



ISTA 2 Series
Partial Simulation
Performance
Test Procedure

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Last TECHNICAL
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For complete
listing of
Procedure
Changes and
Version Dates
go to
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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 2C

Preface

Test Procedure 2C is a partial simulation test for individual packaged furniture products (Case Goods). Although the traditional furniture definition of case goods is for hard goods and not upholstered furniture, it can be used for any furniture transported in a container.

- 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:

- Consider ISTA General Simulation Performance Test Procedure 3A or 3E.

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

Scope

Test Procedure 2C covers testing of individual packaged-products of furniture (Case Goods) 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	Atmospheric Preconditioning	Temperature and Humidity	Ambient	Required
2	Atmospheric Conditioning	Controlled Temperature and Humidity	Temperature and Humidity chosen from chart	Optional
3	Vibration	Random Under Dynamic Load	Calculated Top Load differs for Distribution Channel, package size and configuration. Random vibration spectrum differs for Distribution Channel.	Required
4	Shock (Alternative methods allowed – select one test type)	Drop	Height varies with packaged-product weight and Distribution Channel	Required
		Exception One and Two Incline-Impact (Conbur)	Impact Velocity varies with packaged-product weight	
		Horizontal Impact	Impact Velocity varies with packaged-product weight	

Equipment
Required
Atmospheric
Conditioning

Atmospheric Preconditioning:

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

Equipment required for **Optional** Atmospheric Conditioning

- Chamber and Control apparatus complying with the apparatus section of ASTM D 4332-01.

Equipment
Required
Vibration Under
Dynamic Load

Vibration Under Dynamic Load Test:

- Random Vibration Test System complying with the apparatus section of ASTM D 4728-01.
- Top-Load apparatus of one, two or four separate loading systems

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
Incline Test	Incline-impact tester (conbur)	ASTM D 880-92(02)
Horizontal Test	Horizontal impact test system	ASTM D 4003-98
Rotational Edge Test	Rotational drop	ASTM D 6179-97