

RULES

ITEM 181-A

FURNITURE PACKAGE PERFORMANCE TESTING

This Rule provides an alternative to: Item 180; the Test Shipment Permit Program (Item 689); packaging provisions as found within the Furniture Group, item 79000 and the Furniture Parts Group, item 82750; and separate numbered Packages, including the "F" and "S" Packages. It is recommended for solving chronic damage problems and for providing an acceptable assurance level of packaging for articles of furniture. This test procedure is to represent normal handling and distribution of cartoned furniture. This Rule does not purport to address all of the safety issues, if any, associated with its use. It is the responsibility of the user of this Rule to establish appropriate safety and health practices.

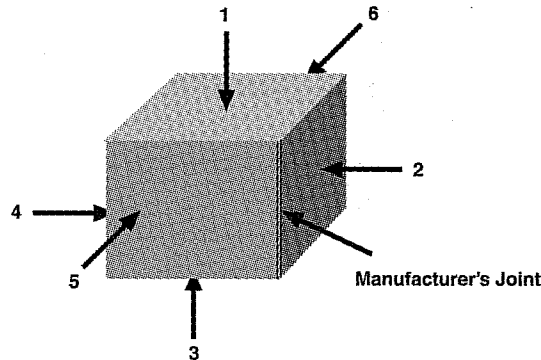
This test procedure does not apply to packages utilizing stretch or shrink plastic film wrap-style shipping units. This procedure applies only to furniture that is fully contained within corrugated fibreboard shipping containers. Exceptions include corrugated fibreboard flanged, open-bottom containers only when the container is appropriately marked with UP arrows.

In order to qualify as authorized methods of packaging under this Rule, shipping containers must be preshipment tested by successfully passing the following prescribed performance test requirements and must meet the acceptance criteria as indicated.

Shippers will be required to perform the following specified minimum tests to be considered as an approved package and be eligible to certify shipping containers as specified within Section VI herein. Multiple test specimens are recommended when available, and all specimens tested must pass.

For the purpose of retest uniformity, handling steps utilized in transporting the article (once fully packaged) from the production line to the warehouse to the testing laboratory, i.e., clamp trucks, baseloid lift trucks, hanging conveyors, must be identified and documented on test report form so that these procedures may be repeatable.

Test Specimen Orientation and Nomenclature:



Section I. Conditioning

The test laboratory must record temperature and humidity conditions of the testing facility at the start of the test procedure. In addition, record the length of time test specimen was held in test facility prior to actual testing.

Section II. Compression/Vibration Test

Two alternative methods are permissible, Method (A) or (B).

Method (A)

Shipping units must be vibration tested under a stacked, nonresponsive compressive load for twenty minutes on three axes using the procedures of ASTM D4169 Schedule D, Assurance Level II, for random vibration. The exception to this procedure: Shipping units clearly marked on at least two panels of the container with UP arrows require concentrated dead load to be applied only in the axis (axes) indicated by the UP arrow orientation. The vibration test must be performed on all three axes.

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Use a concentrated dead load (see description of load following formula) to simulate miscellaneous freight loaded on top of a floor-stowed shipping unit in a trailer of 9 ft. inside height, determining the amount of load for each axis of test from this formula:

$$\text{FORCE (lbf)} = \frac{(10 \text{ pcf}) \times (108 \text{ in.} - H) \times (L \times W) \times DF}{1728 \text{ cubic inches per cubic foot}} \quad (\text{see Note 2})$$

FORCE: Definitions

FORCE (lbf)	=	pounds of force
10 pcf	=	average density of LTL freight (pounds per cubic ft)
108 in. (see Note 1)	=	inside height of trailer (inches)
1728 cubic inches per cubic foot	=	conversion from cubic inches to cubic feet
H (inches)	=	height of shipping unit in the test orientation (inches)
L (inches)	=	length of shipping unit in the test orientation (inches)
W (inches)	=	width of shipping unit in the test orientation (inches)
DF (design factor)	=	5

The concentrated dead load (see Note 2) shall consist of:

1. Dead load container(s).
2. Plywood sheet(s) must be larger than test specimen's top dimension.

The test specimen should not be fastened to the vibration table. Lateral movement is permitted, but yet restricted so that the test specimen does not move from under the perimeter of the dead load.

NOTE 1—The formula is reduced to 54 inches instead of 108 inches for packages under 30 pounds or 2 cubic feet (3456 cubic inches) or less in size.

NOTE 2—To avoid any gross distortion of calculated loads, a maximum dead load of 750 pounds should be utilized when the calculated dead load does not meet this limitation.

NOTE 3—For step or form-fitting containers, the load may be applied proportionately, dividing the total load by the surface area of the panels formed by stepping.

Method (B)

Shipping units must be subjected to compression and vibration in **separate** tests. A compression test is conducted first, and then the same shipping unit is vibration tested.

