



# INGAL

## CIVIL PRODUCTS

A **valmont**  COMPANY



# Product Catalogue

[www.ingalcivil.com.au](http://www.ingalcivil.com.au)



**EZY-GUARD**  
INGAL CIVIL PRODUCTS  
**SMART**



**EZY-GUARD 4**  
INGAL CIVIL PRODUCTS



**EZY-GUARD HC**  
INGAL CIVIL PRODUCTS



**Ingall MPR**  
Motorcyclist Protection Rail



**QuadGuard**  
Crash Cushions



**FlexFence**  
Wire Rope Safety Barrier



**ET2000**  
End Terminal



**TRACC**  
Crash Cushion



**ArmorZone**  
Temporary Barrier



**SafeStop**  
Truck Mounted Attenuator



**DeckGuard**  
Car Park Barrier



**ZeePark**  
Car Park Barrier



**Sentinel**  
Car Park Barrier



**Column Buffa**  
Car Park Barrier



**TruckShield**  
Car Park Barrier

Ingal Civil Products	About Us	4
	Containment Levels	5
	Our Locations & Contact List	6
	FAQ	7
Guardrail Safety Barriers	Ezy-Guard Smart	10
	Ezy-Guard 4	12
	Ezy-Guard HC	14
	FlexBeam W-Beam Guardrail (G4)	16
	ThrieBeam (G9)	18
	Accessories	20
Guardrail End Terminals	ET2000	26
	ET-SS	27
	MELT	28
	TREND 350	29
	Guardrail Transitions	30
	Trailing Terminal	32
Wire Rope Safety Barriers	FlexFence TL4 Wire Rope Safety Barrier	36
	FlexFence Driven Sleeve Post Foundation	38
	FlexFence Terminals	39
	Tension Unit	40
	Swaging Unit	40
Crash Cushions and Attenuators	QuadGuard Crash Cushions	44
	QuadGuard Elite	46
	QuadGuard CZ	46
	QuadGuard Parts	47
	TRACC Crash Attenuation Cushion	48
	Raptor Pole Protection	50
Motorcyclist Protection	Ingal MPR	54
	ET Protection Shield	56
	Stack Cushion	57
Workzone and Truck Mounted Attenuators	Safe-Stop SS90 HD TMA	61
	Safe-Stop SS180 HD TMA	62
	Safe-Stop SST Trailer TMA	63
	Resista Post	64
	Kona Post	65
Fencing	Boundary Fencing	68
	Pedestrian Barrier	69
Carpark Barriers	ZEE-Park	72
	ZEE-Park DeckGuard	73
	ZEE-Park Sentinel	74
	ZEE-Park TruckShield	75
	Spring Steel BUFFA	76
	Column Buffa	77
	Rigid Post	78
	Accessories	78
Installation Rigs	Heavy Duty Orteco Pile Driver	81
Temporary Barriers	ArmorZone	84
	ArmorCade	86
	BG800	88
Emergency Access Gate	Emergency Access Gate	90
Noisewall	Genus Noisewall	92





# Ingal Civil Products

*Australia's leading manufacturer  
of road safety barriers since 1933*

## ***Committed to Your Safety***

*Road Safety Barriers • Crash Cushions • Motorcyclist Barriers  
Delineation • Truck Mounted Attenuators • Carpark Barriers  
Industrial Barriers • Pedestrian Fencing • Boundary Fencing*

### **WHO WE ARE**

Established in 1933, Ingal Civil Products is Australia's leading manufacturer and distributor of safety barrier systems for roads and carpark applications throughout the Asia-Pacific region. As a division of Industrial Galvanizers Corporation Pty Ltd, we are part of a large network of companies specialising in engineered steel products and galvanizing services whilst employing over 8000 people in more than 20 countries.

At Ingal Civil Products we pride ourselves on having made a significant contribution to the safety of our roads. Our product range includes road safety barriers, carpark & industrial barriers, workzone & traffic control products, delineation and fencing products. We are the market leader for safety barrier systems and continue to service our customers through our ongoing program of research and development.

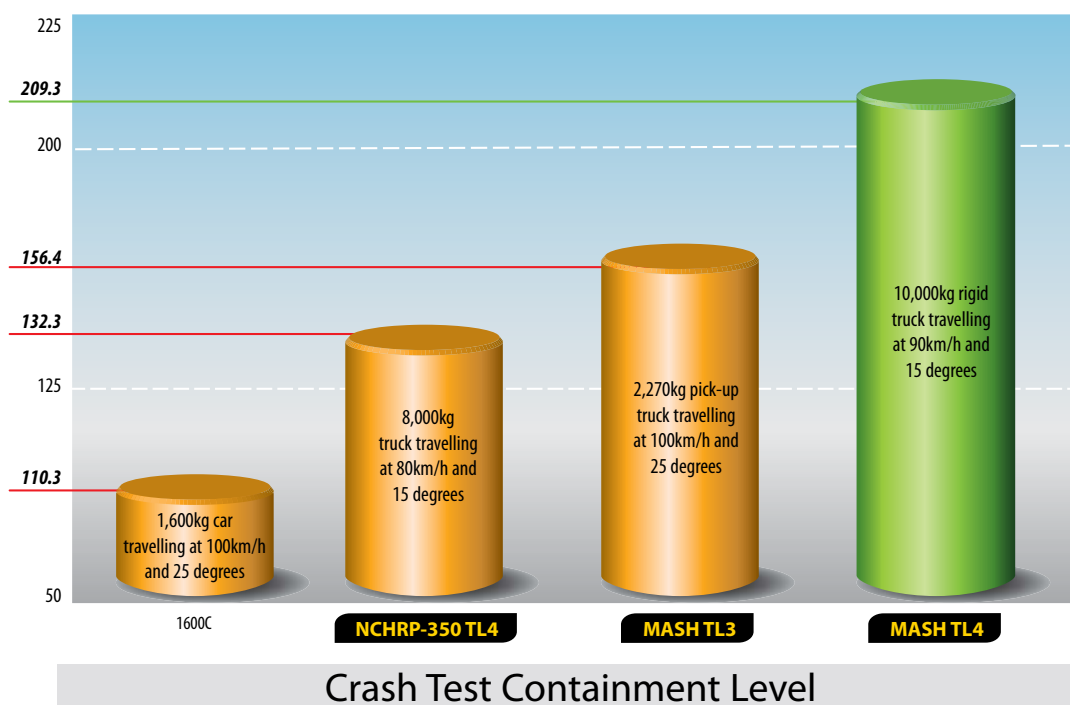
# Innovative Engineering Made in Australia





# Containment Levels

## Roadside Safety Barrier Testing Standards Explained



Note: The MASH TL4 impact severity is 209.3kJ

## WHAT IS A CONTAINMENT TEST LEVEL?

The containment level categorises the capacity of a highway safety device in terms of the vehicle type and mass, speed and impact angle. MASH (Manual for Assessing Safety Hardware) is an international standard that has been adopted in Australia as the basis for all crash testing of highway safety devices. MASH replaced the previous testing standard NCHRP-350 in 2009 and was introduced to better reflect the current vehicle fleet.

For each containment level, or test level, the road safety barrier system is tested using a minimum of two vehicle types. The logic behind this requirement is by testing with a light vehicle and a heavy vehicle within each test level, the capacity of the system will be verified with the large vehicle and the occupant risk parameters of the device will be verified with the small vehicle. In MASH, Test Levels 1, 2 and 3 cover different speed environments from 50km/h up to 100km/h, and test levels 4, 5 and 6 are for heavy vehicles ranging from 10,000kg up to 36,000kg.

### MASH TL3 COMPLIANT

Demonstrates the ability to contain and redirect the following:

- 1,100kg car at 100km/h and 25°
- 2,270kg pick-up (ute) at 100km/h and 25°

### MASH TL4 COMPLIANT

Demonstrates the ability to contain and redirect the following:

- 1,100kg car at 100km/h and 25°
- 2,270kg pick-up (ute) at 100km/h and 25°
- 10,000kg truck at 90km/h and 15°

### NCHRP-350 TL3 COMPLIANT

Demonstrates the ability to contain and redirect the following:

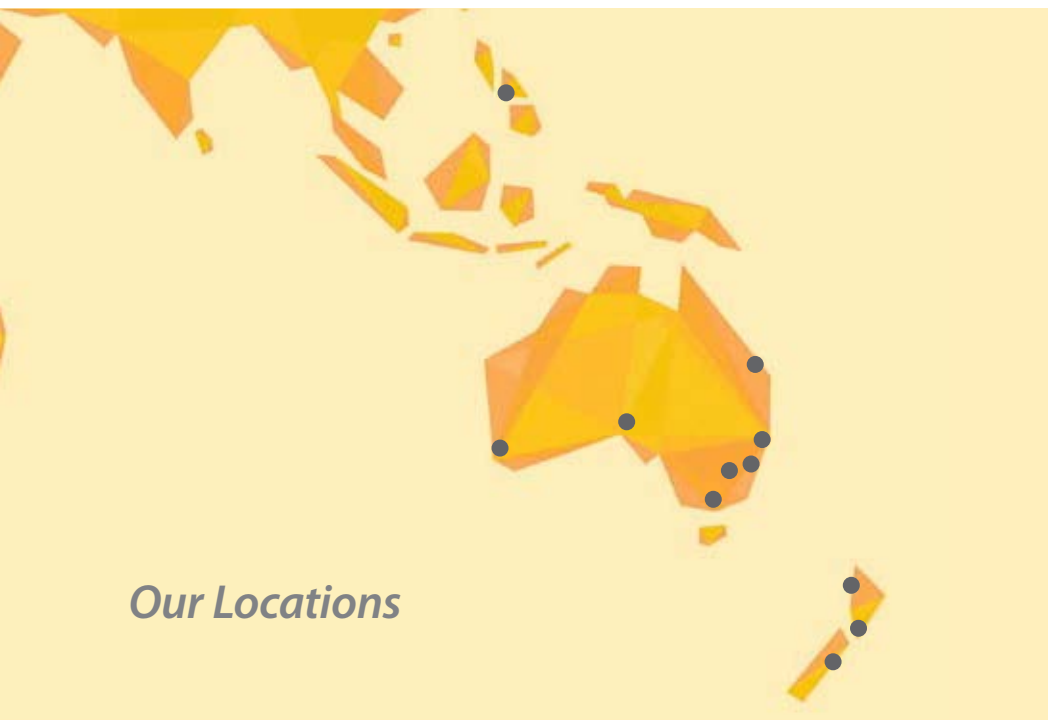
- 820kg car at 100km/h and 20°
- 2,000kg pickup (ute) at 100km/h and 25°

### NCHRP-350 TL4 COMPLIANT

Demonstrates the ability to contain and redirect the following:

- 820kg car at 100km/h and 20°
- 2,000kg pickup (ute) at 100km/h and 25°
- 8,000kg truck at 80km/h and 15°





*Our Locations*

**Locations  
Australia Wide**

**3 Locations in  
New Zealand**

**Philippines  
Malaysia**

# Australia's Leading Solution Provider for Roadside Safety Barriers

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**Australia**

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Perth	(08) 9358 9139
Adelaide	(08) 8169 2300
Newcastle	0400 235 883
Wagga	0427 779 588

**New Zealand**

Auckland	021 877 653
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	021 504 870
	021 2464 997
Christchurch	021 480 753
	021 1983 311
Wellington	021 504 870



# FAQs

Visit our website for more information [www.ingalcivil.com.au](http://www.ingalcivil.com.au)

## WHAT IS AS/NZS 3845.1:2015

The Australian standard relating to road barrier systems. Under AS/NZS 3845.1:2015, MASH has been nominated as the crash testing standard for safety barrier systems.

## WHAT IS A CLEAR ZONE?

The horizontal width of space available for the safe use of an errant vehicle which consists of the verge area and is measured from the nearside edge of the left hand traffic lane. In the case of a divided road it is also measured from the offside edge of the right-hand traffic lane to the edge of pavement for opposing traffic.

## WHAT IS THE WORKING WIDTH?

The maximum width that is required to prevent an impacting vehicle from colliding with an object behind a road safety barrier system. This includes both the dynamic deflection and the extra width due to the roll of the impacting vehicle.

## WHAT IS A TERMINAL?

The specially designed end pieces of a road safety barrier system. The leading terminal is on the end of the road safety barrier system that faces oncoming traffic and the trailing terminal is on the other end. Terminals are subdivided into classifications of gating and non-gating terminals.

## WHAT IS A GATING TERMINAL?

Terminals that are designed to break away, pivot or hinge, and that allow a vehicle to pass through when impacted at an angle to the end, or at a point upstream of the beginning length of the associated road safety barrier system.

## WHAT IS A NON-GATING TERMINAL?

Terminals that are designed to redirect a vehicle and absorb part of the energy of an impacting vehicle at any point along the terminal without allowing it to pass behind the road safety barrier system.

