

ISTA 3 Series
General
Simulation
Performance
Test
Procedure

VERSION
DATE

Last

TECHNICAL
Change:

APRIL
2017

Last

EDITORIAL
Change:

APRIL
2017

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

Preface

ISTA, Distributing Confidence, Worldwide™

ISTA 3 Series tests are advanced tests.

- J They challenge the capability of the package and product to withstand transport hazards, but
- J They use general simulation of actual transport hazards, and
- J They do not necessarily comply with carrier packaging regulations.

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

- J Shortened packaged development time and confidence in product launch
- J Protection of products and profits with reduced damage and product loss
- J Economically balanced distribution costs
- J Customer satisfaction and continued business.

There are three sections: Overview, Testing and Report

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

Two systems of weights and measures are presented in ISTA test procedures. They are the English system (Inch-Pound) and the international system SI (Metric). Inch-Pound units are shown first with Metric units in brackets, except in some tables where they are shown separately.

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

VERY IMPORTANT:

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

OVERVIEW OF PROCEDURE 3E

Procedure 3E is a general simulation test for unitized loads of similar retail or institutional packaged-products shipped from a manufacturing location to a distribution center. The unitized loads of packaged-products are shipped through a motor carrier (truck) delivery system, where an entire trailer-load is filled with unitized packaged-products, often of similar retail packaged-products, intended for one destination. This type of shipment is called Full Truckload (FTL).

A unitized load is defined as one or more products or packaged-products usually on a skid or pallet, but always secured together or restrained for distribution as a single load. Examples would be a stretch wrapped pallet load of individual containers, a single non-packaged machine banded to a pallet or a pallet with a corrugated tray, tube and a cap.

- J It can be used to evaluate the protective performance of packaged-products related to vibrations, shocks and other stresses normally encountered during handling and transportation.
- J It can be used to evaluate load stability.
- J The test levels are based on general data and may not represent any specific distribution system.
- J The package and product are considered together and not separately.
- J Some conditions of transit, such as moisture, pressure or unusual handling, may not be covered.

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

Specific suggestions:

- J To test the individual packaged-product that might be shipped non-unitized from a distribution center to a retail outlet, use ISTA Test Procedure 3F.
- J To test packaged-products prepared for shipment via a Less-Than-Truckload (LTL) delivery system carrier. LTL is defined as a motor carrier (truck) shipment, where different types of packaged-products, often from different shippers and intended for different ultimate destinations, are mixed in the same load then use ISTA Test Procedure 3B.

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

Scope

Procedure 3E covers the testing of unitized loads, made up of either single or multiple products or packages of similar products prepared for shipment via a Full Truckload (FTL) delivery system carrier. FTL is defined as motor carrier shipment, where an entire trailer-load is filled with unitized packaged-products, often of similar retail packaged-products, intended for one destination.

Product Damage Tolerance and Package Degradation Allowance

The shipper shall determine the following prior to testing:

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

Samples

For additional information on this determination process refer to Guidelines for Selecting and Using ISTA Procedures and Projects.

Samples should be the untested actual package and product, but if one or both are not available, the substitutes shall be as identical as possible to actual items.

Number of samples required:

One sample (unitized load) is required for the tests in this procedure.

Replicate Testing Recommended:

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

- J Requires the procedure to be performed one time, but
- J Recommends performing the procedure five or more times using new samples with each test.
- J Refer to Guidelines for Selecting and Using ISTA Procedures and Projects for additional information on statistical sampling.

NOTE:

Packages that have already been subjected to the rigors of transportation cannot be assumed to represent standard conditions. In order to insure testing in perfect condition, products and packages shipped to certified laboratories for testing must be:

- J over-packaged for shipment to the laboratory or
- J repackaged in new packaging at the laboratory.

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.

Test Sequence

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

Sequence #	Test Category	Test Type	Test Level	For ISTA Certification
1	Atmospheric Preconditioning	Temperature and Humidity	Ambient	Required
2	Atmospheric Conditioning	Controlled Temperature and Humidity	Temperature and humidity chosen from chart	Optional
3	Shock (Alternative methods allowed – select one test type)	Incline Impact (Conbur)	48 in per second (1.2 m per second)	Required
		Horizontal Impact	48 in per second (1.2 m per second)	
4	Shock	Rotational Edge Drop	Height varies with packaged-product weight	Required
5	Compression (Alternative methods allowed – select one test type)	Machine Apply and Release	Calculated Test Force x 1.4	Required
		Machine Apply and Hold	Calculated Test Force	
		Weight and Load Spreader	Calculated Test Load	
6	Vibration	Random	Overall G _{rms} level of 0.54	Required
7	Shock	Rotational Edge Drop	Height varies with packaged-product weight	Required

Equipment Required Atmospheric Conditioning

Atmospheric Conditioning:

-) Humidity recording apparatus complying with of the apparatus section of ASTM D 4332.
-) Temperature recording apparatus complying with the apparatus section of ASTM D 4332.

