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Freight containers — Mechanical seals

Conteneurs pour le transport de marchandises — Scellés mécaniques

(Revision of ISO/PAS 17712:2006)

ICS 55.180.10

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Foreword

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

This third edition cancels and replaces the second edition of ISO/PAS 17712:2006 which has been technically revised.

Freight Containers — Mechanical Seals

1 Scope

This International Standard establishes uniform procedures for the classification, acceptance, and withdrawal of acceptance of mechanical freight container seals. It, along with its normative annex, 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 9001:2000, *Quality management systems – Requirements*

ISO/IEC 15417, *Information technology — Automatic identification and data capture techniques — Code 128 bar code symbology specification*

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
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 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 that is 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 that is 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 that is 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.

3.5
manufacturer
a company or entity that either owns the seal-producing factory or contracts to buy made-to-order seals for re-sale from a third party factory

3.6
bar code label
automatic identification technology that encodes information into an array of parallel bars and spaces of varying widths

3.7
Mechanical seal types and requirements

3.7.1
types of mechanical seal

3.7.1.1
wire seal
length of wire secured in a loop by some type of seizing device

EXAMPLE Crimp wire, fold wire and cup wire seals.

3.7.1.2
padlock seal
locking body with a bail attached

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

3.7.1.3
strap seal
metal or plastic strap secured in a loop by inserting one end into or through a protected (covered) locking mechanism on the other end

3.7.1.4
cable seal
cable and a locking mechanism

EXAMPLE 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.

3.7.1.5
bolt seal
metal rod, threaded or unthreaded, flexible or rigid, with a formed head, secured with a separate locking mechanism

3.7.1.6
cinch or pull-up seal
indicative seal consisting of a thin strip of material, serrated or non-serrated, with a locking mechanism attached to one end

NOTE 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.

3.7.1.7
twist seal
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

3.7.1.8
scored seal
metal strip which is scored perpendicular to the length of the strip

NOTE 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.

3.7.1.9
label seal
frangible seal consisting of a paper or plastic backing with adhesive

NOTE The combination of backing and adhesive are chosen to cause the seal to tear when removal is attempted.

3.7.1.10
barrier seal
designed to provide a significant barrier to container entry

EXAMPLE 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.

4 Seal requirements

4.1 General

4.1.1 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.).

4.1.2 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.

4.1.3 Seals constructed with plastic coating over metal components shall have sufficiently thick metal components so as to preclude removal of the plastic coating, opening of the seal and re-closing of the seal without leaving visual evidence of tampering.

4.1.4 Security and high security seals shall be designed to function as intended when used in an ambient temperature range of –20˚ C to + 50˚ C.

4.2 Marking

4.2.1 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.

4.2.2 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 must (a) meet the appropriate physical parameters in this International Standard 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.

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

4.2.4 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.

4.2.5 Manufacturers should be able to identify their own products.

4.2.6 Manufacturers may choose to add a machine-readable bar code to their seals. The bar code shall represent the unique identification as reflected in 4.2.1, 4.2.2, and 4.2.5. Bar codes, if used, shall comply with ISO/IEC 15417, which addresses Code 128 bar code symbology specification.

4.3 Identification marks

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

a) seals intended for use on freight containers moving under customs laws as instruments of international trade shall be approved and individually marked as determined by the relevant customs organization or competent authority;

b) 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;

c) 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.

4.4 Evidence of tampering

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

a) easy opening of the seal under hand pressure;

b) absence of free play/rotation;

c) frayed appearance of wire or cable;

d) evidence of glue or application of heat;

e) blushing / colour change of plastic coating;

f) irregular identifiers;

g) scratches or nicks adjacent to the locking mechanism;

h) deformation of the locking mechanism;

i) apparent rebuilding or substitution of component parts .

5 Testing

5.1 General

The general type of seal and its configuration shall be used to configure the appropriate test fixture. Testing is to be done every other year as set forth in A.3.3 (1) unless more frequent testing is required by the competent authority. Five samples shall be tested for each of the 5 tests. For each test all 5 of the samples must successfully pass the test. A total of 25 samples will be tested.

Per test and temperature range, 5 seals shall be tested. All seals have to pass in order to reach the relevant category (see ASTM 1157).

5.2 Tensile test

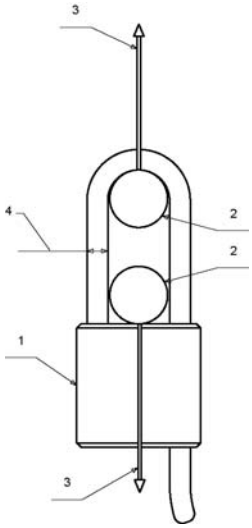
A pull test shall be conducted to determine the strength of a seal's locking mechanism. The test fixture shall apply a uniform load to the seal in a manner that simulates reversal of the motion used to lock the seal. The load shall be slowly applied until the seal forcibly opens or is otherwise broken. For all seals, pulling speed must be (5,08 ± 2,54 cm/min).

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.

Suggested apparatus for conducting tensile tests is given in Figures 1 to 5.

NOTE 1 Seals should be tested as they are being sold.

NOTE 2 Tests should be carried out at a temperature of 21 ºC ± 3 ºC.



