

BRITISH STANDARD

Fences –

Part 1: Specification for chain link fences

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 31 and a back cover.

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This part of BS 1722 supersedes BS 1722-1:1999, which is withdrawn.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 systems²⁾.*

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 those suited to special requirements; nor to specify requirements for “patent” proprietary fencing systems. However, the structure of such fences or gates should be in accordance with the applicable 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 materials 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 needs to be constructed.

Choosing a suitable 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 neither to overstrain coated wire or to damage protective treatments during installation.

Ground conditions might indicate that a variation in the length of a post or strut, or the depth to which these would be set, is desirable. The posts and struts and setting depths specified in this standard are intended for use in normal ground conditions, but if special conditions exist that warrant variations in the specification, e.g. the ground is softer or firmer than usual, such a change should be agreed with the specifier.

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 chain link fences and gates and gateposts for use with chain link fences. The gates specified are steel with a provision for chain link infill or other infill if required by the purchaser.

NOTE For gates for domestic purposes, timber or “wrought iron” gates may be preferred. These types of gate are specified in BS 4092-1.

This standard specifies requirements for fences up to 2.5 m in height with a chain link mesh infill. For other security fences, refer to BS 1722-10, BS 1722-12 and BS 1722-14, and for chain link fences for tennis court surrounds refer to BS 1722-13.

This standard specifies a method of allocating a reference code to each type of fence, indicating its height, the type and weight of infill, and the materials of the posts and the type of wire coating.

NOTE These type references are given in Table 1 and Table 2. For uniformity the heights given in Table 1 and Table 2 are of the main infill material and exclude any ground clearance at the base or additional height provided by extension arms for barbed wire. Wire and chain link sizes are selected from BS EN 10223-6.

This standard is divided into requirements for the material components for fences and for installation of the fences. This standard also includes requirements for protective treatments. However, maintenance requirements for the fence after installation are outside the scope of this standard.

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

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.

BS 1210, *Specification for wood screws*³⁾

BS 1722-7:2006, *Fences – Part 7: Specification for wooden post and rail fences*

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

³⁾ Obsolescent.

- 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 4652, *Specification for zinc-rich priming paint (organic media)*
- 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 – Part 1: Steels*
- BS EN 480 (all parts), *Admixtures for concrete, mortar and grout – Test methods*
- BS EN 844-9, *Round and sawn timber – Terminology – Part 9: Terms relating to features of sawn timber*
- 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 10223-1, *Steel wire and wire products for fences – Part 1: Zinc and zinc alloy coated steel barbed wire*
- BS EN 10223-2, *Steel wire and wire products for fences – Part 2: Hexagonal steel wire netting for agricultural, insulation and fencing purposes*
- BS EN 10223-3, *Steel wire and wire products for fences – Part 3: Hexagonal steel wire netting for engineering purposes*
- BS EN 10223-4, *Steel wire and wire products for fences – Part 4: Steel wire welded mesh fencing*
- BS EN 10223-5, *Steel wire and wire products for fences – Part 5: Steel wire woven hinged joint and knotted mesh fencing*
- BS EN 10223-6:1998, *Steel wire and wire products for fences – Part 6: Steel wire chain link fencing*
- BS EN 10223-7, *Steel wire and wire products for fences – Part 7: Steel wire welded panels – For 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 Terms and definitions

For the purposes of this part of BS 1722, the timber definitions in BS EN 844-9 and Figure 1 apply.

Figure 1 **General characteristics of a chain link fence**

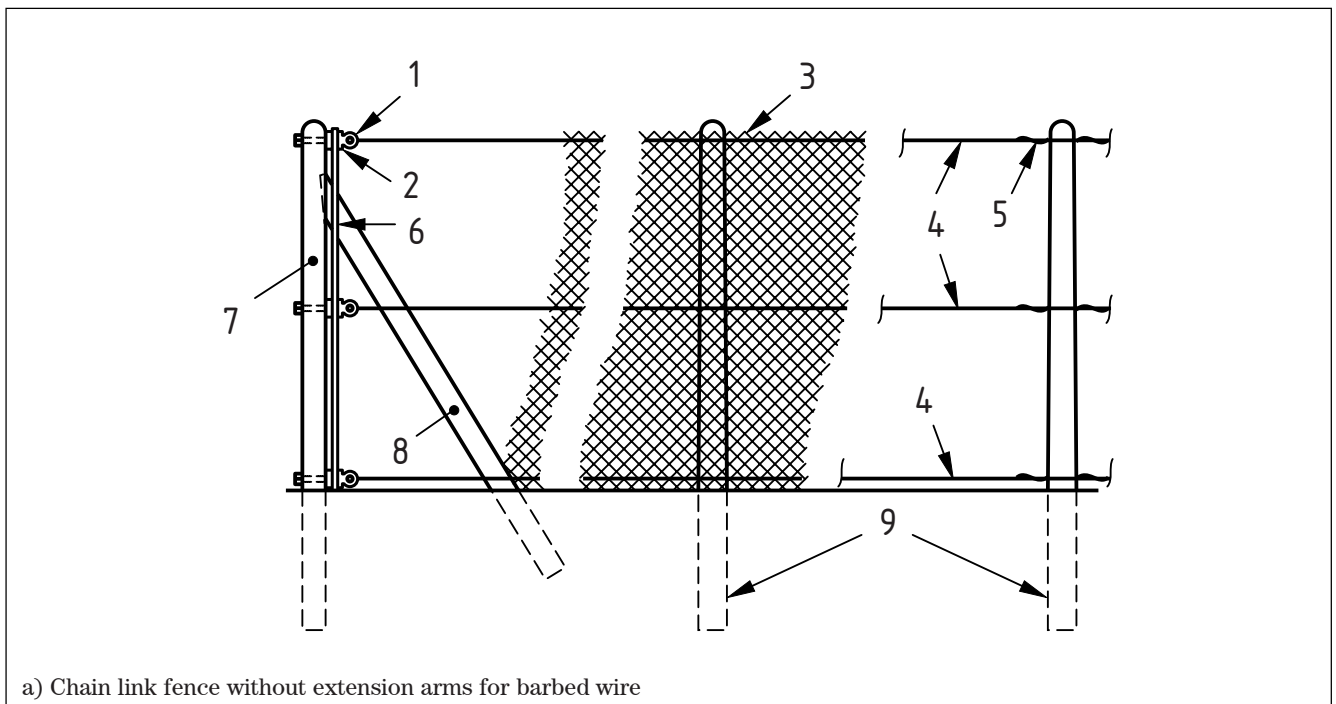
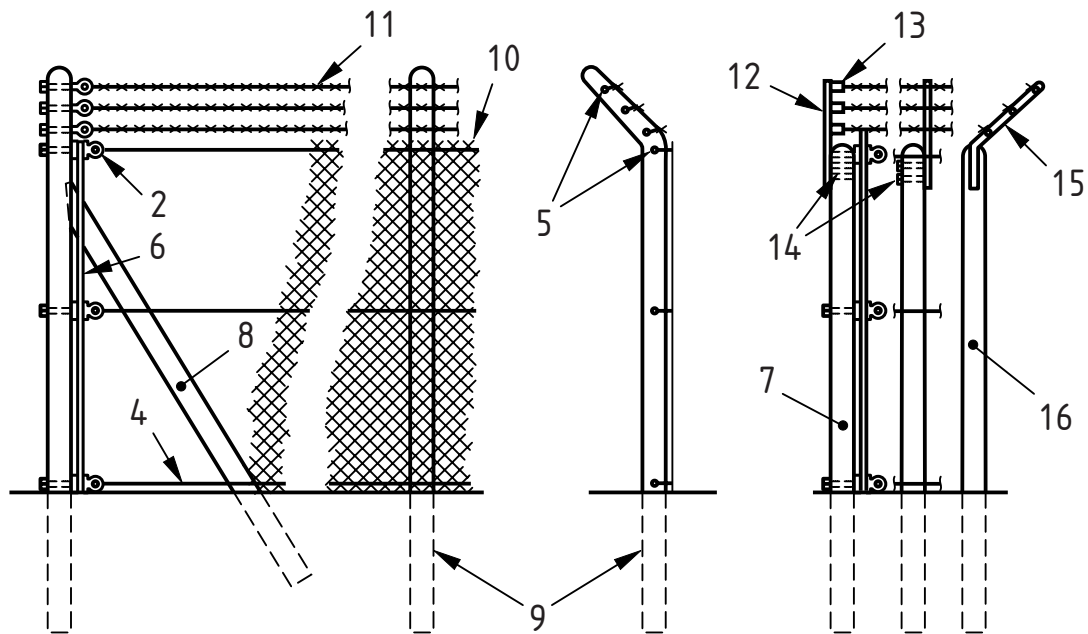
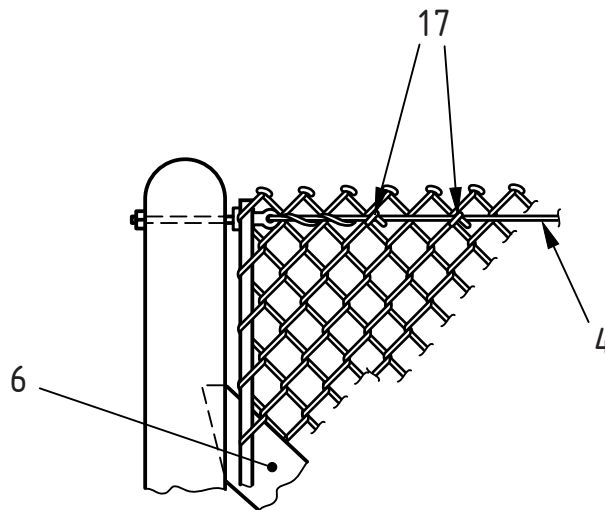


