

### SLOVENSKI STANDARD oSIST prEN ISO 4180:2019

01-marec-2019

Embalaža - Celovita, napolnjena transportna embalaža - Splošna pravila za pripravo programov preskušanja primernosti za uporabo (ISO/DIS 4180:2019)

Packaging - Complete, filled transport packages - General rules for the compilation of performance test schedules (ISO/DIS 4180:2019)

iTeh STANDARD PREVIEW (standards.iteh.ai)

Emballages - Emballages d'expédition complets et pleins - Règles générales pour l'établissement de programmes d'essais de performance (ISO/DIS 4180:2019)

Ta slovenski standard je istoveten z: prEN ISO 4180 rev

ICS:

55.180.40 Celovita, napolnjena

transportna embalaža

Complete, filled transport

packages

oSIST prEN ISO 4180:2019

en,fr,de

**oSIST prEN ISO 4180:2019** 

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### DRAFT INTERNATIONAL STANDARD ISO/DIS 4180

ISO/TC **122**/SC **3** 

Secretariat: BSI

Voting begins on: **2019-02-04** 

Voting terminates on:

2019-04-29

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

Emballages — Emballages d'expédition complets et pleins — Règles générales pour l'établissement de programmes d'essais de performance

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#### **Foreword**

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This document was prepared by Technical Committee ISO/TC 122, *Packaging*, Subcommittee SC 3, *Performance requirements and tests for means of packaging, packages and unit loads (as required by ISO/TC 122)*.

This second edition cancels and replaces the first edition (ISO 4180:2009) which has been technically revised. The first edition of ISO 4180:2009 cancelled and replaced ISO 4180-1:1980 and ISO 4180-2:1980.

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

#### 1 Scope

This International Standard establishes general rules for the compilation of performance test schedules for complete, filled transport packages intended for use within any distribution system except for the packages used for dangerous goods.

#### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 14149, Packaging — Complete, filled transport packages and unit loads — Impact test by rotational drop

ISO 2206, Packaging — Complete, filled transport packages — Identification of parts when testing

ISO 2233, Packaging — Complete, filled transport packages and unit loads — Conditioning for testing

ISO 2234, Packaging — Complete, filled transport packages and unit loads — Stacking tests using a static load

ISO 2244, Packaging — Complete, filled transport packages and unit loads — Horizontal impact tests

ISO 2247, Packaging — Complete, filled transport packages and unit loads — Vibration tests at fixed low frequency

ISO 2248, Packaging — Complete, filled transport packages — Vertical impact test by dropping

ISO 2873, Packaging — Complete, filled transport packages and unit loads — Low pressure test

ISO 2875, Packaging — Complete, filled transport packages and unit loads — Water-spray test

ISO 2876, Packaging — Complete, filled transport packages — Rolling test

ISO 8318, Packaging — Complete, filled transport packages and unit loads — Sinusoidal vibration tests using a variable frequency

ISO 8768, Packaging — Complete, filled transport packages — Toppling test

ISO 10531, Packaging — Complete, filled transport packages — Stability testing of unit loads

ISO 12048, Packaging — Complete, filled transport packages — Compression and stacking tests using a compression tester

ISO 13355:2016, Packaging — Complete, filled transport packages and unit loads — Vertical random vibration test

ISO 21067-1, Packaging — Vocabulary — Part 1: General terms

IEC 60068-1:2013, Environmental testing — Part 1: General and guidance

IEC 60068-2-64, Environmental testing — Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance

IEC 20068-3-8, Environmental testing — Part 3-8: Supporting documentation and guidance — Selecting amongst vibration tests

#### 3 Terms and definitions

General terms and definitions are found in ISO 21067. The following terms and definitions apply specific to this document.

#### 3.1

#### performance test schedule

single laboratory test, or series of tests, intended to ascertain the performance, under working conditions, of the subject under test

#### 3.2

#### hazard

factor which brings a possibility of damage or deterioration of the value to the packaged freight or product

#### 3.3

### power spectral density (acceleration power spectral density PSD

degree of variation in energy for each frequency to the acceleration signal in a specific frequency range as a function of frequency. Refer to IEC 60068-2-64, 3-8

### 4 Hazard iTeh STANDARD PREVIEW

Typical hazards in the logistics process, and the related international testing standards, are shown in Table 1.

