PUBLICLY AVAILABLE SPECIFICATION

ISO/PAS 17712

Second edition
2006-07-01

Freight containers — Mechanical seals

Récipients de fret — Joints mécaniques

Reference number
ISO/PAS 17712:2006(E)

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Published in Switzerland

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Foreword

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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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

— an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;

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An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/PAS 17712 was prepared by Technical Committee ISO/TC 104, *Freight Containers*.

This second edition cancels and replaces the first edition (ISO/PAS 17712:2003), which has been technically revised.

Freight containers — Mechanical seals

1 Scope

This Publicly Available Specification establishes uniform procedures for the classification, acceptance and withdrawal of acceptance of mechanical freight container seals. It provides a single source of information on mechanical seals which are acceptable for securing freight containers in international commerce.

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

ISO 9001, *Quality management systems — Requirements*

3 Terms and definitions

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

3.1
seal
mechanical device marked with a unique identifier, which is externally affixed to the container doors, and designed to evidence tampering or intrusion through the doors of a container and to secure closed the doors of a container

NOTE In addition, depending on its construction, the seal provides varying degrees of resistance to an intentional or unintentional attempt to open it or to enter the freight container through the container doors.

3.2
high security seal
seal constructed and manufactured of material such as metal or metal cable with the intent to delay intrusion

NOTE High security seals generally must be removed with quality bolt cutters or cable cutters. They require inspection to indicate whether tampering has occurred or entry has been attempted.

3.3
security seal
seal constructed and manufactured of material that provides limited resistance to intrusion and requires lightweight tools for removal

NOTE Security seals require inspection to indicate whether tampering has occurred or entry has been attempted.

3.4
indicative seal
seal constructed and manufactured of material that can easily be broken by hand or by using a simple snipping tool or shear

NOTE Indicative seals require inspection to indicate whether tampering has occurred or entry has been attempted.

4 Mechanical seal types and requirements

4.1 Wire seals

Wire seals consist of a length of wire secured in a loop by some type of seizing device.

EXAMPLES Crimp wire, fold wire and cup wire seals.

4.2 Padlock seals

Padlock seals consist of a locking body with a bail attached.

EXAMPLES Wire shackle padlock (metal or plastic body), plastic padlock and keyless padlock seals.

4.3 Strap seals

Strap seals consist of a metal or plastic strap secured in a loop by inserting one end into or through a protected (covered) locking mechanism on the other end.

4.4 Cable seals

Cable seals consist of a cable and a locking mechanism. On a one-piece seal, the locking or seizing mechanism is permanently attached to one end of the cable. A two-piece cable seal has a separate locking mechanism which slips onto the cable or prefabricated cable end.

4.5 Bolt seals

Bolt seals consist of a metal rod, threaded or unthreaded, flexible or rigid, with a formed head, secured with a separate locking mechanism.

4.6 Cinch or pull-up seals

Cinch or pull-up seals are indicative seals consisting of a thin strip of material, serrated or non-serrated, with a locking mechanism attached to one end. The free end is pulled through a hole in the locking mechanism and drawn up to the necessary tightness. Cinch or pull-up type seals may have multiple lock positions. These seals are generally made of synthetic materials such as nylon or plastic. They should not be compared to simple electrical ties.

4.7 Twist seals

Twist seals are made of steel rod or heavy-gauge wire of various diameters, which is inserted through the locking fixture and twisted around itself by use of a special tool.

4.8 Scored seals

Scored seals consist of a metal strip which is scored perpendicular to the length of the strip. The strip is passed through the locking fixture and bent at the score mark. Removal of the seal requires bending at the score mark which results in breakage of the seal.

4.9 Label seals

Label seals are frangible seals consisting of a paper or plastic backing with adhesive. The combination of backing and adhesive are chosen to cause the seal to tear when removal is attempted.

4.10 Barrier seals

Barrier seals are designed to provide a significant barrier to container entry. A barrier seal may, for example, enclose a portion of the inner locking rods on a container. Barrier seals may be designed to be reusable.

