

BS EN 10223-4:2012



BSI Standards Publication

Steel wire and wire products for fencing and netting

Part 4: Steel wire welded mesh fencing

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National foreword

This British Standard is the UK implementation of EN 10223-4:2012. It supersedes BS EN 10223-4:1998, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ISE/106, Wire Rod and Wire.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Partie 4: Grillage en acier soudé

Stahldraht und Drahterzeugnisse für Zäune und
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für Zäune

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Foreword

This document (EN 10223-4:2012) has been prepared by Technical Committee ECISS/TC 106 "Wire rod and wires", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2013, and conflicting national standards shall be withdrawn at the latest by May 2013.

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

This document supersedes EN 10223-4:1998.

EN 10223 "Steel wire and wire products for fencing and netting" consists of the following parts:

- *Part 1: Zinc and zinc-alloy coated steel barbed wire*
- *Part 2: Hexagonal steel wire netting for agricultural, insulation and fencing purposes*
- *Part 3: Hexagonal steel wire mesh products for engineering purposes*
- *Part 4: Steel wire welded mesh fencing*
- *Part 5: Steel wire woven hinged joint and knotted mesh fencing*
- *Part 6: Steel wire chain link fencing*
- *Part 7: Steel wire welded panels for fencing*
- *Part 8: Welded mesh gabion products*

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies requirements for steel wire welded mesh fencing of which there are many types for a variety of applications. It specifies the general characteristics of welded mesh fencing supplied as rolls or panels and coatings, properties and tolerances.

This European Standard covers only orthogonal welded mesh i.e. wire welded at right angles to one another.

For welded mesh fencing made from panels the specification covers only panels made from wires not greater than 10 mm.

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.

EN 10021, *General technical delivery conditions for steel products*

EN 10204, *Metallic products — Types of inspection documents*

EN 10218-1, *Steel wire and wire products — General — Part 1: Test methods*

EN 10218-2:2012, *Steel wire and wire products — General — Part 2: Wire dimensions and tolerances*

EN 10244-1, *Steel wire and wire products — Non-ferrous metallic coatings on steel wire — Part 1: General principles*

EN 10244-2:2009, *Steel wire and wire products — Non-ferrous metallic coatings on steel wire — Part 2: Zinc or zinc alloy coatings*

EN 10245-1, *Steel wire and wire products — Organic coatings on steel wire — Part 1: General rules*

EN 10245-2, *Steel wire and wire products — Organic coatings on steel wire — Part 2: PVC finished wire*

EN 10245-3, *Steel wire and wire products — Organic coatings on steel wire — Part 3: PE coated wire*

EN ISO 1461, *Hot dip galvanized coatings on fabricated iron or steel articles — Specifications and test methods (ISO 1461)*

3 Terms and definitions

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

3.1

welded mesh fencing

fencing made by electrical resistance welding either:

- a) zinc-coated or zinc alloy coated wires; or
- b) bright wires which are subsequently coated after welding either with zinc or zinc alloy

Note 1 to entry: In both cases, the wire may or may not be crimped. The welded mesh may or may not be subsequently coated with an organic material.

3.2

spacing

distance measured between leading edge and leading edge of wires (see Figure 1)

3.3

mesh size of welded mesh

spacing of line wires followed by the spacing of cross wire e.g. for 50 mm line wire spacing and 25 mm cross wire spacing the mesh size is 50 mm x 25 mm

3.4

line wires

wires running in the longitudinal direction parallel with the length of the roll or panel (see Figure 1)

3.5

cross wires

wires running in the transverse direction (see Figure 1)

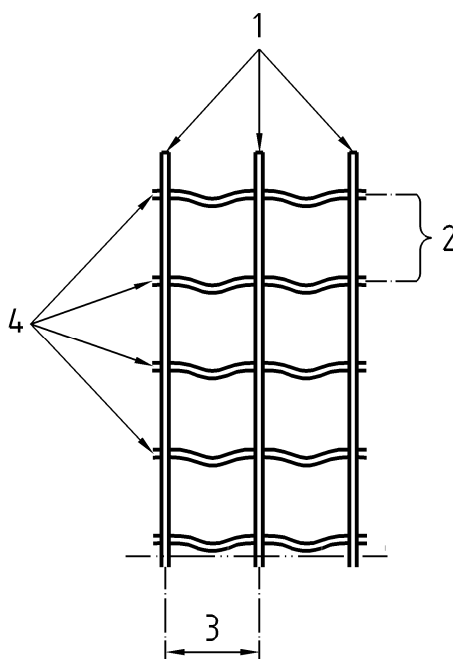
Note 1 to entry: On erection of the fence, the cross wires become vertical.

