

# QuadGuard<sup>®</sup> CEN

CRASH CUSHIONS

## PRODUCT DESCRIPTION MANUAL



# QuadGuard® CEN

The QuadGuard® CEN was tested to meet the requirements and guidelines of the 110km/h, 100km/h, 80km/h and 50km/h performance classes using the CEN criteria described in European Standard EN 1317-3 (Crash Cushions).

## Product Description Manual

Valtir, LLC



15601 Dallas Parkway  
Suite 525  
Addison, Texas 75001



**Warning:** The local highway authority, distributors, owners, contractors, lessors, and lessees are responsible for the assembly, maintenance, and repair of the QuadGuard® CEN system. Failure to fulfill these **RESPONSIBILITIES** with respect to the assembly, maintenance, and repair of the QuadGuard® CEN system could result in serious injury or death.



**Important:** These instructions are for standard assembly specified by the appropriate highway authority. In the event the specified system assembly, maintenance, or repair would result in a deviation from these assembly instructions, contact the appropriate highway authority engineer.

**This manual must be available to the worker overseeing and/or assembling the product at all times. For additional copies, contact Valtir International at +1 (214) 589-8140 or [www.Valtir.com](http://www.Valtir.com).**

The instructions contained in this manual supersede all previous information and manuals. All information, illustrations, and specifications in this manual are based on the latest QuadGuard® CEN system information available to Valtir International at the time of printing. We reserve the right to make changes at any time. Please contact Valtir International to confirm that you are referring to the most current instructions.

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[www.Valtir.com](http://www.Valtir.com)

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## Customer Service Contacts

Valtir International is committed to the highest level of customer service. Feedback regarding the QuadGuard® CEN system, its assembly procedures, supporting documentation, and performance is always welcome. Additional information can be obtained from the contact information below:

### **Valtir International**

Telephone:	USA: +1 214 589 8140 Europe: +44 7361 864735 Asia / Pacific: +65 6276 3398 Middle East / Africa: +46 709 66 10 55
Fax:	(800) 770-6755 (USA) +1 214 589 8423 (International)
Website:	<a href="http://www.Valtir.com">www.Valtir.com</a>

## Important Introductory Notes

Proper assembly of the QuadGuard® CEN is critical to achieve performance that has been evaluated and accepted per EN 1317-3. These instructions should be read in their entirety and understood before assembling the QuadGuard® CEN. These instructions are to be used strictly in conjunction with the assembly of the QuadGuard® CEN and are for standard assemblies only as specified by the appropriate highway authority. If you need additional information, or have questions about the QuadGuard® CEN, please contact the highway authority that has planned and specified this assembly and, if needed, contact the Valtir International Customer Service Department. This product must be assembled in the location specified by the appropriate highway authority. If there are deviations, alterations, or departures from the assembly protocol specified in this manual, the device may not perform as it was tested.



**Important: DO NOT** use any component part that has not been specifically approved for this system during the assembly or repair of this system.

This product has been specified for use by the appropriate highway authority and has been provided to that user who has unique knowledge of how this system is to be assembled. No person should be permitted to assist in the assembly, maintenance, or repair of this system that does not possess the unique knowledge described above. These instructions are intended for an individual qualified to both read and accurately interpret them as written. These instructions are intended only for an individual experienced and skilled in the assembly of highway products that are specified and selected by the highway authority.

A set of product drawings are available from Valtir International upon request. Such drawings should be reviewed and studied thoroughly by a qualified individual who is skilled in interpreting them before the start of any product assembly.



**Important:** Read safety instructions thoroughly and follow the suggested safe practices before assembling, maintaining, or repairing the QuadGuard® CEN. It is your responsibility to follow these warnings. Failure to follow warnings can result in serious injury or death to workers and/or bystanders and also compromises the acceptance of this system by the EN 1317-3. Please keep up-to-date instructions for later use and reference by anyone involved in the assembly of the product.



**Warning:** Ensure that all of the QuadGuard® CEN system Danger, Warning, Caution, and Important statements within the QuadGuard® CEN Manual are followed completely. Failure to comply with this warning could result in increased risk of serious injury or death in the event of a collision.

## **Safety Rules for Assembly**

### **\* Important Safety Instructions \***

This manual must be kept in a location where it is readily available to persons who assemble, maintain, or repair the QuadGuard® CEN. Additional copies of this manual and the Assembly Manual are available from Valtir International by calling +44 7361 864735 or by visiting [www.Valtir.com](http://www.Valtir.com). Please contact Valtir International if you have any questions concerning the information in this manual or about the QuadGuard® CEN.

Always use appropriate safety precautions when operating power equipment, mixing chemicals, and when moving heavy equipment or QuadGuard® CEN components. Safety articles including but not limited to work gloves, eye protection, safety-toe shoes, and back protection should be used.

