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Steel strapping for packaging

Cerclage métallique destiné à l'emballage

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 122, *Packaging*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Steel strapping for packaging

1 Scope

This document specifies the classification, dimensions, shape, technical requirements, inspection rules and testing methods as well as marking, ordering information and logistics of the steel strapping for packaging.

This document is applicable to steel strapping for packaging in the field of metallic material, glass, light industrial products and logistics, etc.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 404, *Steel and steel products — General technical delivery requirements*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
packaging
product to be used for the containment, protection, handling, delivery, storage, transport and presentation of goods, from raw materials to processed goods, from the producer or manufacturer to the user or purchaser, including processor, assembler or other intermediary

[SOURCE: ISO 21067-1:2016, 2.1.1, modified]

3.2
steel strapping
strip of metal material, which is made from carbon steel or alloy steel through heat treatment process, used in bundling, reinforcing and connection for industrial goods and transport process by manual or automatic machine

3.3
camber
greatest deviation of a side edge from a straight line, the measurement being taken on the concave side with a straight edge

[SOURCE: ISO 3574:2012, 3.3]

3.4
flatness
maximum distance between the lower surface of steel strapping and the horizontal surface

3.5
twist
maximum dip angle formed by the lower surface of steel strapping from the horizontal surface

4 Classification

4.1 Tensile strength

Steel strapping's tensile strength classification shall be in accordance with Table 1.

Table 1 — Tensile strength classification

Classification	Abbreviation
Regular tensile strength	RT
High tensile strength	HT
Super high tensile strength	SHT

4.2 Surface finish

Steel strapping's surface finish classification shall be in accordance with Table 2.

Table 2 — Surface finish classification

Classification	Abbreviation
Bright	B
Blue and waxed	BW
Painted and waxed (Painted only)	PW(P)
Zinc coated	Z

For the description of each category, see Annex A.

When agreed between the manufacturer and the purchaser, stainless steel strapping may be supplied.

The painted and zinc coated thickness on each side shall not be less than 3 µm.

The colour of painted coating is normally black. When agreed between the manufacturer and the purchaser, other colours may be supplied.

4.3 Wound type

Steel strapping's wound type classification shall be in accordance with Table 3.

Table 3 — Wound type classification

Classification	Abbreviation
Ribbon	R
Oscillated	O

For the description of each category, see Annex A.

5 Dimensions, shape and tolerances

5.1 Nominal dimensions

The nominal thickness and width of steel strapping should be as shown in Table 4. When agreed between the manufacturer and the purchaser, other dimensions may be supplied.

Table 4 — Width and thickness

Dimensions in millimetres

Nominal thickness	Nominal width						
	12,7	16	19	25,4	31,75	40	50
0,4	√	√					
0,5	√	√	√				
0,6	√	√	√				
0,7			√				
0,8			√	√	√		
0,9			√	√	√	√	
1,0				√	√	√	
1,2					√		√
1,27					√		√
1,45					√		

5.2 Dimension tolerances

The dimension tolerances of steel strapping shall be in accordance with Table 5.

Table 5 — Dimension tolerances

Tolerances in millimetres

Dimension	Tolerances
Thickness	±0,05
Width	±0,13

5.3 Shape tolerances

The shape tolerances of steel strapping shall be in accordance with Table 6.

Table 6 — Shape tolerances

Shape	Specimen length 2 000 mm (per 2 000 mm length) max.
Camber	10 mm
Flatness	24 mm
Twist	18°

5.4 Weld

Welding is not recommended due to safety reason unless there is an agreement between the manufacturer and the purchaser. Strength of manufacturer's process welded joints in coils of strapping shall not be less than 75 % based on the tensile strength shown in Table 7.

5.5 Coil inside diameter

The recommended coil inside diameter is 406 mm and the tolerance shall be ± 2 mm. When agreed between the manufacturer and the purchaser, other inside diameter may be supplied.

6 Technical requirements

6.1 Mechanical properties

6.1.1 The requirements for steel strapping mechanical properties shall be in accordance with Table 7.

Table 7 — Mechanical properties of steel strapping

Classification	Tensile strength, R_m MPa min.	Elongation after fracture, A Nominal thickness mm	Elongation after fracture, A % min.
Regular tensile strength	830	0,4 to 0,6	2
		0,7	4
		0,8 to 1,2	8
	880	0,4 to 0,6	2
		0,7	4
		0,8 to 1,2	8
High tensile strength	930	0,4 to 0,6	2
		0,7	4
		0,8 to 1,2	8
	980	0,7	8
		0,8 to 1,2	10
Super high tensile strength	1 150	1,0 to 1,45	8
	1 250		6
	1 350		6

6.1.2 For steel strapping bend properties, see Table B.1. If required, the bend test may be carried out in accordance with Annex B.

