



ISTA, Your Alliance in Transport Packaging is the world leader in Performance Tests for Packaged-Products.

ISTA 3 Series tests are advanced tests and are designed to:

- 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 reduced
- Confidence in product launch
- Reduction in damages and product loss
- Balanced distribution costs
- Customer satisfaction contributing to increased market share

There are three sections: Overview, Testing and Report

- Overview provides general knowledge required before testing and
- Testing presents the specific instructions to do laboratory testing 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: SI (Metric) or English system (Inch-Pound). Metric units are shown first followed by the Inch-Pound units in parentheses; there are exceptions in some tables (when showed separately).

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

For measuring	Metric units and symbols	English units and symbols
Weight	kilograms (kg) or grams (gm)	pounds (lb)
Distance	meters (m) or millimeters (mm)	feet (ft) or inches (in.)
Volume	Cubic centimeters (cm ³)	Cubic inches (in ³)
Density	kilograms per cubic meter (kg/m ³)	pounds per cubic inch (lb/in ³)
Temperature	Centigrade (°C)	Fahrenheit (°F)
Absolute Pressure	Kilopascal (kPa)	Pounds per square inch (psi)

- 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.

NOTE:

In other ISTA Test Procedures 68 kilograms is used as the conversion from 150 pounds. In 3A, 70 kilograms and 150 pounds are used because it's a common dividing point found in parcel delivery systems from countries that use either metric (SI) or English (inch-pounds) units of measure.

VERY IMPORTANT:

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

OVERVIEW OF PROCEDURE 3A

Test Procedure 3A is a general simulation test for individual packaged-products shipped through a parcel delivery system. The test is appropriate for four different types of packages commonly distributed as individual packages, either by air or ground. The types include standard, small, flat and elongated packages. 3A includes an optional combination of Vibration and Vacuum (high altitude's lowered air pressure) test. It tests the container's (whether primary package or transport package) ability to hold a seal or closure and the retention of contents (liquid, powder or gas) without leaking.

Standard packaged-products shall be defined as any packaged-product that does not meet any of the following definitions for small, flat or elongated packaged-product:

Small packaged-products shall be defined as any packaged-product where the:

- volume is less than 13,000 cm³ (800 in.³), and
- longest dimension is 350 mm (14 inches) or less and
- weight is 4.5 kg (10 lb) or less.

Flat packaged-products shall be defined as any packaged-product where the:

- shortest dimension is 200 mm (8 inches) or less and
- next shortest dimension is four (4) or more times larger than the shortest dimension, and
- volume is 13,000 cm³ (800 in.³) or greater.

Elongated packaged-products shall be defined as any packaged-product where the:

- longest dimension is 900 mm (36 inches) or greater and
- both of the package's other dimensions are each 20 percent or less of that of the longest dimension.

Note:

If a packaged-product is both Flat and Elongated, the package should be tested as Elongated

- 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 a parcel delivery system.
- Test levels are based on general data and may not represent any specific distribution system.
- 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.

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

NOTE:

Hazardous material packaging that pass this test procedure may not meet international, national or other regulatory requirements for the transport of hazardous materials. This test is not a substitute for United Nations and/or any other required test standards for the transport of hazardous materials, but should be used as additional test in conjunction with them.

Scope

Test Procedure 3A covers testing of individual packaged-products weighing 70 kilograms (150 pounds) or less when prepared for shipment via a parcel delivery carrier.

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

One sample is required for this test procedure

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:

In order to ensure testing in perfect condition, product and packages shipped to an ISTA laboratory for testing shall be:

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

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

3A - Standard Packaged-Product Test

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	Drop Individual Package	9 Drops - Height varies with packaged-product weight	Required
4	Vibration	Random With and without Top Load	Overall G_{rms} levels of .53 and 0.46.	Required
5	Vibration	Random under a Vacuum	Truck or Truck & Air Dependent	Optional
6	Shock	Drop Individual Package	8 Drops-Height varies with packaged-product weight. Includes drop on hazard	Required

3A – Small Packaged-Product Test

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	Drop Individual Package	9 Drops - Height varies with packaged-product weight	Required
4	Vibration	Random With and without Top Load	Overall G_{rms} level of .53	Required
5	Vibration	Random under a Vacuum	Truck or Truck & Air Dependent	Optional
6	Shock	Drop In a Bag	7 Drops –Height varies with packaged-product weight	Required

OVERVIEW OF PROCEDURE 3A

3A – Flat Packaged-Product Test

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	Drop Individual Package	9 Drops - Height varies with packaged-product weight	Required
4	Vibration	Random With and without Top Load	Overall G_{rms} levels of 0.53 and 0.46.	Required
5	Vibration	Random under a Vacuum	Truck or Truck & Air Dependent	Optional
6	Shock	Rotational Edge Drop	200 mm (8 in.)	Required
7	Shock	Full Rotational Flat Drop	Varies with packaged-product dimensions	Required
8	Shock	Hazard Impact	Hazard Box dropped 400 mm (16 in.)	Required