## WHAT IS THE POINT OF NEED?

The point that a terminal will redirect an errant vehicle rather than allowing it to pass through. This is measured from the beginning of the terminal.

## WHAT DOES MASH MEAN?

MASH (Manual for Assessing Safety Hardware) is an international standard that has been adopted in Australia for crash testing of safety devices. The 2009 MASH replaces the

previous testing standard: the NCHRP-350. ASBAP have nominated MASH as the basis for all barrier testing.

## MASH TL3 COMPLIANT

The TL3 is a level of impact testing under the MASH Standard. Compliance with this test demonstrates the system's ability to contain and redirect the following:

- 1,100kg car at 100km/h and 25°
- 2,270kg pick-up (ute) at 100km/h and 25°

## MASH TL4 COMPLIANT

The TL4 is a level of impact testing under the MASH Standard. Compliance with this test demonstrates the system's ability to contain and redirect the following:

- 1,100kg car at 100km/h and 25°
- 2,270kg pick-up (ute) at 100km/h and 25°
- 10,000kg truck at 90km/h and 15°

## WHAT DOES NCHRP-350 MEAN?

NCHRP-350 (National Cooperative Highway Research Program Report 350) is an international standard that was previously adopted in Australia for crash testing of safety devices. This has now been superseded by the MASH standard. NCHRP-350 accepted hardware is still approved for new installation and replacement. All new product innovations must be tested under the updated MASH standard.

## NCHRP-350 TL2 COMPLIANT

Compliance with this test demonstrates the system's ability to contain and redirect the following:

- 820kg car at 70km/h and 20°
- 2,000kg pickup (ute) at 70km/h and 25°

## NCHRP-350 TL3 COMPLIANT

Compliance with this test demonstrates the system's ability to contain and redirect the following:

- 820kg car at 100km/h and 20°
- 2,000kg pickup (ute) at 100km/h and 25°

## NCHRP-350 TL4 COMPLIANT

Compliance with this test demonstrates the system's ability to contain and redirect the following:

- 820kg car at 100km/h and 20°
- 2,000kg pickup (ute) at 100km/h and 25°
- 8,000kg truck at 80km/h and 15°





# GUARDRAIL SAFETY BARRIERS



**Ezy-Guard Smart**



**Ezy-Guard 4**



**Ezy-Guard HC**



**FlexBeam W-Beam Guardrail (G4)**



**ThrieBeam (G9)**



**Accessories**

# Guardrail Safety Barriers



## QUICK REFERENCE GUIDE

PART No. (4m Kit)	PRODUCT	TYPE	CRASH RATING	CRASH TEST DEFLECTION	SYSTEM MASS (KG/M)
10005582	Ezy-Guard® Smart	W-Beam	MASH TL3	1.65m	18.6
10008202	Ezy-Guard® 4	W-Beam	MASH TL3 & NCHRP350 TL4	1.65m	18.6
10008484	Ezy-Guard® HC	Thrie Beam	MASH TL4	1.77m	28.8
10002135	FlexBeam W-Beam (G4)	W-Beam	NCHRP350 TL3*	1m*	27
10003727	ThrieBeam® (G9)	Thrie Beam	NCHRP350 TL3*	0.6m*	37.75

\*Deemed to comply - not crash tested.





# EZY-GUARD<sup>®</sup>

INGAL CIVIL PRODUCTS

## SMART

### *MASH TL3 Compliant Roadside Safety Barrier*

**MASH TL3 COMPLIANT**

<b>RAPID INSTALLATION</b>	Few components facilitate rapid installation.
<b>SAFER</b>	Fully compliant to MASH TL3.
<b>COST SAVINGS</b>	Savings on freight and faster to install.
<b>NARROW WIDTH</b>	A system width of just 200mm conserves valuable formation width.
<b>FEWER PARTS</b>	No blocking pieces or rail stiffener plates.







## INTRODUCTION

Ezy-Guard Smart by Ingal is the next generation steel guardrail barrier providing superior design, rapid installation, driver confidence, and more metres of barrier for your dollar. Ingal Civil is a trusted and respected brand in the industry. Ezy-Guard Smart provides the perfect guard rail solution.

Using significantly less steel than conventional steel guardrail barriers; Ezy-Guard Smart is designed to provide stable vehicle containment and re-direction and minimises occupant risk.

The Z-post profile shields post edges from vulnerable road users and provides sectional strength when driving through difficult ground conditions.

An Ezy-Carriage bracket is used to secure the W-beam rails to the Z-posts and eliminates the requirement for blocking pieces and rail stiffening plates.

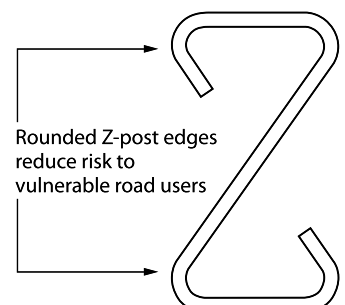
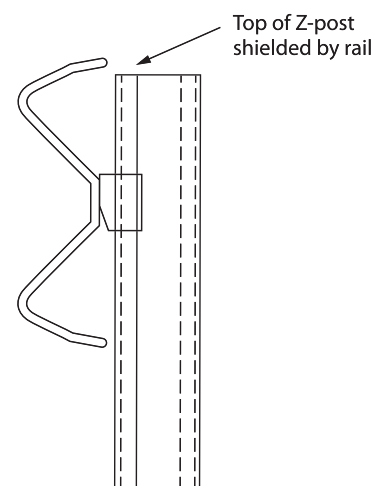
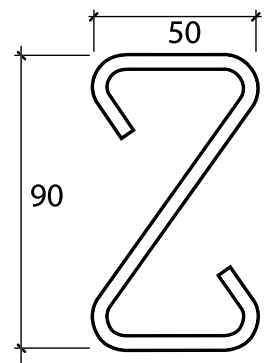
- Consideration for Motorcyclists.
- No snag points.
- Quick installation.

## SPECIFICATIONS

Ezy-Guard Smart z-post length:	1,600mm
Ezy-Guard Smart z-post mass:	12.3kg
Ezy-Guard Smart system mass:	18.6kg per meter
Rail height above ground:	730mm
Z-post height above ground:	720mm
Post spacing:	2,000mm
Ezy-Guard smart system width:	200mm
Crash rating	MASH TL3
Crash test deflection:	1.65m
Surface treatment:	Galvanised to AS/NZS 4680

## PART NUMBERS

4m Kit	10005582	Posts	10008201
Finish Post Kit	10005694	Carriage	10007824
Rail	10001017	Delineator (Red)	10005588



# EZY-GUARD<sup>4</sup>

INGAL CIVIL PRODUCTS

### *MASH TL3 and NCHRP-350 TL4 Compliant Roadside Safety Barrier*

**MASH TL3** COMPLIANT

**NCHRP-350 TL4** COMPLIANT

<b>RAPID INSTALLATION</b>	Fewer components facilitate rapid installation.
<b>SAFER</b>	Fully compliant to MASH TL3 & NCHRP-350 TL4.
<b>COST SAVINGS</b>	Savings on freight costs and faster to install.
<b>FEWER PARTS</b>	No blocking pieces or rail stiffener plates.
<b>NARROW WIDTH</b>	A system width of just 200mm conserves valuable formation width.





## INTRODUCTION

Introducing the Ezy-Guard 4. This next generation steel guardrail barrier provides one of the best guardrail solutions available today. It provides MASH TL3 and NCHRP-350 TL4 containment. The superior design offers rapid installation, improved motorist safety and more metres of barrier for your dollar. If you need a highway barrier which is built to last, is cost effective and can be deployed quickly, this guard rail is the ideal choice.

Ezy-Guard 4 rails and Z-posts are manufactured from hot-rolled steel in accordance with AS/NZS 1594. The guard rail product is hot dip galvanised in accordance with AS/NZS 4680 leaving no surface untreated.

The Z-post profile shields vulnerable road users from post edges and provides sectional strength when driving through difficult ground conditions.

An Ezy-Carriage is used to secure the W-beam rails to the Z-posts eliminating the requirement for blocking pieces and rail stiffening plates. This unique connection provides a soft ride-down for the occupants and smooth vehicle containment and redirection. Road Safety barriers today are far advanced from their predecessor; this next generation safety guardrail safety barrier will stand the test of time and deliver superb safety standards that are currently unrivalled.

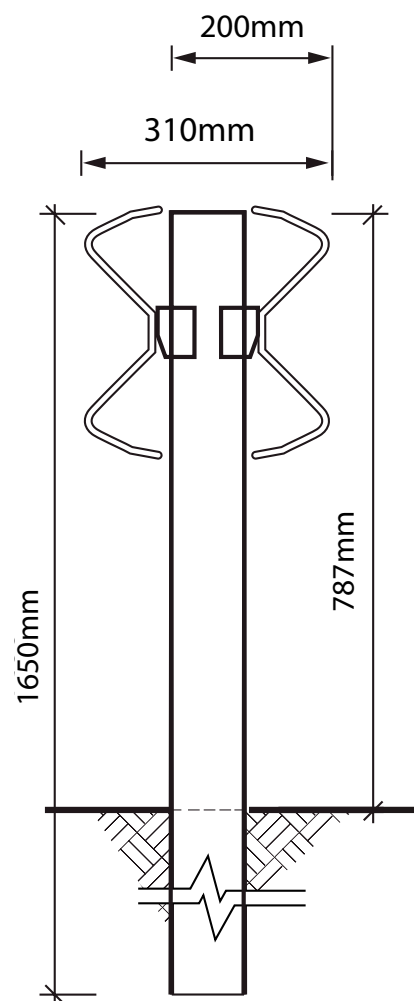
- Fewer parts.
- Safer.
- Rapid installation.
- High performance.
- Local design and manufacture.
- Consideration for motorcyclists.
- Narrow width.

## SPECIFICATIONS

Ezy-Guard 4 z-post length:	1,650mm
Ezy-Guard 4 z-post mass:	12.5kg
Ezy-Guard 4 system mass:	18.6kg per meter
Rail height above ground:	787mm
Z-post height above ground:	777mm
Post spacing:	2m
Ezy-Guard 4 system width:	200mm
Crash rating:	MASH TL3 & NCHRP-350 TL4
MASH TL3 crash test deflection:	1.65m
Surface treatment:	Galvanised to AS/NZS 4680

## PART NUMBERS

4m Kit	10008202	Posts	10008201
Finish Post Kit	10006246	Carriage	10007824
Rail	10001017	Delineator (Red)	10005588





# EZY-GUARD<sup>HC</sup>

INGAL CIVIL PRODUCTS

### *High Containment Roadside Safety Barrier*

**MASH TL3 COMPLIANT**

**MASH TL4 COMPLIANT**

**HIGH PERFORMANCE**

Demonstrated containment and re-direction of a 10,000kg truck travelling at 90km/h.

**SAFER**

Fully compliant to MASH TL4.

**FEWER PARTS**

No blocking pieces or rail stiffener plates.

**RAPID INSTALLATION**

Fewer components facilitate rapid installation.

**COST SAVINGS**

Savings on freight costs and faster to install.

**NARROW WIDTH**

A system width of just 245mm conserves valuable formation.





## INTRODUCTION

Introducing Ezy-Guard High Containment. A member of the Ezy-Guard family, and the next generation steel guardrail barrier. Providing superior motorist safety with a tested containment of MASH Test Level 4.

Ezy-Guard HC is crash tested to the latest performance standards, distinguishing this particular guardrail from all existing public domain guardrail barrier systems in Australia.

The Z-post profile shields vulnerable road users from post edges and provides sectional strength when driving through difficult conditions.

An Ezy-HC-Carriage is used to secure the ThrieBeam rails to the post, eliminating the requirement for blocking/offset pieces and rail stiffening plates. This unique connection provides a soft ride-down for the occupants and a smooth vehicle containment and redirection.

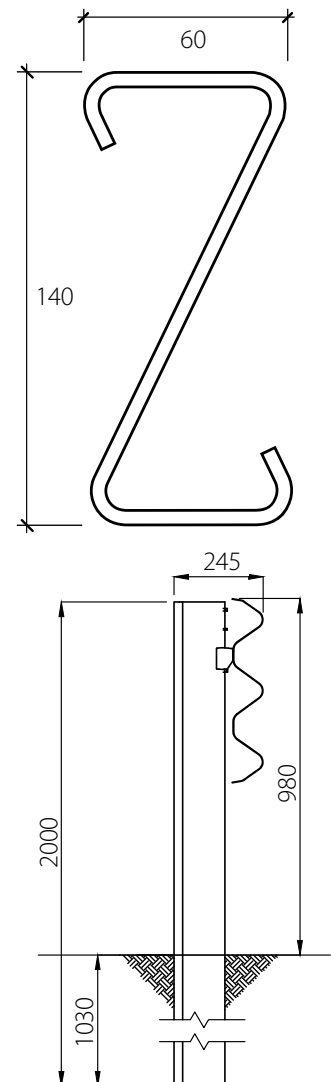
- Fully compliant to MASH TL4.
- High containment.
- Locally designed and manufactured.
- Narrow footprint saving road width.
- Consideration for motorcyclists with rounded post corners.
- Easy to transport and simple to install.

