BRITISH STANDARD

BS 6579-7: 1989

# Safety fences and barriers for highways —

## Part 7: Specification for components for untensioned corrugated beam safety fence

UDC 625.738.692.88

# Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Road Engineering Standards Policy Committee (RDB/-) to Technical Committee RDB/18, upon which the following bodies were represented:

Aluminium Federation
Association of Consulting Engineers
British Cement Association
British Railways Board
British Steel Industry
Convention of Scottish Local Authorities
County Surveyors' Society
Department of Transport
Institution of British Engineers
Institution of Civil Engineers
Institution of Highways and Transportation
Royal Automobile Club
Royal Society for the Prevention of Accidents

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

Department of Transport (Engineering Policy and Programme Division)
Department of Transport (Transport and Road Research Laboratory)
Fencing Contractors' Association

This British Standard, having been prepared under the direction of the Road Engineering Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 31 December 1989



The following BSI references relate to the work on this standard:
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# Contents

# Foreword

This Part of BS 6579 has been prepared under the direction of the Road Engineering Standards Policy Committee. The other Parts of BS 6579 either published or in preparation are:

— *Part 1: Specification for components for tensioned corrugated beam safety fence on Z posts*;

— *Part 2: Specification for tensioned corrugated beam safety fence on offset brackets*;

— *Part 3: Specification for components for tensioned rectangular hollow section beam (100 mm × 100 mm) safety fence*;

— *Part 4: Specification for tensioned rectangular hollow section beam (200 mm × 100 mm) safety fence*;

— *Part 5: Specification for open box beam safety fence (single height:)*;

— *Part 6: Specification for open box beam safety fence (double height)*;

— *Part 8: Specification for concrete safety barriers*.

BS 6579 is being produced at the request of users and manufacturers in order to cover the various types of safety fences and barriers available.

Fences detailed in Parts 1 to 7 have been developed already and approved for use on roads in the United Kingdom.

The designs are based on the results of static and dynamic tests carried out in the past on components and complete systems under the direction of the Transport and Road Research Laboratory (TRRL).

The safety barrier in Part 8 is for use only on certain roads at the date of publication of this Part of BS 6579.

If further types are developed, the standard will be revised and increased in scope to cover additions and variations.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

**Summary of pages**

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

## 0 Introduction

**0.1** The objective of providing safety fences or barriers adjacent to a highway is to reduce the consequences of vehicles leaving the carriageway and entering areas where it would be unsafe for them to travel.

Safety fences are intended to absorb some of the energy of impact and to redirect the errant vehicle, so that it follows, within a narrow angle, the line of the fence in the direction of the traffic and does not overturn.

Safety barriers are intended to provide containment without significant deflection or deformation under impact, and to re-direct errant vehicles along the line of the barrier in the direction of traffic.

**0.2** The safety fences and barriers for ground mounting which are the subject of BS 6579 are for use in conjunction with parapets on bridges and other structures which are the subject of BS 6779. Although definitions in both standards have been chosen so as to align as closely as possible, there are some cases where the definition is applicable only to a particular Part of BS 6579 and does not apply generally.

**0.3** No direct guidance is given in BS 6579 on the situations where safety fences and barriers should be erected or on the choice of the types described in the various Parts, but information pertaining to general characteristics of different types of safety fences and barriers is given in Appendix A.

**0.4** There are various situations and various methods by which transition between a safety fence or safety barrier and a bridge parapet can be assured without impairing the overall protection afforded to the users of the highway.

In the case of untensioned corrugated beam safety fence it is not appropriate to make a direct connection to a bridge parapet and transition to an open box beam safety fence should be made using a special transition piece.

NOTE Details of a special transition piece are given in Part 5 of this standard.

Appendix B gives recommendations on methods of connecting safety fences to bridge parapets and other types of safety fence.

**0.5** It is important to recognize that the performance of a safety fence can be affected by factors that are not covered by the specifications for the components. These factors include the choice of intermediate posts to suit the ground conditions and the erection and maintenance of the fence.

**0.6** Figure 1 illustrates the general arrangement of an untensioned corrugated beam safety fence for which the components specified in this Part of BS 6579 are intended. It is essential that the end posts and all angled beam posts are surrounded by granular material rammed and ramped as illustrated in Figure 1. Intermediate timber posts should be surrounded by well rammed granular fill and steel posts driven securely.

**0.7** Enquiries concerning the availability of detailed drawings providing information on manufacture and installation should be made to the Department of Transport Headquarters[1)] or Regional Offices of the Department.

**0.8** Appendix C gives a list of components for the safety fence and their Transport and Road Research Laboratory (TRRL) item numbers.

**0.9** Appendix D lists information that should be provided when making an enquiry or order.

**0.10** In Appendix E important recommendations are given on the transport, handling and storage of components prior to assembly on site.

## 1 Scope

This Part of BS 6579 specifies the requirements for the components to be used in the construction of the untensioned corrugated beam (UCB) type of safety fence. Requirements are given for the materials and dimensions of the components and for protective treatments and finishes.

Erection of the assembled fence is outside the scope of this Part of BS 6579 (see **0.3**).

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

## 2 Definitions

For the purposes of this Part of BS 6579 the following definitions apply.

**2.1**
**vehicle restraint system**

installation to provide a level of containment for errant vehicles to limit damage or injury to users of the highway

**2.2**
**vehicle safety fence**

vehicle restraint system in the form of horizontal members mounted on posts

**2.3**
**vehicle safety barrier**

vehicle restraint system that is continuously in contact with its supporting foundations throughout its length

[1)] Department of Transport, BE Division, St Christopher House, Southwark Street, London SE1 0TE.

**2.4**
**single sided safety fence**

a safety fence having the face of its beams in front of, or in line with, the face of the supporting posts, with traffic approaching on one side only

**2.5**
**double sided safety fence**

a safety fence having the traffic face of its beams in front of, or in line with, the traffic faces of the supporting posts, with the traffic approaching on both sides

**2.6**
**traffic face**

the face of a safety fence or barrier that is nearer to the vehicular traffic flow

**2.7**
**impacting vehicle**

a vehicle striking a safety fence or barrier whether or not it is redirected

**2.8**
**terminal**

that end-section of the length of a safety fence within which the beam rises from or is brought down to an anchorage

**2.9**
**flaring (of the ends)**

the setting back of ground anchorages behind the line of a safety fence

NOTE Flaring is intended to reduce the risk of errant vehicles hitting or mounting the anchorages and to reduce the risk of a vehicle passing behind the safety fence.

