall be externally flush, easily opened and held securely closed by approved type fasteners, and shall be so designed that the action of the slipstream shall tend to keep these doors closed in flight. Screws used as fasteners for access openings shall be of identical length and diameter for each opening insofar as practicable. When screws of different length are required for an opening, a method of differentiation (such as a diffe[ent diameter for each length of screw) shall be used. Captive fastener units shall be used.

3.8-13 Quick disconnect and unitized items. The maximum practical use shall be made of unitized construction with automatic alignment tc facilitate installation and quick disconnect of those items requiring removal for servicing or maintenance purposes.

3.8.14 Modularization. To the extent practicable, the detail design of the interior electronic arrangements, assemblies and subassemblies shall incorporate the modularization concept commensurate with the state of the art, and shall include accessible test points to facilitate location of faulty modules. Faulty modules shall be removable without major disassembly of the missile. Modules shall be provided with adequate test points to facilitate their maintenance.

3.8.15 Standards of manufacture for electronic equipment. Fabrication of electronic equipment shall be in accordance with MIL-E-8189.

3.8.15 Mechanized production (Including printed circuits). Mechanized production (including printed circuits) shall be in accordance with MIL-E-8189, unless otherwise specified herein.

3.8.17 Computer design. The design of embedded computer elements shall comply with the requirements of AR-106. All microprocessors incorporated In the missile shall be designed to utilize an identical microinstruction set and format. Computers and computer elements shall be designed to be compatible with government furnished equipment (GFE) to be included in the missile.

3.8.18 Computer software design. Computer software for programming, operating, testing, or supporting the embedded computer shall be designed in accordance with MIL-STD-1679 to efficiently utilize the hardware to meet performance requirements. The computer firmware shall also be designed, documented and tested in accordance with the computer software requirements of this specification and MIL-STD-1679.

3.8.19 Computer documentation. The following computer documents shall be prepared in accordance with MIL-STD-1679:

a. Interface Design Specification (IDS).
b. Program Performance Specification (PPS).
c. Program Design specificaton (PDS).
d. Program Description Document (PDD).
e. Data Base Design Document (DBD).
f. Program Package Document.
g. Operator’s Manual (OM).
h. System Operator’s Manual (SOM).
i. Software Quality Assurance Plan.
j. Software Configuration Management Plan (SOIP).
k. Software Development Plan.
l. Software Change Proposal (SCP)/Software Enhancement Proposal (SEP).
m. Computer Software Trouble Report (STR).

3.9 Subsystems and major components of each subsystem.

3.9.1 Guidance subsystem. The guidance subsystem is the missile subsystem that receives and processes information from the target, the weapon control system, and other sources in order to determine steering signals that are applied to the stabilization subsystem. Performance, physical characteristics and parameters, when applicable, shall be specified as follows:

a. Physical characteristics

(1) Type.
(2) Size and shape.
(3) Weight.

b. Performance

(1) R_{90} detection range (specified as a function of closing rate and scan rate).

(R_{90} is the range for which there is a 90 percent probability of detecting the target.)

(2) T_{90}. tracking range (specified as a function of closing rate and scan rate, if appropriate).

(T_{90} is the range for which there Is a 90 percent probability of obtaining a valid target track.)

(3) Angle resolution and accuracy.

(4) Range rate resolution gating and accuracy.

(5) Range resolution and accuracy.

(6) Sub-clutter visibility (ie, performance in a clutter environment depicted in terms of items (1) to (5) above).

(7) Performance in an electronic countermeasures (ECM) environment, depicted in terms of items (1) to (5) above. Performance in an ECM environment shall be related to threat capabilities.

(8) Beam aspect tracking capability.

(9) Line-of-sight tracking limits.

3.9.1.1 Radome(s). The following parameters and characteristics of each radome contained in the missile shall be specified:

a. Physical characteristics

(1) Type of radome.
(2) Size and shape
(3) Height.

b. Performance

(1) Bandwidth

(2) Error slope (the error slope is defined as the ratio of the incremental change in apparent target position to an equal change in look angle).

(3) Transmission and reception signal losses.

(4) Erosion and absorption.

(5) Thermal tolerance.

(6) Strength.

3.9.1.2 Antenna(s). The following parameters and characteristics of each antenna contained in the missile shall be specified (see 3.9.5.4 for fuze receiving and transmitting antennas):

a. Physical characteristics

(1) Type of antenna (planar, parabolic, etc).
(2) Polarization.
(3) Mixer design, if it is a part of the antenna.
(4) Gimbal design and limits,
(5) Antenna stabilization designs
(6) Dimensions.
(7) Height.

b. Performance

(1) Sum and difference pattern versus frequency
(2) Coupling losses.
(3) Peak power limit, if it is a transmitting antennas
(4} Frequency bandwidth.
(5) Antenna stabilization response and accuracy,

3.9.1.3 Transmitters}. The following parameters and characteristics of each transmitter contained in the missile shall be specified:

a. Physical characteristics

(1) Type of transmitter (impatt diode, magnetron, etc.
(2) Modulator design,
(3) Dimensions,
(4) Weight,
(5) Power required.

b. Performance

(1) Continuous wave and pulsed power capability versus frequency.
(2) Duty cycle.
(3) Frequency, bandwidth and pulse repetition frequency.
(4) Waveform characteristics.
(5) Phase distortion and noise spectrum.

3.9.1.4 Receiver(s). The following parameters and characteristics of each receiver contained in the missile shall be specified:

a. Physical characteristics

(1) Type of receiver.
(2) Type of local oscillator.
(3) Dimensions.
(4) Weight.

b. Performance

(1) Noise figure.
(2) Gain versus frequency.
(3) Dynamic range (from sensitivity to saturation).
(4) Bandwidth and frequency response.
(5) Automatic gain control response time.
(6) Transmit and receive switching speeds and required blanking.

3.9.1.5 Signal processor. The following parameters and characteristics of the signal processor shall be specified:

a. Physical characteristics

(?) Type of processor (digital or analog).
(2) Dimensions.
(3) Weight.

b. Performance

(1) Processing time.
(2) Processing update.
(3) Description of all computations or manipulations of either digital or analog data.

3.9.1.6 Counter-countermeasures (CCM). CCM techniques and performance in a countermeasure environment shall be specified and shall include, but not be limited to, the following:

a. Automatic gain control protection.
b. Velocity stealing protection.
c. Angle deception protection.
d. Range deception protection
e. Frequency agility.
f. Home-on-jam (HOJ)
g. Radar absorption material

3.9.1.7 Jam to signal ratio. The performance of an electronic counter countermeasures (ECCM) technique shall be specified in terms of how much jamming to signal (J to S) ratio, expressed in decibels, shall be necessary to defeat the ECCM.

3.9.1.8 Decision logic. The criteria for determining when the missile sensor subsystem is in an electronic countermeasures environment shall be specified. The criteria for determining the type of ECCM to utilize, and for how long, shall be specified. Included shall be the criteria for switching to and from home-on-jam mode of operation.

3.9.2 Stabilization subsystem. The stabilization subsystem is the missile subsystem that controls the flight dynamics of the missile. The type of stabilization subsystem used shall be specified. A block diagramof the stabilization subsystem shall include each element, and shall be defined so that the stabilization subsystem performance can be determined. Stability, accuracy, margin, time constants, and limits of the stabilization system shall be specified.

3.9.2.1 Steering. The maximum commands that each channel of the steering system must be capable of executing shall be specified as a function of velocity, altitude, missile roll, missile pitch and atmospheric conditions. Logic modifying the steering commands (for example, the maximum qravity-force under certain conditions) shall be specified in words and in flow-charts. The input commands that the steering section shall respond to shall be defined. Time constants for each steering command shall be specified, along with the method of measurement and the definition (eg, time required for a Control surface to travel 90 percent of the angular distance from its initial position to its final position, given a step input). The accuracy of the damping factor to which the system must repond shall be specified.

3.9.2.2 Roll. The type and characteristics of the roll system shall be specified in detail. The maximum value of the controlled variable that can be induced shall be specified as a function of velocity, altitute, and steering transients. Input commands to the roll system and system reponse required shall be defined. Time constants for the roll system shall be defined and specified.

