

ISTA 6 Series
General
Simulation
Performance
Test
PROJECT*

ISTA, Distributing Confidence, Worldwide™

ISTA® 6-Series *Member Performance Tests* are protocols created by ISTA members to suit their own particular purposes and applications. This 6-SAMSCLUB test was developed by ISTA in cooperation with Sam's Club, and is designed as a General Simulation protocol. General Simulation tests

- Challenge the capability of the package and product to withstand transport hazards, but
- Utilize general simulation of actual transport hazards, and
- Do not necessarily comply with carrier packaging regulations.

When properly executed, ISTA procedures will provide tangible benefits of:

- Product to market time reduction
- Confidence in product launch
- Reduction in damage and product loss
- Balanced distribution costs
- Customer satisfaction contributing to increased market share

There are three sections to this procedure: Overview, Testing, and Reporting

- Overview provides general knowledge required before testing and
- Testing presents the specific instructions to do laboratory testing and
- Reporting indicates what data shall be recorded to submit a test report.

Two systems of weights and measures are presented in ISTA test procedures: English system (Inch-Pound) or SI (Metric). Inch-Pound units are shown first followed by the Metric units in parentheses; there may be exceptions in some tables (when shown separately).

Familiarity with the following units and symbols used in this document is required:

For measuring	English units and symbols	Metric units and symbols
Weight	pounds (lb)	kilograms (kg) or grams (gm)
Force	pounds force (lbf)	newtons (N)
Distance	feet (ft) or inches (in)	meters (m) or millimeters (mm)
Velocity	inches per second (in/sec)	meters per second (m/sec) or millimeters per second (mm/sec)
Volume	cubic inches (in ³)	cubic centimeters (cm ³) or cubic meters (m ³)
Density	pounds per cubic inch (lb/in ³)	kilograms per cubic meter (kg/m ³)
Temperature	Fahrenheit (°F)	Celsius (°C)

- Either system may be used as the unit of measure, but
- The units chosen shall be used consistently throughout the procedure.
- Units are typically converted to two significant figures and
- Not exact equivalents.

VERY IMPORTANT:

The entire document shall be read and understood before proceeding with a test.

* Notes Regarding ISTA "Projects" and "Procedures"

- ISTA® 6-SAMSCLUB is currently an ISTA "Project", first released in September 2010. New ISTA test protocols are given the designation "Project" during their implementation phase. After a minimum one-year period and required evaluation, a "Project" will either be adopted as an established "Procedure", revised and kept as a "Project" for another period of time, or be dropped. Therefore, a "Project" is potentially subject to greater and more frequent revision than a "Procedure".
- ISTA members may use either Procedures or Projects for package certification.
- Comments regarding this Project and its use are encouraged and welcome. Please contact ista@ista.org.

VERSION
DATE
September
2010
Initial Release

Last
TECHNICAL
Change:
SEPTEMBER
2010

Last
EDITORIAL
Change:
JANUARY
2012

For complete
listing of
Procedure
Changes and
Version Dates
go to
www.ista.org

OVERVIEW OF PROJECT 6-SAMSCLUB

Project 6-SAMSCLUB is a general simulation test for packaged-products shipped through the Sam's Club distribution system to final destinations in the U.S. It was developed from an extensive survey, observation, and field measurement program of the actual Sam's Club system. The program involved personal visits to various Distribution Centers, overseas suppliers and ports, and U.S. Club stores. Ocean containers, trucks, and fork lifts were instrumented for acceleration and other data. Industry experts translated this information, observation, and data into the 6-SAMSCLUB Project laboratory tests specified here.

Users should be aware of other packaging requirements (configurations, materials, weight and height limits, etc.) for the Sam's Club system.

Project 6-SAMSCLUB is appropriate for four different types of packaged-products, designated Types A through D below, commonly shipped through the Sam's distribution system to U.S. destinations. For Type A non-perishable products which are initially shipped as palletized loads, there are two sub-types based on the club (store) quantity. For Floor-Loaded products there are two types based on size and weight. See Definitions below for an explanation of club (store) quantity, large/small floor-loaded products, and other terms used in this document.

