

ISTA 2 Series
Partial
Simulation
Performance
Test
Procedure

VERSION
DATE
Last
TECHNICAL
Change:
JANUARY
2011

Last
EDITORIAL
Change:
JANUARY
2012

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

Preface

ISTA, Distributing Confidence, Worldwide™

ISTA 2 Series tests are a combination of basic test elements from ISTA 1 Series (Non-Simulation Integrity Performance Testing) and advanced test elements from ISTA 3 Series (General Simulation Performance Testing).

- They challenge the capability of the package and product to withstand transport hazards, **but**
- They only simulate some actual transport hazards, **and**
- They do not necessarily comply with carrier packaging regulations.

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

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

There are three sections: Overview, Testing and Report

- **Overview** provides the general knowledge required before going into the testing laboratory **and**
- **Testing** presents the specific instructions to do the testing in the laboratory **and**
- **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.

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

VERY IMPORTANT:

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

OVERVIEW OF PROCEDURE 2C

Test Procedure 2C is a partial simulation test for individual packaged furniture products (Case Goods). Although the traditional furniture definition of case goods is for hard goods and not upholstered furniture, it can be used for any furniture transported in a container.

- It can be used to evaluate the performance of a packaged-product.
- It can be used to compare relative performance of package and product design alternatives.
- It should be considered for the evaluation of packaged-products intended for international distribution.
- 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 may be appropriate for different conditions or to meet different objectives.

Specific suggestions:

- Consider ISTA General Simulation Performance Test Procedure 3A or 3E.

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

Scope

Test Procedure 2C covers testing of individual packaged-products of furniture (Case Goods) for shipment.

Product Damage
Tolerance and
Package
Degradation
Allowance

The shipper shall determine the following prior to testing:

- 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 this determination process refer to *Guidelines for Selecting and Using ISTA Procedures and Projects*.

Samples

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 is required for the tests in this procedure.

Replicate Testing Recommended:

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

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

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:

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

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	Vibration	Random Under Dynamic Load	Calculated Top Load differs for Distribution Channel, package size and configuration. Random vibration spectrum differs for Distribution Channel.	Required
4	Shock (Alternative methods allowed – select one test type)	Drop	Height varies with packaged-product weight and Distribution Channel	Required
		Exception One and Two Incline-Impact (Conbur)	Impact Velocity varies with packaged-product weight	
		Horizontal Impact	Impact Velocity varies with packaged-product weight	

Equipment
Required
Atmospheric
Conditioning

Atmospheric Preconditioning:

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

Equipment required for **Optional** Atmospheric Conditioning

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

Equipment
Required
Vibration
Under
Dynamic Load

Vibration Under Dynamic Load Test:

- Random Vibration Test System complying with the apparatus section of ASTM D 4728.
- Top-Load apparatus of one, two or four separate loading systems

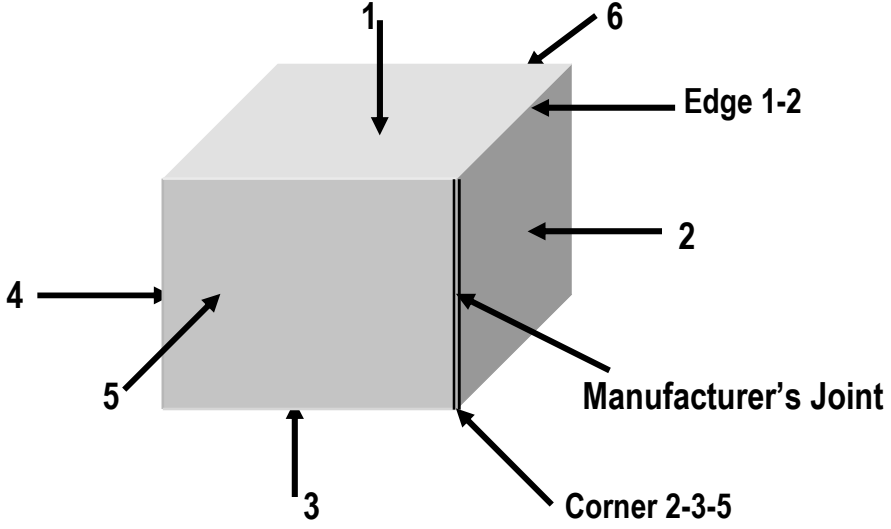
Equipment
Required
Shock

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

Type of Shock Test	Equipment	In compliance with the apparatus section of:
Drop Test	Free fall drop tester	ASTM D 5276
Vertical Shock Test	Shock test machine	ASTM D 5487
Incline Test	Incline-impact tester (conbur)	ASTM D 880
Horizontal Test	Horizontal impact test system	ASTM D 4003
Rotational Edge Test	Rotational drop	ASTM D 6179

