HIASA Rail

Motorcyclist Protection Device

Product and Installation Manual

Please call Australian Construction Products on 1800 724 172 or visit www.acprod.com.au for more information

April 2016
Table of contents

Introduction
System overview
Limitations and warnings
W-beam guardrail with HIASA Rail
Motorcyclist impact mitigation
Safety statements
Design considerations
Parts identification
Installation preparation
Installation instructions
Installation checklist
Technical drawings
Frequently asked questions

Appendices

A. Crash tests results summary
B. System Certifications
C. Letter of acceptance
**Introduction**

HIASA Rail is a safety device aimed at reducing the crash severity for errant motorcyclists impacting the strong posts of a W-Beam guardrail system.

HIASA Rail prevents a dismounted, sliding motorcyclist from directly impacting a steel post. The rail also prevents them from sliding through the gap below the W-Beam guardrail, between the posts.

**System overview**

HIASA Rail is designed to be installed on the single G4/W-Beam guardrail system supported by “C” shaped steel strong posts with steel blockouts, at two metre post spacings.

HIASA Rail is a continuous, horizontal steel rail, mounted on brackets below the W-Beam at each post. The rail sections are spliced with bolts, washers and nuts.

Strong post W-Beam barrier systems with HIASA Rail have successfully met all applicable evaluation criteria for the EN 1317-2 N2 performance level. These tests were done to ensure that the crash performance of the W-Beam system was not compromised.

The assessment of motorcyclist impact mitigation was demonstrated through full scale crash tests with 86.5 kg sliding dummies impacting the rail at 70kph, at a 30 degree angle of impact. The HIASA Rail performance falls within the UNE 135 900 (Spain) Level 1 minimum impact severity class.
Limitations and Warnings

Crash impacts that differ from or exceed the test conditions may result in significantly different results any may not meet the applicable evaluation criteria.

The crash test summaries are reported in the appendices.

W-Beam guardrail with HIASA Rail

The HIASA Rail system was crash tested installed on the single G4/W-Beam guardrail system. This system is supported by “C” shaped steel strong posts with steel blockouts, at two metre post spacings. The W-Beam system both with and without the HIASA Rail met the performance requirements for the EN 1317-2, N2 level of containment.

Motorcyclist impact mitigation

Motorcyclist impact mitigation was demonstrated through full scale crash tests using sliding 86.5 kg dummies at 70 kph and an impact angle of 30 degrees. Impact forces on the dummies were measured at the post and midspan. The Head Injury Criteria values were within the Level 1 minimum severity limits.

Safety Statements

Before installation

Placement and use of HIASA Rail should be done in accordance with the guidelines and recommendations set forth by the local road authority and local standards.

HIASA Rail is a highly engineered safety device made up of a relatively small number of parts. Before starting installation ensure that one is familiar with the make-up of the system.

General safety

All required traffic safety precautions should be complied with. All workers should wear required safety clothing (high visibility vests, steel capped footwear, gloves, hard hats, safety glasses etc.).

Only authorised trained personnel should operate any machinery. Where overhead machinery is used, care must be taken to avoid any overhead hazards.

Hardware safety statements

Each rail section weighs 24.2 kg, so lifting by two people is necessary.

Avoid placing hands or fingers where they may be pinched or hit during the lifting or fitting of the brackets and rail sections (e.g. around bolt holes, etc.).
Design considerations

Undulating ground conditions
Site specific grading may be necessary to ensure that there are no “humps” or “hollows” that may significantly alter the trajectory and impact of a sliding motorcyclist. It is preferred that HIASA Rail be installed on flat or near level ground. The cross slope should be 10:1 or flatter which is consistent with the requirement for the W-Beam guardrail system.

Obstructions
As with all road side safety hardware, HIASA Rail has been designed and evaluated according to standard test conditions. For this reason, it is preferred that any obstruction that could affect the engagement or deformation of the rail by an impacting motorcyclist or vehicle be removed.

