

BRITISH STANDARD

Fences –

Part 10: Specification for anti-intruder fences in chain link and welded mesh

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Foreword

Publishing information

This part of BS 1722 was published by BSI and came into effect on 30 November 2006. It was prepared by Technical Committee B/201, *Fences and gates*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This part of BS 1722 supersedes BS 1722-10:1999, which is withdrawn.

Relationship with other publications

BS 1722 is published in parts as follows:

- *Part 1: Specification for chain link fences;*
- *Part 2: Specification for strained wire and wire mesh netting fences;*
- *Part 4: Specification for cleft chestnut pale fences;*
- *Part 5: Specification for close-boarded and wooden palisade fences;*
- *Part 7: Specification for wooden post and rail fences;*
- *Part 8: Specification for mild steel (low carbon steel) continuous bar fences and hurdles;*
- *Part 9: Specification for mild steel (low carbon steel) fences with round or square verticals and flat horizontals;*
- *Part 10: Specification for anti-intruder fences in chain link and welded mesh;*
- *Part 11: Specification for prefabricated wood panel fences;*
- *Part 12: Specification for steel palisade fences;*
- *Part 13: Chain link fences for tennis court surrounds¹⁾;*
- *Part 14: Specification for open mesh steel panel fences;*
- *Part 16: Specification for organic powder coatings to be used as a plastics finish to components and mesh;*
- *Part 17: Specification for electric security fences – Design, installation and maintenance;*
- *Part 18: Specification for steel mesh site perimeter temporary fencing systems.²⁾*

Information about this document

It should be noted that no attempt has been made to standardize fences or gates of a purely decorative nature, or to suit special requirements; nor to specify requirements for “patent” proprietary fencing systems. It is recommended, however, that such fences or gates should be designed in accordance with the relevant clauses of this part of BS 1722.

¹⁾ Obsolete.

²⁾ Part 18 is in development and will be published as a Draft for Development (DD).

This standard aims to establish minimum requirements for material and workmanship of the more common types of fence in order to ensure satisfactory service for the purchaser, and to assist manufacturers and installing contractors by eliminating unnecessary minor variations in the demands of purchasers. It specifies requirements for the components that make up a fence and the way in which the fence should be constructed.

Choosing a fence is affected by factors such as intended purpose, desired service life, aesthetic considerations and availability of components. The specifier can match a suitable choice of fence to its intended purpose by reference to Table 1 and Table 2 and also inform those installing the fence of the basic characteristics required.

Premature failure of the fence can be avoided by taking care not to damage protective treatments during installation.

This standard specifies the requirements for anti-intruder wire mesh fences. It may be used as a specification for work to be carried out by a specialist fencing contractor or, if such a contractor is not available, by local labour under strict supervision, with component parts supplied by firms approved by the purchaser.

The specification given in this standard is suitable for use in industrial estates, airfields, oil and gas installations, etc. where an enhanced level of security over fences conforming to BS 1722-1 is required. Other types of enhanced security fences are specified in BS 1722-12 [security palisade (SP) fences] and in the relevant clauses of BS 1722-14.

It should be noted that throughout this part of BS 1722 fence post spacings are given in terms of centre-to-centre distances.

Ground conditions may indicate that a variation in the length of a post or strut, or the depth to which it should be set, is desirable. The post and strut setting depths specified in this standard are intended for use in normal ground conditions but if special conditions exist that warrant a change in the specification, e.g. the ground is softer or firmer than usual, such a change should be agreed with the specifier. This also applies to other similar changes.

Use of this document

It has been assumed in the drafting of this part of BS 1722 that the execution of its provision is entrusted to appropriately qualified and experienced people. Before installation commences the Lead Installer should hold a current FISS/CSCS registration card skilled level (blue card) or equivalent and all other operatives should hold the basic fence operative card (green card) or equivalent.

At the time of publication of this British Standard the registration cards are validated by the Joint Fencing Industry Skills Scheme (FISS) and Construction Scheme Skills Certification Scheme (CSCS). FISS/CSCS maintains a national register of fence installers and operatives. There might be other schemes available.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Requirements in this standard are drafted in accordance with *The BSI guide to standardization – Section 2: Rules for the structure, drafting and presentation of British Standards*, subclause **11.3.1**, which states, “Requirements should be expressed using wording such as: ‘When tested as described in Annex A, the product shall ...’”. This means that only those products that are capable of passing the specified test will be deemed to conform to this standard.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This part of BS 1722 specifies requirements for anti-intruder chain link or welded mesh fences and gates of at least 2.4 m in height for situations that require a higher level of protection than that offered by fences conforming to BS 1722-1. It also includes requirements for the installation of the fencing at the specified location.