Optional Atmospheric Conditioning

Chamber and Control apparatus complying with the apparatus section of ASTM D 4332.

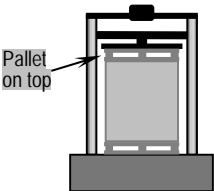
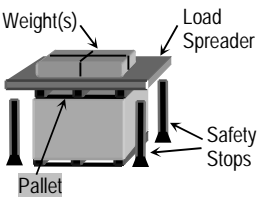
Equipment Required Shock

The following alternatives are acceptable for the equipment required for the Impact Test:

Type of Shock Test	Equipment	In compliance with the apparatus section of:
Incline Test	Incline impact tester (conbur)	ASTM D 880
Horizontal Test	Horizontal impact test system	ASTM D 4003

Equipment Required Compression

The following alternatives are acceptable for the equipment required for the Compression Test:

Type of Compression Test	Equipment	In compliance with the apparatus section of:	Additional Required Equipment
Apply and Release Test	 <p>Compression Test Machine</p> <p>Pallet on top</p>	ASTM D 642 Fixed or Floating platen acceptable	Use an identical pallet on top as what the test item is shipped on.
Apply and Hold Test			
Apply and Hold Test	 <p>Weight and load spreader</p> <p>Weight(s)</p> <p>Load Spreader</p> <p>Pallet</p> <p>Safety Stops</p>	NA	See above for description of the pallet. 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.

Equipment Required Vibration

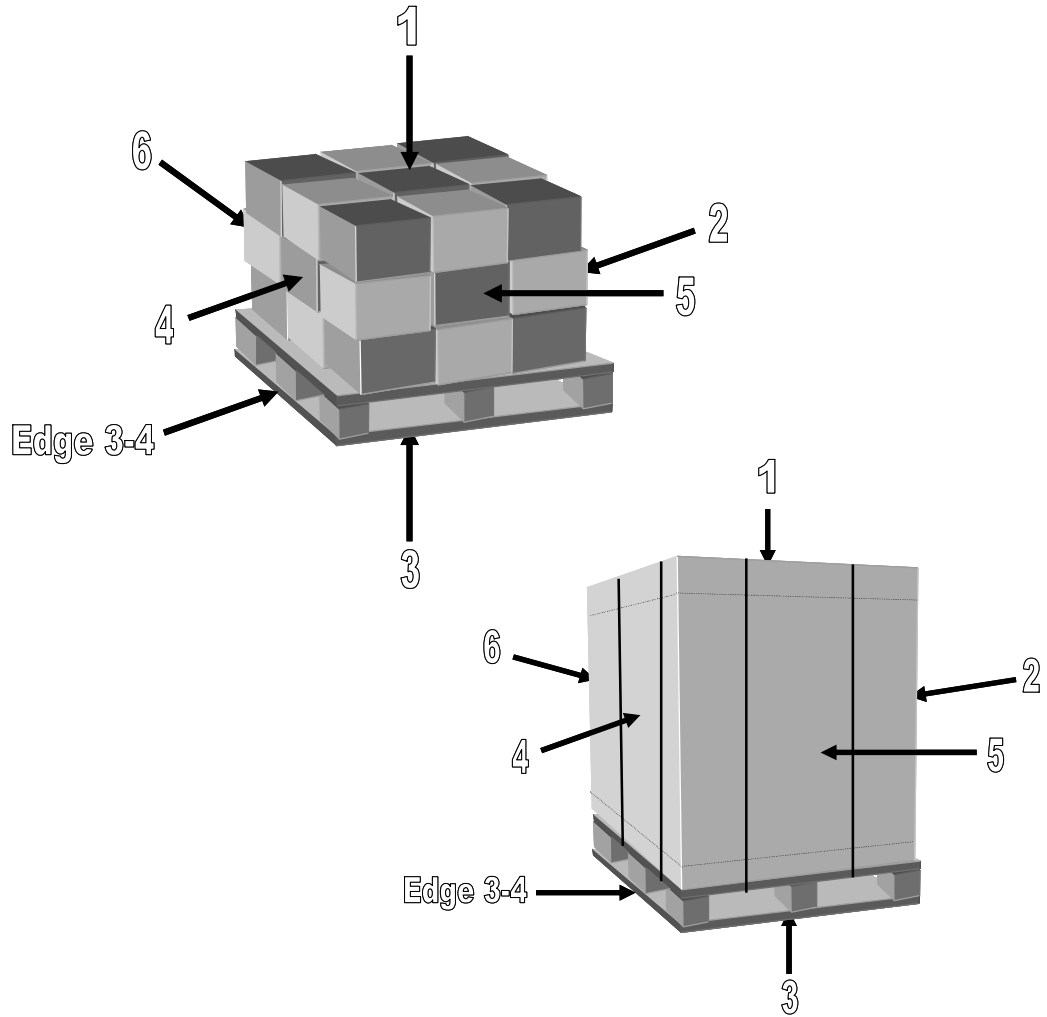
Random Vibration Test:

-) Random Vibration Test System complying with the apparatus section of ASTM D 4728.

BEFORE YOU BEGIN PROCEDURE 3E

Prior to beginning the tests identify the faces and edges according to the procedure below.

Step	Action
1	Place the unit load in its designed transport orientation.
2	Position one of the smallest width faces of the unit load directly in front of you.
3	Identify faces according to the diagram below.
4	Identify edges using the numbers of the two faces forming that edge. Example: Edge 3-4 is the edge formed by face 3 and face 4 of the unit load.
5	Go to next page for further Before You Begin details.



3E

Unit Load
Weight and
Size
Measurement

Before You
Begin
Atmospheric
Conditioning

Before You
Begin
Shock Testing

BEFORE YOU BEGIN PROCEDURE 3E

You shall know the unit load's:

- J gross weight in pounds (kg), and
- J outside dimensions of Length, Width and Height (L x W x H) in inches (mm or m).

Required Preconditioning:

The packaged-product should be stored prior to climate conditioning at laboratory ambient temperature and humidity for twelve (12) hours.

Optional Conditioning Recommended (to be performed after the required preconditioning):

To permit an adequate determination of packaged-product performance at anticipated atmospheric limits and where it is known that the atmospheric extremes are detrimental to the product, ISTA:

- J Requires the highest temperature and humidity limits of the product be used, but
- J Recommends that both the highest and lowest atmospheric conditions be used.

Condition packaged-products according to one or more of the conditions listed in the table below.

- J Remaining test requirements should be performed as soon as possible after removing the packaged-product from environmental conditioning apparatus.
- J If more than one conditioning sequence is selected, a new and complete test should be performed following each sequence.

Anticipated Conditions	Time in Hours	Temperature in °C (°F)	Humidity in %
Extreme Cold, Uncontrolled RH	72	-29°C (-20°F)	uncontrolled RH
Cold, Humid	72	5°C (40°F)	85µ RH ± 5µ
Controlled Conditions	72	23°C (73°F)	50µ RH ± 5µ
Hot, Humid	72	38°C (100°F)	85µ RH ± 5µ
Hot, Humid then Extreme Heat, Moderate RH	72 then 6	38°C (100°F) then 60°C (140°F)	85µ RH ± 5µ then 30µ RH ± 5µ
Elevated Temperature, Uncontrolled RH	72	50°C (120°F)	uncontrolled RH
Extreme Heat, Dry	72	60°C (140°F)	15% RH +/- 5%
Severe Cold, Uncontrolled RH	72	-18°C (0°F)	uncontrolled RH
User Defined High Limit	72	Based upon known conditions	Known conditions
User Defined Low Limit	72	Based upon known conditions	Known conditions
User Defined Cycle	72	Based upon known conditions	Known conditions

CAUTION:

If the Unit Load:

- J has a length twice the width or more and
- J a center of gravity above the midpoint of the height,
- J there is the possibility that the Unit Load could tip over when testing one of the longest edges, therefore
- J you may conduct the Rotational Edge Drop test on both the shortest edges.

