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MILITARY SPECIFICATION

SEAT SYSTEM: CRASH-RESISTANT, NON-EJECTION, AIRCREW, GENERAL SPECIFICATION FOR

This specification is approved for use within the U.S. Army Aviation Systems Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the general requirements for adjustable, crash-resistant, non-ejection aircrew seats for light fixed-wing or rotary-wing aircraft.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

FEDERAL

PPB-B-601	Box Wood Cleated Plywood
PPP-B-636	Box Shipping Fiber Beard
V-T-295	Thread, Nylon

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to U.S. Army Aviation Systems Command, ATTN: AMSAV-ELSS, St. Louis, Missouri 63120-1798, by using the self addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

NO DELIVERABLE DATA REQUIRED BY THIS DOCUMENT
AMSC N/A FSC 1680

MILITARY

MIL-C-6021	Castings, Classification and Inspection of
MIL-P-116	Preservation Methods of
MIL-R-8236	Reel, Shoulder Harness, Inertia Lock
MIL-W-8604	Welding of Aluminum Alloys: Process for
MIL-W-8611	Welding, Metal Arc and Gas, Steels and Corrosion and Heat Resistant Alloys, Process for
MIL-W-25361	Webbing, Textile, Polyester, Low Elongation
MIL-W-45205	Welding, Gas Metal-Arc and Gas Tungsten-Arc, Aluminum Alleys, Readily Weldable for Structures, Excluding Armor

STANDARDS

FEDERAL

FED-STD-751	Stitches, Seams and Stitching

MILITARY

MIL-STD-22	Welded-Joint Design
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-143	Specifications and Standards Order of Precedence for the Selection of
MIL"STD-471	Maintainability Demonstration
MIL-STD-810	Environmental Test Methods and Engineering Guidelines
MIL-STD-882	System Safety Program Requirements
MIL-STD-889	Dissimilar Metals
MIL-STD-1333	Aircrew Station Geometry for Military Aircraft
MIL-STD-1472	Human Engineering Design Criteria for Military Systems Equipment and Facilities
MIL-STD-45662	Calibration System Requirements

HANDBOOKS

MILITARY HANDBOOK

MIL-HDBK-5	Aerospace Vehicle Structures, Metallic Materials and Elements for

2.1.2 Other Government publications. The following other Government publications form a part of this specification to the extent specified herein. Unless otherwise specified, the. issues shall be those in effect on the date of the solicitation.

Federal Aviation Administration

FAR Part 25 — Airworthiness Standards, Transport Category Aircraft Code of Federal Regulations

Title 49, Chapter 5, Part 572, "Anthropomorphic Test Dummy"

Federal Register, Vol. 38, No. 62, April 2, 1973, pp. 8455-8458 as amended.

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

2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

Society of Automotive Engineers

SAE J211 — SAE Recommended Practice, “Instrumentation for Impact Tests”

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

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

3.2 Qualification Seats furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list at the time set for opening of bids (see 4.4 and 6.2).

3.3 First article. When specified in the contract or purchase order a sample shall be subjected to first article inspection (see 4.5).

3.4 Design. The seat shall position the pilot to permit comfortable operation of the aircraft. Occupant survival in aircraft accidents shall be a primary consideration in seat design. The seat shall be adjustable and provide a means of crash load attenuation. The occupant restraint system, attaching hardware to the aircraft, seat cushions, headrest and mountings for ancillary equipment are a part of the seat.

3.5 Materials. Materials shall be as specified herein. When specifications and standards are not specifically designated, selection of materials and processes shall be in accordance with MIL-STD-143.

3.5.1 Critical Members. All structural members shall be fabricated from ductile materials whose elongation is in excess of 10 percent. Critical tensile and bending members, which, because of other design considerations, cannot be allowed to appreciably deform plastically, may be designed of higher strength materials having elongations as low as 4 percent for thin (less than 0.030 inch (0.8mm) thick) sheet materials. In all cases, the system shall be designed to avoid brittle failure.

3.5.2 Flammability. Materials in their finished condition shall satisfy FAR Part 25.853.

3.5.3 Megnesium. Magnesium alloys shall not be used.

3.6 Construction. All exposed portions of the seat shall be free from projections and sharp edges that could catch or damage the occupant, crew members or their clothing and equipment. Exposed edeges shall be rounded to .04 inch (1.0mm) minimum radius and exposed corners to .5 inch (13MM) minimum radius.

3.6.1 Interchangeability. The seat and its subassembly components which are appropriate for replacement shall be functionally and dimensionally interchange-able through tolerancing or manufacturing tooling.

3.6.2 Dissimilar Metals. Unless components are suitably protected against electrolytic corrosion, contact between dissimilar metals shall not be used. Dissimilar metals are defined in MIL-STD-889.

3.6.3 Joining and fastening. Riveting and welding may be used for assembling the component parts which are suitable for this type of assembly. Safety margins-for shear and tensile bolts shall be at least 5 and 10 percent, respectively. Bolts less than 0.25 inch (6.0mm) in diameter shall not be used in any single bolted connection. Nuts shall be of a self-locking type or be safetied. Riveted joints shall be designed in accordance with MIL-HDBK-5. Welded joints shall be in accordance with MIL-W-8604, MIL-W-45205, MIL-W-8611, and MIL-STD-22.

3.7 Hardware. MS, AN or other military standard parts shall be used wherever they are suitable for the purpose. Castings shall not be used in the primary seat structure except in the inertia reel. The inertia reel and load carrying castings in secondary structure shall be radiographically inspected per MIL-C-6021. Primary structure is defined as any component whose failure under crash loads would cause occupant displacement or loss of retention,

3.8 Environmental.

3.8.1 Temperature. The seat shall withstand nonoperating exposure from -65° to +160°F (-54 to 71 °C) without deterioration and deliver specified performance in the range of -25° to +130°F (-32 to 54.°C) when subjected to the high and low temperature tests of Methods 501 and 502, MIL-STD-810.

3.8.2 Solar Radiation. All materials used in the seat and exposed to sunshine shall satisfy criteria in Method 505 of HIL-STD-810,

3.8.3 Humidity. The seat shall not deteriorate and shall operate satisfactorily during and after being subjected to the humidity test specified in Method 507 of MIL-STD-810.

3.8.4 Fungus. If any material utilized in the construction of the seat is suspected to be a nutrient to fungi, the material shall no deterioration when subjected to Method 508 of MIL-STD-810.

3.8.5 Salt fog. The seat shall be corrosion-resistant or processed to withstand Method 509 of MIL-STD-810 without deterioration in the installed condition.

3.8.6 Dust. The seat shall be capable of-satisfactory operation after exposure to Method 510 or MIL-STD-810.

3.8.7 Vibration. The seat shall not deteriorate and shall be capable of satisfactory operation after being subjected to the testing defined in 4.7.5.8.

3.9 Maintainability. Access to seat components shall conform to MIL-STD-1472. The cushions and restraint shall be replaceable without removal of the seat from the aircraft. Cushion replacement shall not require tools. Joints requiring disassembly for installation and removal of the seat from the aircraft, or disassembly of the component parts, shall be bolted. The design shall require no scheduled maintenance.

3.10 Reliability. Endurance of component parts shall conform to specifications of Section 4.

3.11 Physical Characteristics

3.11.1 Configuration. Basic seat design shall be consistent with the

requirements of MIL-STD-1472. Configuration and dimensions of the seat shall conform to MIL-STD-1333. Other seat and restraint dimensions shall be based on the anthropometric data of MIL-STD-1472 to fit a 5th to 95th percentile male aviator with allowances for clothing and equipment. minimum inside seat width shall be 19.0 inches (48cm). The overall seat and restraint system configuration shall prevent occupant submarining under the 4.7.4 test conditions.

3.11.2 Adjustment. The seat shall have an adjustment range complying with MIL-STD-1333 and provide and upward-downward and forward-aftward adjustment pattern. The seat shall travel smoothly and be adjustable in increments of hot more that 0.75 inch (19mm) in both axes. The adjustment mechanisms shall lock the seat in position after each adjustment. Either a spring loaded or power device may be used to raise the unlocked seat when the weight of the occupant is removed. If a spring device is employed, the imbalance load shall be not more than 125 pounds (556 newtons) when the seat is in the lowest position and not less than 30 pounds (133 newtons) when the seat is in the highest position. Suitable stops shall be provided at the ends of the adjustment range.