## SPECIFICATIONS

Ezy-Guard HC Z-post length:	2,000mm
Ezy-Guard HC Z-post mass:	19.5kg
Ezy-Guard HC system mass:	28.8kg per metre
Rail height above ground:	980 mm
Z-post height above ground:	970mm
Post spacing:	2,000mm
Ezy-Guard HC system width:	245mm
Crash rating:	MASH TL4
MASH TL4 crash test deflection:	1.77m
NCHRP TL4 crash test deflection:	1.0m
Surface treatment:	Galvanised to AS/NZS 4680

## PART NUMBERS

4m Kit	10008484	HC Posts (2m)	10005540
Finish Post Kit	10008485	HC Carriage	10004116
ThrieBeam Rail	10000837	Retrofit Carriage	10008486



# FlexBeam W-Beam Guardrail (G4)

## *Roadside Safety Barrier*

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### **HIGH VISIBILITY**

Ensures driver confidence regard less of weather conditions.

---

### **PERFECT FOR GUTTERS AND RAISED MEDIANS**

Often regarded as hazards, the post and block design of this road barrier increases safety and lessens the risk of rollover or vaulting.

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### **DEEMED TO COMPLY TO TL3**

G4 is deemed to comply to NCHRP-350 Test Level 3.

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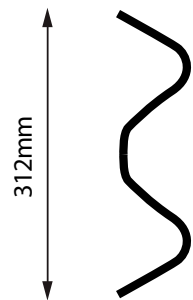


## INTRODUCTION

Roadside barriers have been developed over the years to safely redirect vehicles that leave the roadway. Ingal are market leaders in guardrails and provide roadside barriers that are built to last. Many different rigid, semi-rigid and flexible designs for roadside barriers have now evolved. The most common system consists of a steel W-beam rail supported on steel posts with end treatments and transitions of various designs using similar materials.

The Ingal Civil FlexBeam guardrail's uniform high resistance to impacts is assured by its continuous flexible beam action. This prevents dangerous pocketing and minimises the ride down deceleration that is experienced by the vehicle and its occupants.

The high visibility of the FlexBeam guardrail creates driver confidence. This is an intangible but exceedingly important factor. At night or in foggy conditions, the excellent visibility of the Ingal Civil FlexBeam guardrail highlights the limit of safe travel and reduces dangerous centreline crowding.

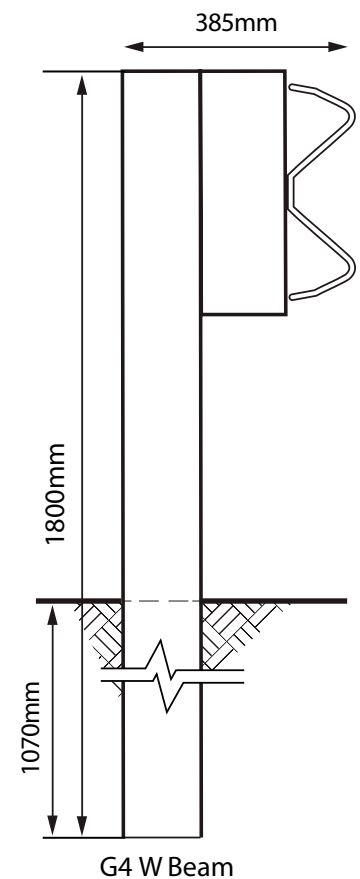


## SPECIFICATIONS

G4 post length:	1,800mm
G4 post mass:	24kg
G4 system mass:	27kg per metre
Post height above ground:	730mm
Post spacing:	2.0m
G4 system width:	385mm
Crash rating:	Deemed to comply to NCHRP-350 TL3*
Crash test deflection:	1m*
Surface treatment:	Galvanised to AS/NZS 4680

## PART NUMBERS

4m Kit	10002135	Posts	10001078
Finish Post Kit	10003739	Rail	10001017



\*Deemed to comply - not crash tested.



# ThrieBeam<sup>®</sup> (G9)

## *Thrie Beam Safety Barrier*

### **COMPLIANCE STANDARD**

The G9 ThrieBeam is deemed to comply to NCHRP-350 TL3.





## INTRODUCTION

The G9 ThrieBeam® road safety barrier has a greater profile which is better adept to protect motorists from any danger or hazard that may be close to the verge of the road. It is positioned higher than a standard W-beam would traditionally be placed and is a much stiffer barrier, specifically where retaining large vehicles are concerned.

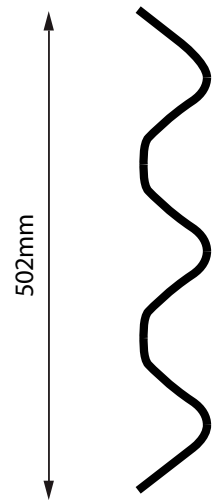
Roadside barriers have been developed over the years to safely redirect vehicles that leave the roadway. Many different rigid, semi-rigid and flexible designs for roadside barriers have now evolved. The ThrieBeam system consists of a semi-rigid steel beam rail, similar to the W-beam but with an extra corrugation. Supported on steel posts with end treatments and transitions of various designs using similar materials.

An important attribute of the ThrieBeam guardrail is its stiffness especially for larger vehicles. Due to the greater height of the rail face, ThrieBeam guardrail provides reduced deflection and improved resistance to vehicle vaulting or under running. The reduced dynamic deflection and maintenance demand makes the ThrieBeam guardrail ideally suited for major facilities carrying a high volume of high-speed traffic. The ThrieBeam guardrail should also be used in transition from the FlexBeam guardrail for more rigid barriers. This significantly reduces the deflection of the barrier system at the transition to the rigid barrier.

Another important note to observe is regarding transitions from W-beam to the ThrieBeam guard rail. General applications of this can be seen on bridge approaches as they provide an effective changeover from a rigid to a semi-rigid barrier. The robustness of the ThrieBeam road safety barrier reduces deflections which in turn lessens the chance of vehicle pocketing.

For a more modern solution and system, please refer to Ezy-Guard HC.

- Manufactured to State Road Authority Specifications.
- Hot dipped galvanised.

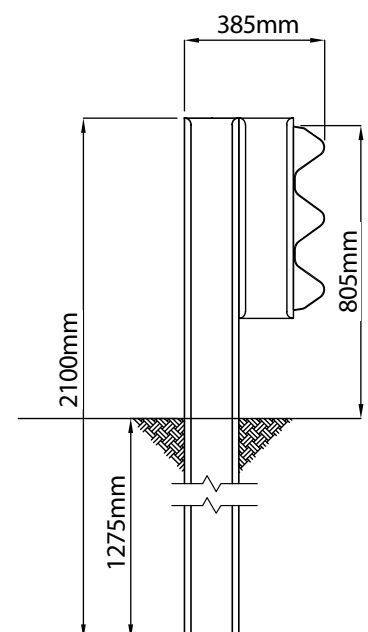


## SPECIFICATIONS

G9 post length:	2,100mm
G9 post mass:	28kg
G9 system mass:	37.75kg per meter
Rail height above ground:	805mm
Post height above ground:	825mm
Post spacing:	2,000mm
G9 system width:	385mm
Crash rating:	Deemed to comply to NCHRP-350 TL3*
Surface treatment:	Galvanised to AS/NZS 4680

## PART NUMBERS

4m Kit	10003727	Posts	10001073
Finish Post Kit	10007366	Rail	10000837





# Ezy-Lift<sup>®</sup> Carriage

*Future-proofing your guardrail installation*



## INTRODUCTION

The Ezy-Lift<sup>®</sup> Carriage is an innovative height adjustment carriage to ensure a compliant barrier height after the road has been over-layed. For existing Ezy-Guard installations where the road surface has been over-layed or resurfaced, resulting in the barrier height being outside of the installation tolerance, the Ezy-Lift carriage is available to bring the W-Beam back to the appropriate height.

The carriage gives the option to lift the W-Beam by +50, +100, +150 and +180mm.

There is no need to reinstall new road safety barriers after resurfacing, meaning a cost effective solution with minimal road closure time. The Ezy-Lift Carriage can be easily retrofitted in the field and uses the same reliable and proven technology of the Ezy-Guard Smart road safety barrier, maintaining your MASH TL-3 containment level.

- Fully tested & compliant system.
- Compatible with MASH TL3 Ezy-Guard Smart and TL4 Ezy-Guard 4.
- Easy-to-install.
- Option to lift the W-Beam by +50, +100, +150 and +180mm.
- Retrofit to existing Ezy-Guard after resurfacing.
- No need to reinstall new road safety barriers.
- Consistent high performance.

## PART NUMBER

Ezy-Lift Carriage	10008486
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# Guardrail Delineators

## *Improving guardrail visibility*



Ingal Guardrail Delineators are UV resistant and will not fade or crack. In the event of an impact they incur zero damage to the vehicle. A clever "Click-in" design requires no bolt connection for attachment to Ingal blocking piece

- Delineator tape meets the requirements of class 1A material as defined AS/NZS 1906.1.
- Compliant to state road authority specifications.
- Manufactured from durable PET.
- Will not shatter or crack.
- Vandal resistant.
- Available for attachment to steel blocking pieces or Ingal blocking pieces.

### PART NUMBERS

Red/White PET Delineator Steel Block Attachment	C1275
Red/White PET Delineator Ingal Block Attachment	C1277

# Ingal Post Cap

## *Making guardrail safer*



The use of guardrail barriers in areas of pedestrian or cyclist activity may result in contact with the back of the guardrail system causing injury and damage. Traditional steel backing rails may result in vehicle spearing when the safety barrier is impacted.

The Ingal Post Cap is a rapid and safe solution that will not compromise the performance of the safety barrier. The cap can be attached to new or existing FlexBeam guardrail installations utilising Z, I and C posts and shields the sharp edges of the post and block.

- Available for attachment to Z, I and C posts and blocks.
- Can be retro-fitted to existing installations.
- 100% Recyclable.
- UV stable.
- Suitable for use with guardrail systems using steel or plastic blocks.

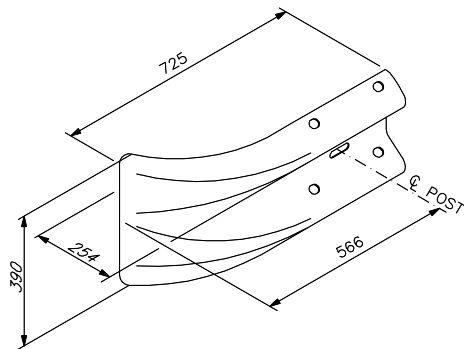
### PART NUMBER

C Post Cap	10001068
Ezy-Guard Post Cap	10008228
I-Beam Post Cap	10008998



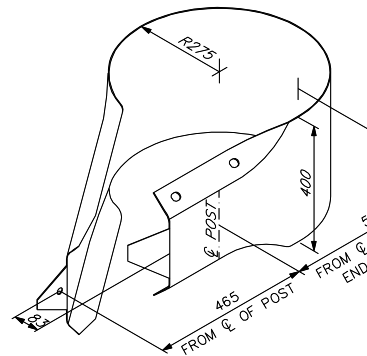
# Other Accessories

*Suitable for off-road applications*



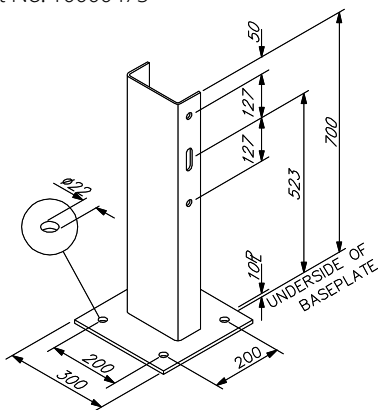
Fishtail

Part No. 10000473



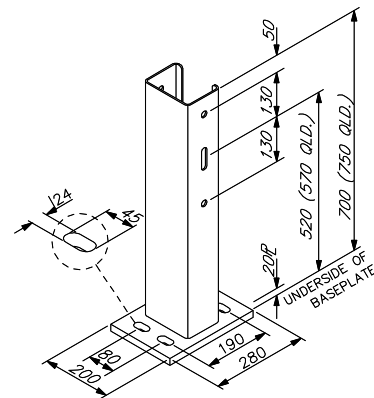
Bullnose

Part No. C1060G



U-Post on Base Plate

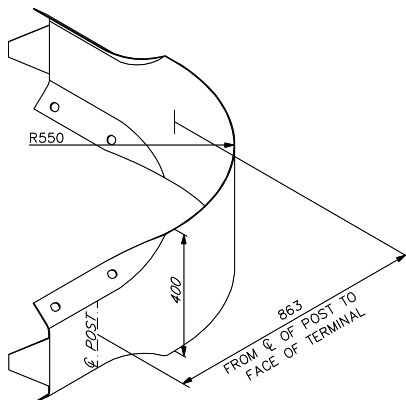
Part No. C1135G (Vic)



