



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

ISTA 3 Series tests are advanced tests.

- They challenge the capability of the package and product to withstand transport hazards, **but**
- They use general simulation of 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 3D

Preface

Test Procedure 3D is a general simulation test for small packaged-products that become unitized with other packaged-products in any type of transport bag by parcel delivery carriers.

- 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.
- The 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.

Specific suggestions:

- For packaged products larger in dimension than 12 x 12 x 3 inches (310 x 310 x 80 mm) and/or over 10 lbs. (4.5 kg) in weight use ISTA Test Procedure 3A and not 3D.
- Refer to *Guidelines for Selecting and Using ISTA Procedures and Projects* for additional information.

OVERVIEW OF PROCEDURE 3D

Scope

Test Procedure 3D covers testing of small individual packaged-products that when shipped via a parcel delivery service maybe bagged by the carrier.

Product Damage
Tolerance and
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	Shock	Drop	30 inches (760 mm)	Required
2	Vibration	Random	Overall G_{rms} level of 0.52	Required
3	Shock	Drop	30 inches (760 mm)	Required

EQUIPMENT REQUIRED FOR PROCEDURE 3D**Equipment
Required
Shock****Free Fall Drop Test:**

- Free Fall Drop Test System complying with of the apparatus section of ASTM D 5276-98.

**Equipment
Required
Vibration****Random Vibration Test:**

- Random Vibration Test System complying with the apparatus section of ASTM D 4728-01.

**Equipment
Required
Additional**

- Two United States Postal Service #1 Mailbags or equivalent [approximately 39 x 27 inches (1.0 x 0.7 meters)] used throughout the testing sequence.
 - One bag is filled with 200 pounds (90 kilograms) of sand suitably packaged in smaller bags.
 - Sample Bag to be filled with the Test Specimen and dunnage made of wood, high density poly-ethylene or similar density materials in the following numbers and sizes:
 - 24-cylindrical pieces approximately 6 inches (150 mm) in diameter and 3 inches (80 mm) high weighing approximately 0.5 pound (230 grams).
 - 8-Small rectangular blocks approximately 6 x 6 x 0.5 inches (150 x 150 x 13 mm) weighing approximately 1.5 pounds (680 grams).
 - 8-Large rectangular blocks approximately 11 x 5 x 1.5 inches (280 x 130 x 38 mm) weighing approximately 3.3 pounds (1.5 kilograms)

BEFORE YOU BEGIN PROCEDURE 3D

Identification of Faces

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

With the empty mailbag lying flat:

- Mark the face that is up as 1.
- Turn the bag over and mark the opposite face with 2.
- The bag opening shall be considered the top.
- The end opposite the top shall be considered the bottom.

Before You Begin Shock Testing

Fill a #1 mailbag with a mixture of products that represent the product mix to be evaluated plus the dunnage:

The drop height shall be 30 inches (760 mm) as measured from the lowest part of the bag, if over hanging the drop platen.

Before You Begin Vibration Testing

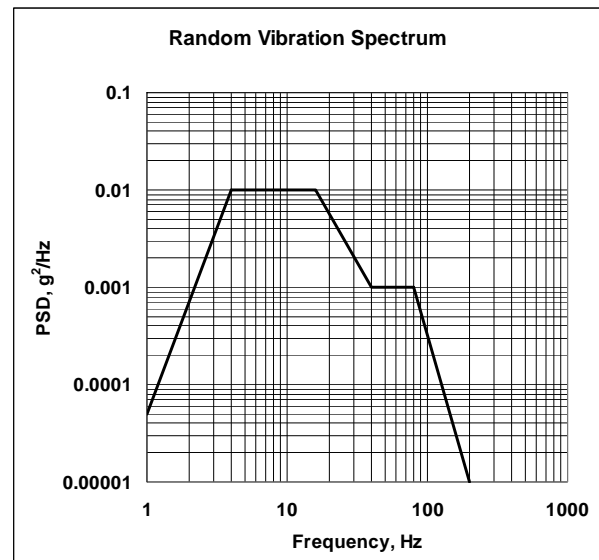
CAUTION:

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

- Prevent the test specimen from moving off the platform **and**
- Maintain test orientation of the packaged-product or stack, **but**
- The 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 0.52

Frequency (Hz)	PSD Level, g^2/Hz
1.0	0.00005
4.0	0.01
16.0	0.01
40.0	0.001
80.0	0.001
200.0	0.00001



TEST SEQUENCE FOR PROCEDURE 3D

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

First Shock Test Block

DROP		
Step	Action	
1	Test the packaged-product according to the level in the Before You Begin Block. Follow the sequence in the table below.	
	Drop #	Packaged-Product Orientation
	1	Bottom
	2	Face 1
	3	Face 2
	4	Bottom
	5	Face 1
	6	Face 2
2	Shock testing is now complete. Go to the Vibration Test Block.	

Vibration Test Block

RANDOM	
Step	Action
1	Place the specimen bag on the center of the vibration table with face 1 in the down orientation.
2	Start the vibration machine to produce the random vibration spectrum indicated in the Before You Begin Block.
3	Stop the vibration machine at the completion of 30 minutes.
4	Turn the bag over so that face 2 is in the down orientation.
5	Place another #1 mailbag filled with 200 pounds (90 kg) of sand on top of the test specimen.
6	Start the vibration machine to produce the random vibration spectrum in Step 2.
7	Stop the vibration testing at the end of 30 minutes.
8	Inspection of the packaged-product for visible damage is allowed, provided inspection does not alter, in any way, the current condition of the package or the condition or position of the product(s).
9	Vibration testing is now complete. Go to the Second Shock Test Block.

TEST SEQUENCE FOR PROCEDURE 3D

DROP		
Step	Action	
1	Test the packaged-product according to the level in the Before You Begin Block. Follow the sequence in the table below.	
	Drop #	Packaged-Product Orientation
	1	Bottom
	2	Face 1
	3	Face 2
	4	Bottom
	5	Face 1
	6	Face 2
2	All testing is now complete. Go to the Test Report Block.	

TEST REPORT FOR PROCEDURE 3D

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

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.

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

ISTA Transit Tested Program

The ISTA Transit Tested Certification Mark as shown is a:

- registered certification mark **and**
- can only be used by license agreement **and**
- by a member of the International Safe Transit Association.

When a member prints this certification mark on a packaged-product with their license number they are showing their customer and the carrier that it has passed the requirements of ISTA preshipment testing.



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.

Changes in the product include changes in:

- Design **or**
- Size **or**
- Materials.

Changes in the process include changes in:

- Manufacturing **or**
- Assembly **or**
- Filling.

Changes in the package include changes in:

- Configuration **or**
- Dimensions **or**
- Weight **or**
- Materials **or**
- Components.

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

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