5 General requirements and marks

5.1 General

Security and high security seals shall be strong and durable so as to prevent accidental breakage and early deterioration (due to weather conditions, chemical action, etc.).

All classes of seals shall be capable of being affixed easily and quickly and shall be designed and constructed to prevent undetectable tampering under normal usage.

Seals shall be identified by unique marks (such as a logotype) and unique numbers that are readily legible; markings intended for unique identification of the seal shall be considered permanent. All seals shall be uniquely numbered and identified.

Qualifying seals shall be marked or stamped in a readily legible way to identify their classification as indicative ("I"), security ("S"), or high-security ("H") seals. In order to be qualifying, the seal shall (a) meet the appropriate physical parameters in this document, and (b) be manufactured by a firm that is verifiably compliant with Annex A. Any modification of markings shall require obvious irreversible physical, chemical, heat or other damage to or destruction of the seal.

Seals shall be designed and constructed so as not to permit removal or undoing without breaking, or tampering without leaving clear visible evidence.

In the case of reusable devices, the seal number should be carried on the portion designed to be cut off so as to preclude its reuse.

Manufacturers should be able to identify their own products.

5.2 Identification marks

Regulatory authorities and private customers may require identifiers that go beyond the requirements of this document.

Seals intended for use on freight containers moving under customs laws as instruments of international trade shall be separately approved and marked as determined by the relevant customs organization or competent authority.

If the seal is to be purchased and used by customs, the seal or fastening, as appropriate, shall be marked to show that it is a customs seal by application of unique words or markings designated by the appropriate customs organization and a unique identification number.

If the seal is to be used by private industry (i.e. a shipper, manufacturer or carrier), it shall be clearly and legibly marked and uniquely numbered and identified. It may also be marked with a company name or logo.

5.3 Evidence of tampering

Different seal types evidence tampering in different ways. Some examples of this are:

— easy opening of the seal under hand pressure;

— absence of free play / rotation;

— frayed appearance of wire or cable;

— evidence of glue or application of heat;

— blushing / colour change of plastic coating;

— irregular identifiers;

— scratches or nicks adjacent to the locking mechanism;

— deformation of the locking mechanism; and

— apparent rebuilding or substitution of component parts.

6 Testing

6.1 General

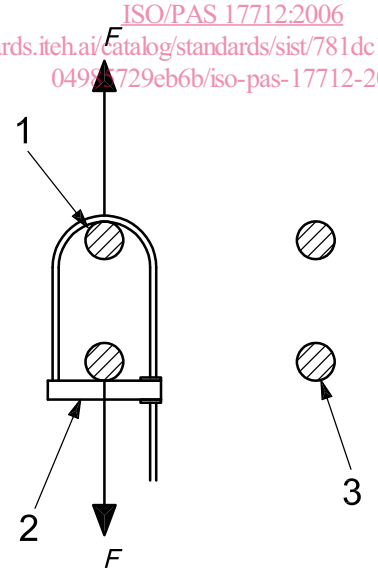
The general type of seal and its configuration shall be used to configure the appropriate test fixture.

6.2 Tensile test

A pull test shall be conducted to determine the strength of a seal's locking mechanism (see Figures 1 through 4). The test fixture shall apply a uniform load to the seal in a manner that simulates reversal of the motion used to lock the seal. The load shall be slowly applied until the seal forcibly opens or is otherwise broken.

The seal shall be classified based on the tensile force recorded at the time of failure of the seal based on the criteria set forth in Table 1.

