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[METRIC]
A-A-59136
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SUPERSEDING
PPP-C-1752D(3)
1 FEBRUARY 1993

COMMERCIAL ITEM DESCRIPTION

CUSHIONING MATERIAL, PACKAGING, CLOSED CELL FOAM PLANK

The General Services Administration has authorized the use of this commercial item description as a replacement for Class 2 and Class 3 of PPP-C-1752D by all federal agencies.

1. SCOPE

1.1 This commercial item description covers closed cell foam plank materials used for cushioning and packaging applications, including static dissipative and fire retardant grades.

1.2 The selection of foam cushioning material is dependent on its application and factors such as drop height, product weight, thickness and derived dynamic performance while its application depends on environmental factors such as temperature, humidity, transportation and storage . Therefore, a variety of classes and grades reflecting material characteristics are available. Refer to MIL-HDBK-304 for additional information.

1.3 This standard does not purport to address the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. CLASSIFICATION.

2.1 Foam planks shall be of the following types, classes, and grades as specified.

Class 1 - General purpose polyethylene plank material (unskived).
Class 2 - General purpose polypropylene plank material (unskived).
Class 3 - General purpose plank material, polymer specified by the Procuring Activity (unskived).
Class 4 - Special purpose (skived) sheets, planks, and shapes as specified by the Procuring Activity.

Beneficial comments, recommendations, deletions, clarifications, etc. and any other data which may improve this document should be addressed to: AFMC LSO/LOP, 5215 Thurlow St., Wright-Patterson AFB OH 45433-5540.

FSC 8135

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Grade A - Standard.
Grade B - Static dissipative.
Grade C - Fire retardant (See 3.5).
Grade D - Static dissipative and Fire retardant (See 3.5).

Type I - 14 Kg Constant Compression Creep, See 3.10
Type III - 21 Kg Constant Compression Creep, See 3.10
Type IV - 25 Kg Constant Compression Creep, See 3.10
Type V - 37 Kg Constant Compression Creep, See 3.10

3. SALIENT CHARACTERISTICS

3.1 Terminology - General definitions for packaging and distribution environments are found in Terminology ASTM D 996.

3.2 Materials: The foam material supplied under this specification shall be suitable to protect items from hazards encountered during handling and shipping at temperatures between -54°C (-65°F) and 70°C (158°F).

3.3 Form - Material shall be furnished in the forms specified.

3.3.1 Plank Material (Class 1, 2 and 3) - Pieces of material which have a rectangular horizontal cross section and a nominal thickness of more than 13 mm.

3.3.2 Special Shapes (Class 4 only) - Extruded, fabricated, and molded shapes, rounds, die cuts, and all other pieces of polyethylene foam which meet the dimensional tolerances of 3.9. Die cuts may consist of a single layer or several layers of cushioning material laminated together to reach the specified material thickness.

3.4 Static Dissipative Material (Grades B and D) - Static dissipative material shall conform to all requirements for the specified type (See 5.4.3), while continuing to meet the requirements of 3.2.

3.4.1 Electrostatic Decay Time - The average decay time, when tested as specified in 5.4.3.1, shall be less than 2.0 seconds

3.4.2 Resistivity.

3.4.2.1 Surface Conductive Material - Surface resistivity, when tested as specified in 5.4.3.2, shall not be less than 1.0×10^5 and not more than 1.0×10^{14} ohms per square.

3.5 Fire-Retardant Material (Grades C and D) - Fire retardant material shall conform to all the requirements specified by the Procuring Activity for the specified type and class. (See 7.2.1.8)

3.6 Dynamic Cushioning Properties (Types I, III, IV, and V) - The dynamic cushioning average points, when tested as specified in 5.6, shall lie entirely between the upper and lower limit curves of the applicable figure (Figures 1, 2, 3, and 4).

3.7 Density - The nominal density of the material when tested as specified in 5.4.2 shall be tested and reported. Unless otherwise specified the density will not be used to reject material.

Type I - 32 Kg/M^3 (2 PCF) Nominal Density Cushioning Material.
Type III - 64 Kg/M^3 (4 PCF) Nominal Density Cushioning Material.
Type IV - 96 Kg/M^3 (6 PCF) Nominal Density Cushioning Material.
Type V - 144 Kg/M^3 (9 PCF) Nominal Density Cushioning Material.

