VOLUME 2 HIGHWAY STRUCTURES: DESIGN (SUBSTRUCTURES AND SPECIAL STRUCTURES), MATERIALS

SECTION 2 SPECIAL STRUCTURES

PART 3

TD 32/93

WIRE ROPE SAFETY FENCE

SUMMARY

This Standard is concerned with the requirements for wire rope safety fences for use on verges and central reserves of new and existing trunk roads, including motorways.

INSTRUCTIONS FOR USE

1. Remove TD 32/89 which is superseded by this Standard and archive as appropriate.

2. Insert TD 32/93 into Volume 2, Section 2.

4. Archive this sheet as appropriate.

Note: New contents pages for Volume 2 dated December 1993 are available with BA 48/93.

THE HIGHWAYS AGENCY TD 32/93

THE SCOTTISH OFFICE DEVELOPMENT DEPARTMENT

THE WELSH OFFICE
Y SWYDDFA GYMREIG

THE DEPARTMENT OF THE ENVIRONMENT
FOR NORTHERN IRELAND

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Volume 2 home page

REGISTRATION OF AMENDMENTS

Amend No	Page No	Signature & Date of incorporation of amendments	Amend No	Page No	Signature & Date of incorporation of amendments

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Contents

Chapter

1. INTRODUCTION

1.1 This Standard, TD 32/93, is concerned with the requirements for wire rope safety fences for use on verges and central reserves of new and existing trunk roads, including motorways. It replaces Department of Transport Departmental Standard TD 32/89 and Scottish Technical Memorandum SH 3/90.

1.2 The specification requirements and the WR Series of drawings for the Wire Rope Safety Fence previously contained in Appendices A.1 to A.6 of Departmental Standard TD 32/89 and Technical Memorandum SH 3/90 have been amended and are now included in the Manual of Contract Documents for Highway Works: Specification for Highway Works (MCHW 1) and Highway Construction Details (MCHW 3).

1.3 Where wire rope safety fences are procured through a contract incorporating the Specification for Highway Works (MCHW 1) products conforming to equivalent sampling and testing undertaken in other member states will be acceptable in accordance with the terms of the 104 and 105 Series of Clauses of the Specification. Any contract not containing these Clauses must contain a suitable clause of mutual recognition having the same effect, regarding which advice should be sought.

1.4 Consequent to further development of the wire rope safety fence system, based on reduced post spacing, together with feedback from users of the system since its introduction in 1989, amendments have been included in this Standard, TD 32/93, in respect of the 'limitations on use' (Section 3.1) and 'design requirements' (Section 4.2).

Scope

1.5 The wire rope safety fence described in this Standard complies with the performance testing criteria for the normal level of vehicle containment given in Series 400 of the Specification for Highway Works (MCHW 1). The Standard also sets down the essential layout requirements and limitations on the use of wire rope safety fences.

1.6 Any request for a departure from this Standard shall be referred to the Overseeing Department.

Implementation

1.7 This Standard should be used forthwith for all schemes currently being prepared provided that, in the opinion of the Overseeing Department, this would not result in significant additional expense or delay progress. Design Organisations should confirm its application to particular schemes with the Overseeing Department.

2. DEFINITIONS

General Description of Fence

21. The fence consists of four tensioned galvanised steel wire ropes having an overall height of 604 mm supported by galvanised steel posts at nominally 2.4 m centres. The two upper ropes are located in a slot in the top of the posts and the two lower ropes are interwoven along the fence between each pair of posts. The ropes are joined and tensioned by means of rigging screws provided at intervals not exceeding 154 m. The ends of the ropes are attached to anchors embedded in the ground or to surface mounted anchors. Where the length of the fence is greater than 627 m intermediate anchors are used. To provide continuity two ropes (i.e., one upper and one lower) of the four ropes are anchored at each intermediate anchor. The connection between each rope and its anchor is designed to uncouple when a vehicle impact occurs in the vicinity of the anchor. The movement of the released rope is restrained by a safety check rope.

