



PARAPET STANDARD & SPECIFICATION UPDATES

**Richard Bowen
Engineering Inspector
National Roads Authority**

*National Roads Authority - Standards Section
Training for New Developments
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Context



ARCA

Presentation Content

Update to BD52 - Design of Vehicle & Pedestrian Parapets

**Update to Series 400 - Road Restraint Systems
(Vehicle & Pedestrian)**

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Update to BD52

Update to BD52 - Design of Vehicle & Pedestrian Parapets

- Introduction
- Definitions
- General Requirements
- Bespoke Parapets
- Pedestrian Parapets
- Anchorages & Supporting Members
- Approaches & Transitions
- Appendices

Update to BD52

IS EN 1317 Compliance

- 1.3 Following the implementation of relevant parts of IS EN 1317, there is now a comprehensive suite of requirements for the testing and CE marking of vehicle parapets suitable for the majority of applications. It is a requirement of the National Roads Authority that vehicle parapets used in connection with new national road structures shall be fully IS EN 1317 compliant.

Update to BD52

IS EN 1317 Compliance - Exceptions

- Particular Circumstances
 - Bridges over the railway, where particular safety criteria apply
 - Heritage structures where particular aesthetic criteria may apply
 - Urban areas where traffic speeds are low and particular aesthetic criteria may apply
- Existing structures

Update to BD52

Existing Structures

➤ Paragraph 1.4

- Use BD 52 for the replacement of existing parapets on existing bridges
- Where BD 52 containment levels give rise to undue cost implications, a risk based approach (including a cost benefit analysis) for identifying the appropriate containment level shall be used.

➤ Paragraph 1.5

- Particular requirements for the replacement of parapets on existing masonry arch bridges are given in Paragraph 4.9.

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General Requirements - Containment Levels

Location	Minimum Parapet Containment Level
<p>All structures in urban areas where the legal speed limit is 60kph or less, except where:</p> <ul style="list-style-type: none">• The structure crosses or adjoins a motorway or railway• The structure is on a horizontal curve and / or gradient and the radius and / or gradient does not comply with relevant desirable minimum standards . Relevant desirable minimum standards are described in NRA TD 9. <p>All accommodation bridges serving a single landholding except accommodation bridges over the railway.</p>	N1
All structures not otherwise explicitly dealt with in this table	N2

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General Requirements - Containment Levels

Location	Minimum Parapet Containment Level
All structures forming part of partially or fully free flow interchanges All structures carrying a motorway and crossing or adjoining another national route All structures carrying a national or regional road where the geometric alignment does not comply with relevant desirable minimum standards within a distance of 215m of either approaches to the structure. Relevant desirable minimum standards are described in NRA TD 9.	H2
All structures crossing or adjoining the railway	H4a

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General Requirements - Containment Levels

- Minimum criteria are given in preceding tables
- The responsibility rests with the Designer to provide the appropriate containment level taking account of the following factors:
 - The hazard formed by the parapet itself;
 - The risk to vehicles from penetrating the parapet and reaching the hazard below;
 - The risk to others (either on or below the structure) arising from a vehicle penetrating the parapet.

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General Requirements - Impact Severity

- Normal Containment - Impact Severity Level A
- Higher or Very High Containment - Impact Severity Level B permitted

General Requirements - Working Width

- The Working Width shall be no greater than **W4**
 - Designer responsibility to ensure that the parapet system has been tested to circumstances similar to those in which the parapet is proposed to be used.
 - no wheel of an errant vehicle should fall between the parapet edge beam and the deformed restraint system

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General Requirements - Height

Application	Parapet Height (mm)
Structures carrying motorways or roads to motorway standard from which pedestrians, animals and cyclists are excluded by Order	1000
Other road structures not otherwise explicitly dealt with	1250
Where a cycleway is adjacent to the parapet	1400
Accommodation bridges	1500
Very High Containment Level applications except railway structures	1500
All structures over railways	1800
Bridleway bridges	1800

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General Requirements - Aesthetics

- Aesthetic effect of parapets to be considered at all stages of the design of the structure.
- Aesthetic effect of parapets includes both the appearance (and detailing) of the vehicle parapet itself as well as the interrelationship of the parapet with the main structure (e.g. the setting out of the parapet posts with respect to bridge supports and/or joints in deck fascia etc).

