

INCH POUNDS

MIL-PRF-9884F
27 May 1997
SUPERSEDING
MIL-H-9884E
28 December 1984

PERFORMANCE SPECIFICATION

PAD, ENERGY DISSIPATOR

This specification is approved for use by the Department of the Army, Natick Research, Development, and Engineering Center, and is available for use by all Departments and Agencies of the Department of Defense (DoD).

1. SCOPE

1.1 Scope. This specification covers the performance and acceptance requirements for a pad which dissipates the energy at impact of items that are airdropped.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of the specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents. (None).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be used in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Attn: SSCNC-IR, Natick, MA 01760-5018 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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2.3 Non-Government publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

TECHNICAL ASSOCIATION OF THE PULP
AND PAPER INDUSTRY (TAPPI)

Standard T441 - Water Adsorptiveness of Sized (Non-Bibulous) Paper and Paperboard (Cobb Test)

(Applications for copies should be addressed to the Technical Association of the Pulp and Paper Industry Standards, Technology Park, PO Box 105113, Atlanta, GA 30348).

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.1.1.

3.2 Operating requirements. The energy dissipator pad shall satisfy the following user-oriented requirements.

3.2.1 Dynamic crushing stress. The energy dissipator pad shall have a dynamic crushing stress of 6300 ± 900 pounds per square foot to 70% minimum strain, and the stress strain curve shall be essentially rectangular.

3.2.2 Rebound energy. The rebound energy of the energy dissipator pad shall not exceed 8% of the absorbed energy to a 70% minimum strain.

3.2.3 Static load. The energy dissipator pad shall support a 4000 pound per square foot minimum static load.

3.2.4 Cutability. The energy dissipator pad shall be capable of being cut into segments, by hand, with a knife.

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3.3 Interface and interoperability requirements.

3.3.1 Dimensions. The energy dissipator pad shall be 36 inches by 96 inches \pm 1/2 inch and the thickness shall be 3 inches \pm 1/16 inch.

3.3.2 Surfaces. The top and bottom surfaces of the energy dissipator pad shall be capable of being bonded to other pads or bonded to wood using adhesive paste (NSN 8040-00-273-8713) (see 6.6).

3.4 Support or ownership requirements.

3.4.1 Weight. The weight of one cubic foot of the energy dissipator pad shall not exceed two pounds.

3.4.2 Water resistant. The energy dissipator pad shall be resistant to water without degradation of the energy dissipating characteristics of the pad.

3.4.3 Moisture content. The percent of moisture of the energy dissipator pad shall not exceed 12%.

3.4.4 Water adsorptiveness. The energy dissipator pad shall have a maximum water adsorptiveness of 100 grams per square meter.

3.5 **Environmental requirements.** The energy dissipator pad shall be functional in ambient temperatures from -40°F to +125°F.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.1.1)
- b. Conformance inspection (see 4.1.2)

4.1.1 First article inspection. When a first article inspection is required (see 3.1 and 6.2), the first article shall be examined for all the verifications listed in table I.

4.1.2 Conformance inspection. Conformance inspection includes those examinations and tests from table I as defined in the contract or purchase order (see 6.2 and 6.4).

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TABLE I Verification methods

Title	Requirements	Verification
OPERATING REQUIREMENTS	3.2	4.3
Dynamic crushing street	3.2.1	4.3.1
Rebound energy	3.2.2	4.3.1
Static load	3.2.3	4.3.2
Cutability	3.2.4	4.3.3
INTERFACE AND INTEROPERABILITY REQUIREMENTS	3.3	4.4
Dimensions	3.3.1	4.4.1
Surfaces	3.3.2	4.4.2
SUPPORT OR OWNERSHIP REQUIREMENTS	3.4	4.5
Weight	3.4.1	4.5.1
Water resistant	3.4.2	4.5.2
Moisture content	3.4.3	4.5.3
Water adsorptiveness	3.4.4	4.5.4
ENVIRONMENTAL REQUIREMENTS	3.5	4.6

4.2 Verification methods. Verification methods can include visual examination, measurements, testing, certification and similarity to previously-approved or previously-qualified designs.