Packaged-Product Types

- **Type A: Non-Perishable, initially shipped palletized** (on standard or custom pallet)
 - Club (store) quantity is the unchanged palletized load
 - Club (store) quantity is *other* than the unchanged palletized load, including elongated and flat package-products
- **Types B and C: Non-Perishable, initially shipped floor-loaded**, including elongated and flat packaged-products
 - **Type B:** Large floor-loaded packaged-products
 - **Type C:** Small floor-loaded packaged-products
- **Type D: Perishable, initially shipped palletized**

Definitions

- **Perishable.** Typically products such as foods, beverages, fresh flowers, etc. which may be susceptible to deterioration or spoilage if not maintained at prescribed temperature, humidity, or other conditions.
- **Non-Perishable.** Typically products which are not harmed by extremes of temperature, humidity, etc.
- **Floor-Loaded.** Products which are initially shipped without being unitized or palletized, initially loaded directly into a transport vehicle or ocean container, where the club (store) quantity is a case or unit.
 - A floor-loaded packaged-product is considered **Large** if it
 - Weighs 50 lb (23 kg) or more or
 - The longest dimension is 24 in (610 mm) or greater and the next-longest dimension is 20 in (510 mm) or greater and the shortest dimension is 20 in (510 mm) or greater or
 - Any of the length, width, or height dimensions are 30 in (760 mm) or greater
 - A floor-loaded packaged-product is considered **Small** if it does not meet the definition of Large above.
- **Club (Store) Quantity**
 - The club or store quantity is the number of packaged-products typically shipped at any one time to an individual club or store to replenish its stock.
 - A group of packaged-products may be shipped from the manufacturer or producer in a unitized load, but the load may subsequently be disassembled into smaller groups or individual packaged-products for shipment to the clubs or stores to meet their replenishment requirements.
- **Domestic Shipment**, where the initial point of origin is within the U.S.
- **International Shipment**, where the initial point of origin is outside the U.S.
- **Unitized Load.** Multiple articles or packages bound together (with straps, shrink- or stretch-film, etc.) for handling and transportation as one unit.
- **Standard and Custom Pallet.** A standard pallet is a design which is in wide industry use, with published specifications, quality, and applications, used within those specifications and in a typical application. Standard pallets have information, provided by their manufacturers or distributors, available on the internet. A custom pallet is one designed for a specific product or narrow range of products, and with its design and performance characteristics not widely known or published.
- **Elongated Packaged-Product**
 - A packaged-product where the longest dimension is 36 in (910 mm) or greater and
 - both of the other dimensions are each 20 percent or less of the longest dimension
- **Flat Packaged-Product**
 - A packaged-product where the shortest dimension is 8 in (200 mm) or less and
 - the next longest dimension is four (4) or more times larger than the shortest dimension, and
 - the volume is 800 in³ (13,000 cm³) or greater

NOTE: If a packaged-product is both Elongated and Flat in accordance with the above definitions, it should be tested as Elongated.

Preface continued on next page

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- Slip Sheet
 - A flat sheet of material with tabs on one or more sides, used as a base upon which to assemble, store, handle and transport goods and materials as a unit load.

General

- Testing can be used to evaluate the protective performance of a packaged-product related to vibrations, shocks and other stresses normally encountered during handling and transportation in the Sam's Club distribution system.
- Tests and levels are generally based on the survey, observation, and measurement program described above.
- The package and product are considered together and not separately.
- Some conditions of transit, such as moisture, pressure, or unusual handling may not be covered.

Other ISTA Procedures or Projects may be appropriate for different conditions or to meet different objectives.

Refer to *Guidelines for Selecting and Using ISTA Test Procedures and Projects* for additional information.

NOTE:

Hazardous Material (Dangerous Goods) packaging that passes this test procedure may not meet international, national or other regulatory requirements for the transport of Hazardous Materials (Dangerous Goods). This test is not a substitute for United Nations and/or any other required test standards for the transport of Hazardous Materials (Dangerous Goods), but may be used as an additional test in conjunction with them.