3.6

panel

welded mesh produced in flat form to specified dimensions or cut from rolls of welded mesh

Note 1 to entry: Panels are produced either with overhanging edges or with flush cut edges



Key

- 1 cross wires
- 2 line wire spacing
- 3 cross wire spacing
- 4 line wires

Figure 1 — Example of mesh

4 Information to be supplied by the purchaser

The following information shall be supplied by the purchaser at the time of enquiry and order:

- a) number of this European Standard;
- b) quantity and packaging;
- c) if for agricultural use or not;
- d) roll or panel;
- e) mesh size(s);
- f) diameters of line and cross wires;
- g) length and width of rolls or size of panels;
- h) the class of zinc or zinc/alloy coating and whether applied before or after manufacture and if required, the adherence and assessment of adherence (wrap specification);
- i) whether an organic material coating is required and, if so, the type and colour;
- j) tensile strength of line wires and cross wires if different from each other;
- k) whether or not crimping is required in line or cross wires;
- l) if applicable, the number of apertures required;
- m) in the case of panels, whether to be produced with overhangs or cut flush;
- n) test report requirements;
- o) agreed quality characteristics for testing (see Clause 7).

5 Manufacture

5.1 Base metal

The base metal of the welded mesh fencing shall be low carbon steel.

5.2 Fabrication

5.2.1 Rolls

The welded mesh fencing in roll shall be fabricated by electrical resistance welding either from:

- a) bright wires which subsequently after welding are either zinc or zinc alloy coated to EN 10244-1 and EN 10244-2:2009, class A; or
- b) zinc or zinc alloy wire coated to EN 10244-1 and EN 10244-2:2009, class A, unless otherwise agreed at the time of enquiry and order.

Where requested by the purchaser the welded mesh fencing shall be subsequently coated with an organic material to EN 10245-1 and EN 10245-2 or EN 10245-3. The type and colour and any other criteria shall be given on the order.

5.2.2 Panels

Panels shall be produced by either:

- a) cutting from zinc or zinc alloy coated rolls; or
- b) by electrical resistance welded bright wires and subsequently zinc or zinc alloy coated to EN ISO 1461. No bare patches shall be permitted.

When requested by the purchaser the welded mesh fencing shall be subsequently coated with an organic material to EN 10245-1 and EN 10245-2 or EN 10245-3. The type and colour and any other criteria shall be given on the order.

5.3 Welding

The mesh shall be produced by electrical resistance welding at every line wire/cross wire intersection.

The line and/or cross wires may be crimped.

Depending on the application, the mesh spacing throughout the fencing may be the same, as in 50 mm x 50 mm security mesh or varying as in the welded mesh fencing for agricultural or general use i.e. decreasing mesh size from the top downwards. The diameter of line wires may be different from the diameter of cross wires.

6 Requirements

6.1 Tensile strength

The tensile strength of the line and cross wires shall be in the range 350 N/mm² to 950 N/mm². For any delivered lot, the spread of tensile strength shall be within 200 N/m².

NOTE The tensile strength of the line wires may not be the same as the tensile strength of the cross wires.

6.2 Tolerance on wire diameters

The tolerance in diameter of the wires shall comply with the following grades from EN 10218-2.

- a) zinc or zinc alloy coated wire to EN 10244-2:2009, class A, tolerance shall be to EN 10218-2:2012, T1 (Table 1).
- b) other zinc or zinc alloy coated wire, tolerance shall be to EN 10218-2:2012, T2 (Table 1).
- c) bright wire, tolerance shall be to EN 10218-2:2012, T3 (Table 1).
- d) wire coated with an organic material, tolerance shall be to EN 10218-2:2012 (Table 2).

6.3 Coatings

6.3.1 Zinc and zinc alloy coatings

6.3.1.1 Rolls

When coating applies to EN 10244-2:2009, class A, samples taken from the fence shall have the minimum coating mass requirement reduced by 5 % and where specified the number of dips shall be reduced by one half minute dip.

Additionally, the adherence and wrapping requirements shall be as agreed at the time of enquiry and order.

6.3.1.2 Panels

Where panels have been cut from zinc or zinc alloy coated rolls, the coated wire shall comply with the requirements of 6.3.1.1.

Where panels have been produced by zinc or zinc alloy coating after fabrication the coated panels shall comply with the requirements of EN ISO 1461. Where mesh in panels coated after fabrication contains two diameters of wire, the coating mass shall not be less than the average of the specified minimum values of the two diameters.

6.3.2 Organic material coatings

When present, organic material coatings shall comply with the appropriate part of EN 10245-1 and EN 10245-2 or EN 10245-3.

6.4 Tolerance on mesh dimensions

The nominal mesh spacing measured leading edge to leading edge shall be subject to the tolerances in Table 1 after coating.

Table 1 — Tolerances on mesh spacing

Dimensions in millimeters

Mesh spacing x	Tolerance
$x \leq 25$	$\pm 2,0$
$25 < x \leq 50$	$\pm 3,0$
$50 < x \leq 75$	$\pm 4,0$
$x > 75$	$\pm 5,0$

The mesh shall have the number of apertures given on the order. The variation in the mesh spacing shall provide a maximum cumulative variation of ± 5 mm per meter.

6.5 Weld shear strength

When tested in accordance with Annex A the average of all the four loads shall not be less than 75 % of the wire breaking load of the smallest diameter wire.

