

ISTA 2 Series
Partial
Simulation
Performance
Test
Procedure

VERSION
DATE
Last

TECHNICAL
Change:
JANUARY
2011

Last
EDITORIAL
Change:
JANUARY
2012

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 2C

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

Equipment required for **Optional** Atmospheric Conditioning

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

Equipment
Required
Vibration
Under
Dynamic Load

Vibration Under Dynamic Load Test:

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

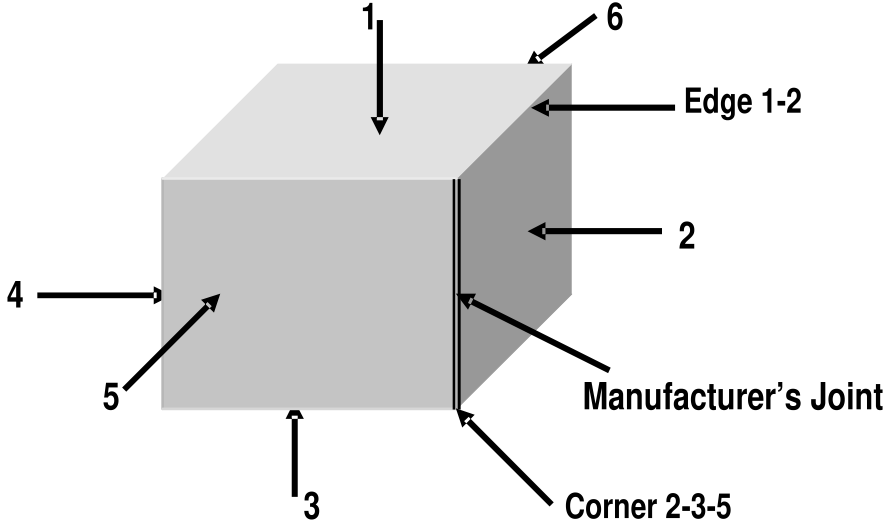
Equipment
Required
Shock

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
Vertical Shock Test	Shock test machine	ASTM D 5487
Incline Test	Incline-impact tester (conbur)	ASTM D 880
Horizontal Test	Horizontal impact test system	ASTM D 4003
Rotational Edge Test	Rotational drop	ASTM D 6179

BEFORE YOU BEGIN PROCEDURE 2C

Prior to beginning the tests identify the faces, edges and corners according to the procedure below.

Step	Action
1	Place the packaged-product in its intended shipping position as determined by shipper. If the shipping position can be variable, place the packaged-product so that the primary shipping label location is on the top face.
2	Does the packaged-product have only six faces (2 sides, 2 ends, top and bottom)? - If Yes, then go to Step 5. - If No, continue to next Step.
3	Develop a method to identify each face, edge and corner and document with a diagram.
4	Go to next page for further Before You Begin details.
5	Is the package a corrugated container? - If Yes, continue to next Step. - If No, then go to Step 8.
6	Does the package have a manufacturer's joint connecting a side and an end face? - If Yes, continue to next Step. - If No, then go to Step 8.
7	Turn the packaged-product so that you are looking directly at a face with the manufacturer's joint on the observer's right and go to Step 9.
8	Position one of the smallest width faces of the packaged-product directly in front of you.
9	Identify faces according to the diagram below. 
10	Identify edges using the numbers of the two faces forming that edge. Example: Edge 1-2 is the edge formed by face 1 and face 2 of the packaged-product.
11	Identify corners using the numbers of the three faces that meet to form that corner. Example: Corner 2-3-5 is the corner formed by face 2, face 3, and face 5 of the packaged-product.
12	Go to next page for further Before You Begin details.

Packaged-Product Weight and Size Measurement

You shall know the packaged-product's:

- gross weight in pounds (kg), **and**
- outside dimensions of Length, Width and Height (L x W x H) in inches (mm or m)

Before You Begin Test Levels

TEST LEVELS VARY

There are different hazard levels for case good furniture packages associated with various channels of distribution. **You shall select a level of testing from one of the following three levels and follow that level throughout the entire test:**

- **LEVEL ONE** for product-packages shipped via small parcel delivery systems.
- **LEVEL TWO** for product-packages shipped via general commodity motor carrier.
- **LEVEL THREE** for product-packages shipped via specialized furniture carrier.

NOTE:

Level One shall be used if the channels of distribution are not known. If more than one channel is possible, the lowest level number of those possible channels shall be used.

Before You Begin Atmospheric Conditioning

Required Preconditioning:

The packaged-product should be stored prior to climate conditioning at laboratory ambient temperature and humidity for twelve (12) hours.

Optional Conditioning Recommended (to be performed after the required preconditioning):

To permit an adequate determination of packaged-product performance at anticipated atmospheric limits and where it is known that the atmospheric extremes are detrimental to the product, ISTA:

- **Requires** the highest temperature and humidity limits of the product be used, **but**
- **Recommends** that both the highest and lowest atmospheric conditions be used.

Condition packaged-products according to one or more of the conditions listed in the table below.

- Remaining test requirements should be performed as soon as possible after removing the packaged-product from environmental conditioning apparatus.
- If more than one conditioning sequence is selected, a new and complete test should be performed following each sequence.

Anticipated Conditions	Time in Hours	Temperature in °C ±2°C (°F ±4°F)	Humidity in %
Extreme Cold, Uncontrolled RH	72	-29°C (-20°F)	uncontrolled RH
Cold, Humid	72	5°C (40°F)	85% RH ±5%
Controlled Conditions	72	23°C (73°F)	50% RH ±5%
Hot, Humid	72	38°C (100°F)	85% RH ±5%
Hot, Humid then Extreme Heat, Moderate RH:	72 then 6	38°C (100°F) then 60°C (140°F)	85% RH ±5% then 30% RH ±5%
Elevated Temperature, Uncontrolled RH	72	50°C (120°F)	uncontrolled RH
Extreme Heat, Dry	72	60°C (140°F)	15% RH +/- 5%
Severe Cold, Uncontrolled RH	72	-18°C (0°F)	uncontrolled RH
User Defined High Limit	72	Based upon known conditions	Known conditions
User Defined Low Limit	72	Based upon known conditions	Known conditions
User Defined Cycle	72	Based upon known conditions	Known conditions