Inclined or Horizontal Impacts:

- J The required impact tests may be accomplished with either an inclined or horizontal machine. If an inclined-impact machine is used, the minimum required impact velocity must be 48 in/sec (1.2 m/sec). If a horizontal-impact machine is used, the minimum required velocity change must be 48 in/sec (1.2 m/sec) and the required shock must be a nominal 10 millisecond duration half sine pulse.
- J When using impact velocity or velocity change, if any velocity in a Test Sequence is below the required minimum level, that sequence event must be repeated until the test velocity meets the minimum.

BEFORE YOU BEGIN PROCEDURE 3E

Overview:

The Compression test force/weight to be applied accounts for both potential scenarios of Warehouse Compression and Vehicle Compression. A single Formula is used to calculate this Compression value.

Either a compression machine or a system of weights and a load spreader may be used for these tests. If a compression machine is used, both force “apply-and-release” and “apply-and-hold” methodologies are permitted.

CAUTION:

When using weights and a load spreader use extreme care to prevent injury.

Formula Term Definitions for Calculations:

The following are definitions of terms used in the Compression calculation sections that follow:

- Wt = Gross weight of the unitized load (lbs. or kg.)
- S = Total number of potential unitized loads in a warehouse stack or vehicle stack, including the bottom unitized load
- L = Total number of layers in the unitized load
- F = Compensating Factor
- 1.4 = Factor to account for time of compression (only to be used in the apply-and-release method)
- 9.8 = Metric conversion factor

The Compensating Factor, F, is used to account for effects which may not be simulated in the laboratory tests, such as temperature/humidity conditions, misalignments, long-duration loading, etc. The Factor values given in the sections that follow are typical, but other F values may be used in certain situations including reduced factors.

For example:

- J If compression testing is performed in conjunction with atmospheric conditioning which reduces container strength (e.g. corrugated containers under high humidity, plastic containers under high temperature), Compensating Factors may be reduced.
- J If the materials and structures which support the compression load (whether product, primary package, transport package, or a combination) are not affected by time, temperature, or humidity, then Compensating Factors may be reduced.
- J If the Compensating Factor values given in the sections that follow are not used, sufficient justification must be included in the Test Report.

Compression Calculation:

There are three separate calculations, each with English and Metric units, to accommodate the three different allowable test approaches.

Methodology	English Units	Metric Units
Compression Machine	Pounds Force (lbf)	Newtons (N)
Apply-and-release test force	$\frac{\{[Wt \times (S - 1) + (Wt / L)(L - 1)] \times F - (Wt / L)(L - 1)\}}{x 1.4}$	$\frac{\{[Wt \times (S - 1) + (Wt / L)(L - 1)] \times F - (Wt / L)(L - 1)\}}{x 1.4 \times 9.8}$
Apply-and-hold test force	$[Wt \times (S - 1) + (Wt / L)(L - 1)] \times F - (Wt / L)(L - 1)$	$\frac{\{[Wt \times (S - 1) + (Wt / L)(L - 1)] \times F - (Wt / L)(L - 1)\}}{x 9.8}$
Weight and Load Spreader	Pounds (lb)	Kilograms (kg)
Apply-and-hold dead weight test	$[Wt \times (S - 1) + (Wt / L)(L - 1)] \times F - (Wt / L)(L - 1)$	$\{[Wt \times (S - 1) + (Wt / L)(L - 1)] \times F - (Wt / L)(L - 1)\}$

NOTES:

Use an F value of 3 for these calculations or supply sufficient justification in the Test Report to support use of a different value.

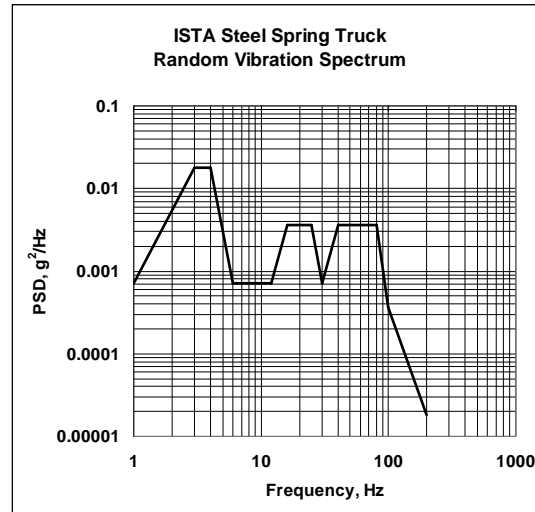
CAUTION:

A restraining device or devices shall be used with the vibration test system to:

- J Prevent the test specimen from moving off the platform and
- J Maintain test orientation of the packaged-product, but
- J The restraining device or devices shall not restrict the vertical motion of the test specimen during the test.