3.9.2.3 Roll-steering interactions. The three-dimensional stability characteristics of the system shall be specified as a function of velicity and altitude. The interactions between the roll system and the steering system as a function of velocity and altitude shall be specified.

3.9.2.4 Control channels. The control channels to the actuators shall be described, and their minimum sensitivity and maximum noise level shall be specified. The minimum accuracy in encoding and decoding the command shall also be specified. The amount of cross-coupling between each of the channels shall be specified in such detail as to allow calculation of resultant command for any set of Possible inputs.

3.9.2.5 Limiters. The characteristics of the limiters used to limit commands to and within the system shall be specified. The limiters in each channel and the cross-coupling between them shall be identified. Changes in the limiting as a function of the missile conditions and the missile operational phases shall be specified.

3.9.2.6 Shaping networks. Changes in the shaping characteristics shall be specified in terms of missile conditions and missile operational phases. The characteristics of the shaping networks used to shape the command and feedback signals in the stabilization system shall be specified. ,

3.9.2.7 Actuators. The type of actuators used (electromechanical, fluid etc) shall be specified. The transfer function characteristics required of each actuator shall be specified, either in words or graphically. The power input requirements of each actuator, whether fluid, mechinical, electrical or otherwise, shall be specified. Mechanized input and output characteristics including torque, angular limits, and inertia characteristics shall be specified.

3.9.2.8 Biases. Any constant bias (eg, horizontal gravity-bias) required shall be specified by describing the direction and magnitude of the bias. In addition, the method of implementation (eg, control surfaces, deflecting rocket nozzle, etc) shall be specified.

3.9.2.9 Instruments. The type of sensors used to measure position, rate and acceleration shall be specified, The accuracy, bandwidth, bias and drift of the instruments shall be specified as a function of missile flight conditions. Included shall be the weight and dimensions of each instrument.

3.9.3 Airframe subsystem.

3.9.3.1 Structural characteristics. The following structural design parameters and characteristics shall be specified:

a. Types of material (plastics, composites, etc).
b. Strength to weight ratio.
Ablation and erosion,
c Thermal Sensitivity,
e. Elastic modulus.
f. Density and thickness,
g. Attachment interfaces.
h. Modularity considerations,
i. Insulation and electromagnetic interference (EMI) shielding,

3.9.3.2 Structural dynamics. The followinq characteristics of the air-frame structural dynamics shall be specified:

a. Vibration isolation considerations.
b. Body bending modes,
c. Structural resonance and buzz characteristics,

3.9.3.3 Aerodynamics. The following characteristics of the airframe aerodynamics shall be specified and all sources of performance data shall be identified (ie, wind tunnel data, analytical data, etc).

a. Lift forces

(1) Lift coefficient versus angle of attack.
(2) Lift slope variation with math.
(3) Wing and body lift distribution.
(4) Wing and control surface loadings from trimmed lift.

b. Drag forces

(1) Profile drag versus math number.
(2) Induced drag versus lift coefficient.
(3) Drag versus altitude and Mach number throughout the flight envelope.
(4) Interference drag and boat tail drag effects.

c. Control moments

(1) Pitch (yaw) moment clue to angle of attack.
(2) Pitch (yaw) moment due to control surface motion.

(4) Control surface hinge moments.

d. Stability

(1) Static stability margin, loaded and empty condition.
(2) Dynamic stability margin, in flight conditions.

3.9.4 Propulsion subsystem. The following performance and physical characteristics of the propulsion subsystem shall be specified:

a. Physical characteristics

(1) Type (rocket, ramjet, or combination of rocket and ramjet).
(2) Dimensions.
(3) Weight and center of gravity before and after burn.

b. Performance

(1) Specific impulse (motor-fuel).
(2) Total thrust.
(3) Time-thrust and time-impulse profiles.
(4) Burn rate versus soak temperatures.
(5) Mass fraction and density.
(5) Thermal stability.
(7) Altitude and speed effects on performance.
(8) Angle of attack restrictions (due to flameout).
(9) Maneuverability restrictions (due to flameout).
(10) Special environmental conditions (including storage).

3.9.4.1 Propellant (fuel) type and composition. The following detailed description of the propellant-motor type and its composition shall be specified:

a. Type (solid, packaged liquid, hybrid, etc).
b. Binder material (energetic, non-energetic).
c. Motor case and grain design.
d. Smoke-smokeless considerations.

3.9.4.2 Case design. The following detailed characteristics of the case shall be specified:

a. Structure (spun. band wound, wire wound).
b. Material (steel, composites, glass).
c. Strength.
d. Stiffness.
e. Chamber pressure.
f. Description of external attachments.

3.9.4.3 Nozzle design. The following detailed characteristics of the nozzle shall be specified:

a. Type of configuration.
b. Size, shape arid weight.
c. Material composition.
d. Temperatures and pressure characteristics,
e. Movement and gimbal design (if any),
f. Other blast deflection techniques, such as jet vanes.

3.9.4.4 Inlet design. If the propulsion subsystem contains a ramjet, the inlet design shall be specified in detail. The configuration of the inlets shall be shown. The start or unstart math number shall be specified.

3.9.4.5 Combustion chamber design. The detailed characteristics of the combustion chamber shall be specified. The configuration of the chamber shall be included. The pressure and burn rate shall be specified as a function of temperature.

3.9.4.6 Controls. The manner in which the propellant burning rate and direction of burn (if applicable) are controlled shall be specified. The techniques used to achieve thrust vector control and thrust magnitude control shall be described in detail with appropriate diagrams.

3.9.4.7 Ignition. The ignition system shall be described in detail. The Igniter safety mechanism and the igniter shall be described with appropriate diagrams. The manner in which the igniter safety mechanism arms the motor ignition system electrically and mechanically shall be specified. Ground handling safety features shall be identified.

3.9.4.8 Booster. If the missile is designed with detachable boosters, the performance and physical characteristics of the booster shall be specified. The parameters shall be those described in 3.9.3.1 through 3.9.3.3.

3.9.5 Armament subsystem. The armament subsystem is composed of the warhead, the fuze, and the safety and arming device. The performance and physical characteristics and interface requirements of the armament subsystem shall be specified. The performance and physical characteristics of each shall be specified in detail, as shown below. The following items are classified as explosive under Interstate Commerce Commission regulations:

a. Rocket motor,
b. Rocket motor igniter.
c. Warhead
d. Fuze.
e. Fuze booster,
f. Flexible explosive lead.

3.9.5.1 Warhead. The warhead shall be installed in the missile such that wings, fins, or other major parts, components, sections, units, etc, are not located over the warhead to interfere with the warhead performance. The following performance and physical characteristics of the warhead shall be specified in detail.

a. Physical characteristics

(1) Type of warhead (explosive fragmentation, expandable, etc),
(2) Size and shape.
(3) Weight.

b. Performance

(1) Lethal radius against the specified threat or volumne,
(2) Probability of obtaining acceptable miss distance.
(3) Thermal stability.

3.9.5.2 Explosive material. The performance and physical characteristics of the explosives and expandable shall be specified in detail. Included shall be the following:

a. Physical characteristics

(1) Explosive material composition and proportions,
(2) Explosive size and shape.
(3) Explosive weight.
(4) Material of expandables.
(5) Size and shape of expandable.
(6) Weight of expandable.
(7) Packaging of expandable.

b. Performance

(1) Energy of blasts
(2) Thermal stability.
(3) Radius of expandable.
(4) Velocity of expandable

3.9.5.3 Fuze. The performance and physical characteristics of the fuze shall be specified in detail. Included shall be the following:

a. Characteristics

(1) Fuze type (proximity, contact, etc).
(2) Fuze size.
(3) Fuze weight.
(4) Description of interlocks.
(5) Fuze electrical power

b. Performance

(1) Fuze initiation process,
(2) Time delay definitions and computation techniques.
(3) Discrimination techniques (range, line-of-sight rate, etc).
(4) Discrimination accuracy and resolution.
(5) Discrimination in a multiple target environment,
(6) Performance in clutter,
(7) Performance in an electronic countermeasures environment.
(8) Performance in adverse weather.
(9) Special operational characteristics.