C-Post on Base Plate

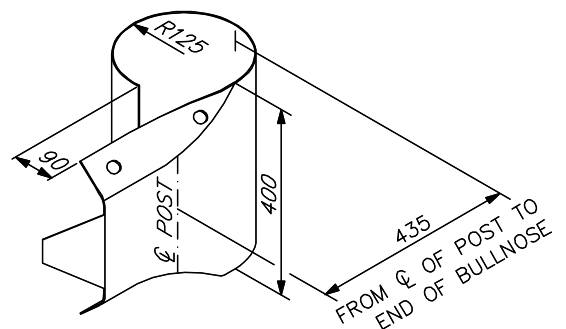
Part No. C1432G

Part No. C1409G (Qld)



Right Angle Terminal

Part No. 10000501 – Convex  
10000504 – Concave



Short Bullnose

Part No. 10000493







## GUARDRAIL END TERMINALS



ET2000



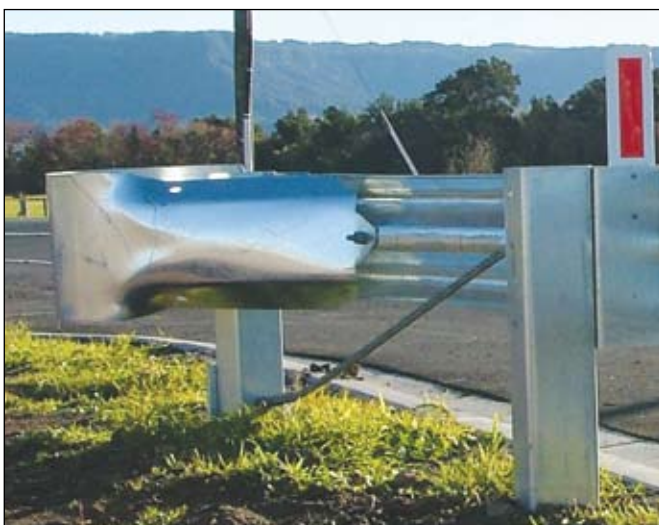
ET-SS



MELT



TREND 350



Trailing Terminal



Guardrail Transitions



# Guardrail End Terminals



## QUICK REFERENCE GUIDE

PART No.	PRODUCT	TERMINAL ALIGNMENT	END IMPACTS	END IMPACT ABSORPTION METHOD	LENGTH	POINT OF NEED	CRASH RATING*
10006450	ET2000 TL3	Straight	Yes	Rail Extrusion	15.24m	3.81m	TL3
APPLICATIONS: W-Beam End Treatments subject to end-on impacts on roads with a posted speed greater than 70km/h. Ideal in locations with limited clear zones.							
10006448	ET2000 TL2	Straight	Yes	Rail Extrusion	7.6m	3.81m	TL2
APPLICATIONS: End-on impacts on roads with a posted speed up to 70km/h.							
10007996	ET-SS	Straight	Yes	Anchor Rail Tension	15.48m	5.0m	MASH TL3
APPLICATIONS: W-Beam End Treatments subject to end-on impacts.							
10006444	MELT	Curved	Yes	Nil	8.0m	4.0m	TL3
APPLICATIONS: W-Beam End Treatments subject to end-on impacts.							
10007656	TREND 350	Straight	Yes	Rail Deformation	11.40m	3.81m	TL3
APPLICATIONS: W-Beam End Treatments subject to end-on impacts.							
10006446	Trailing Terminal	Curved	No	N/A	4.0m	N/A	TL3
APPLICATIONS: Departure terminations not subject to end-on impacts.							
10000869	Guardrail Transitions	Straight	N/A	N/A	6.0m**	0m	TL3
APPLICATIONS: W-Beam End Treatments to rigid structures.							

\*All crash ratings are NCHRP-350 unless otherwise noted. \*\*Varies with jurisdiction. Before design or installation, please check the current acceptance conditions of the local road authority.





# ET2000

*Tangential End Treatment*

**NCHRP-350 TL3 COMPLIANT**



## INTRODUCTION

The Ingal Civil ET2000 Plus guardrail extruder terminal has been designed specifically to absorb the kinetic energy of an impacting vehicle at a controlled rate, providing a soft ride-down for vehicle occupants.

Unlike traditional flared guardrail terminals, the ET2000 Plus from Ingal is a tangential end treatment that is installed on a straight alignment. The use of an ET2000 Plus provides an end treatment solution for applications where there is insufficient space for a flared end terminal or when it is cost prohibitive to place an embankment for a flared terminal.

The ET2000 Plus is available to purchase in two sizes. The compact 7.62m TL2 terminal is an economical solution where the posted speed is less than or equal to 70km/h. The standard 15.24m TL3 terminal is acceptable for all posted speeds greater than 70km/h.

## SPECIFICATIONS

Test Level	NCHRP TL2	NCHRP TL3
Overall length	7.62m	15.24m
Total Mass	330kg	540kg
Point of Need	Post 3 (3,810mm)	
Surface Treatment	Galvanised to AS/ NZS 4680	

## PART NUMBERS

ET2000 TL3	10006450
ET2000 TL2	10006448

- Compliant to NCHRP 350.
- Available in TL2 or TL3 configurations.
- Can be installed parallel or with a tapered offset to the roadway.
- Absorbs vehicle impact energy.
- Available packaged as individual units.



# ET-SS

*Front Anchored Technology*

**MASH TL3 COMPLIANT**



## INTRODUCTION

The ET-SS is an all-steel tangent end terminal for use with W-beam guardrail systems. Using a proprietary head that flattens and extrudes W-beam guardrail upon end-on impacts within the MASH testing criteria, the ET-SS dissipates energy while guiding flattened rail through the mouth at the bottom of the unit. The system is MASH Test Level 3 compliant as a redirective, gating end terminal. It is also available in Test Level 2 configuration.

Assembly Advantages:

- Splices at mid-span of the posts allow for easy assembly.
- Extruded rail is flattened and maintains connection to unit for quicker repair and clean up.
- Compatible with various W-beam guardrail systems.

## SPECIFICATIONS

Optional System Offset	Up to 610mm over 15.2m (1:25)
Head Width	178mm
System Length	15.48m TL-3, 7.86m TL-2
Length of Need	Starts at Post #3

## PART NUMBERS

ET-SS Kit	10007996
-----------	----------

- Tall narrow extruder head provides less obstruction for ongoing maintenance operations such as mowing and snow removal.
- 100% galvanized steel head and post design reduces weather or UV related issues.
- The ET-SS head has the potential to be reused after impact. The ultimate decision of reusability rests with the specifying transportation authority.
- Unique anchorage design allows guardrail run to remain anchored after end-on impacts, when impacted according to MASH guidelines.





# MELT

## *Modified Eccentric Loader Terminal (MELT)*



## INTRODUCTION

The Modified Eccentric Loader Terminal (MELT) from Ingal Civil is designed to provide a soft gating impact to prevent the end rail from spearing an impacting vehicle. The Ingal MELT terminal is installed on a parabolic offset with rails supported on shelf angles to minimise the potential for vehicle penetration.

The Ingal Civil MELT also provides the flexural tensile strength needed to deliver for redirection performance of the determined length-of-need section.

The MELT terminal is now available with the Ingal Block and Steel Yielding Terminal Posts in order to reduce product inventory and facilitate fast deployment and installation.

The MELT is deemed to comply to NCHRP 350 TL3 and because of this its approval has been rescinded in NSW, Victoria and NZ. Please check the approval status of the MELT prior to installation.

## SPECIFICATIONS

Test Level	NCHRP TL3
Overall length	8,000mm
Point of Need	Post 3 (4,000mm)
Surface Treatment	Galvanised to AS/NZS 4680 after fabrication

## PART NUMBERS

MELT Kit	10006444
----------	----------

Before design or installation, please check the current acceptance conditions of the local road authority.





# TREND 350

*Tangential End Treatment*

**NCHRP-350 TL3 COMPLIANT**



## INTRODUCTION

The TREND 350 End Terminal is a cost-effective, energy absorbing end treatment used to shield the ends of W-beam barriers. The TREND 350 End Terminal has a nominal length of 11.43m and is suitable for guardrail with W-beam heights from 705mm to 790mm. The TREND 350 End Terminal has been approved as meeting the requirements of NCHRP-350, Test Level 3 (TL-3) as a re-directive, gating end treatment.

The TREND 350 impact head is supported by a Hinged Break-Away post in the first post position, a Steel Yielding Terminal Post in the second post position, and I-Beam guardrail line posts in the remaining post positions. During head-on impacts, the longitudinal forces separate the HBA® Post, releasing the Upper HBA® Post from the Lower HBA® post. The energy of an impacting vehicle is absorbed by friction between the panels and deformation of the rail sections as they slide rearward over the shaper fins on the adjoining panels.

## SPECIFICATIONS

Head Width	300mm
System Length	11.5m
Length of Need	Starts at Post #3

## PART NUMBERS

TREND 350 Kit	10007656
---------------	----------

- Tall narrow impact head provides less obstruction for ongoing maintenance operations such as mowing and maintenance.
- 100% galvanized steel head and post design reduces weather or UV related issues.
- Tested and approved to NCHRP-350 Test Level 3 as a gating, re-directive energy absorbing terminal.
- Compatible with various guardrail systems with heights ranging from 705mm to 790mm.
- No soil plate, meaning quick and easy to install Post 1.



# Guardrail Transitions

## *Semi-rigid to rigid barrier transition*



## INTRODUCTION

The most common types of bridges are reinforced concrete walls or metal rails on concrete parapets. If improperly treated, the exposed ends of these railings can pose a rigid fixed object to errant vehicles. In most instances an approach guardrail is used to shield the exposed end and to prevent vehicles from travelling in behind the railing.

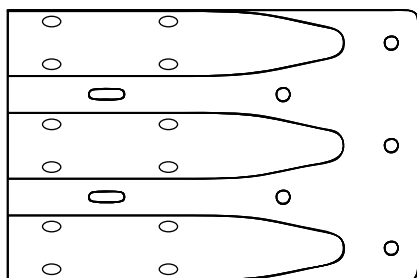
Guardrail is typically more flexible than the bridge rails to which they are attached. A transition section is therefore required wherever there is a change in the deflection characteristics between the approach guardrail and bridge rail or between different barrier systems.

### SPECIFICATIONS

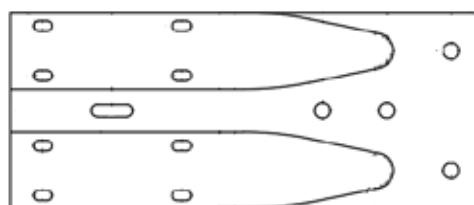
Test Level	NCHRP TL3
Overall length	8m
Surface Treatment	AS/NZS 4680 Galvanised

### PART NUMBERS

ThrieBeam Connector	10001174
W-Beam Connector	10000489



ThrieBeam  
Connector



W-Beam  
Connector

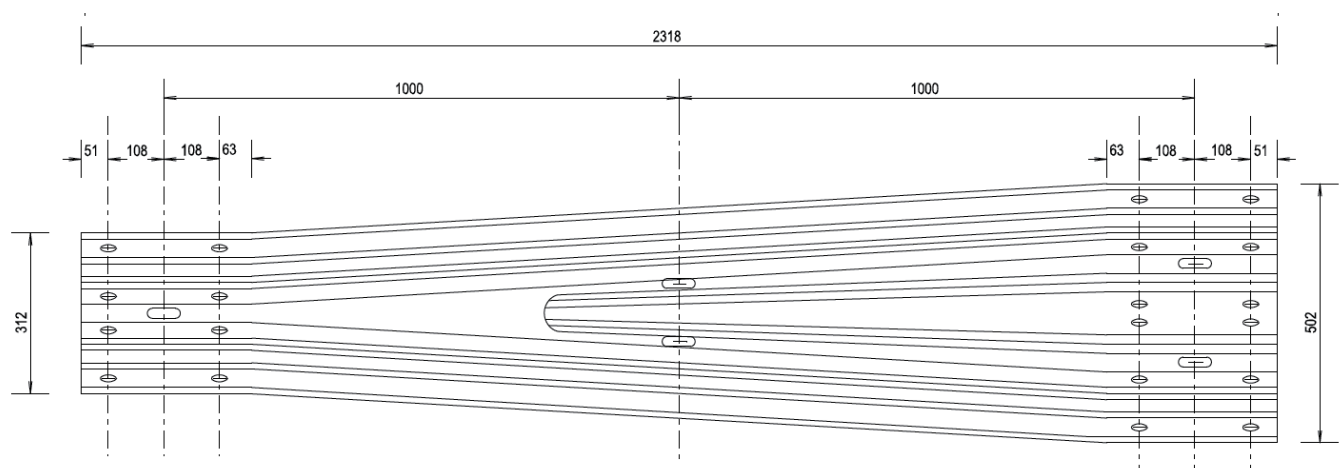
# W-Beam to ThrieBeam Transition Panels

**SPECIFICATIONS**

Effective length	2m
Surface Treatment	AS/NZS 4680 Galvanised

**PART NUMBERS**

Symmetrical Transition	10000869
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Symmetrical Transition W-Beam to ThrieBeam

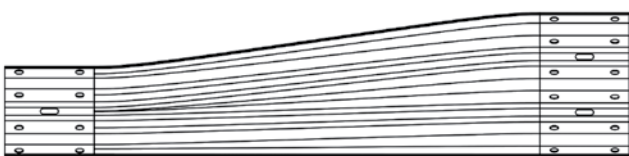
# Asymmetrical Transition

**SPECIFICATIONS**

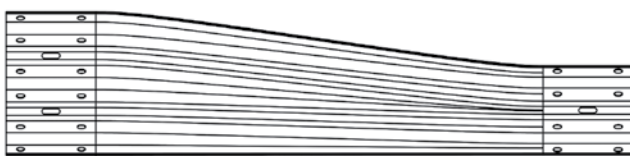
Effective length	1.905m
Surface Treatment	AS/NZS 4680 Galvanised

**PART NUMBERS**

Asymmetrical Transition LHS	10001809
Asymmetrical Transition RHS	10001811



Asymmetrical Transition from  
W-Beam to ThrieBeam - LHS



Asymmetrical Transition from  
ThrieBeam to W-Beam - RHS





# Trailing Terminal

*Anchorage provision for W-Beam crash barriers*



## INTRODUCTION

In some cases, such as when installed on divided roadways, downstream ends of roadside barriers may not be subject to head-on impacts. For such cases, the terminal end needs to provide the necessary longitudinal support to redirect vehicles that impact the barrier near the end of the system.