Figure 1 General characteristics of a chain link fence (continued)



b) Chain link fence without extension arms for barbed wire



c) Details of mesh at straining post (showing knuckles only)

Key

- | | |
|----------------------|-----------------------------------|
| 1 Eyebolt | 10 Barbed top mesh (if specified) |
| 2 Cleat | 11 Barbed wire |
| 3 Mesh | 12 Steel angle extension arm |
| 4 Line wire | 13 Winder or eyebolts |
| 5 Stirrup | 14 Bolts |
| 6 Stretcher bar | 15 Steel flat extension arm |
| 7 Straining post | 16 Intermediate post |
| 8 Strut | 17 Wire ties |
| 9 Intermediate posts | |

4 Dimensions and general characteristics

4.1 Fences

The overall dimensions of chain link fence types shall conform to Table 1 and Table 2.

NOTE The general characteristics of a chain link fence with concrete posts, showing a typical layout and illustrating the terminology associated with chain link fences, are shown in Figure 1. Fences with steel or timber posts are similar but without cleats.

4.2 Gates

Single or double gates shall be used to fill openings up to and including 5 m in width. Double gates with leaves of equal width shall be used to fill openings between 5 m and 10 m in width.

Table 1 General characteristics of chain link fences with zinc (Z) or zinc alloy (ZA) coated mesh

Type of fence			Height at posts A)	Pattern	Chain link fencing			Line wires				Suitable uses	
Concrete post (ZC or ZAC) ^{B)}	Steel post (ZS or ZAS) ^{B)}	Wooden post (ZW or ZAW) ^{B)}			Width of roll m	Length of side of mesh mm	Wire nominal diameter mm	Number of rows	Spacing (approx.) mm		Nominal diameter mm		
90 90A	90 90A	90 90A	0.90 0.90	Medium Heavy	0.90 0.90	50 50	2.50 3.00	2 or 3 2 or 3	430 ^{C)} 430 ^{C)}	430 ^{C)} 430 ^{C)}	3.00 3.55	3.15 3.15	House garden fronts and divisions
120 120A	120 120A	120 120A	1.20 1.20	Heavy Extra heavy	1.20 1.20	50 50	3.00 3.55	3 3	580 580	580 580	3.55 4.00	3.15 3.15	Playgrounds, general purposes
140 140A	140 140A	140 140A	1.40 1.40	Medium Heavy	1.40 1.40	50 50	2.50 3.00	3 3	680 680	680 680	3.00 3.55	3.15 3.15	General purposes, railways, house garden flanks, highways
140B	140B	140B	1.40	Extra heavy	1.40	50	3.55	3	680	680	4.00	3.15	Playing fields, recreation grounds
140C 140D	140C 140D	140C 140D	1.40 1.40	Medium Heavy	1.40 1.40	40 40	2.50 3.00	3 3	680 680	680 680	3.00 3.55	3.15 3.15	Railways, general purposes
180 180A	180 180A	180 180A	1.80 ^{D)} 1.80 ^{D)}	Heavy Extra heavy	1.80 1.80	50 50	3.00 3.55	3 3	880 880	880 880	4.00 3.00	3.15 3.15	Commercial property
180B	180B	180B	1.80 ^{D)}	Heavy	1.80	40	3.00	3	880	880	3.55	3.15	Railways, general safety
180C 180D	180C 180D	— —	1.80 ^{D),E)} 1.80 ^{D),E)}	Heavy Extra heavy	1.80 1.80	50 50	3.00 3.55	3 3	880 880	880 880	3.55 4.00	3.15 3.15	Industrial security
180E	180E	—	1.80 ^{D),E)}	Heavy	1.80	40	3.00	3	880	880	3.55	3.15	Railways, general safety
215 215A	215 215A	215 215A	2.15 ^{D)} 2.15 ^{D)}	Heavy Extra heavy	2.15 2.15	50 50	3.00 3.55	3 3	1 055 1 055	1 055 1 055	3.55 4.00	3.15 3.15	Commercial property
215B	215B	215B	2.15 ^{D)}	Heavy	2.15	40	3.00	3	1 055	1 055	3.55	3.15	Railways, general safety
215C 215D	215C 215D	— —	2.15 ^{D),E)} 2.15 ^{D),E)}	Heavy Extra heavy	2.15 2.15	50 50	3.00 3.55	3 3	1 055 1 055	1 055 1 055	3.55 4.00	3.15 3.15	Industrial security
215E	215E	—	2.15 ^{D),E)}	Heavy	2.15	40	3.00	3	1 055	1 055	3.55	3.15	Railways, general safety

A) Heights are of the main infill material, and exclude any ground clearance at the base, or additional height provided by extension arms for barbed wire.

B) Z, ZA = zinc, zinc alloy coating, respectively; for the wire or mesh; C, S, W = concrete, steel, wooden posts, respectively.

C) Two rows of line wires are more usual. A spacing of approx. 860 mm should be used, for both two and three line wire fences.

D) The top of the fence may be barbed.

E) The fence shall have cranked extension arms with barbed wire, increasing the height by approx. 340 mm.