3.11.3 Controls. The seat adjustment controls shall be located on the forward right hand side of the bucket for vertical adjustment and forward left hand side for longitudinal adjustment. The inertia reel control shall be on the forward left side of the bucket. Control levers shall be accessible to the seat occupant clothed in all required personal flight and survival equipment and reel locked. The position of the levers shall not change relative to the occupant when the seat is adjusted. The locking mechanisms shall be released by a forward movement of the controls and automatically lock, and indicate lock by aft movement, when the controls are released. The location of the variable load energy absorber control shall be visible and accessible for easy adjustment. Movement and force requirements shall not exceed MIL-STD-1472 limits .

3.11.4 Cushions. The seat cushions shall be designed for comfort and durability and not as a device to absorb crash energy. The thickness of the compressed (1.0.G) cushion at the lowest point of the buttocks shall be between 0.5 inches (13mm) and 0.75 inches (19mm). The cushions shall be retained such that aircraft maneuvers, crashes, or occupant motion shall not cause displacement or separation.

3.11.5 Headrest. A headrest shall be provided that moves with the seat bucket during seat adjustment and stroking. The headrest shall be positioned for the 5th through 95th percentile population. Headrest padding shall be 1 inch (25mm) thick and consistent with Figure 1. Headrest width shall be a maximum consistent with cockpit visibility requirements.

3.11.6 Drain holes. Unarmored buckets shall be provided with 0.25 inch (7mm) diameter drains at the low point when the aircraft is in normal ground attitude. Armored buckets shall be provided with provisions to drain moisture at the low point when the aircraft is in normal ground attitude.

3.11.7 Occupant restraint. The occupant restraint subsystem shall conform to Figure 2. The restraint harness shall be comfortable, light in weight, and easy for the occupant to put on and take off even in the dark. The restraint harness shall provide freedom of movement. to operate the aircraft controls. Restraint webbing shall conform to MIL-W-25361 to the extent that other characteristics are not specified herein. The restraint shall be attached to the stroking portion of the seat such that relative position to the occupant will be maintained.

3.11.7.1 Lap belt. The lap belt anchorage geometry shall be as shown on Figure 3. The lap belt end attachments shall be capable of rotating plus and minus 20 degrees (0.350 radians) vertically from design inclination. An adjustor shall be provided in each strap.

3.11.7.2 Lap belt tiedown strap. The lap belt tiedown strap anchorage point shall be located on the seat pan centerline between 14 to 15 inches (35 to 38 cm) forward of the seat reference point. The buckle shall be affixed to the belt tiedown strap. An adjustor shall be provided. The maximum webbing extension allowed by the adjustor shall be limited to that required to fit a 95th percentile aviator.

3.11.7.3 Shoulder straps. Shoulder harness anchorage geometry shall be as shown on Figure 3. The guide at the top of the seat shall not be more that 0.5 inch (13 mm) wider than the strap passing through it. Edges and corners of the guide in contact with webbing shall be smooth and rounded to a radius no less than 0.25 inch (6mm) to minimize fraying. Motion through the webbing guide shall not be impaired by shoulder strap design.

3.11.7.4 Restraint system construction. Stitch pattern and cord size shall conform to Figure 4. The strap wrap radius at buckles, anchorages, and adjustments shall be not less than 0.062 inch (1.6mm) as shown on Figure 4. All surfaces in contact with moving straps shall have a miximum surface roughness of 32 RMS to prevent fraying.

3.11.7.5 Inertia reels. Both shoulder straps shall be served by a single inertia reel conforming to type MA-6 of MIL-R-8236, except that the ultimate strength of the inertia reel assembly shall be 5000 pounds (22,250 newtons) minimum while statically loading the lead-in webbing- The reel shall be located. as close to the shoulder strap guide as possible.

3.11.7.6 Buckle. The buckle shall be a five point quick release type permanently attached to the tie-down strap and operable with gloves. The only action required to secure the restraint system shall be insertion of the metal end fittings into the buckle. The buckle shall be equipped with a pad to provide a soft interface that distributes loads to the occupant. The buckle and pad shall not exceed a total thickness of 1.75 inches (45 mm). Vibration, decelerative loading or contact with occupant ***or*** aircraft controls shall not inadvertently open the buckle. The intentional release of the restraint harness

shall be simple and require at least 5 pounds (22.25 newtons) force. The force required to release the system with a 250 pound (114 kilogram) occupant inverted in a crash shall not exceed 50 pounds (222.5 newtons).

3.11.7.7 Adjustable hardware. The lap belt length adjustors shall be located at the side of the hips below the iliac crests of the pelvis. The shoulder strap adjustors shall be located low on the chest to avoid concentrated pressure on the collar bones. The force required to adjust strap length shall not exceed 30 pound (133 newtons), and it shall be possible to easily make adjustments with either hand. A downward pull on the shoulder harness straps shall tighten the shoulder harness. An upward and forward pull on the lap belt straps shall tighten the lap belt straps. Adjustment hardware shall be spring loaded such that strap length adjustments do not change in flight. A nominal 1.5 inch (38 mm) tab shall remain outside the adjustors when the restraint is at maximum extension.

3.12 Performance Characteristics.

3.12.1 Structural strength. Structural strength requirements shall be based on a 250 pound (114 kilogram) occupant weight plus the weight of the seat and any equipment attached to or carried in the seat. The required seat strengths and allowable deflections are specified in Table I. Seat components subject to being bumped, kicked, or used as handholds or steps shall be designed to withstand these loads without damage.

3.12.2 Crash force attenuation. The seat shall be fitted with a variable load-limiting vertical energy absorption device. This device shall be either continuously variable or provide a minimum of 3 increments to cover an occupant weight range from 140 to 250 pounds (64 to 114 kg) such that the requirements outlined in 4.7.4 are met. Motion during vertical energy absorption shall be parallel to within ± 10° (0.175 radians) pitch to the seat back tangent line. With the seat bucket in the full down adjustment position, not less than 12 inches (30 cm) of vertical stroking distance shall be provided.

TABLE I. Seat Design and Static test Requirements

Test ref. no.	Loading direction with repect to fuselage floor	Minimum Load Factor[a]	Body weight used in load determination lbs (kg)	Seat Weight used in load determination	Deflection limited[d] in (cm)
		Undirectional Loads			
1	Forward	35	250 (114)	Full	2 (5.1)
2	Aftward	12	250 (114)	Full	2 (5.1)
3	Lateral[c]	20	250[f] (114)	Full	4 (10.2)
4	Downward (bottomed)	25	200[f] (91)	Full	No Reqmt.
5	Upward	8	250 (114)	Full	2 (5.1)
		Combined Loads			
6	Combined Forward[c] Lateral[b] Downard (Stroking)	25 9 e	250 (114) 250 (114) 140 (64)	Full Full Stroking Part	Full Stroke

Notes

a. The aircraft floor or bulkhead shall be deformed prior to the conduct of static tests and kept deformed throughout load application.

b. Forward and lateral loads shall be applied prior to downward load application.

c. The lateral loads shall be applied in the most critical direction.

d. Under load at neutral seat reference point.

e. Static load factor as necessary to meet dynamic test criteria, Table III.

f. Effective weight of a 250 pound (114 kg) occupant.

12.3 Restraint System Strength and Elongation. Strength and dimensional properties of the restraint webbing shall conform to Table II. The strength and elongation properties of the lap belt, shoulder harness and lap belt. tiedown strap assemblies shall conform to 4.7.7.

