



SLOVENSKI STANDARD
oSIST prEN ISO 21898:2023
01-julij-2023

Embalaza - Prožni vsebniki FIBC za nenevarne snovi (ISO/DIS 21898:2023)

Packaging - Flexible intermediate bulk containers (FIBCs) for non-dangerous goods (ISO/DIS 21898:2023)

Verpackung - Flexible Großpackmittel (FIBC) für nichtgefährliche Güter (ISO/DIS 21898:2023)

Emballages - Grands récipients vrac souples (GRVS) pour matières non dangereuses (ISO/DIS 21898:2023)

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Packaging — Flexible intermediate bulk containers (FIBCs) for non-dangerous goods

Emballages — Grands récipients vrac souples (GRVS) pour matières non dangereuses

ICS: 55.180.99

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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ISO/DIS 21898:2023(E)**Foreword**

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 21898 was prepared by Technical Committee ISO/TC 122, *Packaging*, Subcommittee SC 3, *Performance requirements and tests for means of packaging, packages and unit loads*.

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Packaging — Flexible intermediate bulk containers (FIBCs) for non-dangerous goods

1 Scope

This document specifies materials, construction and design requirements, type test, certification and marking requirements for flexible intermediate bulk containers (FIBCs) intended to contain non-dangerous solid materials in powder, granular or paste form, and designed to be lifted from above by integral or detachable devices.

Guidance is also provided on the selection and safe usage of FIBCs.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 4892-3, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps*

ISO 4892-4, *Plastics — Methods of exposure to laboratory light sources — Part 4: Open-flame carbon-arc lamps*

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

ISO 13934-1, *Textiles — Tensile properties of fabrics — Part 1: Determination of maximum force and elongation at maximum force using the strip method*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 General

3.1.1

flexible intermediate bulk container

FIBC

intermediate bulk container having the body made of flexible material such as woven plastic fabric or plastics film, designed to be in contact with the contents, either directly or through an inner liner, and collapsible when empty

3.1.2

heavy-duty reusable flexible intermediate bulk container

FIBC designed and intended to be used for a multitude of fillings and discharges, and both factory and field repairable in such a way that the tensile strength across a repair is at least as great as that of the original

ISO/DIS 21898:2023(E)**3.1.3****standard-duty reusable flexible intermediate bulk container**

FIBC designed and intended to be used for a limited number of fillings and discharges

Note 1 to entry: An FIBC of this category cannot be reused if damaged, i.e. it is not repairable.

Note 2 to entry: The replacement of a removable inner liner is not considered a repair.

3.1.4**single-trip flexible intermediate bulk container**

FIBC designed and intended to be used for one filling only

Note 1 to entry: An FIBC of this category cannot be reused. Neither replacement of an inner liner nor repair of the FIBC is relevant to this category.

3.1.5**FIBC type**

FIBCs of like design, manufactured using like materials and methods of construction (giving at least equal performance) to the same nominal cross-sectional dimensions

Note 1 to entry: Within a type, the circumference may be increased by up to 10 % by comparison with samples passing a type test, provided the same geometry is maintained. Where the type has a base discharge spout, smaller diameter discharge spouts of like design may be used.

Note 2 to entry: The presence or absence of an inner liner does not constitute a change of type.

3.1.6**safe working load****SWL**

maximum load which the FIBC may carry in service, as certified

3.1.7**safety factor****SF**

integer quotient between the final test load in the cyclic top lift test and the SWL value rounded down

Note 1 to entry: Safety factors may be illustrated as follows (see also [B.3.3](#)):

| | Example 1 | Example 2 |
|--------------------------------|------------------|------------------|
| Designated SWL | 500 kg | 500 kg |
| Final load, cyclic test | 2 400 kg | 2 600 kg |
| Quotient | 4,8 | 5,2 |
| Integer quotient, rounded down | 4 | 5 |

Note 2 to entry: The results in Example 1 above indicate a single-trip FIBC which does not meet the requirements of this International Standard, whilst those in Example 2 indicate a single-trip FIBC which meets the requirements.

3.1.8**lifting device**

integral and/or fixed lifting devices which form part of the FIBC and are tested with it

Note 1 to entry: Detachable lifting devices are regarded as lifting tools.

3.1.9

bulk material

FIBCs are intended to contain solid materials in powder, granular or paste form (see item 1 Scope). The transport of coarse sharp-edged materials in FIBCs is a non-standard use. Such materials may only be transported in FIBCs that are marked with a special label. The special label is issued when the FIBCs have been tested with the intended filling material.