Table 2 General characteristics of chain link fences with plastics coated mesh

Type of fence		Height at posts ^{A)}	Pattern	Chain link fencing			Line wires					Suitable uses										
Concrete post (PZC, PZAC or PC) ^{B)}	Steel post (PZS, PZAS or PS) ^{B)}			Wooden post (PZW, PZAW or PW) ^{B)}	Width of roll	Length of side of mesh	Grade A wire		Grade B wire		Spacing (approx.)		Grade A wire		Grade B wire							
		m		m	mm	Nominal core diameter	Nominal outside diameter	Nominal core diameter	Nominal outside diameter	mm	mm	mm	Middle to bottom	Nominal core diameter	Nominal outside diameter	mm	mm	mm	mm	mm	mm	
90	90	0.90	Light	0.90	50	1.90	2.65	1.70	2.50	2.50	2.50	2.50	430 ^{C)}	3.15	3.15	2.24	3.15	3.15	2.24	3.15	3.15	House garden fronts and divisions
90A	90A	0.90	Medium	0.90	50	2.24	3.15	2.24	3.15	3.15	3.15	430 ^{C)}	430 ^{C)}	3.55	3.55	2.50	3.55	3.55	2.50	3.55	3.55	
90B	90B	0.90	Heavy	0.90	50	2.50	3.55	2.50	3.55	3.55	3.55	430 ^{C)}	430 ^{C)}	4.00	4.00	3.00	4.00	4.00	3.00	4.00	4.00	
120	120	1.20	Heavy	1.20	50	2.50	3.55	2.50	3.55	3.55	3.55	580	580	4.00	4.00	3.00	4.00	4.00	3.00	4.00	4.00	Playgrounds, general purposes
120A	120A	1.20	Extra heavy	1.20	50	3.00	4.00	3.00	4.00	4.00	4.00	580	580	4.75	4.75	3.00	4.75	4.75	3.00	4.75	4.75	
140	140	1.40	Medium	1.40	50	2.24	3.15	2.24	3.15	3.15	3.15	680	680	2.50	3.55	2.50	3.55	2.50	2.50	3.55	3.55	General purposes, railways, house garden flanks, highways
140A	140A	1.40	Heavy	1.40	50	2.50	3.55	2.50	3.55	3.55	3.55	680	680	3.00	4.00	3.00	4.00	4.00	3.00	4.00	4.00	
140B	140B	1.40	Extra heavy	1.40	50	3.00	4.00	3.00	4.00	4.00	4.00	680	680	4.75	4.75	3.00	4.75	4.75	3.00	4.75	4.75	Playing fields, recreation grounds
140C	140C	1.40	Medium	1.40	40	2.24	3.15	—	—	—	—	680	680	2.50	3.55	—	—	—	—	—	—	Railways, general purposes
140D	140D	1.40	Heavy	1.40	40	2.50	3.55	—	—	—	—	680	680	3.00	4.00	—	—	—	—	—	—	
180	180	1.80 ^{D)}	Heavy	1.80	50	2.50	3.55	2.50	3.55	3.55	3.55	880	880	3.00	4.00	3.00	4.00	4.00	3.00	4.00	4.00	Commercial property
180A	180A	1.80 ^{D)}	Extra heavy	1.80	50	3.00	4.00	3.00	4.00	4.00	4.00	880	880	3.55	4.75	3.00	4.75	4.75	3.00	4.75	4.75	
180B	180B	1.80 ^{D)}	Heavy	1.80	40	2.50	3.55	—	—	—	—	880	880	3.00	4.00	—	—	—	—	—	—	Railways, general safety
180C	—	1.80 ^{D), E)}	Extra heavy	1.80	50	3.00	4.00	3.00	4.00	4.00	4.00	880	880	3.55	4.75	3.00	4.75	4.75	3.00	4.75	4.75	Basic industrial security
180D	—	1.80 ^{D), E)}	Super weight	1.80	50	3.55	4.75	—	—	—	—	880	880	3.55	4.75	—	—	—	—	—	—	
180E	—	1.80 ^{D), E)}	Heavy	1.80	40	2.50	3.55	—	—	—	—	880	880	3.00	4.00	—	—	—	—	—	—	Railways, general safety
215	215	2.15 ^{D)}	Heavy	2.15	50	2.50	3.55	2.50	3.55	3.55	3.55	1 055	1 055	3.00	4.00	3.00	4.00	4.00	3.00	4.00	4.00	Commercial property
215A	215A	2.15 ^{D)}	Extra heavy	2.15	50	3.00	4.00	3.00	4.00	4.00	4.00	1 055	1 055	3.55	4.75	3.0	4.75	4.75	3.0	4.75	4.75	
215B	215B	2.15 ^{D)}	Heavy	2.15	40	2.50	3.55	—	—	—	—	1 055	1 055	3.00	4.00	—	—	—	—	—	—	Railways, general safety
215C	—	2.15 ^{D), E)}	Heavy	2.15	50	3.00	4.00	3.00	4.00	4.00	4.00	1 055	1 055	3.55	4.75	3.00	4.75	4.75	3.00	4.75	4.75	Basic industrial security
215D	—	2.15 ^{D), E)}	Extra heavy	2.15	50	3.55	4.75	—	—	—	—	1 055	1 055	3.55	4.75	—	—	—	—	—	—	
215E	—	2.15 ^{D), E)}	Heavy	2.15	40	2.50	3.55	—	—	—	—	1 055	1 055	3.00	4.00	—	—	—	—	—	—	Railways, general safety

A) Heights are of the main infill material, and exclude any ground clearance at the base, or additional height provided by extension arms for barbed wire.

B) PZ, PZA = zinc, zinc alloy coating, respectively, for the wire or mesh; C, S, W = concrete, steel, wooden posts, respectively.

C) Two rows of line wires are more usual. A spacing of approx. 860 mm should be used, for both two and three line wire fences (90, 90A and 90B only).

D) The top of the fence may be barbed.

E) The fence shall have cranked extension arms with barbed wire, increasing the height by approx. 340 mm.

5 Additional security

Fences 180C, 180D, 180E, 215C, 215D and 215E shall include three lines of barbed wire set on straight (vertical) or cranked extension arms conforming to **6.7**. Gates for fences with barbed wire shall also include barbed wire on straight (vertical) extension arms conforming to **6.7**.

NOTE 1 Extension arms for concrete or steel posts may be integral with the post or separate attachments. Wire spacing requirements apply to both integral and separate extension arms.

NOTE 2 Additional security may be provided by chain link mesh with a barbed top (see Table 1 and Table 2) or finished with a line of barbed wire attached to the top of the mesh.

NOTE 3 For other security fences, reference should be made to BS 1722-10, BS 1722-12 and BS 1722-14.

6 Materials and construction

6.1 Wire

6.1.1 General

Wire for fences shall conform to the appropriate part of BS EN 10223 or BS 4102.

6.1.2 Chain link mesh

Chain link mesh shall be zinc or zinc alloy coated wire conforming to BS EN 10223-6:1998, **5.2d**) and Table 1, or plastics coated wire conforming to BS EN 10223-6:1998, **5.2a**) and Table 2.

6.1.3 Line wire

Line wire shall conform to BS 4102 with a nominal diameter conforming to Table 1 and Table 2.

6.1.4 Stirrup wire

Stirrup wire shall conform to BS 4102 with a nominal diameter 2.5 mm. Organic coated stirrup wire shall be of nominal core diameter 2.0 mm and nominal outside diameter 3.55 mm.

6.1.5 Tying wire

Tying wire shall conform to BS 4102. Zinc or zinc alloy coated tying wire shall be of low carbon (mild) steel of nominal diameter 2 mm. Organic coated tying wire shall be of nominal core diameter 1.4 mm and nominal outside diameter 2 mm.

Preformed rings (see **6.6.5**), if used, shall be applied using the correct tool.

6.1.6 Barbed wire

Barbed wire shall conform to BS EN 10223-1.

6.2 Concrete posts and struts

6.2.1 Material

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

6.2.2 Tolerance 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.
- d) base dimensions of intermediate posts, if a mould base with dimensions conforming to Table 3 is used for shorter posts, using a stopping-off plate located not more than 300 mm from the base of the mould.

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

6.2.3 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 to prevent lodgement of water.

Posts shall be holed to allow the fixing of line wires, etc., as specified in 6.2.4. The holes 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 within ± 5 mm.

Posts for use with barbed wire shall have integral extensions (see 6.2.4) or be holed for the attachment of extension arms (see 7.11.1).

6.2.4 Fence posts and struts

General dimensions of concrete fence posts and struts shall conform to Table 3.

Straining posts and struts shall not be tapered.

Straining posts shall be provided with a firm bearing for struts, within the top third of the length above ground (not including extensions for barbed wire).

Straining posts shall be holed for attaching straining fittings. Holes shall be offset from the face of the strut to prevent line wires snagging.

Intermediate posts without integral cranked extensions shall be tapered to 75 mm × 75 mm at the top. Intermediate posts with integral cranked extensions shall be tapered to not less than 75 mm × 75 mm just below the crank and shall be not less than 75 mm × 75 mm at the end of the cranked top. Intermediate posts shall be holed for attaching line wires. Spacing of line wires shall be as specified in Table 1 and Table 2.

Table 3 Concrete posts and struts

Height of fence m	Posts					Struts	
	Length m	Intermediate posts	Straining posts	Gate posts ^{A)}		Length ^{B)} m	Section mm
		Base dimensions ^{C)} mm	Section mm	Max. 1 m gate leaf	Max. 2 m gate leaf		
				Section mm	Section mm		
0.90	1.57	100 × 100	100 × 100	125 × 125	150 × 150	1.50	75 × 75
1.20	1.87	125 × 125	125 × 125	125 × 125	150 × 150	1.83	100 × 75
1.40	2.07	125 × 125	125 × 125	125 × 125	150 × 150	1.93	100 × 75
1.80	2.62	125 × 125	125 × 125	125 × 125	150 × 150	2.59	100 × 85
1.80 with integral extension arms	3.04 (approx.)	125 × 125	125 × 125	125 × 125	150 × 150	2.59	100 × 85
2.15	2.97	125 × 125	125 × 125	125 × 125	150 × 150	2.89	100 × 85
2.15 with integral extension arms	3.39 (approx.)	125 × 125	125 × 125	125 × 125	150 × 150	2.89	100 × 85

^{A)} Concrete posts for gate leaves over 2 m wide are heavy, and steel posts may be preferred.