3.9.5.4 Fuze receiving and transmitting antennas. The performance and physical characteristics of the fuze receiving and transmitting antennas shall be specified in detail as follows:

a. Physical characteristics

(1) Type of antenna (planar, parabolic, etc).
(2) Polarization.
(3) Mixer design, if it is a part of the antenna.
(4) Gimbal design and limits.
(5) Antenna stabilization design.
(6) Dimensions.
(7) Weight.

b. Performance

(1) Sum and difference pattern versus frequency.
(2) Coupling losses.
(3) Peak power limit, if it is a transmitting antenna.
(4) Frequency bandwidth.
(5) Antenna stabilization response and accuracy.

3.9.5.5 Fuzing transmitter. The performance and physical characteristics of the fuzing transmitter shall be specified in detail as follows:

a. Physical characteristics

(1) Type of transmitter (impatt diode, magnetron, etc).
(2) Modulator design.
(3) Dimensions,
(4) Weight.
(5) Power required.

b. Performance

(1) Continuous wave and pulsed power capability versus frequency.
(2) Duty Cycle.
(3) Frequency, bandwidth and pulse repetition frequency.
(4) Waveform characteristics.
(5) Phase distortion and noise spectrum.

3.9.5.6 Fuzing receiver. The performance and physical characteristics of the fuzing receiver shall be specified as follows:

a. Physical characteristics

(1) Type of receiver.
(2) Type of local oscillator.
(3) Dimensions.
(4) Weight.

b. Performance

(1) Noise figure.
(2) Gain versus frequency.
(3) Dynamic range (from sensitivity to saturation).
(4) Bandwidth and frequency response.
(5) Automatic gain control response time.
(6) Transmit and receive switching speeds and required blanking.

3.9.5.7 Fuzing signal processing. A description of the computations or manipulations of either digital, analog or mechanical data accomplished by the fuze shall be specified in detail.

3.9.5.8 Safety and arming device. The performance and physical characteristics of the missile safety and arming device shall be specified in detail as follows:

a. Characteristics

(4) Size and shape.
(5) Weight.
(6) Power requirements.

b. Performance

(1) Processing technique to determine safe arming distance,
(2) Safety provisions to ensure warhead does not arm accidentally.

3.9.5.9 Self destruct mechanism. Self destruct mechanisms shall be provided and installed in the missiles, when required, in accordance with the specification to meet the specific requirements of the detail specification or specification sheet for preventing enemy recovery and minimizing information available upon enemy capture of the missile wreckage. Self destruction may be accomplished by detonating the warhead or other device designated by the acquiring activity. The self-destruct system shall not be susceptible to actuation by enemy countermeasures prior to target intercept.

3.9.5.10 Command deflect/destruct mechanism. Command deflect and destruct mechanism shall be provided in accordance with the detail specification or specification sheet and installed in those missiles required by the contract to permit missile range target conservation and assure range safety.

3.9.6 Power subsystem. The power subsystem is defined as the electrical power supply hydraulic, and the pneumatic power supply. The performance and physical characteristics of each power subsystem shall be specified in detail as follows:

3.9.6.1 Electrical power. The power requirements of the missile shall be specified in detail. The voltages and currents required by the missile as a function of time shall be specified. The definition shall include the captive carry phase and the actual missile flight phases. The power required by each missile subsystem shall be specified as a function of time. Voltage regulations or current regulations required by each missile subsystem shall be specified. The specifications of the electrical needs of the missile shall be of sufficient detail such that the power required by the missile at any time can be determined by the power requirements of each of the subsystems at the same time. The electrical power and control equipment shall be subject to approval of the acquiring activity and shall be selected on the basis of an acceptable load analysis. If launching aircraft power is required prior to missile launch, and 28 volts dc or 115/200 volts, 400 cycle, ac is selected for the missile electrical system, the system shall be capable of operating directly from the launching aircraft power supply, the characteristics of which shall be in accordance with MIL-STD-704. A converter shall be provided for installation in the launching aircraft or missile if ether types of power are required.

3.9.6. 1.1 Battery source. If the missile prime power source contains a battery, the performance and physical characteristics of the battery source shall be specified in detail. Included shall be the following:

d. Physical characteristics

(1) Type of battery (wet, dry, rechargeable, one shot, etc).
(2) Material composition.
(3) Voltage converter description.

b. Performance

(1) Power drain as a function of time from each battery.
(2) Voltage-current outputs from each terminal.
(3) Voltage-current regulation tolerances.
(4) Short circuit protection requirements.
(5) Environmental and operational constraints.
(6) Storage requirements.
(7) Shelf life.

3.9.6.1.2 Turbine source. If the missile prime source contains a turbine, the performance and physical characteristics of the turbine shall be specified in detail. Included shall be the following:

a. Physical characteristics

(1) Type.
(2) Size.
(3) Height.

b. Performance

(1) Power input.
(2) Power output.
(3) Frequency (Alternating Current-Direct Current).
(4) Conversion efficiency.
(5) Maximum revolutions per minute.
(6) Electromagnetic noise.
(7) Voltage-current outputs for power distribution.
(8) Voltage-current regulation tolerances.
(9) Short circuit protection requirements
(10) Environmental and operational constraints.

3.9.6.2 Pneumatic power. The characteristics of the pneumatic power supply shall be specified detail. The missile components requiring power as a function of time shall be specified. Requirements for visually checking and refilling the pressure vessel shall be specified, if required. Included shall be the following:

a. Physical characteristics

(1) Type of power supply (nitrogen, air, etc)
(2) Size.
(3) Weight.

b. Performance

(1) Power input.
(2) Torque output.
(3) Conversion efficiency.
(4) Environmental and operational constraints.

3.9.7 Recovery subsystem. The recovery subsystem shall decelerate the missile during descent in such a manner as to result in minimum damage on impact with land or water. Locating equipment shall be provided to facilitate retrieval in minimum time. If water recovery is required, the missile shall remain afloat for a sufficient time to permit locating and retrieval thereof. requirements for a recovery system shall be provided for all develo~ment missiles and for training when specified by the acquiring activity.

3.9.8 Fire detection subsystem. The fire detection subsystem shall provide an indication to the launching aircraft of fire or dangerous overheating.

3.9.8.1 Aircraft fuel fire. The missile ordnance shall be designed to meet the ordnance requirements of MIL-STD-1648 for air launched guided missiles exposed to aircraft fuel fire.

3.9.9 Instrumentation and tracking subsystem. Instrumentation and tracking subsystem shall be provided and instal led, when required, in accordance with the general requirements of the specification, meeting the specific requirements of the detail specification for the particular missiles cited in the contract. All instrumentation shall conform to the Inter-Range Instrumentation Group (IRIG) standards, and shall be approved by the acquiring activity.

3.9.10 Telemetering subsystem. Telemetering subsystem shall be as small and simple as practical to reliably transmit all required data to the recording station designated by the acquiring activity. The telemetry subsystem shall be capable of interfacing with an encoding device for secure telemetry transmission; for example, the KG66 encoder developed by the National Security Agency (NSA). The telemetering subsystem shall be so designed that there will be no deleterious interference between it and other systems within the missile. The telemetering subsystem shall be capable of withstanding all the environments which the missile may encounter. The subsystem shall be designed to be as rugged as, and to have equal or greater precision than, the subsystem it is expected to test. The selection of the telemetering subsystem shall be subjected to the approval of the acquiring activity. The telemetry subsystem shall be developed for installation in the tactical construction of the missile.

3.9.11 Identification subsystem. Electronic and visual identification subsystems shall be provided and installed in those missiles designated by the acquiring activity for operation, test and recovery in accordance with the detail specification or specification sheet.

3.9. 11.1 Electronic Identification Devices. When required, interrogated or radiating beacons shall be installed in the missile to facilitate identification, tracking, and recovery.

3.9.11.2 Visual Identification Devices. When required, visual identification, tracking, and locating devices shall be provided and installed led in the missile. The system may consist of a pressurized smoke tank, flares, signal rockets, lights, or other devices specified or approved by the acquiring activity. The design shall provide intermittent or continuous operation of the system by remote control or by programmed control as appropriate.

3.l0 Physical characteristics. Missile configuration, including maximum length and diameter and maximum radius of control and stabilizing surfaces in the extended or attached position, shall be specified.

3.10.1 Heights. The following missile weights (in pounds) shall be specified:

a. Gross weight at launch, less government furnished equipment.
b. Basic flight design gross weight.
c. Maximum design gross weight.

