

MIL-P-14401B(AT)
 6 May 1980
 SUPERSEDING
 MIL-P-14401A(AT)
 19 July 1966

MILITARY SPECIFICATION

PADS, CUSHIONING: PERSONNEL-PROTECTION, VEHICULAR

This specification is approved for use by US Army Tank-Automotive Materiel Readiness 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 pads for cushioning interior surfaces of military vehicles to protect personnel from injury (see 6.1).

1.2 Classification. Pads shall be of the following types and classes as specified (see 6.2):

Type I	- Facial contact.
Class CS	- Closed Cell, Expanded Rubber.
Class VS	- Cellular Vinyl Elastomer.
Class FR	- Foam Rubber.
Type II	- Head and Body Contact.
Class CS	- Closed Cell, Expanded Rubber.
Class VS	- Cellular Vinyl Elastomer.
Class HF	- Hair Felt.
Class WF	- Wool Felt.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL

C-F-202 - Felt Sheet (Hair) and Felt Roll (Hair).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Tank-Automotive Materiel Readiness Command, ATTN: DRSTA-GSS, Warren, MI 48090, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

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| C-F-206 | - Felt Sheet, Cloth, Felt Wool, Pressed. |
| JJ-S-746 | - Stockinet, Surgical. |
| QQ-Z-325 | - Zinc Coating, (Electrodeposited)
Requirements for. |
| CCC-C-432 | - Cloth, Sheeting, Cotton, (Unbleached,
Bleached and Dyed). |
| MMM-A-1617 | - Adhesive, Rubber Base, General Purpose. |

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| MIL-F-2312 | - Felt, Hair or Wool, Mildew Resistant and
Moisture Resistant, Treatment for. |
| MIL-C-3133 | - Cellular Elastomeric Materials, Molded or
Fabricated Parts. |
| MIL-C-3395 | - Cloth, Netting, Nylon. |
| MIL-I-15126 | - Insulation Tape, Electrical, Pressure
Sensitive Adhesive and Pressure Sensitive
Thermosetting Adhesive. |
| MIL-C-16555 | - Coating Compound, Strippable, Sprayable. |
| MIL-E-52835 | - Enamel, Modified Alkyd, Camouflage, Lusterless. |
| MIL-C-81562 | - Coatings, Cadmium, Tin-cadmium and Zinc
(Mechanically Deposited). |

STANDARDS

FEDERAL

- | | |
|-------------|---------------------------------|
| FED-STD-191 | - Textile Test Methods. |
| FED-STD-601 | - Rubber, Sampling and Testing. |

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| MIL-STD-105 | - Sampling Procedures and Tables for Inspection
by Attributes. |
| MIL-STD-129 | - Marking for Shipment and Storage. |
| MIL-STD-670 | - Classification System and Tests for Cellular
Elastomeric Materials. |

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

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3. REQUIREMENTS

3.1 First article. First article samples of pads to be furnished under this specification shall be produced prior to manufacture of these items in production quantity. First article samples shall be properly identified and subjected to first article inspection (see 4.3). Samples inspected by the contractor shall be fully representative of pads to be supplied from production facilities.

3.2 Materials. Materials shall be as specified herein and in referenced specifications, standards and drawings. Material shall be free of defects which adversely affect performance or serviceability of the finished product (see 6.4).

3.2.1 Toxic materials. Pads shall not contain materials which cause dermatitis or other ill effects to personnel coming in contact with pads. Materials used in pads shall not give off toxic fumes, injurious to personnel in confined enclosures, when ignited.

3.2.2 Type I class CS. Base material shall be of closed-cell sponge rubber conforming to MIL-C-3133 and rubber conforming to SCE3 of MIL-STD-670.

3.2.3 Type I class VS. Base material shall be cellular expanded polyvinyl chloride of density equivalent to grade SCE3 of MIL-STD-670.

3.2.4 Type I class FR. Base material shall be of foam rubber conforming to SC03 of MIL-STD-670.

3.2.5 Type II class CS and VS. Base material shall be as specified in 3.2.2 and 3.2.3 respectively.

3.2.6 Type II class HF. Base material shall be hair felt, conforming to type III of C-F-202, which shall be bonded to a backing fabric conforming to type I, class I of CCC-C-432.

3.2.7 Type II class WF. Base material shall be wool felt conforming to class 9R2, 9R3 or 9R4 of C-F-206. Felt shall be fungus and water resistant in accordance with type III of MIL-F-2312.