Scope

Project 6-SAMSCLUB covers the testing of packaged-products prepared for shipment via the Sam's distribution system to U.S. destinations. In this system, packaged-products are typically shipped from the manufacturer or producer through one or more Distribution Centers (DCs), and then to the clubs (stores). Various types of handling may occur in the DCs, including manual, fork lift, clamp truck, etc. The original shipment configuration may be altered at a DC to fit the needs of the system and the requirements of the clubs (stores). Final shipment to the club (store) is typically on a pallet.

Product Damage
Tolerance and
Package
Degradation
Allowance

The shipper, manufacturer, Sam's Club buyer, and/or other stakeholders shall determine the following prior to testing, to permit the determination of pass or fail at the conclusion of the tests:

- what constitutes damage to the product and
- what damage tolerance level is allowable, if any, and
- the correct methodology to determine product condition at the conclusion of the test and
- the acceptable package condition at the conclusion of the test.

For additional information on these determinations refer to *Guidelines for Selecting and Using ISTA Test Procedures and Projects*.

Additional
Information,
IMPORTANT

The shipper, manufacturer, Sam's Club buyer and/or other stakeholders shall also provide information regarding the club (store) quantity, pallet type, initial shipment configuration, approved container loading diagram, details of shipment and configurations within the distribution system, typical atmospheric conditions, etc. as required to determine proper testing parameters. Many of the TEST BLOCKS require such information for proper implementation; see the individual TEST BLOCKS for specific details.

Samples

Both products and packages should be as close as possible to actual production items. Pre-production prototypes such as hand-made samples, CAD-generated one-of-a-kind or short run samples, etc. are usually not sufficiently representative of production items to yield meaningful test results. It may be appropriate to conduct preliminary tests of a product and package early in the development cycle, but final official testing should be performed with actual production items.

One sample is required for this test procedure. If the sample is a palletized or unitized load, it may be required to select individual case or unit samples from that load for further testing as directed.

When multiple identical specimens are tested, all specimens must pass all tests.

To permit an adequate determination of representative performance of the packaged-product, ISTA:

- Requires the test procedure, with the required number of samples, to be performed one time, but
- Recommends performing the entire test procedure five or more times using new samples for each test.

Refer to *Guidelines for Selecting and Using ISTA Test Procedures and Projects* for additional information.

NOTE:

In order to ensure testing in perfect condition, products and packages shipped to an ISTA Certified Laboratory for testing shall be:

- Adequately over-packaged for shipment or
- Repackaged in new packaging at the laboratory.

NOTE:

Any pallet or skid used in this procedure should be of a type and condition which is typical of what is in actual field use for the packaged-product being tested.

NOTE:

It is important to thoroughly document the configuration, materials, and construction of the tested product and package. Significant variations in performance can sometimes be caused by seemingly insignificant differences. Photo documentation is strongly recommended to supplement detailed written descriptions.

Basis Weight

Basis Weights of Corrugated Board

When the outer package is a corrugated box, it is strongly recommended that the basis weights of the papers/paperboards used to make the box be determined and documented. Basis weights are likely to be better indicators of box construction and equivalence for comparison purposes than ECT or Burst performance ratings.

Refer to *Guidelines for Selecting and Using ISTA Procedures and Projects* for additional information on documentation and basis weight determination.

OVERVIEW OF PROJECT 6-SAMSCLUB

The tests shall be performed on each test sample in the sequence indicated in the following tables:

Test Sequence
Type A
Non-Perishable,
Initially Shipped
on Standard
or Custom
Pallet

Type A – Non-Perishable, Initially Shipped on Standard or Custom Pallet

Note: Also use this test for Type B or C items which are *utilized* and initially shipped floor-loaded on a slipsheet, but which are ultimately placed on a pallet for shipment *as a unit* to the club (store). Properly secure the unit to a standard pallet (with several layers of stretch wrap, with strapping, or with other appropriate means). Subsequently, consider it to be a Type A and test it according to the chart below.