Trailing Terminals are intended to provide anchorage for the barrier. They are not crash-worthy terminals when struck head-on since they are not designed to break away.

## SPECIFICATIONS

Overall length	4m
Surface Treatment	Galvanised to AS/NZS 4680 after fabrication

## PART NUMBERS

Trailing Terminal Kit	10006446
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## WIRE ROPE SAFETY BARRIERS



FlexFence TL4 WRSB



FlexFence Terminals



Accessories

# Wire Rope Safety Barriers

  
**INGAL**  
CIVIL PRODUCTS  
A **valmont**  COMPANY





# Wire Rope Safety Barriers



## QUICK REFERENCE GUIDE

PART No.	PRODUCT	STANDARD POST SPACING	POST TYPE	CRASH RATING	CRASH TEST DEFLECTION (TL3)	POST HOLE VOLUME M <sup>3</sup>	ANCHOR HOLE VOLUME M <sup>3</sup>
10007374	FlexFence®	2.5m / 3m	Concrete/ Driven	TL3/TL4	1.4m	0.043	2.64



# FlexFence® TL4 WRSB

*Peace of mind with the most popular WRSB in Australia*

**NCHRP-350 TL3 COMPLIANT**

**NCHRP-350 TL4 COMPLIANT**

## **EASY TO INSTALL**

The straight alignment of the ropes allows for easy installation and tensioning.

## **SAFER**

Soft ride-down due to high level of flexibility.

## **COST SAVINGS**

Low concrete consumption.

## **EASY TO REPAIR**

In most instances the posts simply need to be inserted back into the sleeve and the wire re-tensioned.







## INTRODUCTION

The superior design and clean lines of the FlexFence Wire Rope Safety Barrier (WRSB) have seen it become the road safety industry's most preferred wire rope safety barrier. FlexFence has gained popularity as a median barrier for the prevention of cross-median accidents. Cross-median accidents are typically violent collisions with a high probability of multiple serious injuries and death. Thus, the design trend is towards providing positive vehicle containment in wider median applications for which wire rope safety barriers have not historically been warranted.

## SPECIFICATIONS

Steel wire rope mass:	1.21kg/m
Steel wire rope ultimate tensile strength:	165.5kn
Post & bracket material:	To AS/NZS1594
Swage fittings material:	Stainless Steel Grade 304
Steel wire rope finish:	Galvanised coating
Sigma post finish:	Galvanised to AS/NZS 4680
Anchor bracket finish:	Galvanised to AS/NZS 4680
Rope diameter:	19.0mm
Sigma post height:	1,230mm
Top cable height:	720mm
2nd from top cable height	640mm
2nd from bottom cable height	560mm (TL4 only)
Bottom cable height:	480mm
Standard post spacing:	2.5m or 3.0m

- Compliant to NCHRP 350.
- Available in TL3 or TL4 configuration.
- Superior 4 rope system.
- Machine swaged, stainless steel fittings for dependable in-service performance.
- Variable post spacing to suit deflection requirements.
- Posts can be powder-coated.
- Available with TL3 Terminal – non releasing terminal, allowing the system to retain cable tension after an impact.

## PART NUMBERS

TL3 Above Ground Kits	10007371	Anchor Post Repair Kits	10007087
TL3 Below Ground Kits	10007372	Post only (White)	10007750
TL4 Above Ground Kit	10007373	Post only (Black)	10007748
TL4 Below Ground Kit	10007374	Post only (Green)	10007749





# FlexFence® TL4

## Driven Sleeve Post Foundation

*Optional for the FlexFence TL4 WRSB*

**NCHRP-350 TL4 COMPLIANT**



### INTRODUCTION

**Driven Sleeve Post Foundation Option:** The FlexFence Driven Sleeve is a recent variant added to the system. The Driven Sleeve is an alternative to the typical concrete post footing where a steel sleeve foundation is driven into the ground.

- Benefits:
- No post concrete required
  - Rapid installation
  - Minimal spoil removal
  - Hot Dip Galvanised to AS/NZS 4680

### PART NUMBERS

FlexFence TL4 Driven Sleeve Post Foundation Kit 10007593

- NCHRP-350 Test Level 3 and TL4 compliant.
- EN1317 Class H1 and L2 compliant (13,000kg bus travelling at 70km/h and 20 degrees).
- Posts are hot dip galvanised and can be powder-coated to a variety of colours.
- Machine swaged fittings for added durability and safety.
- Available with TL3 Terminal - Non release.
- 2.5m or 3m post spacing.
- Parallel rope system - easy maintenance and installation.

# FlexFence® Terminals

*FlexFence WRSB End Treatment*

**NCHRP-350 TL3 COMPLIANT**



## TL3 END TERMINAL

The FlexFence TL3 Terminal is designed to provide a soft gating impact preventing vehicles from launching or snagging. The terminal comprises shortened posts at 1m spacings reducing the angle at which the cables are terminated, thus minimising the potential for vehicle rollover.

## STANDARD END TERMINAL

The FlexFence Standard Terminal is designed to provide the necessary anchoring support to the cable barriers so they can redirect errant vehicles that impact the wire rope barrier within the length-of-need section.

The Standard Terminal is a release terminal and therefore can only be used in locations where it cannot be impacted, such as behind a semi-rigid or rigid barrier. For design applications which require a non-release terminal, refer to the FlexFence TL3 Terminal.

The standard end terminal is available with a variety of anchor block designs. These include rectangular, trapezoidal and pier shapes. The selection of a suitable design will depend upon soil type, road formation width and available installation equipment.

## PART NUMBERS

Terminal Post Kit	10007203
Anchor Repair Kit	10007087
Post only	10007750

### TL3 End Terminal Features:

- Safest end terminal on the market - Non release capability retains ropes for secondary impacts.
- Can be retrofitted to existing installations.
- Uses standard FlexFence components minimising product inventory.
- Length of terminal – 12m.
- Point of need – 12.6m from anchor point.
- Post spacings – 1m centres.
- Posts are hot dip galvanised and can be powder-coated.
- Machine swaged fittings for added durability and safety.





## Tension Unit

*For the installation and maintenance of FlexFence WRSB*



The Ingal Tension Unit is a portable device used for the installation and maintenance of FlexFence WRSB Wire Rope Safety Barrier. Comprising of a hydraulic hand pump and tension assembly, the unit can be used to increase or decrease the tension in the cable barrier system. During installation, the unit is used to tension the barrier system according to the ambient temperature conditions. FlexFence is installed using pre-stretched wire rope cable, meaning that the barrier tension is retained when impacted under normal conditions.

During repair, it may be necessary to release the tension in the barrier system.

### PART NUMBER

Hand Pump and Tension Rig	10001674
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## Swaging Unit

*Used to attach end fittings to the wire rope cable*



The Ingal Swaging Unit is a portable device used to attach end fittings to the wire rope cable during the assembly of FlexFence WRSB Wire Rope Safety Barrier. The use of swaged fittings provides a secure attachment to the cable barrier which is critical in the performance of the system.

The cutting and swaging of cables on site ensures the barrier is installed according to site conditions.

### PART NUMBER

Swaging Unit	10001688
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## CRASH CUSHIONS AND ATTENUATORS



QuadGuard Crash Cushions



TRACC® Crash Attenuation Cushion



Raptor™ Crash Cushion

# Crash Cushions and Attenuators



# Crash Cushions and Attenuators



## QUICK REFERENCE GUIDE

PART No.	PRODUCT	APPLICATION
10100318	QuadGuard Crash Cushion	Non-gating fully re-directive crash cushion.
10100202	QuadGuard Elite	Highly reusable, self-restoring, non-gating re-directive crash cushion.
10100103	QuadGuard CZ	Relocatable/Temporary work-zone QuadGuard (entire system can be moved as a single unit).
10001863	TRACC® Crash Cushion	Pre-assembled for quick and safe installation.
10200018	Raptor™	Designed to reduce the impact severity of vehicles with a pole or tree.





# QuadGuard Crash Cushions

*Non-gating fully re-directive crash cushion*

**NCHRP-350 TL3 COMPLIANT**

<b>REPAIRABLE</b>	High efficiency, 80% reusability after most design impacts.
<b>COMPACT</b>	Modular design (one to 12 bays accommodate speeds from 40 km/h to 120 km/h).
<b>SAFE</b>	Crash cushion is fully compliant to NCHRP350, AS/NZS 3845.
<b>WIDE</b>	Able to shield hazards up to 3200mm wide.





## INTRODUCTION

QuadGuard crash cushions are available to shield hazards from 610mm to 3200mm wide, and for speeds from 40km/h to 120km/h. Each QuadGuard System consists of crushable, energy-absorbing cartridges surrounded by a framework of exclusive steel Quad-Beam™ panels.

The QuadGuard System has successfully passed the complete NCHRP 350 Test Level 2 & 3 test matrix. Higher speed units are available. During head-on design impacts, the QuadGuard Systems telescope rearward and progressively crush the cartridges to absorb the energy of impact.

When impacted from the side, the QuadGuard System safely redirects the errant vehicle back toward its original path without gating. Fully-tested transition panels are available to all common guard rail profiles, concrete structures and temporary steel barriers.

## CONFIGURATION OPTIONS

### Standard QuadGuard

Speed	Bays	Length	Hazard Width - Max	Height	Part No.
60km/h	2	3.08m	915mm	817mm	10100300
70km/h	3	4.00m	2285mm	817mm	10100303
80km/h	4	4.91m	2285mm	817mm	10100308
90km/h	5	5.83m	2285mm	817mm	10100313
100km/h	6	6.74m	3200mm	817mm	10100318
110km/h	8	8.54m	2285mm	817mm	10100323
115km/h	9	9.49m	2285mm	817mm	10100328

# QuadGuard Crash Cushion

**Non-gating fully re-directive crash cushion**



- Compact, modular design (1 to 12 bays accommodates speeds from 40 to 120 km/h).
- Able to shield hazards up to 3200mm wide.
- Quad-Beam™ panels provide 30% higher beam strength than ThrieBeam.
- High efficiency 80% reusability after most design impacts.

### PART NUMBER (100k Unit)

QuadGuard	10100318
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## QuadGuard Elite

*Highly reuseable, self-restoring, non-gating re-directive crash cushion*



- Durable, reusable HDPE cylinders provide low lifecycle cost.
- QuadGuard Elite will self-restore after many, but not all, design impacts.
- Shields hazards up to 2285mm wide.
- Compact design accommodates impacts at speeds up to 115km/h.
- Quad-Beam™ panels provide 30% higher beam strength than ThrieBeam.
- Even the Flex-Belt nose is reusable after most design impacts.

### PART NUMBER (100k Unit)

QuadGuard Elite	10100202
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## QuadGuard CZ

*Relocatable/temporary work-zone QuadGuard*



### Entire system can be moved as a single unit.

- Relocatable crash cushion offerings the latest technology for shielding hazards 610mm to 915mm wide.
- Monorail base eliminates the need for anchoring chains and tension cable – easier installation.
- High efficiency – 80% reusability after most design impacts.
- Fully-tested transition panels.
- Lifting brackets.