BEFORE YOU BEGIN PROCEDURE 2C

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

Step	Action
1	Place the packaged-product in its intended shipping position as determined by shipper. If the shipping position can be variable, place the packaged-product so that the primary shipping label location is on the top face.
2	Does the packaged-product have only six faces (2 sides, 2 ends, top and bottom)? <ul style="list-style-type: none"> If Yes, then go to Step 5. If No, continue to next Step.
3	Develop a method to identify each face, edge and corner and document with a diagram.
4	Go to next page for further Before You Begin details.
5	Is the package a corrugated container? <ul style="list-style-type: none"> If Yes, continue to next Step. If No, then go to Step 8.
6	Does the package have a manufacturer's joint connecting a side and an end face? <ul style="list-style-type: none"> If Yes, continue to next Step. If No, then go to Step 8.
7	Turn the packaged-product so that you are looking directly at a face with the manufacturer's joint on the observer's right and go to Step 9.
8	Position one of the smallest width faces of the packaged-product directly in front of you.
9	<p>Identify faces according to the diagram below.</p> 
10	Identify edges using the numbers of the two faces forming that edge. Example: Edge 1-2 is the edge formed by face 1 and face 2 of the packaged-product.
11	Identify corners using the numbers of the three faces that meet to form that corner. Example: Corner 2-3-5 is the corner formed by face 2, face 3, and face 5 of the packaged-product.
12	Go to next page for further Before You Begin details.

Packaged-
Product
Weight and
Size
Measurement

You shall know the packaged-product's:

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

Before You
Begin
Test Levels

TEST LEVELS VARY

There are different hazard levels for case good furniture packages associated with various channels of distribution. **You shall select a level of testing from one of the following three levels and follow that level throughout the entire test:**

- **LEVEL ONE** for product-packages shipped via small parcel delivery systems.
- **LEVEL TWO** for product-packages shipped via general commodity motor carrier.
- **LEVEL THREE** for product-packages shipped via specialized furniture carrier.

NOTE:

Level One shall be used if the channels of distribution are not known. If more than one channel is possible, the lowest level number of those possible channels shall be used.

Before You
Begin
Atmospheric
Conditioning

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:

- **Requires** the highest temperature and humidity limits of the product be used, **but**
- **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.

- Remaining test requirements should be performed as soon as possible after removing the packaged-product from environmental conditioning apparatus.
- 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 ±2°C (°F ±4°F)	Humidity in %
Extreme Cold, Uncontrolled RH	72	-29°C (-20°F)	uncontrolled RH
Cold, Humid	72	5°C (40°F)	85% RH ±5%
Controlled Conditions	72	23°C (73°F)	50% RH ±5%
Hot, Humid	72	38°C (100°F)	85% RH ±5%
Hot, Humid then Extreme Heat, Moderate RH:	72 then 6	38°C (100°F) then 60°C (140°F)	85% RH ±5% then 30% RH ±5%
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:

When using a Top-Load apparatus use extreme care to prevent injury.

CAUTION:

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

- prevent the Top-Load from moving off the package being tested **and**
- prevent the test specimen from moving off the platform **and**
- maintain test orientation of the stack, **but**
- the device or devices shall not restrict the vertical motion of the test specimen during the test.

The packaged-product is tested

- in all three axes
- with a top-load calculated for each axis
- for 20 minutes in each axis

Exceptions to Vibration Under Dynamic Load:

You do not conduct a compression/vibration test, but run a vibration test as detailed in the compression/vibration test without any concentrated dead load, **if**:

- the packaged-product is 72 in (1.8 m) or taller in height **and**
- has a definite, outside of the package, skid or pallet

You test in only one axis for 60 minutes if:

- the packaged-product is 60 in (1.5 m) or taller in height **or**
- for any height packaged-product that has definite orientation markings **or**
- the packaged-product is on a visible skid or pallet

NOTE:

This vibration under dynamic load test requirement is:

- a performance test, **but not**
- a predictor of warehouse stacking capability.