**2.10**
**initial installation length**

the length of safety fence, obtained by setting out the position of each intermediate post from the centre of the angled beam post (the datum), when lap bolt clearances have been taken up but before beam to post connections are tightened

## 3 Components

### 3.1 Beams

Beams and angled beams shall be formed from steel, complying with BS 1449-1, grade 43/25, BHR or BS 4360, grade 43 A. All beams shall have the profile shown in Figure 4 and comply with the appropriate dimensional requirements given in Figure 2.

NOTE The normal post spacing is 3.2 m and beams to cover a greater spacing than this should only be required as replacements in an existing installation.

### 3.2 Posts

**3.2.1** Posts shall comply with the dimensional requirements shown in Figure 3.

**3.2.2** Steel posts shall be made from steel complying with BS 4360, grade 43A except for the end post which shall be made from steel complying with BS 4360, grade 43C.

**3.2.3** Timber posts and packing blocks as shown in Figure 1 and Figure 3 respectively shall comply with the following requirements.

a) *Timber quality*. Timber for posts and blocking out pieces shall be one of the species referred to in section 6 of BS 5589:1989 for performance Category A.

It shall be stress graded and marked to comply with BS 4978 or BS 5756 or other grading rules accepted in BS 5268-2.

The grade of timber for safety fence posts shall be not less than SC4 classification of BS 5268. Alternatively, if the section is increased from 150 mm × 150 mm to 175 mm × 175 mm, SC3 classification will be acceptable.

b) *Treatment*. Hardwoods, where heartwood is classified in BS 5589 as being sufficiently durable for a 40 year service life in ground contact, may be used untreated. All other timbers and all timber containing sapwood shall be treated in accordance with section 1 and section 6 of BS 5589:1989 for performance Category A materials to be used in ground contact.

NOTE This category provides a service life of 40 years.

### 3.3 Brackets

Offset brackets, end shoes and spacers as shown in Figure 1 and Figure 2 shall be made from steel complying with BS 4360 grade 43A.

### 3.4 Fasteners

Fasteners shall be manufactured in steel as follows.

a) Bolts and screws shall be ISO metric black hexagon type, complying with BS 4190, grade 4.6 unless otherwise specified on the figures.

b) Nuts shall be ISO metric black hexagon nuts, grade 4 complying with BS 4190 unless otherwise specified on the figures.

c) Washers shall be black complying with BS 4320, form F or as in Table 2 unless otherwise specified on the figures.

d) Nails shall comply with BS 1202-1.

e) Timber connectors shall comply with BS 1579.

## 4 Tolerances

**4.1** Tolerances on dimensions of components shall be in accordance with the appropriate dimensional specification, detailed drawings and relevant figure of this Part of BS 6579.

**4.2** Deviation from the specified dimensions for steel materials and fabricated components shall be measured before galvanizing.

## 5 Protective finish

**5.1** All steel components excluding reinforcing rings and reinforcing bars shall be hot dip galvanized, with tolerances as specified on the drawings, in accordance with Table 1 of BS 729:1971, after fabrication.

**5.2** Fasteners shall be spun galvanized (centrifuged) in accordance with BS 729.

NOTE Where the purchaser wishes the components to be painted by the supplier he should specify his requirements with the enquiry or order.

## 6 Marking

Every beam, post, anchorage and offset bracket shall be marked, indented or embossed with:

a) the number of this British Standard, i.e. BS 6579;

b) manufacturer's identification mark;

c) digits indicating month and year of manufacture, (e.g. 10/89 indicates manufacture during October 1989).

## Appendix A Vehicle safety fences and barriers for highways: type characteristics

Information on type characteristics is given in Table 1. Illustrations of fence and barrier types are given in Figure 8.

**Table 1 — Safety fences and barriers: type characteristics**

| Type | Ref. | Material | Type of support or mounting | Post spacing | Beam position mounting height | Single/ double sided | Tension un-tensioned T/UT | Design deflection | Design vehicle mass | Vehicle speed | Design angle of departure (max.) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | m | mm | | | mm | t | km/h (miles/h) | degrees | |
| Corrugated beam | TCB1 | Steel | Z section steel post | 3.2 | Side 610 | Single | T | 1 000 | 1.5 | 113(70) | 8 | May reduce dazzle when mounted in central reserve. |
| Corrugated beam | TCB2 | Steel | Z section steel post | 1.6 | Side 610 | Single | T | 800 | f.5 | 113(70) | 10 | |
| Corrugated beam | TCB3 | Steel | Steel or timber post with off set | 3.2 | Side (inclined at 15°) 535 | Double | T | 800 | 1.5 | 113(70) | 10 | |
| Corrugated beam | TCB4 | Steel | Single Z section steel post | 3.2 | Side 610 | Double | T | 800 | 1.5 | 113(70) | 10 | |
| Corrugated beam | UCB | Steel | Steel or timber posts with off sets | 3.8 (max.) | Side 525 | Single or double | UT | | 1.5 | 80(50) | 10 | |
| Rectangular hollow section 100 mm × 100 mm | TRH S1 | Steel | Single Z section steel post | 3.2 | Top 610 | Both | T | 1 000 | 1.5 | 113(70) | 10 | Reduces extent of snow/sand drift. On dual carriageways central reserve has to be hardened. |
| Rectangular hollow section 200 mm × 100 mm | TRH S2 | Steel | Single | 3.2 | Top or side 610 | Both<br>Single | T<br>T | 600<br>600 | 1.5 | 113(70) | 8 | |
| Open box beam | OB1 | Steel | Z section steel post | 2.4 | Side 610 | Single | UT | 600 | 1.5 | 113(70) | 10 | |
| Open box beam | OB2 | Steel | Z section steel post | 2.4 | Side 610 | Double | UT | 400 | 1.5 | 113(70) | 10 | |
| Open box beam (double height) | OB3 | Steel | Z section steel post | 2.4 | Side 610 and 1 020 | Single | UT | 1 000 | 5 | 80(50) | 15 | This type of safety fence will also satisfy the condition of a 1.5 t vehicle impacting at 20° and travelling at 113 km/h (70 miles/h). |
| Concrete barrier | CSB | Concrete | Profiled barrier on continuous foundation | — | 816 to top of concrete | Double | — | Zero | 1.5 | 80(50) | 8 | May reduce dazzle when mounted in central reserve. |

NOTE 1 Mounting heights quoted are to the centre of the beam above the adjacent carriageway level. If the horizontal distance from the beam traffic face to the carriageway exceeds 1 500 mm the height dimension of the beam centre line will relate to the surface immediately below.