There should be no vertical kerbing in front of a HIASA Rail installation, as this will be a significant unmitigated impact for a sliding motorcyclist. If kerbing is required it should be of a fully mountable profile to minimize snagging.

Orientation
The HIASA Rail splices are over lapped in the direction of the adjacent traffic (i.e. the trailing end of the upstream rail end overlays the leading end of the downstream rail).
HIASA Rail - Parts Identification

Rail section

Rolled end section, brackets and bolts/nuts

Post bracket

Splice bolts, washers and nuts

M16X32; 4 each per joint plus 1 each for lower post bracket
HIASA Rail – Installation Preparation

Site preparation
As with all guardrail installations, those with HIASA Rail to be installed require the cross slope to be 10:1 or flatter. The batter hinge point should be no less than 600 mm behind the posts. Site grading may be necessary.

Before installing HIASA rail, ensure that all materials required for the system are on site and have been identified. See bill of materials for the particular application and parts identification sheet.

Ensure that the area where the HIASA Rail is to be installed is large enough to safely manoeuvre and mount the rails.

Tools required
To position and assemble HIASA Rail you will require the following tools:

> Ratchet with 16mm sockets (M16 bolts) and a minimum 50mm extension

> Pry bar

Bill of materials (per 4m rail section)

> HIASA Rail section (1); hot dipped galvanised

> Post brackets (2) (i.e. 2 brackets per section plus 1 bracket for the last post on the last section to mount the rolled end section); hot dipped galvanised

> Splice bolts, washers and nuts (i.e. 4 each per rail splice and 1 each per lower post bracket rail connection); M16 X32

> Rolled end sections (2) (i.e. 1 leading and 1 trailing for each end of the installation); hot dipped galvanised

NOTE THAT THE POST BOLT, WASHER AND NUT (M16X50) THAT HOLD THE POST BRACKET TO THE BLOCKOUT ARE COMPONENTS OF THE G4/W-BEAM GUARDRAIL SYSTEM.
Installation instructions

Step 1 – Site preparation
Prepare for the installation by reviewing the location and layout where the HIASA Rail is to be installed. The installed length of each HIASA Rail is 4.32 m, with an effective length of 4m between the two end post bracket bolts.

HIASA Rail must not interfere with the performance guardrail end terminal. HIASA Rail must not be installed within the length of the end terminal. Refer to the applicable end terminal product manual for that information.

The HIASA Rail components should be visually inspected to confirm suitability. Damaged rail or hardware should be replaced. Contact ACP for replacement parts.

The W-Section guardrail system on which the HIASA Rail is to be installed must be fit for purpose.

The ground surface should be reasonably flat in front and below the guardrail system (i.e. the cross slope should be 10:1 or flatter). An uneven surface should be re-graded.

Step 2 – Installing brackets
The HIASA Rail post brackets are installed on each post for the installation length. The nut on the W-Section post bolt should be removed, and the bracket fitted, followed by replacing the post bolt nut. The nut should not be tightened initially as the brackets should be loosely fit to enable the placement and adjustment of the rail sections.
Step 3 – Rail placement

The rail section is set in place and attached to the lower post bracket slot using a bracket bolt, washer and nut. The upstream and centre post brackets should have the nuts loosely fit to hold the rail in place. The rails must be lapped in the direction of travel, where the upstream rail trailing end overlays the downstream rail leading end. This lapped joint is then bolted using the 4 splice bolts, washers and nuts. The bolts should be loosely fit to enable further adjustment.

The washers are never used on the rail face. The washers are only used next to the nuts.

A Rolled end section is required for both ends of an installation (See Step 4). The initial rail section should be installed with the rolled end section.

Adjust the vertical alignment of the screen. The gap between the bottom of the HIASA Rail and the ground level should be 30mm +/- 10mm.

