Drop test

2020-03-DHL-FROZEN SOLUTION-MEDIUM BELGIUM-03 (Pellets)

dated

March 26, 2020

Client:	DHL Express
Unit/s under test (UUT):	DHL Frozen Solution Medium Belgium box 11507 – passive temperature maintenance systems
Test specification:	Drop test based on ADR P650/IATA PI650 / UN3373
Test scope:	Drop test of the test sample based on ADR P650/IATA PI650 with five different drop orientations Drop height: 1.20 m

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1 Test Facility

Schaumaplast Reilingen GmbH
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Note
The Schaumaplast drop test facility complies with the BAM (1) guideline 6.0 section 6.2 and with ADR section 6.1.5.3.4. However Schaumaplast / the test facility is *not* BAM accredited.
The tests were carried out to the best of our knowledge and belief.
(1) BAM – Bundesanstalt für Materialforschung und -prüfung

2 Client

DHL-Express commissioned Schaumaplast Group to carry out the following test on an insulated shipper consisting of corrugated carton (outer packaging 1), EPS box (outer packaging 2), primary and secondary packaging (inner packaging) and dry ice as cooling medium:

- **Drop test according to packing instruction P650 (ADR/IATA), described / specified also in section 6.1.5.3 (ADR 2019).**

Remarks:

- **The specifications of the drop test according P650 (ADR) and PI650 (IATA) are identical.**
- It should be noted that the complete packaging was not subjected to any irrigation test (ADR section 6.3.5.3.6.1) and pre-conditioning process (ADR section 6.3.5.3.6.1) prior to the drop test. The test sample had room temperature when the test was conducted.
- The regulations allow a new sample to be used for each drop. In this case, one and the same sample was used for all five drop tests with full load and for one subsequent drop with minimum load (worst-case scenario).
- Paragraph 9 in P650 is, according to customer statements, ensured in a regular shipment by an always remaining residual quantity of the cooling medium. This means that in the present case the product is fixed by overdimensioning of the cooling medium.
- The packing instruction P650 is valid for UN 3373 (packaging used for the transport of biological substances, cat B)

3 Description of construction

3.1 Outer packaging (1)

Designation	Folding box made of corrugated board according to FEFCO 0711
Inner dimension	419 x 349 x 290 mm
Outer dimension	425 x 355 x 300 mm
Wave thickness	approx. 3 mm
Material	Corrugated board
Closure type	Flap adhesion
Manufacturer	Liebensteiner Kartonagenwerk GmbH

Table 1: Specification of the outer packaging (1)

3.2 Outer packaging (2)

Designation	Neopor box 10594
Inner dimension	315 x 245 x 185 mm
Outer dimension	415 x 345 x 285
Wall thickness	50 mm
Effective volume	14.3 L
Density	25.0 g/L
Weight	660 g
Manufacturer	Schaumaplast Reilingen GmbH

Table 2: Specification of the outer packaging (2)

3.3 Inner packaging

3.3.1 Primary packaging

Designation	Tube with premounted cap
Diameter	15.3 mm
Length	92 mm
Nominal volume	10 ml
Quantity	12
Material	Polypropylene (PP)
Closure type	Screw cap
Manufacturer	SARSTEDT AG & Co. KG

Table 3: Specification of the primary packaging

3.3.2 Secondary packaging

Designation	Security pressure bag
Dimension	275 x 190 mm
Pressure stability	95 kPa

Table 4: Specification of the secondary packaging

3.4 Information on the intended content

Liquid substances

4 Drop tests

4.1 Full load

Drop foundation	Concrete foundation with 20 mm thick steel plate
Drop mechanism	Drop test system with electromagnetic activation
Drop height	1.20 m (packing group II)
Test medium	Primary packaging filled with antifreeze (min. 98% filling level)
Cooling medium	Dry ice pellets (16mm)
Total weight [kg]	12.6 kg
Temperature test medium & primary packaging	-20±2 °C (initial)
Drop orientation	• Drop Test 1: Flat on the bottom • Drop Test 2: Flat on the upper side • Drop Test 3: Flat on the longest side • Drop Test 4: Flat on the shortest side • Drop Test 5: On one corner
Test climate	room climate, unregulated

Table 5: Specification of the drop test – full load

4.2 Minimum load

Drop foundation	Concrete foundation with 20 mm thick steel plate
Drop mechanism	Drop test system with electromagnetic activation
Drop height	1.20 m (packing group II)
Test medium	Primary packaging filled with antifreeze (min. 98% filling level)
Cooling medium	none
Total weight [kg]	1.6 kg
Temperature test medium	-20±2 °C (initial)
Drop orientation	On one corner
Test climate	room climate, unregulated

Table 6: Specification of the drop test – minimum load

4.3 Summary

The six drop tests were carried out with one and the same sample (worst case scenario). No leakage of test medium from the primary packaging could be detected neither after any of the five cases with full load nor after the single drop test without cooling element, in which only the test product was in the transport box.

Based on the listed test results it is confirmed that the tested packaging passed the drop tests in accordance with packing instruction P650 (ADR/IATA). The test report may become invalid if other packaging methods are used or if other packaging components are used.

5 Photo documentation

Figure 1: Packaging components

Figure 2: Temperature of the test medium

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Figure 3: Package

Figure 4: Mass of dry ice

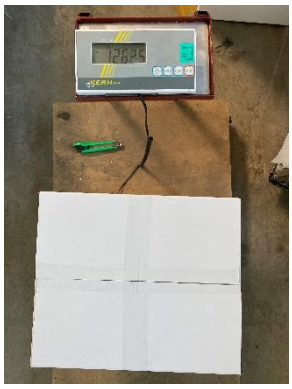

Figure 5: Total weight

Figure 6: Drop system

Figure 7: Drop height

Figure 8: Test sample after drop test 1

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Figure 9: Test sample after drop test 2

Figure 10: Test sample after drop test 3

Figure 11:Test sample after drop test 4

Figure 12: Test sample after drop test 5

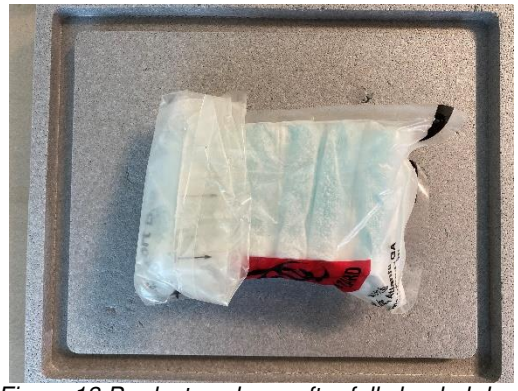

Figure 13:Product package after fully loaded drop test

Figure 14: Product package after minimum loaded drop test

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Final note

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