Test Certificate No. B 13122.1/24-6

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3, BUKJEONGSEO-GIL, YANGSAN-SI, GYEONGSANGNAM-DO,
REPUBLIC OF KOREA

Test order Electrical measuring of a **Type B-FIBC** acc. IEC 61340-4-4:2018

Test piece ***Flexible Intermediate Bulk Container (FIBC without inliner)***

Date of receipt 21.05.2024

Design

Manufacturer's type designation Coffee creamer bag

Dimensions	(104 cm x 104 cm) x 120 cm **Volume** 1550 litres **Tare** 2900 g
Fabric of wall, bottom and base	Circular fabric, Polypropylene 196 g/m², uncoated, white fabric with 20 blue coloured tapes and eight interwoven reinforcing stripes
Fabric of skirt and discharge spout	Polypropylene 53 g/m² + 13 g/m² coating, white fabric without colored characterization
Suspension	Four blue PP-webbings (70 mm wide, 53 g/m), sewn flat onto the reinforcing stripes in a length of 30 cm / 30 cm, cross corner design
Details	No vertical seams, four horizontal seams at the bottom (double lock stitching) / wall and base fabric folded in the bottom seams / top with skirt / discharge spout d = 45 cm, double seam, with four petal closure / additional trough-shaped base (104 cm x 105) cm x 25 cm, made out of PP-fabric, held in place by Velcro strips, with a 104 cm x 17 cm tunnel attached to one side / no liner / document pocket made of transparent PE material / SWL-label made of white taffeta material: front side with black, green and red ink, rear side unprinted / yellow label with electrostatic information made of taffeta PP material: yellow front side with black ink, rear side unprinted

1. Breakdown Voltages of the fabrics

The breakdown voltages of the fabrics shall be less than 6000 V.

Test regulations IEC 60243-2 "Methods of test for electric strength of solid insulation materials - Part 2: applied Additional requirements for tests using direct voltage"

Test apparatus High-voltage power supply: Labordata DSS 75/25 USB

Electrodes IEC 60243-1, Electrode device P75/P25

Test climate Temperature 23 ± 2 °C and 20 ± 5 % RH acc. IEC 61340-4-4:2018

Test conditions Five specimens of both fabrics and dual layers of the bottom fabric have been taken by a circular cutter (each specimen 100 cm^2) and have been installed into the measuring device LABORDATA P75/P25 USB (diameter of the electrodes d = 75 mm and d = 25 mm).

A direct voltage has then been applied and increased up to breakdown at a speed of 300 V/s acc. IEC 61340-4-4:2018. Five measurements have been performed on each specimen.

Test results

Fabric of wall
Range of 25 values: **2114 V to 2675 V**
Total average of breakdown voltage: **2384 V**

Fabric of skirt and discharge spout
Range of 25 values: **1010 V to 1333 V**
Total average of breakdown voltage: **1178 V**

Fabric of bottom with additional trough-shaped base
Range of 25 values: **3491 V to 4243 V**
Total average of breakdown voltage: **3920 V**

In detail the values are listed in annex 2.

2. Surface Resistivity of labels and document pockets

Type B FIBC labels and document pockets shall not be made from materials with Surface Resistivity of less than 1.0 x 10^9 Ω, tested at a climate of 23 ± 2 °C and 60 ± 5 % rH.

Test regulations IEC 61340-2-3 "Electrostatics - Part 2-3: Methods of test for determining the resistance and resistivity of solid planar materials used to avoid electrostatic charge accumulation"

Test apparatus Teraohmmeter Labordata AW 200-4, 10 V / 100 V

Electrodes IEC 61340-2-3, Ring electrode

Outer diameter of inner electrode: 30 mm
Inner diameter of annulus electrode: 56 mm
Outer diameter of annulus electrode: 64 mm

Test conditions The samples have been installed into the measuring device Labordata AW 200-4 and five measurements of both surfaces have been performed (preconditioning time > 12 h).