^{B)} Length suitable for fixing up to 45° to level ground.

^{C)} Reducing to 75 mm × 75 mm at the top (see 6.2.1).

6.2.5 Gate posts and struts

General dimensions of concrete gate posts and struts shall conform to Table 3 and shall not be tapered.

Gate posts shall be holed for attaching hanging and shutting fittings. If chain link is attached to the gate post directly, the gate post shall be holed to attach straining fittings and shall have a firm bearing for a strut (see 6.2.4).

6.3 Steel fence, gate posts and struts

6.3.1 Materials and protective treatment

Steel grades for posts, struts, baseplates, caps and corrosion protective treatments applied to these materials shall conform to Annex B.

6.3.2 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 standards (see Table B.1).

6.3.3 General construction

Steel components shall be free from sharp edges and burrs. Tops of hollow steel posts shall be capped.

Posts shall be holed for attaching line wires, etc., as specified in **6.3.4**. Holes for the top line wire shall be 25 mm below the top of the post (excluding extensions for barbed wire). Holes shall be free from obstructions.

Posts for barbed wire shall have integral extensions with the same cross-section as the post, or means for attaching extension arms (see **6.7**).

NOTE Separate extension arms may be bolted or welded on.

6.3.4 Fence posts and struts

Dimensions of steel posts and struts produced from rolled steel angle, round tube or rectangular or round hollow sections shall conform to Table 4.

NOTE 1 The use of thicker walls than those shown in Table 4 for posts and struts is permissible if agreed between purchaser and supplier.

NOTE 2 Alternative section sizes to those shown (e.g. 38 mm / 44.5 mm or 51 mm OD circular) may be used in appropriate cases if agreed between purchaser and supplier.

Straining posts and struts shall be fitted with baseplates (see **6.3.6**) or have spragged ends.

Straining posts and struts shall be holed for bolting together with an 8 mm bolt, within the top third of the length of the straining post above ground level (not including extensions for barbed wire). Straining posts shall be holed for attaching straining fittings.

Intermediate posts of rolled steel angle for 180C, 180D, 180E, 215C, 215D or 215E fences shall have spragged ends or shall be fitted with baseplates. Intermediate posts of other sections for 180C, 180D, 180E, 215C, 215D or 215E fences shall have dowels fitted through the base or shall be fitted with baseplates (see **6.3.6**). Intermediate posts for other types of chain link fence shall have spragged or dowelled ends, or shall be fitted with baseplates, or shall have pointed ends for driving into the ground. Intermediate posts shall be holed for attaching line wires.

NOTE 3 Spacings of line wires are specified in Table 1 and Table 2.

6.3.5 Gate posts and struts

Dimensions of steel gate posts shall conform to Table 5. Strut dimensions shall be as given in Table 4.

NOTE 1 The use of thicker walls than those shown in the Table 4 and Table 5 for 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.

Gate posts and struts shall be fitted with baseplates or dowels (see **6.3.6**).

Table 4 Recommended dimensions for steel posts and struts

Height of fence	Posts										Struts			
	Length		Intermediate posts (section size)			Straining posts (section size)			Length ^{A)}		Section			
	mm	m	Rolled steel angle	Tube or circular hollow section	Rectangular hollow section	Rolled steel angle	Tube or circular hollow section	Rectangular hollow section	30°	45°	Rolled steel angle	Tube or circular hollow section	Rectangular hollow section	
m			mm	mm	mm	mm	mm	mm	m	m	mm	mm	mm	
0.90	40 × 40 × 5	33.7 × 2.6	40 × 40 × 2.5	50 × 50 × 6	48.3 × 3.0	50 × 50 × 3	50 × 50 × 3	50 × 50 × 3	1.40	1.30	40 × 40 × 4	33.7 × 3.0	40 × 40 × 2.0	
1.20	40 × 40 × 5	33.7 × 2.6	40 × 40 × 2.5	50 × 50 × 6	48.3 × 3.0	50 × 50 × 3	50 × 50 × 3	50 × 50 × 3	1.50	1.71	40 × 40 × 4	33.7 × 3.0	40 × 40 × 2.5	
1.40	40 × 40 × 5	42.4 × 2.6	40 × 40 × 2.5	60 × 60 × 6	60.3 × 3.0	50 × 50 × 3	50 × 50 × 3	50 × 50 × 3	1.68	2.00	50 × 50 × 5	42.4 × 3.0	40 × 40 × 2.5	
1.80	50 × 50 × 5	42.4 × 2.6	40 × 40 × 2.5	60 × 60 × 6	60.3 × 3.0	50 × 50 × 3	50 × 50 × 3	50 × 50 × 3	2.15	2.55	50 × 50 × 5	42.4 × 3.0	40 × 40 × 2.5	
1.80 with integral arms	50 × 50 × 6	48.3 × 3.0	40 × 40 × 3.0	60 × 60 × 6	60.3 × 3.0	50 × 50 × 3	50 × 50 × 3	50 × 50 × 3	2.15	2.55	50 × 50 × 5	42.4 × 3.0	40 × 40 × 2.5	
2.15	50 × 50 × 6	48.3 × 3.0	40 × 40 × 3.0	60 × 60 × 6	60.3 × 3.0	50 × 50 × 3	50 × 50 × 3	50 × 50 × 3	2.50	2.95	50 × 50 × 5	42.4 × 3.0	40 × 40 × 2.5	
2.15 with integral arms	50 × 50 × 6	48.3 × 3.0	40 × 40 × 3.0	60 × 60 × 6	60.3 × 3.0	50 × 50 × 3	50 × 50 × 3	50 × 50 × 3	2.50	2.95	50 × 50 × 5	42.4 × 3.0	40 × 40 × 2.5	

A) It is recommended that the struts be fixed at an angle of 45° on level ground. If site conditions are unsuitable for this, and if agreed between the purchaser and supplier, the struts may either be fixed at 30° or alternative strut lengths used.

Table 5 Recommended dimensions for steel gate posts for gates up to 2.15 m

Width of each gate leaf (max.)	Tube or circular hollow section		Rectangular hollow section		Rolled Steel Joist		Universal beam		Universal column		Baseplates (section)	
	mm	mm	mm	mm	Size	Mass per unit length	Size	Mass per unit length	Size	Mass per unit length	mm	mm
	mm	mm	mm	mm	mm	kg/m	mm	kg/m	mm	kg/m	mm	mm
1.5	88.9 × 4	80 × 80 × 3.5	127 × 76	16.5	127 × 76	13	127 × 76	13	—	—	—	250 × 250 × 5
2.0	114.3 × 5	100 × 100 × 4	127 × 114	27.0	178 × 102	19	178 × 102	19	—	—	—	250 × 250 × 5
3.0	168.3 × 5	150 × 150 × 5	152 × 127	37.0	254 × 146	37	254 × 146	37	152 × 152	37	300 × 300 × 6	300 × 300 × 6
4.0	—	180 × 180 × 6	—	—	—	—	—	—	203 × 203	60	300 × 300 × 6	300 × 300 × 6
5.0	—	200 × 200 × 10	—	—	—	—	—	—	203 × 203	71	300 × 300 × 6	300 × 300 × 6

6.3.6 Baseplates and dowels

Baseplates shall have a minimum thickness of 3 mm and shall be continuously welded to posts. Baseplates for steel straining posts and struts shall project at least 50 mm all round the post.

Baseplates for steel intermediate posts shall extend at least 40 mm from at least one face of the post.

Dimensions and masses of baseplates for steel gate posts shall conform to Table 5. Baseplates shall not interfere with 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 from either side of the post.

6.3.7 Welding

All welding operations shall be carried out in accordance with BS EN 1011 Parts 1 and 2, by suitable personnel qualified according to BS EN 287-1.