Tighten all bolts to a torque of 60 N.m. to 80 N.m.
Step 4 – Attach the HIASA Rolled End section

Each end of an installation must have a rolled end section installed. The leading end has a left rolled end section and the trailing end will have a right rolled end section.

Each Rolled End Section will include:

- 1 off Rolled Section LH or RH
- 1 off Rub Rail bracket
- 2 off L-Shaped Brackets
- 5 off M16 x 32 Splice Bolt/Nuts
- 2 off M16 x 150 Hex Head Bolt/Nuts
- 4 off M16 x 30 Hex head Bolt/Nuts

1. To enable connection of the Rolled End Section to the Motorcycle Rail install a Rub Rail bracket as you normally would to hold up the motorcycle rail.

There is no need to fasten the lower splice bolt between the motorcycle rail and bracket as the rolled end section will need to overlap prior to fastening the connection.
2. The Rolled End Section is set in place with the first rail lapped in the direction of travel, where the upstream rail trailing end overlays the downstream rail leading end.

The lapped joint is attached to the lower post bracket slot using a splice bolt and nut. That joint is then bolted using 4 splice bolts and nuts. The bolts should be loosely fit to enable further adjustment.

3. The Rolled End Section required 2 x L-Shaped Brackets to attach the rearward side flap to the C-Post supporting the end.

To do this start with the outer side first and fix an L-Shaped bracket to the second set of holes (from left to right as shown below) using 2x M16 x 30mm Hex Head Bolt/Nuts. See below.

Do the same on the inner side as well, however utilize the last set of holes to fix the bracket here.
4. The final step is to connect 2 x M16 x 150 Hex Head bolt/nuts through both of the ends of the L-Shaped brackets to lock them together however allowing some space for movement of the End Section upon an impact if ever occurs.

Ensure thread and nut end is on the rearward side of the Rolled End Section as shown below. Do not use a rattle or air gun, it may cause over tightening.

5. Leading and Trailing End after installation

 Rolled end section - leading end

 Rolled end section back view - trailing end
Installed HIASA Rail
## HIASA Rail
### Installation Checklist

<table>
<thead>
<tr>
<th>General</th>
<th>Y</th>
<th>N</th>
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</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
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<tr>
<td>The ground is near level (i.e. maximum cross slope of 10:1) below the W-Beam guardrail.</td>
<td></td>
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<tr>
<td><strong>General</strong></td>
<td></td>
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<tr>
<td>The W-Beam guardrail installation is in acceptable fit for purpose condition.</td>
<td></td>
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<tr>
<td><strong>General</strong></td>
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<tr>
<td>There are no hazards (e.g. curbs, junction boxes, sign supports) that will interfere with the performance of the HIASA rail.</td>
<td></td>
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<tr>
<td><strong>Rail Brackets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The brackets are installed and the post bolts are tight.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rail Sections</strong></td>
<td></td>
<td></td>
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<tr>
<td>There is no evident damage to the rail section.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The rails are correctly lapped (upstream rail trailing end overlays the downstream rail leading end).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four splice bolts per joint are installed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rolled End Sections</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are leading and trailing rolled end sections correctly lapped and bolted.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HIASA Rail height</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The gap between the bottom of the rail and the ground level should be 30mm +/- 10mm.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bolts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All bracket and splice bolts are torqued to between 60Nm and 80Nm.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All post bolts are tightened.</td>
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</tbody>
</table>

**Comments:**

<table>
<thead>
<tr>
<th>Location:</th>
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</thead>
<tbody>
<tr>
<td>Installed by:</td>
<td>Date:</td>
<td></td>
</tr>
<tr>
<td>Inspected by:</td>
<td>Date:</td>
<td></td>
</tr>
</tbody>
</table>

Contact ACP for more information on this or other road safety products
Technical drawings
Technical drawings
Frequently Asked Questions

1. **What are the maintenance requirements?**

   A HIASA Rail installation does not require maintenance under normal conditions. However, the guardrail cross slope grading should periodically be checked, and any uneven grading be fixed or build-up of material be removed.

