



Golden Gate Chapter

WHAT'S NEW IN PACKAGING TEST METHODS & STANDARDS

Bill Kipp



February 2010

INTRODUCTION

- What “Test Methods & Standards” are we talking about?
 - Testing related to complete, finished packaged-products, to assess their suitability for shipping/distribution

- ISTA
- ASTM
- ISO
- NMFTA



INTERNATIONAL SAFE TRANSIT ASSN.



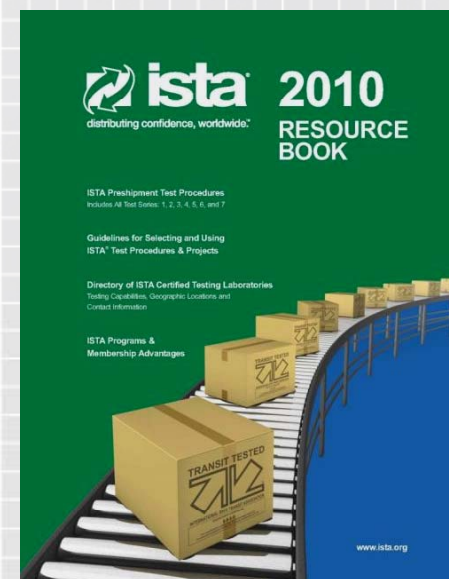
- A non-profit technical trade association, focused entirely on issues related to transport packaging and distribution
- 775 member companies in 32 countries
- “Provide economic and environmental benefits by helping to control product damage and over-packaging during the physical distribution of products”

www.ista.org

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- By creating, maintaining, providing, and advocating...
 - Performance testing procedures
 - Currently 30 different test procedures
 - Certification
 - Labs
 - People
 - Packages
 - Education and training
 - Member support



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WHAT'S NEW?



Packaged-Products for Less-Than-Truckload
(LTL) Shipment

Project

3B
2009

- Released May 2009
 - Covers
 - Standard packages weighing 200 lbs. or less
 - Standard packages weighing over 200 lbs.
 - Cylindrical packages
 - Palletized or skidded loads
 - Flat and elongated packages

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WHAT'S NEW?



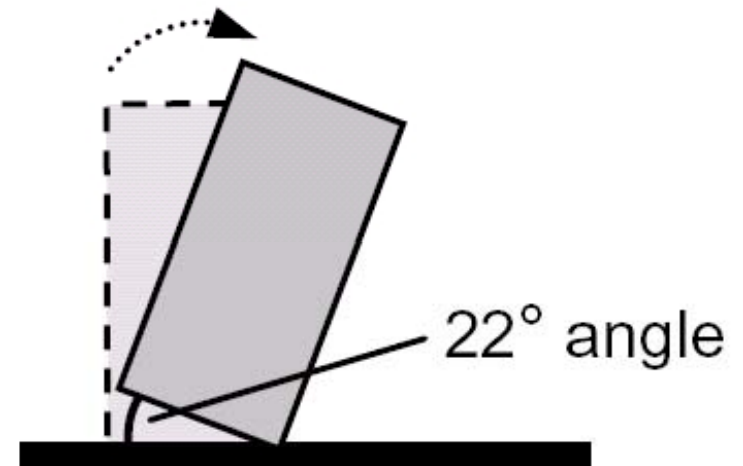
Packaged-Products for Less-Than-Truckload
(LTL) Shipment

Project

3B
2009

- New aspects
 - Tip/tipover tests

Tip/Tipover Tests



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WHAT'S NEW?



Packaged-Products for Less-Than-Truckload
(LTL) Shipment

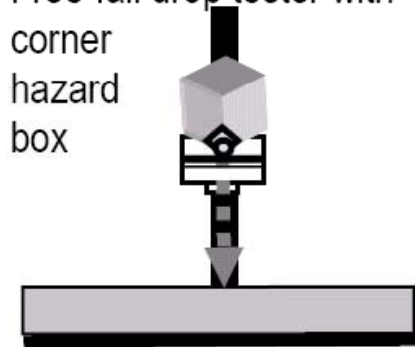
Project

3B 2009

- New aspects
 - Concentrated corner impacts

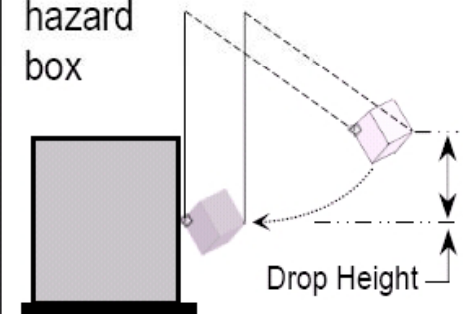
Concentrated Corner
Impact Tests

Free-fall drop tester with
corner
hazard
box



Concentrated Corner
Impact Tests
(Alternate)

Pendulum with corner
hazard
box



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WHAT'S NEW?



Packaged-Products for Less-Than-Truckload
(LTL) Shipment

Project

3B
2009

- New aspects
 - Concentrated corner impacts



VIDEO

INTERNATIONAL SAFE TRANSIT ASSN.