6.4 Construction of gates

6.4.1 General

Dimensions of steel gate frames and braces fabricated from tubes or hollow sections shall conform to Table 6.

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 (e.g. 38 mm / 44.5 mm or 51 mm OD circular) may be used in appropriate cases if agreed between purchaser and supplier.

Gates shall be the same height as the chain link mesh of the fence.

Table 6 Steel gate frames and braces for gates up to 2.15 m

Width of each gate leaf (max.)	Circular hollow section		Rectangular hollow section	
	Outside frame	Braces	Outside frame	Braces
m	mm	mm	mm	mm
1	42.4 × 3.0	33.7 × 3.0	40 × 40 × 3.0	30 × 30 × 3.0
4	48.3 × 3.0	42.4 × 3.0	40 × 40 × 3.0	40 × 40 × 3.0
5	60.3 × 3.0	48.3 × 3.0	50 × 50 × 4.0	50 × 50 × 3.0

6.4.2 Construction

Gates shall be of welded construction. All welding operations shall be carried out in accordance with BS EN 1011 Parts 1 and 2, by suitable personnel qualified according to BS EN 287-1. Vertical braces shall be fixed at not more than 1.2 m centres and there shall be at least one horizontal brace (except for gates 1.2 m or less in height and width, which may have a single diagonal brace). Extension arms for barbed wire shall conform to 6.7.

6.4.3 Infill

The infill shall be either chain link mesh of the same mesh size and gauge as the fence or suitable alternative infill agreed between the supplier and purchaser. The infill shall be attached by stretcher bars (see 7.1.3) bolted with hot dip galvanized 8 mm bolts to 60 mm × 25 mm × 5 mm lugs welded to the framework of the gate.

6.4.4 Hinges

Hinges and pins shall be of steel. The bottom hinge shall be of either the heel and socket or plate and pin type.

For heel and socket hinges, and gate leaves up to 2 m wide, the heel plate shall be at least 12 mm thick and the pin at least 16 mm in diameter. For wider gate leaves, the heel plate shall be at least 25 mm thick and the pin at least 20 mm in diameter. For heel and socket type bottom hinges, a block and band top hinge may be used, but the band shall be not less than 50 mm × 6 mm.

Plate and pin hinges for gate leaves up to 2 m wide shall be of plate at least 12 mm thick with a 16 mm diameter pin. For wider gates, hinges shall be of 25 mm thick plate with 20 mm diameter pins.

Female halves of hinges shall be welded to the gate frame.

Hinge plates for steel gate posts shall be welded to the gate posts or holed to take two 12 mm bolts.

Hinge plates for concrete gate posts shall be holed to take a single 16 mm bolt, or, for gates up to 1.2 m in height and up to 1.2 m in width, at least four countersunk head No. 12 screw gauge wood screws (see 7.7).

NOTE If additional security is required the top hinge should be inverted.

Adjustable hinges may be used if desired, but the method of fixing these to the gate post shall be agreed between the supplier and purchaser.

6.4.5 Drop bolts and slam plates

Low carbon (mild) steel drop bolts of at least 20 mm diameter shall be fitted to each leaf of double leaf gate frames. These shall be provided with ground sockets both in the open and closed positions.

Ground sockets shall be of the “easy clean” type.

Double gates shall have a slam plate at least 10 mm thick.

6.4.6 Locking device

Each gate shall be fitted with a locking bar at least 40 mm × 10 mm flat, secured in a frame 40 mm × 10 mm flat or 40 mm × 40 mm × 5 mm, angle iron welded to the gate frame at the junction of the horizontal brace on the shutting stile. For double leaf gates, the locking bar shall shoot into a staple of at least 25 mm × 5 mm.

6.5 Timber posts and struts

6.5.1 Material

Timber posts and struts shall be of square sawn timber conforming to BS 1722-7:2006, 6.1.

6.5.2 Tolerances on size

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

- a) an allowance on size of 1% reduction for every 5% of moisture content below 28%;

NOTE The sizes specified in this standard are for timber with a moisture content of 28% determined in accordance with Annex D.

- b) an allowance on length of posts of ± 50 mm;
- c) an allowance on other dimensions of:
- 1) for dimensions under 75 mm: ± 3 mm;
 - 2) for dimensions 75 mm and over: ± 6 mm.

6.5.3 Fence posts and struts

General dimensions of timber fence posts and struts shall conform to Table 7. Fence posts and struts shall have a single cross-section throughout (except for at a bearing for a strut, which may be of smaller cross-section).

Straining posts and struts shall be cut square across the base. Straining posts shall be notched for struts within the top third of the length of the straining post above ground level.

Intermediate posts for fences designated 90 and 120 shall be cut square across the base or shall be pointed for driving. Intermediate posts for fences designated 140, 180 and 215 shall be cut square across the base.

Table 7 Timber fence posts and struts

Height of fence	Posts						Struts	
	Length (all posts)	Intermediate posts	Straining posts	Gate posts			Length ^{A)}	Section
				Maximum size of gate leaf				
				1.0 m	1.5 m	2.0 m		
Section	Section	Section	Section	Section				
m	m	mm	mm	mm	mm	mm	m	mm
0.90	1.50	75 × 75	100 × 100	100 × 100	125 × 125	125 × 125	1.50	75 × 100
1.20	1.80	75 × 75	100 × 100	100 × 100	125 × 125	150 × 150	1.80	75 × 100
1.40	2.10	75 × 100	100 × 100	100 × 100	125 × 125	150 × 150	2.10	75 × 100
1.80	2.70	125 × 125	125 × 125	125 × 125	150 × 150	150 × 150	2.70	75 × 100
2.15	3.00	125 × 125	125 × 125	125 × 125	150 × 150	150 × 150	3.00	75 × 100

NOTE Ground conditions might indicate that a variation in the length of a post or strut, or the depth to which these would be set, is desirable. The posts and struts and setting depths specified in this standard are intended for use in normal ground conditions, but if special conditions exist that warrant variations in the specification, e.g. the ground is softer or firmer than usual, such a change should be agreed with the specifier.

^{A)} These lengths are suitable for struts fixed at an angle of 45° on level ground (see Note for variations).

6.6 Fittings, fixings and straining devices

6.6.1 Eye bolt strainers

Eye bolt strainers shall consist of 250 mm long bolts of at least 9.5 mm diameter and with an eye at one end. Eye bolt strainers for high tensile line wire shall have welded eyes, and shall be threaded and fitted with nuts and washers. Two-way eye bolt strainers shall be fitted with ring nuts.

Each eye bolt shall have a uniformly sized cleat of low carbon (mild) steel angle, not less than 38 mm × 38 mm × 5 mm. All cleats shall be the same size.

Eye bolt strainers and cleats shall be hot dip galvanized conforming to BS EN ISO 1461.

6.6.2 Winding brackets

Winding brackets for posts shall be of low carbon (mild) steel, flat, and at least 25 mm × 3 mm.

Winding brackets shall have a 12 mm winding bolt with a friction type ferrule or ratchet winder. Each winding bracket shall have an 8 mm fixing bolt. One end of the winding bracket shall be holed for attaching a line of wire.

Winding brackets and fixing bolts shall be hot dip galvanized conforming to BS EN ISO 1461.

6.6.3 Stretcher bars

Stretcher bars shall be of low carbon (mild) steel, flat, and 25 mm × 5 mm, for mesh with a 50 mm side or above, or 20 mm × 5 mm, for mesh with a side less than 50 mm. Stretcher bars shall be holed for attaching to cleats or straining fittings by 8 mm bolts.

Stretcher bars and fixing bolts shall be hot dip galvanized conforming to BS EN ISO 1461.

6.6.4 Staples

Hair pin staples shall be of round wire 3 mm in diameter or sectional wire with the same cross-sectional area, with a zinc coating conforming to BS EN 10244-2. Staples for timber posts shall be 40 mm × 4 mm and of round or sectional wire with a zinc coating conforming to BS EN 10244-2.

6.6.5 Preformed rings

Preformed rings shall be at least 4 mm × 1.5 mm with a zinc coating conforming to BS EN 10244-2.

6.6.6 Nails, bolts, washers, and screws

Washers shall conform to BS 4320. Bolts, washers and nails shall be hot dip galvanized conforming to BS EN ISO 1461. Screws shall be zinc coated steel wood-type with countersunk heads, conforming to BS 1210.