Table 1 — Expected hazard during logistics process, and related international testing standards

Basic factor	b17f546e42b6/sis Hazard	-en-iso-4180-2020 Related international stan	darde
in logistics	nazaru	Related lifter national stan	uarus
		Vertical random vibration test	ISO 13355
	Vibration during transportation	Sinusoidal vibration tests using a variable frequency	ISO 8318
	<ul> <li>Repetitive impact by flip-up</li> </ul>	Vibration tests at fixed low frequency	ISO 2247
Prananant	Horizontal impact by sudden stop or start		
Transport	Horizontal impact by linking work of railway freight car	Horizontal impact test	ISO 2244
	Variable communication toot for stacking	Random vibration test	ISO 13355
	Variable compression test for stacking during transportation	Sinusoidal vibration tests using a variable frequency	ISO 8318
	Low pressure by high altitude	Low pressure test	ISO 2873
	Drop impact by human handling	Vontical impact test by draming	ISO 2248
	Drop impact by machine handling	Vertical impact test by dropping	EN 14149
Handling	Horizontal impact during handling by forklift or crane as such	Horizontal impact test	ISO 2244
S	Rough handling by rolling	Rolling test	ISO 2876
	Topple	Toppling test	ISO 8768
	Handling of unit load	Stability testing of unit loads	ISO 10531

**Table 1** (continued)

Basic factor in logistics	Hazard	Related international star	ıdards
	Compression load in stacking storage in	Stacking tests using a static load	ISO 2234
Storage	warehouse	Compression test using a compression tester	ISO 12048
		High temperature test	
Climate	Temperature and humidity	High temperature/High humidity test	ISO 2233 IEC 60068-1
		Low temperature test	
	Wet, dewing	Water-spray test	ISO 2875

#### 5 Preparation of the test schedule

5.1 Test item shall be selected from <u>Table 2</u> depend on the expected hazard considering logistics related elements which affect to the specimen.

The characteristics of the specimen, test equipment and past damage experience should be considered when select the test item.

<u>Table 3</u> shows an example of hazards and corresponding test items.

**5.2** The test schedule shall be chosen by accumulated or integrated from selected hazard. Follow the <a href="https://example.com/Article-6">Article-6</a> for the selection of test level.

However, the test level can be modified by the agreement between stakeholders.

 $\underline{\textbf{Table 4}} \ \textbf{shows example of performance test schedule.} \\ \underline{\textbf{SISI/051}} \underline{\textbf{19}} \underline{\textbf{400a.4859-4b9}} \underline{\textbf{1-a978}} \underline{\textbf{1000}} \underline{\textbf{1000$ 

- **5.3** There is no predetermined test sequence. If the user does not have specific information about the distribution cycle and corresponding hazards on its package, refer to <u>Table 4</u> for the example of test order. Each test method may also be performed individually when necessary.
- **5.4** The test level based on the actual measurement data shall be prior if available.
- **5.5** Refer to ISO 10531 for handling and stability test of the unit load.