Weight data shall be prepared in accordance with MIL-M-3947 and MIL-STD-176.

3.10.2 Center of gravity locations. The following missile center of gravity locations shall be specified (in inches):

a. Missile center of gravity in the launching condition.
b. Missile center of gravity at engine burnout.
c. Center of gravity of each section such as propulsion, control, guidance, and warhead.

Balance data Shall be prepared in accordance with MIL-W-3947 and MIL-STD-176,

3.10.3 Moment of inertia. The following missile moments of inertia shall be specified:

d. Rolling moment of inertia:
   (1) Launching condition.
   (2) After motor burnout condition.

b. Pitching moment of inertia:
   (1) Launching condition.
   (2) After motor burnout condition.

c. Yawing moment of inertia:
   (1) Launching condition.
   (2) After motor burnout condition.

Moment of inertia data shall be prepared in accordance with MIL-W-3947.

3.10.4 Strength. Missile strength requirements shall be specified and shall be based on:

a. Basic flight design gross weight (pounds).
b. Maximum design gross-weight (pounds).
c. “G” forces on airframe due to maneuvers.

Strength data shall be prepared in accordance with MIL-M-8856.

3.10.5 Missile life. The missile shall have a minimum calendar life of 10 years starting from the time of acquiring activity acceptance. Life requirements include missile government furnished equipment to be installed in the missile but the contractor is not responsible for government furnished equipment compliance. Minimum missile life under the conditions listed below shall be specified. Each of the requirements establishes a time which shall be accumulated over the calendar life of the missile for the conditions stated (see 4.10.16).

TABLE I. Missile life requirement

ITEM	CONDITION	REQUIREMENT
1 (**)	Packaged storage (in missile containers)	At least 10 years of storage life in the missile containers during which time the missile shall be capable of being subjected to the Naval Surface Environment of MIL-STD-210.
2 (**)	Nonoperating nonstorage conditions, including incidental hangar and flight deck exposure	At least (*) months of nonoperating nonstorage life. The total combined packaged storage aboard ship and nonoperating nonstorage life shall be at least 5 years.
3	Captive flight	At least (*) hours of the Naval Air Environment of MIL-STD-210.
4	Operating life in ready state	At least (*) hours of the Naval Air Environment of MIL-STD-210.
5	Operating life -- full power	At least (*) hours, with the exception of the battery which shall be as specified in the detail specification or specification sheet.

(*) TO BE SPECIFIED IN THE DETAIL SPECIFICATION OR SPECIFICATION SHEET.

(**) Completion of any cumulative total of a 10 year time span will satisfy the requirements of Items 1 and 2 as an alternate requirement to any one requirement of Item 1 and Item 2. These limitations shall not be interpreted to limit short operational periods for purposes of depot and preflight operational checkout.

3.10.6 Missile environmental life. The missile shall be designed to withstand environmental conditions that will be experienced during captive and free flight (see 3.13.1), including synergistic effects due to exposure of the missile to a combination of concurrent environments.

3.10.7 Temperature conditioning. Cooling, if required by the missile, shall be specified and shall include the following:

a. Type of cooling (convection, forced fluid, forced air, etc).
b. Capacity (gallons per minute (gpm), British Thermal Units (BTU) per hour, etc) of the system.
c. Any external connections.

3.10.7.1 Heaters. Provisions shall be specified if heaters are needed to preserve missile temperature for dormant carry and snap start.

3.10.8 Missile ready state preparation. Maximum time required for the missile to reach a steady state from a dormant state shall be specified as a function of the critical parameters of the dormant and ready states (eg, temperature). The maximum length of time the missile shall be required to remain in a ready state shall also be specified.

3.10.9 Missile demonstration. Requirements for a missile demonstration test plan shall be specified (see 4.10.13).

3.11 Performance.

3.11.1 Threats. Threat capabilities of the missile may be specified in a separate document to be referenced herein.

3.11.2 Launch conditions. Permissible launch conditions shall be specified by launch envelope diagrams for specific combinations of launch platform speeds, altitudes, and maneuvers. Included shall be degradations of missile launch conditions as a function of environmental conditions (day, night, climate, weather, etc). Launch conditions shall be specified so as to allow proper mechanization of these conditions in the aircraft or surface launch computer and display systems.

3.11 .2.1 Launch acceptability regions. Aircraft flight envelopes within which it shall be possible to launch the missile shall be specified. Aircraft flight conditions shall include minimum and maximum velocity and altitude, g profile, roll-pitch-heading rates and accelerations, roll and pitch limits, etc.

3.11.2.2 Terminal acceptability regions. Performance capability of the missile by use of terminal acceptance regions (graphical presentations) shall be specified. Each terinal acceptability region shall be defined for specific combinations of missile and target altitude and velocity.

3.11.3 Guidance requirements. Requirements of each guidance mode to successfully guide the missile shall be specified. A guidance mode is a particular manner of operation that exists between the missile and its guidance platform (ie, semi active high pulse repetition frequency, command inertial, etc) or between the, missile and the target (ie, active low pulse repetition frequency, home-on-jam,etc).

3.11.3.1 Missile modes. The performance Capability of the missile to operate in two or more of the following modes shall be specified:

a. Active. (During this mode, the missile generates signals which illuminate the target. The missile uses these signals for guidance).

b. Passive. (During this mode, the missile uses signals He, infrared, jamming) generated by the target for guidance.)

c. Semiactive. (During this mode the missile uses signals generated by the launching aircraft for guidance.)

d. Inertial. (During this mode, the missile uses inertial coordinates generated by the launching aircraft. These may be completely inertial or updated with command information (command inertial, generated periodically and updated by the launching platform)).

3.11.4 Intercept or accuracy. The following performance capability of the missile to intercept the target shall be specified, including probability of achieving the acceptable missile distance for warhead lethality:

a. Guidance capability.
b. Fuzing capability.
c. Warhead capability.

3.11.5 Missile effectiveness/probabi lity of kill (P_k). The missile shall achieve a P_k (designated number) against targets when launched within designated acceptability regions that shall be specified.

3.11.6 Intercept or accuracy boundaries. Intercept or accuracy boundaries for designated targets (missile distance) shall be specified. Maximum and minimum ranges and altitude shall be specified including any environmental situations which limit intercept boundaries or probabilities of kill within the boundaries.

3.11.7 Maneuverability. Necessary flight and control performance for intercepting a designated target within intercept boundaries shall be specified. Acceleration in both hoziontal and vertical planes shall be stated so that a determination of control forces, strength of control surfaces and airframe can be made.

3.11.8 Tracking and guidance. Missile performance necessary for tracking the target and guiding the missile to the target shall be specified. The following circumstances, including permissible tolerance or degradations in performing under these circumstances, shall be specified:

a. Environmental situations:
   (1) Jamming.
   (2) Clutter background.
   (3) Multiple targets.
   (4) Crossing targets.

3.11.9 Fuzing. Target sensing or timing system necessary to fuze the warhead for maximum effectiveness, including required environmental and altitude (high or low, sea tracking) situations shall be specified.

3.11.10 Lethality. The required destructive capability of the missile warhead against designated targets for various distances and aspect angles shall be specified.

3.12 Operational conditions and characteristics. Operational conditions for the following missile phases, as applicable, including purpose of each phase, performance necessary to execute each phase, relationship of each phase to other phases, missile subsystem interfaces during each phase, guidance mode during each phase and possibility of and criteria for selecting other guidance modes shall be specified:

a. Captive carry phase.
   (1) Dormant with snap start.
   (2) Prelaunch phase.
b. Launch phase.
c. Programmed phase.
d. Midcourse phase.
e. Terminal phase.
f. Intercept phase.

3.12.1 Captive carry phase. Time and environment required for the missile to achieve readiness and maximum period of time the missile is required to remain in readiness shall be specified.

3.12.1.1 Dormant with snap start. Time and environment required for the missile to achieve launch from a dormant condition after launch initiation shall be specified.

3.12.1.2 Prelaunch phase. Time and environment required for the missile to achieve readiness for launch initiation from a dormant condition and maximum period of time the missile is required to remain in a ready state shall be specified.