Key

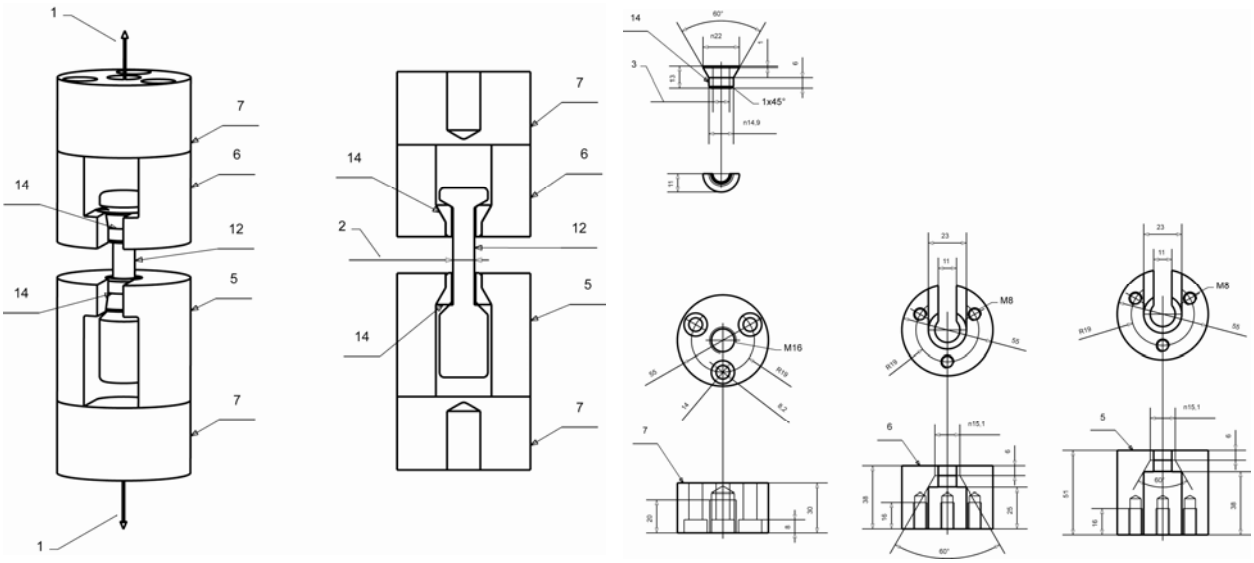
1 Seal group 2 (pull tight type shown)
2 Pin (see NOTES 1, 2, 3)
3 Applied tensile force
4 Cross sectional dimension

NOTE 1 Pin diameter 6,35 mm (0,250 inches) for smallest cross section dimension less than or equal to 3,18 mm (0,125 inches).

NOTE 2 Pin diameter 12,7 mm (0,500 inches) for smallest cross section dimension greater than 3,18 mm (0,125 inches).

NOTE 3 Tolerance ± 0,254 mm (0,010 inches).

Figure 1 — Tensile test method – Wire seals



Key

For total overview of keys, see Figure 10.

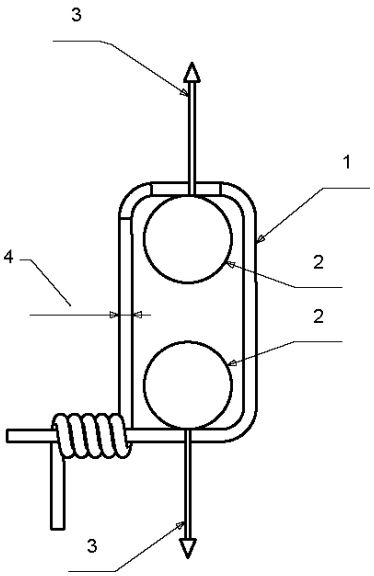
5 Bolt seal fixture lower ø 55 mm x 51 mm steel case-hardening depth 0,7 mm
6 Bolt seal fixture upper ø 55 mm x 38 mm steel case-hardening depth 0,7 mm
7 Collar fixture ø 55 mm x 30 mm steel
12 Bolt seal location (rigid bolt shown)
14 Bolt seal support fixture ø 22 mm x 13 mm steel case-hardening depth 0,7 mm

NOTE 1 Applied force.

NOTE 2 Cross sectional dimension.

NOTE 3 5 % to 10 % bigger than the largest cross section of the bolt seal shaft (see NOTE 2).

Figure 2 — Tensile test method – Bolt seals



Key

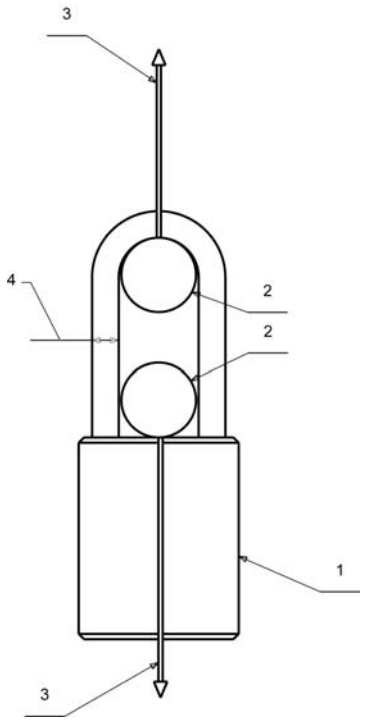
1 Seal group 4 (twist rod type shown)
2 Pin (see NOTES 1, 2, 3)
3 Applied tensile force

NOTE 1 Pin diameter 6,35 mm (0,250 inches) for smallest cross section dimension less than or equal to 3,18 mm (0,125 inches).