NOTE 2 Design angle of approach of vehicle is 20° in each case.

NOTE 3 Beams THRS2 and OB 1 may be mounted on steel brackets fixed to structures.

NOTE 4 Generally, double sided beams for dual carriageways on similar levels require only a single line of posts.

## Appendix B Transition between untensioned corrugated beam safety fence, bridge parapets and other types of safety fence

### B.1 General

**B.1.1** This appendix includes the methods of connecting an untensioned corrugated beam safety fence indirectly to bridge parapets, which are the subject of BS 6779.

**B.1.2** It should be noted that the means for connecting safety fences to bridge parapets varies according to whether the latter are fabricated in steel or aluminium.

### B.2 Transition to open box beam safety fence

**B.2.1** A specially fabricated unit should be used to provide a transition from an untensioned corrugated beam safety fence to an open box beam safety fence (OBB item number 006).

**B.2.2** Where this transition piece is fitted the post spacing should change from 2.4 m for the open box to 1.6 m for the first 10 m (approximately) of untensioned corrugated beam safety fence and 3.2 m thereafter.

### B.3 Connection to steel parapets

For details of components and method of connection refer to Figure 5.

### B.4 Connection to aluminium parapets

**B.4.1** For details of components and method of connection refer to Figure 6 and Figure 7.

**B.4.2** In making all connections between steel and aluminium components stainless steel bolts should be used and a suitable insulating material applied to the interface which should be supplied by the safety fence supplier.

## Appendix C List of components

For the convenience of users of this Part of BS 6579, Table 2 gives a list of components and their TRRL item numbers.

**Table 2 — List of components**

| Item number (correlates with TRRL Drg. Series 1040.50/-) | Description of item |
|---|---|
| G01 001 | Profile of beam (drawing only) |
| G01 002 | Standard beam |
| G01 003 | Angled beam — LH |
| G01 004 | Intermediate post — Timber |
| G01 005 | Packing block — Timber |
| G01 006 | End shoe |
| G01 007 | Intermediate post driven — Steel |
| G01 008 | Offset bracket |
| G01 009 | Flanged post — Steel |
| G01 010 | Spacer |
| G01 011 | End post — Timber |
| G01 012 | Lap bolt |
| G01 013 | Screw M 12 × 30 length. BS 4190 grade 4.6 |
| G01 014 | Screw M 16 × 40 length. BS 4190 grade 4.6 |
| G01 015 | Bolt M16 × 240 length. BS 4190 grade 4.6 |
| G01 016 | Bolt M16 × 320 length. BS 4190 grade 4.6 |
| G01 017 | Bolt M16 × 400 length. BS 4190 grade 4.6 |
| G01 018 | Bolt M16 × 600 length. BS 4190 grade 4.6 |
| G01 019 | Nut M12 BS 4190 grade 4 |
| G01 020 | Nut M16 BS 4190 grade 4 |
| G01 021 | Washer M12 (form "F") to BS 4320 |
| G01 022 | Washer M16 (form "F") to BS 4320 |
| G01 023 | Nail, clout 14 gauge × ¾ in[a] length galvanized |
| G01 024 | Timber connector M16, galvanized |
| G01 025 | Profile of post (drawing only) |
| G01 026 | Long post driven — Steel |
| G01 027 | Anchor bolt — M20 |
| G01 028 | End post — Steel |
| G01 029 | Angled beam R.H. |
| G01 030 | Intermediate post — Steel (concreted) |
| G02 001 | Transition piece (identical to item no. SG 1040 16/B-006) |

[a] Indicates imperial dimension.

## Appendix D Information to be supplied

The following information should be provided when making an enquiry or order:

a) the number of this British Standard, i.e. BS 6579-7;

b) the type and reference of the safety fence, i.e. untensioned corrugated beam UCB (see Appendix A);

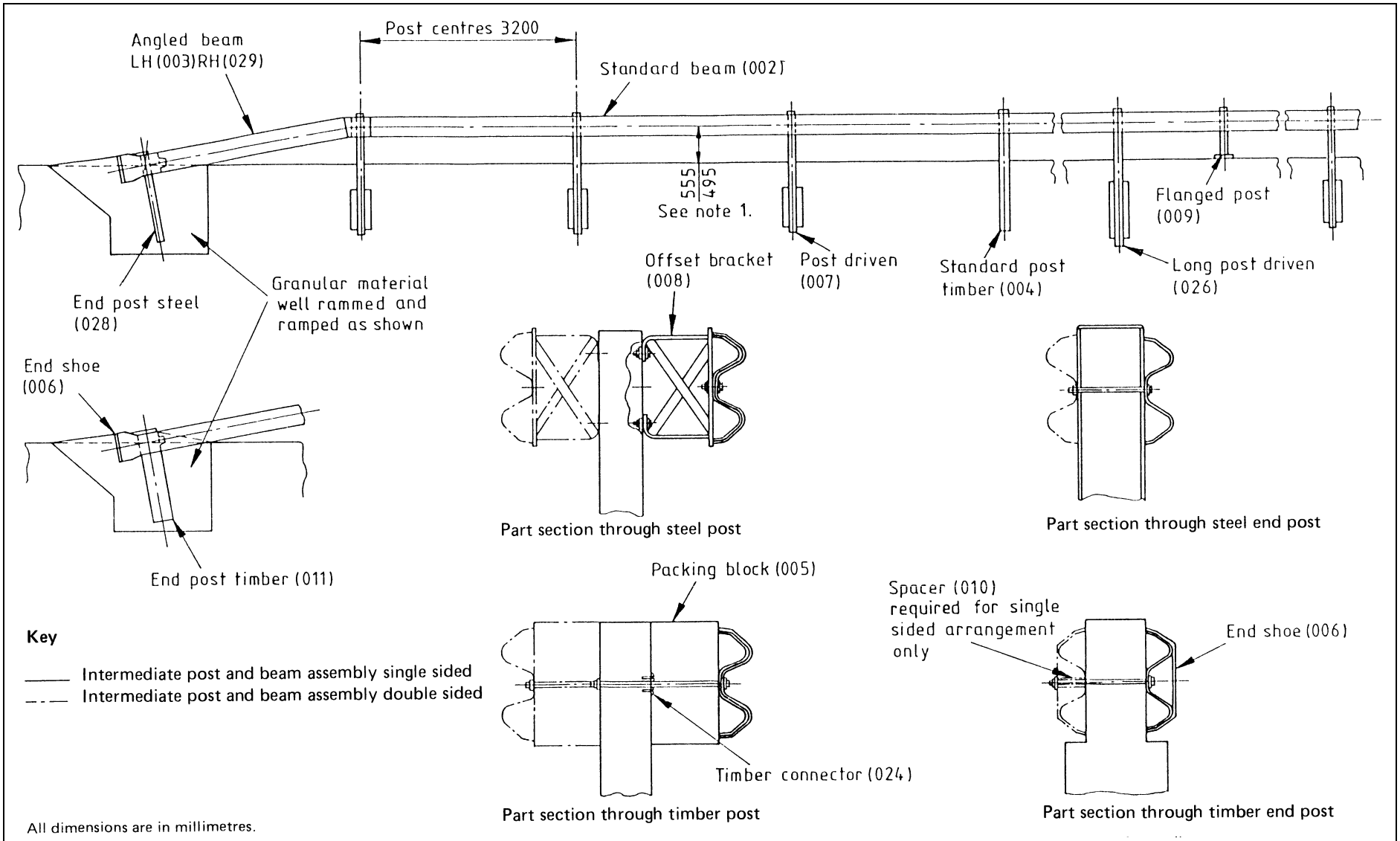
c) the item number and description of each component required, description as given in Appendix C Table 2;

