

SAFETY BARRIERS AND PEDESTRIAN GUARDRAILS

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Safety Barriers and Pedestrian Guardrails

NG 401 General

- 1 The Designer should identify the performance characteristics required to protect each hazard within the scheme. A schedule of these factors should be placed on the Drawings or within Appendix 4/1.
- 2 It is envisaged that insufficient safety barriers will be available with an initial type test report to EN 1317 for the next few years. Where the Engineer accepts that, for a particular location, suitable, certificated barriers are not available, he should refer the matter to the National Roads Authority.
- 3 The positioning of a safety barrier can be affected by the location of drains, cables etc within the verge or central reserve.
- 4 In many cases there will not be an optimum position for the safety barrier and a wide range of Set-backs could be used. The Designer, however, should always identify one location for the safety barrier and state this in Appendix 4/1. Care should be taken to ensure that the Set-back identified does not unduly restrict the selection of safety barrier. If the Contractor proposes a safety barrier which requires a different Set-back, the Contractor must undertake any redesign required in order that this barrier can be installed satisfactorily.

NG 403 Materials

- 1 A wide variety of materials may be used in the fabrication of a safety barrier and there are few restrictions in EN 1317 on their use. The Engineer should establish which materials are used for the selected safety barrier and determine that they conform to relevant standards. He should also be aware of the durability of these materials if failure of the component could compromise the integrity of the barrier during impact.

NG 404 Quality Control for Manufacture

- 1 The June 2000 draft of prEN 1317-5 contains detailed requirements for a comprehensive quality system that all safety barrier manufacturers will need to operate. These have been largely reproduced in the Specification.

- 2 It is possible that some manufacturers may not fully conform to these requirements at present. The Engineer should therefore satisfy himself that sufficient controls are in place in the factory to ensure an adequate level of quality control. Reference should be made to the National Roads Authority in these cases.

NG 406 Installation

Installation Description

- 1 It is very important that detailed descriptions of the installation requirements are provided by the manufacturer. These must be checked against the impact test report to ascertain that the barrier will be installed on site in the same manner as it was for the impact test.

NG 407 Site Testing

Anchorage in Drilled Holes

- 1 The anchorage test results should be included with the as-built records.

System

- 2 The manufacturer should provide a schedule of testing for the safety barrier. This should be sufficiently detailed to provide a high degree of assurance that the barrier will perform in a satisfactory manner.

Ground Conditions

- 3 Most safety barriers rely on ground conditions in order to perform to their designed criteria. Where this is the case, it is vital that the performance of a safety barrier is not compromised in service through the provision of inadequate ground conditions. Consequently, testing shall be undertaken on all barriers where the manufacturer states that the ground conditions are important. The nature of the testing will obviously depend on the type and form of the barrier and it is therefore important that the safety barrier manufacturer specifies the testing.
- 4 It is important to note that some safety barriers are designed to be used in very soft ground. The Engineer should therefore be aware that the provision of hard ground conditions may radically alter the characteristics of the barrier.

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NG 408 Anchorages and Attachment Systems for Surface Mounted Posts

- 1 Anchorages for securing surface mounted posts which utilise drilled holes have been known to fail due to either a lack of cleanliness of the hole or the excess tolerance in the size of the hole. The manufacturer of the anchorages should provide details of the maximum tolerances permitted and the evidence should be submitted to the Engineer. Such evidence should show that the anchorages perform satisfactorily when installed in holes having these tolerances.

NG 410 Temporary Vertical Concrete Safety Barriers

- 1 Temporary Vertical Concrete Safety Barriers (TVCB) as shown in the Safety Barrier Details are for use during construction and maintenance works where the road is subject to a speed limit not exceeding 80 km/h. Such use should be agreed with the Engineer.
- 2 Temporary Vertical Concrete Safety Barriers can be provided by:
 - (i) The Contractor as part of Temporary Works and remaining his property.
 - (ii) The Contractor but becoming the property of the Road Authority on completion of the Works.
 - (iii) The Road Authority for the Contractor's use during the Works.

Appendix 4/1 should state which of the above applies, and where appropriate, details of locations from which they can be collected and/or returned.

NG 411 Terminals and Transitions

- 1 prEN 1317-4, which relates to Terminals and Transitions, is still being prepared. Few, if any, such units will have been tested to the current draft of the standard. It is therefore considered sufficient for these items to have been approved for use by a national or regional road authority in a member state of the European Union and have been installed successfully in that state.

NG 412 Provision of Information, Training, Materials and Equipment

- 1 The National Roads Authority may require the provision of user installation/maintenance manuals and a stock of materials and equipment to be retained in store for maintenance purposes. Training of maintenance staff may also be required for safety barriers which have not previously been installed on the road network. Where this is the case, the compiler should provide a schedule in Appendix 4/1 indicating which materials are required as well the barrier types for which manuals and training are not required.

NG 413 Pedestrian Guardrails

- 1 The type and the location of pedestrian guardrails should be described in Appendix 4/2.

NG414 Transitional Arrangements

- 1 Until the harmonised product standard of EN 1317-5 comes fully into force, certain safety barriers of types previously specified for use in Ireland may continue to be installed in appropriate circumstances.
- 2 Where the Design Organisation has specific and overriding reasons for requiring the use of the UK standard barriers listed in Table 4/2, the relevant Clauses from the Highways Agency Specification for Highway Works shall be incorporated into the contract specification. All relevant Highway Construction Details should also be incorporated.