The following breakpoints shall be programmed into the vibration controller to produce the acceleration versus frequency profile (spectrum) below with an overall G_{rms} level of 0.54. The theoretical stroke required to run this vibration profile is 1.777 in (45.13 mm) peak to peak.

Frequency (Hz)	PSD Level, g^2/Hz
1.0	0.00072
3.0	0.018
4.0	0.018
6.0	0.00072
12.0	0.00072
16.0	0.0036
25.0	0.0036
30.0	0.00072
40.0	0.0036
80.0	0.0036
100.0	0.00036
200.0	0.000018



Calculating Test Time

Estimate the anticipated total distance of the ground shipment the packaged-product may encounter during distribution to determine a test time from the following formulas:

$$\text{Test Time duration in minutes} = (\text{Transport Miles}) \div 5. \text{ Maximum test time 240 minutes}$$

OR

$$\text{Test Time duration in minutes} = (\text{Transport Kilometers}) \div 8. \text{ Maximum test time 240 minutes}$$

Examples:

If the estimated distance is 750 miles, the Test Time would be 150 minutes.

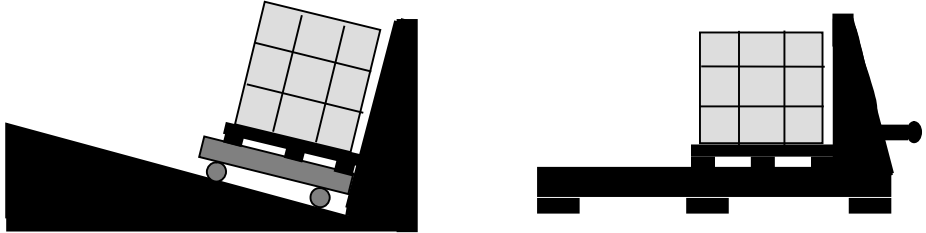

If the estimated distance is 1000 km., the Test Time would be 125 minutes.

The test blocks that follow contain tables that indicate the required steps for each test in the procedure.

TEST BLOCK 1
Atmospheric
Conditioning

TEMPERATURE AND HUMIDITY	
Step	Action
1	The packaged-product should be stored at laboratory ambient temperature and humidity for twelve (12) hours.
2	Is optional conditioning going to be performed?) If Yes, go to Step 6.) If No, go to the next Step.
3	Record the ambient laboratory temperature and humidity when testing starts.
4	At the end of all testing record temperature and humidity.
5	Go to TEST BLOCK 2 (Shock - Impact).
6	Select an anticipated condition from the Before You Begin Atmospheric Conditioning Block.
7	Check the conditioning apparatus to insure that the temperature and humidity are at the required levels.
8	Place the packaged-product in the conditioning.
9	At the completion of the required conditioning time remove the packaged-product from the conditioning apparatus.
10	Record the ambient laboratory temperature and humidity when testing starts.
11	Go to TEST BLOCK 2 (Shock - Impact) and perform the remaining test sequence as quickly as possible.

TEST BLOCK 2
Shock
(Impact)

SHOCK - IMPACT	
Step	Action
1	Do the packaged-products overhang the edge of the pallet?) If Yes, then go to Step 3.) If No, then continue with the next Step.
2	Center the unitized load on the carriage with the pallet edge flat against the backstop or sail and parallel to the leading edge of the carriage and go to Step 4. 
3	Center the unitized load on the carriage with the vertical face of the unitized load flat against the backstop or sail and parallel to the leading edge of the carriage. 

Continued on next page

TEST BLOCK 2
Continued
Shock
(Impact)

Continued from previous page

Step	Action		
4	Test the unitized load at a minimum of 48 in per second (1.2 m per second). If any velocity in a Test Sequence is below the required minimum level, that sequence event must be repeated until the test velocity meets the minimum. Follow the sequence in the table below.		
	Sequence #	Orientation	Specific face
	1	Face	one of the smallest vertical faces
	2	Face	opposite small vertical face
	3	Face	one of the largest vertical faces
4	Face	opposite large vertical face	
5	Impact testing is now complete. Go to TEST BLOCK 3 (Shock – Rotational Edge Drop).		