3.2 FIBC parts

3.2.1

walls

tube of one or more layers, seamless or made out of one or more panels joined together

3.2.2

base

that part of the FIBC which is connected to or integral with the walls and forms the base of the standing FIBC

3.2.3

plain base

base without an opening

3.2.4

base with opening

flat, conical or in another way formed base with an opening

3.2.5

full open base

extensions to the wall(s), forming the base of the FIBC after closing

3.2.6

top

upper part of the FIBC, excluding handling devices, forming the top of the FIBC after closing

3.2.7

body

walls and base of the FIBC

3.2.8

inner liner

integral or removable container which fits into the FIBC

3.3 Operating devices

3.3.1

filling opening

opening for filling the FIBC

3.3.2

filling spout

tube-shaped part at the top for filling the FIBC

3.3.3

filling slit

slit-shaped opening at the top for filling the FIBC

3.3.4

outlet

opening for discharging the FIBC

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3.3.5

discharging spout

tube-shaped part at the base for discharging the FIBC

3.3.6

closing parts

webbing, cords, straps, etc. which are used to close the filling and discharging devices

3.4 Handling devices

3.4.1

supporting and lifting devices

webbings, loops, ropes, eyes, frames or other devices formed from a continuation of the walls of the FIBC, which are integral or detachable, and are used to support or lift the FIBC

3.4.2

four-point lifting

four lifting devices used simultaneously to lift the FIBC

3.4.3

two-point lifting

two lifting devices used simultaneously to lift the FIBC

3.4.4

one-point lifting

one lifting device, or one or more lifting devices brought to one point for lifting

3.5

safety and protection devices

valves, ventilation devices and additional parts which protect the filling, discharging or handling devices

3.6

coated and laminated materials

materials having a surface coating or comprising two or more layers laminated together to protect the contents of the filled FIBC or to protect the environment against the effects of leakage of the contents

3.7 Special treatments

3.7.1

stabilization

modification of the FIBC materials to give better resistance against weathering and ageing

EXAMPLE The addition of an ultraviolet (UV) absorber and/or an antioxidant.

3.7.2

electrostatic conductivity treatment

treatment for modifying the electrostatic behaviour of the FIBC

3.7.3

insect-repellent treatment

treatment for increasing the ability of the FIBC to protect itself and/or its contents against insect attack

3.7.4

flame-retardant treatment

treatment to impart flame resistance to the FIBC

4 Materials, construction and design

4.1 Materials

All categories of FIBC shall be manufactured from flexible materials covered by a written specification. The FIBC manufacturer shall have an authorized statement of conformity for each separate batch of materials.

The properties of the materials may be modified by additives to improve the resistance of the materials against, for example, degradation by heat and sunlight, and to reduce the effect of static electricity.

All load-bearing materials of the FIBC shall be tested in accordance with the test method specified in [Annex A](#) and shall retain at least 50 % of their initial values of the force at rupture and elongation at rupture.

Other light sources than this specified in [Annex A](#) can be used. Details of these other light sources are given in [Annex F](#) (informative).

In case of dispute, the light source specified in [Annex A](#) shall be used.

Materials should be chosen and joined together in such a way that recovery is promoted.

4.2 Construction

All stitched seams and joints shall be locked off and/or back sewn, or provided with a minimum 20 mm tail. All stitched seam-ends shall be secured. The surfaces to be joined by welding, gluing or heat-sealing shall be clean.

4.3 Design filling height

The designed filling height of the FIBC shall be between 0,5 and 2 times the shortest horizontal dimension of the FIBC.

NOTE For FIBCs with a circular cross-section, the shortest horizontal dimension is normally the diameter of the FIBC base, even if the base has square dimensions. For FIBCs with a rectangular base, the shortest horizontal dimension is normally the shortest side.

4.4 Recycled materials

RM (recycled mono-materials*) can be used for all components of the FIBC.

As long as the following point is observed, there is no percentage restriction on the use of recycled materials.

- FIBCs from recycled material must fulfil the same test criteria as FIBCs made of virgin material. (see chapter [5](#) and [annex A](#))
- If the application allows the use of liners from recycled materials, it has to fulfil the same test criteria as liners made of virgin material.

* 95 % or more of the same polymer

5 Performance

5.1 Type-testing

All FIBC types shall be subjected to the following tests:

- a) cyclic top lift;

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b) compression/stacking test.