## Safety Symbols

This section describes the safety symbols that appear in this QuadGuard® CEN Product Description Assembly Manual. Read this manual for complete safety, assembly, operating, maintenance, repair, and service information.

### Symbol

### Meaning



**Safety Alert Symbol:** Indicates Danger, Warning, Caution, or Important. Failure to read and follow the Danger, Warning, Caution, or Important statement indicators could result in serious injury or death to workers and/or bystanders.



**Warning:** Failure to comply with these warnings could result in increased risk of serious injury or death in the event of a vehicle impact with a system **that is no longer compliant with EN 1317-3.**



**Warning:** Do not assemble, maintain, or repair the QuadGuard® CEN system until you have read this manual thoroughly and completely understand it. Ensure that all Danger, Warning, Caution, and Important statements within the manual are completely followed. Please call Valtir International at +1 (214) 589-8140 if you do not understand these instructions.



**Warning:** Do NOT modify the QuadGuard® CEN system in any way.



**Important:** Valtir International makes no recommendation whether use or reuse of any part of the system is appropriate or acceptable following an impact. It is the sole responsibility of the local highway authority and its engineers to make that determination. It is critical that you inspect this product after assembly is complete to make certain that the instructions provided in this manual have been strictly followed.



**Warning:** Ensure that your assembly meets all appropriate local specifications and standards. If you have any questions during the assembly of a QuadGuard® CEN at a particular assembly site, contact the specifying highway authority immediately.

## Limitations and Warnings

The QuadGuard® CEN was tested to meet the requirements and guidelines of the 110km/h, 100km/h, 80km/h and 50km/h performance classes using the CEN criteria described in European Standard EN 1317-3 (Crash Cushions).

The required tests are not intended to represent the performance of products when impacted by every vehicle type or every impact condition existing on the roadway. The tests are performed to measure impacts involving vehicles specified by EN 1317-3, under those specific impact conditions.

Valtir International expressly disclaims any warranty or liability for injury or damage to persons or property resulting from any impact, collision or harmful contact with products, other vehicles, or nearby hazards or objects by any vehicle, object or person, whether or not the products were assembled in consultation with Valtir International or by third parties.

The QuadGuard® CEN is intended to be assembled, delineated, and maintained within specific local guidelines. It is important for the highway authority specifying the use of a highway product to select the most appropriate product configuration for its site specifications. Careful evaluation of site layout, traffic speed/type, direction, and visibility are some of the elements that require evaluation by the highway authority in the selection of a highway product. For example, curbs could cause an untested effect on an impacting vehicle.

After an impact occurs, the debris from the impact should be removed from the area immediately and the QuadGuard® CEN should be evaluated and either restored to its original specified condition or replaced as the highway authority determines as soon as possible.



**Warning:** Use only Valtir International parts that are specified herein for the QuadGuard® CEN for assembling, maintaining, or repairing the QuadGuard® CEN system. **Do not utilize or otherwise comingle parts from other systems** even if the systems are other Valtir International systems. Such configurations have not been tested, nor have they been accepted for use. Assembly, maintenance, or repairs using unspecified parts or accessories is strictly prohibited. Failure to follow this warning could result in serious injury or death in the event of a vehicle impact with an UNACCEPTED system.

## CEN Criteria

The specification of a QuadGuard® CEN for a particular site must always include system width and system length.

### 1) Specification of system width

The QuadGuard® CEN is available in five nominal widths (Figure 11): 610 mm [24"], 760 mm [30"], 915 mm [36"], 1753 mm [69"] and 2286 mm [90"].

As a general rule, selection of the narrowest width that adequately shields the roadside feature is recommended.

Impact conditions which differ from those described in the European Standard EN 1317-3 may result in different crash results than those encountered in testing. Furthermore, impacts in excess of design impact severity, or the existence (at the site of the assembly) of curbs or cross slopes in excess of 8%, may yield crash performance which does not meet the evaluation criteria of European Standard EN 1317-3.

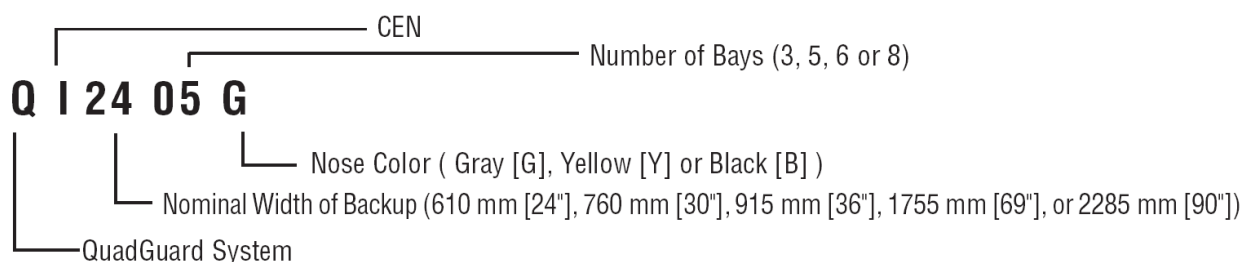
**Table A – QuadGuard® CEN Design Table**