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General Requirements - Pedestrian Restraint

- Where pedestrian access is not prohibited by law, pedestrian restraint is required.
- Pedestrian restraint is to be integral with vehicle parapet - separate pedestrian and vehicle parapets to be avoided.

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Additional Requirements for Bespoke Parapets

- Bespoke parapet:
 - A vehicle or pedestrian parapet which is not a product and thus not compliant with IS EN1317, but which has been subject to a detailed design for a specific situation and set of circumstances

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Additional Requirements for Bespoke Parapets

➤ Design Standards

- BS 6779 Highway parapets for bridges and other structures - Part 1: Specification for vehicle containment parapets of metal construction.
- BS 6779 Highway parapets for bridges and other structures - Part 2: Specification for vehicle containment parapets of concrete construction.
- BS 6779 Highway parapets for bridges and other structures - Part 3: Specification for vehicle containment parapets of combined metal and concrete construction.
- BS 6779 Highway parapets for bridges and other structures - Part 4: Specification for parapets of reinforced and unreinforced masonry construction.

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Additional Requirements for Bespoke Parapets - Materials

- Steel
- Concrete
- Masonry
 - Replacement of existing parapets
 - UK Department of Transport's 2012 document "Guidance on the Design, Assessment and Strengthening of Masonry Parapets on Highway Structures"
 - Masonry cladding to new parapets

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Pedestrian Parapets

- SR CEN/TR 1317-6 Road Restraint Systems - Part 6: Pedestrian Restraint System - Pedestrian Parapets
 - Tested or Designed
 - Height (H_o & H_p)
 - Void Size (D_s)

Update to BD52

Pedestrian Parapets

➤ Design Requirements

- Design to Eurocodes
- Horizontal loading - Method 2
- Other traffic loads - minimum values
- Snow loads to IS EN 1991-1-3
- Wind actions to IS EN 1991-1-4

Update to BD52

Pedestrian Guardrails

➤ Paragraph 5.16

The type of pedestrian protective measure to be used will need to be determined for each specific location depending on the ease of pedestrian access to the hazard in question. It could be a pedestrian guardrail, a pedestrian parapet or an appropriate type of boundary fencing (in accordance with RCD/300/1). It will need to be in keeping with any structural, drainage, environmental and aesthetic considerations of the site in question. The choice of pedestrian protective measure shall be supported by a site specific risk assessment.

Update to BD52

Anchorage & Supports

- The design of parapet attachment systems and anchorages shall be such that:
 - removal and replacement of damaged sections may be achieved readily;
 - under no loading conditions (including the event of a failure) is damage sustained by any part of the bridge.
- For new bridges, the global effects of collision with parapet are to be considered in the design.
- For existing bridges, the capacity of the structure for the new parapet is to be assessed

Update to BD52

Approaches & Transitions

- Safety barrier required on approach and departure from parapet.
- Transition required between parapet and safety barrier.
- Transition shall be capable of maintaining the continuity of the Containment Level and provide a gradual transition between the containment level and working width of the safety barrier and the parapet.

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Approaches & Transitions

- Transitions between tested products to be either:
 - Tested in accordance with ENV 1317:4 or
 - Non tested, but verified by independent detailed computer simulation
- Transitions between a tested safety barrier and bespoke parapet shall be designed from first principles

Update to BD52

Appendices

- Appendix A (Informative) Relevant Extracts from IS EN 1317:
 - Details of containment levels, working widths, etc
 - For reference purposes
- Appendix B (Normative) Amendments and Additions to BS6779
 - Updated information relating to use of BS 6779 in Ireland and in conjunction with new material standards and Eurocodes.

Update to Series 400

Update to Series 400 - Road Restraint Systems (Vehicle & Pedestrian)

- Background to Changes
- Volume 1 - Specification for Road Works
- Volume 2 - Notes for Guidance
- Volume 3 - Method of Measurement for Road Works

Update to Series 400

Background to Changes

- Merging of Series 400 and Series 2200 to deal with Road Restraint Systems.
- Updating of Parapet General Requirements
- General Update to reflect CE Marking

Update to Series 400

Volume 1 - Specification for Road Works & Volume 2 - Notes for Guidance

- Responsibility of Designer
- Ground Conditions
- Installation
 - Obstructions
 - Sightlines

Update to Series 400

Volume 3 - Method of Measurement for Road Works

- Transitions
- Standard Parapets
- Bespoke Parapets



PARAPET STANDARD & SPECIFICATION UPDATES

THANK YOU

ANY QUESTIONS??

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