EZY-GUARD SMART Steel Rail Safety Barrier - Permanent

Product summary

<table>
<thead>
<tr>
<th>Status</th>
<th>Accepted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
<td>Permanent – Flexible Longitudinal Barriers</td>
</tr>
<tr>
<td>Test Level</td>
<td>MASH TL3: 100km/h</td>
</tr>
<tr>
<td>Supplier</td>
<td>Ingal Civil Products</td>
</tr>
<tr>
<td>Description</td>
<td>EZY-GUARD SMART Steel Rail Safety Barrier is a permanent longitudinal barrier.</td>
</tr>
</tbody>
</table>

Introduction and purpose

This detail sheet is intended to supplement VicRoads Road Design Note 06-04 - Accepted Safety Barrier Products. Please refer to RDN 06-04 for the current VicRoads acceptance status, information on the product assessment process and general acceptance conditions.

The technical details within this document have been extracted from information submitted to VicRoads by the Supplier and the recommended ‘Conditions for Use’ from the Austroads Safety Barrier Assessment Panel (ASBAP).

VicRoads requirements take precedence over the product manual and Austroads conditions. Where a departure from these requirements is required, users should understand the risks and document their engineering decisions.

For more detailed product information, refer to the individual product manual or contact the System Supplier.

Technical information

The EZY-GUARD SMART Steel Rail Safety Barrier should be designed, installed and maintained in accordance with the following VicRoads conditions for use.

These conditions for use have been based on an Austroads assessment of technical performance against AS/NZS 3845 and contain VicRoads specific requirements when necessary.

Summary Conditions for Use

<table>
<thead>
<tr>
<th>Accepted configuration</th>
<th>EZY-GUARD SMART Steel Rail Safety Barrier – Permanent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variants</td>
<td>Standard Installation Back to Back Installation Ezy Lift – only to be installed where the road surface has been overlayed Surface Mount – Refer to system conditions Socketed – Refer to system conditions</td>
</tr>
<tr>
<td>Deflection</td>
<td>1.65 metres</td>
</tr>
<tr>
<td>Product manual reviewed</td>
<td>Ingal Civil Product EZY-GUARD SMART, Product &amp; Manual, August 2017 Release</td>
</tr>
<tr>
<td>ASBAP issue</td>
<td>2 December 2019 for EZY-GUARD SMART Steel Rail Safety Barrier</td>
</tr>
</tbody>
</table>

Refer VicRoads conditions for use (below).
VicRoads Conditions for Use

Tested design requirements

<table>
<thead>
<tr>
<th>Containment level</th>
<th>Speed (km/h)</th>
<th>Vehicle mass (kg)</th>
<th>Point of Redirection (m)</th>
<th>Tested article length (m)</th>
<th>Post/Pin Spacing (m)</th>
<th>Dynamic deflection (m)</th>
<th>Working width (m)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASH TL-3</td>
<td>100</td>
<td>2270</td>
<td>Leading 90.8, Trailing 2.0</td>
<td>90.8</td>
<td>2.0</td>
<td>1.65</td>
<td>1.65</td>
<td>Article length between end treatments. Refer other considerations.</td>
</tr>
</tbody>
</table>

Approved Terminals and Connections

Crash Cushions or Terminals must be fitted to both ends of a barrier

Public Domain Products
- W-Beam Guardrail - Permitted
- Thrie-Beam Guardrail - Permitted

Proprietary Products
- ET-SS Terminal
  - Refer to ET-SS Terminal Detail Sheet conditions of approved use
  - The ET-SS Transition must be used to connect the terminal to the barrier.
- GUADGUARD M10 Crash Cushion
  - Refer GUADGUARD M10 Crash Cushion Detail Sheet conditions of approved use.
  - The QUAD-BEAM transition to end terminal must be used to connect the terminal to the barrier.
  - May only be installed where reverse impacts are highly improbable and a risk assessment has been completed and steps taken to mitigate any risks identified.

Design Guidance

System width (m)
- 0.2 for Standard & 0.31 for Back to Back Variant

Installation
- This product must be installed and maintained in accordance with the Product Manual and Road Agency specifications. Road Agency specifications and standards shall have precedence.

Minimum distance to excavation
- 1. 0.5 metres minimum distance between the edge of the barrier and the edge of an excavation, is accepted without further approval.
- 2. Distance less than 0.5m, Seek advice from VicRoads Safe System Engineering or the Supplier for further guidance.

Slope limit
- Side slope limit: 10 Horizontal to 1 Vertical (10.0%).

Systems conditions
- 1. Flaring across the clear zone without a terminal listed above is NOT permitted.
- 2. Installation on top of a kerb is not recommended, however if installed on top of a kerb, all system components must be free to operate.
- 3. EZY-GUARD Surface Mount Variant should be limited to constrained locations, where a driven post cannot be installed, such as across culverts, shallow rock and shallow underground services. The total length of surface mount posts should be minimised where possible. Seek advice from the Safe System Engineering team where necessary.