Design Velocity km/h [mph]	Number of Bays	System Length	Effective Length	Average G Deceleration
50 [31]	3	3.40 m [11'-1 1/2"]	2.74 m [9'-0"]	4.3
80 [50]	5	5.22 m [17'-1 1/2"]	4.57 m [15'-0"]	6.5
100 [62]	6	6.13 m [20'-1 1/2"]	5.49 m [18'-0"]	8.4
110 [69]	8	7.96 m [26'-1 1/2"]	7.32 m [24'-0"]	7.7

Above G's are based upon average values calculated for vehicles that stop in a distance equal to 85% of the effective length.

**Table B – QuadGuard® Standard System Model Numbers**

Number of Bays	Nominal Width				
	610 mm [24"]	760 mm [30"]	915 mm [36"]	1753 mm [69"]	2286 mm [90"]
3	QI2403G, Y or B	QI3003G, Y or B	QI3603G, Y or B	QI6903G, Y or B	QI9003G, Y or B
5	QI2405G, Y or B	QI3005G, Y or B	QI3605G, Y or B	QI6905G, Y or B	QI9005G, Y or B
6	QI2406G, Y or B	QI3006G, Y or B	QI3606G, Y or B	QI6906G, Y or B	QI9006G, Y or B
8	QI2408G, Y or B	QI3008G, Y or B	QI3608G, Y or B	QI6908G, Y or B	QI9008G, Y or B



### Model Number Description



## How to Determine Left/Right

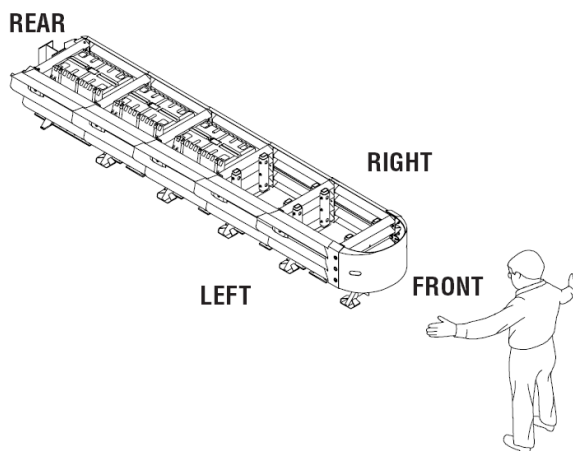
To determine left from right when ordering parts, stand in front of the system facing the roadside feature. Your left is the system's left and your right is the system's right (Figure 1).

## Counting the Number of Bays

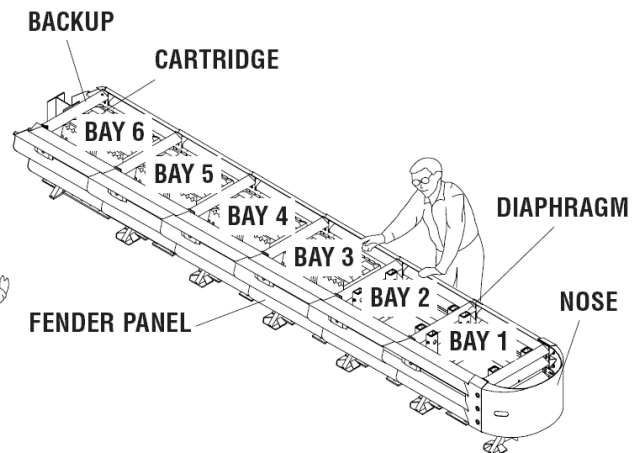
One bay consists of one Diaphragm, two Fender Panels, etc. The Nose Assembly is not considered a Bay. There are no Cartridges in the front 2 bays; therefore there will be 2 more Bays than the number of Cartridges for the system. To determine number of Bays, count Fender Panels on one side (Figure 2).



**Warning:** Safety measures incorporating appropriate traffic control devices specified by the highway authority must be used to protect all personnel while at the assembly, maintenance, or repair site.