6.7 Extension arms for barbed wire

NOTE This clause applies to both integral and separate extension arms for barbed wire unless otherwise stated.

6.7.1 General

Extension arms for barbed wire shall be either straight or bent to 40° to 45° to the vertical.

Extension arms for gates, gate posts and straining posts next to free standing gate posts shall be straight. These shall have two holes for attaching to posts and holes or slots for attaching at least three lines of barbed wire. Holes or slots for barbed wire shall be no more than 150 mm apart, and the lowest hole or slot shall be not more than 200 mm above the top line wire. Separate extension arms and fixing bolts shall be hot dip galvanized conforming to BS EN ISO 1461.

6.7.2 Extension arms for straining posts and gate posts

Extension arms for straining posts and gate posts shall be holed for attaching eye bolt strainers or winding brackets. Separate extension arms shall have two holes for attaching to posts with 8 mm bolts. Separate extension arms for concrete and timber posts shall be of low carbon (mild) steel angle, 50 mm × 50 mm × 6 mm. Extension arms for steel posts shall be of the same section as the post, integral or welded, or separate for bolting to the post.

6.7.3 Extension arms for intermediate posts

Separate extension arms for intermediate concrete or steel posts shall be of low carbon (mild) steel, flat, 30 mm × 6 mm, and holed for attaching two 8 mm bolts.

6.7.4 Extension arms for gates

For gates up to 1.8 m wide, extension arms shall be on the hanging and shutting stiles. For gates 1.8 m in width and above, in addition to extended hanging and shutting stiles, each vertical brace shall be extended by an extension arm welded and saddled above the gate frame.

7 Installation

7.1 Line and level

The top of the fence shall approximately follow the level of the ground along its length.

The presence of any electricity, gas, water or other underground services shall be established prior to commencement of excavation, drilling or erection in the working area.

NOTE Unless specified (see Annex C), the installation of the fence does not include cutting or filling of the ground to vary the levels.

7.2 Posts and struts

Sides of holes for posts and struts shall be vertical except that the sides of a strut hole adjacent to a post may be sloped in the direction of the line of the fence.

NOTE Some damage to the ground at the top of a hole may be allowed if it is limited to the top of the hole, and the hole does not “taper out” towards the top.

Concrete for bedding posts shall be at least one part cement to 10 parts 20 mm all in ballast to BS EN 12620 mixed with the minimum requisite quantity of clean water, or grade C8/10 or ST2 concrete to BS 8500-1:2002 and BS 8500-2:2002. The concrete shall be placed in position before commencement of the initial set.

Holes for fence posts and struts set in rammed backfill only shall be as small as practicable for refilling and ramming.

Holes for concrete posts and steel posts with spragged or dowelled ends shall, after insertion, be filled to at least two-thirds with concrete, with thorough ramming, and topped with backfill. Backfill shall be well rammed before initial setting of the concrete.

Timber posts with square cut ends and steel posts with base plates shall be set as specified for concrete posts, or driven directly into the ground and surrounded by backfill well rammed as filling proceeds.

Timber and steel posts with pointed ends shall be driven into the ground.

7.3 Straining posts

Straining posts shall be placed at all ends and corners of fences following straight lines, at acute variations in level, and at least every 69 m in straight lengths.

Straining posts shall be set 0.6 m in the ground for fences up to and including 1.4 m high and 0.75 m for fences over 1.4 m high. Holes for straining posts set in concrete shall be not less than 0.45 m × 0.45 m, or, if round, 0.3 m in diameter.

Straining posts next to free-standing gate posts in barbed wire fences shall have a vertical barbed wire extension attached.

7.4 Struts

Struts shall be fitted to all straining posts and gate posts acting as straining posts in the direction of the line of fencing. Concrete struts and posts shall be securely fastened together. Steel struts and posts shall be bolted together with an 8 mm bolt. Timber struts shall be securely nailed in the notch in the straining post with two 125 mm × 5 mm nails. Bases of struts shall be at least 0.45 m below ground, measured to the centre of the base of the strut or baseplate. Holes for struts set in concrete shall be at least 0.30 m × 0.45 m.

7.5 Intermediate posts

Intermediate posts shall be provided at intervals of not more than 3 m, measured centre-to-centre.

Intermediate posts shall be set or driven 0.6 m into the ground for fences up to and including 1.4 m high, and 0.75 m for fences over 1.4 m high.

Square holes for intermediate posts set in concrete, for fences up to and including 1.4 m high, shall allow at least 75 mm of concrete all round the post. Round holes shall be at least 0.3 m in diameter, and posts shall be set in the centre of the hole. Holes for intermediate posts for fences over 1.4 m high shall be at least 300 mm × 300 mm. Round holes for intermediate posts for fences over 1.4 m high shall be at least 0.3 m in diameter.

7.6 Gate posts

A hanging and shutting post shall be provided for single leafed gates. Two hanging posts of the same cross-section shall be provided for double gates.

Gate posts shall be set 0.6 m into the ground for gates up to and including 1.4 m high and 0.75 m for gates over 1.4 m high. Holes for gate posts shall be at least 0.45 m square.

After installation of the gate posts the hole shall be filled completely with concrete well rammed as filling proceeds. Concrete shall be filled to approximately 50 mm above ground level and finished with a weathered top to prevent water accumulation.

Gate posts for directly attaching chain link fencing shall be supported by a strut. Free-standing gate posts installed next to a straining post shall be the same height as the straining post.

7.7 Line wires

Fences designated 90 shall have two or three rows of line wires. The top wire shall be secured 75 mm below the top of concrete and timber posts and 25 mm below the top of steel posts. The bottom wire shall be as close as possible to the ground.

Intermediate wires shall be secured midway between the top and bottom wires. Line wires joined at mid-span shall be joined so that normal tension can be applied to the wire.

NOTE Positions of line wires are given in Table 1 and Table 2.

7.8 Straining posts

Each row of line wire shall be strained between each pair of straining posts by winding brackets or eye bolt strainers passing through a hole in the straining post and secured with a nut and washer each side of the post. Eye bolt strainers fixed to intermediate straining posts shall be fitted with ring nuts after the wire is tensioned.

7.9 Intermediate posts

Each row of line wire shall be secured to concrete intermediate posts by:

- a wire stirrup passing through a hole in the post secured to the line wire by three complete turns on each side of the post; or
- a hair-pin staple passing through a hole in the post with the ends bent over twice, or, if high tensile wire staples are used, once.

Each row of line wire shall be secured to steel intermediate posts by:

- one of the methods specified for concrete intermediate posts; or
- passing through a hole in the post.

Each row of line wire shall be secured to timber intermediate posts by a single staple.

NOTE Care should be taken to avoid damaging line wires and coatings by driving staples too far into timber intermediate posts. A running fit should suffice.

7.10 Chain link fencing

Chain link fencing shall be strained between each pair of straining posts and attached at each straining post by a stretcher bar secured to cleats, or, using 8 mm bolts, to straining posts. Stretcher bars shall be attached to concrete posts by cleats, and the chain link mesh attached to the line wires by wire ties or rings, spaced no more than three meshes (“diamonds”) apart on the top line wire, six meshes on intermediate line wire, and five meshes on the bottom line wire.

NOTE Rings should be attached without damage to the ring or coating (e.g. by closing up too much).

7.11 Barbed wire

7.11.1 Extension arms

Extension arms shall support three lines of barbed wire, if specified, on each straining and intermediate post and gate. Separately provided extension arms shall be attached with two spin galvanized 8 mm bolts.

NOTE 1 Cranked extensions for barbed wire should be directed inwards towards the protected area.

Each line of barbed wire shall be strained to the extension arm on each straining post (and gate post if appropriate) with eye bolt strainers or winding brackets.

NOTE 2 Care should be taken to avoid untwisting high tensile barbed wire by over-tensioning.

Barbed wire shall be secured to integral extension arms on concrete and steel intermediate posts by:

- a wire stirrup passing through a hole in the extension arm secured to the barbed wire by three complete turns on each side of the extension arm; or
- a hair-pin staple passing through a hole in the extension arm with the ends twice bent over, or, if high tensile wire staples are used, once.