3.3 Design and construction. A protection pad shall be an assembly consisting of cushioning material of specified firmness and a smooth, tough surface coating. Metal inserts shall be securely attached as shown on applicable drawings (see 6.2). Pads shall be designed for application by cementing to painted or unpainted surfaces, or in the case of metal backed pads, by means of welding, riveting or bolting as specified on applicable drawings. Pads shall not contain materials such as plasticisers or dusting powders in amounts that will prevent effective bonding to metal surfaces. When metal inserts are

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specified, they shall be of mild carbon steel, 0.20 percent maximum, approximately 16 gage (0.062 inch), which shall be properly prepared by zinc plating to a minimum of 0.0002 inch in accordance with QQ-Z-325 type II, class 3, or MIL-C-81562, type II, class 3.

3.3.1 Welding, riveting and bolting. Pads intended to be bolted, riveted or welded in place shall include provisions for such attachments as shown on applicable drawings (see 6.2). Welding tabs shall extend 3/4 inch beyond pad as shown on applicable drawings. Welding tabs shall not be plated.

3.3.2 Type I, classes CS, VS and FR. Where specified on applicable drawing (see 6.2), reinforcement shall be firmly bonded to metal insert with adhesive conforming to type II of MMM-A-1617. Reinforcement ply of nylon stockinet or tape conforming to type I of MIL-C-3395 shall be securely cemented, as specified, over back of backing plate for 1/2 inch and up the edge of the pad for 1/2 inch. In no case shall reinforcement come to full height of pad. Surface coating of polychloroprene not less than 0.020 inch thick shall smoothly cover entire assembly, except attaching lugs shown on applicable drawing (see 6.2).

3.3.3 Type II, classes CS, VS, HF and WF. Construction shall be as specified in 3.3.2, except that cotton stockinet type II of JJ-S-746, or nylon stockinet specified in 3.3.2, shall cover entire pad. Stockinet shall be securely cemented as specified over back of backing plate for 1/2 inch (classes CS and VS). Polychloroprene coating (see 3.3.2) shall be not less than 0.035 inch thick.

3.3.4 Alternate coating. Unless otherwise specified (see 6.2), coating shall be of sprayable, strippable vinyl material conforming to MIL-C-16555 for exterior pads only. Coating shall be not less than 0.020 inch thick for type I pads, and not less than 0.030 inch thick for type II pads. As alternate reinforcement for type II class CS and VS pads, tape conforming to type CF of MIL-I-15126 shall be used. Surface coating, as specified in 3.3.2, shall be applied.

3.3.5 Dimensions. Dimensions of pads shall conform to applicable drawings (see 6.2). Except in restricted locations, minimum thickness of 3/4 inch shall be maintained.

3.4 Performance.

3.4.1 Bonding. Pads bonded to metal insert shall be secured by heat vulcanization, or adhesive. Bonding shall withstand temperature range of minus 40° + 4°F to plus 158° + 2°F without bond separation, embrittlement or cracking. Adhesive shall conform to type II of MMM-A-1617. Surface coatings and bonded plies of all classes shall be securely bonded. Force required to separate plies or coatings shall be not less than 5 pounds per inch of width.

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3.4.2 Softness. Pads shall conform to softness range specified in table I.

TABLE I. Loads on 1-inch ball to cause indentation of 1/4 of pad thickness.

Type	Temperature	Test weight
I Facial	+ 70°F to + 75°F	5.0 Pounds max.
II Body	+ 70°F to + 75°F	10.0 Pounds max.
I Facial	- 40°F to - 45°F	30.0 Pounds max.
II Body	- 40°F to - 45°F	35.0 Pounds max.

3.4.3 Resistance to extreme temperature. Pads shall evidence no cracks, delaminations, or adhesive failure after 72 hours exposure at 158°F, and 72 hours at minus 40°F.

3.4.4 Fire resistance. Pads shall not flame or glow for more than 30 seconds after removal from flame.

3.4.5 Water absorption. Complete pads shall show no water absorption exceeding 0.5 percent by weight of finished pad, excluding weight of metal parts.

3.4.6 Flexibility. Pads shall not become hard or inflexible due to absorption of sealer, adhesive or coating and shall evidence no cracking or bond separation after test specified in 4.5.6.

3.5 Color. Color of exterior surface of pads for use inside vehicle shall be white, and finish shall be acceptable from gloss to lusterless. Hatch opening pads and those exposed to exterior view shall be Forest Green conforming to MIL-E-52835.