NOTE 2 Pin diameter 12,7 mm (0,500 inches) for smallest cross section dimension greater than 3,18 mm (0,125 inches).

NOTE 3 Tolerance ± 0,254 mm (0,010 inches).

Figure 3 — Tensile test method – Twist seals



Key

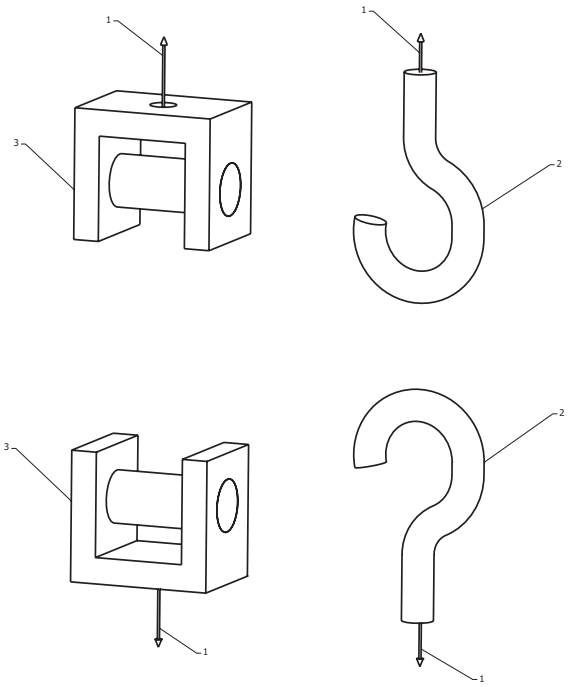
1 Seal group 5 (Padlock type shown)
2 Pin (see NOTES 1, 2, 3)
3 Applied tensile force
4 Cross sectional dimension

NOTE 1 Pin diameter 6,35 mm (0,250 inches) for smallest cross section dimension less than or equal to 3,18 mm (0,125 inches).

NOTE 2 Pin diameter 12,7 mm (0,500 inches) for smallest cross section dimension greater than 3,18 mm (0,125 inches).

NOTE 3 Tolerance ± 0,254 mm (0,010 inches).

Figure 4 — Tensile test method – Padlock seals



Key

1 Applied tensile force
2 and 3 Schematic drawing of possible tensile test fixture configuration for other seals

Figure 5 — Tensile test method – Other 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

5.3 Shear test

5.3.1 A shear test 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 until the seal is severed.

Travel rate for shear test: 12,5 mm ± 6,35 mm/min.

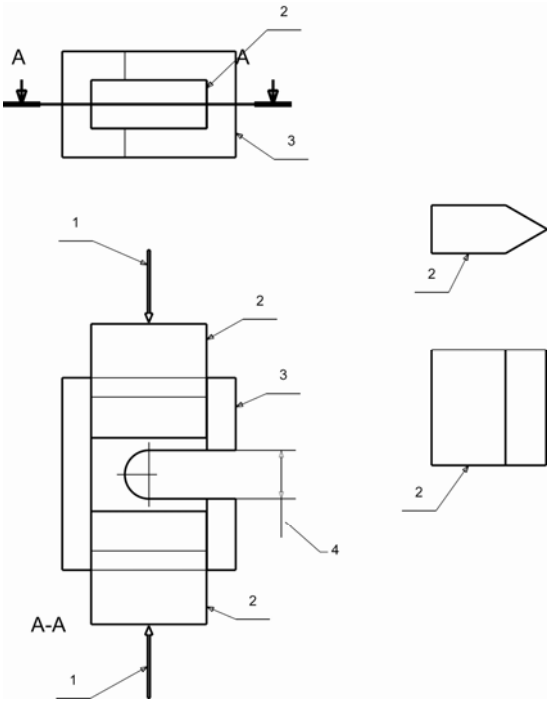
5.3.2 The seal shall be classified based on the compressive load recorded at the time of failure of the seal based on the loads set forth in Table 2.

Suggested apparatus for conducting shear tests is given in Figure 6.

NOTE 1 Apply shear force at the weakest section of the security seal.

NOTE 2 Fixtures should be designed such that applied stress is within the elastic limit of the fixture material.

NOTE 3 Tests should be carried out at a temperature of 21 ºC ± 3 ºC.



Key

1 Applied shear force
2 Cutting blades machined from cutter jaws 60 HRC (approximate size (LxWxH) 38 mm x 12,7 mm x 8 mm (1,5 inches x 0,50 inches x 1,50 inches))
3 Cutting test fixture (appropriate dimensions depend on final ground size of cutting blades)
4 15,9 mm (5/8 inches) shear gap for seal location during test

WARNING — Do not exceed a shear force greater than 8896 N (2000 lbf). If a specimen does not sever during the application of 8900 N (2001 lbf), halt test and unload the test equipment. Record shear force of 8896 N (2000 lbf). Do not test specimen to failure. Sudden and violent rupture of the test specimen can endanger personal, equipment and property. (From ASTM 1157:2004, page 4, Figure 7).