Minimum installation distance from batter hinge point of the slope (m)
- 0.5 - The proposed distance supersedes the one stated within the product & installation manual.

Gore area use
- Refer to appropriate approved terminal conditions

Pedestrian area use
- Permitted – consider potential for snagging and deflection.

Cycleway use
- Permitted – consider potential for snagging and deflection.

Frequent impact likely
- Permitted

Remote location
- Permitted

Median use
- Permitted
Foundation pavement conditions

<table>
<thead>
<tr>
<th>Pavement</th>
<th>Use</th>
<th>Accepted Speed (max)</th>
<th>Post/Pin spacing (m)</th>
<th>Pavement construction</th>
<th>Post/pin type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>Permitted</td>
<td>100 km/h</td>
<td>2.0</td>
<td>Refer to Manual</td>
<td>Only for Surface Mount Variant</td>
</tr>
<tr>
<td>Deep lift asphaltic</td>
<td>Permitted</td>
<td>100 km/h</td>
<td>2.0</td>
<td>Foundation pavement conditions must be smooth and free of snag points, kerbs or obstructions that may interfere with the operation of the product</td>
<td>EZY-GUARD SMART Post Refer to the Product Manual</td>
</tr>
<tr>
<td>Asphalt over granular pavement</td>
<td>Permitted</td>
<td>100 km/h</td>
<td>2.0</td>
<td>Socket variant to be designed – refer notes.</td>
<td></td>
</tr>
<tr>
<td>Flush seal over granular pavement</td>
<td>Permitted</td>
<td>100 km/h</td>
<td>2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsealed compacted formation</td>
<td>Permitted</td>
<td>100 km/h</td>
<td>2.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other considerations and comments

Transition to Rigid Barriers and End Posts
EZY-GUARD SMART shall be transitioned to Guard Fence where a connection to a rigid concrete barrier or bridge end post is scheduled. This transition shall be in accordance with Ingal drawing EZT-SM-020.

Reduced Post Spacing (1 metre)
The use of reduced 1m post spacings, to achieve desired deflection, shall only be used at isolated hazard points (i.e. an isolated tree), with the transition to 1m spacing starting 10m before hazard and 10m after hazard. Long lengths are not desirable.

Dynamic Deflection based on theoretical engineering analysis to NCHRP 350 TL-3 is 1.041m. MASH details have not been provided.

Socketed Variant
Socketed variant may be used in locations where there are likely maintenance benefits (e.g. narrow flush medians).

Concrete socket foundations must be designed to limit the amount of movement during an impact. The tested foundation (300mm Dia x 1000mm Deep) was installed in 100mm deep lift asphalt on 500mm weak soil (32setLayout/ 75kPa) on 400+mm weak soil (25setLayout/ 50kPa).

Minimum length of barrier
Refer VRS to AGRD Part 6; While shorter lengths than the tested article length are possible, the designer must consider how this will affect other performance values (e.g. deflection). Designers should consult with the product supplier or mitigate the risk through additional controls such as reducing the posted speed.

In general, an alternate barrier type should be considered when shorter than the following: 30m.

Installation
Must conform to the requirement listed in references below, including full compliance of Specification 708.

Damaged Components
Damaged components must be replaced. Repaired components must not be used. References

References
- VicRoads Road Design Note 06-04 Accepted Safety Barrier Products.
- VicRoads Road Design Note 06-08 The Use of Guard Fence.
- VicRoads Standard Drawing SD2001 – Kerb types
- VicRoads Standard Drawing SD3573 – Guidance on the verge and permissible slopes
- VicRoads Standard Section 204 – Earthworks
- VicRoads Standard Section 708 – Steel Beam Guard Fence

Detail Sheet – Update Summary

<table>
<thead>
<tr>
<th>Issue</th>
<th>Approved</th>
<th>Amendment</th>
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<tbody>
<tr>
<td>Jun 2017</td>
<td>NDS-SSD</td>
<td>Minor Amendment – Name Change</td>
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<tr>
<td>Oct 2017</td>
<td>NDS-SSD</td>
<td>Updated ASBAP Conditions</td>
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<tr>
<td>Jun 2018</td>
<td>M-SSD</td>
<td>Product variant inclusion</td>
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<td>Jan 2019</td>
<td>M-SSE</td>
<td>Product variant inclusion MASH update</td>
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<tr>
<td>Sep 2019</td>
<td>M-SSE</td>
<td>Tested article length and minimum length</td>
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<tr>
<td>Mar 2020</td>
<td>M-SSE</td>
<td>New approved MASH terminals</td>
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