TEST BLOCK 3
Shock
(Rotational
Edge Drop)

SHOCK - ROTATIONAL EDGE DROP		
Complete this TEST BLOCK using the drop heights indicated:		
<input type="checkbox"/> Drop height 9 in (230 mm) for packaged-products weighing 500 lb (230 kg) or less, <input type="checkbox"/> Drop height 6 in (150 mm) for packaged-products weighing over 500 lb (230 kg)		
Step	Action	
1	Perform a rotational edge drop. Follow the sequence in the table below.	
	Sequence #	Action
	1	Place the packaged-product on a flat, rigid surface such as steel or concrete with face 3 down.
	2	Support edge 3-5 with a timber or support 3.5 to 4.0 in (90 to 100 mm) in height and width.
	3	Lift the opposite edge (3-6) to the prescribed drop height as indicated at the beginning of this Test Block.
4	Release the edge so that it falls freely onto the flat, rigid surface.	
2	Does the Unit Load have a length equal to or greater than twice the width and a center of gravity above the midpoint of the height? <input type="checkbox"/> If Yes, then go to Step 4. <input type="checkbox"/> If No, then continue with the next step.	
3	Repeat Step 1 on one of the face 3 edges radiating 90° from the edge just tested in Step 1 Sequence 4. Then go to Step 5.	
4	Repeat Step 1 on the face 3 edge opposite the edge just tested in Step 1 Sequence 4. Then go to the next Step.	
5	This rotational edge drop testing is now complete. Go to TEST BLOCK 4 (Compression).	

COMPRESSION		
Step	Action	
1	Testing is to be conducted using the test force or dead weight value from the Compression Test Force/Weight Determination section of Before You Begin Compression Testing.	
	IF the testing equipment to be used is a ...	THEN go to ...
	Compression Test System	Step 2.
	Weight and load spreader	Step 7.
2	Center the packaged-product with face 3 resting on the lower platen of the compression tester. Place a pallet, as described in the Equipment Required Compression section, on top of the test item. Align the corners of the top pallet with the corners of the bottom pallet (center the top pallet on the test item).	
3	Start the test machine and bring the platens together at the rate of one-half 0.5 in (13 mm) per minute.	
4	Perform the appropriate action as indicated in the table below:	
	IF the compression test is a...	THEN ...
	Apply and Release Test	Increase the force until the test machine achieves the Apply and Release test force value from the Compression Calculation section of Before You Begin Compression Testing. Then go to Step 5.
	Apply and Hold Test	Increase the force until the test machine achieves the Apply and Hold test force value from the Compression Calculation section of Before You Begin Compression Testing. Then go to Step 6.
5	Release the force. Go to Step 11.	
6	Maintain the force for one (1) hour, and then release the force. Go to Step 11.	
7	Place the packaged-product with face 3 resting on a smooth, flat, rigid surface. Place a pallet, as described in the Equipment Required Compression section, on top of the test item. Align the corners of the top pallet with the corners of the bottom pallet (center the top pallet on the test item).	
8	Place a rigid load spreader that is larger than the top pallet onto the top pallet.	
9	Add weight to the load spreader till the value from the Compression Calculation section of Before You Begin Compression Testing has been achieved and maintain for one (1) hour.	
10	Remove the weight, load spreader and pallet.	
11	Is the product damaged or the package degraded according to the Product Damage Tolerance and Package degradation Allowance?	
) If Yes, then the packaged-product has failed the test; go to the Reporting an ISTA Test section at the end of this Procedure.	
) If No, then go to TEST BLOCK 5 (Vibration).	

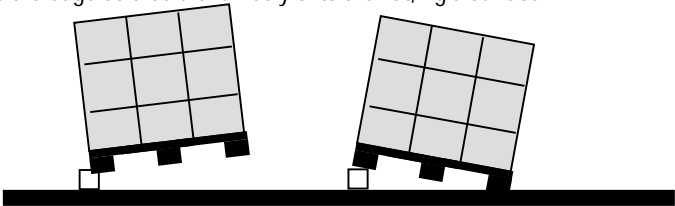
VIBRATION - RANDOM VIBRATION	
Step	Action
1	Put the packaged-product on the vibration table so that face 3 rests on the platform.
2	Start the vibration machine to produce the random vibration spectrum indicated in Before You Begin Vibration Testing.
3	Stop the vibration testing at the end of the test time determined by the Calculating Test Time section in Before You Begin Vibration Testing.
4	Vibration testing is now complete. Go to TEST BLOCK 6 (Shock – Rotational Edge Drop).