Top-Load

Test Level...	Top-Load simulates assorted freight on top of a floor loaded shipping unit in a 108-in (2.7 m) trailer at....
Level One	12 lb/ft ³ (190 kg/m ³)
Level Two	10 lb/ft ³ (160 kg/m ³)
Level Three	8 lb/ft ³ (130 kg/m ³)

The Top-Load apparatus container(s) shall be

- Larger than the test specimen, **but**
- Shall not overhang the specimen by more than 1.5 in (40 mm) **and**
- Shall distribute the calculated Top-Load (TL) evenly over the test specimen.

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To determine if more than one Top-Load apparatus is required, follow the instructions below:

If the packaged-product top surface exceeds 18 in (500 mm) in...	Then there shall be...
only one dimension	two Top-Load apparatus of equal sizes and weights along the long edge
both dimensions	four Top-Load apparatus of equal sizes and weights

- One possible system would be container(s) with the following specifications:
 - RSC – style corrugated container **and**
 - 33 lb/Msf (160 g/sqm) minimum basis weight corrugated facings **and**
 - 0.5 in (13 mm) minimum thickness plywood pieces covering the entire area of the bottom inside flaps of the container, **and**
 - Plastic bags of sand.

Familiarity with the following formulas is required:

Using the Test Level determined in the Test Level Selection Block and the packaged-product size and weight from the Packaged-Product Weight and Size Measurement Block calculate a Top-Load with the appropriate formula from the table below.

If the packaged-product is...	Then use the Top Load Formula corresponding to Test Level		
Small and Light : • 2 ft ³ (0.06 m ³) or less in size and • less than 30 lb (14 kg) in weight	TpLd	English Units (Pounds)	Metric Units (Kilograms)
	TpLd1=	0.007 x (108 - H) x L x W	190 x (2.7 - H) x L x W
	TpLd2=	0.006 x (54 - H) x L x W	160 x (1.4 - H) x L x W
	TpLd3=	0.005 x (54 - H) x L x W	130 x (1.4 - H) x L x W
Large or Heavy packaged-products: • Greater than 2 ft ³ (0.06 m ³) in size or • 30 lb (14 kg) or more in weight	TpLd	English Units (Pounds)	Metric Units (Kilograms)
	TpLd1=	0.007 x (108 - H) x L x W	190 x (2.7 - H) x L x W
	TpLd2=	0.006 x (108 - H) x L x W	160 x (2.7 - H) x L x W
	TpLd3=	0.005 x (108 - H) x L x W	130 x (2.7 - H) x L x W

Where			
TpLd	Top-Load	Pounds (lb)	Kilograms (kg)
Level 1	Average density of freight	0.007 lb/in ³	190 kg/m ³
Level 2	Average density of freight	0.006 lb/in ³	160 kg/m ³
Level 3	Average density of freight	0.005 lb/in ³	130 kg/m ³
Half Height	Height stacked above shipping unit	54 in	1.4 m
Full Height	Height stacked above shipping unit	108 in	2.7 m
H	Height of shipping unit	Inches	Meters
L	Length of shipping unit	Inches	Meters
W	Width of shipping unit	Inches	Meters

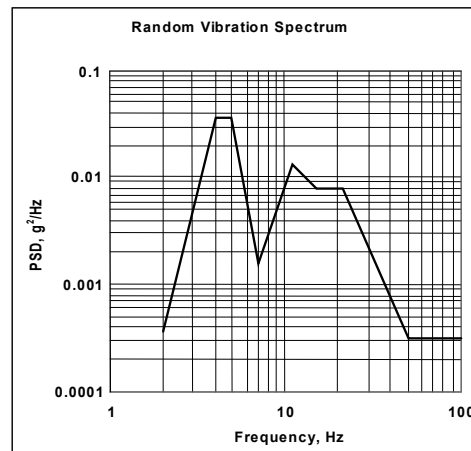
Maximum TL for a package in the face 3 down orientation:	English Units	Metric Units
60 in (1.5 m) or less in height	400 lb	180kg
over 60 in (1.5 m) in height	120 lb	55 kg
Maximum TL for a package in the face 4 down orientation:	120 lb	55 kg
Maximum TL for a package in the face 6 down orientation:	120 lb	55 kg

