

Roads

Master Specification

RD-BF-C1 Supply and Installation of Steel Beam Safety Barrier Systems

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Document Management

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RD-BF-C1 Supply and Installation of Steel Beam Safety Barrier Systems

1 General

- 1.1 This Part specifies the requirements for the supply and installation of Steel Beam Road Safety Barrier systems.
- 1.2 Safety barrier systems must comply with the following, including the latest revisions (in order of precedence):
 - a) GD 300 Accepted Safety Barrier Products,
 - b) The Manufacturer's recommendations, along with any applicable Department requirements
 - c) Contract specific drawings,
 - d) Department's standard drawings
- 1.3 The following documents are also referenced in this Part:
 - a) AS 3845.1 Road Safety Barrier Systems and Devices – Road safety barrier systems
 - b) Austroads Guide to Road Safety - Part 9: Roadside Hazard Management
 - c) AS 1214 Hot-Dip Galvanized Coatings on Threaded Fasteners.
 - d) AS 1365 Tolerances for Flat-Rolled Steel Products.
 - e) AS 1391 Metallic Materials - Tensile Testing at Ambient Temperature.
 - f) AS 1594 Hot-Rolled Steel Flat Products.
 - g) AS1627.1 Metal finishing – Preparation and pre-treatment of surfaces – Removal of oil, grease and related contamination.
 - h) AS 1627.2 Metal finishing – Preparation and pre-treatment of surfaces – Power tool cleaning.
 - i) AS 3569 Steel Wire Ropes.
 - j) AS 3750.7 Paint for steel structures – Aluminium paint.
 - k) AS 3750.9 Organic Zinc-rich Primer.
 - l) AS 4680 Hot-dip Galvanized (Zinc) Coatings on Fabricated Ferrous Articles.
 - m) AS 9001 Quality Management Systems – Requirements.
 - n) GD 300: "Accepted Safety Barrier Products" available from:
<https://www.dit.sa.gov.au/standards/roads-all>
 - o) Standard Drawings, available from <https://www.dit.sa.gov.au/standards/roads-all>
- 1.4 Delineators must comply with RD-LM-S3 "Supply of Guide Posts and Delineators" and RD-LM-C3 "Installation of Guide Posts and Delineators".
- 1.5 All bridge approach barriers must be installed in accordance with the Department's Standard Drawing.

2 Quality Requirements

- 2.1 At a minimum, the Contractor must provide the following documents, procedures and / or instructions:
 - a) evidence that the components comply with the Manufacturer's requirements;
 - b) details of the country of manufacture;

- c) certified copies of manufacturer's test certificates for all materials, or evidence that the supplied components comply with the manufacturer's requirements. For non-proprietary barrier components, the test certificates sheets include:
 - i) chemical properties and results of tensile & elongation tests, and
 - ii) NATA laboratory test certification that the tests comply with AS 3845.1 and other relevant Australian standards.
 - d) for proprietary barrier systems, a copy of the Manufacturer's instructions and any procedure for installation and maintenance of the road safety barrier system
 - e) for galvanized steel components, a manufacturer's certificate of compliance certifying that the zinc coating mass is in accordance with the requirements of AS 3845.1 or AS 4680; and
 - f) evidence that the person(s) supervising the installation of the safety barrier system has attended training in the installation of terminals, conducted by the Manufacturer, within the previous 2 years, or a program demonstrating that the requirements of Clause 4 will be met.
- 2.2 If not provided beforehand, the documentation must be submitted at least 14 days prior to the commencement of installation.
- 2.3 Provision of the documentation listed in this Clause shall constitute a **Hold Point**.

3 Supply of Steel Beam Safety Barrier Components

General

- 3.1 Components of the safety barrier system, including motorcycle barrier components, must be manufactured under a quality system certified to AS 9001 (or equivalent) and must be an accepted product (refer to GD 300).
- 3.2 The Contractor must provide evidence that demonstrate compliance with the requirements of this clause, and evidence that the testing has been undertaken on components which are representative of the materials supplied under this Contract.
- 3.3 Timber posts must not be used. Components must conform to the dimensions shown on the drawings or as specified by the Manufacturer.

Identification

- 3.4 All steel rails, posts and plastic components of a safety barrier must be permanently marked with the following information:
- a) name or mark of the manufacturer;
 - b) strength and base metal thickness of steel rails and posts; and
 - c) a traceable identification number.
- 3.5 The marking must be in text not more than 20 mm high and be in an unobtrusive and readily accessible position.