2. **What are the repair requirements?**

   If a HIASA Rail installation has been damaged through vehicle or motorcyclist impact any deformed sections or brackets should be replaced. Undamaged components should be returned to their original positions and retightened.

3. **How easily can the HIASA rail be restored after impact?**

   HIASA Rail is a modular system so is easily fixed with new components. If the rails show obvious signs of major deformation they should be replaced.

4. **What are the maintenance requirements for repair after a bushfire?**

   The HIASA Rail Motorcyclist Protection Device is made up of non-combustible materials. In the event of a bushfire galvanized coated steel products are generally reflective and tend to perform better than uncoated steel surfaces, this is dependent on factors such as flame intensity and duration.

   Typically the flame duration and intensity in a bushfire are not high enough to compromise the structural strength of the steel. The galvanized coating will generally remain in good condition through a bushfire. If in the aftermath of a bushfire the galvanized surface has been compromised, the HIASA Rail should be replaced.

4. **Does your company provide spare parts? What is the lead time for supply of these parts?**

   There are a very small number of components and are normally available ex stock. On acceptance of an order they can be shipped within 24 hours.

5. **What about vandalism? Can HIASA Rail be easily damaged?**

   As HIASA Rail is manufactured from steel sheeting and the brackets and bolts are very robust it will be difficult to tamper with.

6. **Does HIASA Rail have to be lapped a certain way?**

   Yes, HIASA Rail should be over-lapped parallel to the direction of travel (i.e. the upstream rail trailing end overlays the downstream rail leading end).
Appendix A -
Crash test results summary

Motorcyclist Impact
The HIASA SPM-ES2 version installed on G4/W-Beam guardrail supported by steel strong posts and blockouts at 2 metre post spacings has passed full scale crash tests using crash test dummies, in accordance with UNE 135 900 Spanish Standard: Evaluation of the performance of motorcyclist protection systems in safety guardrails and bridge parapets. The dummies represent a dismounted sliding motorcyclist of 86.5 kg, sliding into the rail at 70 kph at an angle of 30 degrees. Two different impact points were used including at a post and midspan between posts.

Head Injury Criteria (HIC) were measured to assess the level of risk for head injuries, as measured by the forces and momentum on the neck. The post impact resulted in a HIC value of 268, and the midspan impact had a HIC value of 333, placing the risk into the minimum severity class limits of Level 1.
Vehicle Impact

The HIASA SPM-ES2 version was assessed as having successfully met all applicable evaluation criteria for vehicle impacts to the EN1317-2 N2 performance standard. These evaluation criteria included structural adequacy, occupant risk and vehicle trajectory. On the basis of these results compared to those without HIASA Rail it was concluded that the protection of motorcyclists using HIASA Rail does not compromise the crashworthiness of a G4/W-Beam guardrail system, supported by steel strong post and steel blockouts at 2 metre post spacings.

<table>
<thead>
<tr>
<th>Test EN-1317-2 N2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Article</td>
</tr>
<tr>
<td>Impact Severity</td>
</tr>
<tr>
<td>Test Vehicle</td>
</tr>
<tr>
<td>Speed</td>
</tr>
<tr>
<td>Impact Angle</td>
</tr>
</tbody>
</table>
Appendix B – System Certifications

EC DECLARATION OF CONFORMITY

The signatory, on behalf of the company HIERROS Y APLANACIONES S.A. (HIASA), sit in Poligono Industrial de Canientes. s/n. 33470, Corvera, Asturias, Spain

DECLARES THAT:
The product “SINGLE STEEL GUARDRAIL WITH MOTORCYCLIST PROTECTION DEVICE “SPM-ES2”” – Vehicle Restraint System, Safety Barrier for use in public areas,


Notified Certification Body:
BUREAU VERITAS CERTIFICATION
C/ Valportillo Primera, 22-24, Poligono Industrial de la Granja,
28108 Alcobendas, Madrid, España (Spain)
Number of EC Certificate of Conformity:
1035-8003008-L