Figure 6 — Shear test

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

5.4 Bending test

5.4.1 The bending test is conducted to determine the resistance of a seal to failure under bending loads. How the test is run shall be based on the sub classification of the seal as either flexible or rigid. Flexible seals shall be tested for their ability to resist repeated bending cycles without failure. Rigid seals shall be tested to determine their resistance to deformation by bending.

5.4.2 For flexible seals, fix the locking end and flex the material adjacent to this fixed end repeatedly through an arc of 180° until failure. Record the number of cycles through this 180° arch and base classification of the seal on the number of cycles shown in Table 3. Each cycle 180° must be done in 3 seconds. Bending speed 180° in 3 seconds.

NOTE 1 Cycle time (from -90 ºC to 90 ºC bending) 3 seconds ± 1 seconds.

NOTE 2 Tests should be carried out at a temperature of 21 ºC ± 3 ºC.

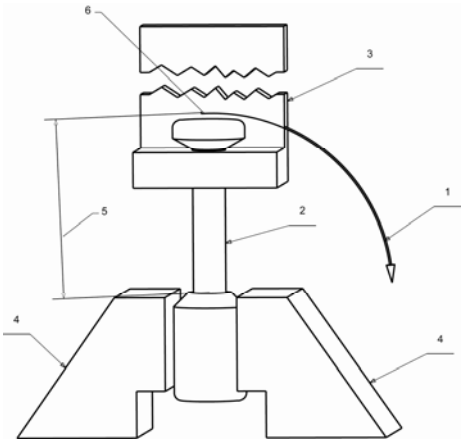
5.4.3 For single-shaft rigid seals, fix the locking end and then fit a tube or other suitable lever over max. 20 mm of the remaining seal and apply a load. The bending to 90° is to be done within 3 seconds. Record the load required to bend the seal and the distance above the fixed end of the seal (the moment arm) that the load is applied. Base the classification of the seal on the maximum bending moment recorded and in accordance with the values set out in Table 3. Bending speed 90° in 3 seconds.

5.4.4 For rigid seals with two shafts such as in a Padlock, fix the locking end and then fit a bar or other suitable lever over max. 20 mm of the remaining seal and apply a load. Rotate the rod or bar until it is in contact with both shafts. Continue to rotate the bar in the same direction an additional 90°. Record the torsional force needed to achieve the 90° rotation or to cause failure of the locking mechanism if that occurs prior to achieving the 90° rotation. Base the classification of the seal on the maximum bending moment recorded and in accordance with the values shown in Table 3. The bending to 90° is to be done within 3 seconds. Bending speed 90° in 3 seconds.

Suggested apparatus for conducting bending tests is given in Figures 7 to 9.

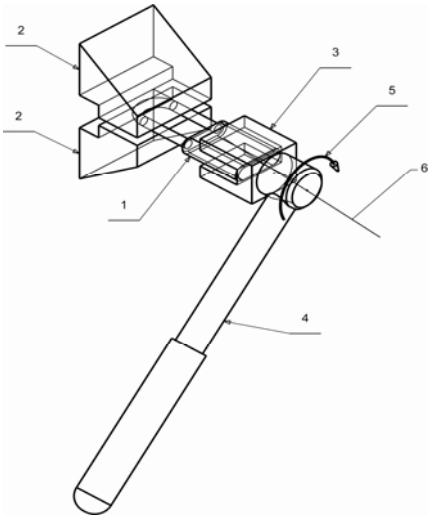
NOTE 1 Tests should be carried out as the seal is being sold.

NOTE 2 Tests should be carried out at a temperature of 21 ºC ± 3 ºC.



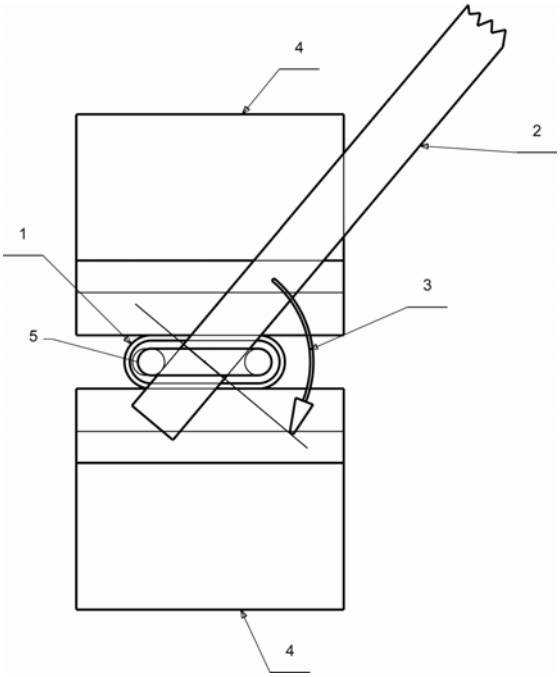
Key
1 90° movement
2 Bolt seal
3 Movable bolt seal holder
4 Holding device (vice or similar object)
5 Moment arm
6 Point of applied load

Figure 7 — Bending test – Bolt seal



Key
1 Seal (padlock type)
2 Vice or similar fixture to fix the seal shackle
3 Seal fixture for torque wrench (size and shape of fixture depend on seal shape)
4 Torque wrench
5 Apply torsional load about centerline of seal
6 Centerline of seal and torque wrench