WHAT'S NEW?



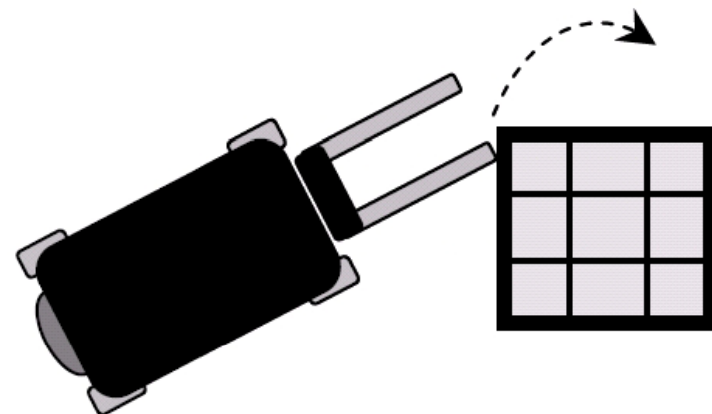
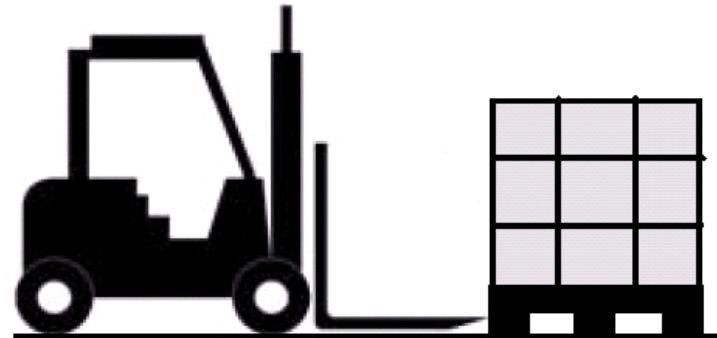
Packaged-Products for Less-Than-Truckload
(LTL) Shipment

Project

3B²⁰⁰⁹

- New aspects
 - Fork lift handling tests

Flat push and rotate



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WHAT'S NEW?

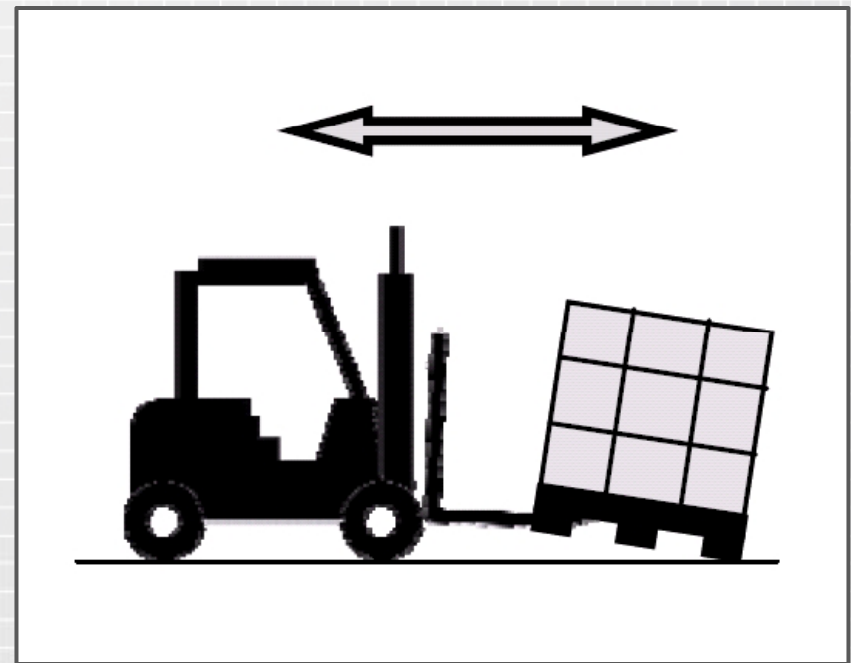
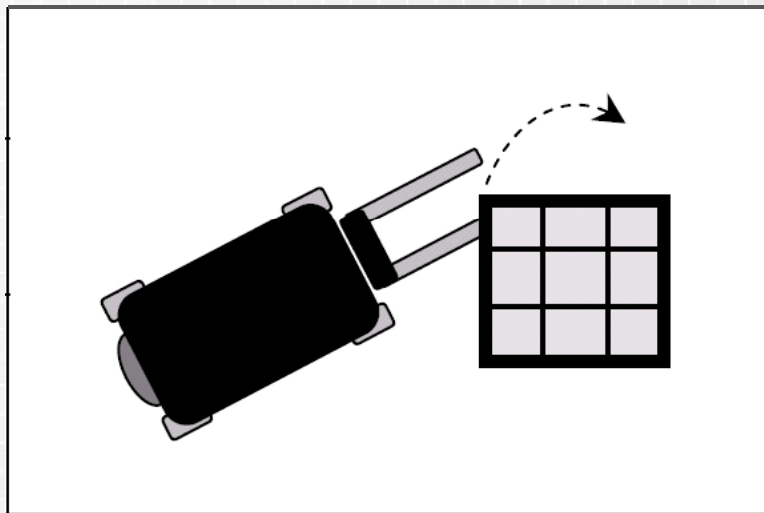


Packaged-Products for Less-Than-Truckload
(LTL) Shipment

Project

3B
2009

- New aspects
 - Fork lift handling tests



Elevated push/pull

Elevated rotate

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WHAT'S NEW?



