



# Extended Testing for Packaged-Products Over 150 lb (68 kg)

1D  
2001

ISTA 1 Series  
Non-Simulation  
Integrity  
Performance  
Test Procedure

VERSION  
DATE  
Last TECHNICAL  
Change:  
JANUARY 2001

Last EDITORIAL  
Change:  
JANUARY 2008

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

Preface

## ISTA, Distributing Confidence, Worldwide™

ISTA 1 Series are the most basic category of performance tests.

- They challenge the capability of the package and product to withstand transport hazards, **but**
- They are not simulations of actual transport hazards, **and**
- 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 1D

Test Procedure 1D is an integrity test for individual packaged-products.

- 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 unitized loads of the same product use ISTA Procedure 1E or ISTA General Simulation Performance Test Procedure 3E.
- For a single packaged-product that is unitized consider ISTA Procedure 1E. 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.

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

## Scope

Test Procedure 1D covers testing of individual packaged-products weighing more than 150 lb (68 kg) when prepared for shipment.

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	Compression Conditioning	Machine or Static	Calculated Test Load or Force	Required
2	Vibration (Alternative methods allowed – select one test type)	Fixed Displacement	1 in (25mm) peak to peak at a frequency to be determined	Required
		Random	Overall G <sub>rms</sub> level of 1.15	
3	Shock (Alternative methods allowed – select one test type)	Drop	6 in (150 mm)	Required
		Incline Impact (Conbur)	69 in (1.7 m) per second impact velocity	
		Horizontal Impact	69 in (1.7 m) per second velocity change	
4	Shock	Rotational Edge Drop	8 in (200 mm)	Required when not testing face 1

Equipment  
Required  
Atmospheric  
Measurement

Atmospheric Measurement:

- Humidity recording apparatus complying with the apparatus section of ASTM D 4332-01.
- Temperature recording apparatus complying with of the apparatus section of ASTM D 4332-01.

Equipment  
Required  
Compression  
Conditioning

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

Type of Compression Test	Equipment	In compliance with the apparatus section of ...
Apply and Release Test	Compression test system	ASTM D 642-00
Apply and Hold Test	Compression test system	ASTM D 642-00
Apply and Hold Test	Weight and load spreader	NA

Equipment  
Required  
Vibration

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

**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 999-01.  
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.

**Random Vibration Test:**

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

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 5276-98
Vertical Shock Test	Shock test machine	ASTM D 5487-98(02)
Incline Test	Incline impact tester (conbur)	ASTM D 880-92(02)
Horizontal Test	Horizontal impact test system	ASTM D 4003-98
Rotational Test	Rotational drop	ASTM D 6179-97