Figure 8 — Bending test – Padlock seal



Key
1 Top view of seal
2 Bar for load application (shown in rest position)
3 90° motion (first step) return to rest position (second step)
4 Vise or similar fixture to fix seal body
5 Shackle of flexible seal

Figure 9 — Bending test – Padlock seal

Table 3 — Bending test seal classification requirements

Cycles to failure (flexible seals)	**Bending moment to failure** (rigid seals) Nm[a]	**Seal classification**
501	50	High security seal
251	22	Security seal
< 251	< 22	Indicative seal
a 1 Nm = 0,737 562 1 ft-lbf		

5.5 Impact test

5.5.1 The impact test shall be conducted to determine the resistance of the seal to an impact load at 18 °C and −27 °C. The test fixture shall be devised so the impact load is applied at the locking mechanism of the seal in the direction opposite the direction used in locking the seal. Using apparatus similar to that employed in the tensile test adding a provision for applying impact loads to the hardware requirements. The impact load shall be applied five times at a load equivalent to 13,56 J. Subsequent impact test sequences shall be run at a load that is 13,56 J higher than the previous five impact loads. Impacts shall be run until the seal fails or successfully withstands five impacts at 40,68 J. A second seal shall be tested at the second temperature.

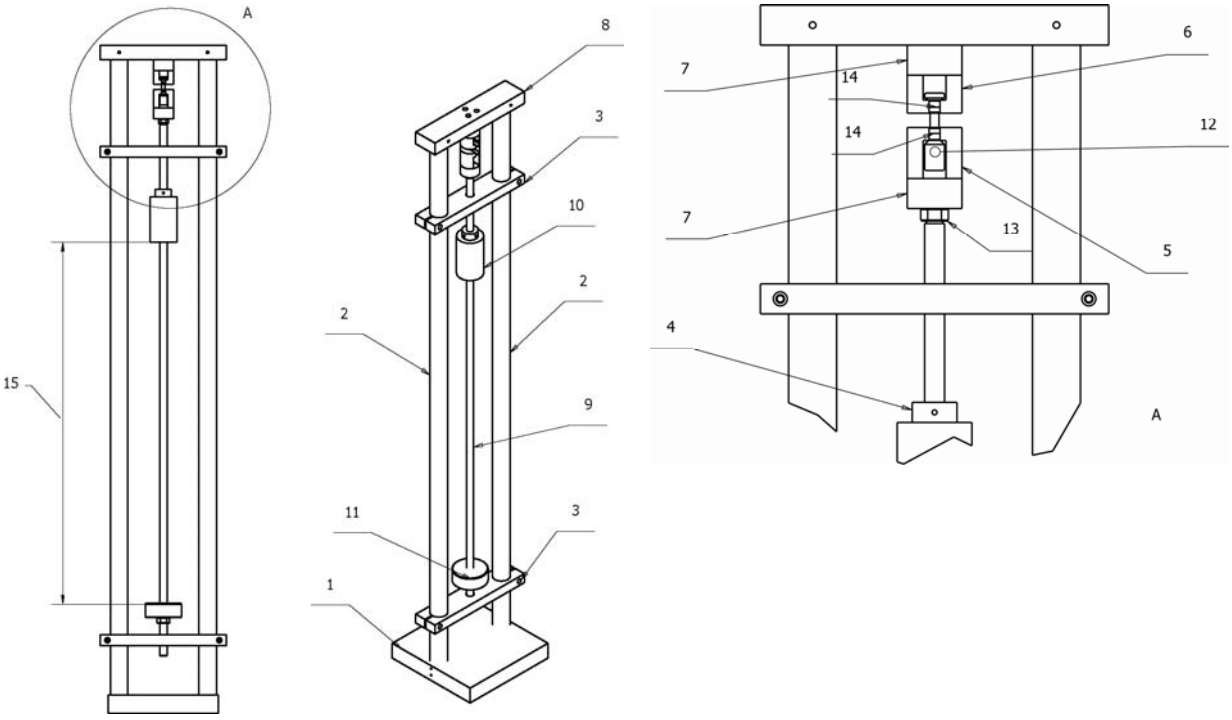
NOTE 1 Apparatus for impact test: Use a U-device turned upside down. Cross-section of the material (see Figure 10, Key 8) min. 3 000 mm^2, steel to be used. Put the bolt into a hole which is 1 mm wider than the bolt. The top section of the hole to be of such design that it takes the bolt head shape. The two legs of the device having 20 mm on either side of the bolt. Use again a U-device turned upside down with a cross-section of min. 3 000 mm^2, steel, hardened through (60 HRc) to be used. Use a disc 30 mm wider than the bolt and 10 mm thick, hardened through (60 HRc). This second device including disc must not weight more than 2 kg. The part hitting the second device (which is guiding the force via the disc to the housing) must be of steel with a tensile strength of min. 700 N/mm^2. See Figure 10.