TABLE II. Restraint webbing

Use	Nominal Width		Thickness		Minimum Tensile Breaking Strength	
	in	cm	in	mm	lbs	N
Lap belt	2.00 to 2.25	5.0 to 5.75	0.045 to 0.065	1.14 to 1.65	6,000	26,690
Shoulder harness	2.00	5.0	0.045 to 0.065	1.14 to 1.65	6,000	26,690
Lap belt tiedown	1.75 to 2.00	4.5 to 5.0	0.045 to 0.065	1.14 to 1.65	6,000	26,690
Inertia reel lead-in	1.75	4.5	0.055 to 0.075	1.4 to 1.9	8,000	33,585

3.13 Identification of product.

3.13.1 Seat. A permanent name plate shall be securely attached to the seat in a visible location. The name plate shall conform to MIL-STD-130 and contain the following information:

Nomenclature: _____
Manufacture's name or trade mark and FSMC _____
Manufacturer's Part No. _____
Contract No. _____
National Stock No. _____
Serial Number _____
Weight (measured) _____

US PROPERTY

3.13.2 Restraint. Both the shoulder harness and the lap belt shall have a permanent label attached to a strap where it cannot travel under an adjustor. Each label shall contain the following information:

Nomenclature _____
Manufacture's name or trade mark and FSMC _____
Manufacturer's Part No. _____
Date of manufacture _____

National Stock No. _____
Contract No. _____

3.13.3 Energy Absorber. Each energy absorber shall have a permanent label attached which contains the following information:

Manufacturer's name or trade mark and FSMC _____
Manufacturer's Part No. _____
Serial No. _____
Contract No. _____

3.13.4 Warning Marking. The following warning shall be marked in a conspicuous location on the seat. The size of the lettering shall be at least 0.25 inch (6 mm) high, yellow on black background.

WARNING

SIT IN SEAT WHILE ADJUSTING*

DO NOT PLACE ANYTHING UNDER SEAT

3.14 Safety. The Contractor shall conduct a system safety program in accordance with MIL-STD-882. The hazard severity classification shall define any hazard identified as degrading the seat system performance as a Category I hazard.

3.15 Workmanship. The seat including all parts and accessories, shall be constructed and finished in a thoroughly workmanlike manner. Attention shall be given to neatness and thoroughness of welding, riveting, machine screw assemblies, painting, and freedom of parts from burrs and sharp edges.

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 supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of

*Delete if adjustment mechanism is not spring loaded

section 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract, Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the government to acceptance of defective material.

4.2 Classification of Inspections. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (See 4.4)
b. First article inspection (See 4.5)
c, Quality Conformance Inspections (See 4.6)

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified below.

4.3.1 Standard Ambient Conditions. Unless otherwise specified, all measurements and tests shall be made at standard ambient conditions as specified in MIL-STD-81O.

4.3.2 Accuracy of Test Apparatus. Except for environmental test apparatus, for which the accuracy is specified in MIL-STD-810, all other test instruments and test equipment shall have an allowable error equal to or less than one-fourth the tolerance for the variable to be measured.

4.3.3 Calibration. All instruments and test equipment shall conform to laboratory standards whose calibration is traceable to the U.S. Bureau of Standards. All instruments and test equipment shall be appropriate for measuring the test parameters and periodically calibrated per MIL-STD-45662.

4.4 Qualification Inspection.

4.4.1 Test Plan. A test plan for qualification testing shall be prepared by the offeror and submitted to the procuring activity. No test may be initiated without procuring activity approval of the test plan.

4.4.2 Witnessing of Tests. The procuring activity reserves the right to witness any all tests. The procuring activity shall be notified of the anticipated test schedule.

4.4.3 Test Articles, Qualification test articles shall be fabricated and shall be representative of items which will be produced by the established production techniques, processes and procedures. Where there are differences in multiple source parts and materials, the items of least expected performance shall be utilized in the fabrication of test articles. Seats or components may be reused

in testing. However, the offeror shall bear full responsibility for any failure resulting from reuse.

4.4.4 Qualification Tests. Tests shall consist of all those listed in 4.7 and shall demonstrate compliance with the requirements. The inspection and functional tests of 4.7.1 shall be repeated as applicable prior to, during, and subsequent to each of the other tests to detect any damage or deterioration resulting from the test. In the event of any failure during qualification, the offeror shall be responsible for any redesign, rework, and retest. Complete retests may not be required providing the offeror can show that the seat changes do not effect the result of prior tests.

4.4.5 Test Reports. A test report shall be submitted to the procuring activity.

4.5 First Article Inspection. First production units shall be subjected to inspections consisting of 4.7.1 and 4.7.2. Inspection for delivery shall also be conducted of the packaging per 4.7.12.

4.6 Quality conformance Inspections. Quality conformance inspections of production shall consist of individual inspections and sampling tests.

4.6.1 Individual. Each seat shall be subjected to the inspections specified in the contract as well as 4.7,1 and 4.7.2.

4.6.2 Sampling Tests. Energy absorbers of each part number and in the quantities specified below shall be randomly selected and subjected to static load-deflection tests to verify compliance with each of the limit-load tolerance ranges .

(a) Two (2) energy absorbers from each lot of 200 or fraction thereof.
(b) Five (5) energy absorbers from each lot greater than 200, but less than 500.

4.6.3 Rejected Lots.

4.6.3.1 Rejection and Retest. If an inspection lot is rejected, the manufacturer may rework it to correct the defects or screen out the defective units and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection and shall not thereafter be tendered for acceptance unless the former rejection is disclosed. Such lots shall be separate from new lots and shall be clearly identified as reinspected lots.

4.6.3.2 Individual Test Continuance. For production reasons, individual tests may be continued pending the investigation of a sampling test failure, but final acceptance of the entire lot or lots produced later shall not be made until it is determined that all items meet all the requirements.

4.6.3.3 Defects in Items Already Accepted. When test failure investigation indicates defect(s) may exist in items already accepted, the contractor shall promptly notify the procuring activity of all suspect conditions and specify method of correction or disposition.

4.7 Test Methods.

4.7.1 Examination of Product. Seats and components shall be carefully examined to determine conformance with Section 3 of this specification and the manufacturer's drawings and specifications. They shall be checked for conformance including markings, accuracy of dimensions, quality of workmanship, use of proper materials, parts, and processes, and freedom from visible defects or any other imperfections. All moving parts shall be examined to ensure that they operate freely without sticking or binding, and yet fit with accuracy required by this specification or the applicable drawing.

4.7.2 Seat Weight. Each complete seat shall be weighed for conformance to the maximum allowable weight, as specified in the applicable associated detail specification.

4.7.3 Static Tests.

4.7.3.1 Seat Static Test Set-up. The seat shall be tested as a complete unit and shall be mounted in a suitable jig or fixture using the actual seat air-frame tiedown attachments. The seat shall be placed in the full up adjustment position. The floor or bulkhead shall "be subjected to buckling and warping prior to load application as shown on Figure 5. The test loads shall be applied through a body block which is contoured per Figure 6. The occupant restraint shall fasten the body block to the seat and shall be tested with the rest of the seat during the static tests.

4.7.3.2 Seat Static Load Application By Conventional Means. The seat shall be subjected to and withstand the tests of Table I without separation of a primary load-carrying member or deflection beyond limits. Total static test loads to be applied, for all directions, shall be determined by multiplying the required load factor specified in the table by the sum of the applicable occupant weight and seat, or seat portion weight. That portion of the static loading that must be withstood by the occupant restraint subsystem shall be applied to the body block and the remainder of the load representing inertial loading of other seat components may be applied separately to the appropriate structure. Maximum deflection shall be measured from the seat reference point, which may be projected to the outside of the bucket for convenience.

4.7.3.3 Seat Static Load Application by Centrifuge. As an alternative, load application by centrifuge is allowed. application by For each loading condition specified by Table I, the appropriately sized dummy shall be seated in the test seat and fastened with the restraint subsystem. The seat shall be oriented relative to the centrifuge arm such that the load is applied in the required direction. The

simulated aircraft floor or bulkhead shall be deformed as required. The centrifuge device shall be brought to a rotational speed corresponding to the required centripetal acceleration for at least one second. The seat shall withstand, without failure or deflections beyond limits, each of the Table I load conditions.

4.7.3.4 Headrest Static Test. The headrest shall be tested by placing a block formed into a head shape against the headrest and loading it to 400 pounds (1,780 newtons) aftward. The headrest shall not fail or permanently deform.