3A – Elongated Packaged-Product Test

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	Drop Individual Package	9 Drops - Height varies with packaged-product weight	Required
4	Vibration	Random With and without Top Load	Overall G_{rms} levels of 0.53 and 0.46.	Required
5	Vibration	Random under a Vacuum	Truck or Truck & Air Dependent	Optional
6	Shock	Rotational Edge Drop	200 mm (8 in.)	Required
7	Shock	Full Rotational Flat Drop	Varies with packaged-product dimensions	Required
8	Shock	Bridge Impact	Hazard Box dropped 400 mm (16 in.)	Required

Equipment
Required
Atmospheric

Atmospheric Conditioning:

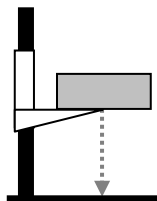
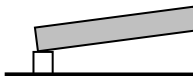
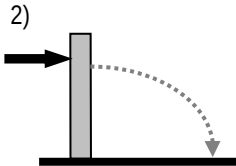
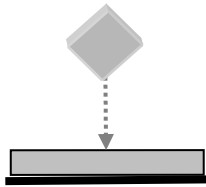
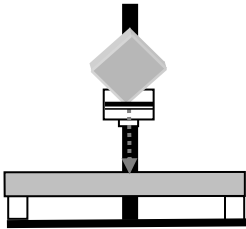
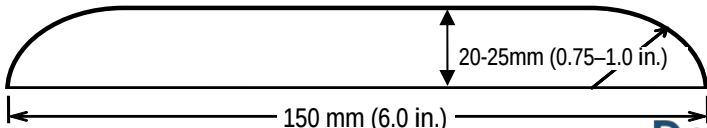
- Humidity recorder complying with of the apparatus section of ISO 2233-00 or ASTM D 4332-00(-01).
- Temperature recorder complying with the apparatus section of ISO 2233-00 or ASTM D 4332-00(-01).

Optional Atmospheric Conditioning

- Chamber and Control apparatus complying with the apparatus section of ISO 2233-00 or ASTM D 4332-00(-01).

Equipment
Required
Shock

Shock Tests:

	All Protocols	Flat and Elongated	Flat	Elongated
Type of Shock Test	Drop Test	Rotational Edge Drop Test Full Rotational Test	Hazard Impact Test	Bridge Impact Test
Type of Equipment	Free-fall drop tester 	1) Support Block  2) 	Hand Drop with Hazard Box 	Free-fall Drop Tester with Hazard Box 
In compliance with the apparatus section of...	ISO 2248-85 or ASTM D 5276-98	ISO 2876-85 or ASTM D 6179-97		ASTM D 5265-98 With the exception of the Hazard Box (Impactor) See below
Additional Required Equipment	Hazard block: 25 mm in height 150 mm in width (1 in. x 6 in.) and at least 200 mm (8 in.) longer than the second shortest package dimension.	Support block: 90 to 100 mm (3.5 to 4.0 in) in height and width and at least 200 mm (8 in) longer than the shortest dimension of face 3.	Hazard box 300 x 300 x 300 mm (12 x 12 x 12 in.) dense wooden box with a total weight of 4.1 kg (9 lb) The box shall have least one bottom edge covered by angle iron. The box should be filled with a sand bag and void fill to hold the bag in place.	
				Support blocks (2) 90 to 100 mm (3.5 to 4.0 in) in height and width and at least 200 mm (8 in) longer than the shortest dimension of face 3.
	Hazard block: The block shall be made of hardwood or metal. The height shall be 20 to 25 mm (0.75 to 1.0 in.) and the width 150 mm (6.0 in.). The length shall be at least 200 mm (8.0 in.) longer than the second shortest package dimension of the length, width and height. The long top edges of the block shall be rounded to a radius equal to the height of the block $\pm 0.02\text{mm}$ (0.0625 in). 			

Equipment
Required
Vibration

Random Vibration Test:

- Random Vibration Test System complying with the apparatus section of ISO 13355-01 or ASTM D 4728-95(-01).
- Some form of column stack fixturing
- Top-Load RSC corrugated package
- Plastic bags
- Sand

Optional Random Vibration under Vacuum:

- Vacuum Chamber: complying with the apparatus section of ISO 2873-00 or ASTM D6653-01; able to fit on the vibration table; able to draw down the internal absolute pressure to 60 kPa (8.7 psi) for the truck and air test, or 70 kPa (10 psi) for the truck-only test; and able to withstand the air and/or truck random vibration input.