3.6 Marking. Marking shall be in accordance with MIL-STD-129.

3.7 Workmanship. Workmanship shall be such as to produce finished pads that are free of cracks or porosity in outer coating. Surfaces of outer face and sides shall be smooth and free of bumps, blisters and abrasions to minimize injury to personnel.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements specified herein. Except as otherwise specified in the contract, 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 Contractor's quality assurance system. The contractor shall provide and maintain an effective inspection and quality assurance system, acceptable to the Government, covering the supplies under the contract. A current written description of the system shall be submitted to the contracting officer prior to initiation of production. The contractor will not be restricted to the inspection station or to the method of inspection listed, provided that an equivalent control is included in the approved quality assurance procedure. The contractor shall notify the Government of and obtain approval for any change to the submitted procedure that might affect the degree of control required by this specification, or other applicable documents referenced herein.

4.1.2 Government verification. All quality assurance operations performed by the contractor will be subject to Government verification at unscheduled intervals. Verification will consist of surveillance of the operations to determine that practices, methods, and procedures of the written inspection plan are being properly applied, and Government product inspection to measure quality of product offered for acceptance. Deviation from prescribed or agreed-upon procedures, or instances of poor practices which might have an adverse effect upon the quality of the product, will immediately be called to the attention of the contractor. Failure of the contractor to promptly correct deficiencies shall be cause for suspension of acceptance until corrective action has been made, or until conformance of product to prescribed criteria has been demonstrated.

4.1.3 Materials. The contractor's inspection records shall be examined to determine conformance to 3.2 through 3.2.7.

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

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

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4.3 First article inspection. First article sample shall consist of four complete pads of type and class to be approved. Samples, properly marked with identifying information, shall be representative of units proposed to be furnished to the Government. First article inspection shall consist of examination as specified in table II and testing as specified in table III.

4.3.1 Failure. Failure of any sample to conform to any requirement specified herein shall cause the Government to withhold approval of first article, until action by the contractor to correct defects and prevent recurrence has been approved by the Government.

4.4 Quality conformance inspection.

4.4.1 Sampling.

4.4.1.1 Lot formation. Unless otherwise specified (see 6.2), a lot shall consist of all pads of one type and class, from an identifiable production period, from one manufacturer, submitted at one time for acceptance.

4.4.1.2 Sampling for examination. Samples for quality conformance examination shall be selected in accordance with level S3 of MIL-STD-105.

4.4.1.3 Sampling for acceptance testing. Samples for acceptance testing shall be selected in accordance with level S3 of MIL-STD-105.

4.4.2 Quality conformance examination.

4.4.2.1 Acceptable quality level. Samples selected in accordance with 4.4.1.2 shall be examined for conformance to the following acceptable quality levels (AQL's) on the basis of percent defective:

<u>Classification</u>	<u>AQL</u>
Major	1.0
Minor	2.5

4.4.2.2 Classification of defects. For examination purposes, defects shall be classified as specified in table II.

TABLE II. Classification of defects.

<u>Categories</u>	<u>Defects</u>	<u>Method of inspection</u>
Major		
101	Dimensions affecting interchangeability not within tolerance (see 3.3 and 3.3.5)	Visual/gage
102	Improper plating (see 3.3)	Visual/gage

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TABLE II. Classification of defects. - Continued

Categories	Defects	Method of inspection
103	Attaching lugs or tabs missing or improperly extended (see 3.3.1 and 3.3.2)	Visual
104	Surface improperly coated (see 3.3.2 and 3.3.3)	Visual
105	Rough, cut or torn surfaces (see 3.7)	Visual
Minor		
201	Dimensions not affecting interchangeability not within tolerance (see 3.3 and 3.3.5)	Visual/gage
202	Reinforcements improperly applied (see 3.3.1 and 3.3.2)	Visual
203	Color incorrect (see 3.5)	Visual/gage
204	Marking incorrect (see 3.6)	Visual
205	Workmanship poor (see 3.7)	Visual

4.4.3 Classification of tests. Test requirements specified herein are classified as follows:

- a. Acceptance tests (see 4.4.4).
- b. Control tests (see 4.4.5).

4.4.4 Acceptance tests. Samples selected in accordance with 4.4.1.3 shall be subjected to the acceptance test specified in table III.