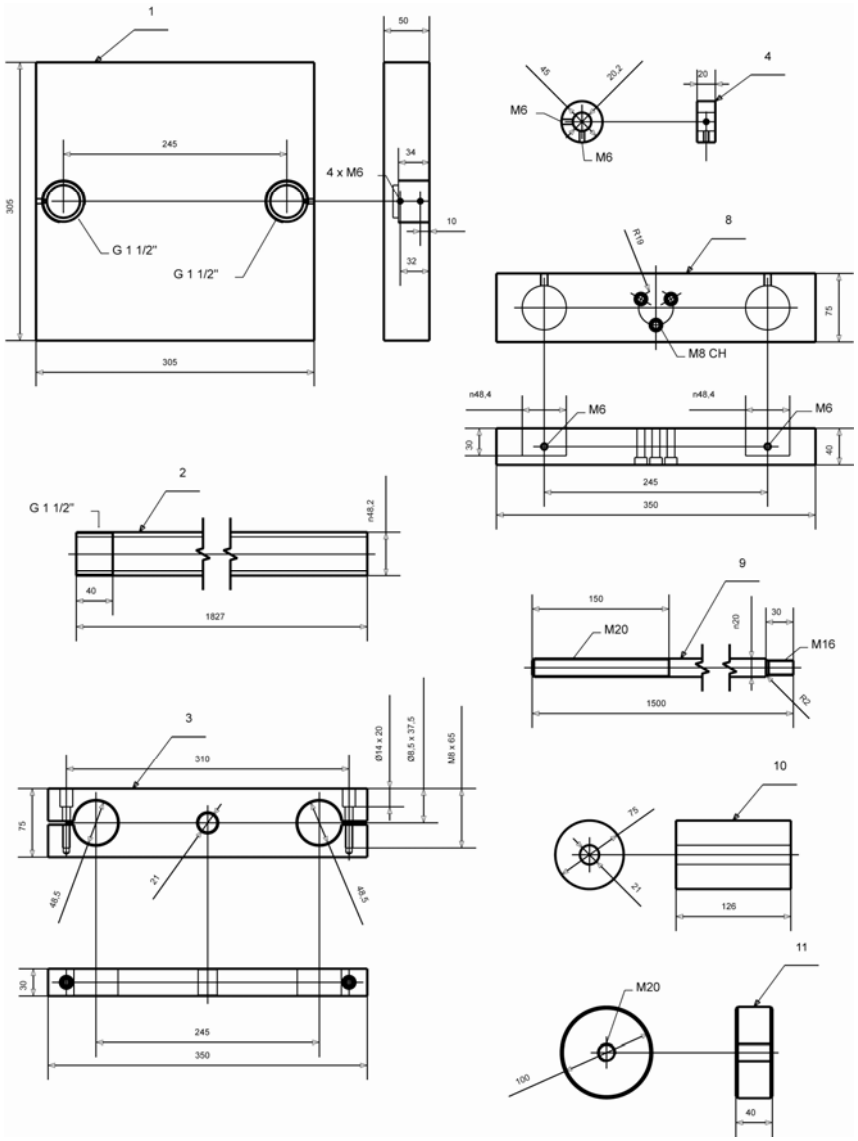
NOTE 2 Impact test apparatus should be placed directly on solid concrete floor.

NOTE 3 Seals should be tested as they are being sold.

NOTE 4 Use safety glasses during test. Risk of parts flying around being an injury risk.

NOTE 5 Tests should be carried out at a temperature of 21 ºC $\pm$3 ºC and –27 ºC $\pm$ 3 ºC.





Key

1 Base plate 300 mm x 300 mm x 50 mm aluminium
2 Support tube 1½" ø external, ø 38,1 mm internal (standard galvanised pipe)
3 Shaft cross support 75 mm x 30 mm x 350 mm aluminium
4 Adjustable stop collar ø 45 mm x 20 mm steel
5 Bolt seal fixture lower ø 55 mm x 51 mm steel case-hardening depth 7 mm (see Figure 2 in tensile test)
6 Bolt seal fixture upper ø 55 mm x 38 mm steel case-hardening depth 7 mm (see Figure 2 in tensile test)
7 Collar fixture ø 55 mm x 30 mm steel case-hardening depth 7 mm (see Figure 2 in tensile test)
8 Fixture support 75 mm x 40 mm x 350 mm steel
9 Weight guide shaft ø 20 mm x 1500 mm steel with M16 and M20 external thread
10 Dead blow weight 4 kg ± 0,01 kg (ø 75 mm x 126 mm approximately internal ø 21 mm made of steel)
11 Anvil collar ø 100 mm x 40 mm steel with internal M20 thread through
12 Bolt seal location
13 M16 nut
14 Bolt seal support fixture ø 22 mm x 13 mm (see Figure 2 in tensile test)
15 Dead blow drop hight (see Table 4).

Figure 10 — Impact test gig

5.5.2 If the seal fails prior to completion of the five impact cycles, it shall be classed based on the next lower set of values. The value at which the seal fails shall be recorded and used to determine the seal's classification. The values set forth in Table 4 shall be the basis for this determination.

Table 4 — Impact test seal classification requirements

Low temperature impact load J	High temperature impact load J	Dead blow weight drop hight (see Figure 10)	Seal classification
40,68	40,68	1,037 m	High security seal
27,12	27,12	0,691 m	Security seal
< 27,12	< 27,12	0,346 m	Indicative seal

5.6 Test report

The test report shall contain as a minimum the following information:

a) identification/description of the test specimen;

b) reference to this International Standard;

c) results of the test: (a)..., (b).....as specified in the individual tests;

d) (conditioning, pre-treatment, etc.);

e) temperature and the relative humidity in the test room throughout the test;

f) details of the supply and monitoring equipment and the response criteria;

g) details of any deviation from this International Standard or from the international standards to which reference is made, and details of any operations regarded as optional.