Test results

Document pocket

Front surface (Ω)	> 1.0 * 10^{13}	> 1.0 * 10^{13}	> 1.0 * 10^{13}	> 1.0 * 10^{13}	> 1.0 * 10^{13}
Rear surface (Ω)	> 1.0 * 10^{13}	> 1.0 * 10^{13}	> 1.0 * 10^{13}	> 1.0 * 10^{13}	> 1.0 * 10^{13}

Yellow label with electrostatic information

Front surface (Ω)	8.9 * 10^{12}	1.4 * 10^{12}	1.4 * 10^{12}	1.1 * 10^{12}	1.2 * 10^{12}
Rear surface (Ω)	1.7 * 10^{12}	2.4 * 10^{12}	2.3 * 10^{12}	1.3 * 10^{12}	1.6 * 10^{12}

SWL label

Front surface (Ω)	> 1.0 * 10^{13}	> 1.0 * 10^{13}	> 1.0 * 10^{13}	> 1.0 * 10^{13}	> 1.0 * 10^{13}
Rear surface (Ω)	> 1.0 * 10^{13}	> 1.0 * 10^{13}	> 1.0 * 10^{13}	> 1.0 * 10^{13}	> 1.0 * 10^{13}

3. Assessment of the test results

The FIBC is constructed from fabrics having an electrical breakdown voltage of less than 6000 V.

The materials of the doucment pocket, the SWL label and the yellow label have a surface resistivity of higher than 1.0 x 10^9 Ω.

The FIBC, the document pocket and both labels fulfill the conditions of IEC 61340-4-4:2018 "Standard test methods for specific applications – Electrostatic classification of flexible intermediate bulk containers (FIBCs) to be classified as

Type B FIBC without inliner

or in combination with suitable liners which meet the requirements of Type L2 or Type L3 acc. IEC 61340-4-4:2018 (see Note 6).

4. Notes

Note 1

Type B FIBCs shall be durably marked by means of permanently attached yellow labels, with at least the information and symbol ISO 7000-2415 as shown in annex 1.

The test piece has no liner.

It is not allowed to use liners without delivering proof of suitability.

Note 2

Type B-FIBCs are allowed to be used in zones 21 and 22 with MIE > 3 mJ, not allowed in zones 0, 1, 2 and 20.

The zones 0, 1 and 2 are places in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist

... is present continuously, for long periods or frequently.	= zone 0
... is likely to occur in normal operation occasionally.	= zone 1
... is not likely to occur in normal operation but, if it does occur, will persist for a short period only.	= zone 2

The zones 20, 21 and 22 are places in which an explosive atmosphere in a form of a cloud of combustible dust in the air

... is present continuously, for long periods or frequently.	= zone 20
... is likely to occur occasionally in normal operation.	= zone 21
... is not likely to occur in normal operations but, if it does occur, will persist for a short period only.	= zone 22

Note 3

It is the responsibility of the manufacturer to ensure the samples tested are representative of the production.

Note 4 If the electrical properties are guaranteed for each delivered FIBC and, at the same time, these properties are ensured by operational use on a continuous basis, then there is no electrostatic concern regarding the use of these Type B FIBCs in the above mentioned hazardous zones.

This statement applies on the condition that the manufactured FIBCs match the test sample. The conformity of the products manufactured by the manufacturer with the test sample is not monitored by LABORDATA.

Note 5 Testing and certifying of the Safe Working Load (SWL) acc. ISO 21898 was not subject of the order.

Note 6 Type L2 liner requirements:
The surface resistivity of both surfaces shall be between 1.0 x 10^9 Ω and 1.0 x 10^{12} Ω (no measurement of a breakdown voltage is required).

If the surface resistivity of one surface is between 1.0 x 10^9 Ω and 1.0 x 10^{12} Ω, and of the other surface higher than 1.0 x 10^{12} Ω, then in addition, a breakdown voltage of less than 4000 V is required.

Type L3 liner requirements:
The surface resistivity of both surfaces shall be higher than 1.0 x 10^{12} Ω and the breakdown voltage of less than 4000 V is required.

Note 7 This certificate expires on 10.06.2027.