2.2 **Set-back** is the unobstructed horizontal dimension between the traffic face of the wire rope safety fence and the edge of the:

(a) paved surface adjacent to the verge; (Note: paved surface comprises carriageway, hardshoulder or hardstrip);

(b) carriageway adjacent to the central reserve (see Figure 1).

2.3 **Clearance** is the unobstructed horizontal dimension between the rear of the wire rope safety fence and:

(a) the traffic face of an obstruction (e.g., overbridge supports, sign posts rock, face, etc.);

(b) the opposite carriageway on a central reserve where there are no obstructions and there is only one safety fence between the carriageways.

3. BASIC CRITERIA

Limitations on Use.

3.1 Wire rope safety fences shall not be used:

(a) where the length of fence at full height would be less than 24 m;

(b) on horizontal curves of radius less than 200 m;

(c) on vertical sag curves of radius less than 3,000 m;

(d) on central reserves having a width of less than:

(i) 3.14 m when the support posts are at 2.4 m centres (see Figure 1);

(ii) 2.75 m when the support posts are at 1.2 m centres;

(iii) 2.4 m when the support posts are at 1.0 m centres.

(e) on central reserves for closing Emergency Crossing Points (ECP) and Maintenance Crossing Points (MCP) except where wire rope safety fences already exist on both sides of the crossing point or where specific approval has been given by the Overseeing Department (see Paragraph 3.2 also);

(f) where the height of any kerb at the edge of the adjacent paved surface exceeds 110 mm and the traffic face of the wire rope safety fence would be positioned less than 1.5 m from the kerb face;

(g) where high mast lighting columns are situated within 10 m of the edge of the paved surface.

3.2 In addition, a wire rope safety fence shall not be connected to any other safety fence or bridge parapet. However, the wire rope safety fence can be interfaced with certain other types of safety fence when installed in accordance with the details shown on Drawings GA/50 to GA/54 of the Highway Construction Details (MCHW 3.2) or as specifically agreed with the Overseeing Department.

4. DESIGN REQUIREMENTS

General

4.1 The design of wire rope safety fence installations shall comply with the following layout and detailing requirements.

Layout

4.2 Layout requirements are as follows:

(a) *Set back at verge*

The desirable minimum set-back shall normally be not less than 1.2 m. It may be reduced to:

(i) 1.0 m adjacent to an obstruction;

(ii) 0.6 m adjacent to any hard shoulder, hardstrip or road having a speed limit not exceeding 50 mph.

(b) *Set back at central reserve*

(i) Where there are no obstructions and there is only one safety fence between the carriageways and the support posts are at 2.4 centres, the minimum set-back shall be 1.5 m;

(ii) In all situations other than (i) above (e.g., two separate safety fences) the set-back shall normally be not less than 1.2 m. It may be further reduced to an absolute minimum of 1.0 m adjacent to short obstructions and on long structures provided the support posts are spaced at 1.2 m centres.

(c) *Clearance*

The minimum clearance shall normally be not less than:

(i) 1.5 m when the support posts are at 2.4 m centres;

(ii) 1.3 m when the support posts are at 1.2 m centres;

(iii) 1.1 m when the support posts are at 1.0 m centres.

(d) *Visibility*

The layout of wire rope safety fences shall comply with the requirements of sight distance given in Departmental Standard TD 9 (DMRB 6.1).

(e) *Transverse ground profile*

The ground beneath, and to each side of the fence and between any kerbing, shall be generally level and shall be free from obstructions within the set-back and clearance dimensions.

(f) *Height of fence*

Where the horizontal distance from the traffic face of the fence to the edge of the adjacent paved surface is less than 1.5 m, the heights of the ropes shall be measured from the level of the adjacent paved surface. Elsewhere the heights of the ropes shall be measured from the general ground level beneath the line of the safety fence (see Figure 1).