4.7.4 Dynamic Tests. Prototype seats shall be dynamically tested to the four conditions specified in Table III. The actual aircraft seat attachment hardware shall be used for mounting the seat in the test fixture. All tests shall be performed with the inertia reel set in the “auto-lock” mode. The seat shall retain the dummy within the confines of the restraint harness and shall evidence no loss of structural integrity. Any failure of a restraint system component or of a primary load-carrying structural member of the seat shall be unacceptable. A primary load-carrying structural member is defined a a nonredundant member whose failure would allow uncontrolled motion of the seat and/or potentially injurious impact of the occupant with cockpit components. Permanent deformations of the structure which do not present a hazard to the occupant are acceptable. Webbing slippage at adjustors in excess of one inch (25.4mm) is unacceptable. The initial seat height adjustment shall be set in the mid-position for all tests except Test 2, which shall be in the full up position. A clad 95th percentile dummy weighing 230 pounds (105 kg) and Hybrid III or VIP-95 shall be used for all tests except Test 3. Test 3 shall use a 50th percentile dummy of Hybrid 111 or CFR Title 49, Chapter 5, Part 572, lightly clad with both arms removed at the shoulder joints to simulate a 5th percentile dummy weight. For all tests, the dummy’s feet shall be secured in a representative anti-torque pedal position. The adjustable attenuation system shall be placed in a load setting corresponding to a 5th percentile occupant weight for Test 3, and a 95th percentile occupant weight for Tests 1,2 and 4, For Tests 3 and 4, an accelerometer shall be rigidly attached to the lower seat pan centerline surface at a point 5.5 inches (14 cm) forward of the seat reference point to measure accelerations parallel to the seat back tangent line. The acceleration measured during Tests 3 and 4 shall not exceed 23 G for more than 0.025 seconds, when measured in accordance with a SAE J211, Class 60 instrumentation system. This time duration shall be additive, in a cumulative manner, for all acceleration excursions exceeding 23 G. The minimum acceptable seat stroking distance for Tests 3 and 4 shall be 9.5 inches (24.1 cm).

4.7.5 Environmental Tests. At least one complete seat in normal operating condition shall be subjected to each of the following environmental tests in the order listed. At the conclusion of each test, all adjustors, controls, and release mechanisms shall be activated to determine satisfactory operation and the seat visually examined for deterioration. Degradation shall be cause for rejection.

4.7.5.1 High Temperature. The seat shall be tested to the requirements of MIL-STD-810, Method 501.2, Procedure I. AT 160°f (71°C) and Procedure II at

130°F (54 °C). Operation of the seat shall be verified at the operating temperature of 130°F (54 °C).

4.7.5.2 Low Temperature. The seat shall be tested to the requirements of MIL-STD-810, Method 502.2, Procedure I at -65°F (-54 °C) and Procedure II. at -25°F (-32 °C). Operation for the seat shall be verified at the operating temperature of -25°F (-32°C)

4.7.5.3 Solar Radiation. Seat fabric and other susceptible materials shall be tested to the sunshine test requirements of HIL-STD-810, Method 505.2, Procedure II. Restraint webbing is excluded.

4.7.5.4 Humidity. The seat shall be tested to the requirements of MIL-STD-810, Method 507.2, Procedure II. Post test inspection shall include a check for evidence of corrosion.

4.7.5.5 Fungus. Potentially susceptible components and meterial samples shall be tested to the fungus test requirements of MIL-STD-810, Method 508.3. Operation of the equipment is not required, but examination shall reveal no evidence of a viable fungus on any surfaces. Restraint webbing is exclded.

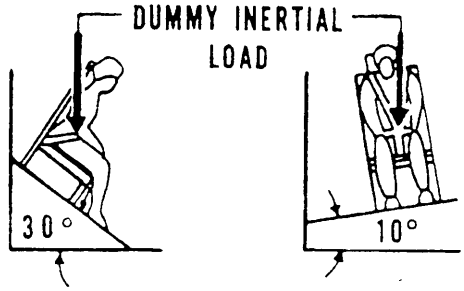
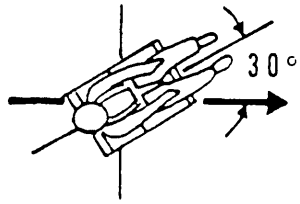
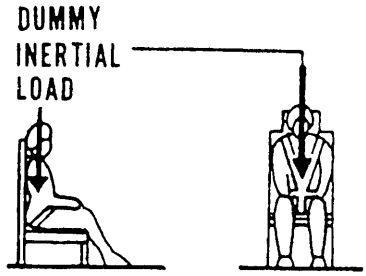
4.7.5.6 Salt Fog. The seat shall be subjected to the requirements of MIL-STD-810, Method 509.2. Inspection after the test shall include a check for evidence of corrosion.

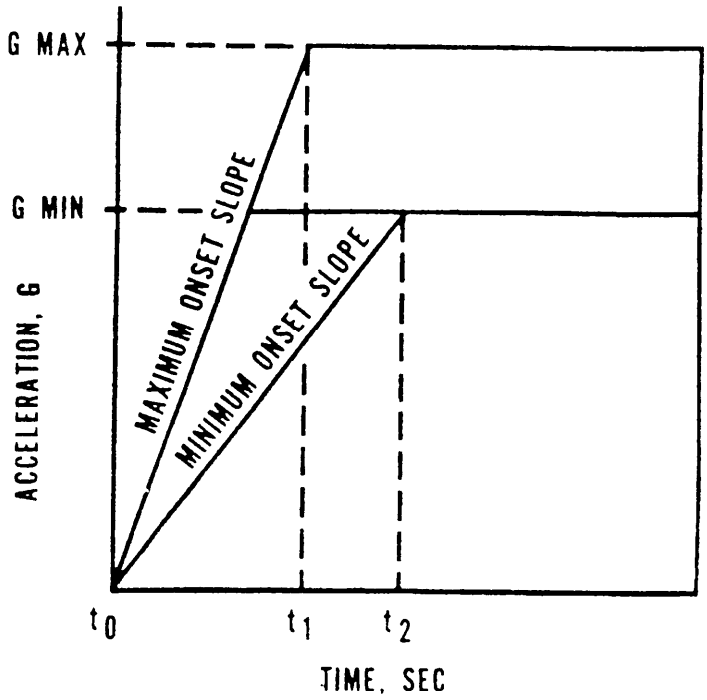
4.7.5.7 Sand and Dust. The seat shall be subjected to the test specified in MIL-STD-810, Method 510.2, Procedure I and 11.

4.7.5.8 Vibration. The seat shall be mounted by its actual attachments to a fixture which in turn shall be fastened to the vibration exciter. Precautions shall be taken in the establishment of mechanical interfaces to minimize the introduction of extraneous responses in the test setup. The vibration tests of the seat shall be conducted separately in each of the three (3) orthogonal directions in the full up, intermediate, and full down adjustment positions with a lightly clad 50th percentile human occupant, The vibration test of each axis shall consist of a sinusoidal sweep over the 4 to 50 HZ frequency range during a time period of no less than seven (7) minutes. An input of 0.10 G shall be used and shall be constant over the frequency range. The vibration transmissibilities shall be controlled to the extent required by the associated detailed specification. The seat shall not deteriorate and shall be capable of satisfactory operation after the test.

4.7.6 Energy Absorber Endurance. Two of each part number energy absorber shall be subjected to enduance testing. One of each shall be first environmentally tested per 4.7.5. Each sample shall then be subjected to a 30 x 10 cycle endurance test at 150% of inflight cruise loads. The steady and vibratory loads are to be based on a 250 pound (114 kg) occupant and 0.1 G vibration level. Load deflection-i tests shall be performed to verify that there had been no degradation.