### PART NUMBER (100k Unit)

QuadGuard CZ	10100103
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# QuadGuard Parts

*Rapid and easy installation on-site for continued road safety*



Cartridge Assy, Type 1

Type 1	10102903
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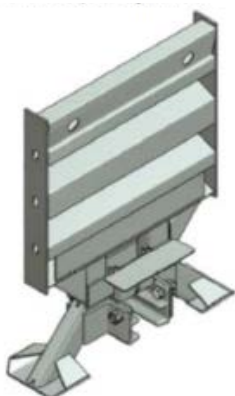
Cartridge Assy, Type 2

Type 2	10102904
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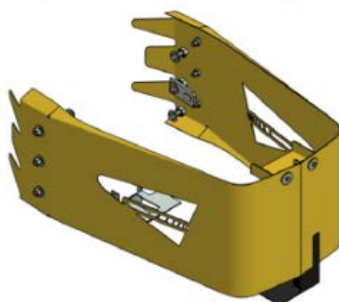
Panel, Fender (QG)

Panel, Fender (QG)	10102002
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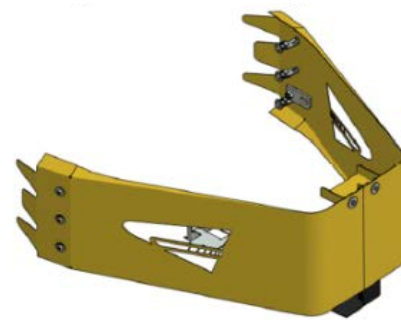
Narrow Diaphragm Kit

610mm (24")	10101100
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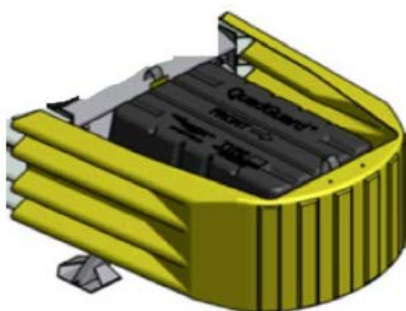
Nose Narrow Assembly

Steel	10101200
Plastic	10101202



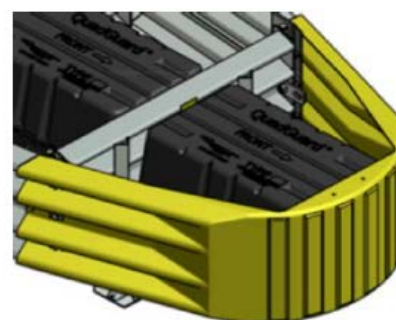
Nose Wide Assembly

Steel	10101203
Plastic	10101201



Plastic Narrow Nose Assembly

Plastic Narrow Nose Kit	10101202
Nose with adjustable support bracket	10102201
Nose narrow bolt pack	10101201



Plastic Wide Nose Assembly

Plastic Wide Nose Kit	10101201
Nose with adjustable support bracket	10102201
Bracket, nose attachment, wide	10102409
Nose wide bolt pack	10101609





# TRACC<sup>®</sup> Crash Attenuation Cushion

*Non-gating fully re-directive crash cushion*

**NCHRP-350 TL3 COMPLIANT**

**RAPID  
INSTALLATION**

Pre-assembled for quick and safe installation.

**REPAIRABLE**

Up to 98% of the TRACC is reusable and repairable after design impacts.

**DURABLE**

Hot dip galvanised.

**SAFE**

Fully compliant to NCHRP 350 TL3.





## INTRODUCTION

Crash cushions, also called impact attenuators, prevent vehicles from impacting a barrier or a fixed object hazard. By either gradually decelerating the vehicle or by redirecting the vehicle away from the hazard. They are ideally suited for terminating concrete barriers or for use where longitudinal barriers would not be effective to shield objects. The TRACC family of crash cushions are fully redirective, non-gating, bi-directional energy absorbing. They are designed to protect motorists from impacting the end of concrete barriers, toll plazas, bridge piers and other hazards in both temporary and permanent work zone locations.

## TRACC®

### Crash Attenuation Barrier

- Non-gating, redirecting terminal.
- TL3 system length – 6.5m.
- TL2 system length – 4.3m (ShortTRACC).
- Narrow width - shields structures up to 610mm wide.
- Connects to concrete, W-beam or ThrieBeam.
- Hot-dip galvanised.
- No plastic, rubber or air filled components providing a long, durable service life

## FasTRACC®

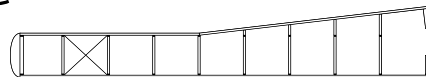
### High-Speed Crash Attenuation Barrier – 110 km/h

- Non-gating, redirecting terminal
- System length – 9.5m
- Narrow width - shields structures up to 610mm wide
- Connects to concrete, W-beam or thrie-beam
- Hot-dip galvanised
- No plastic, rubber or air filled components providing a long, durable service life

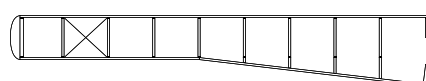
## WideTRACC®

### Crash Attenuation Barrier

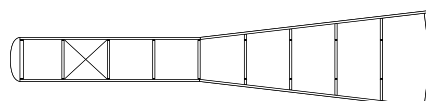
- The WideTRACC can be flared down its right side only, it's left side only or down both sides simultaneously.
- The WideTRACC system is available in widths of up to 1470mm.
- Hazards wider than 1470mm can be protected with the attachment of wing extensions.



Left Side Flared - WideTRACC - L



Right Side Flared - WideTRACC - R



Both Sides Flared - WideTRACC - B

### Configuration Options

System	Test Level	Width	Length	Part No.
ShorTRACC	2	610mm	4.3m	100001862
TRACC	3	610mm	6.5m	10001863
FasTRACC	3+*	610mm	7.9m	10001864
WideTRACC - B	3	1470mm**	6.5m**	10001865
WideTRACC - L	3	1040mm***	6.5m***	10001865*
WideTRACC - R	3	1040mm***	6.5m***	10001865*





# Raptor<sup>TM</sup> Crash Cushions

*Exceptional energy-absorbing capability*

**NCHRP-350** COMPLIANT

<b>SPECIALISED</b>	Reduces the impact severity of errant vehicles with a utility pole or tree.
<b>SAFE</b>	Designed, tested and accepted to NCHRP 350 TL-1 criteria.
<b>RELIABLE</b>	Made from stabilised PE (UV8).
<b>REPAIRABLE</b>	Installation and repairs can be done under 30 minutes.



2000kg Pick-up truck impacting head-on with a pole using the Raptor™ at 50kph



## INTRODUCTION

The Raptor™ is an energy absorbing device designed to reduce the severity of vehicle impacts with utility poles or trees. Its unique technology offers a compact low-cost solution in places where typical crash cushions would not physically fit.

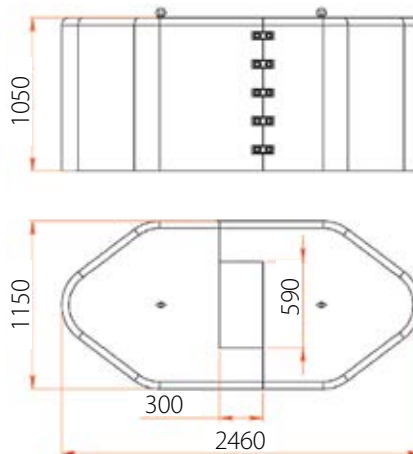
A utility pole (or a tree) offers no energy absorption during a head on impact; consequently the occupants and vehicle will absorb all the impact energy being released from a vehicle decelerating to a halt in a fraction of a second. Approximately 30% of the run-off-road fatalities involve severe impacts with hard objects such as poles and trees. The cost of removing these hazards can be prohibitive as it may involve re-layout of the road itself; as a consequence these hazards are often left unattended until a serious accident occurs.

The impact energy is absorbed by internal plastic cartridges. RAPTOR™ is also capable of deflecting a vehicle in side-on angled impacts. The RAPTOR™ system has been tested to the NCHRP 350 guidelines for a gating, non re-directive crash cushion and has been judged to have satisfied the required evaluation criteria for Test Level 1 (TL-1).

- Highly reduces the severity of vehicle impacts against poles and trees.
- Meets NCHRP 350 test criteria (TL-1).
- Usable in places typically impossible to protect.
- Compact size and easy installation (under 30 minutes).
- Two sizes available to fit multiple width hazards.
- Zero maintenance, UV Stabilised, expected lifespan 25 years.
- Smooth surfaces and geometry, suitable for vulnerable road users.
- After a collision occurs, the non-impacted side can still be re-used.
- No foundations are required.
- Fully recyclable very low cost protection.
- Available in black or yellow.

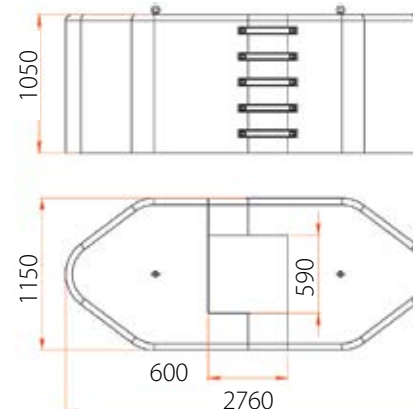
## Raptor™ 300

Overall Length	2460mm
Height	1050mm
Width	1150mm
Void Size	300mm x 590mm
Shells & Cartridges	Stabilised PE (UV8)
Connector & Fixings	Galvanised Steel
Weight (per shell)	110kg
Kit	10200018



## Raptor™ 600

Overall Length	2760mm
Height	1050mm
Width	1150mm
Void Size	600mm x 590mm
Shells & Cartridges	Stabilised PE (UV8)
Connector & Fixings	Galvanised Steel
Weight (per shell)	110kg
Weight (per packer)	12kg
Kit	10200020







Ingall MPR



Protection Shield



Post Cap



Stack Cushion

# Motorcyclist Protection



**INGAL**  
CIVIL PRODUCTS  
A **valmont** COMPANY



# Motorcyclist Protection



## QUICK REFERENCE GUIDE

PART No.	PRODUCT	APPLICATION
10007333	Ingal MPR	Protective enhancement installed on existing guardrail barriers.
10008088	Protection Shield	Added protection to motorcyclists from hazards in impacting end-terminals.
10008228	Post Cap	Post cap to mitigate injury risk to vulnerable road users.
10001555	Stack Cushion	Protects motorcyclists from impacting posts on a wire rope safety barrier.





# Ingal MPR

*Offering the highest level of protection to our motorcyclists*

**MASH & EN1317 COMPLIANT**

## SMART DESIGN

More space between the system and the ground (60mm), allowing water drainage, snow clearance, cleaning of hard shoulders, etc.

## SAFER

Compliant to AS/NZS 3845:2015 and crash tested to EN1317 and MASH TL3.

## COST SAVINGS

No modification required to traditional guardrail barriers to accommodate Ingal MPR.

## EASY TO INSTALL

Quick installation on new or retrofit projects.





## INTRODUCTION

The Ingall Motorcyclist Protection Rail (Ingall MPR) is a protective enhancement installed on existing four-wheel vehicle restraint systems to reduce the chances of serious injury to motorcyclists and pillion passengers in run-off road accidents.

Class A impact severity recorded from dummy testing, this offers the motorcyclist the highest level of protection from head injury.

Traditional highway safety barriers installed on the road carriageways to restrain vehicles from impacting roadside hazards, these typically take the form of the W-Beam rail supported by a series of posts. These posts introduce a significant hazard to an errant motorcyclist in a run-off road accident. The Ingall MPR consists of an under-riding rail which is mounted on a spring bracket. Upon impacting this rail, the spring bracket deflects back absorbing some of the impact energy from the motorcyclist, whilst the rail contains and re-directs the motorcyclist away from the rigid posts and hazards.

- The specially designed anchoring system fully facilitates the positioning of the guard rail at the correct height, ensuring a uniform distance from the ground throughout the run and compensating for uneven terrain and height differences in the existing barriers.
- The mounting bracket also allows the motorcyclist rail to be raised to match alterations in the level of the road surface.
- The motorcyclist rail can be assembled and raised without the need to modify the traditional vehicle barrier system.
- More space between the system and the ground (60mm), allowing water drainage, snow clearance, cleaning of hard shoulders, etc.
- The mounting bracket is symmetric, and is therefore the same for both the right and left side of the carriageway.
- Small number of components and ease of installation make the system very cost-effective.

## SPECIFICATIONS

Ingall MPR Rail Length:	4m or 5m NLL
4m MPR Rail Mass:	12.3kg
Ingall MPR System Mass:	4.65kg per metre
Rail Height Above Ground:	60mm
Post Spacing:	2m or 2.5m
Ingall MPR Crash Test Performance:	Level 1
Manufactured from:	Hot-rolled steel flat products in accordance with AS/NZS 1594
Finish	Galvanised to AS/NZS 4680

## PART NUMBERS

MPR Kit	10007333
Rail	10006773
Mounting Bracket	10006772





# Protection Shield

*Superior terminal protection for motorcyclists*



<b>HIGH SAFETY</b>	Improved visibility for increased motorcyclist awareness.
<b>COST SAVINGS</b>	Small number of components and ease of installation make the system cost-effective.
<b>SMART DESIGN</b>	Design includes post cap for Post 1 removing potential snag point.

