ISTA 2 Series Partial Simulation Performance Test Procedure

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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 2A

Test Procedure 2A is a partial simulation 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.
- 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:

- For packaged-products that may be transported in a small parcel delivery system consider ISTA General Simulation Performance Test Procedure 3A.

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

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OVERVIEW OF PROCEDURE 2A

Scope

Test Procedure 2A covers testing of individual packaged-products weighing 150 lb (68kg) or less when prepared for shipment.

EXCEPTION:
Individual packaged-products on a visible skid or pallet and that weigh more than 100 lb (45 kg) may be tested according to Test Procedure 2B or 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.

NOTE:
When conducting the Compression Test:

- box failure that could result in a stacking failure is considered a failed test, if
- the packaged-product may be warehoused during distribution.
- box failure is allowed if the packaged-product provided is not warehoused, and
- at the conclusion of all testing, the product is not damaged according the Product Damage Tolerance established and
- the package still meets the acceptable package condition, both of which are determined above.

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.

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OVERVIEW OF PROCEDURE 2A

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	Required
3	Compression (Alternative methods allowed – select one test type)	Machine Apply and Release	Calculated Test Force x 1.4	Required
		Machine Apply and Hold	Calculated Test Force	
		Weight and Load Spreader	Calculated Test Load	
4	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_{rms} level of 1.15	
5	Shock (Alternative methods allowed – select one test type)	Drop	Height varies with packaged-product weight	Required
		Incline Impact (Conbur)	Impact Velocity varies with packaged-product weight	
		Horizontal Impact	Impact Velocity varies with packaged-product weight	
6	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_{rms} level of 1.15	

* Note: It is permissible to use either the same method of vibration or different methods of vibration in Sequences #4 and #6. Both Sequences may use Fixed Displacement vibration, both may use Random vibration, or one may use Fixed Displacement and the other Random. The Test Report should clearly document which type of vibration was used for each Sequence number.

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EQUIPMENT REQUIRED FOR PROCEDURE 2A

Equipment Required Atmospheric Conditioning

Atmospheric Conditioning:

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

Equipment Required Compression

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

Type of Compression Test	Equipment	In compliance with the apparatus section of:
Apply and Release Test	Compression test system	ASTM D 642 Fixed or Floating platen acceptable
Apply and Hold Test	Compression test system	
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.
  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.

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
Alternative Incline Test	Incline impact tester (conbur)	ASTM D 880
Alternative Horizontal Test	Horizontal impact test system	ASTM D 4003

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