TABLE III. Dynamic Test Requirements

TEST	CONFIGURATION	PARAMETER	LIMITS
1		t_1 SEC t_2 SEC G MIN G MAX △ V MIN, FT/SEC (M/SEC)	0.043 0.061 46 51 50 (15.2)
2		t_1 SEC t_2 SEC G MIN G MAX △ V MIN, FT/SEC (M/SEC)	0.066 0.100 28 33 50 (15.2)
3 & 4		t_1 SEC t_2 SEC G MIN G MAX △ V MIN, FT/SEC (M/SEC)	0.036 0.051 46 51 42 (12.8)



In addition, three of each part number shall be environmentally tested per 4.7.5. Kach sample shall then be internally stabilized at temperatures of -25 °F (-32 ‘C), 70 °F (21 °C) and +135 °F (57 °C). Load-deflection tests shall be performed with absorber load set at the highest setting while maintaining these temperatures. Any load variance greater than ± 10% design load shall be unacceptable.

4.7.7 Restraint System Tests. The restraint system shall be subject to the following tests prior to being used in seat level testing.

4.7.7.1 Webbing. All webbing shall be tested in accordance with MIL-W-25361.

4.7.7.2 Hardware. All restraint system hardware shall be tested as follows:

a. Buckle. The buckle shall be subjected to the following tests.

(1) Release with load. The shoulder straps and lap belts shall be connected to the buckle around a 250 pound (114 kg) dummy in the correct position for normal use. The dummy shall be inverted such that his spine is vertical and head down. The buckle shall then activated and the release force measured. This sequence shall be repeated 50 times. The force required to release shall not exceed 50 pounds (222 newtons) (for a single-point load application) .

(2) Release, No load. Mount the buckle in normal position on a fixture with all fittings fully engaged but no strap loads applied to them. Manually actuate the buckle’s release mechanism and visually inspect that all fittings are released from the-buckle’s latching mechanism. Release the mechanism and pull the fittings free from the buckle. This sequence shall be repeated 50 times. Release load shall be at least 5 pounds (22.2 newtons) force.

(3) Endurance. Cycle the buckle release with fitting insertions 5,000 times followed by tests a.(1) and a.(2) above and 4.7.7.3.a.

(4) Fitting Angularity. With the buckle restrained, each fitting except the two shoulder harness fittings shall be subjected to and withstand a 4,000 pound (17,800 newtons) static pull 30° (0.524 radians) forward and 30° (0.524 radians) aft out-of-plane, and plus 30° (0.524 radians) and q inus 30° (0.524 radians) in-plane. Shoulder harness fittings shall be tested in an identical fashion except that the pull angles in every case shall be 45° (.785 Radians). A new specimen may be used for each pull direction.

b. Adjustor. Each different adjustor in the harness assembly shall be tested as follows:

(1) Adjustment Load. With no load other than the adjustment reaction load, webbing shall be drawn through each adjustor at a rate of 20 ± 2 in/see (50.8 ± 5.1 cm/see) and the adjustment force measured. The adjustment force shall

not exceed 30 pounds (133 newtons). This test shall be repeated 20 times.

(2) Abrasion. With no load other than the adjustment retraction load, webbing shall be pulled through its adjustor 5,000 times. The webbing shall then be tested to demonstrate that it can still withstand the 4.7.7.3.a, b, and c loads as appropriate and that no slippage of the webbing occurs at the adjustor due to abrasion. The test shall be conducted for each different webbing and adjustor combination.

(3) Adjustor Creep. A 10 pound (4.53 kg) weight shall be attached to webbing passing through the adjustor and the webbing marked at the adjustor. The adjustor shall first be lifted vertically such that the weight hangs freely then motion reversed to release the load in the strap. This sequence shall be repeated 5000 times. Mass acceleration shall not exceed 2.5G. At the completion of the test, there shall be no slippage at the mark.

c. Inertia Reel. The inertia reel shall be tested in accordance with MIL-R-8236 if not a Qualified Products List (QPL) item. In addition, the reel shall be tested to demonstrate an ultimate strength of 5,000 pounds (22,240 newtons) when following the procedures of 4.3.3.1, MIL-R-8236.

4.7.7.3 Restraint Strength. The lap belt. shoulder harness, and lap belt tie-down strap shall be tested separately. At the conclusion of each test, the buckle shall be activated to ensure that permanent deformation did not occur preventing egress of the occupant.

a. Lap Belt Assembly. The lap belt shall be tested in straight tension as an assembly. The lap belt anchors (end fittings) shall be attached to fixtures (one fixed and one movable) and webbing lengths adjusted to fit a 95th percentile occupant. The test shall be started from an initial preload of 100 pounds (445 newtons). The fixtures shall be separated at a rate of 2 in/rein (5.1 cm/min). The elongation and applied load shall be measured continuously or at intervals not to exceed 0.5 inch (13 mm) of elongation. If load-elongation readings are not continuous, a reading shall be taken at 4,000 pounds (17,800 newtons). Loading shall continue to failure. Structural failure of any component or elongation in excess of 7% end to end at a load equal to or less than 4,000 pounds (17,800 newtons) shall be unacceptable.

b. Shoulder Harness Assembly. The shoulder harness assembly shall be tested in straight tension with the inertia reel in a locked position and attached to a suitable fixture. The two shoulder harness end fittings shall be plugged into the buckle and the buckle attached to a movable fixture, the webbing lengths shall be adjusted to fit a 95th percentile occupant. The test shall be started from an initial preload of 100 pounds (445 newtons). The fixtures shall be separated at a rate of 2 in/rein (5.1 cm/mim). The elongation and applied load shall be measured continuously or at intervals not to exceed 0.5 inch (13 mm) of elongation. If load-elongation readings are not continuous, a reading shall be taken at 4,000 pounds (17,800 newtons). Loading shall continue to failure.

Load-elongation data shall be recorded for the free webbing length exclusive of elongation and spooling webbing on the reel. Elongation in excess of 8% at 4,000 pounds (17,800 newtons) or structural failure of any component at or below 5,000 pounds (22,240 newtons) shall be unacceptable. As a separate test, the inertia reel webbing and its stitching to the two shoulder straps shall demonstrate 5,000 pounds (22,240 newtons) ultimate when subjected to straight tension while loading both straps, and 3,000 pounds (13,350 newtons) when loading one strap. The test procedure shall be similar to the above except that the specimen shall consist of only the inertia reel strap and the shoulder straps.

c. Lap Belt Tie-Down Strap. The lap belt tie-down strap shall be tested in straight tension with the buckle and tie-down end fitting attached to fixtures (one fixed and one movable). The test shall be started from an initial preload of 100 pounds (445 newtons). The fixtures shall be separated at a rate of 2 in/rein (5.1 cm/min). The elongation and applied load shall be measured continuously or at intervals not to exceed 0.10 inch (2.5 mm) of elongation. If load-elongation readings are not continuous, a reading shall be taken specifically at 3,000 pounds (13,350 newtons). Loading shall continue to failure, Structural failure of any component or elongation in excess of 10% end to end at a load equal to or less than 3,000 pounds (13,350 newtons) shall be unacceptable.

4.7.8 Adjustment Enurance. The seat, with a live occupant or body block seated on it, shall be mounted simulating normal aircraft installation. The bucket shall then be adjusted upward and downward from its neutral seat reference point to each of its adjustment positions until a total of 5,000 adjustment engagements has been completed. At each adjustment position, the bucket shall lock positively and smoothly. This procedure shall be repeated for the fore and aft adjustment direction.

4.7.9 Aircraft Interface. An aircraft trial installation shall be conducted to determine satisfactory form, fit, function, and flight operation.

4.7.10 Interchangeability Conformance to the requirements for interchangeability of component parts shall be determined by means of suitable jigs and sample parts,

4.7.11 Maintainability Verification. A maintainability demonstration shall be conducted in accordance with MIL-STD-471.

4.7.12 Inspection of Packaging. Except when industrial packaging is specified, the sampling and inspection of the preservation and interior package marking shall be in accordance with groups A and B quality conformance inspection requirements of MIL-P-116. The sampling and inspection of the packing and marking for shipment and storage shall be in accordance with the quality assurance provisions of the applicable container specification shown in section 5 and the marking requirements of MIL-STD-129. The inspection of industrial packaging shall be as specified in the contract.