Provision is made for either single or double extension arms.

This standard includes requirements for component dimensions, together with the permissible tolerances on size. These are minimum requirements and it should normally be acceptable to use larger sizes, except if this could otherwise adversely affect the fitting of components or if replacement parts are required to match with those already present.

This standard includes requirements for protective treatments. However, maintenance requirements for the fence after installation are outside the scope of this standard.

It specifies concrete or steel posts and struts, steel gates and gate posts and zinc coated or plastic coated zinc coated wire or mesh infill.

This standard specifies requirements for fence materials and their combination and installation. Because a fence is made up of a number of separate components of which the particular features vary, e.g. zinc coated or plastic coated wire, a number of combinations are available to the user. Annex C provides details of the fence requirements and installation site that should be agreed between the fence supplier and purchaser at the time of ordering a fence. However, as conditions vary from site to site, Annex C should not be assumed to be exhaustive.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 4-1, *Structural steel sections – Part 1: Specification for hot-rolled sections*

BS 1722-16, *Fences – Part 16: Specification for organic powder coatings to be used as a plastics finish to components and mesh*

BS 3892 (all parts), *Pulverized fuel ash*

BS 4027, *Specification for sulfate-resisting Portland cement*

BS 4102, *Specification for steel wire for general fencing purposes*

BS 4190, *ISO metric black hexagon bolts, screws and nuts – Specification*

BS 4320, *Specification for metal washers for general engineering purposes – Metric series*

BS 4449, *Steel for the reinforcement of concrete – Weldable reinforcing steel – Bar, coil and decoiled product – Specification*

- BS 4482, *Steel wire for the reinforcement of concrete products – Specification*
- BS 4483, *Steel fabric for the reinforcement of concrete – Specification*
- BS 8500 (all parts), *Concrete – Complementary British Standard to BS EN 206-1*
- BS EN 197-1, *Cement – Part 1: Composition, specifications and conformity criteria for common cements*
- BS EN 197-4, *Cement – Part 4: Composition, specifications and conformity criteria for low early strength blastfurnace cements*
- BS EN 206-1:2000, *Concrete – Part 1: Specification, performance, production and conformity*
- BS EN 287-1, *Qualification test of welders – Fusion welding – Steels*
- BS EN 480 (all parts), *Admixtures for concrete, mortar and grout – Test methods*
- BS EN 934 (all parts), *Admixtures for concrete, mortar and grout*
- BS EN 1011-1, *Welding – Recommendations for welding of metallic materials – Part 1: General guidance for arc welding*
- BS EN 1011-2, *Welding – Recommendations for welding of metallic materials – Part 2: Arc welding of ferritic steels*
- BS EN 10088-1:2005, *Stainless steels – Part 1: List of stainless steels*
- BS EN 10088-3, *Stainless steels – Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes*
- BS EN 10223-1, *Steel wire and wire products for fences – Part 1: Zinc and zinc alloy coated steel barbed wire*
- BS EN 10223-4, *Steel wire and wire products for fences – Part 4: Steel wire welded mesh fencing*
- BS EN 10223-6:1998, *Steel wire and wire products for fences – Part 6: Steel wire chain link fencing*
- BS EN 10240, *Internal and/or external protective coatings for steel tubes. Specification for hot dip galvanized coatings applied in automatic plant*
- BS EN 10244-2, *Steel wire and wire products – Non-ferrous metallic coatings on steel wire – Part 2: Zinc or zinc alloy coatings*
- BS EN 12620, *Aggregates for concrete*
- BS EN 12839:2001, *Precast concrete products – Elements for fences*
- BS EN 12878, *Pigments for the colouring of building materials based on cement and/or lime – Specifications and methods of test*
- BS EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods*
- BS EN ISO 2063, *Thermal spraying – Metallic and other inorganic coatings – Zinc, aluminium and their alloys*
- BS EN ISO 12944 (all parts), *Paints and varnishes – Corrosion protection of steel structures by protective paint systems*

3 Wire for chain link fences

3.1 General

All wire shall conform to the relevant parts of BS EN 10223 or BS 4102. Mild steel wire diameters shall be in accordance with Table 1.