(g) *Length of fence*

(i) Where a wire rope safety fence is provided in front of an obstruction, it shall be extended at full height not less than 30 m in advance of the obstruction and shall continue at full height not less than 7.5 m beyond the obstruction;

(ii) On embankments 6 m or more in height, the length of wire rope safety fence should be extended beyond the 6 m high section to ensure that vehicles leaving the carriageway at places of lesser drop will not reach the 6 m high section. On curves, further extension may be needed to reduce the risk of vehicles passing behind the fence.

Detailing

4.3 Detailing requirements are as follows:

(a) *Post foundations*

(i) Foundations shall be designed to resist the test loadings specified in Clauses

403 and 404 of the Specification for Highway Works (MCHW 1);

(ii) For initial detailing, foundations may be designed to resist the effects of a horizontal shear of 10.25 kN combined with a bending moment of 6.0 kNm in a plane at right angles to the fence subject to the test loading requirements in (i) above taking precedence;

(iii) The construction details for driven posts and concrete foundations shown on the WR Series of drawings contained in the Highway Construction Details (MCHW 3.2) shall be specified wherever appropriate. However, specially designed foundations will be required to resist the loading requirements given in (i) above where the standard details are not suitable due to poor ground conditions and/or where posts and foundations would interfere with cables, ducts or drainage systems;

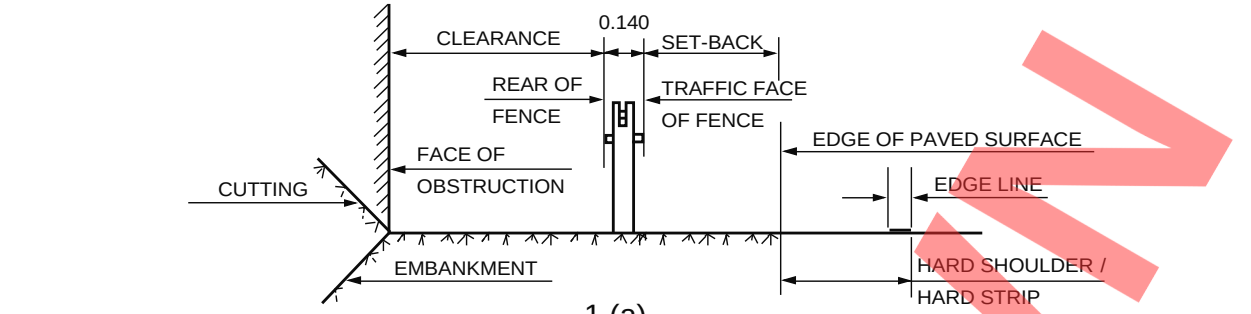
(iv) Where a socket is cast into an in-situ concrete foundation to facilitate post replacement, the foundation shall be of sufficient size to ensure that it is not displaced when the post is knocked down under vehicle impact.

(b) *Anchors*

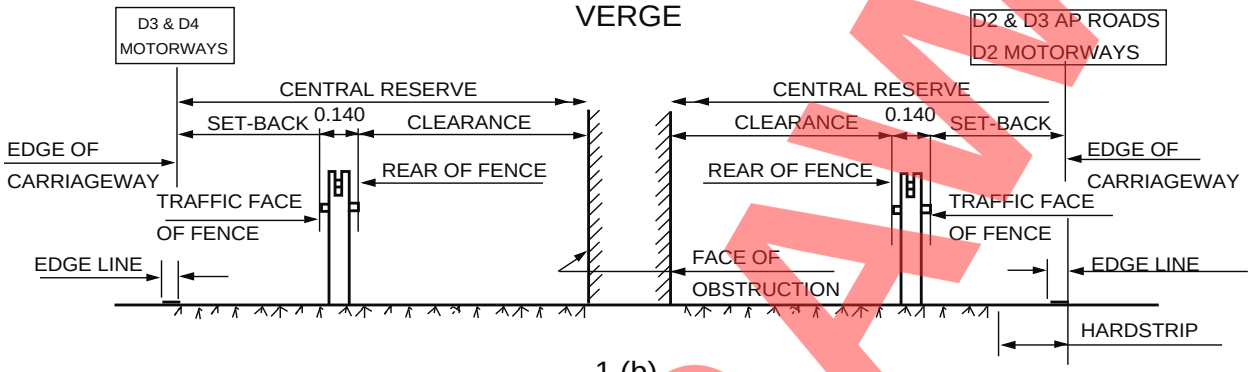
Where intermediate anchors are required, they shall be located not less than 30 m apart longitudinally.