4.2.1 Verification alternatives. The manufacturer may propose alternative test methods, techniques, or equipment, including the application of statistical process control, or cost-effective sampling procedures to verify performance. The contract may specify alternatives that replace verifications required by this specification.

4.3 Operating requirements verification. All user requirements shall be verified as follows:

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4.3.1 Dynamic crushing stress and rebound energy verification. The sample unit shall consist of two specimens, each 16 inches by 18 inches, cut from each of five pads selected at random from the lot. One specimen shall be cut from one end of the pad, and the second from the opposite end. The two specimens from each pad shall be bonded or taped to each other to form a 6-inch thick sample unit. Each sample unit shall be tested for dynamic crushing stress and rebound energy to a 70% minimum strain. Each sample unit shall be impacted by a mass with a contact area of at least 16 inches by 18 inches at a velocity of 28 to 30 feet per second that will crush to at least 70% of the sample thickness. Verify that the crushing stress for each sample unit is 6300 ± 900 pounds per square foot to 70% minimum strain and the stress-strain curve shall be essentially rectangular for a minimum of 0 to 70% strain. The rebound energy shall not exceed 8% of the absorbed energy to a 70% minimum strain. A retest is permitted if one of the five sample units tested fail to meet the requirements. The number of sample units for a retest shall be eight. Verify that seven of the eight retest samples meet the requirements specified above.

4.3.2 Static load verification. A specimen 12 inches square, shall be cut from a pad selected at random from the lot. A 4000-pound minimum static load shall be applied uniformly on the top surface of the specimen and allowed to sit for a minimum of 5 minutes. Verify that the specimen does not deflect greater than 1/16 inch.

4.3.3 Cutability verification. The specimen shall be one pad selected at random. A pad used for cutting the specimens in 4.3.1 may be used. Verify cutability using a parachute rigger's knife (2-1/2 inch minimum blade). The pad shall be capable of being cut by hand, in two separate pieces, across the width with two strokes of the knife. If necessary, after the first cut, cut across the pad again on the same side or turn the pad over and cut in line with the first cut. The pad may be folded into two pieces by bending along the first cut line and cutting along the fold line.

4.4 Interface and interoperability verification. All interface and interoperability requirements shall be verified as follows:

4.4.1 Verify, by measuring that the dimensions of the energy dissipator pad are 36 inches by 96 inches $\pm 1/2$ inch, and the thickness is 3 inches $\pm 1/16$ inch. These dimensions are necessary to be compatible with current field manuals and methods of storing.

4.4.2 Surface bonding verification. The surfaces of the energy dissipator pad shall be capable of being bonded to each other and to pieces of wood using the adhesive paste cited in current field manuals (see 6.6). Verify that there is no shifting or movement of the pads after adhesive has dried.

4.5 Support or ownership verification. All support or ownership requirements shall be verified as follows:

4.5.1 Weight examination. Verify, by weighing, that one cubic foot of the energy dissipator

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pad weighs no more than two pounds.

4.5.2 Water resistant verification. A specimen, 8 inches by 24 inches, shall be cut from a pad selected at random from the lot. If the top and bottom of the energy dissipator pad has a covering protecting the core, puncture it in not less than six places on both sides (if applicable) to allow water to enter into the core structure. Immerse the specimen in tap water at room temperature for a minimum of 60 minutes. The top of the specimen shall be at least 1 inch below the surface of the water. After the immersion period, remove the specimen from the water and shake to remove excess water. If equipped with a protective covering, remove either the top or bottom covering. Verify that there is no separation failure greater than 2 inches in any direction between the covering and the core. If there is a cover on the opposite side, remove it. Separate the core structure across the width of the specimen in three places. Verify that the method of securing the core structure is not affected by water immersion. Not more than one failure shall occur in any one of the three separations.