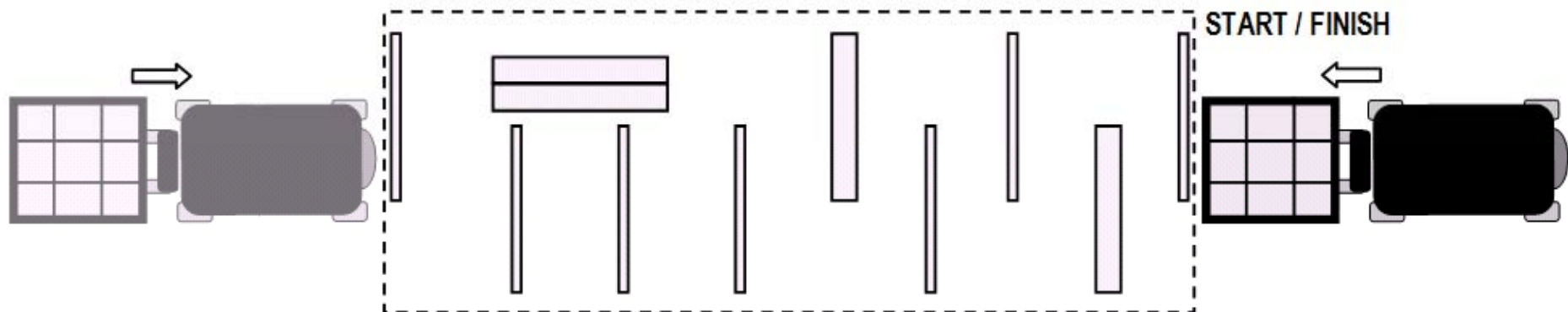
Packaged-Products for Less-Than-Truckload
(LTL) Shipment

Project

3B
2009

- New aspects
 - Fork lift handling tests

Handling course



VIDEOS

INTERNATIONAL SAFE TRANSIT ASSN.

WHAT'S ELSE IS NEW?



Packaged-Products for Club Store Distribution
System Shipment

Project

3J 2010

- Released February 8, 2010 **NEW!**
 - Developed in cooperation with Sam's Club
 - Covers
 - Non-perishables, shipped palletized
 - Non-perishables, shipped floor-loaded
 - Perishables



INTERNATIONAL SAFE TRANSIT ASSN.

WHAT'S ELSE IS NEW?



Packaged-Products for Club Store Distribution
System Shipment

Project

3J
2010

- Very thorough development process
 - Observation and measurement of the Sam's Club distribution environment
 - Analysis of the information and data
 - Creation of draft test methods
 - Test validation
 - Writing of ISTA "Project" protocol



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WHAT'S ELSE IS NEW?



**Packaged-Products for Club Store Distribution
System Shipment**

Project

3J
2010

The club store distribution system has a number of unique aspects. In such systems, packaged-products are typically shipped from a manufacturer or producer anywhere in the world, through one or more ports, terminals, and Distribution Centers (DCs), and then to the clubs or stores. Different modes of transportation and vehicles are used. Various types of handling may occur in the DCs, including manual, fork lift, clamp truck, slipsheet, etc. The original shipment configuration may be altered at a DC to fit the needs of the system and the requirements of the stores. Final shipment to the club or store, regardless of the original configuration, is typically on a pallet.

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WHAT'S ELSE IS NEW?



Packaged-Products for Club Store Distribution
System Shipment

Project

3J 2010

Observation

- Visited 6 distribution centers (DCs)
 - Two “dry” DCs in the U.S.
 - Two “perishables” DCs in the U.S.
 - Two import DCs (U.S., 2 visits ea.)
- Visited 2 overseas suppliers and ports
 - India, China
- Visited a number of Sam’s Club stores



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WHAT'S ELSE IS NEW?



Packaged-Products for Club Store Distribution
System Shipment

Project

3J
2010

Observation

- Over 2200 photographs
 - Facilities and equipment
 - Operations
 - Products and packages
- Almost 20 hours of video
 - Above, plus lift trucks
- Over 50 pages of notes and documentation



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WHAT'S ELSE IS NEW?



Packaged-Products for Club Store Distribution System Shipment

Project

3J 2010



www.ista.org

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WHAT'S ELSE IS NEW?