Dimensions in millimetres



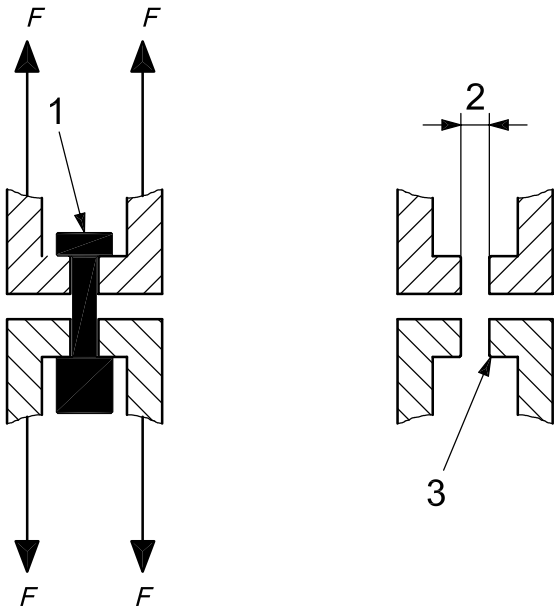
Key

F tensile force
1 pin
2 seal group 2 (cinch type shown)
3 6,35 ∅ pin $d_{min} < 3,18$ [a]
12,7 ∅ pin $d_{min} \geqslant 3,18$ [a]

[a] Tolerance allowed on the fixture dimensions is ± 0,254.

Figure 1 — Suggested test apparatus — Tensile test — Wire seals

Dimensions in millimetres



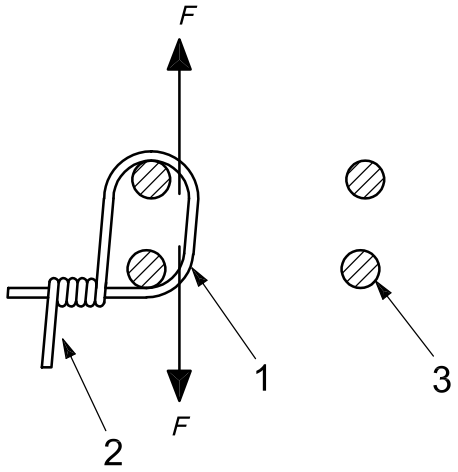
Key

F tensile force
1 seal group 3 (rigid bolt shown)
2 5 % to 10 % larger than cross sectional dimension
3 0,508 × 45° chamfer, typical [a]

[a] Tolerance allowed on the fixture dimensions is ± 0,254.