Annex A
(normative)

Seal manufacturers' security-related practices

A.1 Introduction

This normative annex addresses security-related practices relevant to the manufacture and distribution of seals that conform to this International Standard.

The structure of this International Standard reflects the six stages in the life of a freight container seal, as shown in the table below. Since this International Standard is about the security-related practices of seal manufacturers, the focus within each stage is on the actions within the purview of those manufacturers.

“Manufacturer,” as used in this annex, refers to the entity responsible for the design and sale of the product. While that entity usually owns and operates the producing factory, this is not always the case since firms may subcontract the actual production. In the case of subcontract production, “manufacturer” refers to the firm that drives the process and brings the product to market, not to the operator/owner of the xyz factory.

Tabelle A.1 — Six stages in the life of a freight container seal

Stage Number	Stage name	Role of seal manufacturers
1	Design process	Total responsibility
2	Manufacturing	Total responsibility
3	Distribution	Must set standards and expectations of distributors and re-sellers. Must help educate distributors and re-sellers.
4	User knowledge and discipline	Must help educate users in the care of seals prior to their application to containers, trailers, or other receptacles. Must help educate users in correct use of seals.
5	In-transit management	May help users and regulators educate supply chain personnel.
6	After-life	Total responsibility for maintaining data on production, sales, and ID numbers of seals. Must help educate distributors and re-sellers about maintaining historical data on their seal inventories and sales. Have no role in maintaining chain-of-custody information on completed cargo shipments

A.2 Manufacturer security-related practices in stage I, design process

1) Manufacturers shall design and classify the physical performance characteristics of-seals in accordance with this International Standard. The body of the standard establishes uniform procedures for classification of mechanical seals for freight containers. The specification defines physical parameters for different levels of a seal's physical performance – indicative seals, security seals, and high security seals;

2) Although the international standard is designed for marine containers, seals that conform to it are suitable for other applications, such as bulk railcars or truck trailers used in cross-border and domestic operations;

3) Manufacturers shall 'design-in' effective tamper resistance and tamper evidence for all their seal products in conformance with Clause 4.

A.3 Manufacturer security-related practices in stage 2, manufacturing

A.3.1 General

This clause describes the security-related practices to be applied by seal manufacturers during stage 2. As with the other stages, not every point applies in every situation. If a manufacturer elects not to apply a point because it does not apply to a particular facility, then the manufacturer shall document the rationale for this action and keep it on file for review by certification and regulatory authorities.

There are two dimensions to certification under A.3. The first addresses the security-related business processes of the manufacturer (in A.3.2). The second addresses the physical properties of the seals themselves (in A.3.3). Each area calls for independent certification of conformance.

A.3.2 Seal manufacturer certification

1) Manufacturer shall maintain ISO 9001:2000 or equivalent certification on all company-owned manufacturing facilities;

2) When purchasing contract production services for market-ready seal products, manufacturer shall purchase from ISO 9001:2000 (or equivalent) certified plants;

3) If a manufacturer's facility or outside production facility for market-ready seal products loses its ISO 9001:2000 or equivalent certification, notification shall be sent to the appropriate customs administrations and other appropriate regulatory bodies;

4) The security practices referenced herein shall be implemented in accordance with this International Standard;

5) Manufacturer shall accept random and unannounced inspections of facilities and documentation for conformance with this annex; inspections are to be accomplished by accredited third-party certification bodies. The scope of accreditation of these bodies shall include this International Standard;

   NOTE The "certification bodies" may include competent governmental agencies or authorities. Nothing in this International Standard implies that industry certifying or regulatory bodies would reveal trade secrets or proprietary information among competitors.

6) Manufacturer shall conduct an initial security risk assessment of its facilities, and periodic update reviews, and implement countermeasures and/or policies to overcome potential vulnerabilities or threats;

7) Manufacturer shall assign responsibility for security and product integrity to knowledgeable individual(s), with a principal point of contact;

8) Manufacturer shall agree to cooperate with relevant law enforcement officials;

9) Manufacturer shall cooperate with regulatory and certification bodies in responding to questions and issues regarding compliance, irregularities, copying, etc.;

10) Manufacturer shall develop and maintain a crisis management strategy to prepare for and respond to tampering and other malicious, criminal, or terrorist actions; the strategy shall provide guidelines to segregating and securing affected product;

11) Manufacturer shall promote seal security awareness among all staff. Security awareness includes identification of whom in management they should alert about potential security problems (24-hour contacts);

12) Manufacturer shall require background checks on all employees to the extent allowed under local law or regulation.