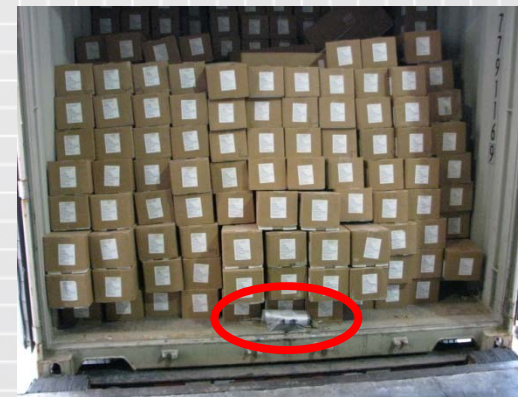
Packaged-Products for Club Store Distribution
System Shipment

Project

3J
2010

Measurement

- Instrumented 3 containers and recorded shipments to U.S. DCs
 - India, China
- Instrumented a domestic truck-trailer
- Instrumented a DC fork lift



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WHAT'S ELSE IS NEW?



Packaged-Products for Club Store Distribution
System Shipment

Project

3J
2010

Information Analysis and Protocol Drafts

- Meetings, meetings, meetings
 - In-person
 - Telephone
 - Web
- Went through 8 drafts of test protocols



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WHAT'S ELSE IS NEW?



Packaged-Products for Club Store Distribution
System Shipment

Project

3J 2010

Validation Testing

- Tested
 - Non-perishable grocery items (several)
 - Frozen foods (several)
 - Housewares (several)
 - Furniture (several)
 - Small appliance
 - Personal care (shampoo)
 - Laundry products (detergent, fabric softener)



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WHAT'S ELSE IS NEW?

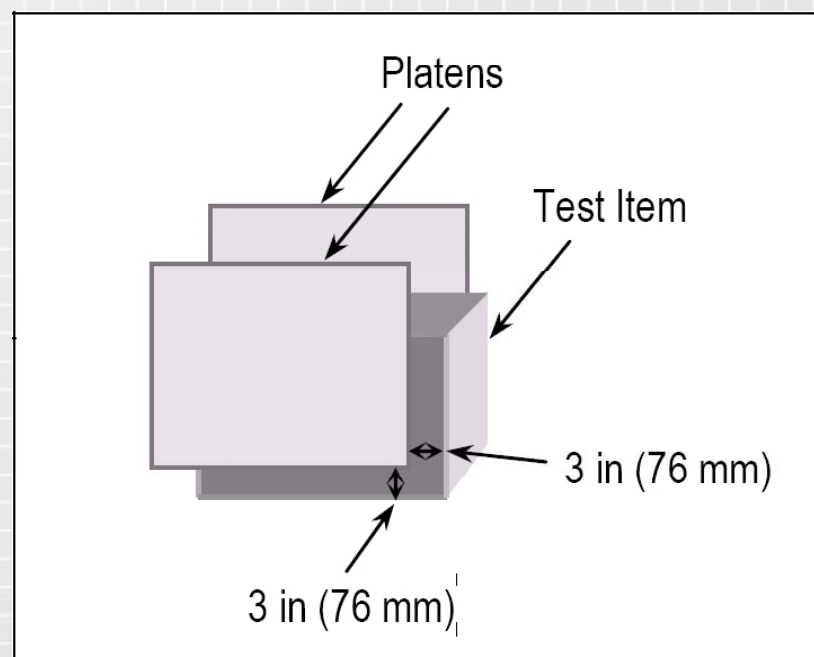


Packaged-Products for Club Store Distribution
System Shipment

Project

3J
2010

- New aspects
 - Clamp testing
 - Forces based on test item weight and dimensions
 - Platens offset 3 inches



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WHAT'S ELSE IS NEW?



Packaged-Products for Club Store Distribution
System Shipment

Project

3J
2010

- New aspects
 - Compression testing
 - Pallet on top
 - Forces take layer and case weights into account



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WHAT'S ELSE IS NEW?

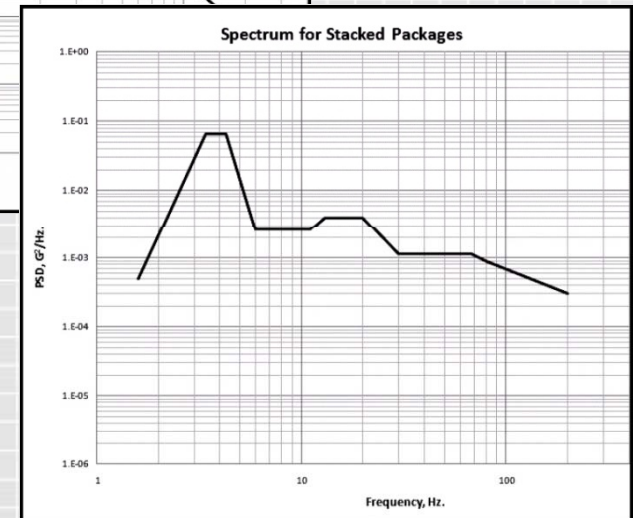
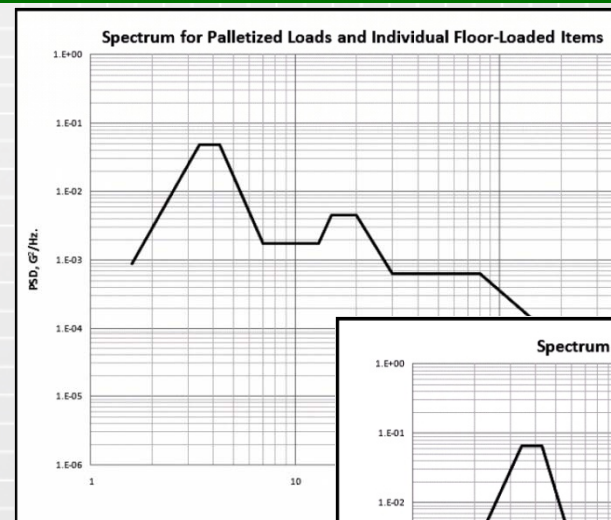