6.2 Appearance quality

6.2.1 The surface of steel strapping shall be smooth, free of rust, kinks waves and grooves.

6.2.2 The edge of steel strapping shall be free of burrs, slivers and unwell-cutting.

6.2.3 The painted and zinc coating shall be uniform and complete, free of runs, cracks and uncoated areas.

6.2.4 The defects that damage the bundles or defects that significantly reduce the tensile strength shall be removed before shipping.

6.3 Corrosion resistance properties

The neutral salt spray test of zinc coated steel strapping shall be free of red rusty spot within 24 h.

7 Inspection and testing

7.1 Dimensions and appearance quality

The inspection of appearance quality shall be carried out by visual examination. The inspection of steel strapping thickness shall be carried out by outside micrometer and the inspection of steel strapping width shall be carried out by vernier calipers. The specimen length shall not be less than 100 mm. The thickness and width shall be measured at 3 spots on each test piece and the mean value of 3 test results is calculated as the thickness or width of the steel strapping. The measurements of shape shall be carried out in accordance with Annex C.

7.2 Coating thickness

The inspection of coating thickness shall be carried out with appropriate measuring equipment. The test shall be carried out at equal interval point more than 3 mm from each side edge of the strapping and the specimen length shall not be less than 100 mm. The coating thickness shall be measured at 3 spots (more than 3 mm from the strapping edges) on each side of the test piece and the mean value of 6 test results is calculated as the steel strapping coating thickness.

7.3 Elongation

The specimen for tensile test shall be original rectangular section shape. The original gauge length, L_0 = 30 mm, shall be marked by means of fine marks or scribed lines. The distance between gauge length marks on the break sample shall be measured with vernier caliper.

7.4 Test unit

The steel strapping shall be examined in test unit. Each test unit consists of a maximum 30 tons steel strapping with the same grade, cold-rolled process, heating treatment process, dimension and surface finish. In case of strip, a coil with mass of more than 30 tons shall be regarded as one test unit.

7.5 Test method

The test item number of test piece, sampling method and test method shall be in accordance with Table 8.

Table 8 — Test item, number of test piece, sampling method and test method per test unit

NO.	Test item	Number of test piece	Sampling method	Test method
1	Dimensions, shape	1 per test unit	At random parts of steel strapping in same test unit	7.1 and Annex C
2	Appearance			Visual examination
3	Coating thickness			Suitable instruments
4	Tensile test			ISO 6892-1
5	Corrosion resistance properties			ISO 9227

7.6 Re-testing and acceptance rules

The re-testing and acceptance rules shall be in accordance with ISO 404.

8 Marking

8.1 The minimum requirements for identifying marking shall include the following:

a) manufacturer's name or identifying brand;

b) the reference of this document (i.e. ISO 24259);

c) product dimensions, tensile strength, surface finish, wound type;

d) production date;

e) lot number;

f) net and gross weight.

When agreed between the manufacturer and the purchaser, other requirements for marking may be supplied.

8.2 The marking contents shall be printed clearly, non-fading and attached to each packaging or shipping unit firmly.

9 Ordering information

To adequately specify the requirements in this document, enquiries and orders shall include the following information:

a) a reference to this document (i.e. ISO 24259);

b) surface finish (see 4.2);

c) wound type (see 4.3);

d) dimensions and tolerances (see 5.1 and 5.2);

e) mechanical properties;

f) coil dimensions (inside diameter, maximum outside diameter) and mass;

g) packaging (see Annex D);

h) quantity required;

i) special requirements (i.e. number of coils per pallet, pallet weight).

10 Logistics

10.1 Collision shall be avoided during material handling, storage, safe loading and unloading, etc whenever possible.

10.2 Steel strapping shall be waterproof and moisture-proof during transportation.

10.3 Steel strapping shall be kept in warehouse when transported in a railway station, or in a pier.

Annex A
(informative)

Surface finish and wound types

A.1 Surface finish

A.1.1 Bright

The natural surface of uncoated steel in a cold rolled condition. The surface can be non-lubricated or lightly oiled.

A.1.2 Blue and waxed

The blue finish is imparted by heat which also cleans the surface. The wax coating is applied to improve tension ability.

A.1.3 Painted and waxed

Various coatings are used to provide a degree of resistance to corrosion or chemical reaction on the surface of strapping and the surface of the goods being strapped.

A.1.4 Zinc coated

A zinc coating is applied by hot dipped or electro-deposit galvanized which provides a degree of corrosion resistance.

A.2 Wound type

A.2.1 Ribbon

A wound type that the steel strapping is wound around a fixed centre point.

A.2.2 Oscillated

A wound type that the steel strapping is wound around a centre point which oscillates on an axis with certain distance.