(c) *Ropes*

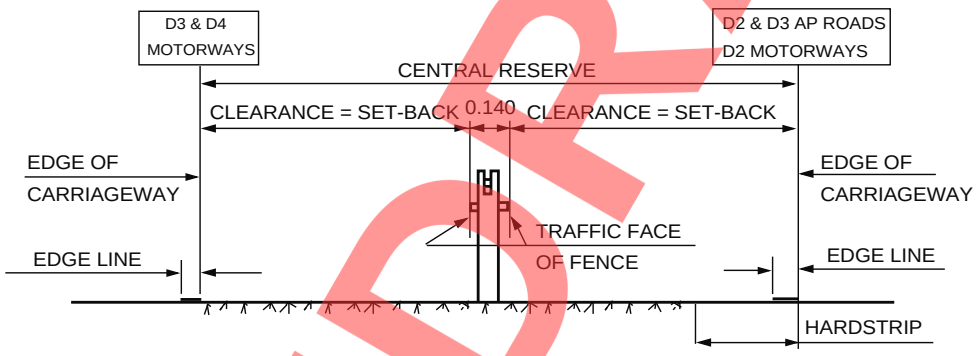
The length of line rope between anchors shall be not more than 627 m. In addition two ropes, one upper and one lower, shall be terminated on one end of an intermediate anchor.



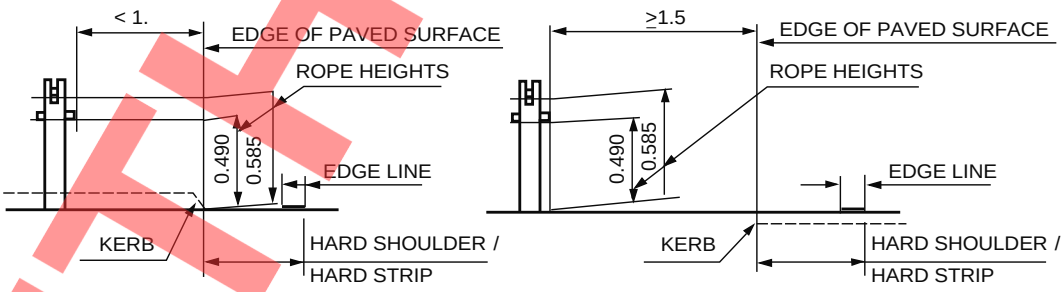
1 (a)
VERGE



1 (b)



1 (c)
CENTRAL RESERVE



1 (d) 1 (e)

ROPE HEIGHTS - VERGE AND CENTRAL RESERVE

WIRE ROPE SAFETY FENCE LAYOUT FEATURES

FIGURE 1

5. REFERENCES

1. Manual of Contract Documents for Highway Works

   Volume 1: Specification for Highway Works HMSO (MCHW 1)

   Volume 2: Highway Construction Details HMSO (MCHW 3)

2. Design Manual for Road and Bridges

   Volume 6: Section 1: Links

   TD9 Highway Link Design HMSO (DMRB 6.1.1)

6. ENQUIRIES

All technical enquiries or comments on this Standard should be sent in writing as appropriate to:-

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