(1) Conduct a compression test on the shipping unit, using either a machine compression test (per ASTM D642) or a constant load (dead weight) test (see Note 1). Apply a force in each of the three axes (exception as in Method (A) stating that shipping units clearly marked on at least two panels of the container with UP arrows requires compression to be applied only in the axis (axes) indicated by the UP arrow orientation) as calculated from the following formula:

$$\text{FORCE (lbf)} = \frac{(10 \text{ pcf}) \times (108 \text{ in.} - H) \times (L \times W) \times DF}{1728 \text{ cubic inches per cubic foot}} \quad (\text{see Note 2})$$

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NOTE 3—For step or form-fitting containers, the load may be applied proportionately, dividing the total load by the surface area of the panels formed by stepping.

NOTE 4—When conducting a constant load compression test, load and maintain the Compression Dead Load for one hour. When conducting a machine compression test per ASTM D642, remove the force immediately after reaching a DF of 7.0.

(2) Using the same shipping unit, without applying any compression force or load, conduct a vibration test for twenty minutes in each of the three axes for a total of sixty minutes as defined earlier within the section. Any of the three following vibration methods may be used: random, ASTM D4169 Schedule E Level II; repetitive shock, ASTM D4169 Schedule F (vertical-linear motion); repetitive shock, ASTM D4169 Schedule F (rotary motion).

Section III. Impact/Handling Tests

Following compression/vibration tests, the same shipping units must be impact/handling tested using the following procedures:

Procedure (A)

Under 150 pounds AND/OR under 130 combined inches, from the formula of $(2 \times L) + (2 \times W) + H$, perform a free-fall drop test, distributed as follows: six faces, three edges, and one corner using the following height and sequence:

Shipping Weight	Drop Height/Inches
0 - 25 pounds	30
Over 25 - 40 pounds	24
Over 40 - 80 pounds	18
Over 80 - 100 pounds	12
Over 100 - 150 pounds	10

Sequence of drops:

Sequence #	Orientation	Specific face, edge or corner
1	Corner	Most fragile face-3 corner, if not known, test 2-3-5
2	Edge	Shortest edge radiating from the corner tested
3	Edge	Next shortest edge radiating from the corner tested
4	Edge	Longest edge radiating from the corner tested
5	Face	One of the smallest faces
6	Face	Opposite small face
7	Face	One of the medium faces
8	Face	Opposite medium face
9	Face	One of the largest faces
10	Face	Opposite large face

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Perform tests as described in paragraphs (1) **AND** (2) below:

(1) For 150 pounds or greater **AND/OR** 130 combined inches or greater from the formula of $(2 \times L) + (2 \times W) + H$:

(a) perform an incline impact test according to ASTM D880, or a horizontal impact on a test machine with short duration shock programmer (ASTM D4003). Impact velocity of 5.75 feet per second (1.75m/sec). Impact Sequence:

1. one of the smallest faces
2. opposite small face
3. one of the medium faces
4. opposite medium face
5. one of the largest faces
6. opposite largest face

OR

(b) perform a free-fall drop height of 6" on the top (face 1), two adjacent sides (faces 2 and 5), and the bottom (face 3) of shipping container for a total of 4 drops.

(2) In addition, when the shipping container length dimension is greater than the height dimension; conduct an 8" rotational edge drop in accordance with ASTM D6179-9.1 on the following four edges formed by faces: 4 and 5, 2 and 5, 4 and 6, and finally 2 and 6 for a total of 4 drops. If the shipping container height dimension is greater than the length dimension, perform test on the following four edges formed by faces: 3 and 6, 3 and 5, 1 and 5, and finally 1 and 6.

Section IV. Documentation

Test methods, conditions, and results must be recorded on the following form and permanently held on file for the duration the article is subject to this Rule. The name shown in the certification symbol, displayed in Section VI of this Rule, shall be the contact for such documentation. Any changes in packaging will require subsequent testing and documentation. Changes in product constructions and/or materials that could affect the initial test results will also require subsequent testing and documentation.

At a minimum, the report should include the following:

- (1) description of article including model number, size, weight, and other distinguishing features;
- (2) description of shipping unit, including specifications of container and interior packaging;
- (3) testing performed;
- (4) conditioning and test conditions;
- (5) acceptance criteria;
- (6) condition of specimens (article and packaging) after testing;
- (7) the laboratory performing tests.