5. PACKAGING

5.1 Preservation and Packaging. Parkaging shall be levels A, B, or C as specified. (see 6.1)

5.1.1 Level A. Unless otherwise specified in the contract or order (see 6.1), each seat system shall be packaged in accordance with Method III of MIL-P-116 in unit containers conforming to PPP-B-601, oversea type, and surface-treated in accordance with that specification.

5.1.2 Level B. Packaging shall be the same as for level A, except containers may conform to PPP-B-636, class weather-resistant.

5.1.3 Level-C. Packaging shall be the same as for level B, except containers may be domestic class.

5.2 Packing. Packing is not required.

5.3 Marking. In addition to any special marking for shipment required by the contract order, containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended-use. The seat covered by this specification is for use by crewmembers of either rotary-wing or light fixed-wing aircraft not requiring ejection seats. This specification is not intended for procurement purposes but as a reference document for aircraft system specifications to define basic seat characteristics. It also serves as the basis for the preparation of associated detail specifications for particular types of seats which tailor the requirements herein and add specific aircraft interface criteria. Examples of seat variations would be armored versus unarmored, tandem versus side-by-side cockpit compatibility, and floor versus bulkhead mounting.

6.2 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in Qualified Products List (QPL No.) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is US Army Aviation Systems Command, 4300 Goodfellow Boulevard, St. Louis, MO 63120 and information pertaining to qualification of products may be obtained from that activity. Qualification shall be against Associated Detail Specifications.

6.3 Ordering data. Not applicable (See 6.1)

Custodian:
Army -- AV

Preparing Activity:
Army -- Av

project No. 1680-A490

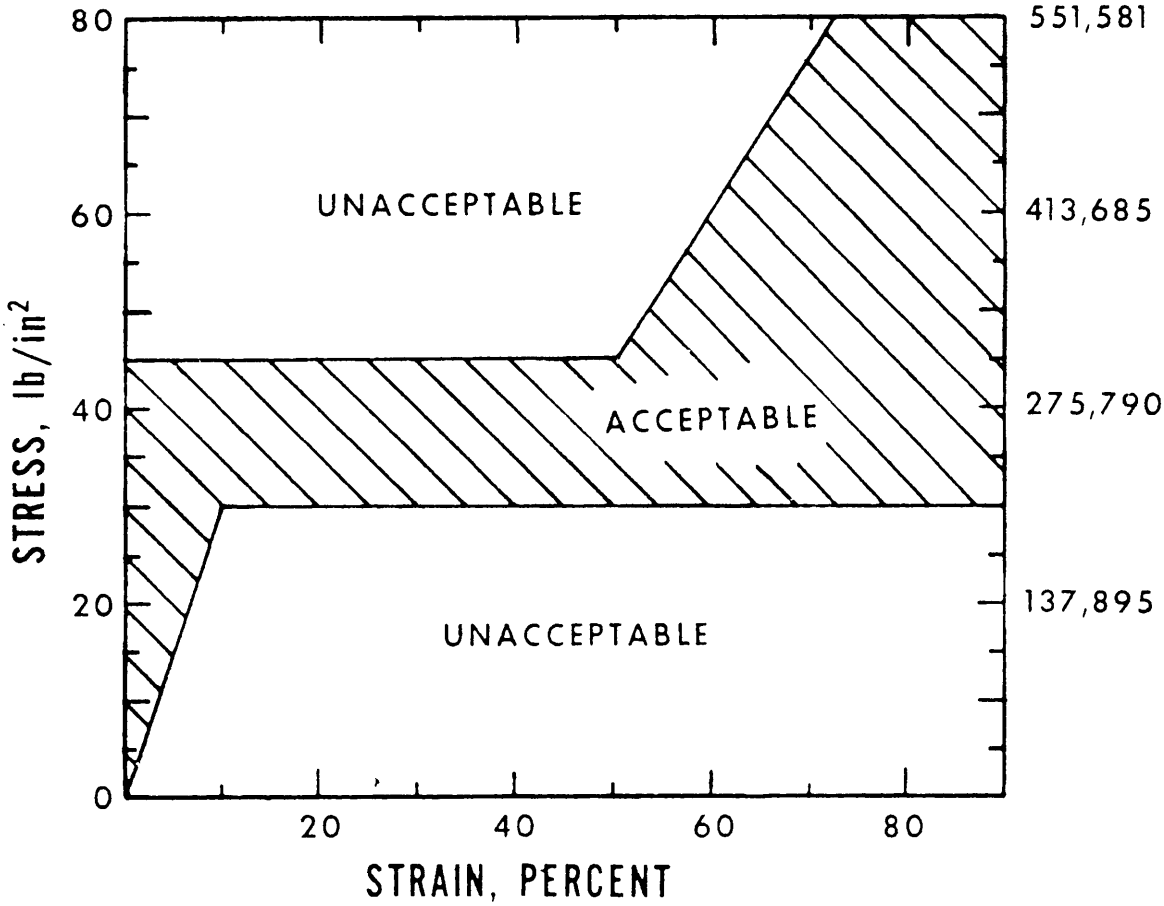


FIGURE 1. Stress-strain properties for headrest padding for padding thicknesses 1 inch or less.

ITEM IDENTITY

1. BUCKLE ASSEMBLY
   - A. SINGLE-POINT RELEASE BUCKLE
   - B. TIEDOWN STRAP
   - C. ADJUSTOR
2. LAP BELT ASSEMBLY
   - A. LAP BELT
   - B. ADJUSTOR
3. SHOULDER HARNESS ASSEMBLY
   - A. INERTIA REEL
   - B. INERTIA REEL STRAP
   - C. LOWER SHOULDER STRAP
   - D. ADJUSTOR