Packaged-Products for Club Store Distribution
System Shipment

Project

3J
2010

- New aspects
 - Vibration profiles linked to data



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WHAT'S ELSE IS NEW?

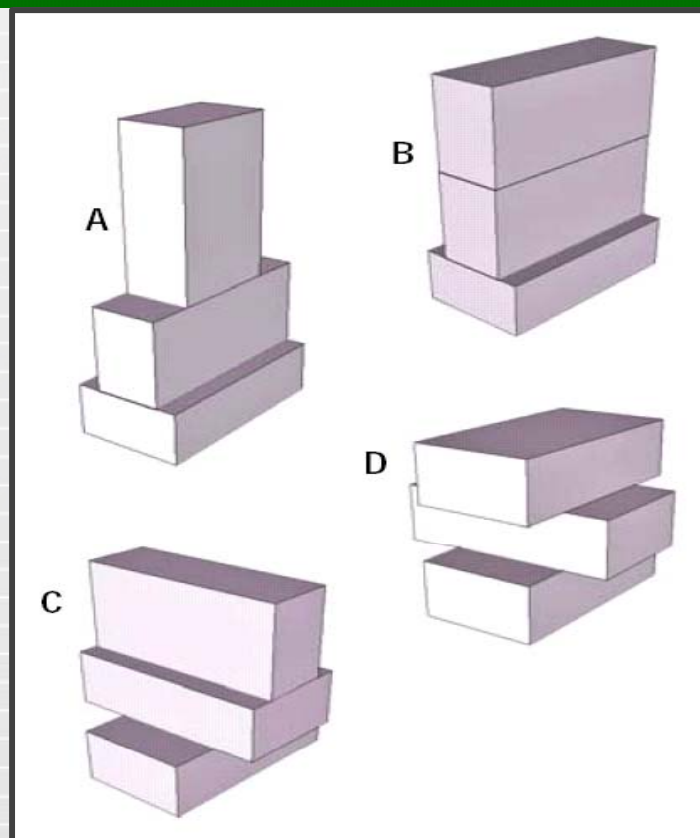


Packaged-Products for Club Store Distribution
System Shipment

Project

3J
2010

- New aspects
 - 3-package stacked vibration



INTERNATIONAL SAFE TRANSIT ASSN.

ANYTHING ELSE?

- Check the website at www.ista.org
- Upcoming Transport Packaging Forum



INTERNATIONAL
TRANSPORT PACKAGING FORUM

March 29 - April 1, 2010
Disney's Coronado Springs Resort
Orlando, Florida

www.transportpackagingforum.com


ASTM INTERNATIONAL

- Big standards-writing organization
- Committee D10 on Packaging
 - About 100 years old
- Two package performance standards, supported by “Test Method” standards
 - D4169-09, November 2009
 - D7386- 08, March 2008



ASTM INTERNATIONAL

WHAT'S NEW?

- D4169
 - Concentrated impact hazard element 
 - Low pressure hazard element

9. Hazard Elements and Test Schedules

9.1 Hazard Elements and Test Schedules are categorized as follows:

Schedule	Hazard Element	Test
A	Handling—manual and mechanical	drop, impact, stability
B	Warehouse Stacking	compression
C	Vehicle Stacking	compression
D	Stacked Vibration	vibration
E	Vehicle Vibration	vibration
F	Loose Load Vibration	repetitive shock
G	Rail Switching	longitudinal shock
H	Environmental Hazard	cyclic exposure
I	Low Pressure Hazard	vacuum
J	Concentrated Impact	impact

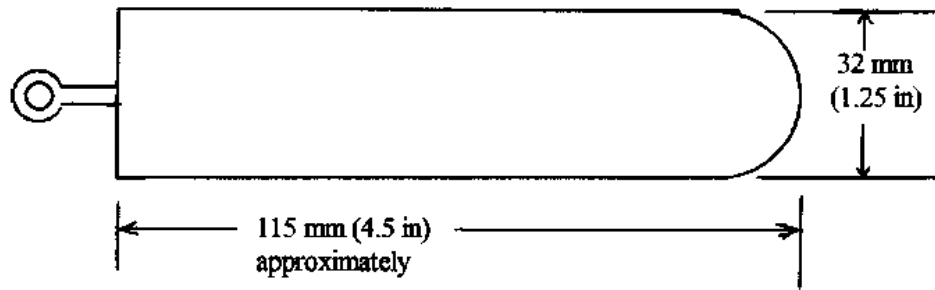


FIG. 1 Cylindrical Mass (steel rod)