## INTRODUCTION

The Motorcyclist Protection Shields are a specially engineered design from Ingal that provides increased safety for motorcyclists when impacting on the extruder head.

A modified face shield offers greater visibility and softer impact to vulnerable motorcyclists. The innovative design also includes a post cap that fixes to Post 1, removing this cumbersome snag point.

The Motorcyclist Protection Shields are manufactured to be resistant to UV, moisture, oil and extreme temperatures. The small number of components result in a quick installation on new or retrofit projects, making the system very cost-effective. Ingal MPS is also cyclist and pedestrian friendly.



## PART NUMBERS

Assembly Kit	10008088
Side Cover	10007891
Cover Post Cap	10007892

- New cover for added protection to motorcyclists from hazards in impacting extruder head.
- Modified face shield offering greater visibility and softer impact.
- Design includes post cap for Post 1, removing snag point.
- Quick installation on new or retrofit projects.
- Resistant to UV, moisture, oil and extreme temperature variations.
- No effect on vehicle containment or impact performance.
- Small number of components and ease of installation make the system very cost-effective.
- Pedestrian and cyclist friendly.

# Stack Cushion

*Protects motorcyclists from impacting posts*



**IMPROVING SAFETY** Designed for attachment to wire rope safety barrier.

**SAFER** No aggressive edges or corners.

**EASY TO INSTALL** No dismantling of the existing wire rope system required for Ingal Stack Cushion attachment.

## INTRODUCTION

Ingal Stack Cushion protects motorcyclists from impacting posts and is designed for attachment to wire rope safety barrier.

No dismantling of the existing wire rope system required for Ingal Stack Cushion attachment. There are no aggressive edges or corners which further enhances safety.

- Ingal Stack Cushion is designed for attachment to wire rope safety barrier.
- Ingal Stack Cushion protects motorcyclists from impacting posts.
- No dismantling of the existing wire rope system required for Ingal Stack Cushion attachment.
- No aggressive edges or corners.

## SPECIFICATIONS

Maximum post size:	100 x 50mm
Ingal Stack Cushion length:	490mm
Ingal Stack Cushion diameter:	200mm

## PART NUMBERS

Ingal Stack Cushion Kit	10001555
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Safe-Stop SS90™ HD TMA



Safe-Stop SS180™ TMA



Safe-Stop SST™ Trailer TMA



Resista Post & Kona Post®

# Workzone and TMA



# Workzone and TMA



## QUICK REFERENCE GUIDE

PART No.	PRODUCT	APPLICATION
10100401	Safe-Stop SS90™ HD TMA	Compact design that is ideal for fitment to short wheelbase trucks where high manoeuvrability is paramount.
10100400	Safe-Stop SS180™ TMA	Ideal for tunnel contracts or areas with low bridges or overhanging structures or foliage.
10100402	Safe-Stop SST™ Trailer TMA	Ideal for multi-use trucks, where a permanent attenuator is not always desirable.
10001361	Resista Post	High performance delineator best utilised in locations with high speed/high impact frequency (eg construction zones, heavy traffic areas and bridges).
10103701	Kona Post®	Quick change delineator, ideal for reoccurring applications.





# Safe-Stop Truck Mounted Attenuators

*Protection wherever the road takes you*

**NCHRP-350 TL3 COMPLIANT**

## INTRODUCTION

Ingal Civil Products offer an end-to-end truck-build service. Sourcing the highest quality vehicles and products available means your traffic crews will spend more time protecting workers and less time dealing with unserviceabilities. More time earning money and less time spending money.

*Benefits of the Ingal Safe-Stop TMA range:*

- Fully engineered and ADR compliant.
- Custom signage or graphics packages available.
- Operation training.
- Truck build includes all national & state TMA code of practice requirements.
- Demonstrator truck available.



- Automatic impact brakes.
- Driver 4-point harness & seat support.
- Full colour LED VMS board.
- C-class LED Arrow board with hydraulic raise/lower mechanism.
- Optional forward facing LED arrow board for double-sided applications.
- Two 5-watt UHF radios.
- Integrated control panel.
- 15,000kg GVM minimum single-cab truck.
- Fully automatic transmission.
- Custom tray bodies available.
- Custom signage or graphics packages.

# Safe-Stop SS90™ HD TMA

*Offers industry leading protection*

**NCHRP-350 TL3 COMPLIANT**



## INTRODUCTION

The SS90™HD is a heavy duty truck mounted attenuator (TMA) available for use on stationary or moving shadow and support vehicles. The SS90™HD has passed all mandatory and optional testing and is NCHRP Report 350 Test Level 3 compliant. Additionally, the SS90™HD has passed the UK TD 49, 110 km/h (68 mph) test. The unit is comprised of two light-weight aluminium cartridges contained in a galvanized support frame. The SS90™HD helps to absorb rear-end impacts at speeds up to 100 km/h.

The SS90™HD is environmentally robust with galvanised, reusable steel frame and components. The back-up frame and pivot point connections have been strengthened in key areas to improve longevity for customers who use the SS90™HD in extreme environments. The SS90™HD is usually repairable after a design impact – having you back on the road sooner.

- The hydraulic pump has been upgraded to a higher temperature rated, more powerful 24v pump.
- Power up and power down hydraulics.
- Easy inspection and maintenance.
- Replaceable energy-absorbing cartridges.
- Custom lighting systems available in 12V, 24V, incandescent or LED systems.
- "Push-to-activate" function raises and lowers unit. Alert buzzer sounds when unit is not fully deployed or in vertical position.
- Simple attachment options mount to standard truck.
- Hand crank jacks and swivel casters allow for easy, stable mounting



## SPECIFICATIONS

Max Height (Deployed)	1190mm
Max Height (Travel)	4010mm
Max Width	2360mm
Length Deployed	3970mm
Overhang	1020mm
Weight	905kg

## PART NUMBER

SS90 HDTMA 10100401





# Safe-Stop SST180<sup>®</sup> TMA

*Passed both mandatory and optional NCHRP-350 TL-3 requirements*



## INTRODUCTION

**NCHRP-350 TL3 COMPLIANT**

Safe-Stop SS180<sup>®</sup> Truck Mounted Attenuator gives legendary Safe-Stop protection in an industry leading low-height package. Only 2.08m high when in travel configuration prevents overhead strikes. Lower than most truck cabs!

The Safe-Stop 180 high-speed TMA meets NCHRP 350, Test Level 3 standards and can be used in work zones with posted speeds as high as 100 km/h. In addition to its high-speed protection, the SafeStop 180 offers exceptional durability. The TMA can withstand nuisance hits up to 10km/h. Its two-cartridge design is modular to allow replacement of a single cartridge during partial impacts - reducing refurbishment costs.

The cartridges are contained in a reusable steel support frame. All of these features reduce the system's overall life cycle cost as compared to other disposable TMAs on the market today. The new 180 Degree tilt feature makes it easier to transport and store, and provides maximum TMA protection with the minimal length, weight, and height. The SafeStop 180 frame folds in the middle and is just 2.08m high in storage mode. The two cartridges stack on top of each other.

- When impacted, the steel support frame progressively collapses, allowing the aluminium cartridge to crush. This absorbs the errant vehicle's impacting energy, bringing it to a controlled stop.
- Hydraulically folds 180 degrees for easy storage and transportation.
- TL-2 2000kg protection in 'folded' position (not small cars).
- Withstands nuisance impacts of up to 10kph.
- Refurbishment can often be completed in the field.

## SPECIFICATIONS

Max Height (Deployed)	1190mm
Max Height (Travel)	2080mm
Max Width	2360mm
Length Deployed	3970mm
Length Travel	2390mm
Weight	943kg

## PART NUMBER

SST180 TMA	10100400
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# Safe-Stop SST<sup>®</sup> Trailer TMA

*TMA in an easy to use trailer package*

**NCHRP-350 TL3 COMPLIANT**



## INTRODUCTION

The Safe-Stop SST<sup>®</sup> Trailer TMA is a development of the popular SS90<sup>®</sup> TMA, but in an easy to use trailer package. The Safe-Stop Trailer high-speed TMA meets NCHRP 350, Test Level 3 standards and can be used in work zones with posted speeds as high as 100 km/h.

In addition to its high-speed protection, the SST<sup>®</sup> TMA offers exceptional durability. The SST<sup>®</sup> can withstand nuisance hits up to 10km/h. Its two-cartridge design is modular to allow replacement of a single cartridge during partial impacts - reducing refurbishment costs. The cartridges are contained in a reusable steel support frame. All of these features reduce the system's overall life cycle cost as compared to other disposable TMAs on the market today.

The SST<sup>®</sup> TMA features hydraulically locking anti-rotational dampeners, preventing the trailer from swinging sideways in the event of an oblique impact. The SST<sup>®</sup> TMA is ideal for contractors requiring flexible use of their truck fleet.

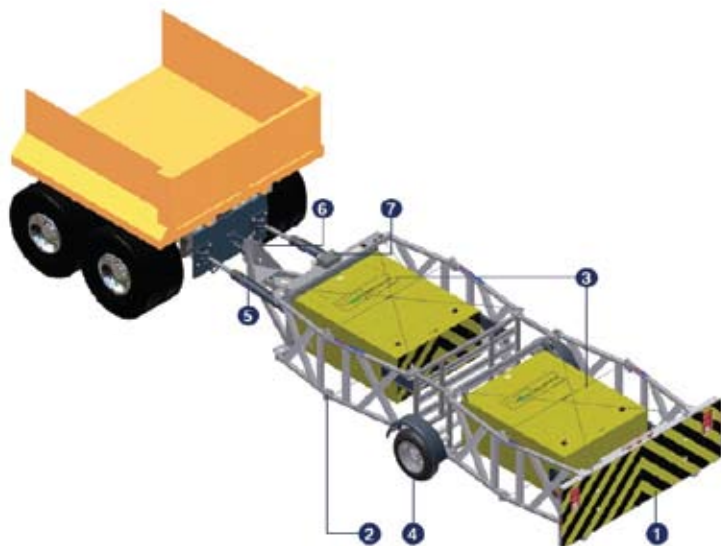
- Speedy attachment.
- SST<sup>®</sup> TMA requires minimal modification of host vehicle.
- Optional integrated arrow board attaches directly to SST<sup>®</sup> TMA.
- Nuisance impact protection and high reusability after a design impact.
- Passes all mandatory & optional NCHRP 350 TL-3 tests.
- Fleet flexibility and operational efficiency Fleet utilisation, rapid deployment, and low operating costs.
- Low installation cost, high fleet utilisation, and operating flexibility.
- Ease of use, low operating cost and minimal vehicle modification.
- Low maintenance costs and high productivity.
- Maximum protection and safety.

## SPECIFICATIONS

Length	5870mm
Width	2360mm
Height	1140mm
Weight	1202kg

## PART NUMBER

SST Trailer TMA	10100402
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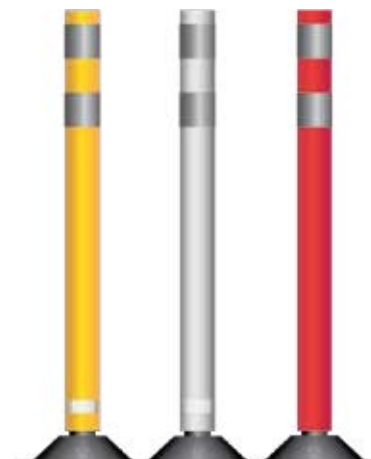
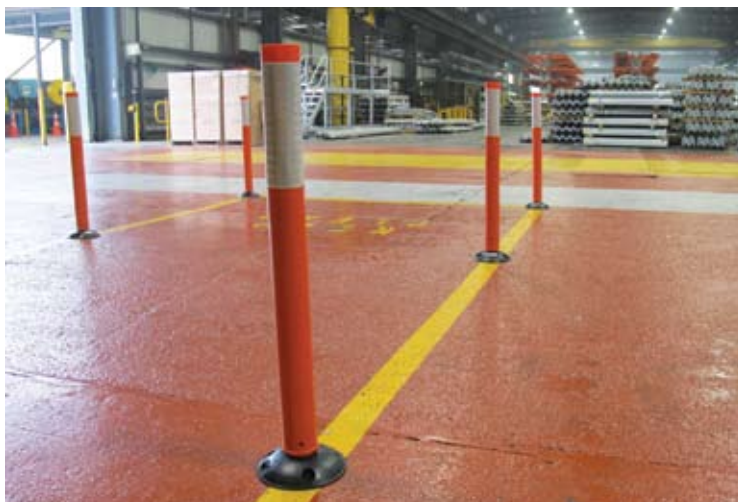
- 1 Impact Face
- 2 Collapsible Frame
- 3 Cartridges
- 4 Heavy-duty torsion suspension axle and wheels
- 5 Anti-rotational dampeners
- 6 Standard attachment to a min 8 ton pintle hook
- 7 Standard emergency braking system





# Resista-Post Delineator

*High-performance delineator*



## INTRODUCTION

The Resista-Post High Performance Delineator is an injection molded urethane flexible post that has been tested to withstand an extreme number of high speed impacts. Resista-Post is best utilised in locations with high speed/high impact frequency and is ideal for installation in construction zones, heavy traffic areas and bridges.