d) any requirements for painting.

## Appendix E Transport, handling and storage

Components should be transported in a manner such as to preserve the profile and finish required by this specification.

The method of handling and storage can adversely affect the supplied finish and it is essential that care is taken to provide for the circulation of air and the avoidance of trapping moisture between beam sections and the growth of “white rust” and other deposits accumulating on surfaces.

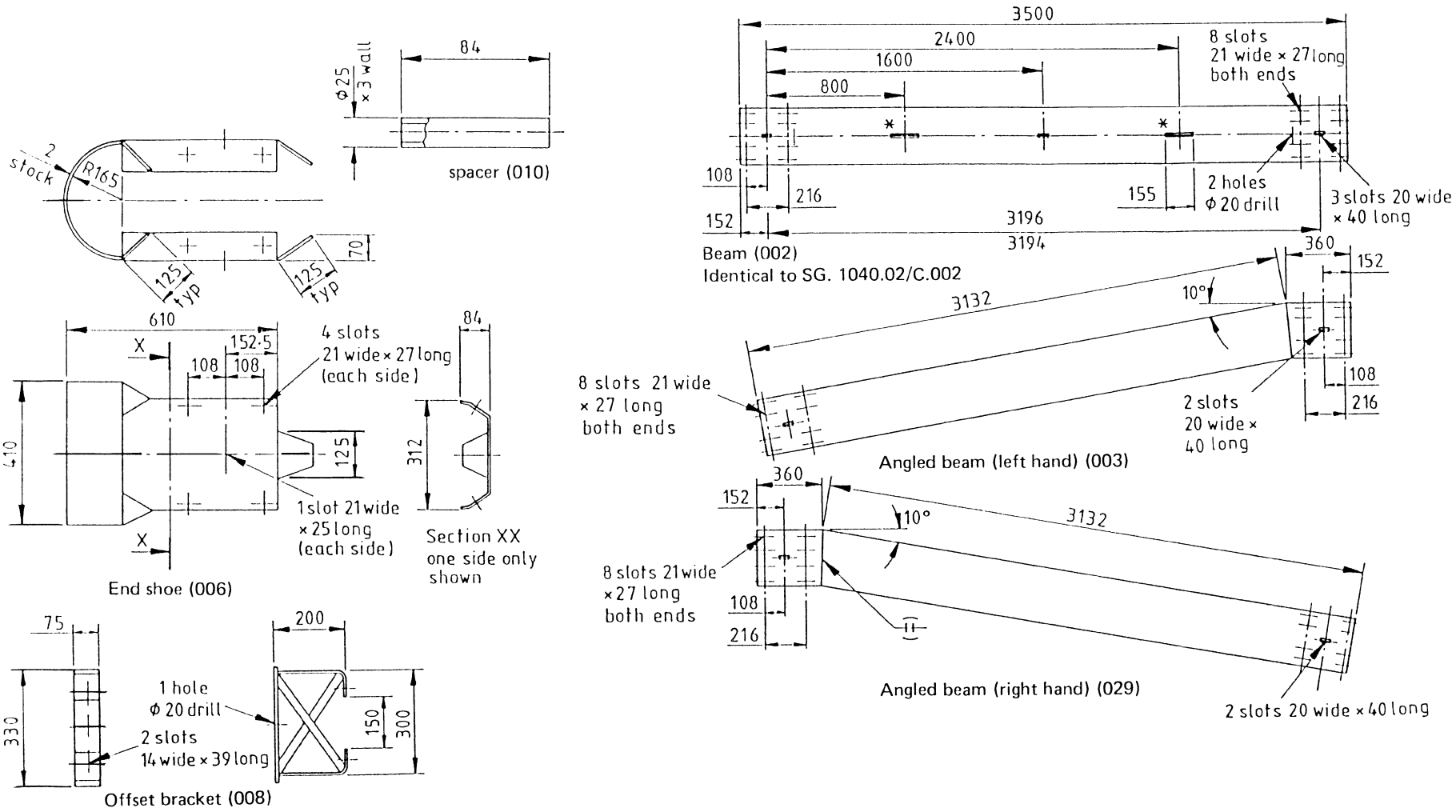



All dimensions are in millimetres.

NOTE 1 If the horizontal distance from the beam traffic face to the edge of the paved surface exceeds 1 500 mm the 555/495 dimension refers to the height of the rail centreline above the surface immediately below.

NOTE 2 The numbers given in parentheses refer to TRRL item numbers.