**Figure 1**  
Left/Right



**Figure 2**  
Number of Bays

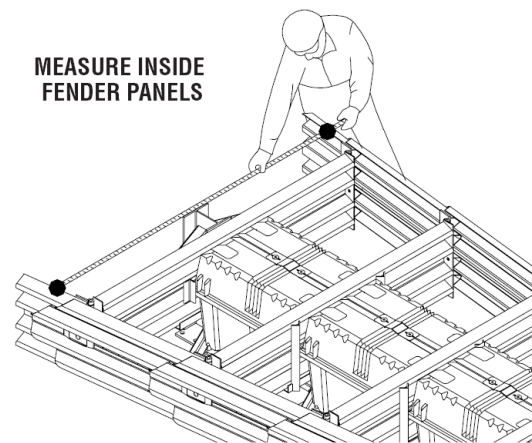
## Measuring the Width

The QuadGuard® CEN is available in 5 nominal widths:

1. 610 mm [24"]
2. 760 mm [30"]
3. 915 mm [36"]
4. 1753 mm [69"]
5. 2286 mm [90"]

The nominal width of the system is the width between Side Panels behind the Backup (Figure 3).

The outside width of the system is approximately 150 mm to 230 mm [6" to 9"] wider than this measurement.



**Figure 3**  
**System Width**

## Specification of System Length

System length is specified by the number of Bays the system includes. The number of Bays required is a function of the design speed of the roadway. Refer to Table A to correlate the design speed of the roadway with the number of Bays which should be specified.

## Basic System Specification Example

To shield a 710 mm [28"] roadside feature on a roadway with a design speed of 100 km/h [62 mph], the designer would call for a 6-Bay system with 760 mm [30"] Diaphragms (Table B).

## Establish Required System Footing



**Important:** The system must be adequately anchored. A QuadGuard® CEN should be deployed only on an acceptable foundation with suitable ground anchors. For minimum requirements, contact the Valtir International Customer Service Department (p. 3).



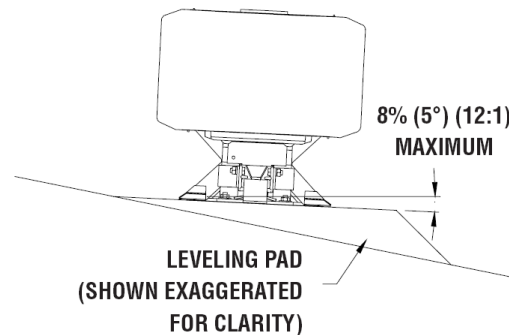
**Warning:** Ensure that there is proper site grading for QuadGuard® CEN placement as dictated by the specifying agency.

### Is there a cross slope at the assembly site?

**Cross slope exists** – if there is a cross slope of more than 8% (5 degrees), or if the cross slope varies more than 2% (1 degree) over the length of the system, a concrete leveling pad may be required (Figure 4).

**No Cross slope** – No additional action is required.

**Note:** Curb shall be mountable and not exceed 100 mm [4”]. Level out as necessary.



**Figure 4**  
**Cross Slope**

## Anchor the System

Cross slope of assembled location shall not exceed 8% and not vary (twist more than 2% from front to back). For these conditions, a leveling pad is required. The anchors when torqued must have a pull out strength of 82.3 kN (18,500 lbs) and a shear strength of 109 kN (24,500 lbs).

## Test Parameters

The best overall measure of anchor performance is load capacity. Anchor load capacity can be defined by testing static tensile and static shear strengths. Static tensile strength is the maximum force sustained by an anchor when subjected to gradual increases in loading at the exposed end of the anchor and applied in line along its axis. Static shear strength is the maximum force sustained by an anchor when subjected to gradual increases in loading applied at the base of the exposed end of the anchor and applied perpendicular to its axis.

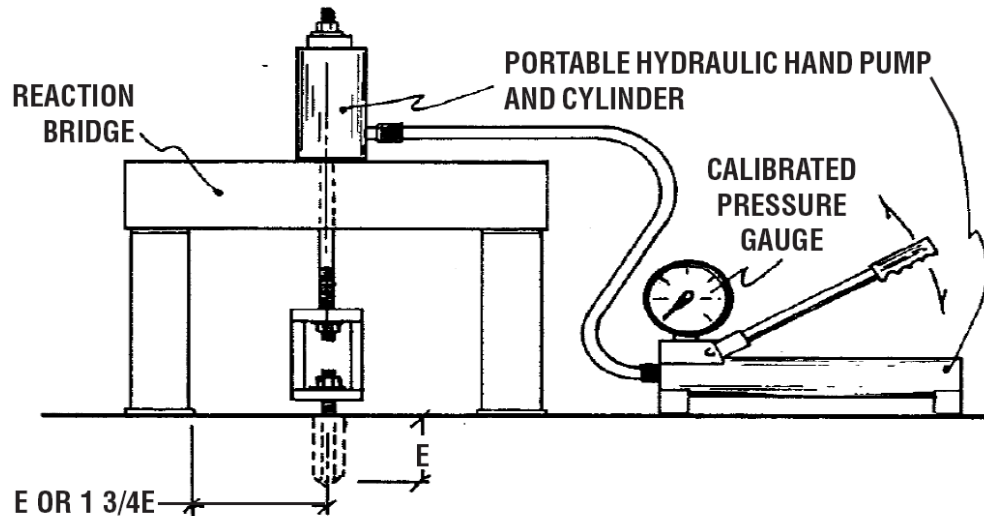
The tensile strength developed will be a function of the strength of the concrete or asphalt surface the anchor is placed in. The embedment depth of the anchor can also affect the anchor's tensile strength.