3.12.2 Launch phase. Time duration between launch and guidance initiation shall be specified. During this phase, signals, generated in the weapon control system, are used to set the initial conditions in the missile as determined by the tactical situation. Missile aircraft interfaces required during the launch-to-eject phase shall be specified, Differences in signals processed by the weapon control system and sent to the missile shall be identified as a function of the tactical situation.

3.12.3 Programmed phase. The following information shall be specified for this missile phase:

a. When, how and by what signals the missile is to be programmed.
b. How long the missile is to remain tuned.
c. What functions are activated prior to launch.
d. How the missile is stabilized.

3.12.4 Midcourse phase. The following information shall be specified

a. Each possible guidance mode.
b. Interfaces or relationships of the missile, target and launch platform.
c. Midcourse guidance accuracy including requirements for successful transition to the terminal phase.

3.12.5 Terminal phase. The missile shall have sufficient guidance time to successfully intercept the target. The following information shall be specified:

a. Guidance mode used during this phase.
b. Interfaces or relationships of the missile, missile subsystems, target, and launch platform.
c. Phase performance to determine guidance accuracy necessary to achieve successful target intercept.
d. Criteria used to determine where missile shall begin its terminal phase.
e. Duration of terminal phase.

3.12.6 Intercept phase. During this phase, fuzing is initiated, firing delay time is determined, and the warhead is detonated. The beginning of the intercept phase shall be a function of target geometry, closing velocity, and missile attitude. The following shall be specified:

a. Fuzing characteristics so that fuzing performance can be optimized.
b. Firing delay time computational process.
c. Warhead performance so that intercept phase performance can be assessed.
d. Interfaces, if any, between missile and launch platform.

3.13 Missile environment. The missile environmental requirements shall be in accordance with MIL-STD-1670. The missile shall be capable of meeting performance requirements after exposure to combinations of climate (temperature, altitude, humidity, rain, ice, hail, snow, lightning, salt fog, salt spray, and dust), shock vibration and noise, as specified herein, including captive flight and free flight.

3.13.1 Climate. The environments of MIL-STD-210 which apply to the missile (eg, ground, Naval surface and air, and world-wide air to 100,000 feet) shall be specified. The missile shall be designed to meet rainfall and precipitation requirements of the World-Wide Air Environment of MIL-STD-210 and the climatic exposure specified during the following conditions:

a. Ready storage. The missile shall meet specified performance after exposure to the ready storage temperature of table I.
b. Nonoperating-nonstorage. The temperature conditions shall not exceed the packaged storage requirements of table I.
c. Captive flight. The missile, whether operating or non-operating, shall meet the captive flight environmental extremes specified in table I.
d. Free flight. The missile shall be capable of operation in free flight when launched under any of the captive flight conditions specified herein. The missile shall be capable of operating at altitudes between sea level and 100,000 feet.

3.13.2 Shock.

3.13.2.1 Ejection shock. The missile shall operate satisfactorily when tested as specified (see 4.10.2).

3.13.2.2 Rocket motor ignition shock. The missile shall be capable of operation after a rocket motor ignition shock test (see 4.10.3).

3.13.2.3 Handling shock. The missile shall be capable of withstanding the handling shock test as specified (see 4.10.4).

3.13.2.4 Catapult and arrested landing shock. Catapult and arrested landing shock load requirements shall be in accordance with MIL-A-8591 (see 4.10.5). Missile performance and Mean-Time-Between-Failure (MTBF) shall not be adversely affected.

3.13.2.5 Shipboard shock. The missile shall be capable of withstanding the shipboard and vibration requirements of MIL-STD-167.

3.13.3 Vibration.

3.13.3.1 Captive flight and free flight vibration. The missile shall: operate satisfactorily in the prelaunch phase (ready state and launch-to-eject cycle) during captive flight when exposed to vibration extremes without degrading free flight performance. The missile shall also operate satisfactorily in free flight vibration extremes.

3.13.3.2 Storage vibration. The missile shall be capable of operation after exposure to logarithmically swept sinusoidal vibration when stowed in a missile container and tested as specified (see 4.10.6).

3.13.4 Noise.

3.13.4.1 Flight deck and captive flight noise. The missile shall meet specified performance after being exposed to a broadband random shaped noise spectrum when tested as specified (see 4.10.7).

3.13.4.2 Free flight noise. The missile shall meet specified performance while being exposed to a broadband random shaped noise spectrum.

3.13.4.3 Salt fog. The assembled missile, with or without wings and control surfaces, shall be capable of operation after exposure to salt fog when tested as specified (see 4.10.9).

3.14 Electromagnetic requirements.

3.14.1 Electromagnetic compatibility (EMC). Requirements related to electromagnetic compatibility shall be specified and shall include (see 4.10.10):

a. Internal electromagnetic compatibility between equipment and subsystems onboard the missile.
b. External electromagnetic compatibility of the missile with equipment abroad the launcher.
c. Electromagnetic compatibility of the missile with radiation which could detrimentally affect ordnance.
d. Radiated environment, both inadvertent and deliberate, in which the missile shall operate or be exposed to.

3.14.2 Electromagnetic compatibility program plan (EMCPP). An EMCPP shall be developed in accordance with the requirements of MIL-E-6051. An electromagnetic compatibility control plan (EMCCP) shall be prepared in accordance with the requirements of MIL-E-6051 and shall be submitted to the acquiring activity as a document subsidiary to the electromagnetic compatibility program plan (EMCPP).

3.14.3 System electromagnetic compatibility (EMC) design. Wiring, cabling, grounding, bonding, and shielding shall be in accordance with MIL-B-5087. Criticality categories and degradation criteria shall be in accordance with requirements of MIL-E-6051.

3.14.4 External electromagnetic environment. The missile shall be designed to provide lightning protection in accordance with MIL-B-5087, and to prevent static electricity from degrading system effectiveness. The missile design shall minimize susceptibility to erratic operation or failure due to inadvertently or deliberately radiated electromagnetic energy in its intended environment. The missile shall be capable of performing its mission without experiencing upset or damage when exposed to electromagnetic pulse effects resulting from high altitude nuclear detonations, in all non-operating and operating conditions. The missile shall also be designed to minimize electronic susceptibility to a deliberately radiated special electromagnetic environment.

3.14.5 Electromagnetic interference (EMI and susceptibility control. The missile design shall incorporate features which minimize electromagnetic interference (EMI) internally and externally. The missile and its subsystems shall meet the following MIL-STD-461 limits requirements: CE03, CE06, CS01, CS02, CS06, RE02, RS02, and RS03.

3.14.6 Hazards of electromagnetic radiation to ordnance (HERO). The missile shall meet the hazards and reliability degrading factor requirement of MIL-STD-1385 for propulsion and electroexplosive devices.

3.14.7 Emission Control (EMCON). The system shall be designed and installed so that in the standby mode of operation no missile shall emit radiation which exceeds a level-of -110 dBm/m^2 at a distance of one nautical miles (nmi) from the aircraft.

3.14.8 Frequency selection/allocation. The contractor shall design the equipment for required performance, utilizing the specified or allocated radio frequencies with channelling and signal characteristics to be compatible with other systems across the frequency spectrum. On newly developed equipment, the contractor shall measure the radio frequency signal spectrum characteristics, both active (transmitter) and passive (receiver) in accordance with AR-29 for the Missile System and, when required by the contract, delineate this work in Frequency Allocation and Equipment Spectrum Signature Data reports. (Submission of frequency data to the acquiring activity does not relieve the contractor, of any responsibility for obtaining Federal Communication Commission (FCC) authorization to operate the equipment while in his possession).

3.15 Safety. The safety requirements for the design and development of air and surface launched guided missiles including propulsion system shall be in accordance with AS-4449 (air launched) and MIL-STD-882. The design safety criteria for fuzes (including safety and arming devices) for air and surface launched guided missiles shall be in accordance with MIL-STD-1316. The safety (personnel hazard) requirements shall be as specified in MIL-STD-454, Requirement 1. Safety requirements shall be in accordance with MIL-S-23069 for air launched guided missiles. Safety precautions for explosive, loaded items shall be in accordance with DOD 4145.26. No single point failure shall be hazardous.