3.2 Chain link mesh

Chain link mesh shall be of zinc or class A zinc alloy coated wire conforming to BS EN 10223-6:1998, **5.2d**), or organic coated wire conforming to BS EN 10223-6:1998, **5.2a**). The size of mesh shall be 40 mm or 50 mm as defined in BS EN 10223-6. The width of the mesh shall be 2.4 m, if it is not to be buried, or 2.7 m if it is to be buried. The top edge and, if exposed, the bottom edge shall be barbed.

Chain link mesh shall be joined by interweaving a spiral and restoring the knuckle or barb.

3.3 Line wire

Mild steel line wire shall conform to BS 4102 with a diameter conforming to Table 1.

3.4 Stirrup wire

Stirrup wire, used for securing line wires to intermediate posts, shall be of mild steel conforming to BS 4102 with a diameter conforming to Table 1.

3.5 Tying wire

Tying wire, used for securing mesh to line wires, shall be of mild steel conforming to BS 4102 with a diameter conforming to Table 1.

3.6 Barbed wire

Barbed wire shall conform to BS EN 10223-1.

4 Concrete components for chain link fences

4.1 General

Concrete posts and struts shall be of steel reinforced concrete conforming to BS EN 12839 and Annex A.

NOTE See Clause 5 for steel posts and struts.

Table 1 Diameters of wires in chain link

Dimensions in millimetres

Type of mesh protection	Mesh wire				Line wire				Stirrup wire				Tying wire			
	Mesh size	Zinc coated wire diameter	Plastic coated grade A		Zinc coated wire diameter	Plastic coated grade A		Zinc coated wire diameter	Plastic coated grade A		Zinc coated wire diameter	Plastic coated grade A		Zinc coated wire diameter	Plastic coated grade A	
			Core wire diameter	External diameter		Core wire diameter	External diameter		Core wire diameter	External diameter		Core wire diameter	External diameter		Core wire diameter	External diameter
Zinc coated chain link	40	3.55	—	—	4.00	—	—	2.5	—	—	1.60	—	—	—	—	—
Zinc coated chain link	50	3.55	—	—	4.00	—	—	2.5	—	—	1.60	—	—	—	—	—
Zinc coated chain link	50	5.00	—	—	5.00	—	—	2.5	—	—	1.60	—	—	—	—	—
Plastic coated chain link	50	—	3.55	4.75	—	3.55	4.75	—	2.5	3.55	—	2.5	3.55	—	1.40	2.00
Plastic coated chain link	50	—	4.75	6.40	—	4.75	6.40	—	2.5	3.55	—	2.5	3.55	—	1.40	2.00

NOTE The wire diameters specified are taken from BS EN 10223-6:1998, Table 1.

4.2 Tolerances on size

Concrete components shall conform to their specified sizes within the following tolerances:

- a) a demoulding draw allowance of up to 4 mm on each of two opposing sides;
- b) length of posts: $\pm 1\%$;
- c) cross-section: ± 3 mm.

NOTE The cross-section is measured about the centre lines.

4.3 General construction

The long arrises formed in the base of the mould shall either be rounded or all their sharp edges shall be removed. The arrises formed at the top of the mould shall be free from overfill. The heads of posts shall be either weathered or half rounded in order to prevent lodgement of water.

Posts shall be holed to allow the fixing of line wires, etc. as specified in 4.4. The hole for the top line wire shall be approximately 75 mm below the top of the post (excluding any extension for barbed wire). Holes for bolts shall allow the bolt to be freely inserted. Holes for wire shall allow a nominal 6 mm diameter bolt to be freely inserted. All holes shall be free from obstructions and accurately positioned.

Posts for use with barbed wire shall have integral extensions (see 4.4 and 4.5) or be holed for the attachment of extension arms (see also 6.11).

4.4 Intermediate posts

The cross-section of intermediate posts shall be 125 mm $\times$ 100 mm. The 100 mm dimensions shall be constant and parallel to the fence line.

The vertical portion of intermediate posts shall be holed for the attachment of line wires but shall not be tapered.

The heads of intermediate posts with an integral cranked extension arm shall be tapered to 85 mm $\times$ 100 mm at the top and shall be holed for the attachment of barbed wire.

The top line wire position shall be 75 mm below the tops of posts without an integral extension, bringing the overall length of the post to 3.22 m.

Where separate extension arms are to be fitted, intermediate posts shall be holed for the attachment of the arms [see Figure C.1a) and Figure C.1b) for typical layout of fence types].

4.5 Straining posts

The cross-section of straining posts shall be 150 mm $\times$ 150 mm. The 150 mm dimensions parallel to the fence line shall be constant.