Fernando Castro Cáncer
MANAGING DIRECTOR
14/02/2012

HIASA
Grupo Gonvarri

Poligono Industrial de Canientes, s/n. 33470 - Corvera, Asturias, ESPAÑA
Tel: +34) 985 128200 Fax: +34) 985 505361
e-mail: seguridadvital_hiasa@gonvarri.com
http://www.hiasa.com
Product & Installation Manual: HIASA Rail
Product & Installation Manual: HIASA Rail
Appendix C – Letter of acceptance

Safety Barrier System Conditions

HIASA RAIL MOTORCYCLIST PROTECTION DEVICE Steel Component - Permanent

The conditions for use of the HIASA RAIL MOTORCYCLIST PROTECTION DEVICE Steel Component - Permanent on the New South Wales classified road network, are shown in the attached Safety Barrier System Conditions.

The conditions are based on the determination of the Austroads Safety Barrier Assessment Panel.

The Safety Barrier System Conditions should be read in conjunction with the Roads and Maritime Specification R132 - Safety Barrier Systems.
### Safety Barrier System Conditions: HIASA Rail

**HIASA RAIL MOTORCYCLIST PROTECTION DEVICE**

**Steel Component - Permanent**

<table>
<thead>
<tr>
<th>Australian Distributor</th>
<th>Australian Construction Products Pty Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Zealand Distributor</td>
<td>CSP Pacific</td>
</tr>
<tr>
<td>Date Issued</td>
<td>12 May 2015</td>
</tr>
</tbody>
</table>

#### Status

Accepted – May be used on the classified road network. These acceptance conditions take precedence over any instructions in the Product Manual.

#### Variants accepted

- HIASA RAIL MOTORCYCLIST PROTECTION DEVICE Steel Component – Permanent
- Rolled End Section.

#### Variants NOT accepted

- Not accepted with proprietary guardrail systems.
- Not accepted with G9 (Thrie-Beam) or G9 modified (Modified Thrie-Beam).
- Not accepted with Victoria Type B guardrail.
- Not accepted with Strong Post Timber guardrail.
- Variants that are not on the list above are not accepted.
- Variants accepted in other jurisdictions, but not accepted in the local jurisdiction, are NOT permitted.

#### Speed limit (km/h)

Not specified.

#### Tested containment (kg)

Not applicable.

#### Adopted dynamic deflection (Nominal 2 tonne vehicle)

Not applicable.

#### Point of need

The ends of the HIASA RAIL MOTORCYCLIST PROTECTION DEVICE Steel Component – Permanent must not be within a curve.

#### Development length

Not applicable.

#### Minimum length of barrier between terminals

Not specified.

#### System width (m)

Not specified.
## Safety Barrier System Conditions: HIASA Rail

<table>
<thead>
<tr>
<th><strong>System conditions</strong></th>
<th>Installation behind or on top of a kerb is not permitted.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Terminals and connections</strong></td>
<td></td>
</tr>
<tr>
<td>W-Beam guardrail</td>
<td>Permitted.</td>
</tr>
<tr>
<td>Thrie-Beam guardrail</td>
<td>Not Permitted.</td>
</tr>
<tr>
<td>Type F Concrete Safety Barrier</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Proprietary product</td>
<td>Not Permitted.</td>
</tr>
<tr>
<td>Other</td>
<td>A Rolled End Section must be fitted to both ends of the component.</td>
</tr>
<tr>
<td><strong>Gore area use</strong></td>
<td>Not Permitted.</td>
</tr>
<tr>
<td><strong>Pedestrian area use</strong></td>
<td>Permitted – consider potential for snagging and deflection.</td>
</tr>
<tr>
<td><strong>Cycleway use</strong></td>
<td>Permitted – consider potential for snagging and deflection.</td>
</tr>
</tbody>
</table>