3.15.1 Survivability and vulnerability. Survivability and vulnerability limits of the missile shall be specified and shall include the resistance requirements of:

a. Avionics of the missile against electromagnetic radiation (emr) and electromagnetic pulse (emp).
b. Missile against lasers.
c. Propulsion system against infrared radiation emitted by the missile.

3.16 Human performance - human engineering. The recognized principles of human engineering shall be applied to the arrangement of controls and assembly sequence;. The human performance - humang engineering requirements for the missile shall be in accordance with MIL-H-46855 and MIL-STD-1472.

3.17 Reliability. Reliability requirements shall be in accordance with MIL-STD-785 The reliability of the missile shall be specified in terms of the probability that the missile shall be reliable until target intercept. Conditions under which requirements are to be met shall also be specified (see 4.10.12).

3.17.1 Reliability demonstration. Documentation requirements for a reliability demonstration test plan shall be specified (see 4.10.11).

3.18 Maintainability. The missile shall be designed to provide simple and rapid replacement of missile Sections during intermediate level maintenance. After undergoing all-up-round testing, the missile shall be capable of being maintained in preflight ready condition without further check for a period of not less than 180 days unless otherwise specified. The mean-time-to-repair for both organizational and intermediate level maintenance shall be specified. Maintainability shall include:

a. Standard parts.
b. Adjustments.
c. Component interchangeability.
d. functional grouping.
e. Test points.
f. Self test and minimum use of special tools.

3.18.1 Maintainability demonstration. Documentation requirements for a maintainability demonstration test plan shall be specified (see 4.10.11).

3.19 Transportability. A packaged (see section 5) missile, after being transported under the ground environment and Naval surface and air conditions of MIL-STD-210, and aboard the carriers shall be capable of operation provided the specified time and environmental extremes are not exceeded.

3.20 Surface texture. The exposed surface shall present a degree of finish, consistent with performance and other requirements, and shall be free from dents, buckles, scratches, projections, rough areas and waviness of a degree that would impair the performance of the product. Surface texture values shall be specified (see 4.10.14).

3.21 Finishes. Finishes or surface protection for missiles and components shall be in accordance with MIL-F-7179, or as otherwise specified in the finish specification for the missile. Protective finish for the missile skin shall be approved by the acquiring activity. Missiles shall be painted grey in accordance with color 36375 of FED-STD-595.

3.21.1 Corrosion reistance. Materials shall be processed in accordance with MIL-F-7179 to resist corrosion.

3.21.2 Dissimilar metals. Selection and protection of dissimilar metal combinations shall be in accordance with MIL-STD-454, Requirement 16 and MIL-F-7179.

3.22 Heat treatment. Heat treatment of steels shall comply with MIL-H-6875,

3.22.1 Work hardening. Work hardening of parts resulting from stamping, drawing, or rolling operations, may be accepted in lieu of hardening by heat treatment, subject to approval of the acquiring activity. Request for approval shall be accompanied by sufficient manufacturing information and test data to demonstrate the amount of strengthening achieved and the extent of the variation in properties from part to part.

3.23 Identification marking.

3.23.1 Nameplates and product marking. Identification and marking applicable to the missile and missile sections shall be as specified. Detailed marking for a particular section shall be in accordance with the requirements noted herein. Nameplates and markings shall be In accordance with MIL-N-18307.

3.23.2 Missile sections identification. Each of the missile sections shall be marked with an identification number, serial number, and the appropriate nomenclature on each side of the fuselage outer surface. Missile identification shall be applied as specified herein. Background color of special markings shall be white, color 27875 of FED-STD-595. When photo reference marking is required, the reference marking shall be black, color 27038 of FED-STD-595, and where other markings appear over the reference marking, the other markings shall be white, color 27875 of FED-STD-595. Where protuberances occur such as antennas, launch lugs, etc, the markings shall not be required. Leveling provisions and the jig points shall be identified- The jig point identification shall include the distance of the jig point from the reference datum for weight and balance purposes. The above requirements shall be made applicable to the individual sections of the missile, as sectionalized for shipping and handling, when required by the acquiring activity. The missile shall be clearly marked showing the proper location of support when the missile or missile sections are normally placed on supports such as dollies or slings to prevent damage to fragile sections or components.

3.23.3 Missile intersection cabling and connectors. Markings for cables and connectors shall be located as specified herein, and shall include the following:

a. Referenced designations.
b. Design activity code identification and identifying number. Serial number.
c. Contractor control number in parenthesis if contractor is not design activity.

3.23.4 Electrical connections. Reference designators shall be marked adjacent to the connectors on the bulkhead connector mounting.

3.23.5 Missile modules, subassemblies, and parts identification. The marking requirements of MIL-STD-130 shall apply. Where items are to be encapsulated or where required manufacturing processes may remove or obliterate identification marking after assembly, the items need not be marked. The identifying part number, serial numbers, unit nomenclature, code identification number, contract number, and the designation U.S. shall be marked on the inner surface of the missile section fuselage assemblies. The detail requirements for marking shall include the following:

a. Design activity code identification and identifying number (presented in the form shown by MIL-STD-130 for parts where possible). Design activity identification as defined in MIL-STD-130 may be substituted for the design activity code identification.

b. Reference designation identification marking shall be controlled by the missile drawing.

c. Missile nomenclature may be included where the addition of this information will add to the functional application of the missile.

d. Manufacturer's identification in accordance with MIL-STD-130 when required.

3.23.6 Missile wiring coding. Coding of internal wiring to missile electronic units shall be in accordance with the System I and System II color coding for chassis wiring requirements of MIL-STD-681.

3.23.7 Functional marking and notices. The coloring for the functional markings and notices shall be selected to provide optimum contrast with the background color.

3.23.8 Physical reference marking. The physical references used for weight leveling, and structural alignment and support shall be clearly marked.

3.23.9 Handling provision markings. The missile shall be clearly marked with handling limit bands when the missile or missile sections are normally placed on supports such as cradles, dollies or slings to prevent damage to fragile sections or components.

3.23.10 Lift and no-lift indications. Support areas shall be identified with a "LIFT HERE" marking. "DO NOT LIFT OR TOUCH RADOME" shall be marked in two places on the forward end of the fuselage just aft of the radome.

3.23.11 Microwave radiation caution notice. The microwave radiation caution notice, "DANGER MICROWAVE RADIATION - STAY CLEAR OF RADOME DURING ANTENNA ACTIVATION", shall be marked in two places on the forward end of the fuselage just aft of the radome, when applicable.

3.23.12 Pressurizing valves. When pressurizing valves are required, suitable identification and service markings shall be provided on the access cover or the adjacent area.

3.24 Interchangeability and replaceability. All missile components, subassemblies and sections having the same part number shall be interchangeable and replaceable in accordance with MIL-I-8500.

3.25 Workmanship.

3.25.1 Design workmanship. All components and assemblies shall be designed to preclude damage to any parts during the manufacture and assembly processes.

3.25.2 Construction workmanship. Workmanship shall be in accordance with high grade missile practice and of good quality to insure safety, proper operation of the missile, and adequate service life. Workmanship shall be subject to the inspection and approval of the cognizant government inspection activity.

3.25.3 Electronic equipment. The workmanship requirements for electronic equipment shall be in accordance with MIL-STD-454, Requirement 9.

3.25.4 Machining. All burrs shall be removed and sharp edges broken unless noted otherwise on the engineering drawing. Close tolerance parts and critical surface finishes shall receive particular care in the machining and handling thereof.

3.25.5 Cleaning. Individual parts shall be thoroughly cleaned prior to assembly, and protected from contamination. The assembly shall be thoroughly flushed and cleaned prior to insertion of protective closures in all openings and ports. The protective closures shall be of such design and material that insertion of the protective closure shall not cause particles of the closure to contaminate the assembly.