**Figure 1 — Untensioned corrugated beam safety fence**

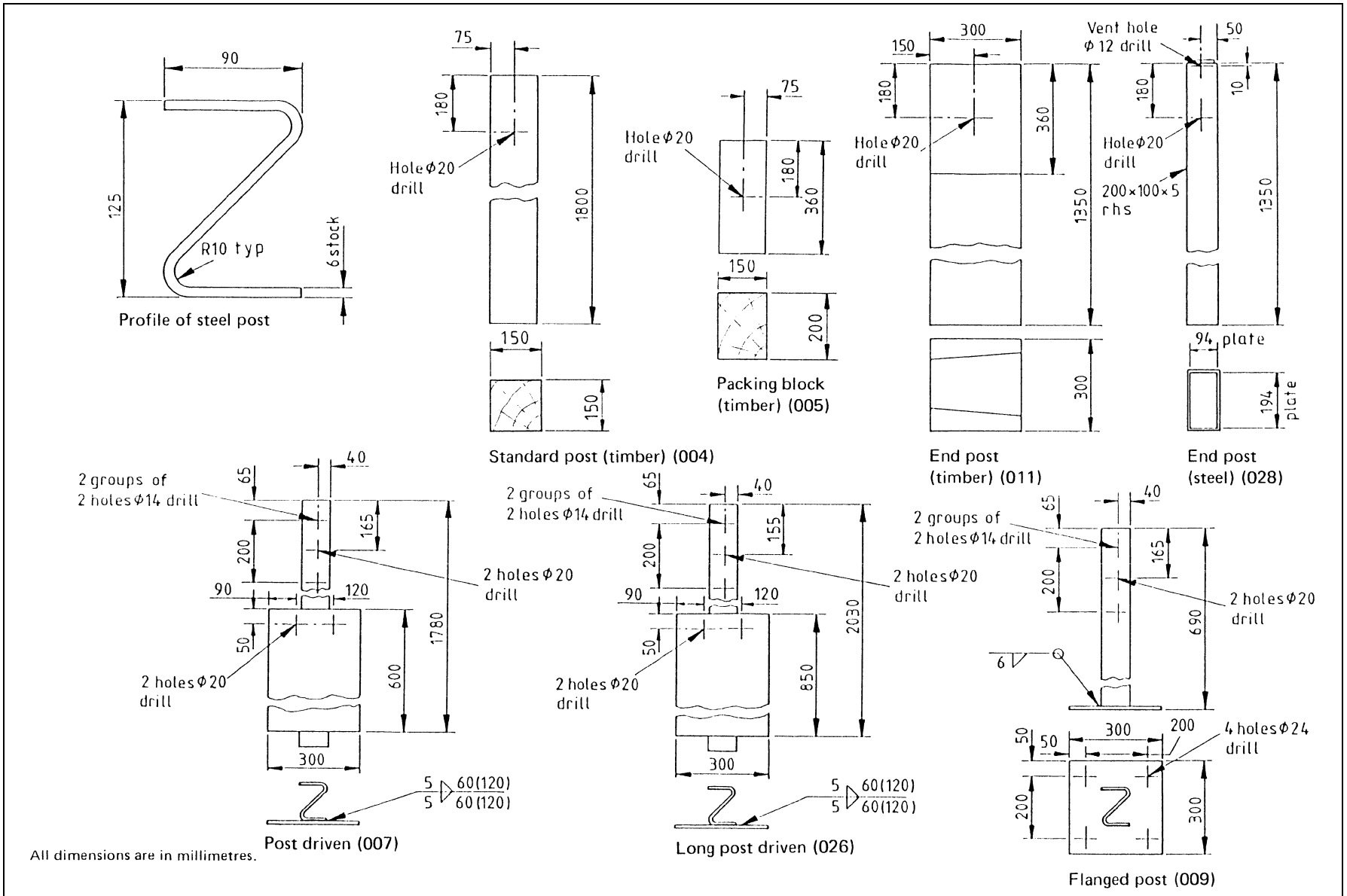



All dimensions are in millimetres.

* To accommodate 8 mm diameter bolt, nut and 2 washers when beams are used for tensioned fence.

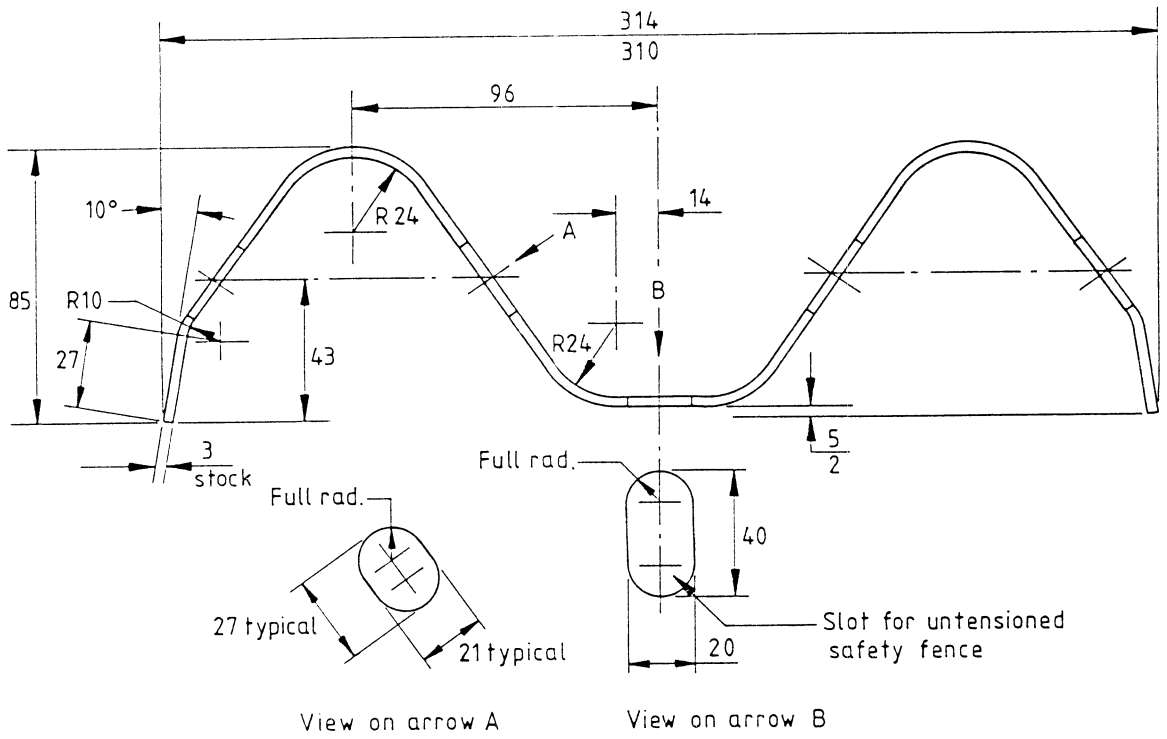
NOTE The numbers given in parentheses refer to TRRL item numbers on DRG. No. 1040.50/000.G01.

