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Steel wire ring net panels — Definitions and specifications

Panneaux de filet en anneaux de fil d'acier — Définitions et spécifications

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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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 17, *Steel*, Subcommittee SC 17, *Steel wire rod and wire products*.

Steel wire ring net panels — Definitions and specifications

1 Scope

This International Standard specifies the characteristics of steel wire ring net panel for retaining of unstable slopes controlling and preventing rockfalls and loose debris flow along roads, highways and railway, urban areas, mines and quarries, and for snow avalanche protection produced from metallic-coated steel wire or advanced metallic coating.

It is not applicable to anchors or soil nails for fixing of steel mesh to an unstable slope.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 7989-2:2007, *Steel wire and wire products — Non-ferrous metallic coatings on steel wire — Part 2: Zinc or zinc-alloy coating*

ISO 10474, *Steel and steel products — Inspection documents*

ISO 22034-1, *Steel wire and wire products — Part 1: General test methods*

ISO 22034-2:2007, *Steel wire and wire products — Part 2: Tolerances on wire dimensions*

3 Terms and definitions

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

3.1
wire ring
steel ring obtained by looping a single steel wire with ends inserted into the thread or secured by one or more than one ferrules

3.2
nominal wire diameter
diameter used to designate the wire

Note 1 to entry: It is expressed in millimetres (mm).

3.3
real wire diameter
average value of the minimal and the maximal diameter, measured in the same section of a straight piece of wire, by means of a micrometer to 0,01 mm

3.4
wire ring size
average value of the diameter of the single ring

Note 1 to entry: See Figure 1.

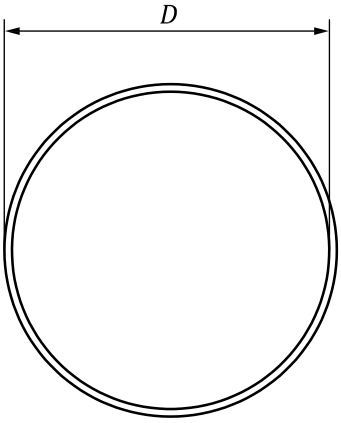


Figure 1 — Ring size

3.5
wire ring net panel
structure of the panel net, made by rings connected with the contiguous rings

3.6
advanced metallic coating
metallic coating with a non-specified composition and having a superior corrosion resistance

3.7
dimensions of a panel
length and width expressed in metres or in number of rings

Note 1 to entry: See Annex D.

3.8
ring structure
way that the ring is manufactured and constituted

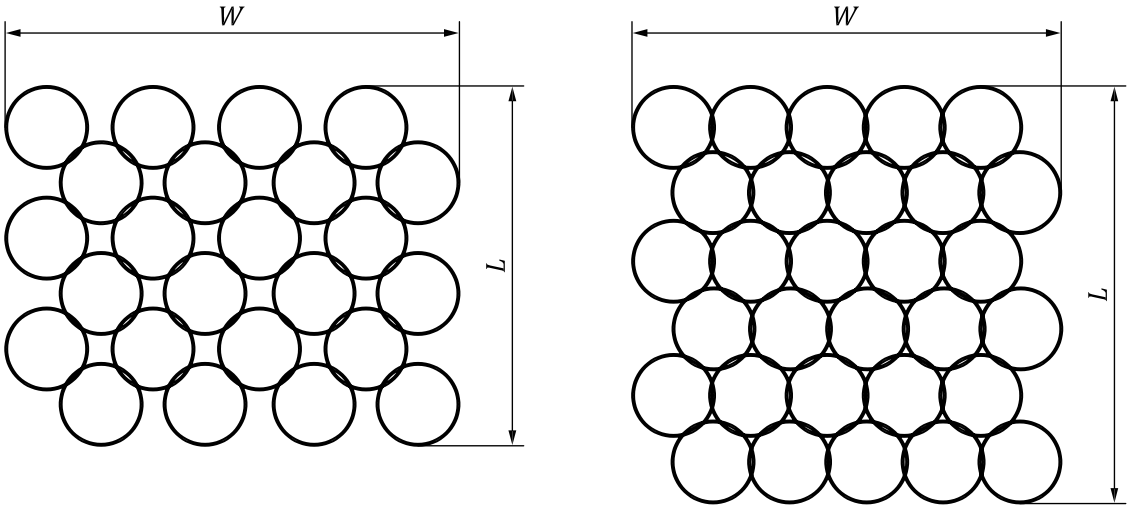
4 Description of use and applications

The typical use for the considered products is retaining of unstable slopes, controlling and preventing rockfalls and loose debris flow along roads, highways and railway, urban areas, mines and quarries, and for snow avalanche protection.