Equipment
Required
Additional

3A - Small

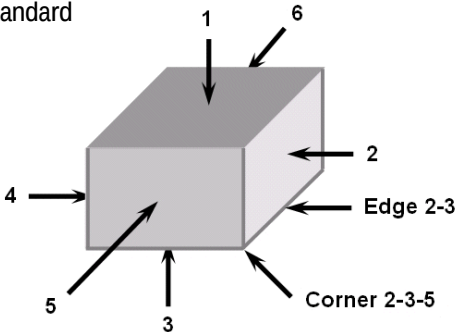
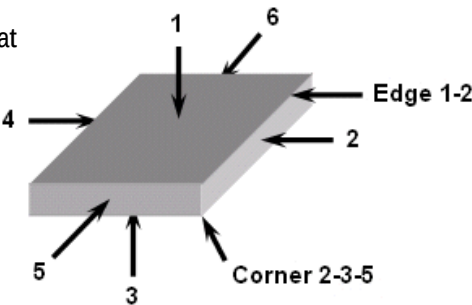
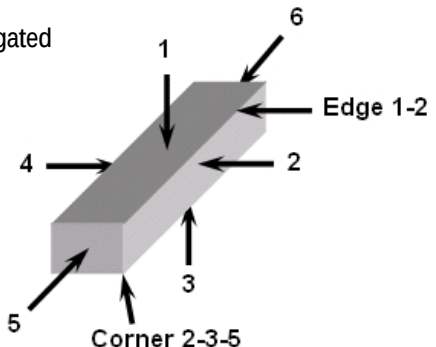
- Two United States Postal Service #1 Mailbags or equivalent [approximately 1.0 x 0.7 meters (39 x 27 inches)] are used throughout the testing sequence.
 - One bag is filled with 36 kilograms (80 pounds) of sand suitably packaged in smaller bags.
 - One bag is the Sample Bag to be filled with the Test Specimen and dunnage packages, to simulate a typical pack.
- Three over-night style envelopes, 1 #5 padded mailer and 1 #6 fiberboard mailer.
- Corrugated fiberboard containers as described in the table below are to be constructed of C-flute board with any of the following minimum values:
 - Burst Test: 1380 kPa or 14 kg/cm² or 200 lb/in² or
 - ECT Value: 7.0 kN/m width or 40 lb/in. width.
- RSC style boxes shall be used for any dunnage package 125 mm (5 in.) or more in height and
- Book-wrap or telescoping tray style may be used for any dunnage package less than 125 mm (5 in.) in height.
- Fill each envelop, mailer and corrugated container as indicated in the table below. Corrugated boxes and book wraps are filled until the desired weight is achieved.
 - It is allowable to substitute dunnage packages with Test Specimen packages or envelopes. The dunnage package that most closely represents the Test Specimen shall be substituted.

The following describes the numbers and sizes of each dunnage package:

Quantity	Package Type	Approximate Size L x W x H		Contents	Approximate Weight	
		Millimeters (mm)	Inches (in.)		Kilograms	Pounds
3	Over-night envelope			25 sheets of paper		
1	#5 Padded mailer			50 sheets of paper		
1	#6 Fiberboard mailer			50 sheets of paper		
1	Corrugated RSC or Book-wrap or Telescoping tray	200 x 125 x 50	8 x 5 x 2	Each corrugated package type and size shall be filled with foam, paper, sand, etc until the desired weight indicated in this table is achieved.	0.5	1.0
1		225 x 150 x 50	9 x 6 x 2		0.5	1.0
1		275 x 275 x 100	11 x 11 x 4		1.0	2.0
1		275 x 200 x 100	11 x 8 x 4		1.0	2.0
1		175 x 150 x 100	7 x 6 x 4		1.8	4.0
1		300 x 300 x 75	12 x 12 x 3		1.8	4.0
1	Corrugated RSC box	200 x 200 x 200	8 x 8 x 8		4.5	10.0
1		150 x 150 x 150	6 x 6 x 6		1.0	2.0
1		250 x 125 x 125	10 x 5 x 5		1.0	2.0

Identification of
Faces, Edges
and Corners

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

Step	Action	
1	Place the packaged-product so the package is in its most stable orientation.	
	IF the test specimen is ...	IF the test specimen is ...
	A Standard, Small, Flat or Elongated with only six faces (2 sides, 2 ends, top and bottom)	Turn the packaged-product so that one of the smallest side faces is directly in front of you. Now go to Step 2.
	A Standard, Small, Flat or Elongated with less than or more than six faces	Develop a method to identify each face, edge and corner and document with a diagram. Now go to the next Block.
	A filled #1 mail bag	Turn the filling end toward you and a side seam (if any) is on the right and downward (nearest the surface). A longitudinal seam (middle seam), if present should be downward and resting on the surface. Now go to Step 2.
	An express envelope or similar type mailer	Position the envelope or mailer so that it is lying flat and the opening is toward you. Now go to Step 3.
2	Standard	Filled #1 Mail Bag
		
	Flat	Elongated
		
Identify faces according to the diagrams. 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. 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. Identify orientation of the product inside the package as it rests on the vibration table.		
3	Mark the face that is up as 1. The right end is 2. The left end is 4 The opening of the envelope shall be 5 (top) The end opposite 5 (top) shall be 6 (bottom). Turn it over and mark the face opposite of face 1 as 3. Express Envelope or Mailer 	