At least three specimens of each FIBC type shall be submitted for testing leading to certification. The specimens shall be tested as follows.

- Specimen 1: cyclic top lift test using the FIBC having the shortest vertical dimension.
- Specimen 2: cyclic top lift test using the FIBC having the greatest vertical dimension.
- Specimen 3: compression test using the FIBC having the greatest vertical dimension.

To comply with this International Standard the three specimens shall all withstand the tests.

When the FIBC type has only one fixed vertical dimension, only Specimens 1 and 3 need be submitted and tested to withstand the tests.

One tested sample shall be durably identified and retained for reference in any later complaint or arbitration.

Tests shall be carried out at a testing facility capable of meeting the operational provisions of ISO/IEC 17025.

5.2 Preparation of FIBC for test

5.2.1 Filling

For both the top lift and compression/stacking test, the FIBC shall be filled to the level specified in accordance with [4.3](#) by the manufacturer/supplier with a tolerance of between 0 to +5 % of that height. The FIBC shall be filled with either

- a) a material, e.g. plastics granules, having the following mechanical properties:
 - bulk density, 400 kg/m³ to 900 kg/m³,
 - mesh size 3 mm to 12 mm,
 - angle of repose 30° to 35°, or
- b) the actual contents to be carried, when these are known, and where their use will not itself be a hazard

NOTE When option b) is chosen, the FIBC type is certified in relation to that specific product only.

5.2.2 Conditioning

The filled FIBC shall be conditioned before testing at ambient temperature and relative humidity. However, in the event of dispute, testing shall be carried out after conditioning under standard conditions of (23 ± 2) °C and (50 ± 5) % relative humidity.

5.3 Test requirements

5.3.1 Cyclic top lift test(s)

Cyclic top lift test(s) shall be carried out in accordance with [Annex B](#) and the following criteria shall apply:

- a) there shall be no breakage of any lifting devices to the extent that any of the lifting devices ceases to support its load; and
- b) when tested with an inner liner, there shall be no protrusion of the latter beyond the outer surface of the FIBC, except through the closure(s), where this is a design feature; and

- c) there shall be no loss of contents; and
- d) no deterioration of the body which renders the FIBC unsafe for transport or storage.

A slight discharge during the test (e.g. from closures or stitch holes) should not be considered to be a failure of the FIBC, provided that no further leakage occurs after the FIBC has been raised clear of the ground.

5.3.2 Compression/stacking test

The compression/stack test shall be carried out in accordance with [Annex C](#) and the following criteria shall apply:

- a) there shall be no loss of contents; and
- b) no deterioration of the body which renders the FIBC unsafe for transport or storage.

A slight discharge during the test (e.g. from closures or stitch holes) should not be considered to be a failure of the FIBC, provided that no further leakage occurs after the FIBC has been raised clear of the ground.

6 Certification

It is recommended that an FIBC type which conforms to the requirements of this International Standard should be certified by a body working under appropriate operational provisions (such as those given in ISO/IEC Guide 65) with a certificate of conformity based on a successful test report(s). ISO/IEC Guide 65 may often be used but it is not a requirement of this International Standard that it shall be used. Where, however, testing and certification are carried out by the same organization, separate individuals shall be responsible for the tests and for the certification based on them, and shall be clearly identified in the documentation.

The certificate shall contain the data shown for the marking specified in [Clause 7a](#)) to i) and [Clause 7k](#)) to m), together with

- a) the name(s) and address(es) of the certifying body and of the test station(s), together with the reference(s) and date(s) of the relevant test report(s), and
- b) the material used as contents in the cyclic top lift and compression/stacking tests.

A certificate for an FIBC type shall be valid for a period of three years from the date of issue.

An FIBC certified and marked as a single-trip FIBC in conformity with this International Standard shall not be reused.

An FIBC certified and marked as a reusable (heavy- or standard-duty) FIBC in conformity with this International Standard shall be reused only with the same type of contents as in the first use.

Reuse of FIBCs with contents differing from those of the first use is not in accordance with this International Standard.

7 Marking

All FIBCs shall be durably marked by means of a permanently attached and easily visible and readable label, or durably printed on the body so that it is easily visible and read after the FIBC has been filled. The following data shall be included:

- a) name and address of the manufacturer;
- b) manufacturer's reference, which shall be unique to any one FIBC type;