Tensile test of anchors chosen should be tested in compliance with ASTM E488 – Standard Test Methods for Strength of anchors in Concrete and Masonry Elements (Figure 5).

## Recording Test Results

Three pull tests should be conducted on site when the anchoring conditions are different from those described in the reference section of this document, with the results recorded. Pictures of the testing should also be taken and stored with the recorded data.

The anchor surface is acceptable if the average of the three pulls is equal or greater than 82.3 kN (18,500 lbs).



$E$  = ANCHOR EMBEDMENT DEPTH

Figure 5

## Special Site Conditions

Contact Valtir International Customer Service Department if you would like assistance with your application (p. 3). You will need to answer the following questions:

1. Are curbs, islands or elevated objects (delineators or signs) present at the site? What height and width are they? All curbs and elevated objects over 100 mm [4"] high should be removed. Curbs over 100 mm [4"] high shall be removed approximately 15 m [50'] in front of the QuadGuard® CEN, and as far back as the system's Backup. Any curbs that must remain shall be 100 mm [4"] maximum and be mountable.
2. If the deployment site is a gore area (place where two roads diverge), what is the angle of divergence?
3. What is the general geometry of the site, including the roadway for 150 m [500"] in front, so traffic patterns can be visualized?
4. When there is an existing guardrail at the site, the Backup of the QuadGuard® CEN shall tie into it when possible.
5. Will there be traffic approaching from the rear of the system? Is the system in a two-way traffic situation, with traffic going in opposite directions on either side of the system, or is the system on the side of the road in a location where crossover traffic is a concern? If so, a Connection Panel from the back of the system to the roadside feature is necessary to prevent vehicle interaction (p. 13).

**Note:** Connection Panels shall be angled so the maximum gap from the Fender Panel overlap does not exceed 20 mm [0.78"] for narrow systems and 25 mm [1"] for wide systems (Figure 6).

6. Are there any other unique features at the site that may affect positioning or performance of the QuadGuard® CEN?

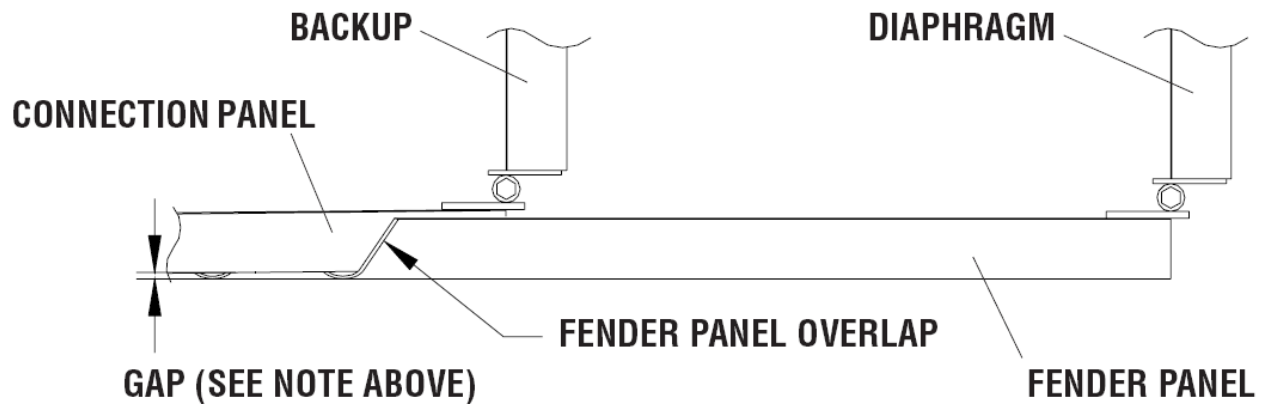


**Warning:** Ensure that the QuadGuard® CEN system and delineation used meet all federal, state, specifying agency, and local specifications.

### Other Factors That May Affect Your Design

1. The existence of drain inlets.
2. Junction boxes or other appurtenances located near the roadside feature.
3. Insufficient space for the length preferred.
4. The location and movement of expansion joints.