**Figure 2 — Details of beams for untensioned corrugated beam safety fence**




NOTE The numbers given in parentheses refer to TRRL item numbers on DRG. No. 1040.50/G01.

**Figure 3 — Details of posts for untensioned corrugated beam safety fence**

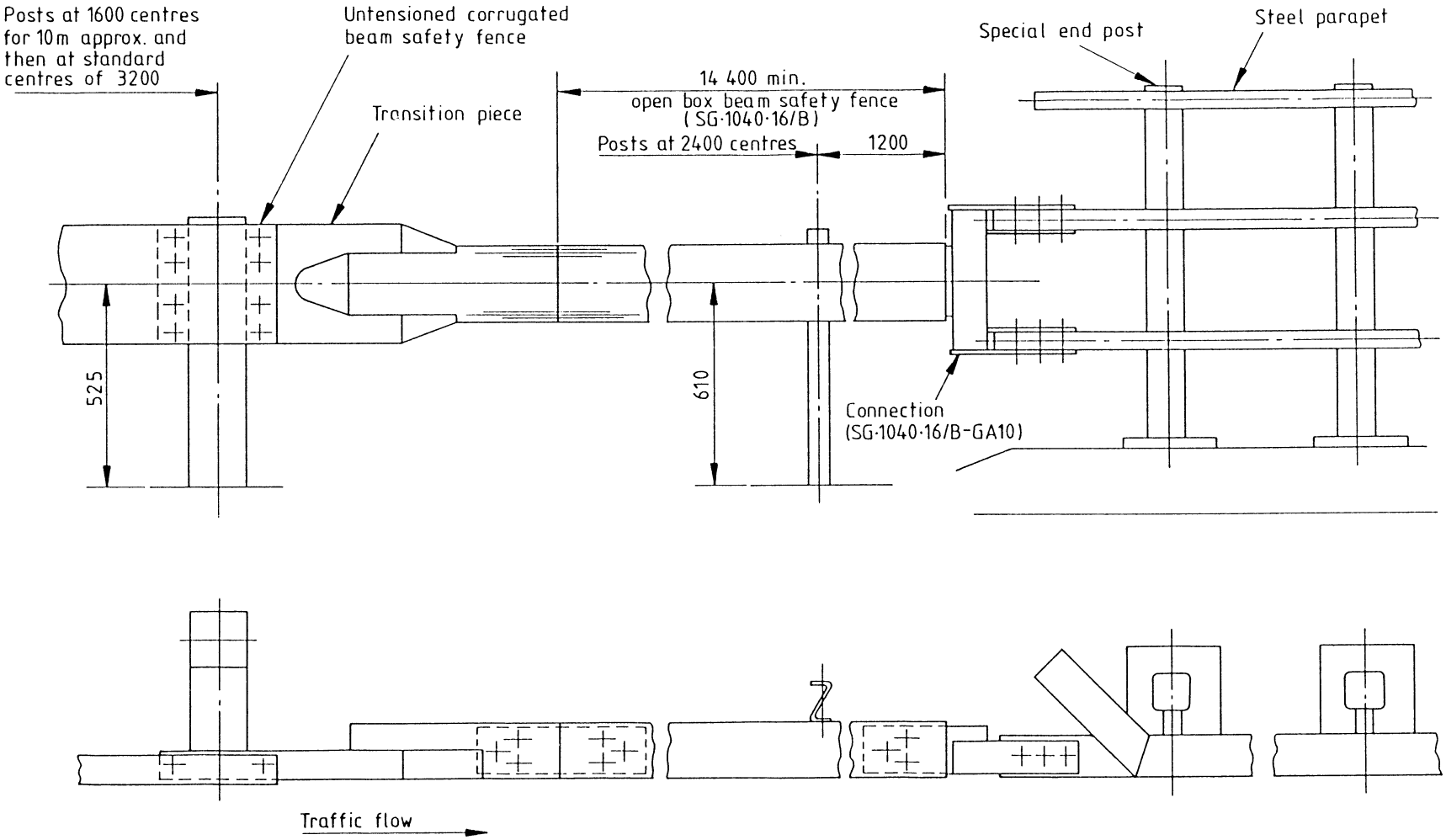



All dimensions are in millimetres.

NOTE 1 *Tolerances*: all length dimensions, unless otherwise stated, 2 mm; all punching dimensions, unless otherwise stated, ± 1 mm.

NOTE 2 This beam is identical to the beam profile in Part 1 of this standard.