SHOCK - ROTATIONAL EDGE DROP

Complete this TEST BLOCK using the drop heights indicated:

Drop height 9 in (230 mm) for packaged-products weighing 500 lb (230 kg) or less,

Drop height 6 in (150 mm) for packaged-products weighing over 500 lb (230 kg)

Step	Action	
1	Perform a rotational edge drop. Follow the sequence in the table below.	
	Sequence #	Action
	1	Place the packaged-product on a flat, rigid surface such as steel or concrete with face 3 down.
	2	Support edge 3-5 with a timber or support 3.5 to 4.0 in (90 to 100 mm) in height and width.
	3	Lift the opposite edge (3-6) to the prescribed drop height as indicated at the beginning of this Test Block.
4	Release the edge so that it falls freely onto the flat, rigid surface.	
		
2	Does the Unit Load have a length equal to or greater than twice the width and a center of gravity above the midpoint of the height? <input type="checkbox"/> If Yes, then go to Step 4. <input type="checkbox"/> If No, then continue with the next step.	
3	Repeat Step 1 on one of the face 3 edges radiating 90° from the edge just tested in Step 1 Sequence 4. Then go to Step 5.	
4	Repeat Step 1 on the face 3 edge opposite the edge just tested in Step 1 Sequence 4. Then go to the next Step.	
5	All testing is now complete. Go to the Reporting an ISTA Test section at the end of this Procedure.	

ISTA Test Report Forms may be downloaded by members through the online ISTA Member Center (www.ista.org/members/). Custom forms are also acceptable, but information on an official ISTA Report Form is considered to be the minimum required for any test report submission and consideration. Test report forms should be submitted to ISTA Headquarters by mail, fax or electronically. Test reports should be detailed enough for accurate repeatability of the test.

The packaged-product has satisfactorily passed the test if, upon examination, it meets the Product Damage Tolerance and Package Degradation Allowance determined prior to testing.

ISTA Certified Testing Laboratories:

-) Should file a test report on all ISTA Test Procedures or Projects conducted.
-) Shall file a test report on all ISTA Test Procedures or Projects conducted to obtain Transit Tested Package Certification or Acknowledgement.

To submit a test report form:

-) Email to ista@ista.org
-) Mail to address shown below
-) Fax to +1 517-333-3813.

ISTA Transit Tested Program: Packaged-Product Certification

The ISTA Transit Tested Certification Mark as shown:

-) is a registered certification mark and
-) can only be printed on certified packages and
-) can only be used by license agreement and
-) by a Shipper member of the International Safe Transit Association.



When a Shipper member prints this certification mark on a packaged-product, with their manufacturer's license number, they are showing their customer, vendors and carriers that it has passed the requirements of ISTA preshipment testing.

To obtain initial certification of a packaged-product:

-) the product manufacturer must be a Shipper member of ISTA in good-standing and with a valid License Agreement on file
-) the testing laboratory must be a member of ISTA in good-standing and have a valid lab certification date
-) a test report must be submitted by the laboratory to ISTA Headquarters.

In order to maintain its certified status and eligibility for identification with the Transit Tested Certification Mark, each packaged-product must be re-tested whenever a change is made in the:

-) Product or
-) Process or
-) Package.

If corrugated packaging is used, it is recommended that the basis weights of the constituent papers/paperboards be determined after testing and documented to provide the best indicator of equivalence or change.

As a quality control procedure, packaged-products should be re-tested frequently, for example, yearly.

For additional information, refer to Guidelines for Selecting and Using ISTA Test Procedures and Projects.

ISTA Membership information is available at www.ista.org.

This Test Procedure is published by:

International Safe Transit Association
1400 Abbot Road, Suite 160, East Lansing, Michigan 48823-1900 USA

© 2017 International Safe Transit Association

No part of the contents of this Test Procedure may be reproduced or transmitted in any form or by any means without the written permission of the publisher.

Order Information: Additional copies of this Test Procedure and the ISTA® RESOURCE BOOK may be ordered online at www.ista.org or by contacting ISTA at (+1) 517.333.3437. A listing of current procedure version dates is available at www.ista.org.