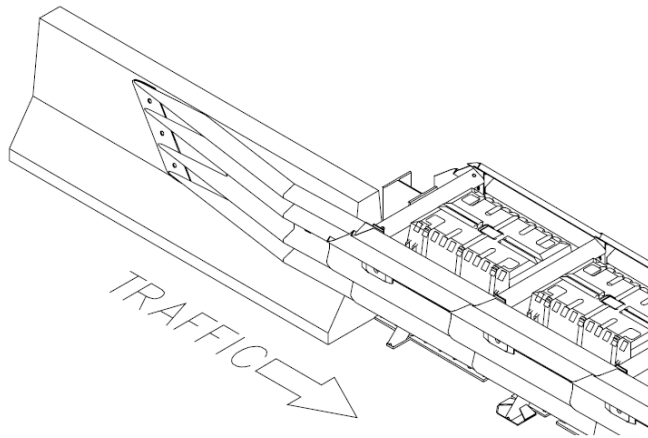
If you have any questions, contact the Valtir International Customer Service Department before proceeding with your design (p. 3).



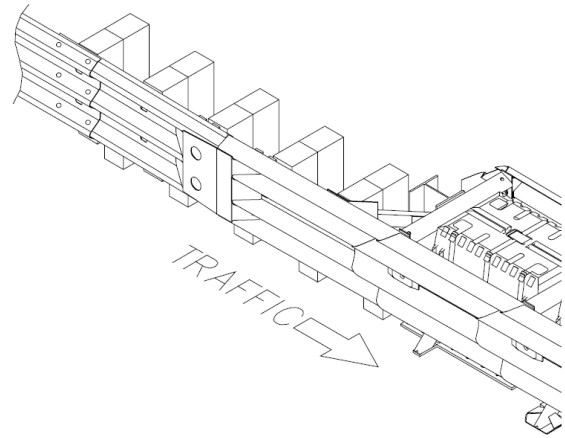
**Figure 6**  
**Fender Panel Gap**

## Connection Panel Types

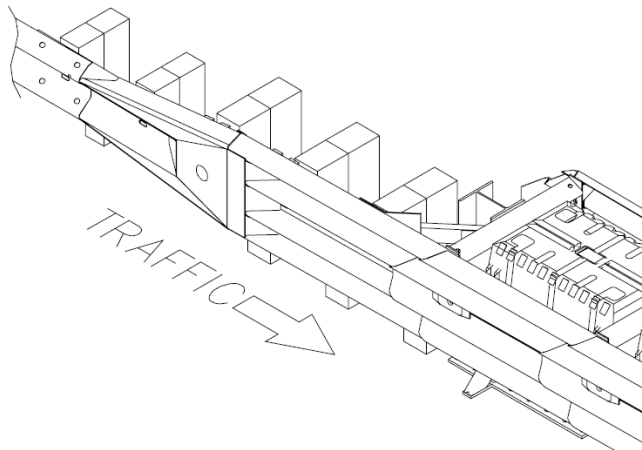
If a system is placed in a location where traffic will be approaching from the rear of the system, then a Connection Panel is necessary. Figures 7, 8, 9, and 10 show the standard Connection Panel types. There are variations for each panel type. The specific Panel needed will depend on system and site conditions. Therefore, it is important to send site specific data to the Customer Service Department for appropriate Connection Panel applications (p. 3).



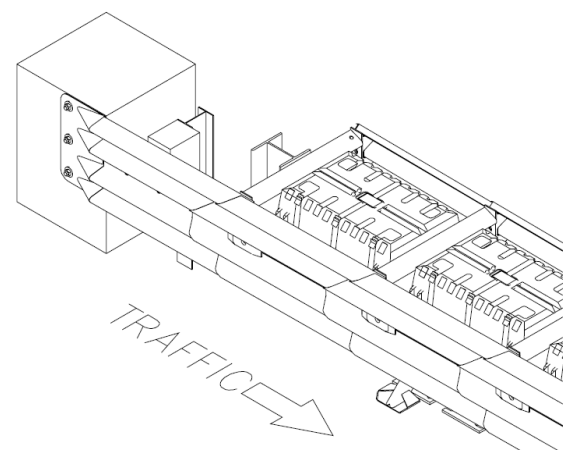
**Figure 7**  
**Quad-Beam™ to Safety Shape**  
**Barrier Connection Panel**



**Figure 8**  
**Quad-Beam™ to Thrie-Beam**  
**Connection Panel**



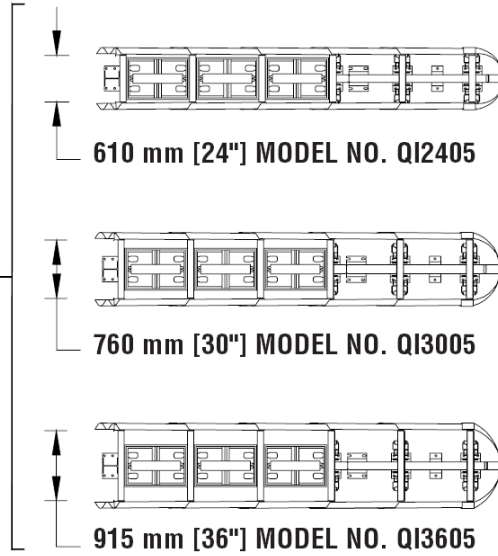
**Figure 9**  
**Quad-Beam™ to W-Beam**  
**Connection Panel**