Competent Engineer

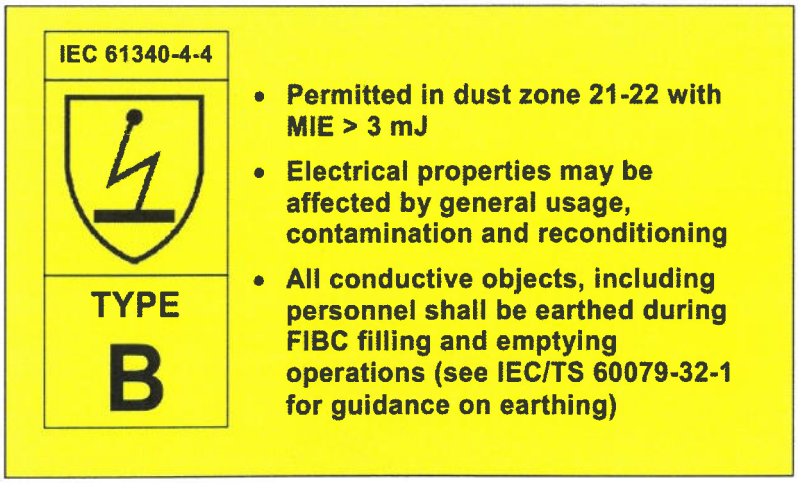
Dipl.-Inform. Fröchtling

Head of Institute

Dr.-Ing. Kielbassa

Annex 1 / Test Certificate No. B 13122.1/24-6

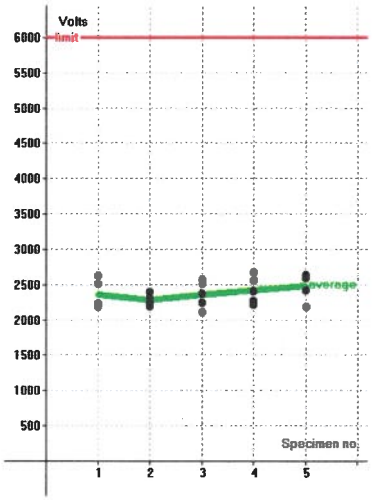
Photo of the test piece



Sample label of Type B-FIBC

Annex 2 / Test Certificate No. B 13122.1/24-6

Breakdown voltages of wall

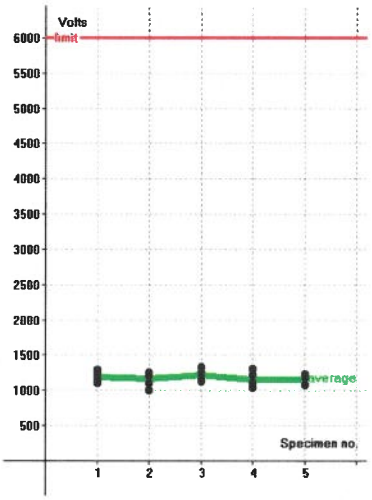


Specimen no.	Maximum voltage readings					Average Volts	Weight g/m²
1	2626	2187	2514	2226	2236	2357	198
2	2275	2192	2304	2241	2402	2282	196
3	2514	2114	2246	2373	2573	2364	196
4	2407	2270	2226	2563	2675	2428	198
5	2597	2187	2641	2602	2421	2489	195

Average weight without coating	197 g/m²
Standard derivation	171 V
Coefficient of variation	7 %
95% confidence interval	+/- 70 V

Maximum breakdown voltage 2675 V
Total average breakdown voltage 2384 V

Breakdown voltages of skirt and discharge spout

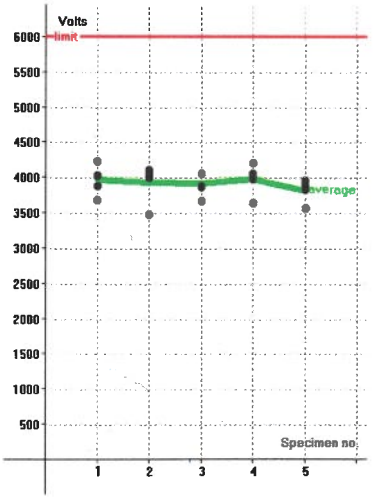


Specimen no.	Maximum voltage readings					Average Volts	Weight g/m²
1	1293	1186	1152	1108	1250	1197	67
2	1225	1108	1010	1210	1259	1162	68
3	1259	1225	1127	1147	1333	1218	70
4	1123	1215	1303	1040	1118	1159	67
5	1181	1079	1191	1225	1083	1151	69

Average weight, incl. coating	68 g/m²
Standard derivation	81 V
Coefficient of variation	6 %
95% confidence interval	+/- 33 V

Maximum breakdown voltage 1333 V
Total average breakdown voltage 1178 V

Breakdown voltages of bottom with additional trough-shaped base



Specimen no.	Maximum voltage readings					Average Volts	Weight g/m²
1	3691	3872	4018	4243	4023	3969	399
2	3994	3989	4101	3491	4052	3925	403
3	3876	4067	3681	3867	4062	3910	409
4	3984	3652	4047	4213	3989	3977	407
5	3950	3579	3872	3872	3828	3820	411

Average weight without coating	406 g/m²
Standard derivation	183 V
Coefficient of variation	4 %
95% confidence interval	+/- 75 V

Maximum breakdown voltage 4243 V
Total average breakdown voltage 3920 V