4. QUALITY ASSURANCE PROVISIONS

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

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

A. Development
B. Production
   a. First article inspection (see 4.8).
   b. QualitY conformance inspection (see 4.9).

4.3 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed under conditions which shall be within the following limits:

a.	Temperature	Room ambient (25°C ± 10 °C)
b.	Altitude	Normal ground (0 to 5000 ft)
	Vibration	None
c.	Humidity	Room ambient up to 90% relative humidity
e.	AC voltage	115 ± 1.0 VAC 400 Hz
f.	DC voltage	27.5 ± 5 VDC

4.4 Inspection procedures. The procedures used for conducting development, first article and quality conformance inspections shall be prepared by the contractor and submitted to the acquiring activity for review and approval. The right is reserved by the acquiring activity to modify the inspections or require any additional inspections deemed necessary to determine compliance with the requirements of this specification or the contract, MIL-T-18303 shall be used as a guide for preparation of inspection

procedures. When inspection procedures approved by the acquiring activity are available from previous contracts, such procedures may be used when their use is approved by the acquiring activity. However, the right is reserved by the acquiring activity to require modification of such procedures, including additional tests, when deemed necessary.

4.5 Presubmission inspection. No item, part or complete missile shall be submitted b.y the contractor until it has been previously inspected by the contractor and found to comply, to the best of his knowledge and belief, with all applicable requirements.

4.6 Rejection and reinspection. Missiles which have been rejected may be reworked or have parts replaced to correct the defects and resubmitted for reinspection. Before resubmitting, full particulars concerning previous rejection and the action taken to correct the defects found in the original shall be furnished to the acquiring activity.

4.7 Development inspection. The contractor shall develop a missile development inspection program in accordance with the planning documents specified in the contract CDRL 1423. The inspection program shall specify the objectives of the tests. The test criteria shall be specified with particular emphasis on the soundness of the testing statistics. Environmental tests shall be conducted in accordance with the environmental test plan of the environmental design criteria document of MIL-STD-1670. The missile shall be tested in accordance with MIL-STD-1648 for simulation of aircraft fuel fire conditions.

4.7.1 Fibrous composite construction (development only). For purposes of developing mechanical properties of the fibrous composites for use in structural design, a sufficient number of specimens shall be tested to arrive at minimum mechanical property values above which at least 90 percent of the population of values is expected to fall with a confidence of 95 percent. For purposes of expeditiously completing a specific structural design, these values may be computed initially based on tests of a reduced number of specimens. Where composite laminate properties are established from single ply properties through analytical techniques, the minimum mechanical properties for the composite laminates shall be substantiated by the performance of a sufficient number of appropriate tests of the composite laminates, permitting computation of minimum values by statistical analyses. All test data required to achieve 90 percent probability and 95 percent confidence level values shall be documented in the substantiating test data report of MIL-A-8868.

4.7.2 Computer and software (development). The contractor shall furnish all equipment and supporting computer software to demonstrate that all requirements of the computer and embedded computer software have been met. In addition to requirements for Quality Assurance and Program Acceptance in accordance with MIL-STD-1679, the software qualification testing shall include

a. System/Program Performance/Acceptance Test for the computer and embedded computer(s) support software.
b. System/Program Performance/Acceptance Test for the computer and embedded computer(s) software.

4.7.2.1 Computer test. A computer test plan, test specification, test procedure and test report shall be prepared in accordance with MIL-STD-1679.

4.7.3 Special tests and examinations (development). Test requirements on parts, components or equipment used in the system shall be specified.

4.8 First article inspection. First article inspection shall include all tests and examinations deemed necessary by the acquiring activity to determine that the missile meets all the requirements of the detail specification, other applicable specifications and the contract. First article inspections shall include environmental tests in accordance with the procedures of MIL-T-5422. Any required certification of materials shall be furnished with test reports.

4.8.1 Sample. First article sample size shall be as specified in the contract or as agreed to by the contractor and the acquiring activity. First article shall undergo reliability tests (see 4.10.12), Failure to pass any specified tests or examinations shall be cause for rejection and discontinuing further tests. The approved first article sample shall be retained by the contractor for his use in the fabrication and testing of missiles to be submitted for acceptance and shall not be considered as one Of the missiles under contract,

4.9 Quality conformance inspection. Quality conformance inspection shall consist of the following inspections:

Individual inspections (see 4.9.1).
a. Sampling inspections (see 4.9.2).
Reliability inspections (see 4.10.12).
b. Special inspections (see 4.11.1).

Any required certification letters of material shall be furnished with test reports.

4.9.1 Individual inspections. Individual inspections are those inspections conducted on each missile. Individual inspections shall be adequate to determine compliance with the requirements of material, design, construction, workmanship, operational adequacy and reliability. As a minimum, each missile accepted snail have passed the following inspections:

a. Examination.
b. Operation.

Failure to pass any individual inspection shall be cause for rejection of the missile.

4.9.2 Sampling inspections. Unless otherwise specified, after completion of individual inspections, a sample shall be selected at random from one of the first ten production missiles (initial production) and in accordance with table II by the acquiring activity. Samples shall be subjected to tests approved by the acquiring activity. As a minimum, each missile selected for sampling inspection shall be subjected to the following:

a. Complete operational test at ambient room conditions, making all necessary measurements to assure that all applicable specification requirements have been met.

b. Operational test at certain environmental conditions. The conditions may vary for each missile tested, and should be based on results of the first article, individual and special tests.

Failure to pass any approved inspections shall be cause for rejection of the entire production lot represented.

TABLE II. Sampling test items. 1/

Item	Production lot size	Number of samples
Missile units	First 10	1
	Next 50	1
	Next 75	1
	Next 100 2/	1 2/

1/ The acquiring activity shall specify the method and sequence of inspection that samples shall be subjected to.

2/ Number of samples is 1 for each additional 200 or fraction thereof of production lot size.

4.9.3 Accessory material. In addition to the complete initial production missile submitted for quality conformance inspection, the contractor shall also submit accessory material and data necessary to test the missile.

4.9.4 Reconditioning of inspected missiles. Missiles, which have been subjected to quality conformance inspection, shall be reconditioned by the contractor by replacing all worn or damaged items. After reworking, the contractor shall resubmit the missile for acceptance.

4.10 Method of inspection.

4.10.1 Special tests and examinations. Special tests and examinations on missile parts, components and equipment shall consist of tests as approved by the acquiring activity. Special tests shall also be conducted for checking the effect of any design or material change on the performance of the missile and to assure adequate quality control.

4.10.2 Ejection shock. A launch shock which approximates a 30 g peak terminal sawtooth pulse of 20 mill iseconds duration shall be applied in the direction of the G vector at the center of each of the launch lugs. The force shall be distributed approximately equally between the launch lugs.

4.10.3 Rocket motor iginition shock. The rocket motor ignition shock test data shall be as specified.

4.10.4 Handling shock. At least six shocks of 15 g peak terminal sawtooth pulses shall be applied for 11 milliseconds duration in any direction to the fwd and aft handling fittings of the missile. The force shall be distributed equally between the two handling fittings.

4.10.5 Catapult and arrested landing shock. The catapult and arrested landing shock load test data shall be as specified.

4.10.6 Storage vibration. The missile, without wings and control surfaces, shall be stowed in a missile container and exposed to a logarithmically swept sinusoidal vibration in a frequency range of 5 to 300 Hz for a specified number of hours.

4.10.7 Flight deck and captive flight noise. The missile shall be exposed to a broadband random shaped noise spectrum in a frequency range of 37.5 to 9600 Hz with an overall maximum sound pressure level of 145 ± 2 db above 0.0002 microbar as well as gun blast over pressure aboard ships and aircraft.

4.10.8 Free flight noise. The missile shall be exposed to a broadband random shaped noise spectrum in a frequency range of 37.5 to 2400 Hz with an overall maximum sound pressure level of 159 ± 2 db above 0.0002 microbar.

4.10.9 Salt fog. The assembled missile, with or without wings and control surfaces, shall be exposed to a salt fog test of 48 hours minimum duration in accordance with MIL-STD-810, Method 509.2, Procedure I. Unless otherwise specified, moisture shall be considered as containing salt from marine atmosphere (see MIL-E-8189).

4.10.10 Electromagnetic compatibiilty. The contractor shall develop an electromagnetic compatibility test program, and shall conduct interference tests in accordance with the applicable demonstration specification to show that the system as installed in the aircraft and as employed in naval operations, does in fact, meet the electromagnetic interference control requirements of the detail specification.

4.10.11 Reliability and maintainability demonstration. The contractor shall develop a reliability and maintainability demonstration test program in accordance with the applicable demonstration specification, and shall conduct the tests to show that the missile as configured in the aircraft and as employed in naval operations, does in fact, meet the reliability and maintainability requirements of the detail or specification sheet.