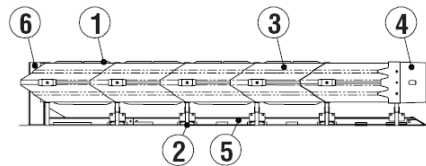
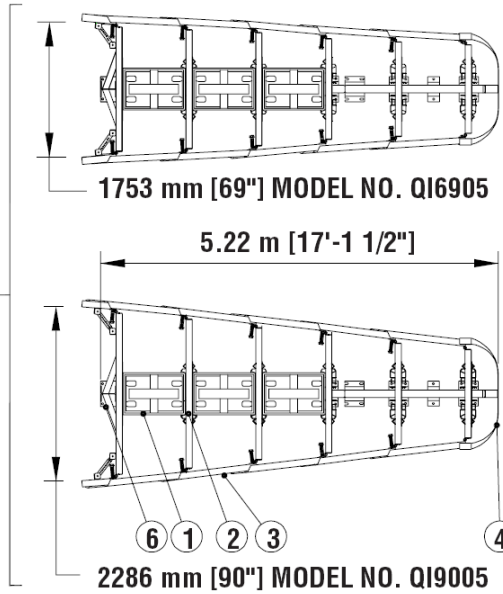
**Figure 10**  
**Quad-Beam™ with End**  
**Shoe Connection and Panel**

**Note:** Wheel Deflectors may be required for Quad-Beam™ End Shoe and safety shape barrier applications.

**QUADGUARD CEN  
FOR NARROW HAZARDS**



**QUADGUARD CEN  
FOR WIDE HAZARDS**



**KEY**

- 1) CARTRIDGE
- 2) DIAPHRAGM
- 3) QUAD-BEAM FENDER PANEL
- 4) NOSE ASSEMBLY
- 5) MONORAIL
- 6) BACKUP

**Figure 11  
Plan & Elevation**

608238

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	611832	PANEL FENDER, QG, G	1.00
2	003400	BOLT, RAIL, 5/8X2, G	2.00
3	003340	5/8" GR HEX NUT	3.00
4	617045	WASHER, MUSHROOM, FORGED, QG, G	1.00
5	116879	SCREW, FL, 5/8X8 1/2, GR, G, SOCKET	1.00
6	003300	WASHER, FLAT, 5/8 X 1 3/4, G	1.00
7	117458	SPRING, DIE, 3/4X6, GALV X1 1/2, OD	1.00

TWO FENDER PANEL ASSEMBLIES REQUIRED PER BAY

**CAUTION**  
20 LBS MAX  
FOR PROPER IMPACT  
PERFORMANCE

THE SPRING (ITEM 7) SHOULD BE  
INSERTED AT AN ANGLE OF APPROXIMATELY 10 DEGREES  
TO COMPLETE THE ASSEMBLY

USE A 3/8" ALLEN WRENCH  
DURING THE ASSEMBLY PROCESS

NOTES:  
1. UNDERLYING PANEL IS EITHER ANOTHER FENDER PANEL  
OR, IN THE CASE OF THE LAST FENDER PANEL, IT COULD  
BE A BACKUP OR AN UNDERLYING PANEL, EXTENSION PANEL OR  
TRANSITION PANEL.

DESIGNED BY D. Standridge	DATE 9/20/2006	REVISED BY N/A	ASSEMBLY NO. 608238
DRAWN BY K. Looney	DATE 9/28/2006	FILE 608238.dwg	
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS UNLESS DIMENSIONS ACCORDING TO SPECIFIED.			
DO NOT SCALE DRAWING			
FENDER PANEL ASSY, QG CEN		SHEET 1 of 1	