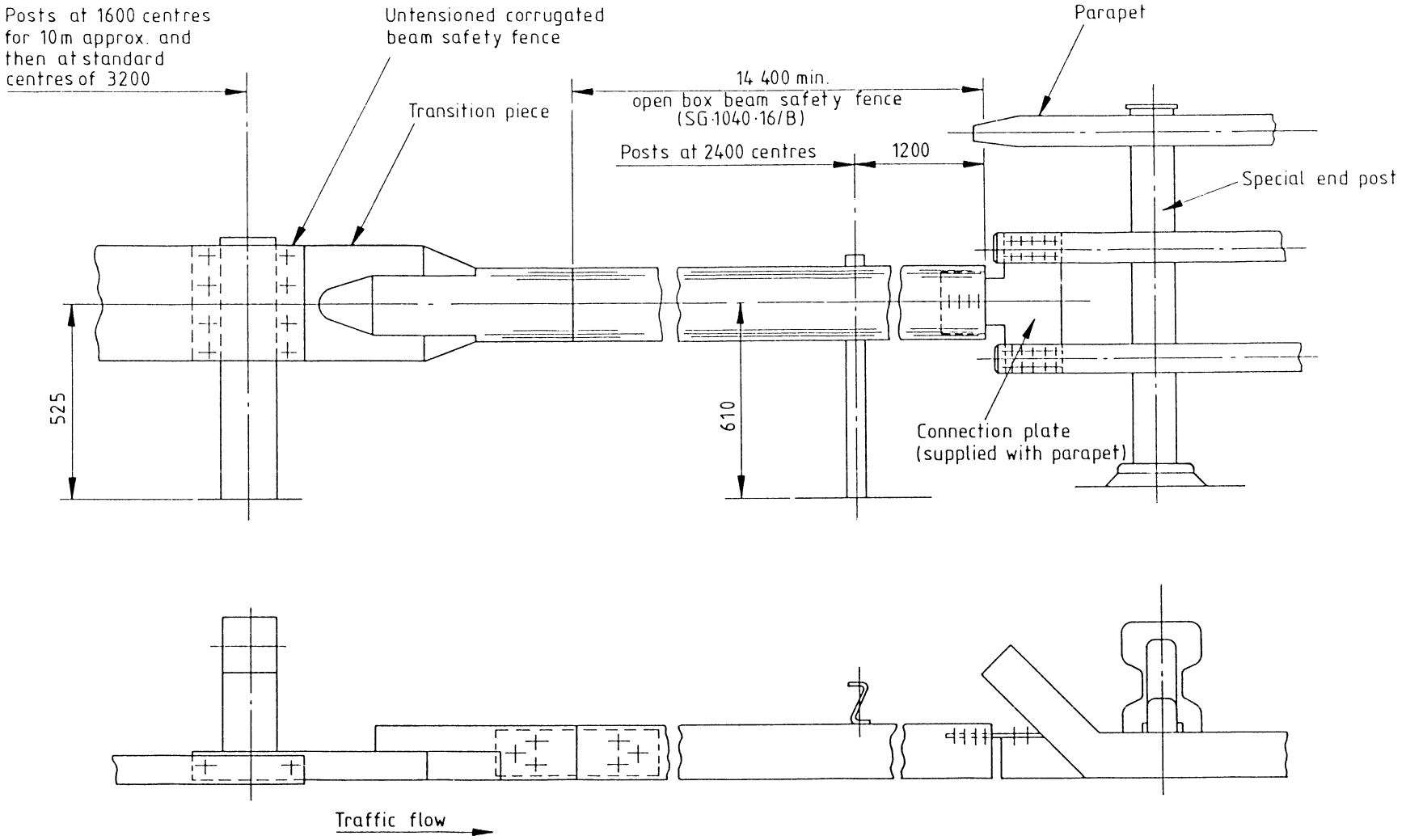
**Figure 4 — Profile and hole positions for corrugated beams**




All dimensions are in millimetres unless otherwise stated.

NOTE The numbers given in parentheses refer to TRRL item numbers.

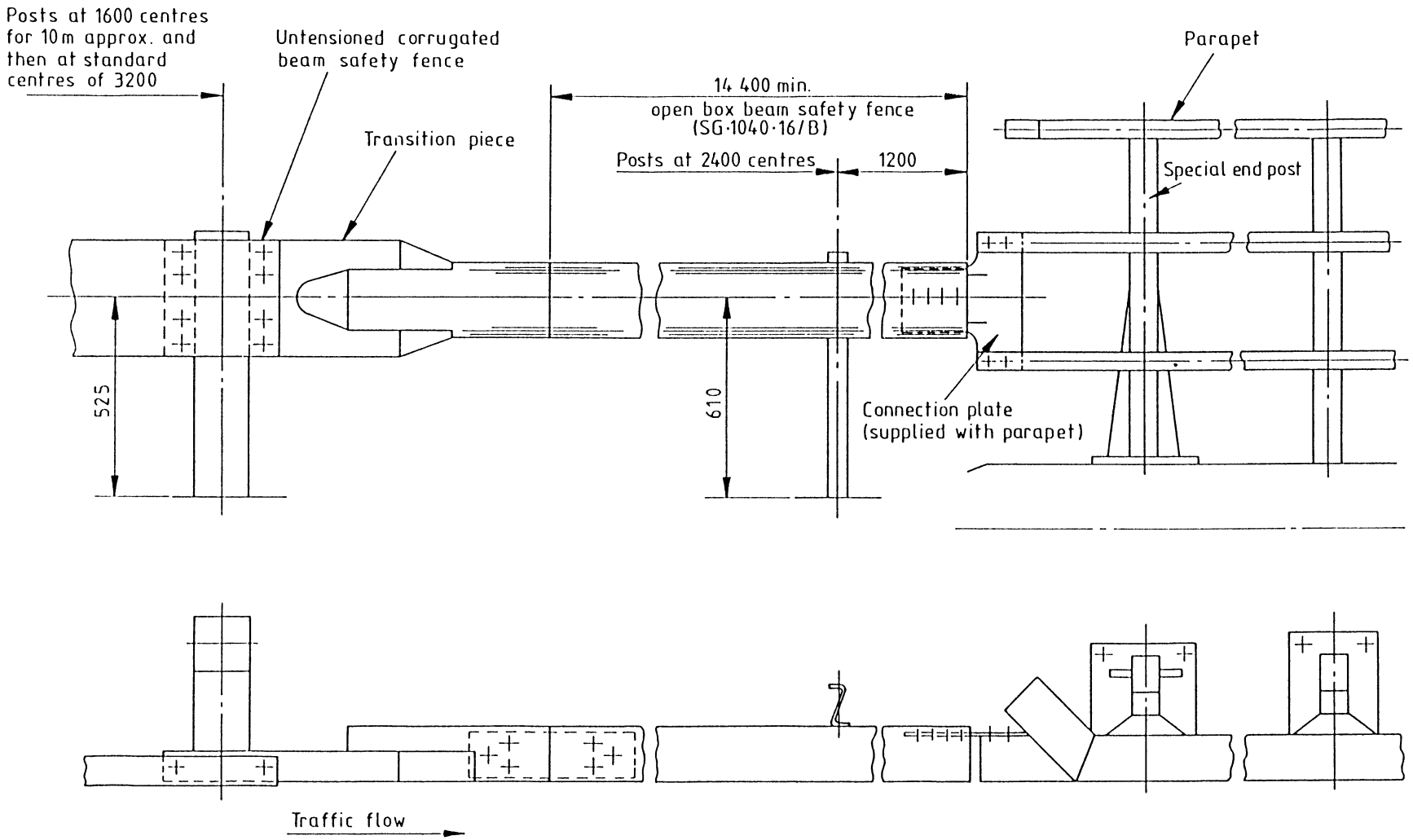
**Figure 5 — Untensioned corrugated beam safety fence connection to steel parapet**




All dimensions are in millimetres unless otherwise stated.