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Test Report Form

Date: _____ Lab Reference No.: _____
 Submitted by: (test technician) _____ Laboratory Performing Test: _____
 Address: _____ City: _____ State: _____ Postal Code: _____ Country: _____
 Phone: _____ FAX: _____ E-MAIL: _____
 Test Performed By: _____ Signature: _____

PRODUCT/ PACKAGING COMPONENTS/ WAREHOUSE & DISTRIBUTION ENVIRONMENT

Test Requested by: (shipper's rep.) _____ Company: _____
 Address: _____ City: _____ State: _____ Postal Code: _____ Country: _____
 Phone: _____ FAX: _____ E-MAIL: _____

Specific Product Tested: (include model number, size, weight, and other distinguishing features) Attach photo, if possible

External Container Size: inches _____ Gross Weight of Packaged Product: pounds _____

Mfg. Warehouse/Distribution Environment:
 Clamp (Squeeze) Lifts y / n _____ Basiloid Lifts y / n _____ Hanging Conveyors y / n _____

Sample Size: (number of test pieces)

Description of Package: (Describe entire shipping unit including container, interior packaging, and pallet) Attach photo, if possible

TESTING METHODS/TEST FACILITY CONDITIONS

I. Conditioning:
 Average Temperature: F _____ Average Relative Humidity(RH): _____ Length of Time in Lab hours _____
 Remarks: _____

II. Compression / Vibration
 Test Procedure Used : Test Procedure A Test Procedure B
 Dead Weight y / n --Force Applied _____
 Compression: y / n --Force Applied _____ Hours Under Compression:
 Inspected after Compression/Vibration? Yes No
 Results (if inspected) Passed Failed

III. Impact / Handling
 Test Procedure A (Under 150 lbs. and/or under 130 united inches)
 Method: Free Fall Shock Machine y / n Less than 130 united inches
 Number of Drops: _____ Height of Drops: (inches) _____
 Test Procedure B (Over 150 lbs. and/or over 130 united inches)
 Method: Drop (free fall) Impact y / n Greater than 130 united inches
 Number of Drops: _____ Height of Drops (Drop test): (inches) _____ Velocity (Impact Test): (inches)
 Rotational Edge Drop Test: Yes No
 Rotational Flat Drop Test: Yes No

RESULTS

Passed Failed
 Condition of Unit: (Attached photo, if possible.)

Comments or recommendations:

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Section V. Acceptance Criteria

The shipping unit shall be deemed acceptable after performance testing if the following criteria are met:

- (a) The article is neither damaged nor nonfunctional.
- (b) The shipping unit has maintained its integrity and still affords reasonable protection against the normal hazards of transportation.

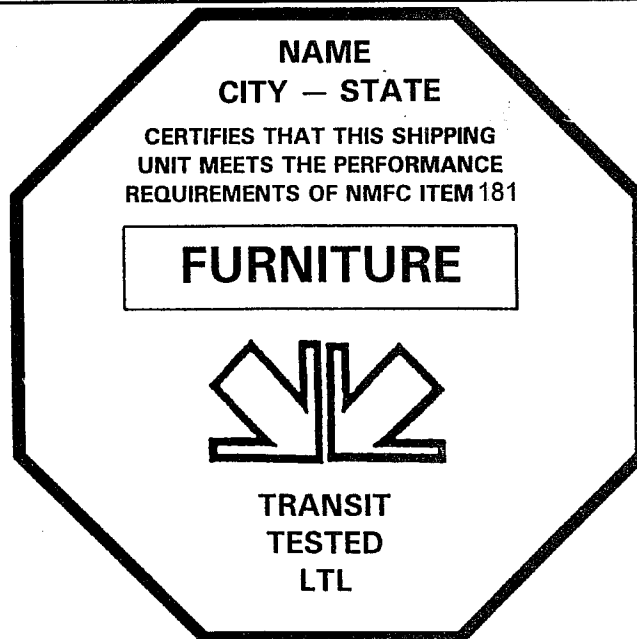
The acceptance criteria of article damage and nonfunctionality must be predetermined before testing and included in the report.

Section VI. Certification

(a) Packages tested in accordance with this item (Rule) must conspicuously bear the following octagonal symbol (3 inches in width and 3 inches in height) showing that they meet the minimum performance requirements specified. This marking is the responsibility of the shipper, ISTA (International Safe Transit Association), or any other third party identified within the symbol by name, city and state. Testing may be conducted by the shipper or any other competent test laboratory.

Directly above each certification symbol there must be printed an NMFTA Performance Test Registration Number. Such number will be issued by the National Motor Freight Traffic Association upon receipt of a properly completed form requesting such a Registration Number, signed by the Manager of Packaging or other responsible individual and certifying that the symbol and Registration Number will be imprinted only on those packages which have met minimum performance test requirements specified. Further, the applicant must divulge on the form the location or locations where completed test report forms are available for inspection upon reasonable request.

NMFTA PERFORMANCE TEST REGISTRATION NUMBER



The use of the above certification symbol does not negate container marking required in Note, item 79022, paragraph (c).

(b) In the event of repeated damages, carriers may request a retest at a third party laboratory. The retest must be conducted according to the same test plan as used for the initial certification testing. No alternative procedures or types of test equipment may be substituted. Should the shipping unit fail the retest, a second retest of two shipping units may be conducted at the third party laboratory and both shipping units must pass the retest.

To qualify as a third party laboratory, such facilities must register with the National Classification Committee (NCC). A list of registered third party laboratories will be made available upon request or can be found on the NCC's Web site at www.nmfta.org.