A.3.3 Seal product certification

1) In accordance with 5.1, manufacturers shall submit all relevant products to an accredited independent testing laboratory to ensure that the product complies with this International Standard. The testing lab shall be accredited according to the standards outlined in ISO/IEC 17025 with an explicit scope that includes this International Standard;

2) Manufacturer shall mark seals with its company identity;

3) Manufacturer shall produce seals with unique numbers and identifiers. Manufacturer shall not re-use or duplicate these unique seal numbers or identifiers unless authorized by the *bona fide* user for the specific seal application;

4) Manufacturer shall track the physical identifiers of all seals and related products that it produces or has produced for it. Manufacturers shall record, by seal type, the number/identifier, date of finished production, date of order, date seals were shipped, and names of consignee(s). Manufacturer shall retain this information for a period of at least seven (7) years in a manner that makes it readily available upon request by a regulatory or certification body;

5) Manufacturer shall restrict the distribution of custom-designed seal application and/or removal tools to facilities authorized by the *bona fide* user;

6) Manufacturer shall segregate and render non-functional any incidental production of scrap seal product before disposal;

7) Manufacturer shall control access to production and storage areas and loading docks and stores seals and related devices in secure areas;

8) Manufacturer shall lock all loaded trailers or containers on the premises;

9) Manufacturer shall "inspect what it expects" by verifying driver identification, if applicable, and verifying the load and count of inbound seal components;

10) Manufacturer shall implement a policy for off-hour deliveries to ensure prior notice of these deliveries. The policy will require the presence of an authorized individual to receive these shipments. Advance notification, by phone, fax, or e-mail, should be required from all vendors/suppliers for incoming deliveries.

A.4 Manufacturer security-related practices in stage 3, distribution

Sales organizations such as distributors or resellers can enhance or undermine even the best manufacturer's security program. The manufacturer shall help educate their distributors and resellers about the importance, mutual advantage, and specifics of effective seal security programs.

The manufacturer party shall set guidelines and should undertake to ensure that their distributors and resellers comply with the following security-related guidelines:

1) Distributor/reseller shall permit manufacturer to review its security procedures;

2) Manufacturer, if it becomes aware of a gap in distributor/reseller security practices, shall identify that gap and recommend needed changes that will provide seals and related devices with the necessary oversight and accountability;

3) Distributor/reseller shall not sell seals or related devices without the manufacturer's identity marked on the devices;

4) Distributor/reseller shall record all aspects of a seal shipment, including source, seal numbers and identifiers, description and the name and address of the individual placing the order and the consignee for the order. Distributor/reseller shall retain such records for a period of at least seven (7) years. Upon request from a government regulatory agency, the distributor/reseller shall make the necessary records available to assist the agency in the investigation of a cargo shipment incident;

5) Distributor/reseller shall conduct an initial security risk assessment of its facilities and implement countermeasures and/or policies to overcome potential vulnerabilities or threats;

6) Distributor/reseller shall control access to storage areas and loading docks, and store seals and related devices in secure areas;

7) Distributor/reseller shall lock all loaded trailers or containers on the premises;

8) Distributor/reseller shall "inspect what it expects," by verifying driver identification, if applicable, and verifying the load and count of inbound seal components;

9) Distributor/reseller shall implement a policy for off-hour deliveries to ensure prior notice of these deliveries. The policy will require the presence of an authorized individual to receive these shipments. Advance notification, by telephone, facsimile transmission, or email, should be required from all vendors/suppliers for incoming deliveries.

A.5 Manufacturer security-related practices in stage 4, user knowledge and discipline

This stage focuses upon the security-related practices of *bona fide* users, including government agencies, such as Customs administrations that might apply seals to a container shipment. The influence and responsibility of seal manufacturers in stage 4 is limited to education.

Security-related practices, in this instance, can be enhanced by the seal through the inclusion of educational information about seals on product cartons, product literature, the Internet, and on-site training when appropriate.

1) Manufacturers shall help educate users in the importance of proper control of and record-keeping about seals *prior to* their application and use;

2) Manufacturers shall help educate users in correct and most effective use of seals, including conformance with applicable standards and regulations.

A.6 Manufacturer security-related practices in stage 5, in-transit management

In-transit shipment chain-of-custody falls beyond the responsibility of the seal manufacturer. However, manufacturers may help users and regulators educate supply chain personnel.

Such education involves the application of chain-of-custody principles. Such principles may include assuring that bar code readers, where applicable, are functioning, that the seal is the right type, that its number has been documented and verified, that its application is correct, and that an audit trail is established. In addition, the principles may include a seal anomaly policy, such as procedures to follow if tampering is noted during a shipment.

A.7 Manufacturer security-related practices in stage 6, after-life

Most of the post-shipment stage in the life cycle of a seal relates to maintaining chain-of-custody information about the shipment of goods itself. Seal manufacturers have no role in maintaining chain-of-custody information on completed cargo shipments.

Manufacturers' responsibilities and security-related practices relate to data about the seals themselves. These responsibilities and practices are covered in Stages 2, 3 and, to a lesser extent, 4. Manufacturers' retain:

1) Total responsibility for maintaining the manufacturer's data on seal production, sales, and unique numbers and identifiers;

2) Responsibility to educate distributors and re-sellers about maintaining historical data on their seal inventories and sales.

Bibliography

[1] ISO 31 (all parts), *Quantities and units*[1)]

[2] ISO 690, *Documentation — Bibliographic references — Content, form and structure*

[3] ISO 690-2, *Information and documentation – Bibliographic references – Part 2: Electronic documents or parts thereof*

[4] ISO 1496-1, Amd. 5, *Door end security*

[5] ISO/IEC TR 10000-1, *Information technology — Framework and taxonomy of International Standardized Profiles — Part 1: General principles and documentation framework*

[6] ISO 10241, *International terminology standards — Preparation and layout*

[7] ASTM 1157:2004, *Standard practice for classifying the relative performance of physical properties of security seals*

1) Under revision and to be renumbered as ISO 80000-series