3.8 Color. For visual identification purposes only.

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3.8.1 Grade A - The color shall be white.
3.8.2 Grade B - The color shall be pink.
3.8.3 Grade C - The color shall be light brown.
3.8.4 Grade D - The color shall be blue-grey.

3.9 Dimensional Tolerances -Unless otherwise specified, the following tolerances apply (5.4.1):

CLASS	LENGTH (%)	WIDTH (%)	THICKNESS
GENERAL PURPOSE PLANK			
1, 2, 3	+6, -0	+8, -0	+20 %, -5 %
SPECIAL PURPOSE SHEETS, PLANKS, AND SHAPES			
4	+6, -0	+8, -0	± 2 mm.

3.10 Constant Compression Creep - The average creep shall be not greater than 10 percent of the initial thickness after testing for 168 hours as specified in 5.5. Sample size 50mm x 100mm x 100mm. Use the applicable loads as follows:

Material Type	Static Load (Kg)
I	14
III	21
IV	25
V	37

4. REGULATORY REQUIREMENTS - NONE

5. QUALITY ASSURANCE PROVISIONS.

5.1 Contractor Certification. The contractor shall certify and maintain all records in accordance with the contract conditions and applicable Federal Acquisition Requirements (FAR) clauses.

5.1.1 First Article Wavier. First article inspection may be waived, by the Air Force Packaging Technology and Engineering Facility (AFPTEF) or the procuring activity, when the procuring activity or contract administrator has data or other evidence to indicate that prior successful first article inspection has been conducted. Only when the first article has been waived by the AFPTEF or procuring activity, may the contractor self-certify that the material will conform to the requirements of this CID.

5.1.2 First Article Inspection. First article inspection shall consist of all tests in this section and shall be performed by the contractor prior to production. First article inspection shall be performed on sample units produced using materials, equipment, and procedures which will be used in fulfilling the contract. First article approval is valid only on the contract on which it is granted , unless extended by the Government to other contracts. In case of dispute, the procuring activity shall require testing on contractor supplied material performed by either AFPTEF or an independent lab.

5.2 Market Acceptability. The following market acceptability criteria are necessary to document the quality of the product to be provided under this CID.

5.2.1 Manufacturer Purchase. The materials manufacturer shall furnish documents that the material being offered is a commercial product meeting the requirements of this CID. Such proof could be completed delivery orders filled for customers within the previous 12 months.

5.2.2 Purchase from a distributor. Distributor purchased products must meet the requirements stated above. Only one manufacturers' product shall be used to fulfill a single purchase order.

5.3 Test Conditions and Specimens.

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5.3.1 Test Conditions - All measurements and tests, other than Static Dissipative Properties (which require 12% relative humidity (RH) conditioning), shall be conducted on specimens conditioned at 23° ± 2°C and 50 ± 5 percent RH for at least 16 hours or until the difference between 2 successive weighings conducted at 1 hour intervals is less than 1 percent of the average weight.

5.3.2 Test Specimens - Test specimens shall be taken from the end item whenever possible. If test specimens cannot be prepared from the end item, they shall be prepared from the same lot of material used to make the end item.

5.4 Tests - The contractor shall comply with all contractual test compliance and reporting requirements.

5.4.1 Dimensions - The dimensions shall be measured and reported in accordance with ASTM D 3575.

5.4.2 Density - (See 3.7) The density of the material shall be determined in accordance with ASTM D 3575, Suffix W, Method A. Report results numerically to the nearest 1.0 Kg/M^3. Unless otherwise specified the density will not be used to reject material.

5.4.3 Static Dissipative Properties (Grades B and D only).

5.4.3.1 Electrostatic Decay Time - The electrostatic decay time shall be determined in accordance with EIA Standard 541, Appendix F. Report results numerically to the nearest 0.1 second.

5.4.3.2 Resistivity - The surface resistivity shall be determined in accordance with EIA Standard 541, Section 4.3. Report Results numerically to 3 significant figures.

5.5 Constant Compression Creep - The creep properties of the cushioning material shall be determined in accordance with ASTM D3575, suffix BB, using the static load specified in 3.10.