The vertical portion of straining posts shall be holed for the attachment of straining fittings for line wires but shall not be tapered. The heads of straining posts with an integral cranked extension arm shall be tapered to 85 mm $\times$ 150 mm at the top and shall be holed for the attachment of straining fittings for barbed wires.

The top line wire position shall be 75 mm below the top of posts without an integral extension, bringing the overall length of the post to 3.22 m. Where separate extension arms are to be fitted, straining posts shall be holed for the attachment of the arms.

Straining posts shall provide a firm bearing for the struts, which shall meet the straining posts at a point within the top one-third of the length of the vertical portion of the straining post which is above the ground [see Figure C.1a) and Figure C.1b)].

4.6 Gate posts

Gate posts for gates up to 1.2 m wide leaf shall conform to 4.5. Gate posts shall, in addition, be holed for the attachment of gate and fence fittings and be weathered to discourage scaling. Integral extension arms on gate posts shall be vertical.

NOTE Gates with leaves over 1.2 m in width should have steel gate posts (see 5.5).

4.7 Struts

The cross-section of struts shall be 100 mm × 100 mm. Struts shall not be tapered. The length of struts shall be not less than 3.25 m.

5 Steel posts for chain link fences

NOTE See Clause 6 for steel fittings.

5.1 Materials and protective treatments

Steel grades for posts, struts, baseplates and caps, and details of corrosion protective treatments that can be applied to these materials, shall be as given in Annex B.

5.2 Tolerances on size

Steel components shall conform to their specified sizes within the following tolerances:

- a) an allowance on length of ± 10 mm;
- b) an allowance on cross-section as specified in the appropriate material standard (see Table B.1).

5.3 General constructional

Steel components shall be free from sharp edges and burrs. The tops of all hollow steel posts shall be capped or sealed.

Posts shall be holed, or otherwise fabricated, for the attachment or threading of line wires, etc. All holes shall be free from obstructions and shall be accurately positioned.

5.4 Fence posts and struts

The recommended dimensions for steel intermediate posts, strainer posts and struts, produced from rolled steel angle, round tube and rectangular or round hollow sections, are set out in Table 2.

NOTE 1 The use of thicker walls than those shown in the table for both posts and struts is permissible if agreed between purchaser and supplier.

NOTE 2 Alternative section sizes to those shown may be used in appropriate cases, if agreed between purchaser and supplier.

Straining posts and struts of rolled steel angle shall either have spragged ends or be fitted with base plates. Straining posts or struts of other sections shall either have dowels fitted through the base or be fitted with base plates (see 5.6). Straining posts and struts shall be holed to allow the two to be bolted together with bolts of minimum diameter 8 mm, at a point within the top one-third of the length of the straining post (excluding the length of any extension for barbed wire) measured above the ground level. In addition, straining posts shall be holed to allow the attachment of straining fittings.

Intermediate posts of rolled steel angle for use with anti-intruder fences shall either have spragged ends or be fitted with base plates [see C.2d)]. Intermediate posts shall be holed to allow the attachment or threading of line wires. When steel posts are holed for threading line wires, the holes shall be as close as possible to the face of the posts.

Posts shall have integral extensions having the same cross-section as the post or be provided with means for the attachment of extension arms (see also 6.11).

NOTE 3 Separate extension arms may be either bolted or welded on.

5.5 Gate posts

Dimensions for gate posts, which may act as gate/end posts or be freestanding, produced from rolled steel joists, universal columns, round tubes and rectangular or round hollow sections, shall be as given in Table 3.

NOTE 1 The use of thicker walls than those shown in the table is permissible if agreed between purchaser and supplier.

NOTE 2 Alternative section sizes to those shown may be used in appropriate cases, if agreed between purchaser and supplier.

5.6 Base plates and dowels

Base plates shall have a minimum specified thickness of 3 mm and shall be bolted or continuously welded to posts. Welded base plates shall be welded in two places for a length not less than 50% of the sum of the external faces of the post or struts. Base plates for steel straining posts and struts shall project at least 50 mm all round the post. Base plates for steel intermediate posts (if specified) shall project at least 40 mm from at least one face of a post. Base plates for steel gate posts shall be as for straining posts, and shall be positioned so that they do not interfere with any adjacent straining posts.

Dowels shall be of steel at least 10 mm in diameter.

Dowels shall be driven through the post within 250 mm of the base of the post and shall project at least 50 mm either side of the post.