5 Wire ring net panels

Wire ring net panels are ring panels where each ring is made by several loop bindings, each one obtained by looping a single steel wire. Each ring is connected with four or six contiguous rings in order to create a net as shown in Figure 2.

For the connection of the panels, shackles or wire rope shall be used. The strength of the connection formed shall be equal to or greater than the tensile strength of the ring net panel.



a) Four contiguous rings **b) Six contiguous rings**

Figure 2 — Example of ring wire net panel layout

The wire ring net panels shall comply with the specifications given in Table 1.

Table 1 — Properties and possible combinations of wire ring net panels

Standard ring diameter[a] mm	Standard windings[b] n	Wire diameter[c,d] mm
	7	
300	9	3
350	12	4
420	16	
	19	

a Other ring diameters and wire diameters are possible, in accordance with project design requirements.

b Other number of windings are possible, in accordance with project design requirements.

c By agreement, other values should be provided.

d Tolerances of metallic coated wire diameter are in accordance with class T1 in ISO 22034-2:2007, Table 1.

6 Properties of wire

The wires shall comply with the diameter and tolerances as specified in Table 1, with the coating as specified in Table A.1, and with the coating weight as specified in ISO 7989-2.

Method of assessment and acceptance criteria for zinc and zinc alloy coating weight are described in ISO 7989-2:2007, Clause 5.

The tensile strength of the wire used for rings shall be minimum 1 380 MPa. The tensile strength of the wire used for rings shall be tested in accordance with ISO 22034-1.

6.1 Ageing and corrosion resistance

6.1.1 Zn class A

When subjected to the neutral salt spray test according to the procedures given in ISO 9227, after a period of 500 h of exposure, the ring samples shall not show more than 5 % of DBR.

6.1.2 Zn95Al5 class B

When subjected to the neutral salt spray test according to the procedures given in ISO 9227, after a period of 500 h of exposure, the ring samples shall not show more than 5 % of DBR.

6.1.3 Zn95Al5 class A

When subjected to the neutral salt spray test according to the procedures given in ISO 9227, after a period of 1 000 h of exposure, the ring samples shall not show more than 5 % of DBR.

6.1.4 Advanced metallic coatings (as Zn90Al10) class B

When subjected to the neutral salt spray test according to the procedures given in ISO 9227, after a period of 1 000 h of exposure, the ring samples shall not show more than 5 % of DBR.

6.1.5 Advanced metallic coatings (as Zn90Al10) class A

When subjected to the neutral salt spray test according to the procedures given in ISO 9227, after a period of 2 000 h of exposure, the ring samples shall not show more than 5 % of DBR.

7 Wire net properties

The chain of three rings is mounted in a calibrated test traction rig and it is connected to the machine with two circular elements of 50 mm diameter, not less than four times the diameter of the strand.

Before the test, a slight tension is given to stabilize the system, then the force is reduced again to zero before the test starts.

The chain of three rings is tensioned by the test machine with a recommended displacement speed of 2 mm/s, until breaking (see Figure 2).

The chain of three rings breaking load is reached when the chain is no longer able to support any increase of the applied force. Tests shall be performed on a minimum number of three samples.

The tensile test machine shall be of class 1 according to ISO 7500-1.