Metal Components Rails

- 3.6 For proprietary safety barrier systems, steel for the rails must comply with the Manufacturer's requirements and any Department requirements.
- 3.7 For steel rails other than proprietary safety barrier systems, the rails must be manufactured from steel which meets the requirements of AS 1594 Grade HA350. The mechanical properties of the base metal must conform to the following requirements when tested in accordance with AS 1391:
- a) minimum yield strength: 350 MPa;
 - b) minimum tensile strength: 430 MPa; and
 - c) minimum elongation in 80 mm 16%;

- 3.8 For steel rails other than proprietary safety barrier systems, the base metal must comply with the following tolerances when measured in accordance with AS 1365:
- a) base metal thickness: 2.7 mm \pm 0.1 mm;
 - b) mill tolerance on strip width: +2.5 mm, -0.0; and
 - c) mill camber tolerance on 2000 mm length: 4.0 mm maximum.
- 3.9 For safety barriers erected as barrier railing on bridges and major culverts, the base material must comply with the following tolerances when measured in accordance with AS 1365:
- a) base metal thickness: 3.5 mm \pm 0.1 mm;
 - b) mill tolerance on strip width: +2.5 mm, -0.0; and
 - c) mill camber tolerance on 2000 mm length: 8.0 mm maximum.

Other Components

- 3.10 For a proprietary safety barrier system, all components must comply with the Manufacturer's requirements and any Department requirements.
- 3.11 For components other than those from a proprietary safety barrier systems, steel posts and blocks must be manufactured from steel which meets the requirements of AS 1594 Grade HA300 and HU300 respectively. The base material thickness must be 4.3 mm \pm 0.1 mm.
- 3.12 For bullnoses other than those as part of a proprietary safety barrier system, these must be manufactured from steel which meets the requirements of AS 1594 Grade HA350.
- 3.13 For cables other than as part of a proprietary safety barrier system, these must comply with the requirements of AS 3569.

Galvanizing

- 3.14 Unless stated otherwise in the Manufacturer's requirements and any Department requirements for GD-300 compliant barrier systems, all steel components must be hot-dip galvanized after fabrication. Galvanizing must comply with:
- a) Bolts, nuts and washers: AS 1214
 - b) All other components: AS 4680
- 3.15 The minimum zinc coating per side for all internal and external surfaces must be:
- a) Beams and terminal: 390 g/m²
 - b) Steel posts and blocks: 500 g/m²
- 3.16 Galvanized coatings must be:
- a) smooth, adherent and of uniform colour; and
 - b) free from stains, gross surface imperfections, markings, runs, blisters, irregularities or inclusions.
- 3.17 Care must be taken during storage, handling, loading and delivery to avoid wet-storage staining and / or damage to the zinc coating.

Curved Rail

- 3.18 If curving is undertaken after galvanizing has been completed, it must be carried out in such a manner that the galvanizing is not damaged. If the radii for curved rails are not specified on the Drawings, the Contractor must determine the appropriate radius.
- 3.19 Shop curving must be undertaken where the required deflection exceeds 160 mm over a 4.0 m section of barrier. The radius must be permanently marked on the rear of the barrier in a manner that does not damage the galvanizing.

Damage

- 3.20 All components must be free from visible damage or deformation(s).
- 3.21 Components must be transported, handled and installed to avoid damage. Components are not to be left with splits, burrs or sharp edges after installation. Any minor damage to galvanizing must be repaired as follows:
- a) clean surfaces to bare metal by power tool cleaning to a minimum of Class St2 in accordance with AS1627.2;
 - b) degrease cleaned surfaces using solvent cleaning in accordance with AS1627.1; and
 - c) apply 2 coats of organic zinc rich primer, as approved to AS3750.9, to a minimum total dry film thickness of 100 µm.
- 3.22 A final coat of aluminium paint as approved to AS3750.7 must be applied to all repairs. This method of repair must be restricted to individual areas not exceeding 40 cm² for any single repair and a total 0.1% of the surface area of any face for multiple repairs.

4 Installation of Safety Barrier Systems

Training of Personnel

- 4.1 Except for safety barrier systems listed as public domain in GD 300 "Accepted Safety Barrier Products," barrier systems must be installed under the supervision of a person who has experience in the installation of the Manufacturer's barriers and terminals. This person must be on site at all times while the system is being installed.

