

ISTA 2 Series  
Partial  
Simulation  
Performance  
Test  
Procedure

VERSION  
DATE  
Last

TECHNICAL  
Change:  
SEPTEMBER  
2006

Last  
EDITORIAL  
Change:  
JANUARY  
2012

For complete  
listing of  
Procedure  
Changes and  
Version Dates  
go to  
[www.ista.org](http://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 2D

Test Procedure 2D is a partial simulation test for individual packaged-products that are considered flat.

Flat shall be defined as any packaged-product where:

- The package's shortest dimension is 8 in (200 mm) or less **and**
- The package's next shortest dimension is four (4) or more times larger than the shortest dimensions.
- 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.
- 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 shipped in the small parcel delivery system with dimensions 12 x 12 x 3 in (310 x 310 x 80 mm) or less and/or 10 lb or less in weight use ISTA General Simulation Performance Test Procedure 3A.
- For elongated packaged-products use ISTA Procedure 2E and not 2D.  
Elongated shall be defined as any packaged-product where:
  - the package's longest dimension is 36 in (910 mm) or greater **and**
  - both of the package's other dimensions are each 20 percent or less than that of the longest dimension.

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

## Scope

Test Procedure 2D covers testing of individual packaged-products weighing 150 lb (68 kg) or less when prepared for shipment and have a configuration that is flat.

**EXCEPTION:**

Individual packaged-products on a visible skid or pallet and that weigh more than 100 lb (45 kg) may be tested according to ISTA Non-Simulation Integrity Performance Test Procedure 1E or ISTA General Simulation Performance Test Procedure 3E.

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	Vibration	Fixed Displacement	1 in (25mm) peak to peak at a freq. to be determined	Required
2	Shock	Rotational Edge Drop	8 in (200 mm)	Required
3	Shock	Drop	Height varies with packaged-product weight	Required
4	Shock	Full Rotational Flat Drop	Varies with packaged-product dimensions	Required
5	Shock	Hazard Impact	Hazard Box dropped 16 in (410 mm)	Required

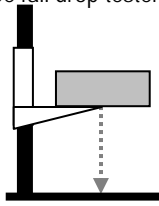
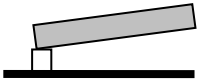
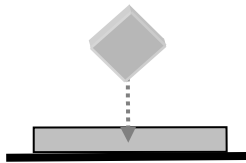
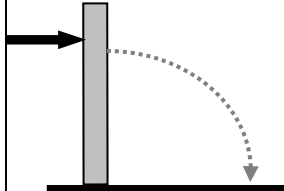
Equipment  
Required  
Vibration

Fixed Displacement Vibration Test:

- Vibration Test System with a 1 in (25 mm) fixed or controlled displacement complying with Method A1 or A2 of the apparatus section of ASTM D 999. Rotary or vertical linear motion of the platform is acceptable.
- Metal shim 0.06 in (1.5 mm), thick approximately 2 in (50 mm) wide and at a convenient length.
- Tachometer or suitable indicator for determining vibration frequency in cycles per second (Hz) or cycles per minute (CPM).
- Automatic timer or stopwatch.

Equipment  
Required  
Shock

The following are acceptable for the equipment required for the various Shock Tests:

Type of Shock Test	Type of Equipment	In compliance with the apparatus section of ...
Drop Test	Free fall drop tester 	ASTM D 5276
Rotational Edge Drop Test	Support Block 	ASTM D 6179
Hazard Impact Test		NA Use a hand drop with a dense wooden hazard box that is 12 x 12 x 12 in (300 x 300 x 300 mm) with at 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. The hazard shall have a total weight of 9 lb (4.1 kg).
Full Rotational Test		ASTM D 6179