Table 2 — Selection guide for test item and test level

			مي داديد ر	فيربغ كم سدنده الرر	,
	Symbol	Test item	onide ioi	guide ior selection of test	Test meth-
	2		Type of hazard	Examples of the product	ods
	A1	Vertical random vibration test in general transportation	Vertical vibration or stacking load in gen-		6.4.2
	A2	Sinusoidal vibration test in general transportation	eral transportation A)		6.4.3
Transport	A3	Random vibration test in rough road transportation	<b>1</b> ps://s	<ul><li>Electric, electronics or mechanical products</li><li>High precision surfaced products</li></ul>	6.4.4
•	A4	Sinusoidal vibration test in rough road transportation	Repetitive shock by poor road	Powder or granular products	6.4.5
	A5	Vibration tests at fixed low frequency	<b>h</b>		ISO 2247
	A6	Stacked vibration test	Variable compression by vibration during transportation		6.4.6
	B1	Free-fall test	Human handling	<ul> <li>Electronic component or product which has</li> </ul>	6.5.2
	B2	Rotational drop test	Machinery handling	mechanical structure	6.5.3
Handling	B3	Horizontalimpacttest	Horizontal impact during handling or transportation	<ul> <li>Liquid or semi-liquid product</li> <li>Liquid, semi-liquid, powder or granular prod-</li> </ul>	6.5.4
	Toppling test	test	Toppling during handling	ucts which are weak to sharp item	ISO 8768
	Rolling test	st	Rough handling by rolling	<ul> <li>Pressure sensitive product, powder or granular products</li> </ul>	1SO 2786
Storage	C	Compression test	Stacking pressure in warehouse	Container for warehouse storage and products	9.9
			High temperature with low humidity	Deformation or cracking by the high temperature	6.7
			Ph 20 051 180	<ul><li>Sensitive to corrosion</li></ul>	
	D1	Temperature and humidity environmen- tal test	High temperature/High humidity	<ul> <li>Hygroscopic product</li> </ul>	<u>Z.9</u>
Climato			<b>E</b> \ 11) d0a	<ul> <li>Mold, spoil, degrade</li> </ul>	
    -			Low temperature	Degradation by contraction or embrittlement	<u>Z.9</u>
	אט	I ow pracelira tact	359 - sanssana mo	— Failure, deformation	8 9
	7	process con	46	<ul> <li>Leak of the contents</li> </ul>	
	Water spray test	ay test	Rain	Wet damage	ISO 2875 <sup>B</sup> )
A) Random	Random vibration has priority.	ıs priority.	r a9 <sup>7</sup>		
B) Test con	dition may b	Test condition may be specified by the agreement of stakeholders.	778-		