General

- 4.2 Posts must be installed in a manner that does not damage the post or any attached soil plate. This may involve pre-drilling holes to loosen the soil or excavating a hole to the required depth.
- 4.3 The Contractor must reinstate any disturbed pavement or ground around a post so that it is in a tight, dense condition and has the same resistance to water penetration as the surrounding surface.
- 4.4 Any damage to the pavement or road seal caused by the Contractor's machinery must be reinstated to the satisfaction of the Principal.

Driving of Posts

- 4.5 Driving may be used to install posts. Where the ground has subsided due to the driving process, the surface must be back filled to natural surface level.
- 4.6 Steel posts must be affectively guided and held during initial stages of driving and must not be bent or sprung into position. No significant horizontal force must be used to correct any tendency for a post running off line. Where a post has run off line or twisted, it must be removed and driving must recommence. To minimise damage to the top of the post, a driving head must be positioned over the post during driving.

Backfill of Post Holes

- 4.7 If a hole is excavated for the installation of a post, it must be backfilled and compacted with Type A material or PM 2/20 so that the permeability of the backfill is not less than the surrounding material. Compaction in layers not exceeding 150 mm at OMC to not less than 95% is deemed to meet this requirement. 1% cement may be added to this backfill.
- 4.8 When a lateral force of 100 kg is applied in any direction within the top 200 mm of the post, the movement of the post at ground level must not exceed 3 mm.

Rock Drilling

- 4.9 Where installation of posts is prevented due to rock, rock-drilling equipment must be used to achieve the required depth. If rock is encountered, the Contractor must provide notification immediately.
- 4.10 For the purpose of this Clause, "rock" means material that prevents the post driver pushing the post to its correct depth when penetration of not more than 5 mm from 5 consecutive blows is encountered with a 500 kg weight falling 3 m or causes noticeable damage to the post during installation.

Tolerances

- 4.11 The safety barrier system must form a smooth line vertically and horizontally when viewed along the line of the system, free from humps, sags or other irregularities. Tolerances for erection of the safety barrier must be as follows:
 - a) horizontal placement of fence ± 10 mm;
 - b) vertical placement of fence ± 20 mm; and
 - c) rotational deviation of post ± 5 degrees.
- 4.12 In addition to the above tolerances, the departure from a line drawn between the tops of any three posts must not exceed 25 mm vertically.

Installation to Specification

- 4.13 Where the Contractor is unable to install the safety barrier in accordance with the requirements of this Part (e.g. an obstruction prevents the installation of a post), a **Hold Point** must apply.
- 4.14 Prior to pouring concrete for safety barrier footings, the Contractor must digitally record photographs which can clearly demonstrate that the specified dimensions of the excavation have been achieved.

Records

- 4.15 The Contractor must provide evidence that the barrier system has been installed in accordance with:
 - a) the Manufacturer's requirements and the requirements of this Part, and
 - b) the design drawings (if applicable), or
 - c) Department's drawings (if applicable)
- 4.16 Evidence may take the form of time-stamped photographs, and/or Manufacturer's checklist or mobile app, and/or QA records.

5 Removal of Existing Barrier

- 5.1 Unless specified otherwise, the removed barrier shall become the property of the Contractor. The removed barrier must not be disposed of in landfill. After posts from existing safety barrier runs are removed, the Contractor must fill the post holes in accordance with Clause "Backfill of Post Holes".
- 5.2 Removal of safety barrier system includes:
 - a) dismantling or demolition of safety barriers, transitions and terminal;
 - b) extracting all posts, anchors and other in-ground components and materials;
 - c) removing all components and waste material from the site;

- d) cleaning, backfilling and mechanically compacting all excavation and holes formed by the extraction of posts, anchors and other in-ground components and materials; and
- e) stacking or disposing of components and waste materials.

6 Hold Points

6.1 The following is a summary of Hold Points referenced in this Part:

Document Ref.	Hold Point	Response Time
2.3	Submission of Quality Documentation	7 days
4.13	Where an obstruction prevents the Installation of safety fence to the specified design.	1 day

7 Verification Requirements and Records

7.1 The Contractor must supply the following records:

Table RD-BF-C1 7-1 Verification Requirements

Document Ref.	Subject	Record to be Provided
4.14	Excavation of Footings	Photographic record of excavation prior to placing concrete
4.15	Installation verification	Evidence that the barrier has been installed in accordance with requirements