BEFORE YOU BEGIN PROCEDURE 2C

For LEVEL ONE Random Vibration:

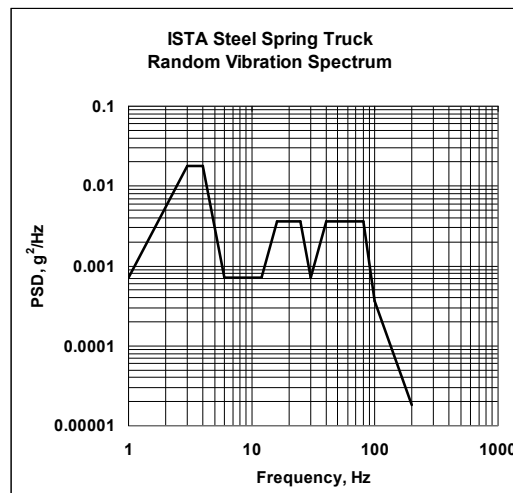
The following breakpoints shall be programmed into the vibration controller to produce the acceleration versus frequency profile (spectrum) below with an overall G_{rms} level of 0.51. The theoretical stroke required to run this vibration profile is 24.13 mm (0.950 in) peak to peak.

Frequency (Hz)	PSD Level, g^2/Hz
2	0.00036
4	0.036
5	0.036
7	0.0016
11	0.013224
15	0.008004
21	0.008004
50	0.00032
100	0.00032

**For LEVEL TWO Random Vibration:**

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 45.13 mm (1.777 in) peak to peak.

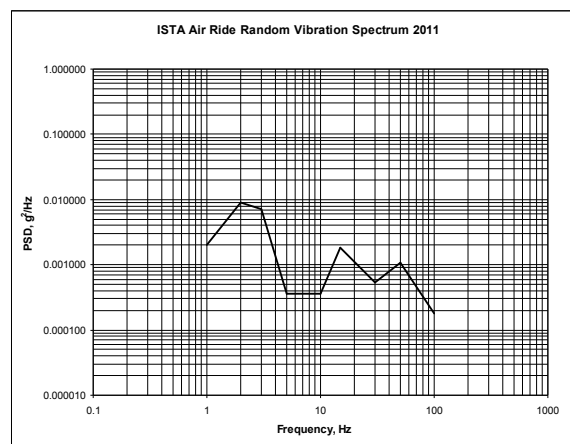
Frequency (Hz)	PSD Level, g^2/Hz
1.0	0.00072
3.0	0.018
4.0	0.018
6.0	0.00072
12.0	0.00072
16.0	0.0036
25.0	0.0036
30.0	0.00072
40.0	0.0036
80.0	0.0036
100.0	0.00036
200.0	0.000018

**For LEVEL THREE Air-Ride Truck Random Vibration:****NOTE:**

This Level assumes your carrier uses Air-Ride trucks, if this is incorrect use the Level Two Random Vibration.

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 0.28. The theoretical stroke required to run this vibration profile is 54 mm (2.14 in) peak to peak.

Frequency (Hz)	PSD Level, g^2/Hz
1.0	0.0009
2.0	0.009
3.0	0.0072
5.0	0.00036
10.0	0.00036
15.0	0.0018
30.0	0.00054
50.0	0.00108
100.0	0.00018



BEFORE YOU BEGIN PROCEDURE 2C

Shock testing is conducted using a drop tester unless the package-product qualifies for either EXCEPTION ONE or EXCEPTION TWO.

The height of the drop test varies for packaged-products that weigh:

- less than (<) 50 lb (23 kg),
- 50 lb (23 kg) to 100 lb (45 kg) and
- greater than (>) 100 lb (45 kg).

According to the selected Test Level, find the appropriate drop height from the following chart.

Drop Chart		Drop Heights					
Packaged-Product Weight		Level One		Level Two		Level Three	
lb	kg	in	mm	in	mm	in	mm
< 50	< 23	30	760	24	610	18	460
50-100	23-45	20	510	16	410	12	310
> 100	> 45	12	310	10	250	8	200

EXCEPTION ONE for Shock Testing - Individual packaged-products with a:

- Package configuration that makes dropping impractical **and**
- Mass of 100 lb (45 kg) or more **or**
- Height over 60 in (1.5 m) **or**
- Total dimensions (L + W + H) more than 108 in (2.7 m).