4.5.3 Moisture content verification. Cut two specimens, each measuring 16 inches by 18 inches, from opposite ends of each of five pads randomly selected from the lot. Subject each specimen to approximately 360°F in a drying oven for a period of 2 hours minimum. Each specimen shall be weighed to the nearest 1/4 ounce, both prior to and after being dried. For each specimen, the percent of moisture shall be computed by dividing the loss of weight after heating by the weight before heating and multiplying by 100. Verify that the percent of moisture of the pad shall not exceed 12%. Samples required shall have been manufactured at least 24 hours prior to being subjected to this verification.

4.5.4 Water adsorptiveness verification. If paper or similar water adsorptive material is used for the core, water adsorptiveness of each side of the material shall be determined. Verify in accordance with TAPPI Standard T441 at an exposure time of 5 minutes minimum. Results for each exposure shall be determined to the nearest 0.01 gram and the average of 10 results calculated for each side. The maximum water adsorptiveness for each side shall be 100 grams per square meter.

4.6 Environmental certification. The contractor shall certify that the energy dissipator pad is functional at ambient temperatures of -40°F to +125°F.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite

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packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory).

6.1 Intended use. The energy dissipator pad is cut into sections and made into stacks which are used as impact energy dissipators for airdrop of supplies and equipment rigged on platforms and delivered by parachute to troops in the field.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a) Title, number, and date of this specification.
- b) Issue of DoDISS to be cited in the solicitation, and, if required the specific issue of individual documents referenced (see 2.3).
- c) When a first article is required (see 3.1, 4.1.1 and 6.3).
- d) Sampling for conformance inspection (see 4.1.2 and 6.4).
- e) Packaging requirements (see 5.1).

6.3 First article. When requiring a first article inspection, contracting documents should provide specific guidance to offerors. This guidance should cover whether the first article is a first article sample, a first production item, or the number of test items. These documents should also include specific instructions regarding arrangements for examinations, approval of first article test results and disposition of first articles. Pre-solicitation documents should provide Government waiver rights for samples for first article inspection to bidders offering a previously-acquired or tested product. Bidders offering such products who wish to rely on such production testing must furnish evidence with the bid that prior Government approval is appropriate for the pending contract.

6.4 Conformance inspection. Affordable conformance inspection with confidence varies depending upon a number of procurement risk factors. Some of these factors include contractor past performance, government schedules and budget, product material and design maturity, manufacturing capital equipment and processes applied, the controlled uniformity of those processes, labor skills and training, and the uniformity of measuring process and techniques. During the solicitation, contracting documents should indicate those tests desired from table I and their designated frequency based on a risk assessment for the procurement.

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6.5 Recycled, recovered or environmentally preferable materials. Recycled, recovered or environmentally preferable material should be used to the maximum extent possible, provided the materials meet or exceed the operational, environmental and maintenance requirements specified herein and promote economically advantageous life cycle cost.

6.6 Adhesive paste. Adhesive paste conforming to MMM-A-137 Adhesive, Resilient Flooring (Water Soluble), has provided the bonding requirements of this specification in the past.

6.7 Subject term (key word) listing.

Absorber, shock
Cushion

6.8 Technical data. Energy dissipator pads have been produced satisfactorily using MIL-H-9884E.

6.9 Changes from previous revision. This specification supersedes MIL-H-9884E dated 28 December 1984. Asterisks are not used in this revision to identify changes, due to the extensiveness of the changes required to convert this specification from a detail to a performance specification.

Custodians:

Army - GL
Navy - AS
Air Force - 99

Preparing activity:

Army - GL
(Project 1670-0879)

Review activities:

Army - AV
Air Force - 82
Navy -MC

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of 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.

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
MIL-PRF-9884F

2. DOCUMENT DATE (YYMMDD)
970527

3. DOCUMENT TITLE PAD, ENERGY DISSIPATOR

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE (Include Area Code)
(1) Commercial
(2) AUTOVON
(if applicable)

7. DATE SUBMITTED
(YYMMDD)

8. PREPARING ACTIVITY

a. NAME
U.S. ARMY NATICK RD&E CENTER

b. TELEPHONE Include Area Code)
(1) Commercial (2) AUTOVON
(508) 233-4883 256-4883

c. ADDRESS (Include Zip Code)
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NATICK, MA 01760-5015

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:
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