Sequence Number	Test Category	Test Type	Test Level	Remarks
1	Atmospheric Preconditioning TEST BLOCK 1	Temperature and Humidity	Lab ambient, 12 hours	Required
2	Atmospheric Conditioning TEST BLOCK 1	Controlled Temperature and Humidity	Temperature and humidity chosen from chart	Optional
3	Shock TEST BLOCK 2	Inclined or Horizontal Impact	42 in/sec (3.5 ft/sec) (1.1 m/sec) impact velocity or velocity change	Required Impact all 4 vertical faces of pallet load
4	Shock TEST BLOCK 3	Rotational FLAT Drop	6 in (150 mm) (domestic) 8 in (200 mm) (int'l)	Required Test entire pallet load
5	Compression, Vertical TEST BLOCK 4	Top-to-Bottom Pallet on top	Calculated from formula Maintain force for 1 hour	Required Test entire pallet load Machine, or weights and load spreader
6	Vibration, Vertical TEST BLOCK 8	Random	Overall Grms level of 0.46 3 hours	Required Test entire pallet load
7	Shock TEST BLOCK 9	Rotational EDGE Drop	4 in (100 mm) (domestic) 6 in (150 mm) (int'l)	Required Test entire pallet load
8	Flat Push TEST BLOCK 11	Push Pallet Load with Fork Blade Tip	Push 40 in (1 m) in 2-3 sec	Required only for loads on custom pallets
<p>Stop here if "Club Quantity" is the unchanged pallet load. Continue if the "Club Quantity" is <i>not</i> the unchanged pallet load</p>				
<p>Select three specimens from the load, one each from top, middle, and bottom layers (if possible) for further tests below. All specimens must pass all tests.</p>				
9	Compression, Horizontal TEST BLOCK 10	Clamping Simulation	Calculated from formula Clamp in multiple orientations as directed	Required only for certain distribution situations
10	Shock TEST BLOCK 5	Free-Fall Drop Bottom Orientations	15 in (380 mm) (domestic) 18 in (460 mm) (int'l)	Required 3 drops each specimen
11	Vibration, Vertical, Stacked TEST BLOCK 12	Random All 3 Specimens Stacked Vertically	Overall Grms level of 0.55 1 hour	Required only for certain product types and distribution situations
12	Shock TEST BLOCK 13	Concentrated Edge Impact	Hazard box dropped 12 in (300 mm) (domestic) 15 in (380 mm) (int'l)	Required only for flat packages
13	Shock TEST BLOCK 14	Bridged Impact	Hazard box dropped 12 in (300 mm) (domestic) 15 in (380 mm) (int'l)	Required only for elongated packages

OVERVIEW OF PROJECT 6-SAMSCLUB

Type B – Non-Perishable, Initially Shipped Floor-Loaded into a Transport Vehicle or Ocean Container, Club Quantity is Case or Unit, Packaged-Product Defined as Large

Notes:

- Use this test for packaged-products defined as Large according to the *Definitions* section on page 2.
- If the test item is *unitized* and initially shipped floor-loaded on a slipsheet, but is ultimately placed on a pallet for shipment *as a unit* to the club (store), place it on a standard pallet prior to starting the test and use the *Type A* test protocol on page 5 (*Non-Perishable, Initially Shipped on Standard or Custom Pallet*). Properly secure to the pallet with several layers of stretch wrap, with strapping, or with other appropriate means.
- If the test item is *unitized* and initially shipped floor-loaded *without* a slipsheet, but is ultimately placed on a pallet for shipment *as a unit* to the club (store), perform Sequence Numbers 1, 2, and 7 below, then secure the unit to a standard pallet and perform Sequence Numbers 3 through 7 of the *Type A* test protocol on page 5 (*Non-Perishable, Initially Shipped on Standard or Custom Pallet*). Properly secure to the pallet with several layers of stretch wrap, with strapping, or with other appropriate means.