If EXCEPTION ONE for Shock Testing is applicable, use the following chart to determine the appropriate impact velocity for an incline or horizontal test according to packaged-product weight:

EXCEPTION ONE FOR SHOCK TESTING		Impact Velocity					
Packaged-Product Weight		Level One		Level Two		Level Three	
lb	kg	ft/s	m/s	ft/s	m/s	ft/s	m/s
< 50 lb	< 23	13	3.9	11	3.5	10	3.0
50-100	23-45	10	3.2	9.3	2.8	8.0	2.5
> 100	> 45	8.0	2.5	7.3	2.2	6.6	2.0

EXCEPTION TWO for Shock Testing - Individual packaged-products with a:

- Definite skid bottom on which the unit is intended to be shipped **and**
- With Markings that sufficiently identify the bottom **and**
- Mass of 150 lb (68 kg) or more **or**
- Height over 60 in (1.5 m) **or**
- With the total dimensions (L + W + H) more than 130 in (3.3 m).

If EXCEPTION TWO for Shock Testing is applicable, 42 in per second (1.1 m per second) is the impact velocity used for the Incline or Horizontal Test Method.

TEST SEQUENCE FOR PROCEDURE 2C

SHOCK TEST DETERMINATION (DETERMINE TEST BLOCKS TO BE USED)		
Step	Action	
1	Determine if shock testing is going to be by drop test or impact test according to the Before You Begin Shock Testing.	
	IF testing is going to be by ...	THEN the Shock TEST BLOCK to use will be...
	Drop Test	TEST BLOCK 3 (Shock– Drop).
	EXCEPTION ONE for Shock Testing:	TEST BLOCK 4 (Shock– Impact).
	EXCEPTION TWO for Shock Testing:	TEST BLOCK 5 (Shock– Impact) and TEST BLOCK 6 (Shock– Rotational Edge Drop).

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

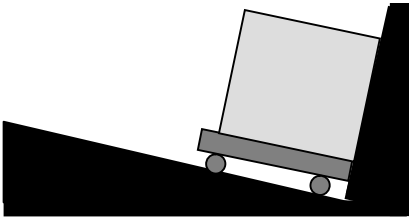
TEMPERATURE AND HUMIDITY	
Step	Action
1	The packaged-product should be stored at laboratory ambient temperature and humidity for twelve (12) hours.
2	Is optional conditioning going to be performed? <ul style="list-style-type: none"> • If Yes, go to Step 6. • If No, go to the next Step.
3	Record the ambient laboratory temperature and humidity when testing starts.
4	At the end of all testing record temperature and humidity.
5	Go to TEST BLOCK 2 (Vibration Under Dynamic Load).
6	Select an anticipated condition from Before You Begin Atmospheric Conditioning.
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 period remove the packaged-product from the conditioning apparatus.
10	Atmospheric conditioning is complete. Go to TEST BLOCK 2 (Vibration Under Dynamic Load).and perform the remaining test sequence as quickly as possible.