Barbed wire shall be secured to separate extension arms on concrete and steel intermediate posts by:

- a wire stirrup passing through a hole in the extension arm secured to the barbed wire by two complete turns on each side of the extension arm;
- a tie wire passing through a hole in the extension arm; or
- if the extension arm has slots, by straining the barbed wire and placing it in the slots.

7.11.2 Barbed wire on gates

Barbed wire on gates shall be stretched hand tight and secured to lugs at the stiles. The barbed wire shall be secured to extended vertical braces, if present, with hair-pin staples or stirrup wires.

8 Gates

Hanging and latching fittings for gates shall be secured to steel gate posts with two 12 mm bolts and to concrete or timber posts with a single 16 mm bolt.

NOTE 1 For gates 1.2 m or less in height and 1.2 m or less in width, hung on single posts, latching fittings may be attached with two 10 mm bolts or at least two 32 mm long No. 12 gauge screws, and hanging fittings with at least four 50 mm long No. 12 gauge screws.

NOTE 2 If the top hinge of a gate is a plate and pin hinge, additional security can be provided by inverting the top hinge to prevent lifting the gate off.

Gates shall have a ground clearance of not more than 50 mm at the meeting point, unless the site conditions require a greater clearance. When closed, the space between the meeting stiles shall not exceed 12 mm.

9 Renovation of damage to hot dip galvanized coating

Small areas of hot dip galvanized coating damaged by welding, cutting, or handling during transit and installation shall be renovated with low melting point zinc alloy repair rods or powder specifically for this, or by at least two coats of good quality zinc-rich paint conforming to BS 4652.

Zinc coatings to renovated areas shall be of at least equal thickness to the original layer.

NOTE Generally, repairs should not be attempted on damaged areas greater than 40 mm².

10 Statement of conformity

10.1 Fence manufacturer

On delivery, the manufacturer/supplier of the fence shall provide the installer with a certificate, conforming to **10.3**, confirming that the fence and/or gates are manufactured in accordance with the client's instructions.

*NOTE This certificate can be in the form of an invoice provided this conforms to **10.3**.*

10.2 Fence installer

On completion, the fence installer shall provide the end user with a certificate conforming to **10.3** confirming that the installation and materials used are in accordance with the client's instructions.

*NOTE This certificate can be in the form of an invoice provided this conforms to **10.3**.*

10.3 Certificate

In addition to the requirements of **10.1** and **10.2**, the certificate shall also include the following information:

- a) the supplier's name and address;
- b) the contract or order number;
- c) the date of delivery or installation, as appropriate;
- d) the purchaser's name and address.

10.4 Statement

The manufacturer and/or installer shall make a statement to the effect that it is their policy to conform to a previously client-agreed and documented specification and to offer goods and/or services accordingly.

NOTE This could be done by inclusion in trade advertising and "terms of trading" statements supplied with quotations.

Annex A (normative) **Concrete components**

A.1 Materials

A.1.1 Cement

Cement for concrete shall be:

- a) Portland cement (ordinary or rapid hardening) conforming to BS EN 197-1;
- b) Portland-blastfurnace cement conforming to BS EN 197-4; or
- c) sulfate-resisting Portland cement conforming to BS 4027.

A.1.2 Aggregate

Aggregate for concrete shall conform to BS EN 12620.

Aggregate shall not exceed 10 mm nominal size.

A.1.3 Admixtures

Admixtures for concrete shall conform as follows:

- a) pigments: BS EN 12878;
- b) pulverized fuel ash: BS 3892;
- c) concrete admixtures: BS EN 480 or BS EN 934 and shall be used in accordance with BS EN 12839.

Admixtures shall have no harmful effect on reinforcement and setting, hardening and durability of the concrete.

A.1.4 Chloride content

For chloride content BS EN 206-1:2000, **5.2.7** applies.

Calcium chloride based admixtures shall not be added to concrete containing steel reinforcement.

A.1.5 Reinforcement

Reinforcement for concrete shall conform to BS 4449, BS 4482 or BS 4483.

A.2 Moulds

Moulds shall remain rigid during placing and compaction of the concrete and shall prevent loss of water, grout or mortar. Moulds shall produce finished components accurately within the specified size limits.

Timber moulds shall be of closely jointed planed timber.

A.3 Manufacture

A.3.1 Mixing

Concrete shall be mixed in a mechanical mixer until uniform in colour and consistency.

A.3.2 Placing and compaction

Concrete shall be placed as soon as practicable after mixing, and shall be thoroughly compacted by vibration, tamping or other method so that on demoulding the surface is free from honeycombing and other large blemishes (see A.4).

NOTE Blemishes do not include small surface voids caused by entrapped air or water.

A.3.3 Location of reinforcement

Reinforcement shall be prefabricated and located during placing and compacting of the concrete so that the cover of concrete measured from main external faces and from the top of a post or strut is at least 15 mm or 10 mm if the section is 100 mm × 100 mm or less.

The length of the assembled reinforcement shall be at least equal to the minimum length of the component, minus up to 100 mm to allow for the minimum cover and up to 75 mm to allow for cutting, prefabrication and location.

Reinforcement shall extend beyond the centre line of the uppermost line wire hole or beyond the top edge of the uppermost rail fixing point, as appropriate.

NOTE If the ends of components are splayed, each bar can be of equal length.

A.3.4 Protection from freezing

Materials that have been exposed to below freezing point shall not be used unless completely thawed.

Components shall not be moulded if the mould is below freezing point. The temperature of fresh concrete shall be not less than 5 °C at the time of placing.

A.3.5 Maturing

Components shall not be used unless:

- a) the concrete has a strength of 45 N/mm², tested in accordance with A.5; or
- b) they have been allowed to mature under suitable conditions for at least 28 days at normal ambient temperatures.

A.4 Surface characteristics

A.4.1 Surface finish as cast

The surface finish shall be assessed against the reference photographs in BS EN 12839:2001, Annex B. Furthermore, the total area of blowholes shall not exceed 3% of the concrete surface and no blowhole shall exceed 150 mm².

NOTE It is acknowledged that semi-dry cast posts may have a more visually open surface texture than shown in these photographs.

A.4.2 Surface finish as treated

The requirements of with BS EN 12839:2001, 5.3.2 shall apply.

A.5 Tests

To demonstrate compliance, testing shall comprise of initial type testing and factory production control in accordance with BS EN 12839:2001, Clause 6.

A.6 Product information

The manufacturer shall give the following information on at least one product by unit of packaging, delivery notes, certificate or any documentation supplied with components in accordance with BS EN 12839:2001, **ZA.3**.

- a) Name (or identifying mark) and address of the manufacturer.
- b) Last 2 digits of the year in which the marking was affixed.
- c) BS 1722 and BS EN 12839: Elements for fences.
- d) Loadbearing capacity, expressed in newtons according to the result of initial type testing, rounded down to the nearest ten.

Annex B (normative) Steel components and protective treatments

B.1 Material form

Steel posts and struts shall be produced from the following:

- a) rolled steel angle (RSA)⁴⁾ or angle re-rolled from railway lines⁵⁾;
- b) rectangular or square hollow sections (RHS);
- c) circular hollow sections or round tubes;
- d) I/H sections⁶⁾ (rolled steel joists (RSJ), universal beams and universal columns);

B.2 Material grades

NOTE 1 The steel grade(s) employed should be specified by the customer (the purchaser, fence designer, supplier, component manufacturer, fabricator or installer, as applicable), on the basis of the mechanical properties, formability and weldability required.

Appropriate mild steel grades shall be selected from National or International Standards or suitable equivalent proprietary materials may be used.

Steel grades to be considered shall have a minimum yield strength in excess of 175 N/mm², unless the design permits lower strength materials to be employed.

NOTE 2 Tubes and hollow sections may be hot or cold formed.

Where components are to be hot dipped galvanised, the purchaser shall confirm with the supplier that the steel composition is suitable.

NOTE 3 A non-exhaustive range of recommended material grades is given in Table B.1.

⁴⁾ Fence posts and struts only.

⁵⁾ Re-rolled angles are normally produced from steel sections.

⁶⁾ Gate posts only.