Test Sequence
Type B
Non-Perishable,
Initially Shipped
Floor-Loaded,
Club Quantity
is Case or Unit,
Packaged-
Product
Defined as Large

Sequence Number	Test Category	Test Type	Test Level	Remarks
1	Atmospheric Preconditioning TEST BLOCK 1	Temperature and Humidity	Lab ambient, 12 hours	Required
2	Atmospheric Conditioning TEST BLOCK 1	Controlled Temperature and Humidity	Temperature and humidity chosen from chart	Optional
3	Shock TEST BLOCK 2	Inclined or Horizontal Impact Impact 4 or 6 faces as directed	42 in/sec (3.5 ft/sec) (1.1 m/sec) impact velocity or velocity change	Required
4	Shock TEST BLOCK 3	Rotational FLAT Drop Test in multiple orientations as directed	7 in (180 mm) (domestic) 9 in (230 mm) (int'l)	Required
5	Compression, Vertical TEST BLOCK 4	Test in multiple orientations as directed Standard pallet on top depending upon upper surface area	Calculated from formula Maintain force for 1 hour	Required Machine, or weights and load spreader Pallet required for upper surface areas \geq 45 x 37 in (1140 x 940 mm)
6	Vibration, Vertical TEST BLOCK 8	Random With Top Load of 0.0035 lbs/in ³ (96 kg/m ³)	Overall Grms level of 0.46 3 hours	Required Test in multiple orientations as directed
7	Compression, Horizontal TEST BLOCK 10	Clamping Simulation	Calculated from formula Clamp in multiple orientations as directed	Required only for certain distribution situations
8	Shock TEST BLOCK 9	Rotational EDGE Drop Test in multiple orientations as directed	5 in (130 mm) (domestic) 7 in (180 mm) (int'l)	Required
9	Shock TEST BLOCK 13	Concentrated Edge Impact	Hazard box dropped 12 in (300 mm) (domestic) 15 in (380 mm) (int'l)	Required only for flat packages
10	Shock TEST BLOCK 14	Bridged Impact	Hazard box dropped 12 in (300 mm) (domestic) 15 in (380 mm) (int'l)	Required only for elongated packages

OVERVIEW OF PROJECT 6-SAMSCLUB

Type C – Non-Perishable, Initially Shipped Floor-Loaded into a Transport Vehicle or Ocean Container, Club Quantity is Case or Unit, Packaged-Product Defined as Small

Notes:

- Use this test for packaged-products defined as Small according to the *Definitions* section on page 2.
- If the test item is unitized and initially shipped floor-loaded on a slipsheet, but is ultimately placed on a pallet for shipment as a unit to the club (store), place it on a standard pallet prior to starting the test and use the *Type A* test protocol on page 5 (*Non-Perishable, Initially Shipped on Standard or Custom Pallet*). Properly secure to the pallet with several layers of stretch wrap, with strapping, or with other appropriate means.
- If the test item is unitized and initially shipped floor-loaded without a slipsheet, but is ultimately placed on a pallet for shipment as a unit to the club (store), perform Sequence Numbers 1, 2, and 6 below, then secure the unit to a standard pallet and perform Sequence Numbers 3 through 7 of the *Type A* test protocol on page 5 (*Non-Perishable, Initially Shipped on Standard or Custom Pallet*). Properly secure to the pallet with several layers of stretch wrap, with strapping, or with other appropriate means.

Test Sequence
Type C
Non-Perishable,
Initially Shipped
Floor-Loaded,
Club Quantity
is Case or Unit,
Packaged-
Product
Defined as *Small*