| **Frequent impact likely** | Permitted. |
| **Remote location** | Permitted. |
| **Median use** | Permitted – where rear impact is not possible. |
| **Minimum median width (m)** | Not specified. |
| **Flare rate (See Explanation of Terms diagram)** | Match guardrail. |
| **Offset to travel lane (m)** | Match guardrail. |
| **Hazard free area beside barrier or terminal (Working Width)** | Not applicable. |
# Safety Barrier System Conditions: HIASA Rail

| Installation | The HIASA RAIL MOTORCYCLIST PROTECTION DEVICE Steel Component - Permanent must be installed and maintained in accordance with the Product Manual and Road Agency specifications. The Road Agency specifications and standards shall have precedence. |
| Minimum distance to excavation | Not applicable. |
| Slope limit | Pavement slope. |
| **Foundation pavement conditions** | | |
| | Concrete | Not applicable. |
| | Deep lift Asphallic Concrete | Not applicable. |
| | Asphallic concrete over granular pavement | Not applicable. |
| | Flush seal over granular pavement | Not applicable. |
| | Unsealed compacted formation | Not applicable. |
| | Natural surface | Not applicable. |
| | The surface beneath the HIASA RAIL MOTORCYCLIST PROTECTION DEVICE Steel Component - Permanent must be smooth and free of snag points, kerbs or obstructions that may interfere with the operation of the product. |
| **Attachments and screens** | In accordance with the requirements of Australian/New Zealand Standard AS/NZS 3845, road furniture and other non-product hardware must not be attached to the product. |
| **Damaged components** | Damaged components must be replaced. Repaired components must not be used. |
| **Delineation** | The installed system shall include delineation as prescribed by Road Agency specifications and drawings. |
| **Traceability and markings** | Product markings shall be in accordance with marking/s prescribed by the current Australian/New Zealand Standard AS/NZS 3845 Road Safety Barrier Systems and Road Agency specifications. Traceability details that must be permanently fixed to the product are: |
| | • Name of the product. |
| | • Manufacturer or distributor name. |
| | • Date of manufacture. |
| | • Model or version details of the product, if applicable. |
| | • Batch number, if applicable. |
| | • Serial number, if applicable. |
| | Traceability details must be easily visible but unobtrusive and not be in a form that becomes prominent advertising. |
| | No advertising shall be displayed on the installation. |
| | Traceability must be in a form that will not be erased with use. |
## Safety Barrier System Conditions: HIASA Rail

<table>
<thead>
<tr>
<th>Notes</th>
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<tbody>
<tr>
<td>Conditions are based on drawings SPM001, SPM002, SPM004, SPM-AUST-010710-003, SPM-AUST-010710-004, SPM-AUST-010710-005 and the Product Manual supplied by the Proponent, dated February 2015 (version 19.02.15). This acceptance will cease if there is any change in the product design or specifications.</td>
</tr>
<tr>
<td>Only the Product Manual authorised by the Proponent shall be used in any marketing of the product.</td>
</tr>
<tr>
<td>Acceptance of the HIASA RAIL MOTORCYCLIST PROTECTION DEVICE Steel Component - Permanent does not place any obligation on the Road Agency, or its contractors, to purchase or use the product.</td>
</tr>
<tr>
<td>The Austroads Safety Barrier Assessment Panel may periodically re-assess the HIASA RAIL MOTORCYCLIST PROTECTION DEVICE Steel Component - Permanent. The Road Agency may withdraw or modify at any time, the acceptance status or conditions of use of the product without notice. Users should refer to the Road Agency web site to ensure they have the latest version of the conditions related to this product.</td>
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</tbody>
</table>
Safety Barrier System Conditions: HIASA Rail

Design Terminology

Deflection Terminology

Flare Terminology

Terminal Terminology

For more information, refer to Austroads Guide to Road Design Part 6: Roadside Design, Safety and Barriers