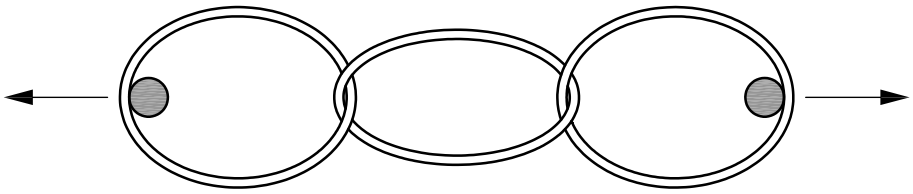


Figure 3 — Scheme of the test on net rings

8 Wire ring net properties (longitudinal tensile test with no lateral contraction and load bearing capacity test)

Tensile strength and load bearing capacity tests are described in Annex B and Annex C.

Tensile strength and load bearing capacity tests are indications of product performance and quality. The use of the results for design purposes shall be based on an engineering judgement in accordance with the experience and the current practice and site conditions.

9 Sampling and testing

The manufacturer is responsible for the control of product quality.

10 Inspection and documentation

If agreed at the time of ordering, a certificate according to ISO 10474 shall be supplied containing the following data:

— product description;

— manufacturer's name and address;

— quantity of products supplied;

— wire coating (type and class);

— maximum breaking load of chain of three rings;

— length and width of ring panels in m and number of rings;

— number of hours of exposure without showing not more than 5 % of DBR.

In addition, if requested, the following data shall also be supplied:

a) client name;

b) ring net load bearing capacity;

c) ring net tensile strength.

Annex A
(informative)

Possible metallic coating options

The wire of the ring net panel is protected with a metallic coating. Depending on the corrosivity of the environment for which the wire ring mesh is installed (see ISO 9223), possible options for metallic coating are presented in Table A.1.

Table A.1 — Description of the environment of the installation site, coating wire ring requirement

Site environment level (in accordance with ISO 9223:2012, Table 4)	Coating	Class (ISO 7989-2)	Estimated working life of the product (year)
Low aggressive: (C2) Dry conditions Temperate zone, atmospheric environment with low pollution, e.g. rural areas, small towns (over 100 m above sea level). Dry or cold zone, atmospheric environment with short time of wetness, e.g. deserts, sub-arctic areas.	Zinc	A	25
	Zn95 %/Al5 % alloy	A B	50 25
	Advanced metallic coating	A B	120 50
Medium aggressive: (C3) Dry conditions Temperate zone, atmospheric environment with medium pollution or some effect of chlorides, e.g. urban areas, coastal areas with low deposition of chlorides, e.g. subtropical and tropical zone, atmosphere with low pollution	Zinc	A	10
	Zn95 %/Al5 % alloy	A B	25 10
	Advanced metallic coating	A B	50 25
High aggressive: (C4) Wet conditions Temperate zone, atmospheric environment with high pollution or substantial effect of chlorides, e.g. polluted urban areas, industrial areas, coastal areas, without spray of salt water, exposure to strong effect of de-icing salts, e.g. subtropical and tropical zone, atmosphere with medium pollution, industrial areas, coastal areas, shelter positions at coastline.	Zn95 %/Al5 % alloy	A	10
	Advanced metallic coating	A B	25 10

NOTE Working life (product) — the period of time during which the performance of a product will be maintained at a level that enables a properly designed and executed works to fulfil the essential requirements (i.e. the essential characteristics of a product meet or exceed minimum acceptable values, without incurring major costs for repair or replacement). The working life of a product depends upon its inherent durability and normal installation and maintenance.

A clear distinction has to be made between the assumed economically reasonable working life for a product (also called: design working life), which underlies the assessment of durability in Technical Specifications, and the actual working life of a product in a works. The latter depends on many factors beyond the control of the producer, such as design, location of use (exposure), installation, use and maintenance.

The estimated working life can thus not be interpreted as being a guarantee given by the producer.

Technical Specification writers will have to take a view about the “normal” working life of the products that they deal with. The assumed working life of a product should take account of the assumed working life of the works, the ease and cost of repair or replacement of the product, maintenance requirements and exposure conditions.

Dark brown rust appearance on surface cannot be considered as the end of the working life.

For specific use, the ring wire net panels can also be produced with polymeric coated steel wire or polymeric coated steel wire rings.