Table 3 — Example of hazards and corresponding test items

No.         Activity         Hazard         Correspond test item           1         Unitization at factory         Machine handling         Rotational drop test: BZ           2         Container loading by forklift         Machine handling         Horizontal impact test: BZ           3         Transport to port         150 km, paved road, by trailer         Vertical random vibration test: A1           4         Storage at port         Maximum stack height: Z,4 m         Compression test: BZ           5         Load to container ship         Machine handling         Pertical random vibration test: A1           6         Transport by ship         Maximum stack height: Z,4 m         Compression test: BZ           7         Unload from container ship         Machine handling         Pertical random vibration test: A1           8         Transport container to warehouse         3 000 km, paved road, by trailer         Pertical random vibration test: BZ           8         Transport container to warehouse         Maximum stack height: 5 m         Compression test: BZ           9         Storage operation by forklift         Maximum stack height: 5 m         Compression test: BZ           10         De-banning at warehouse         Maximum stack height: 5 m         Compression test: C           11         Transport to final destination         Man handli					
Unitization at factory   Machine handling   Container loading by forklift   Machine handling   Container loading by forklift   150 km, paved road, by trailer   Estorage at port   Maximum stack height: 2,4 m   Container ship   Maximum stack height: 5 m   Container ship   Container ship   Maximum stack height: 5 m   Container ship   Container ship   Container ship   Container ship   Maximum stack height: 5 m   Container ship   Container s	No.	Activity	Hazard	Correspond test item	Selection of test method
Transport to port   150 km, paved road, by trailer   150 km, paved road, paved road, by trailer   150 km, paved road, by trailer   150 km, paved road,	1	Unitization at factory	Machine handling	Rotational drop test: B2	6.5.3
Transport to port  Storage at port  Transport by ship  Transport container ship  Storage operation by forklift  Storage operation by forklift  Storage at warehouse  Reload to local distribution truck  Transport to final destination  Unloading at final destination  Transport to final destination	c	000000000000000000000000000000000000000	ttps	Rotational drop test: B2	6.5.3
Transport to port  Storage at port  Load to container ship  Transport by ship  Unload from container to warehouse Storage operation by forklift  Storage at warehouse  Transport to final destination  Transport to final destination  Unloading at final destination  Storage at warehouse  Transport to final destination  Transport to final destination  Transport to marehouse  Transport to final destination	7	Container toaumg by torking	Macinine namuning	Horizontal impact test: B3	6.5.4
Storage at port  Load to container ship  Transport by ship  Unload from container ship  Storage operation by forklift  Storage at warehouse  Characterian at warehouse  Transport to final destination  Unloading at final destination  Transport  Maximum stack height: 2,4 m 2,	3	Transport to port		Vertical random vibration test: A1	6.4.2
Load to container ship  Transport by ship  Unload from container ship  Unloading at final destination  Load to container ship  Wachine handling  Vibration  Wachine handling	4	Storage at port		Compression test: C	9.9
Transport by ship  Transport by ship  Unload from container ship  Transport container to warehouse  Storage at warehouse  Transport to final destination  Unloading at final destination  Transport to final destination  Man handling  Vibration  Machine handling  Machine handling  Machine handling  Machine handling  Machine handling  Machine handling  Transport to final destination  Partly unpaved, truck  Man handling  Man handling  Man handling  Man handling  Man handling  Man handling	Ц	I out to coute in our chira	rds	Rotational drop test: B2	6.5.3
Transport by ship  Unload from container ship  Unload from container ship  Maximum stack height: 2,4 m2 5 container to warehouse  Storage operation by forklift  Storage at warehouse  Storage at warehouse  Beload to local distribution truck  Transport to final destination  Unloading at final destination  Transport by trailer 2,4 m2 5 container 2,4 m2 5 c	c 	Load to container sinp	macinile namuning	Horizontal impact test: B3	6.5.4
Transport to final destination  Unload from container ship  Maximum stack height: 2,4 m, o o o o o o o o o o o o o o o o o o	7	Transfer of the contract of th	Vibration Vibration	Vertical random vibration test: A1	6.4.2
Unload from container ship  Transport container to warehouse  Storage operation by forklift  Storage at warehouse  Storage at warehouse  Character of inal destination  Unloading at final destination  Unloading at final destination  Unloading at final destination  Transport to final destination  Unloading at final destination  Transport to final destination  Man handling	o 	itansport by suip		Compression test: C	9.9
Transport container to warehouse  Storage operation by forklift Storage at warehouse  Storage at warehouse  Beload to local distribution truck  Transport to final destination  Unloading at final destination  Transport container to warehouse  Man handling	7	Unload from container ship	Machine handling	Rotational drop test: B2	6.5.3
Storage operation by forklift  Storage at warehouse  Storage at warehouse  Reload to local distribution truck  Transport to final destination  Unloading at final destination  Storage operation by forklift  Machine handling  Mach	0	The state of the s	2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Vertical random vibration test: A1	6.4.2
Storage operation by forklift Storage at warehouse Storage at warehouse  De-banning at warehouse Reload to local distribution truck  Transport to final destination Unloading at final destination  Storage operation by forklift  Man handling	0	it alispoit container to warenouse	3 000 kili, paveu i oau, by u aliel	Horizontal impact test: B3	6.5.4
Storage operation by forklift  Storage at warehouse  Storage at warehouse  De-banning at warehouse  Reload to local distribution truck  Transport to final destination  Unloading at final destination  Storage at warehouse  Maximum stack height: 5 m Si			SO nda	Rotational drop test: B2	6.5.3
Storage at warehouse  De-banning at warehouse Reload to local distribution truck  Transport to final destination Unloading at final destination  Storage at warehouse  Man handling  Partly unpaved, truck Partly air cargo  Man handling	_	Storage operation by forklift	Maciline namening	Horizontal impact test: B3	6.5.4
De-banning at warehouse Reload to local distribution truck Transport to final destination Unloading at final destination  Temperature/Humidity  Man handling  Man handling  Partly air cargo  Man handling  Man handling  Man handling  Bath	n	Storage at warehouse		Compression test: C	9.9
De-banning at warehouse Reload to local distribution truck Transport to final destination Unloading at final destination  De-bandling  Man handling  Man handling  Man handling  Man handling  Man handling  Man handling			Temperature/Humidity $+ = 0$	Temperature and humidity environmental test: D1	<u>7.9</u>
Transport to final destination  Organical destination  Organical destination  Man handling  September 1.10	10	De-banning at warehouse Reload to local distribution truck	20 151f9d 80-20	Free-fall test: B1	<u>6.5.2</u>
Transport to final destination  Partly air cargo  Onloading at final destination  Man handling  Bartly air cargo  Annoading at final destination  Man handling  Bartly air cargo  Annoading at final destination  Man handling				Random vibration: A1	6.4.2
Unloading at final destination Man handling 4-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5	11	Transport to final destination		Random vibration test in rough road transportation: A3	6.4.4
Unloading at final destination Man handling 49-9-9-9-9-9-9-9-9-9-9-9-9-9-9-9-9-9-9-				Low pressure test: D2	<u>8.9</u>
<b>V</b> 9f-a978	12	Unloading at final destination		Free-fall test: B1	6.5.2
			9f-a978-	V	