5.6 Dynamic Cushioning - Figures 1, 2, 3, and 4 define the dynamic cushioning properties provided by 50 mm of material. These requirements are intended to ensure procurement of a consistently uniform product of a quality attainable by most of the industry. Figures 1, 2, 3, and 4 should be considered as quality assurance requirements only, not as design criteria. For design purposes, complete cushioning data in the form of peak acceleration versus static stress curves for specific drop heights can be obtained from other sources such as manufacturers data. (See 1.2)

5.6.1 Test Specimens - Test samples shall be 50 ± 2 mm thick x 150mm x 150mm for Types I, III and IV and 50 ± 2 mm thick x 125mm x 125mm for Type V. Material less than 50 mm thick shall be plied up without the use of adhesive to produce a total thickness of 50 ± 2 mm. Material more than 50 mm thick shall be cut or planed to a uniform thickness of 50 mm. Not less than 5 material samples shall be tested, each at a different static stress. See applicable Figure for recommended test points.

5.6.2 Dynamic Cushioning Determination: Dynamic cushioning (See 5.6) shall be determined in accordance with ASTM D1596. The impact velocity (based on drop height) shall be 345.75 ± 3.00 cm per second. Record the average peak G of drops 2 through 5 to the nearest G as the average peak G value for the static stress applied.

5.6.3 Plot. Plot a best fit dynamic cushioning curve throughout the range covered by the applicable upper and lower limit curves of Figures 1, 2, 3, and 4 using a French curve, drawing spline, or by use of a mathematical curve fitting analysis. Report results as either pass on the basis of all averaged points falling between the upper and lower limits, or fail.

6. PACKAGING. Preservation, packaging, and marking shall be as specified in the contract or order**.**

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7. NOTES.

7.1 Metric conversions to English units should be made using international conversion standards. For quick reference use 2.54 cm = 1 in, 16 Kg/M^3 = 1 lb/ft^3 (PCF), 0.07 Kg/cm^2 = 1 lb/in^2 (PSI).

7.2 Part Identification Number (PIN). The following part identification numbering procedure is for Government purposes and does not constitute a requirement for the contractor.

This example describes a part numbering system for CID A-A-59136

Example of reference part number:

AA59136 - 1 I A

Class 1 - General purpose polyethylene plank material (unskived).
Class 2 - General purpose polypropylene plank material (unskived).
Class 3 - General purpose plank material, polymer specified by the Procuring Activity (unskived).
Class 4 - Special purpose (skived) sheets, planks, and shapes as specified by the Procuring Activity.

Type I - 14 Kg Constant Compression Creep, See 3.10
Type III - 21 Kg Constant Compression Creep, See 3.10
Type IV - 25 Kg Constant Compression Creep, See 3.10
Type V - 37 Kg Constant Compression Creep, See 3.10

Grade A - Standard.
Grade B - Static dissipative.
Grade C - Fire retardant (See 3.5).
Grade D - Static dissipative and Fire retardant (See 3.5).

Note: **Bold Text** refers to the reference part number.

7.2.1 Additional Ordering Data - In addition to the part number the purchaser may include the following information in procurement documents:

7.2.1.1 Contact Corrosivity (Ref. Fed-Std-101, Method 3005, Cleaning per ASTM D3330)
7.2.1.2 Dimensional tolerances for special purpose sheets, planks, and shapes.
7.2.1.3 Special Color (see 3.8)
7.2.1.4 Compression Set (Ref. ASTM D3575, Suffix B, Maximum of 25% set typical value)
7.2.1.5 Flexibility (Procuring activity must define test)
7.2.1.6 Thermal Stability (Ref. ASTM D3575, Suffix S, dimensional change not greater than 2% typical value)
7.2.1.7 Flammable Blowing Agent Content (Procuring activity must define test to determine Lower Explosive Limit (LEL), typical value is 50%). (Ref. NIPHLE 97T-002)
7.2.1.8 Fire Retardancy (Procuring activity must define test)
7.2.1.9 Compressive Strength (Ref. ASTM D3575, Suffix D) Typical values follow:

Material Type	Compressive Range - $Kg/cm^2 \times 10^{-2}$ (PSI)
I	0.28 - 0.84 (4-12)
III	0.85 - 1.4 (13-20)
IV	1.41 - 3.5 (21-50)
V	3.51 - 7.0 (51-100)

7.2.1.10 Water Absorption (Ref. ASTM D3575, Suffix L, 0.1 pound per square foot typical value)

7.3 Intended Use - The material covered by this specification is intended primarily for use in cushioning and packaging applications satisfying MIL-STD-2073 and ASTM D3951 to protect items from environmental hazards such as shock, vibration, concentrated forces, and abrasion during handling and shipping. Grade B materials also protect items from the buildup or retention of electrostatic potential. Grade C materials have been treated to retard their burning rate. Grade D materials have been treated to satisfy both Grade B and C requirements.