NOTE Numbers given in parentheses refer to TRRL item numbers.

**Figure 6 — Untensioned corrugated beam safety fence connection to BACO (BACO Contracts Ltd.) parapet**




All dimensions are in millimetres unless otherwise stated.

NOTE Numbers given in parentheses refer to TRRL item numbers.

**Figure 7 — Untensioned corrugated beam safety fence connection to AHDE (Alcan High Duty Extrusions Ltd.) parapet**

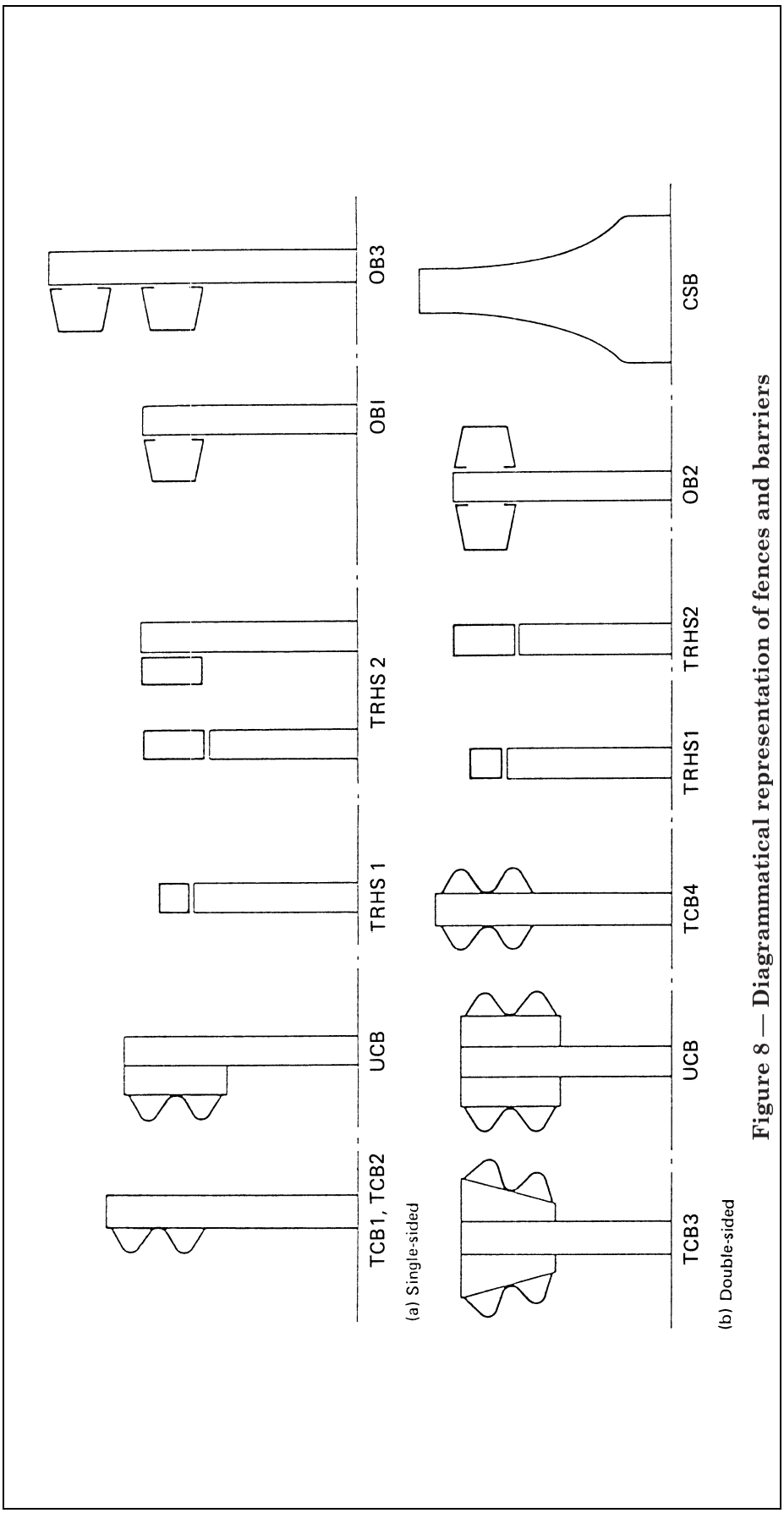



**Figure 8 — Diagrammatical representation of fences and barriers**

# Publications referred to

BS 729, *Specification for hot dip galvanized coatings on iron and steel articles.*
BS 1202, *Specification for nails.*
BS 1202-1, *Steel nails.*
BS 1449, *Steel plate, sheet and strip.*
BS 1449-1, *Specification for carbon and carbon-manganese plate, sheet and strip.*
BS 1579, *Specification for connectors for timber.*
BS 1722, *Fences.*
BS 1722-1, *Specification for chain link fences.*
BS 4190, *Specification for ISO metric black hexagon bolts, screws and nuts.*
BS 4320, *Specification for metal washers for general engineering purposes. Metric series.*
BS 4360, *Specification for weldable structural sheets.*
BS 4449, *Specification for carbon steel bars for the reinforcement of concrete.*
BS 4978, *Specification for softwood grades for structural use.*
BS 5268, *Structural use of timber.*
BS 5268-2, *Code of practice for permissible stress design, materials and workmanship.*
BS 5589, *Code of practice for preservation of timber.*
BS 5756, *Specification for tropical hardwoods graded for structural use.*
BS 6579, *Safety fences and barriers for highways.*
BS 6579-1, *Specification for components for tensioned corrugated beam safety fence on Z posts*[2)].
BS 6579-3, *Specification for components for tensioned rectangular hollow section beam (100 mm × 100 mm) safety fence*[2)].
BS 6579-4, *Specification for tensioned rectangular hollow section beam (200 mm × 100 mm) safety fence*[2)].
BS 6579-5, *Specification for open box beam safety fence (single height)*[2)].
BS 6579-6, *Specification for open box beam safety fence (double height)*[2)].
BS 6579-8, *Specification for concrete safety barriers*[2)].
BS 6779, *Parapets for vehicle containment on highways.*
BS 6779-1, *Specification for parapets of metal construction.*

[2)] Referred to in the foreword only.

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