Figure 2 — Suggested test apparatus — Tensile test — Bolt seals

Dimensions in millimetres



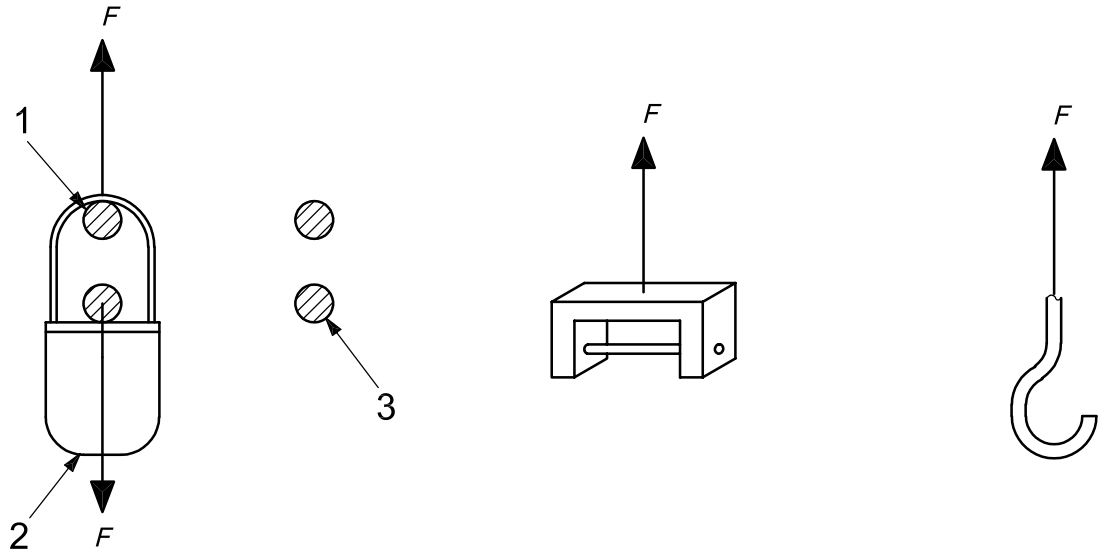
Key

F tensile force
1 pin
2 seal group 4 (twist rod shown)
3 6,35 ∅ pin $d_{min} < 3,18$ [a]
12,7 ∅ pin $d_{min} \geqslant 3,18$ [a]

[a] Tolerance allowed on the fixture dimensions is ± 0,254.

Figure 3 — Suggested test apparatus — Tensile test — Twist seals

Dimensions in millimetres



Key

F tensile force

1 pin

2 seal group 5 (padlock type shown)

3 6,35 ∅ pin $d_{min} < 3,18$ [a]
12,7 ∅ pin $d_{min} \geqslant 3,18$ [a]

[a] Tolerance allowed on the fixture dimensions is ± 0,254.

Figure 4 — Suggested test apparatus — Tensile test — Padlock seals

Table 1 — Tensile test seal classification requirements

Load to failure kN [a]	**Seal classification**
10,0	High security seal
2,27	Security seal
< 2,27	Indicative seal

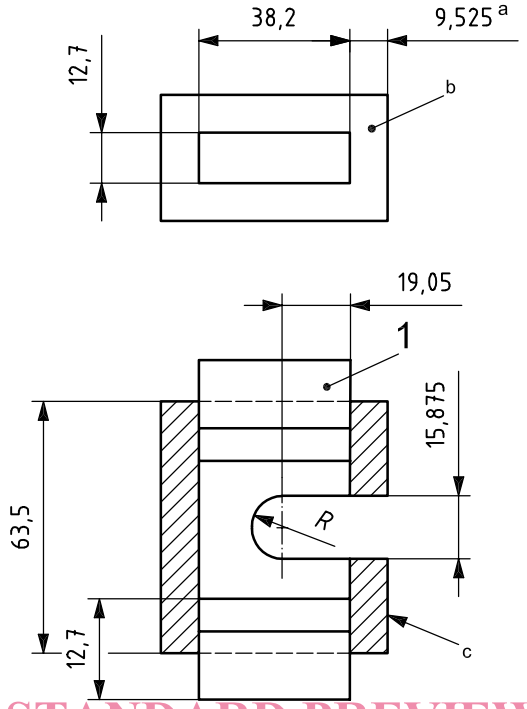
[a] 1 J = 0,737 562 1 ft-lbf
1 N = 0,224 808 9 lbf
1 kg-f = 2,204 585 5 lbf
1 Nm = 0,737 562 1 ft-lbf

6.3 Shear test

A shear test (see Figure 5) shall be conducted to test the ability of a seal to withstand cutting with shearing blades, as might be implemented with bolt cutters. The cutting blades used in the test fixture shall be sufficiently well aligned that seals are cut and not merely deformed as might occur with a thin, flexible seal and misaligned blades. The compressive load shall be applied slowly until the seal is severed.

The seal shall be classified based on the compressive load recorded at the time of failure of the seal based on the loads set forth in Table 2.

Dimensions in millimetres



Key

1 two cutting blades machined from cutter jaws

a Wall type.

b One- or two-piece construction is acceptable.

c Approximate dimensions depend on final ground size of cutting blades.

Figure 5 — Suggested apparatus for conducting shear tests

Table 2 — Shear test seal classification requirements

Load to failure kg-f [a]	**Seal classification**
341	High security seal
227	Security seal
< 227	Indicative seal

a 1 J = 0,737 562 1 ft-lbf
1 N = 0,224 808 9 lbf
1 kg-f = 2,204 585 5 lbf
1 Nm = 0,737 562 1 ft-lbf