NOTE Breaking load is the maximum force during the tensile test before breaking.

If the average fails to meet this requirement, all the welds across the specimen shall be tested. The mesh shall be deemed acceptable if the average of all the weld shear test values across the specimen is greater than 75 % of the wire breaking load of the smallest diameter wire.

7 Sampling and testing

The manufacturer shall be responsible for the control of product quality by the application of statistical methods of sampling and analysis of results or, alternatively, by sampling and testing for the agreed quality characteristics at a rate of one roll/reel in one sample every week or one per production change.

8 Inspection documentation

Unless otherwise agreed at the time of enquiry and order, non specific testing and inspection documentation shall be provided according to the requirements of EN 10021 and EN 10204.

9 Test methods

9.1 Tensile test

Wire samples away from weld intersections shall be tested in accordance with EN 10218-1.

9.2 Wire dimension

Wire samples away from the weld intersections shall be tested in accordance with EN 10218-2.

9.3 Weld shear strength

Weld shear strength shall be tested as described in Annex A.

9.4 Coating tests

9.4.1 Zinc or zinc alloy coating of wire before welding

The coating mass of the wire used in fabricating the welded mesh shall be tested in accordance with EN 10244-1 and EN 10244-2. Additionally, the uniformity and adherence of the coating, if required shall also be tested in accordance with EN 10244-2.

9.4.2 Welded mesh which is zinc or zinc alloy coated after welding

The coating mass and uniformity when required shall be tested in accordance with EN 10244-2 on a sample cut from the mesh, which shall include two line wires, two cross wires and four welds. The coating mass shall be tested by the gravimetric method in accordance with EN 10244-2.

The above applies only for rolls of mesh continuously coated in line and panels cut from such rolls.

9.4.3 Hot dip zinc or zinc alloy coating by a batch process (panels)

The coating mass shall be tested in accordance with EN ISO 1461.

9.4.4 Coated with organic material after fabrication

The organic material coating shall be tested in accordance with the appropriate part of EN 10245-1, EN 10245-2 or EN 10245-3.

10 Packaging

Welded mesh fencing shall be supplied in rolls of length 25 m and 50 m with a tolerance $\begin{matrix} +2,0 \\ 0 \end{matrix}$ %.

By agreement other roll lengths may be supplied.

Panels shall be suitably packaged usually in specified multiples on a pallet.

Annex A (normative)

Weld shear strength test method (welded mesh)

Take a section of mesh of sufficient size from each 5 t of mesh or part thereof.

Select four welds at random from the specimen and test for weld shear strength. The cross wire of each test specimen shall extend approximately 25 mm on each side of the line wire – see Figure A.1. In the tensile testing machine the horizontal wire (the larger of the two) shall rest in a broad hook form jig whose legs shall be a maximum of $2d$ of the wire apart, which gives adequate support without constraining the weld interface. The hook shall be gripped in the upper jaws of the testing machine with a sufficient thickness of packaging on each side of the vertical wire to allow free movement of the latter within the jaws. The lower part of the vertical wire shall be held in the bottom jaws of the testing machine (see Figure A.2). Increasing load shall be applied until failure of the weld or wire occurs.

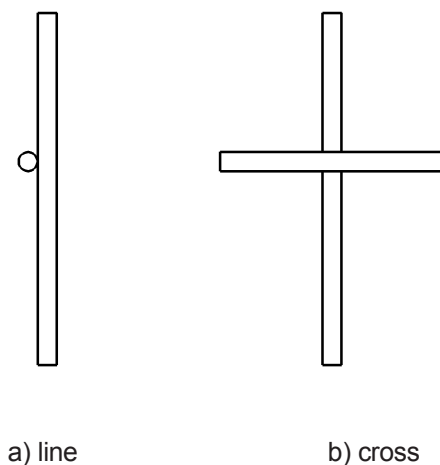
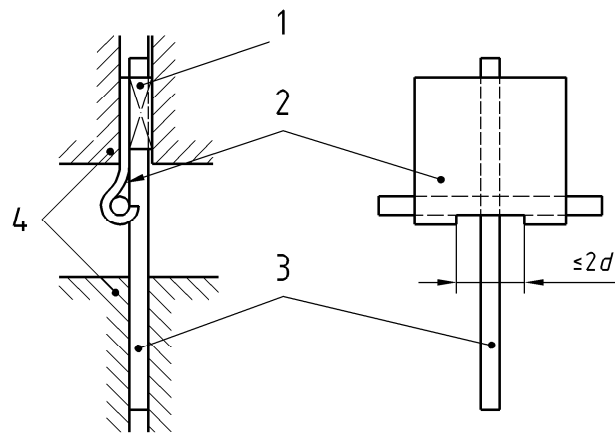


Figure A.1 — Weld intersections



Key

- 1 packing
- 2 hook attachment
- 3 test piece
- 4 tensile test machine grips
- d wire diameter

Figure A.2 — Sample in jaws of testing machine

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