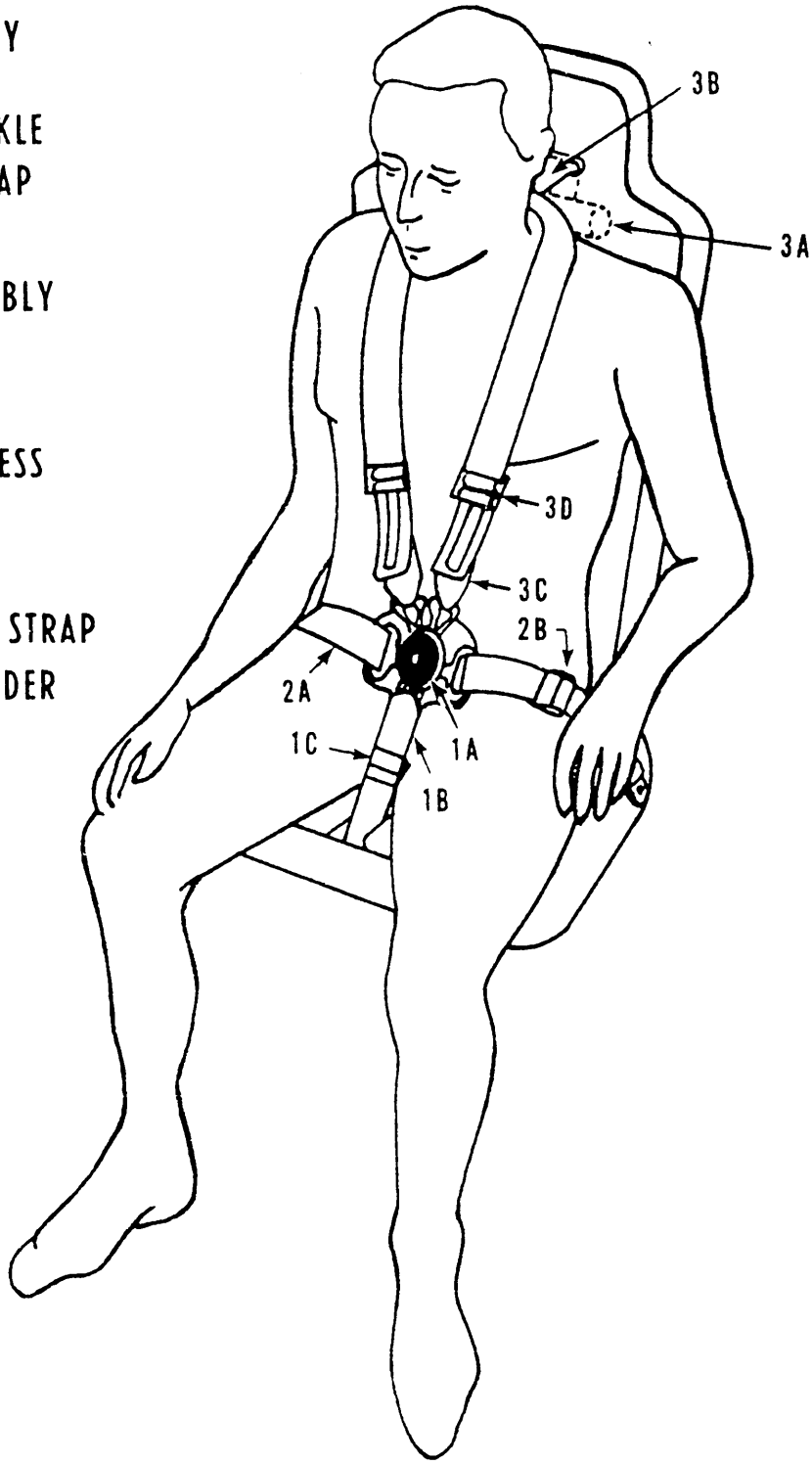


FIGURE 2. Restraint subsystem configuration,

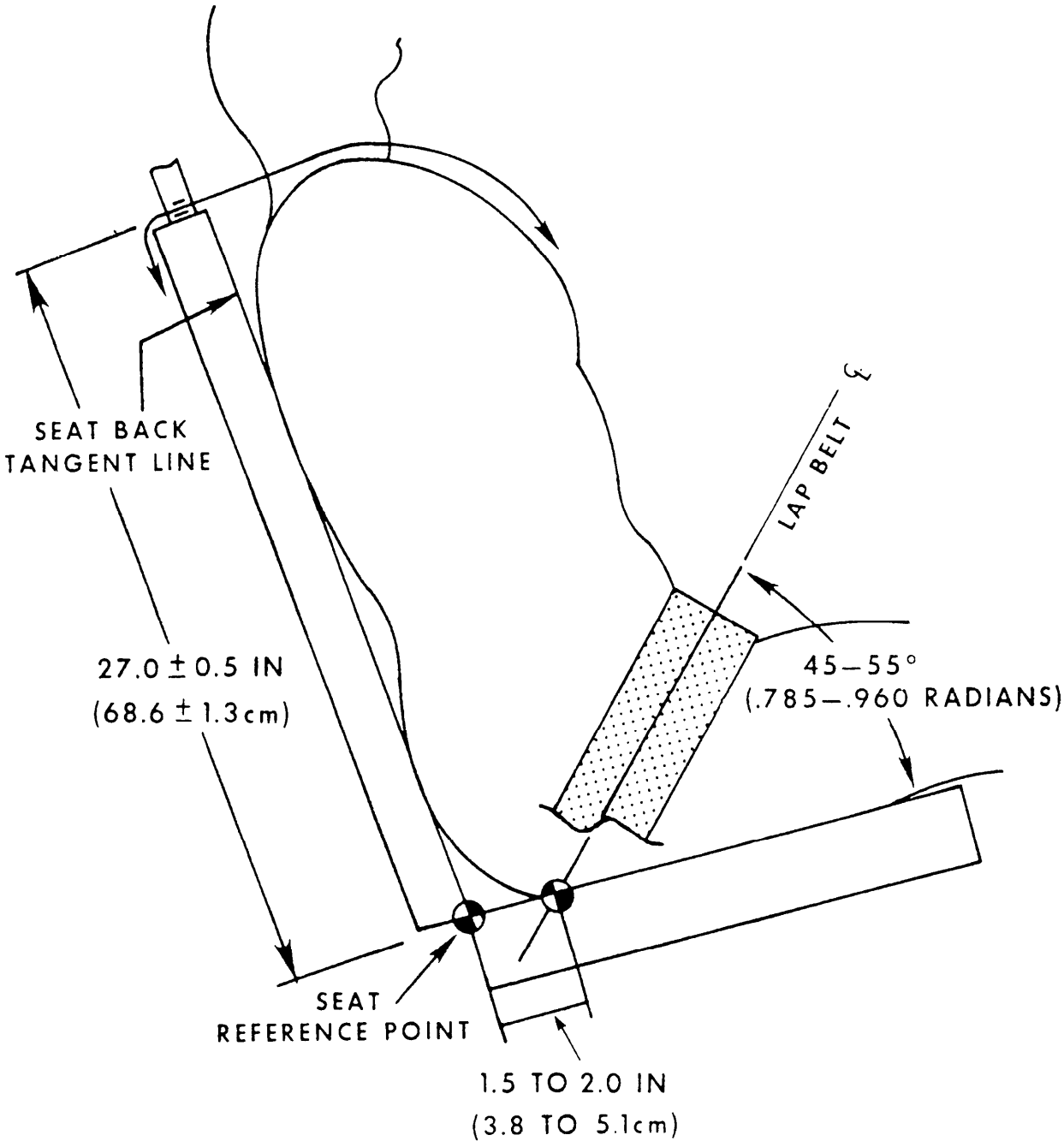


FIGURE 3. Lap belt anchorage geometry.

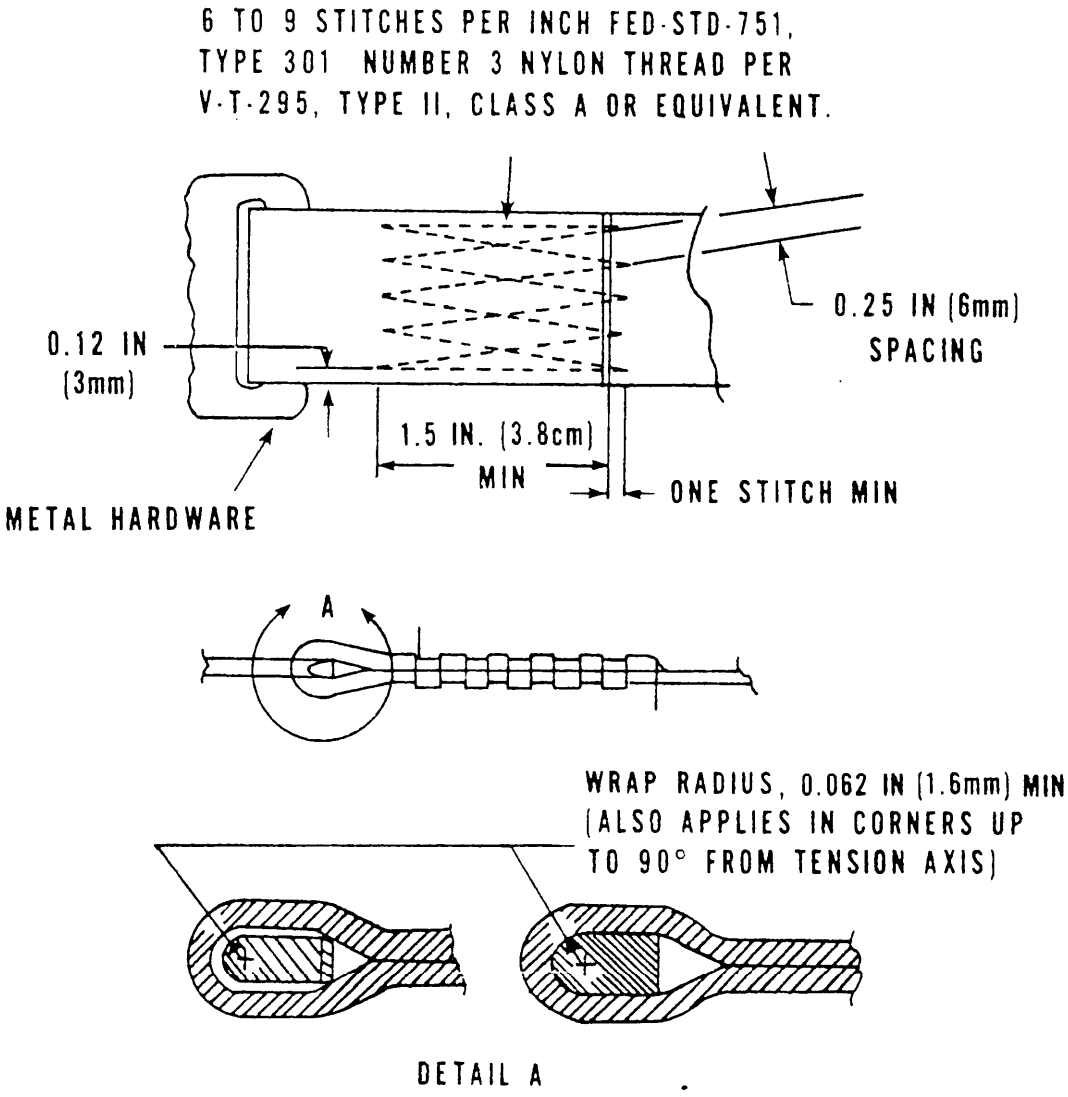


FIGURE 4. Stitch pattern, cord-size, and wrap radius for strap joints.