4.10.12 Reliability. Reliability tests shall be conducted based on MIL-STD-781. Acceptance and rejection criteria shall be in accordance with a test plan of MIL-STD-781 that shall be specified. Test details, performance characteristics to be measured, preventive maintenance allowed during tests, etc, shall be submitted to and approved by the acquiring activity.

4.10.13 System performance demonstration test. The contractor shall develop a missile demonstration test program in accordance with MIL-D-18243 and the applicable addenda and conduct the tests to show the missile as implemented in the aircraft and as employed in naval or surface operations, shall meet the performance requirements of the detail specificatiofi or specification sheet.

4.10.14 Surface texture. Surface texture values shall be measured in accordance with ANSI B46.1.

4.10.15 Operation. All equipment shall be operated long enough to permit the missile temperature to stabilize and to check sufficient characteristics, and to record adequate data to assure satisfactory missile operation.

4.10.16 Life. The life test shall be a specified number of hours duration and shall be performed on missiles that have passed individual inspections. The life test shall be performed under accelerated environmental conditions (see 4.10.16.1). Test life accumulated during the reliability test shall be counted toward the life test provided the entire hours are accumulated on a single mission.

4.10.16.1 Accelerated environmental life cycle. An accelerated environmental cycle test, representative of the environmental conditions that the missile shall encounter during captive and free flight, shall be conducted. The test shall be performed using a step cycle procedure (an example is shown on table III). The number of hours specified for each test step shall only include the actual time of the test, not including set-up and environmental change time. Synergistic effects of concurrent environmental conditions shall be Included. The test shall be conducted simultaneously with vibration environments experienced during captive flight and free flight with random excursions to resonant frequencies, intermittent salt fog, etc. The missile shall be monitored during each step. Completion of the last step shall constitute one (1) cycle. The test shall consist of a total number of specified cycles. A limited performance check shall be made between each test cycle. The performance check proposed by the contractor shall be subject to approval by the acquiring activity.

(Example) TABLE III. Missile accelerated environmenal life cycle test.

STEP	TEST CONDITION
1	At ambient temperature apply full power.* Hold at full power* for ** hours. Remove power.*
2	Lower temperature to +30°F (-1°C). Apply full power* for ** hours. Remove power.*
3	Lower temperature to 0°F (-18°C). Apply full power* for ** hours. Remove power.*
4	Lower temperature to -30°F (-34°C). Apply full power* for ** hours. Remove power.*
5	Lower temperature to -65°F (-54°C). Apply full power* for ** hours. Remove power.*

(Example) TABLE III. Missile accelerated environmenal life cycle test-Continued.

STEP	TEST CONDITION
6	Raise temperature to +120°F (+49°C). Apply full power* for ** hours. Remove power.*
	* Power excludes missile propulsion. ** To be filled in prior to issuing detail specification or specification sheet.

4.10.17 Examination. Missiles shall be inspected for conformance to this specification with respect to material, design, construction, marking, and workmanship (see 3.6, 3.8, 3.23, and 3.25).

4.10,18 Inspection of packaging. The sampling and inspection of the preservation, packing and container marking shall conform to this specification (see section 5).

5. PACKAGING

5.1 Preservation packaging. Unless otherwise specified, preservation packaging shall be level A or C in accordance with MIL-P-116 (see 6.2.1).

5.2 Packing. Unless otherwise specified, packing shall be level A or C. Missiles or missile sections shall be packed in accordance with MIL-STD-648 (see 6.2.1}.

5.2.1 Packaged storage. The missile shall be protected from adverse climatic conditions when exposed to the storage temperatures of table I.

5.3 Marking. Marking of shipping containers shall be in accordance with MIL-STD-129. Leveling provisions and the jig points shall be identified. The jig point identification shall include the distance of the jig point from the reference datum for weight and balance purposes. The above requirements shall be made applicable to the Individual sections of the missile, as sectionalized for shipping and handling, when required by the acquiring activity. The missile shall be clearly marked showing the proper location of support when the missile or missile sections are normally placed on supports, such as dollies or slings, to prevent damage to fragile sections or components.

6. NOTES

6.1 Intended use. The guided missile is a guided, self-propelled store designed to be launched from an airborne or surface (ground or water) vehicle, which is intended to seek and intercept a target that is airborne, on the ground or under the water surface.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Quantity required.
First article inspection (see 6.3).
c. Levels of preservation-packaging and packing (see section 5).
e. Name and location of government representative responsible for random selection of inspection samples (see 4.9.2).
f. Where test reports, data items (see 6.2.2), and certification letters of materials are to be forwarded.

6.2.2 Data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirement List (CDRL) the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL Incorporated into the contract. When the provisions of DAR 7-104.9 (n) (2) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraphs.

Paragraph no.	Data requirement title	Applicable DID no.
3.5	Drawings, Engineering and Associated Lists	DI-E-7031
3.8.19	Interface Design Specification	DI-E-2135
3.8.19	Program Performance Specification	DI-E-2136
3.8.19	Program Design Specification	DI-E-2138
3.8.19	Program Description Document	DI-S-2139
3.8.19	Data Base Design Document	DI-S-2140
3.8.19	Program Package Document	DI-S-2141
4.7.2.1	Computer Program Test Plan	DI-T-2142
4.7.2.1	Computer Program Test Specification	DI-E-2143
4.7.2.1	Computer Program Test Procedures	DI-T-2144
4.7.2.1	Computer Program Test Report	DI-T-2156
3.8.19	Operator's Manual	DI-M-2145
3.8.19	System Operator's Manual	DI-M-2148
3.8.19	Software Quality Assurance Plan	DI-R-2174
3.8.19	Software Configuration Management Plan	DI-E-2175
3.8.19	Software Development Plan	DI-A-2176
3.8.19	Software Change Proposal/ Software Enhancement proposal	DI-E-2177
3.8.19	Computer Software Trouble Report	DI-E-2178
3.10.1, 3.10.2	Derivation, Specification Weight-Mass Properties Data for Missiles	UDI-S-21208
3.13.lc, 3.13.ld, 3.13.3.1, 3.8.1	Flight Plan Approval Package-Missile	DI-S-3620
3.14.2	Plan Control System Electromagnetic Compatibility	UDI-T-21330

Paragraph no.	Data requirement title	Applicable DID no.
3.14.2	Plan, Test System Electromagnetic Compatibility	UDI-T-21331
3.15	System Safety Program Plan	DI-H-1320
3.15.1	Vulnerability Assessment Report	DI-R-3051
3.17	Reliability Program Plan	DI-R-1730
3.18	Maintainability Program Plan	DI-R-5190
3.21	Process Specification	DI-E-3130
4.4	Procedures, Test	UDI-T-21265
4.10.10	Plan, Test, Electromagnetic Compatibility (EMC)	DI-R-2055
4.10.11, 3.17.1, 3.18.1	Reliability/Maintainability Demonstration Test Plan	DI-R-3538
4.10.13, 3.10.9	Missile Demonstration Test Plan	DI-S-5138

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5000.19L., Vol. 11, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.3 First article. When a first article inspection is required, the item will be tested and should be a first article sample. The first article shall be tested and approved under the appropriate provisions of 7-104.55 of the Armed Services Procurement Regulation. When a contractor is in continuous production of guided missiles from contract to contract, consideration should be given to waive the first article inspection. The contracting officer shall include specific instructions in acquisition documents regarding arrangements for examinations, test approval of documents and disposition of first article.

6.4 Government-furnished property. The contracting officer should arrange to furnish the property listed in 3.4.1.

6.5 Government-loaned property. The contracting officer should arrange to loan the property listed in 3.4.2.

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

Custodians:
Navy - As
Air Force -11

Review activity:
Navy - 0S

Preparing activity:
Navy - AS
(Project No. 1410-0109)

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge *(DO NOT STAPLE)*, and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document*(s)* or to amend contractual requirements.

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Naval Air Engineering Center
Engineering Specifications and Standards Department
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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-M-8555C	Missiles, Guided, Design And Construction, General Specification For

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
	☐ MANUFACTURER
	☐ OTHER *(Specify)* _____

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)*

DD FORM 82 MAR 1426

PREVIOUS EDITION IS OBSOLETE.