IPS Technology
Packaging Tooling Testing

Transport simulation on Plastic drums – Cordstrap CC65 and CB6S - Drumclip DC19B GREEN

Test Report IPS8858-80 | ISTA-3E2017

ista
CERTIFIED LABORATORY

The IPS-report may be released for viewing to relevant parties.

IPS Technology is an independent packaging and tooling design agency. Aside from designing IPS also performs research, delivers advice on packaging issues and performs packaging test in its own test facility.

Test conducted on 24 February 2022

Boschdijk 760
5624 CL Eindhoven
IPS Technology is een handelsnaam van Industrial Packing Support BV

T: +31 (0)40 2647 200
I: www.ips-technology.com
E: info@ips-technology.com

IBAN: NL14 ABNA 0601 3712 08
BIC: ABNANL2A
BTW: NL814301216B01
KvK: 17136987

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Internal Doc ID#: IPS8858-80

ISTA 3E version 2017

Date of report: 25 February 2022

CUSTOMER INFORMATION

Client: Geba Innovations **ATTN:** Wouter Geldhof

Project name: Transport simulation on metal drums - Cordstrap CC65 and CB6S - 4x Drumclip DC19B GREEN

LAB INFORMATION

Testing Lab: IPS-Technology
Location: Boschdijk 760, 5624 CL Eindhoven, The Netherlands
ISTA Member: ST-9778

Date of Test: 24 February 2022

Test performed by: Otto van den Berg

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PRODUCT & PACKAGING INFORMATION

Packed product(s) and packaging description	4 plastic drums on a wooden pallet, strapped Cordstrap CC65 and CB6S and 4x Drumclip DC19B GREEN.
Packed pallet dimension	116 x 116 x 108 [mm]
Packed pallet weight	916 [kg]
Packed pallet degradation allowance	If no conditions are provided by the customer, IPS will adopt a "PPDA" as follows: **The packed pallet may show damaging marks, but still needs to bundle, protect and support the content in a functional way.**
Product Damage Tolerance	Individual packages and products contained are not within the scope of this test, and are not opened or checked.

CONCLUSIONS

Testing is done according to plan and no incidents occurred during testing.

Pallet is functional, strapping and Drumclips are in place. Drums are bundled, protected and supported as stated in the "PPDA" above.

The package therefore **PASSES** the test.

Eindhoven, 28 February 2022

Test Engineer:
Otto van den Berg

Checked by:
Johan Bruins

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TEST RESULTS

Overview Recommendations	Testing is performed according to plan and without incidents.
Packaging Condition	Packaging is functional after all tests.
Product Condition (if inspected)	Drumclips are undamaged and in the correct position. Cordstraps are undamaged.

	Test	Value	OBSERVATIONS Items in Grey are not performed. Items in red are not completed.
BLOCK 1	**Temp and Humidity**		23°C and 50% Humidity
BLOCK 2	Shock: Horizontal Impact	1.2 m/s	
BLOCK 3	Shock: Rotational edge drop	150 mm	
BLOCK 4	Compression: Apply and release	3847 kg	
BLOCK 5	Vibration: Random	1 hour	
BLOCK 6	Shock: Rotational edge drop	150 mm	

Package after testing

Product after testing

ISTA 3E version 2017

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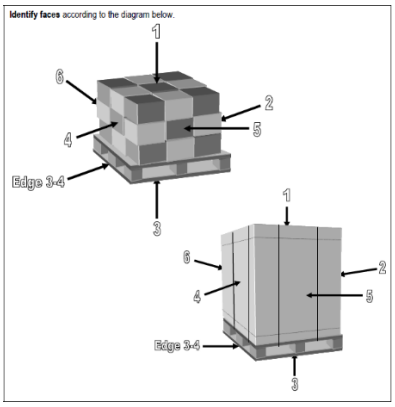
PRE-TEST INSPECTION

Product Condition	Drums have some dents. Pallet is undamaged. Drumclips and Cordstraps are new and installed after arrival at IPS testlab.
Packaging Condition before testing	NEW re-packaged with new materials before testing.
Additional Notes	Re-strapping is done by Geba employee with appropriate tools, conform packaging guidelines of Geba.