Sequence Number	Test Category	Test Type	Test Level	Remarks
1	Atmospheric Preconditioning TEST BLOCK 1	Temperature and Humidity	Lab ambient, 12 hours	Required
2	Atmospheric Conditioning TEST BLOCK 1	Controlled Temperature and Humidity	Temperature and humidity chosen from table	Optional
3	Shock TEST BLOCK 6	Free-Fall Drop Multiple Orientations First Sequence	6 drops – 14 in (360 mm) max (domestic) 18 in (460 mm) max. (int'l)	Required
4	Compression, Vertical TEST BLOCK 4	Test in multiple orientations as directed	Calculated from formula Maintain force for 1 hour	Required Machine, or weights and load spreader
5	Vibration, Vertical TEST BLOCK 8	Random With Top Load of 0.0035 lbs/in ³ (96 kg/m ³)	Overall Grms level of 0.46 3 hours	Required Test in multiple orientations as directed
6	Compression, Horizontal TEST BLOCK 10	Clamping Simulation	Calculated from formula Clamp in multiple orientations as directed	Required only for certain distribution situations
7	Shock TEST BLOCK 7	Free-Fall Drop Multiple Orientations Second Sequence	6 drops – 26 in (660 mm) max (domestic) 32 in (810 mm) max. (int'l)	Required
8	Shock TEST BLOCK 13	Concentrated Edge Impact	Hazard box dropped 12 in (300 mm) (domestic) 15 in (380 mm) (int'l)	Required only for flat packages
9	Shock TEST BLOCK 14	Bridged Impact	Hazard box dropped 12 in (300 mm) (domestic) 15 in (380 mm) (int'l)	Required only for elongated packages

OVERVIEW OF PROJECT 6-SAMSCLUB

Type D – Perishable, Initially Shipped Palletized

Test Sequence
Type D
Perishable,
Initially Shipped
Palletized

Sequence Number	Test Category	Test Type	Test Level	Remarks
1	Atmospheric Conditioning TEST BLOCK 1	Controlled Temperature and Humidity	Cool, cold, or frozen as appropriate, chosen from chart	Required
2	Shock TEST BLOCK 9	Rotational EDGE Drop	4 in (100 mm) (domestic) 6 in (150 mm) (int'l)	Required Test entire pallet load
3	Compression, Vertical TEST BLOCK 4	Top-to-Bottom Standard pallet on top	Calculated from formula Hold force for 30 seconds, release	Required Test entire pallet load Machine, or weights and load spreader
Select three specimens from the INTERIOR of the load (if possible), one each from top, middle, and bottom layers (if possible) for further tests below. All specimens must pass all tests.				
4	Shock TEST BLOCK 5	Free-Fall Drop Bottom Orientations	15 in (380 mm) (domestic) 18 in (460 mm) (int'l)	Required 3 drops each specimen

NOTE:

The above is a deliberately abbreviated test sequence, intended to be completed in a minimum amount of time. This will help to ensure that the characteristics of the cool, cold, or frozen test specimen do not change appreciably during the sequence, if the tests cannot be conducted in the conditioned atmosphere.

NOTE:

Vibration testing is not required for Type D, Perishable packaged-products.

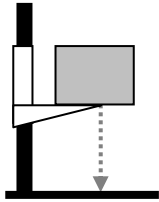
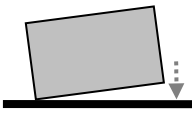
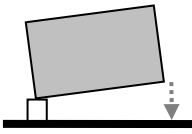
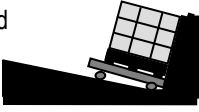
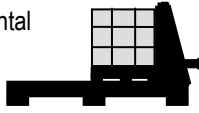
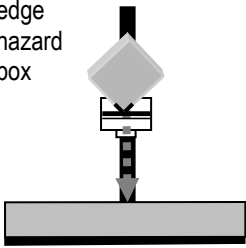
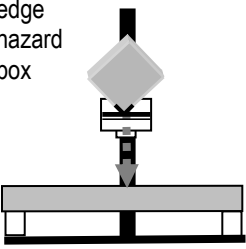
EQUIPMENT REQUIRED FOR PROJECT 6-SAMSCLUB

Atmospheric Pre-Conditioning and Conditioning:

- Humidity recorder complying with of the apparatus section of ASTM D 4332 or ISO 2233.
- Temperature recorder complying with the apparatus section of ASTM D 4332 or ISO 2233.

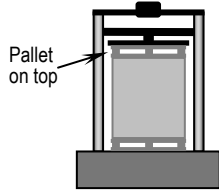
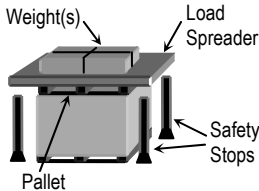
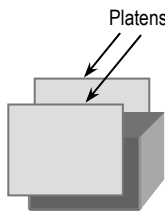
Controlled Temperature and Humidity:

- Chamber and Control apparatus complying with the apparatus section of ASTM D 4332 or ISO 2233.