NG SAMPLE APPENDIX 4/1: SAFETY BARRIERS

Sheet 1

[Note to compiler: Include here:]

- 1 The locations of safety barriers are shown on Drawings Nos*[generally the 1:500 or 1:1000 Site Plans]*.
- 2 The performance criteria for the safety barriers are shown on the above drawings/scheduled in the following table. *[Delete as appropriate.]*
- 3 Schedule of Safety Barriers

Barrier Ref No	Start Chainage of LoN	End Chainage of LoN	Hazard Information				Barrier Type	Single/ Double Sided	Safety Barrier Performance Criteria			
			Hazard Description	Hazard Chainage	Location	Drawing Reference			Containment Level	Impact Severity	Working Width	Set-back

[Safety barriers with different performance criteria within a continuous length should be split into sections such that the performance criteria for each section are unique. Alternatively, the safety barriers on a scheme may be assigned categories each of which define the performance criteria for that type of fence. The table should identify the performance criteria for each section of safety barrier at each barrier location or of each barrier type.

Where a Length of Need comprises many short lengths of barrier with different performance criteria (for example at lighting columns in a central reserve), standard details should be provided on the Drawings and each combination of barriers given a reference. This barrier reference should then be entered in the table once only for each length of combined barrier. There is no need to indicate each length of each type of safety barrier but performance criteria should be stated for all barriers in the combination (e.g. W6/W4/W3, H2/N2 etc.).

Barrier types will normally be indicated where:

1. *the In-situ Concrete Barrier is to be used; or*
2. *there are specific and overriding reasons for specifying a particular barrier type.*

In the latter case, the agreement of the National Roads Authority is required before particular barrier types are included in the Schedule of Safety Barriers.

The Compiler should indicate the Working Width required as an absolute value (e.g. W6) and not as a range of acceptable values.

The Start and Finish Chainages shall be derived from the Approach and Departure Lengths which have been determined in accordance with NRA TD19 and the Designer’s risk assessment of the level of protection required.]

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4 Temporary Vertical Concrete Safety Barriers

[Note to compiler: State here:]

- (i) Who is to provide Temporary Vertical Concrete Safety Barriers (TVCB).
- (ii) Location for removal of Temporary Vertical Concrete Safety Barrier on completion of the Works.
- (iii) Location(s) from which Temporary Vertical Concrete Safety Barrier is to be collected and returned by the Contractor if provided by the Road Authority.
- (iv) Who is to own the Temporary Vertical Concrete Safety Barrier on completion of the Works.

5 Other Details [to be included as required]

- (a) Any special details which are shown on the Drawings and have been designed by the Designer.
- (b) Any special requirements for setting out details.
- (c) Details of testing requirements and frequency of testing not covered already within the Specification.
- (d) Any special testing requirements for anchorages in drilled holes.
- (e) Where required by the National Roads Authority, the compiler should include a schedule of:
 - (i) Installation and/or maintenance manuals for each barrier type;
 - (ii) Any materials which are to be provided for maintenance purposes;
 - (iii) Special items of equipment etc required for the installation, testing, maintenance and demolition of the safety barriers.

[Note to compiler:

The schedule should take account of the barrier type specified (if any) and the overall length of each barrier type. The schedule should generally include sufficient length of safety barrier (and components) to allow for the replacement of at least 50m of each safety barrier type or 5% of the overall length of each barrier type installed on that contract. At least one terminal and transition of each type should also be provided. However, reference should be made to the National Roads Authority and the maintaining authority for replacement materials requirements.

Where a scheme is contained within more than one county boundary, the schedule should identify which barriers are provided to the individual county maintenance depots. The schedule should also state where the barriers and components should be delivered to. Account should also be taken in the schedule of the delivery time for the replacement of barriers and their components. An entry in the schedule for the safety barrier to be provided to a County may be as follows.]

Barrier Information					Barrier Quantity to be supplied for Stated Delivery Period				Provision of Information, Training etc.	
Barrier Type	Containment Rating	Impact Severity	Working Width	Total length	< 2 days	2-7 days	8-28 days	Over 29 days	Manuals	Training
N/A	N2	A	W6	1087m	55m	75m	100m	200m	See Note 1	See Note 1

Notes:

- 1 Manuals and training shall be provided for all safety barriers which are not listed within Table 4/2 of the Specification.

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NG SAMPLE APPENDIX 4/2: PEDESTRIAN GUARDRAILS

[Note to compiler:

Details should be given here of locations and type of pedestrian guardrails required. Cross-references may be made to the Drawings where appropriate.]

NG SAMPLE APPENDIX 4/3: SAFETY BARRIER DETAILS

[Note to compiler:

In the absence of National Roads Authority Safety Barrier Details the Safety Barrier Details shall be the UK Highways Agency : Manual of Contract Documents: Volume 3 – Highway Construction Details: Section 2.]

Clause No.	Safety Barrier Details
409.1	NRA Manual of Contract Documents for Road Works: Volume 4 – Road Construction Details, Drawing Number RCD/400/2 and 7.
410.1	UK Highways Agency: Manual of Contract Documents: Volume 3 – Highway Construction Details: Section 2, Drawing Number GA/205.
411.1 (c)	NRA Manual of Contract Documents for Road Works: Volume 4 – Road Construction Details, Drawing Number RCD/400/3.
411.3 (c)	NRA Manual of Contract Documents for Road Works: Volume 4 – Road Construction Details, Drawing Number RCD/400/4, 5 and 6.
414	UK Highways Agency: Manual of Contract Documents: Volume 3 – Highway Construction Details: Section 2, Drawing Numbers GA/11 to GA/13, GA/18 to GA/28, SF/00, SF/22 and SF35.

See April
2002.