Package as received



Identification of sides

Pallet re-strapped

TEST SUMMARY

Described in this test report is a transport simulation test. The goal of this test, performed according the ISTA 3E version 2017 standard for Unitized Loads, is to validate how the packed pallet, and the Cordstrap and Drumclip in particular, handle shocks and vibrations during transport. An engineer of Geba Innovations is present during testing. Before testing, the pallet is re-strapped using new Drumclips and new Cordstraps, with the proper tools according to the packaging guidelines of Geba. All testing is done without the transport belt over the pallet as prescribed by the Geba packaging guidelines. After the test the pallet, Cordstraps and Drumclips are inspected by engineers of IPS Technology.

Further inspection (done by the customer) is not within the scope of this test report.
The following tests are conducted in sequence:

Items in grey are not performed as agreed by the customer.

Sequence Number	Test category	Test Type	Test Level	For ISTA Certification
1	Atmospheric Preconditioning TEST BLOCK 1	Temperature and Humidity	Ambient	Required
*	Atmospheric Conditioning TEST BLOCK 1	Controlled Temperature and Humidity	Temperature and Humidity chosen from chart	Optional
2	Shock (alternative methods allowed) TEST BLOCK 2	Inclined Impact	1.2 m/s	Required
		Horizontal impact	1.2 m/s	
3	Shock TEST BLOCKS 3	Rotational edge drop	150 mm	Required
4	Compression (alternative methods allowed) TEST BLOCK 4	Apply and release	Truck or Truck & Air dependent	Required
		Apply and hold		
		Weight and load spreader		
5	Vibration BLOCK 5	Random	Overall Grms levels of 0.54	Required
6	Shock TEST BLOCK 6	Rotational Edge Drop	150 mm	Required

ATMOSPHERIC PRECONDITIONING

The package is preconditioned to laboratory ambient temperature and humidity (23^0C, 50% RH) for at least 12 hours prior to testing.

SHOCK: HORIZONTAL IMPACT

Rolling floor | water tank counter weight | steel wall

The packed pallet is exposed to horizontal impacts to all four sides. Impact velocity is 1.2 m/s.

Test setup face 4

After test face 4

Test observations	No remarkable events occurred during testing.

SHOCK: FIRST ROTATIONAL EDGE DROP

Wooden beam | Wooden block | Rope

Based on the mass of the packed pallet, 916 kg, the drop height is set at 150 mm. During the drop test, the side opposite to the drop side is supported by a timber with a height of 100 mm. Two long edges and a short edge are tested.

Test setup

Test observations	No remarkable events occurred during testing.

COMPRESSION: APPLY AND RELEASE

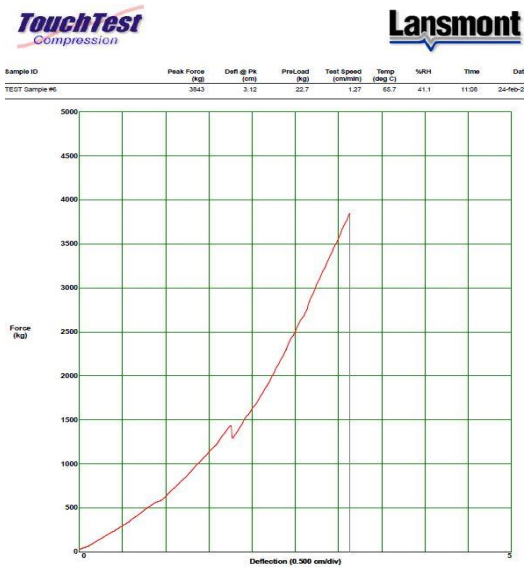
Compression tester: **Lansmont Corp** | Type: **152-50K** | Last calibrated/valid until: **20-11-2017/20-11-2020**

The packed pallet is exposed to a 'Apply and Release' compression test according the ISTA 3E test protocol and calculation.