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7.4 Test Equipment Calibration

7.4.1 Test Equipment Calibration for Dynamic Cushioning - The Air Force Packaging Technology and Engineering Facility (AFPTEF), AFMC LSO/LOP, 5215 Thurlow St, Wright-Patterson AFB, Ohio 45433-5540, is responsible for verifying performance of this test equipment and maintaining a List of Facilities with Calibrated Testing Equipment for Government use. Manufacturers and suppliers are urged to arrange to have the performance of their test equipment verified well in advance of any required material conformance testing. Information on this verification/calibration process for Government procurement may be obtained from this facility.

7.4.2 Other Test Equipment Calibration - All equipment used to perform the test requirements specified herein shall be calibrated to the manufacturers' specification. Calibration certification shall be verifiable and provided upon request.

7.5 KEYWORDS

polyethylene, polypropylene, sheet, plank, fire retardant, static dissipative, foam, cushioning.

7.6 REFERENCED DOCUMENTS

7.6.1 ASTM Standards*:* ASTM Standards are available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

D 996 Terminology of Packaging and Distribution Environments
D 1596 Test Method for Shock Absorbing Characteristics of Package Cushioning Materials
D 3575 Test Methods for Flexible Cellular Materials Made from Olefin Polymers
D 3951 Standard Practice for Commercial Packaging

7.6.2 EIA STANDARDS:

EIA 541 Packaging Material Standards for ESD Sensitive Items

EIA Standards are available from ANSI/EIA American National Standards Institute 11 West 42nd Street, 13th Floor, New York, NY 10036

7.6.3 NIPHLE Documents:

NIPHLE 97T-002 Methodology for Measuring Residual Hydrocarbon Blowing Agent in Extruded Polyethylene Foam

NIPHLE Documents are available from NIPHLE 6902 Lyle Street, Lanham MD 20706-3454

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7.6.4 Government Documents: Copies of federal and military specifications, standards and handbooks are available from the Standardization Documents Order Desk, 700 Robbins Ave., Building 4D, Philadelphia PA 19111-5094.)

MIL-HDBK-304 Package Cushioning Design
MIL-STD-2073 Standard Practice for Military Packaging

7.7 Cross Reference from PPP-C-1752D: Use the following Cross Reference chart for converting requirements from the superseded PPP-C-1752 Federal Specification to this document.

PPP-C-1752 Designation	CID Designation
Class 1	CID A-A-59135 (Sheet)
Class 2	Class 1, 2 or 3
Class 3	Class 4
Grade A	Grade A
Grade B	Grade B
Grade C	Grade C
Grade D	Grade D
Type I	Type I
Type III	Type III
Type IV	Type IV
Type V	Type V
Type VII	CID A-A-59135 (Sheet)