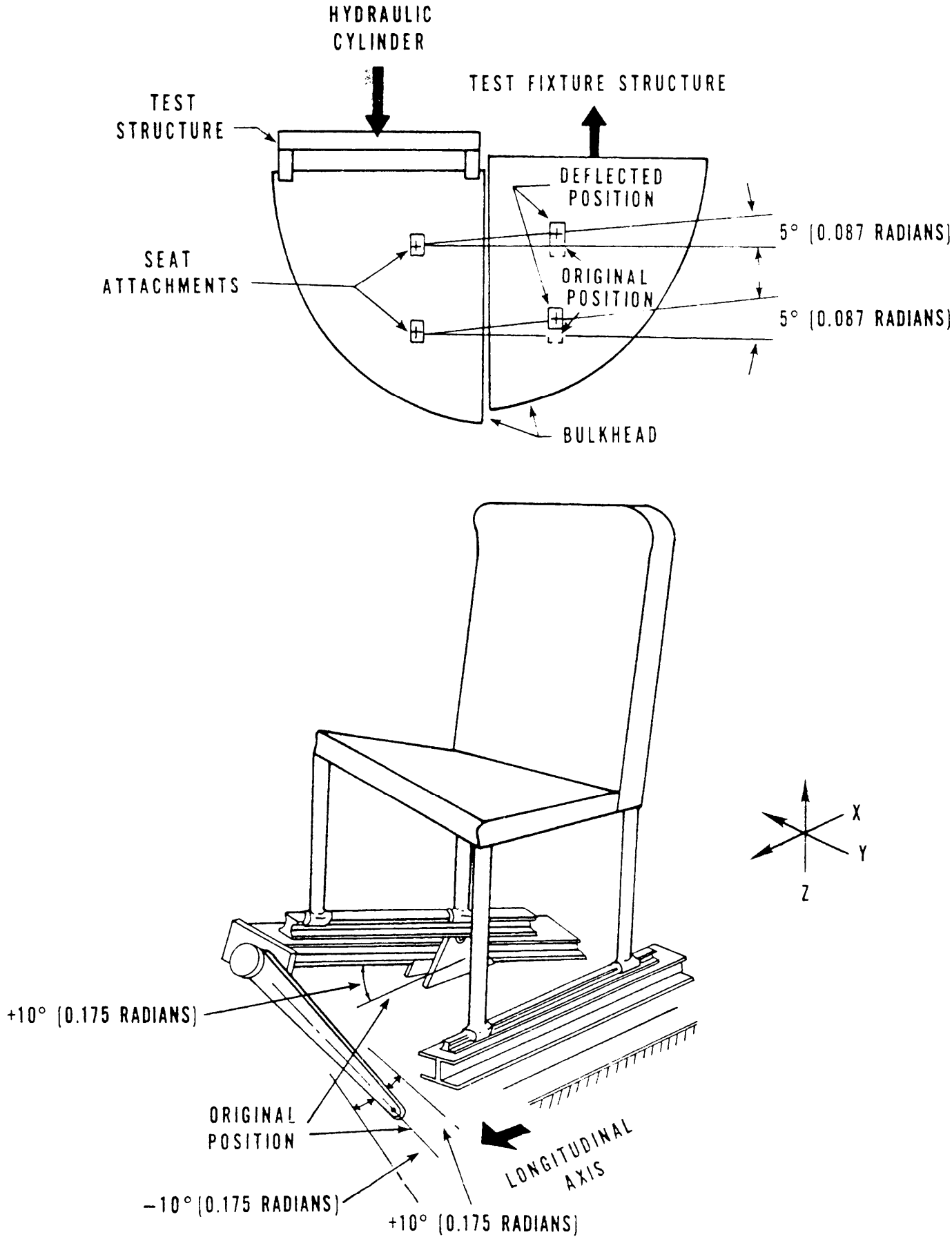


FIGURE 5. Floor or bulkhead warpage requirement for static loading of seat(s).

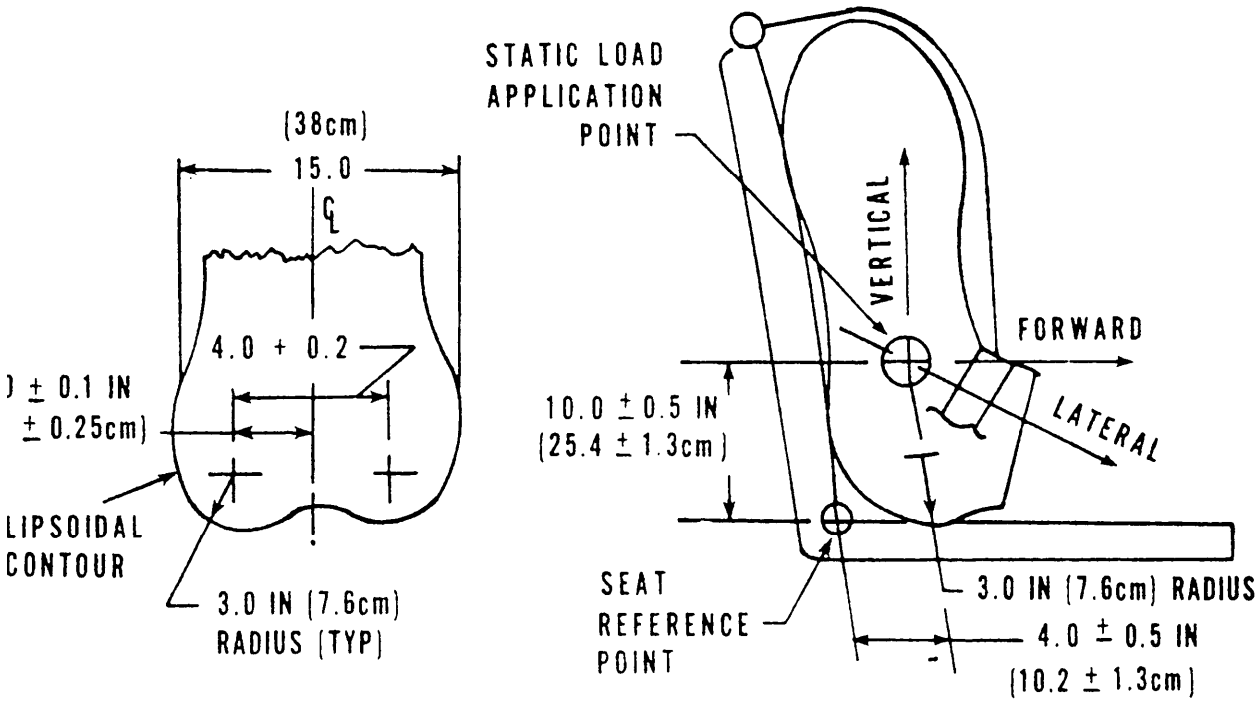


FIGURE 6. Static load application point and body block pelvis geometry.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-S-58095A(AV)	SEAT SYSTEM: CRASH-RESISTANT, NON-EJECTION, AIRCREW, 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 1426