Table B.1 Recommended steel grades

Material	Dimensional standard	Material standard	Material grade ^{A)}
Rolled steel angle	BS EN 10056-1	BS EN 10025-2	S185/S235JR
Circular, square or rectangular hollow sections	BS EN 10210-2 BS EN 10219-2	BS EN 10210-1 BS EN 10219-1	S235JRH S235JRH
Circular tubes	BS EN 10255 BS EN 10296-1 DIN 1615	BS EN 10255 BS EN 10296-1 DIN 1615	S195T E155 ^{B)} /E190/E195 ST 33
I/H sections – rolled steel joists, universal beams and universal columns	BS 4-1	BS EN 10025-2	S185/S235JR
Plate for baseplates, caps, etc.	—	BS EN 10025-2	S185/S235JR

^{A)} Where applicable, the use of higher strength or more enhanced grades than those shown is permissible, provided that they meet the necessary requirements for formability, weldability or galvanizing.

^{B)} Where the design permits.

B.3 Protective treatment

Steel components and fabrications shall be suitably protected against corrosion with one or more of the following treatments:

- hot dip galvanizing in accordance with BS EN ISO 1461 or BS EN 10240;
- thermal spray coating of zinc or aluminium in accordance with BS EN ISO 2063;
- organic powder coating in accordance with BS 1722-16;
- painting in accordance with BS EN ISO 12944 (parts 1 to 8), as applicable, to meet durability requirement H.

All loose scale, oil and dirt shall be removed from the surfaces before treatment. Closed hollow sections to be hot dipped galvanized shall be provided with the necessary drain holes.

NOTE Guidance on the appropriate protective coatings to use in specific environments and recommended coating thicknesses can be found in BS EN ISO 14713.

Annex C (informative) Specifying a chain link fence

C.1 General

When preparing a specification for a fence it is important that precise details of the requirements of the fence and the installation site are provided. This annex lists items that should be specified at the time of ordering the fence. As conditions vary from site to site, this annex should not be assumed to be exhaustive.

C.2 Site conditions

The following items should at least be agreed between the supplier and purchaser at the time of enquiry and/or order:

- a) the line and length of fence (see Clause 7);
- b) the profile of the fence and ground clearance (see Clause 7);
- c) the site preparation (see Clause 7):
 - 1) clearance;
 - 2) cutting or filling of ground level;

NOTE Unless otherwise agreed between the supplier and purchaser, installation of the fence should not include cutting or filling the ground or securing culverts, ditches, etc.

- d) any specific requirements for non-standard post lengths due to ground conditions (see Foreword);
- e) the number and position of gates.

NOTE The requirements for lengths of posts and struts in this standard (see Table 3, Table 4 and Table 7) and foundation sizes are for "normal" ground conditions. This standard does not cover conditions of particularly firm or soft ground, where other lengths or foundation sizes may be required. Details of steel and timber posts and the method of setting these are also affected by ground conditions.

C.3 Construction of fence

The following items should at least be agreed between the supplier and purchaser at the time of enquiry and/or order:

- a) the mesh width and pattern (see Table 1 and Table 2⁷⁾);
- b) the type of infill (see Tables 1 and Table 2²⁾), i.e.:
 - 1) zinc coated chain link;
 - 2) plastics coated chain link;
 - 3) grade A (zinc coated core);
 - 4) grade B (core not zinc coated);
 - 5) additional security: barbed top;
 - 6) additional security (see footnotes to Table 1 and Table 2):
barbed wire⁸⁾ [low carbon (mild) steel or high tensile steel],
and type (and orientation relative to the protected site) of
extension arm, i.e.:
 - i) vertical⁹⁾;
 - ii) cranked⁴⁾;
 - iii) integral;
 - iv) add-on;

⁷⁾ See reference codes for fence types given in Tables 1 and 2.

⁸⁾ Fences designated 180C, 180D and 180E have a minimum of three lines of barbed wire.

⁹⁾ Extension arms on gates and gate posts and straining posts adjacent to gate posts are vertical.

- c) the type of line wire (see **6.1.3**), i.e.:
- 1) low carbon (mild) steel;
 - 2) high tensile steel;
 - 3) zinc coated;
 - 4) plastics coated:
 - i) grade A;
 - ii) grade B;
- d) the type of posts and struts (see Table 1 and Table 2), i.e.:
- 1) concrete, including:
 - i) standard of surface finish, assessed against the reference photographs in BS EN 12839:2001, Annex B;
 - ii) if it is desired that sharp edges are removed from all long arrises of concrete posts, this should be agreed as an additional requirement of the specification (see **6.2.3**);
 - 2) steel (see **6.3.4**), including:
 - i) the type of section (see Table 4);
 - ii) the type of protective treatment (see Annex C);
- e) timber (see **6.5**), including:
- 1) hardwood;
 - 2) softwood;
 - 3) preservative treatment (category A or B);
- f) base details for steel or timber posts, and method of setting (i.e. in concrete or rammed backfill, or driven (see **6.2.5** and **6.3.3**);
- g) any special requirements for spacing of straining posts on curved fences, or intermediate posts;
- NOTE Clause 7 provides for spacing of intermediate posts at maximum centres of 3 m. If shorter bays are required they should be specified.*
- h) fittings (see **6.6**), including requirements for attaching line wires or barbed wire, including threaded line wires (see **7.2** and **7.4**);
- i) gates (see **6.4**), i.e.:
- 1) the type of gate (see Foreword);
 - 2) the width of opening (measured as width clear for passage), for:
 - i) single leaf gates;
 - ii) double leaf gates¹⁰⁾
 - 3) the height of gate, including barbed wire if required;
 - 4) the type of section (see **6.2.5** and Table 6);
 - 5) the type of protective treatment (see Annex B);

¹⁰⁾ For over 5 m wide.

- 6) the type of hinge (see **6.4.3**), for:
 - i) top, either:
 - plate and pin; or
 - block and band;
 - ii) bottom, either:
 - plate and pin;
 - heel and socket;
- 7) installation details (see Clause **7**), i.e.:
 - i) the position of ground socket
 - ii) the ground clearance.

Annex D (informative) Determination of moisture content

Moisture content should not exceed 28% when measured with a calibrated moisture meter of the electrical resistance type, fitted with insulated probes that can be hammered into wood to the depth specified in Table D.1.

When determining the suitability of a charge of timber for preservation, moisture readings should be made on no fewer than $\sqrt{(n/2)}$ separate components, where n is the total number of components in the charge. The components to be measured should be taken from random positions in the charge. The number of heartwood and sapwood faces sampled should reflect the relative proportions of these types of wood in the charge as a whole.

If preferred, the oven-dry method of determining moisture content as described in BS EN 212 may be used in place of a moisture meter.

To achieve the recommended moisture content of 28% (m/m) timber can be either air dried or kiln dried. For either process it is essential that fencing timber is debarked and stacked so that air can circulate freely. In winter little natural drying is likely, therefore kiln drying may be the only effective solution.

Table D.1 **Determination of moisture content of timber to be treated for use in fencing**

Type of timber	Length of electrodes within the timber	Maximum indicated moisture content in an sample %
a) All sapwood	25 mm, or sapwood thickness if less	
b) Heartwood of wood species other than those listed in c):		
posts	25 mm	28
other components	12 mm	
c) Heartwood of sweet chestnut, dahoma, danta, guarea, kapur, kempas, oak	5 mm	

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

BS 1722-10, *Fences – Part 10: Specification for anti-intruder fences in chain link and welded mesh*

BS 1722-12, *Fences – Part 12: Specification for steel palisade fences*

BS 1722-13, *Fences – Part 13: Chain link fences for tennis court surrounds¹¹⁾*

BS 1722-14, *Fences – Part 14: Specifications for open mesh steel panel fences*

BS 4092-1, *Specification for domestic front entrance gates – Part 1: Specification for metal gates*

BS 5589, *Code of practice for preservation of timber*

BS EN 212, *Wood preservatives – General guidance on sampling and preparation for analysis of wood preservatives and treated timber*

BS EN 10025-2, *Hot rolled products of non-alloy structural steels – Part 2: Technical delivery conditions for flat products*

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BS EN 10255, *Non-alloy steel tubes suitable for welding or threading – Technical delivery conditions*

BS EN 10296-1, *Welded circular steel tubes for mechanical and general engineering purposes – Technical delivery conditions – Part 1: Non-alloy and alloy steel tubes*

BS EN ISO 14713, *Protection against corrosion of iron and steel in structures – Zinc and aluminium coatings – Guidelines*

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¹¹⁾ Obsolete.

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