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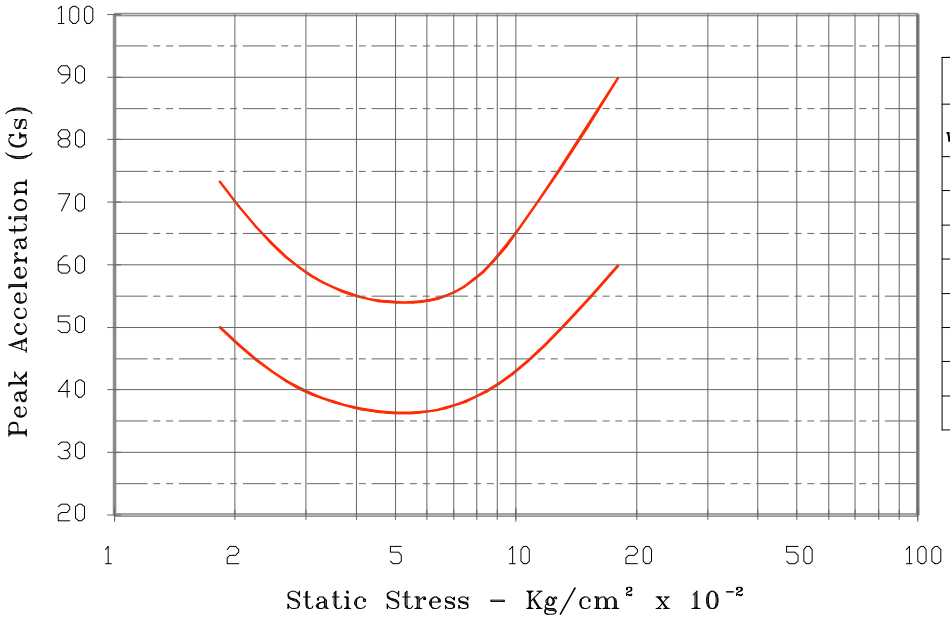
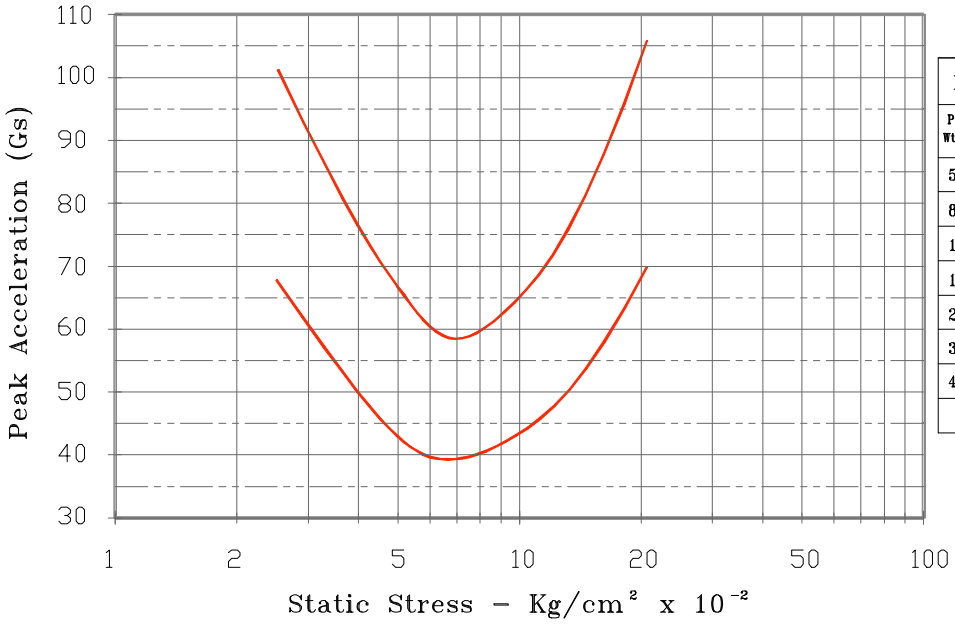
FIGURE 1, Type I
DYNAMIC CUSHIONING CURVE
60 cm DROP HEIGHT, 2–5 IMPACTS
50 mm X 150 mm X 150mm Sample Size



Recommended Test Points				
Platen Wt. (Kg)	Static Stress	Minimum G Value	Nominal G Value	Maximum G Value
3.97	1.76	50	62	74
5.82	2.59	42	52	62
8.73	3.88	37	46	55
11.64	5.17	36	45	54
17.46	7.76	37	46	55
23.28	10.35	45	56	67
40.74	18.11	60	75	90

FIGURE 2, Type III
DYNAMIC CUSHIONING CURVE
60 cm DROP HEIGHT, 2–5 IMPACTS
50 mm X 150 mm X 150mm Sample Size



Recommended Test Points				
Platen Wt. (Kg)	Static Stress	Minimum G Value	Nominal G Value	Maximum G Value
5.82	2.59	68	85	102
8.73	3.88	51	64	77
11.64	5.17	41	51	61
14.55	6.47	38	47	56
20.37	9.05	42	52	62
32.01	14.23	51	64	77
49.47	21.99	70	88	106