AR = {[Wt x (S-1) +(Wt/L) x (L-1)] x F – (Wt / L) x (L-1)} x 1,4 x 9,8

AR = {[916 x (2-1) +(916/1) x (1-1)] x 3 – (916/ 1) x (1-1)} x 1,4 x 9,8

Wt	Total weight of packaged product (Kilograms)	916 Kg	
S	Total number of potential unitized loads in a vehicle stack	2	Including the bottom unitized load
L	Total number of layers in the unitized load	1	
F	Compensating factor	3	Typical compensating factor
9,8	Metric conversion factor	9,8	
1,4	Factor to account for time of compression	1,4	
AR	Result of calculation: Test Load for Apply and Release (Newton)	37700 N	= 3847 Kg



Test setup

Test observations

The test is performed with a pallet on top of the packet pallet. This is done in order to simulate a stacking load "footprint" of similar packed pallets.
The package withstood the compression test without problems.

RANDOM VIBRATION: STEEL TRUCK PROFILE

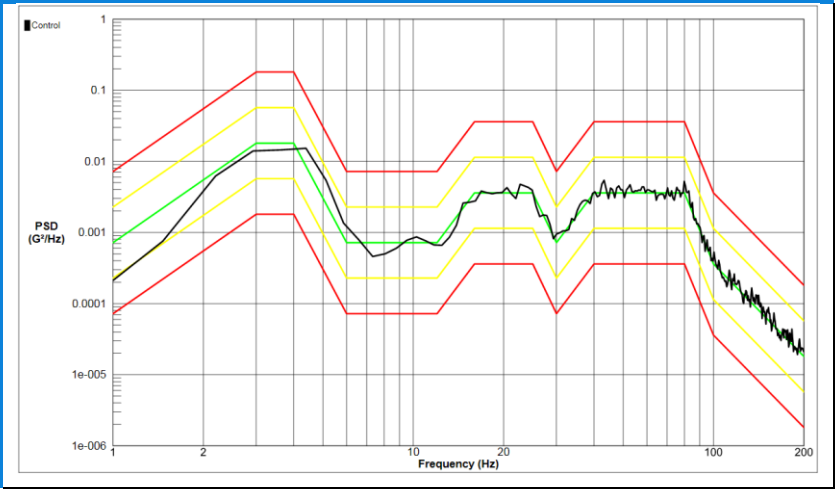
Vibration table: **Lansmont Corp.** | Type: **10000 TTV** | Last calibrated/valid until: **24-11-2020 / 24-11-2023**

The packed pallet is placed on the vibration table and is handled as 'loose load' shipment, not attached to the table. This is not in compliance with the Geba packaging guidelines. The duration of 60 minutes is specified by the customer and is equivalent to 480 km truck transport.

Test profile and settings

Frequency (Hz)	PSD Level (g^2/Hz)
1.0	0.00072
3.0	0.018
4.0	0.018
6.0	0.00072
12.0	0.00072
16.0	0.0036
25.0	0.0036
30.0	0.00072
40.0	0.0036
80.0	0.0036
100.0	0.00036
200.0	0.000018

Typical graph of **ISTA 3E Steel spring truck Spectrum**



Test setup

Test observations	No remarkable events occurred during testing.

SHOCK: SECOND ROTATIONAL EDGE DROP

Wooden beam | wooden block | rope

Test setup similar to first drop test.

Test setup

After test

Test observations	Pallet cracked but still functional.

POST TEST PICTURES

After the test the packaging and the product is photographed to show how the packaging and product endured the testing.

Packaging

Extra

Post test observations	After execution of the complete test cycle no remarkable/unexpected damages to the packed pallet or its components are found. Drums are contained, secured and stable on the pallet.
Recommendations	

END OF REPORT