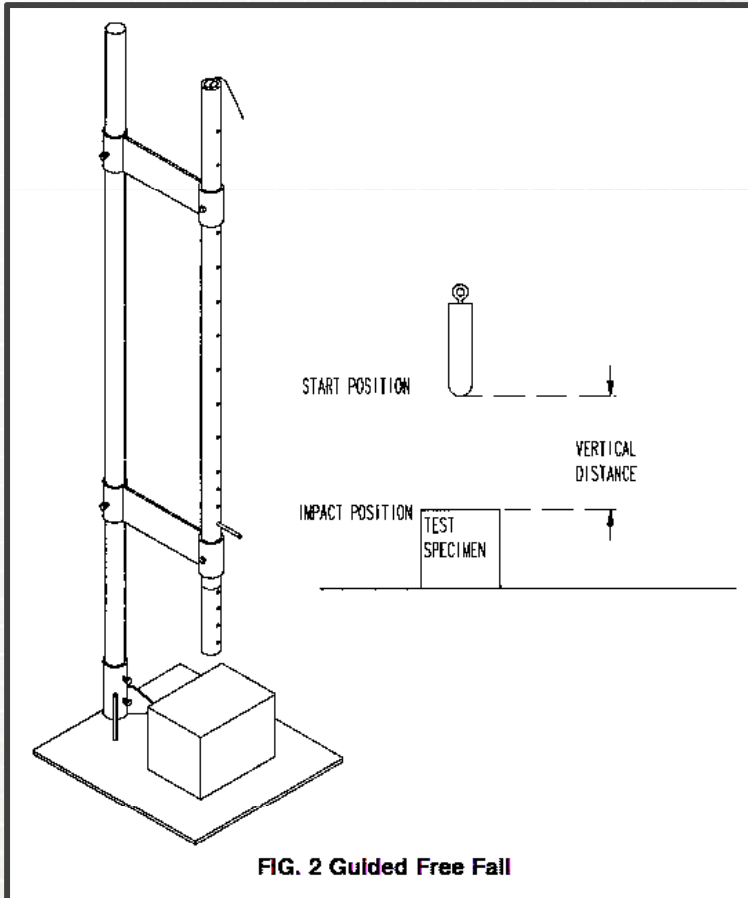


FIG. 2 Guided Free Fall

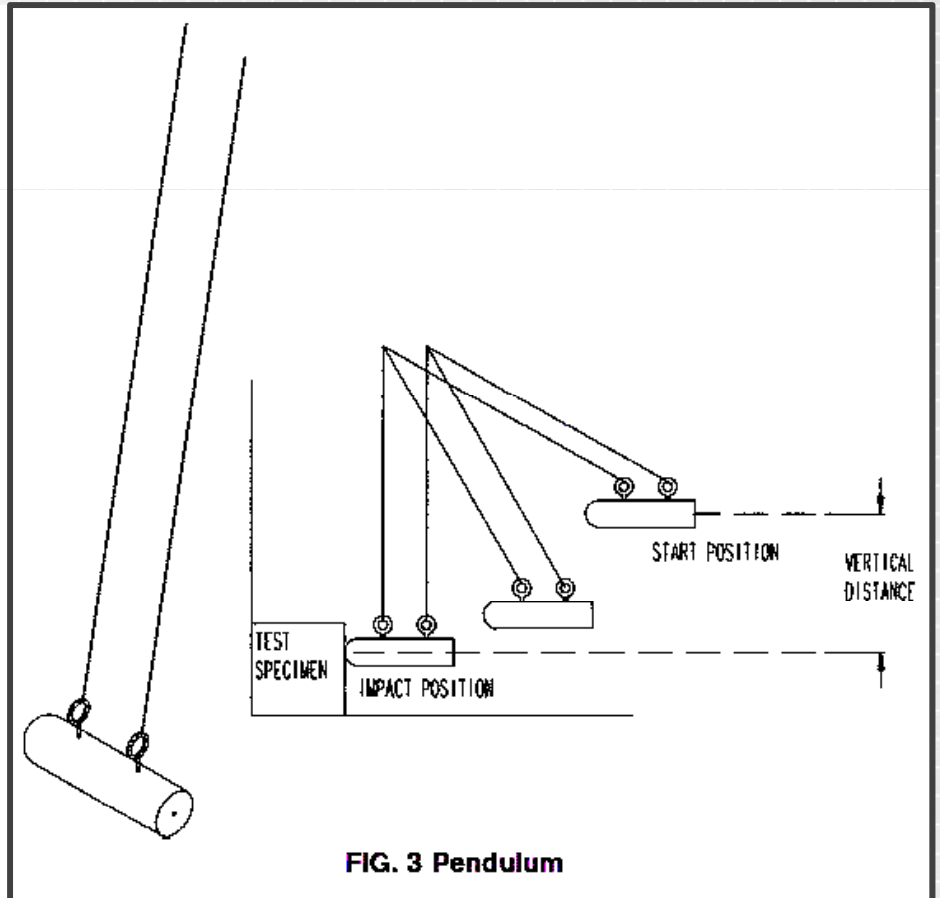
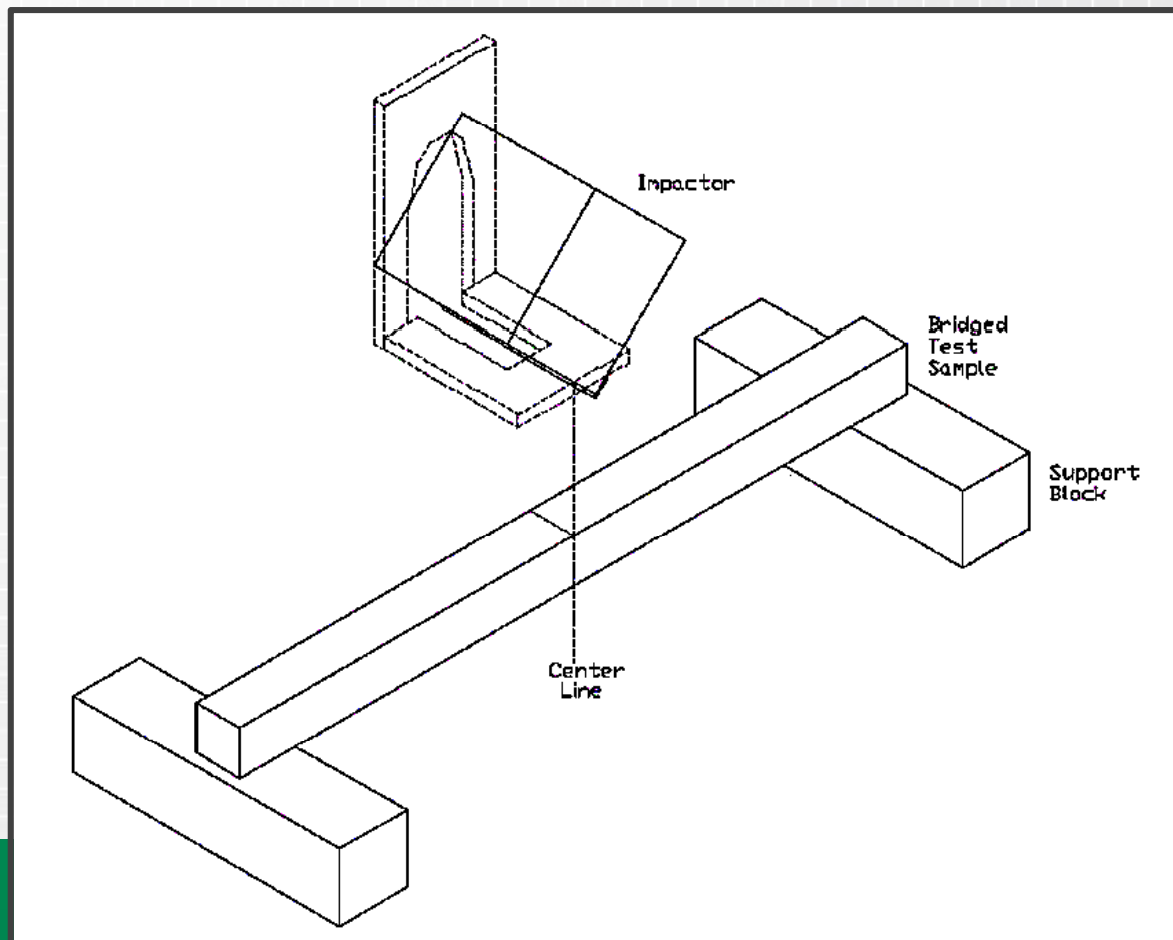


FIG. 3 Pendulum

ASTM INTERNATIONAL

WHAT'S NEW?

- D4169
 - Bridge impact hazard element



ASTM INTERNATIONAL

WHAT'S NEW?

- D4169
 - Good examples in Appendixes

APPENDIXES

(Nonmandatory Information)

X1. EXAMPLE TEST PLANS

X1.1 The following examples will serve to illustrate the use of this practice:

X2. USING THE DC-2 DISTRIBUTION CYCLE

X2.1 The DC-2 distribution cycle is used when an anticipated distribution is well understood and other cycles, DC-3 through DC-18, are not sufficiently descriptive. The understanding of distribution may be developed in several ways, including: measurement of the environment with appropriate instrumentation; careful observation of the various hazard elements in distribution; reference to published authoritative information; product damage reports; or a combination thereof.

ASTM INTERNATIONAL

WHAT'S NEW?

- D7386
 - For “Single Parcel Delivery Systems”
 - Four Test Plan Schedules, depending on
 - Standard
 - Small
 - Flat
 - Elongated

A = Handling K = High Altitude
 D = Vibration L = Concentrated Impacts
 I = Bridge Impact M = Tip Over
 J = Hazard Drop N = Rotational Edge Drop

Test Specimen	Description	Performance Test Schedule Sequence (see Section 8)									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
TS-1	Small packaged-products bagged for transport	A1 ^A	D2 ^B	K ^{A,C}	A4 ^B	D3 ^A	A3 ^A				
TS-2	Large flat packaged products	A1	D1	K ^C	A2	M	N	J	D3	A3	L
TS-3	Long narrow packaged products	A1	D1	K ^C	A2	M	N	I	D3	A3	L
TS-4	All other packaged-products	A1	D1	K ^C	A2	D3	A3	L			

ASTM INTERNATIONAL

WHAT'S NEW?