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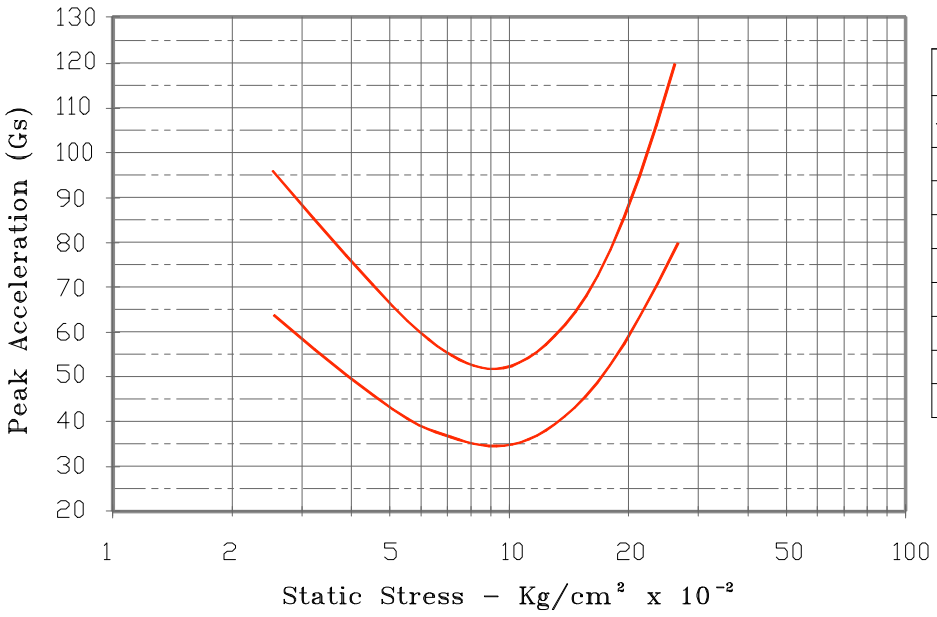
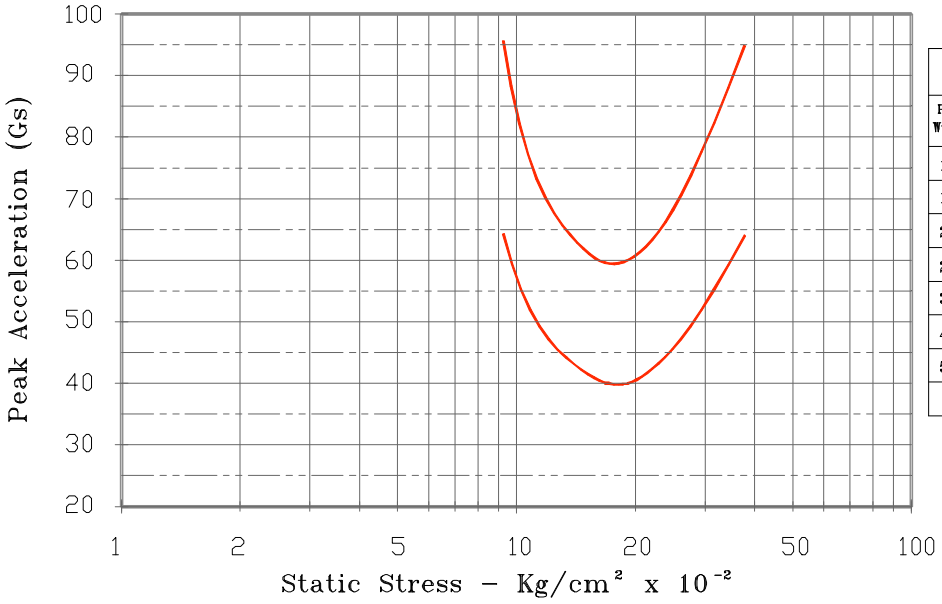
FIGURE 3, Type IV
DYNAMIC CUSHIONING CURVE
60 cm DROP HEIGHT, 2–5 IMPACTS
50 mm X 150 mm X 150mm Sample Size



Recommended Test Points				
Platen Wt. (Kg)	Static Stress	Minimum G Value	Nominal G Value	Maximum G Value
5.82	2.59	64	80	96
11.64	5.17	42	53	64
14.55	6.47	38	47	56
20.37	9.05	33	41	49
29.28	13.01	38	48	58
43.65	19.40	54	67	80
58.20	25.87	80	100	120

FIGURE 4, Type V
DYNAMIC CUSHIONING CURVE
60 cm DROP HEIGHT, 2–5 IMPACTS
50 mm X 125 mm X 125 mm Sample Size



Recommended Test Points				
Platen Wt. (Kg)	Static Stress	Minimum G Value	Nominal G Value	Maximum G Value
14.55	9.33	64	80	96
17.46	11.19	50	62	74
23.28	14.92	42	52	62
26.19	16.79	38	48	58
34.92	22.38	42	52	62
43.65	27.98	50	63	75
58.20	37.31	64	80	96

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CIVILIAN COORDINATING ACTIVITY - FSS

MILITARY INTERESTS:
Custodians:
Army - SM
Air Force - 69
Navy - AS
DLA - CC

Review Activities:
Army - GL, AR, AT, MI
Air Force - 70, 71, 80, 84, 99
Navy - SA, SH, YD1, OS

Preparing Activity - 69:

Project (8135-0704)