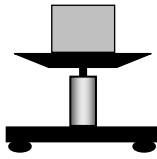
Type of Shock Test	Type of Equipment	Equipment Requirements	Additional Required Equipment
Free-Fall Drop Tests	Free-fall drop tester 	Compliance with the apparatus sections of ASTM D 5276 or ISO 2248.	
Rotational FLAT Drop Tests		Compliance with the apparatus sections of ASTM D 6179 or ISO 2876.	
Rotational EDGE Drop Tests	Support Block 	Compliance with the apparatus sections of ASTM D 6179 or ISO 2876.	Support block 3.5 to 4.0 in (90 to 100 mm) in height and width and at least 8 in (200 mm) longer than the longest package dimension to be supported.
Inclined or Horizontal Impact Tests (Alternates)	Inclined  Horizontal 	Compliance with the apparatus sections of ASTM D 880 or ASTM D 4003 or ISO 2244.	
Concentrated Edge Impact Tests	Free-fall drop tester with edge hazard box 	Drop tester in compliance with the apparatus sections of ASTM D 5276 or ISO 2248.	Concentrated Edge Hazard Box 12 x 12 x 12 in (305 x 305 x 305 mm) wood box with a total weight of 9 lb (4.1 kg). Any required ballast weight should be dense flowable material in a bag or bags, held in place with suitable void fill. The impact edge of the box shall be covered with angle iron.
Bridged Impact Tests	Free-fall drop tester with edge hazard box 	Compliance with the apparatus section of ASTM D 5265, with the exception of the Hazard Box (Impactor).	Concentrated Edge Hazard Box and Support Blocks See above for description of the Concentrated Edge Hazard Box. Support blocks (2 ea) shall be 3.5 to 4.0 in (90 to 100 mm) in height and width and at least 8 in (200 mm) longer than the longest package dimension to be supported.

EQUIPMENT REQUIRED FOR PROJECT 6-SAMSCLUB

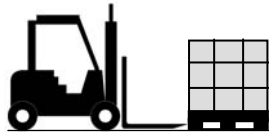
Equipment
Required
Compression

Type of Compression Test	Type of Equipment	Equipment Requirements	Additional Required Equipment
Vertical Compression (Top-to-Bottom)	<p>Compression Test Machine</p>  <p>Pallet on top</p>	Compliance with the apparatus section of ASTM D 642 "Fixed-Platen Testing Machine".	<p>Standard 48x40 in (1200x1000 mm) block pallet, "picture-frame", full-perimeter-base type, on top of test item. If test item is shipped on a custom pallet, use an identical custom pallet on top.</p> <p>Top pallet not required for Small floor-loaded items and certain Large floor-loaded items.</p>
Vertical Compression (Top-to-Bottom) (Alternate)	<p>Weight(s) & Load Spreader</p>  <p>Weight(s) Load Spreader Safety Stops Pallet</p>	The Load spreader must be larger than the top face of the test item, and shall be sufficiently rigid to apply a uniform compression force.	<p>See above for description of the pallet.</p> <p>Top pallet not required for Small floor-loaded items and some Large floor-loaded items.</p> <p>Safety stops are recommended to support the load spreader and weight(s) to prevent damage or injury in the event of a rapid collapse of the test item.</p>
Horizontal Compression (Clamping Simulation)	<p>Clamp Tester</p>  <p>Platens</p>	<p>Platens must be larger than the side dimensions of the test item, and with an opening sufficient to accommodate the test item.</p> <p>The desired compression must be achieved with minimum overshoot.</p>	<p>Controls must permit applying the required clamping force smoothly at a rate of 0.02-0.1 in/sec (0.5-2.5 mm/sec) and with minimum force overshoot.</p> <p>Force measurement accuracy to within $\pm 5\%$ of the actual value, using accepted calibration means.</p>

Equipment
Required
Vibration

Type of Vibration Test	Type of Equipment	Equipment Requirements	Additional Required Equipment
Vertical Vibration	<p>Random Vibration Test System</p> 	Compliance with the apparatus section of ASTM D 4728 or ISO 13355	Means must be provided to maintain proper alignment of the test item and any top load apparatus, and to prevent the test item from moving off the vibration system's platform, without restricting vertical motion of the test item or apparatus.