4.4.4.1 Failure. If a pad fails to pass the acceptance test specified herein, the Government shall withhold acceptance of subsequent pads until evidence has been provided by the contractor that corrective action has been taken.

4.4.5 Control tests. Control test samples shall be selected at a rate of three (3) of each type and class for each 500 units produced, except that not less than three nor more than six units shall be selected in any 30 day period. Samples shall be examined as specified in table II and tested as specified in table III.

4.4.5.1 Failure. Failure of a control test sample to pass any specified examination or test may be cause for the Government to refuse to accept subsequent lots until it has been proven, to the satisfaction of the Government, that the faults revealed by the test have been corrected.

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TABLE III. Classification of tests.

Description	Requirement	Test	First article	Acceptance test	Control tests
Bonding	3.4.1	4.5.1	X		X
Softness	3.4.2	4.5.2	X		
Temperature resistance	3.4.3	4.5.3	X		
Fire resistance	3.4.4	4.5.4	X		X
Water absorption	3.4.5	4.5.5	X		X
Flexibility	3.4.6	4.5.6	X	X	

4.5 Conformance verification.

4.5.1 Bonding test. Surface coatings and bonded plies which are cemented or vulcanized to metal plates shall be machine tested in accordance with method 8001, FED-STD-601, to determine conformance to 3.4.1.

4.5.2 Softness test. To determine conformance to 3.4.2, firmness shall be determined by measuring force in pounds required to press a hemispherical indenter foot, 1.000 inch in diameter, to a depth of 25 percent of normal thickness of pad (see table I). Tests shall be made on finished pad at locations that assure uniformity, near edges as well as at any location of pad, provided periphery of indenter does not extend beyond apex of curvature at edges of pad surfaces.

4.5.3 Extreme temperature tests. Test specimens shall be subjected to an ambient air temperature of plus 158°F for 72 hours, followed by a 12-hour cooling to room temperature and tested as specified in 4.5.1. Specimen shall then be placed in an ambient air temperature of minus 40°F for 6 hours. While at this temperature, specimen shall be flexed five times back and forth, 30 degrees, around a 3 inch mandrel and examined to determine conformance to 3.4.3.

4.5.4 Fire resistance test. Fire resistance test shall be conducted in accordance with method 5903 of FED-STD-191 except that test specimen shall be a finished pad of suitable size. Flame and glow time shall be combined to determine conformance to 3.4.4.

4.5.5 Water absorption test. Three finished pads shall be weighed and immersed in water at 75° + 5°F with upper surface of pad approximately 2 inches below surface of water. After 24 hours of immersion, each specimen shall be removed, surface moisture quickly absorbed by dry cloth and specimen reweighed. Percentage increase in weight shall be calculated to determine conformance to 3.4.5.

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4.5.6 Flexibility. Specimen, without metal backing, shall be bent 60 degrees back and forth around a 1-inch mandrel, completing one cycle in 10 seconds. Specimen shall be inspected to determine conformance to 3.4.6.

4.6 Inspection of packaging. Materials and processes involved in preparation for delivery shall be inspected to determine conformance to requirements of Section 5. Deviation from specified requirements may cause the Government to reject shipments associated with the non-conforming items until the contractor's plan to correct deficiencies and prevent recurrence has been approved by the Government.

5. PACKAGING

5.1 Preservation, packaging, packing and marking. Preservation, packaging, packing and marking for the desired level of protection shall be in accordance with the applicable packaging standard or packaging data sheet specified by the procuring activity (see 6.2).

6. NOTES

6.1 Intended use. Pads covered by this specification are intended for use in combat vehicles as covering for surfaces to minimize injury to operating personnel when vehicle is traversing irregular terrain, and to absorb shock and reduce rebound of articles which may be thrown against interior surfaces of vehicle.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number and date of this specification.
- b. Type and class (see 1.2).
- c. Applicable drawing (see 3.3).
- d. Alternate coating (see 3.3.4).
- e. Lot formation, if different (see 4.4.1.1).
- f. Selection of applicable level of preservation, packaging and packing (see 5.1).

6.3 First article. First article samples shall be tested and approved under the appropriate provisions of 7-104.55 of the Defense Acquisition Regulation. The contracting officer should include specific instructions in all procurement instruments regarding arrangements for examination, tests and approval of the first article (see 3.1).

6.4 Recycled materials. The use of recycled materials which meet the requirements of the applicable material specifications without jeopardizing the intended use of the item shall be encouraged (see 3.2).

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6.5 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.

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Preparing activity:
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