TEST BLOCK 2
Vibration
Under
Dynamic Load

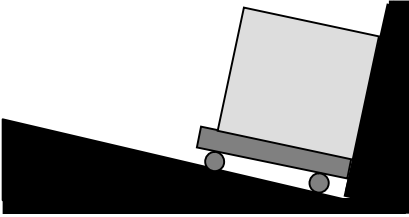
VIBRATION - DYNAMIC LOAD AND RANDOM			
Step	Action	TESTING ORIENTATION	VIBRATION DURATION
1	Put the packaged-product on the vibration table so that face 3 rests on the platform.	FACE 3 on table surface	60 MINUTES or 20 MINUTES (Determined in Step 4)
2	Using some form of column stack fixturing, stack the Top-Load(s) determined from Before You Begin Vibration Under Dynamic Load on top of the test specimen.		
3	Start the vibration machine to produce the random vibration spectrum indicated in the Before You Begin Vibration Under Dynamic Load.		
4	Does the packaged-product have definitive orientation markings or Is the packaged-product 60 ins (1.5 m) or greater in height or is the packaged-product on a visible skid or pallet? <ul style="list-style-type: none">• If Yes, then continue with the next Step.• If No, then go to Step 7.		
5	After the completion of 60 minutes, stop the vibration testing and remove the Top-Load(s).		
6	Remove the packaged-product from the vibration table and go to Step 16.		
7	After the completion of 20 minutes, stop the vibration testing and remove the Top-Load(s).		
8	Turn the packaged-product so that either face 2 or 4 is in the down orientation in the center of the vibration table.	FACE 2 or FACE 4 on table surface	20 MINUTES
9	Using some form of column stack fixturing, stack the Top-Load(s) determined from Before You Begin Vibration Under Dynamic Load Testing on top of the test specimen.		
10	Start the vibration machine to produce the random vibration spectrum indicated in Before You Begin Vibration Under Dynamic Load.		
11	After the completion of 20 minutes, stop the vibration testing and remove the Top-Load(s).		
12	Turn the packaged-product so that either face 5 or 6 is in the down orientation in the center of the vibration table.	FACE 5 or FACE 6 on table surface	20 MINUTES
13	Using some form of column stack fixturing, stack the Top-Load(s) determined from Before You Begin Vibration Under Dynamic Load Testing on top of the test specimen.		
14	Start the vibration machine to produce the random vibration spectrum indicated in the Before You Begin Block.		
15	After the completion of 20 minutes, stop the vibration testing and remove the Top-Load(s).		
16	Vibration Under Dynamic Load testing is now complete. Go to TEST BLOCK 3 (Shock - Drop) or TEST BLOCK 4 (Shock - Impact) or TEST BLOCK 5 (Shock - Impact).		


TEST SEQUENCE FOR PROCEDURE 2C

SHOCK - DROP (FOR PACKAGED-PRODUCTS NOT QUALIFYING FOR EXCEPTIONS ONE OR TWO)			
Step	Action		
1	Test the packaged-product according to the level determined in the Drop Chart in Before You Begin Shock Testing. Follow the sequence in the table below.		
	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 longest 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
2	All testing is now complete. Go to the Reporting an ISTA Test section at the end of this Procedure.		

SHOCK - IMPACT (FOR PACKAGED-PRODUCTS QUALIFYING FOR EXCEPTION ONE ONLY)			
Step	Action		
1	Center the packaged-product on the carriage with the vertical face of the packaged-product flat against the backstop or sail and parallel to the leading edge of the carriage.		
			
2	Test the packaged-product according to the level determined in the EXCEPTION ONE for Shock Testing Chart in Before You Begin Shock Testing. Follow the sequence in the table below.		
	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 longest 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
3	All testing is now complete. Go to the Reporting an ISTA Test section at the end of this Procedure.		

TEST SEQUENCE FOR PROCEDURE 2C

SHOCK - IMPACT (FOR PACKAGED-PRODUCTS QUALIFYING FOR EXCEPTION TWO ONLY)			
Step	Action		
1	Center the packaged-product on the carriage with the vertical face of the packaged-product flat against the backstop or sail and parallel to the leading edge of the carriage. 		
2	Test the packaged-product according to the level determined in the EXCEPTION TWO for Shock Testing chart in Before You Begin Shock Testing. 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
3	Impact testing is now complete. Go to TEST BLOCK 6 (Shock - Rotational Edge Drop).		

SHOCK - ROTATIONAL EDGE DROP (FOR PACKAGED-PRODUCTS QUALIFYING FOR EXCEPTION TWO ONLY)			
Step	Action		
1	Determine the drop height and support size according to the test level in the table below:		
	IF the Test Level is...	Then the drop height is...	The support size is ...
	Level One	8 in (200 mm)	7.5 to 8.0 in (180 to 200 mm)
	Level Two	8 in (200 mm)	3.5 to 4.0 in (90 to 100 mm)
	Level Three	4 in (100 mm)	3.5 to 4.0 in (90 to 100 mm)
2	Place the package with face 3 down onto a flat, rigid surface such as steel or concrete		
3	Test the packaged-product using a support and drop height determined in Step 1 by supporting one edge and dropping the opposite edge so that it falls freely onto the flat, rigid surface. 		
4	Follow the sequence in the table below.		
5	Edge Supported	Edge Dropped	
	3-4	2-3	
	2-3	3-4	
	3-6	3-5	
	3-5	3-6	
6	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.

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