Equipment
Required
Flat Push

Type of Test	Type of Equipment	Equipment Requirements	Additional Required Equipment
Flat Push with Fork Lift Truck	<p>Fork Lift Truck</p> 	A fork lift truck of sufficient capacity to handle the test specimens and complying with the apparatus sections of ASTM D 6055 or ISO 10531.	

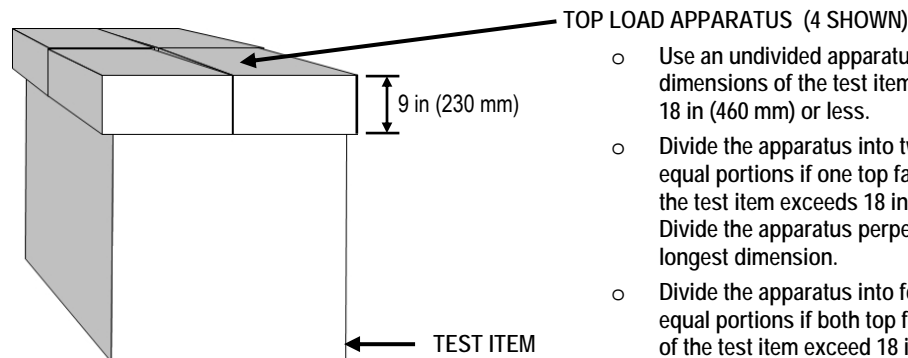
EQUIPMENT REQUIRED FOR PROJECT 6-SAMSCLUB

A Top Load Apparatus is required for the vibration testing of Types B and C, Non-Perishable Items Initially Shipped Floor-Loaded into a transport vehicle or ocean container.

Equipment
Required
Additional

Vibration
Top Load
Apparatus

- The Top Load Apparatus is described and shown below, and includes:
 - A sturdy fiberboard box or similar container with a height of 9 in (230 mm), and with a minimum 0.75 in (20 mm) thick plywood load spreader covering the entire inside bottom surface.
 - Some means of adding additional weight as required so that the top load is distributed evenly over the entire inside bottom face area of the top load apparatus.
 - Adequate void fill to securely hold the weight in place to prevent it from moving or bouncing within the top load apparatus.
 - Bottom face dimensions (length and width) which are at least 2 in (50 mm) larger than the top face dimensions of the test item to which it is applied [for a minimum overhang of 1 in (25 mm) on each side], but must not be greater than 6 in (150 mm) larger than the top face dimensions of the test item [for a maximum of 3 in (76 mm) overhang on each side].
- The Top Load Apparatus must be divided into 2 separate equal portions if *one* of the top face dimensions of the test item exceeds 18 in (460 mm), and into 4 separate equal portions if *both* of the top face dimensions of the test item exceed 18 in (460 mm).



- Use an undivided apparatus if both top face dimensions of the test item are 18 in (460 mm) or less.
- Divide the apparatus into two separate equal portions if one top face dimension of the test item exceeds 18 in (460 mm). Divide the apparatus perpendicular to the longest dimension.
- Divide the apparatus into four separate equal portions if both top face dimensions of the test item exceed 18 in (460 mm).

The Top Load is to simulate the effects of 6 lb/ft³ (0.0035 lb/in³) (96 kg/m³) of assorted freight on top of a floor loaded packaged-product in a truck-trailer or ocean container with an inside height of 108 in (2.7 m). This load density has been determined by empirical testing which resulted in correlation between damage in the test lab and damage in the field.

- Means must be provided to maintain proper alignment of the Top Load Apparatus on the test item (column stack fixtures, stretch wrap around the test specimen and the top load apparatus, etc.), without restricting the vertical motion of the top load apparatus and the test specimen.