- D7386
 - Much like ISTA 3A
 - Same basic concepts
 - Same exact vibration profiles
 - Many detail differences
 - Use D7386 if you or your company prefers ASTM standards
 - Use ISTA 3A if your carrier is UPS



ASTM INTERNATIONAL

WHAT'S NEW?

From the UPS Tariff – Terms & Conditions of Service, Section 7: Packaging

“Packages must be so packed or wrapped as to meet UPS’s published standards related thereto set forth in the Service Guide, or on ups.com, **and as to pass tests set forth in the International Safe Transit Association (“ISTA”) Procedure 3A, Procedure for Testing Packaged Products, published by ISTA.**”

ASTM INTERNATIONAL

WHAT'S NEW?

- ASTM may be starting a certification program

“The ASTM Board of Directors in October, 2009 authorized development of the capability to offer ASTM Certification Programs for products (material, products, systems and services) and personnel. This was the result of having received several inquiries... [from] industries desiring an independent third party demonstration of compliance to standards and from industries facing regulatory pressures to prove compliance to standards.”

“At this time, ASTM has not developed any certification programs...”

ASTM INTERNATIONAL

WHAT'S NEW?

- ASTM may re-organizing Committee D10

“After discussion and approval at the Executive Web meeting on January 14, the attached reorganizational proposal is being circulated for your vote. Please note that voting in favor of this reorganization is the first step, then modifying scopes and possibly switching the jurisdiction of certain standards would follow.”



ISO

- International Organization for Standardization
- Similar to ASTM in many ways
 - Big standards-writing organization
 - Small committee (TC 122) concerned with packaging
 - One package performance standard, ISO 4180, supported by “Test Method” standards
- Revised 4180 after 29 years (!)



ISO

INTERNATIONAL
STANDARD

ISO
4180

First edition
2009-02-15



**Packaging — Complete, filled transport
packages — General rules for the
compilation of performance test
schedules**

ISO

- ISO 4180
- Some interesting information
 - Damage and acceptance criteria
 - Quantifying the extent of damage
 - Mounting of test items to the vibration table
- Very poor with regard to specifics
 - In 24 pages, only 3 charts of actual test plans
 - Insufficient detail



Table 21 — Test schedules and intensities for packages of gross mass > 100 kg

Basic sequence	Test type	Reference standard	intensity			Notes
			lowest 3	2	highest 1	
Conditioning	Atmospheric	ISO 2233	23 °C at 50 % Relative Humidity			If other conditions are desired choose atmospheric conditioning from Table 1
Shock	Horizontal impact test	ISO 2244	1 m/s	1,5 m/s	2 m/s	Apply impact once on each side face
Compression	Static load	ISO 12048	Maximum load	Maximum load × 2	Maximum load × 3	Maximum load [package mass × (number of stacked elements – 1)] Apply load and release
Transport vibration	Vibration	Random PSD ISO 13355	Nominal PSD ISO 13355 15 min	Nominal PSD ISO 13355 90 min	Nominal PSD ISO 13355 180 min	PREFERRED TEST Perform test in vertical direction only
		ISO 8318 sinusoidal	7 m/s ² 15 min	7 m/s ² 90 min	7 m/s ² 180 min	It is recommended to conduct the test with variable frequency
Transport vibration	Repetitive shock	Random PSD ISO 13355	Nominal PSD ISO 13355 10 min	Nominal PSD ISO 13355 20 min	Nominal PSD ISO 13355 30 min	Use random PSD with no clamping of units to table surface
Compression	Static load	ISO 12048	Apply maximum load for 24 h			Impose maximum expected load [package mass × (number of stacked elements – 1)] In case a compression of the sides is possible (package that can be clamped), a compression test on the sides affected by the clamp is necessary
Shock	Drop tests	ISO 14149 Rotational drop	10 cm	20 cm	30 cm	Perform drop on two adjacent edges of the base of the package from the prescribed height

NAT'L MOTOR FREIGHT TRAFFIC ASSN.

- Administers the National Motor Freight Classification
 - ...commodity descriptions; classes; rules; **packaging definitions, specifications or requirements**; bill of lading formats, terms and conditions...
- Item (Rule) 180, “Performance Test for Shipping Containers”
- Item (Rule) 181, “Furniture Package Performance Testing”



NAT'L MOTOR FREIGHT TRAFFIC ASSN.



- Items 180 and 181 are alternatives to the Test Shipment Permit program (Item 689)
 - “Recommended for solving chronic damage problems and for providing an acceptable assurance level of packaging...”
- Both Items were revised in October of 2009
 - No technical changes



Golden Gate Chapter

WHAT'S NEW IN PACKAGING TEST METHODS & STANDARDS

QUESTIONS?