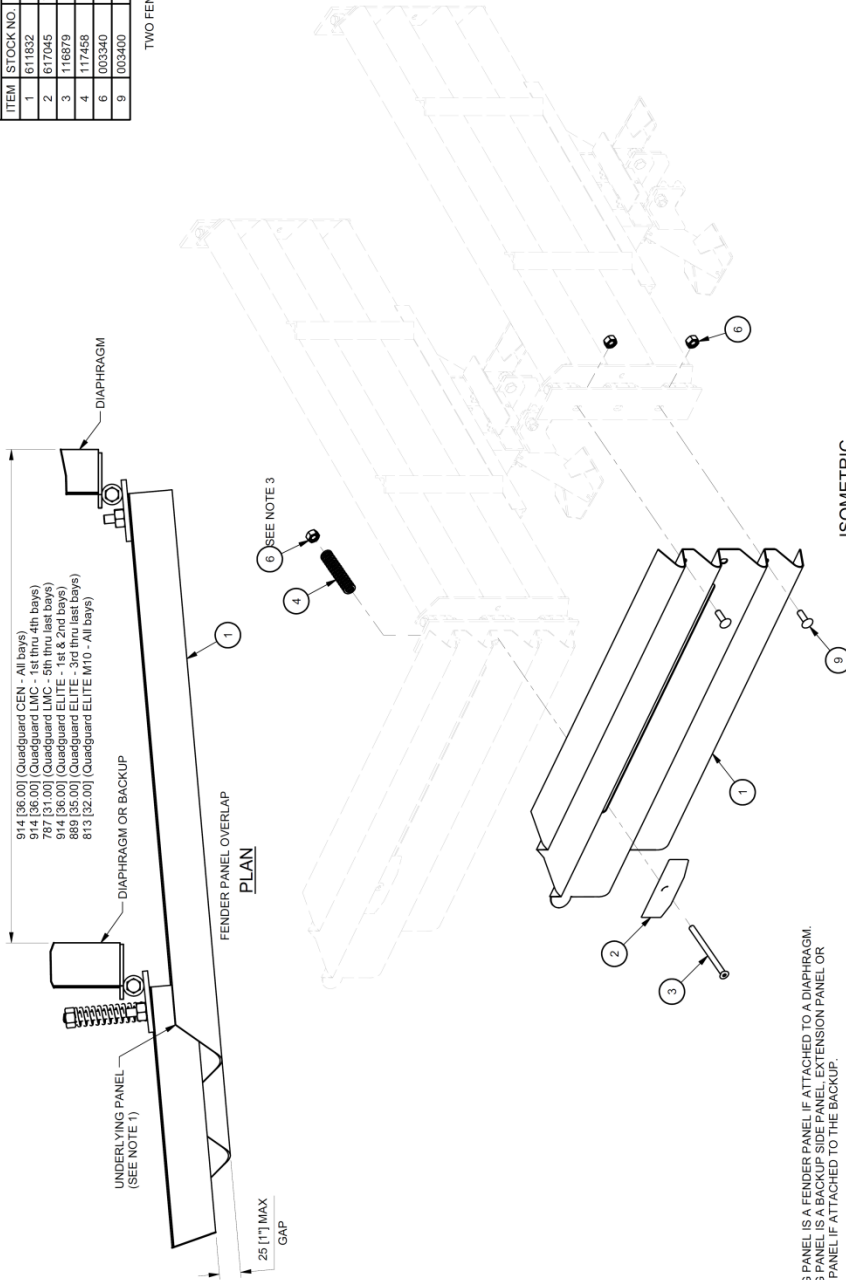
**Fender Panel Assembly, QG CEN**



608240

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	611832	PANEL FENDER.QG.G	1.00
2	617945	WASHER.MUSHROOM.QG.G	1.00
3	116879	SCREW.FL.5/8 X8 T2.GR.G.SOCKT	1.00
4	117458	SPRING.DIE.1 1/2.ODX3/4X6	1.00
6	003340	NUT.HX.5/8.G.RAIL	3.00
9	003400	BOLT.RAIL.5/8X2.G	2.00

TWO FENDER PANEL ASSEMBLIES REQUIRED PER BAY



NOTES:  
 1. UNDERLYING PANEL IS A FENDER PANEL IF ATTACHED TO A DIAPHRAGM.  
 UNDERLYING PANEL IS A BACKUP SIDE PANEL, EXTENSION PANEL OR  
 TRANSITION PANEL IF ATTACHED TO THE BACKUP.  
 2. TIGHTEN NUT UNTIL IT REACHES END OF THREADS.

DATE		4/20/1998	REVISION	N/A
BY		R. Cummins	DATE	608240.dwg
CHECKED BY		R. Blaski	DATE	4/29/1998
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS (MM). DIMENSIONS ACCORDING TO ASME Y14.5M-1994 UNLESS OTHERWISE SPECIFIED.				
DO NOT SCALE DRAWING				
ASSEMBLY NO. 608240				
FENDER PANEL ASSY.QG LMC/QGE 69/90				
PART NO. 608240				REV. 1
SHEET 1				OF 1

# QuadGuard CEN 69/90 Fender Panel Assembly

**Notes:**

**Notes:**



USA Office:  
**+1-214-589-8140**

UK Office:  
**+44 1473 221105**

Sweden Office:  
**+46 709 66 10 55**

Singapore Office:  
**+65 6276 3398**

Central/Latin America:  
**+1-916-644-9108**

**[WWW.VALTIR.COM](http://WWW.VALTIR.COM)**

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