Base and anchor options are either a surface mount for asphalt/concrete or a soil anchor. The Resista-Post is easy to install and lasts longer than standard delineators. These features mean it requires less repair labor.

- Tapered one piece urethane design.
- Extreme impact performance.
- 360° visibility.
- Flexible at extreme temperatures.
- High intensity, flexible prismatic reflective sheeting standard.
- Standard post colors: white, yellow, orange.
- Standard reflective colors: silver, amber, orange.
- Custom post colors: blue, green, black, red, dark gray, light gray, yellow-green.
- Various lengths available.

### PART NUMBER

Resista-Post	10001361
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### SPECIFICATIONS

Post Height	914mm
Post Diameter	76mm
Weight	0.95kg
Base Diameter	203mm

# Kona Post® Delineator

## Quick-change delineator



## INTRODUCTION

The KonaPost® is an excellent alternative to traditional orange cones. It is ideal for reoccurring applications where orange cones or markers are often impacted and must be quickly deployed in specific patterns on a regular basis.

The unique design of the KonaPost enables it to take multiple impacts and stay in place. It has been tested to take over 200 direct wheel impacts at 72 km/h. The flexible 152mm plug easily inserts into a hot-dip galvanised steel receptacle that is recessed into the pavement. The posts can be deployed when needed and quickly removed by lifting them out of the pavement receptacles.

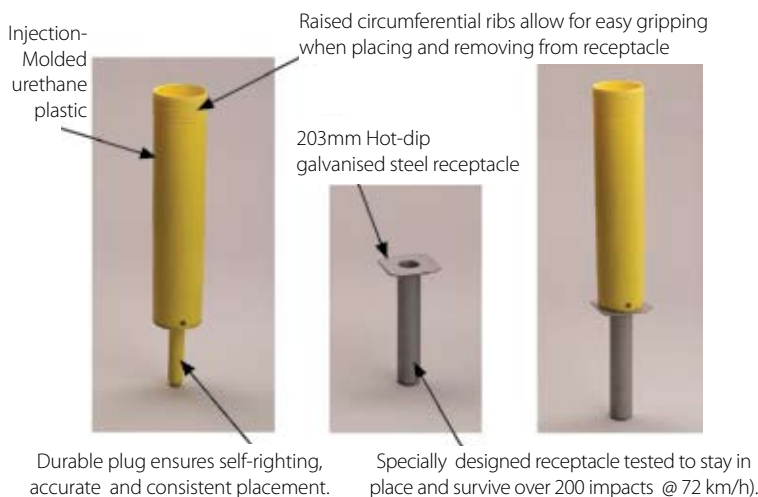
The heavy duty KonaPost can be used as a channelising, marking, delineation device in many applications, including:

- Gate closures
- Reversible lanes and lane redirect
- Parking lots and garage environments
- Event management

- Extremely impact resistant.
- 360° full visibility.
- No protruding metal parts.
- One piece post construction.
- Withstands extreme temperatures.
- Easy placement.
- Reflective sheeting available.
- Available in white, yellow and orange (custom colors available).

## SPECIFICATIONS

Post Height	483mm
Post Width	102mm
Plug Height	152mm
Receptacle Plate Width	114mm
Receptacle Depth	203mm



## PART NUMBER

Kona Post 10103701





## FENCING



Boundary Fencing



Pedestrian Fencing

# Fencing



# Fencing



## QUICK REFERENCE GUIDE

PART No.	PRODUCT	APPLICATIONS
10007994	Boundary Fencing	Improving site security around sporting fields, parkland & bushland.
10001755	Pedestrian Fencing	Used to channel pedestrians in a predictable and safe way in traffic areas.





# Boundary Fencing

*Improving site security around sporting fields, parkland and bushland*



## BOUNDARY FENCING

Prevents unauthorised vehicle access to protect areas such as sporting fields, parkland & bushland.

The Rigid C posts are driven into the ground and are fitted with Post Caps to protect pedestrians from post edges. Twin 19mm diameter cables pass through pre-punched holes in each post.

All posts are hot dipped galvanized for improved durability. Rapid and low-cost installation is a feature of Ingal Boundary Fencing as no concrete is required for installation.

- Rigid C-Posts are driven into the ground.
- Hot dipped galvanised.
- Twin 19mm cables.
- Protects bushland, sporting fields and parkland from unauthorised vehicle access.
- No concrete required.



# Pedestrian Fencing

**Crucial to maintaining Road Authority Safety Standards**



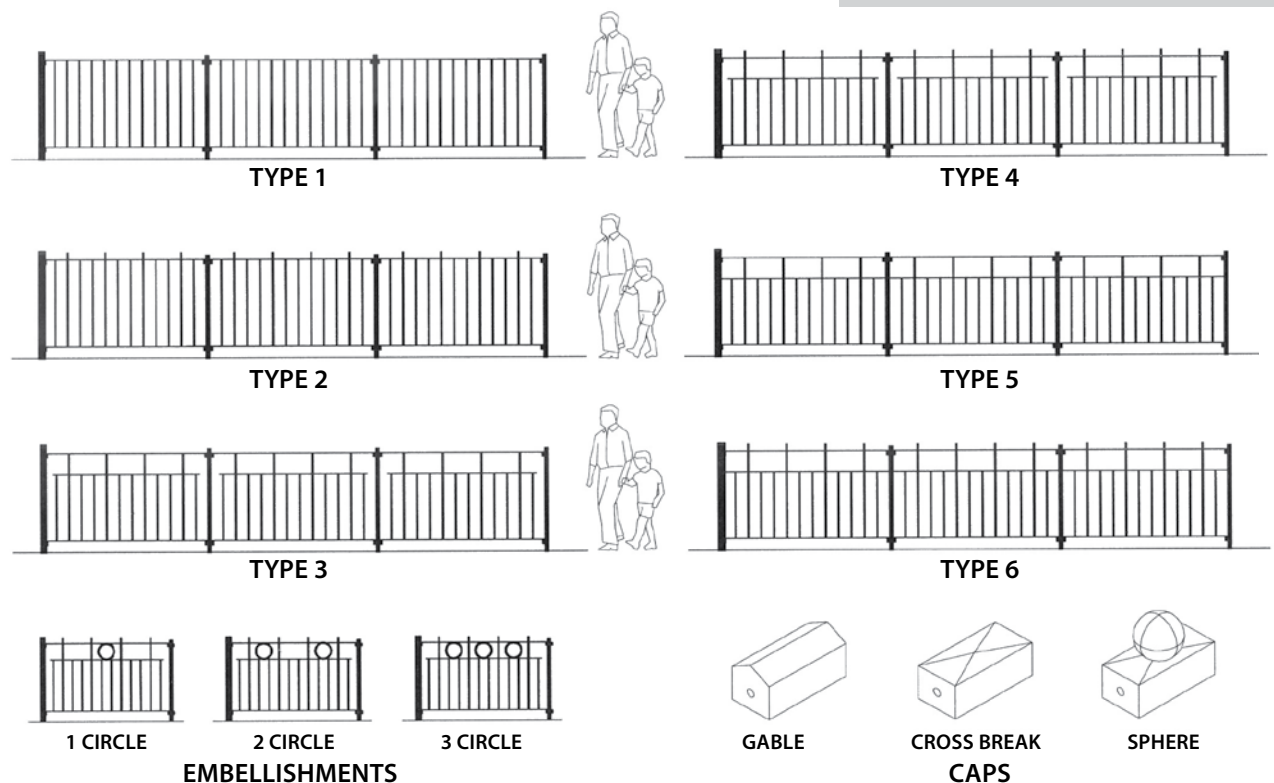
## PEDESTRIAN FENCING

### Applications:

- Shopping Centres
- Intersections
- Entertainment Venues
- School Zones
- Sports Arenas and Events
- Tourist Attractions

Pedestrian fencing is used to channel pedestrians in a predictable and safe way in traffic areas. The Pedestrian Fence design has been created using solid steel members and joined with nut and bolt connections which allows the panels to collapse as an entire panel and reduce the potential for detachment of the individual pedestrian fencing elements. Not only does this provide additional pedestrian safety, but it can also prevent the impacting vehicle from becoming impaled.

- Manufactured to State Road Authority Specifications.
- Hot dipped galvanised.
- Available in median or verge configuration.
- Separates pedestrian and vehicle activity.
- Designed NOT to spear impacting vehicles.
- Anti-climb design.





## CARPARK BARRIERS



**ZEE-Park®**



**ZEE-Park® DeckGuard**



**ZEE-Park® Sentinel**



**ZEE-Park® TruckShield**



**Spring Steel BUFFA™**



**Column Buffa™**



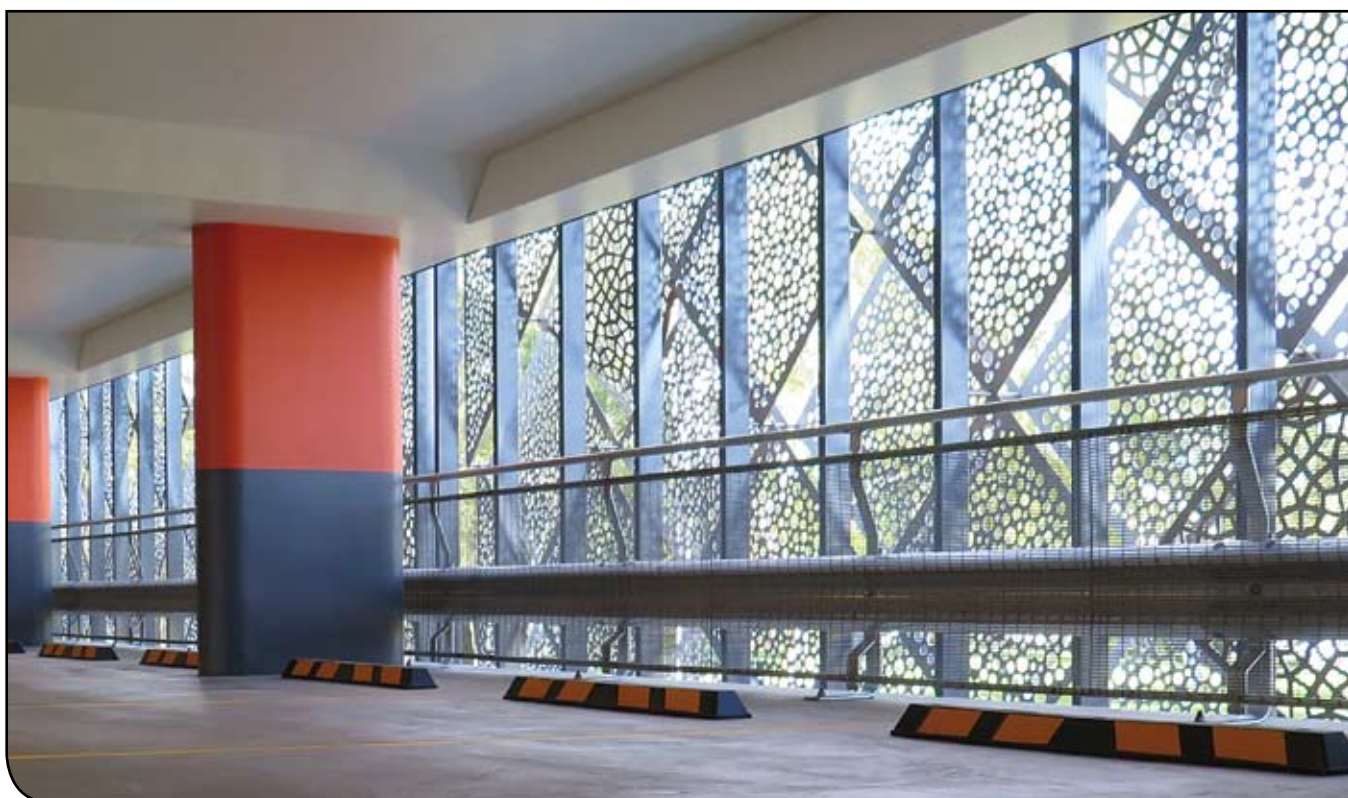
**Rigid Post**



**Accessories**



# Carpark Barriers



## QUICK REFERENCE GUIDE

PART No.	PRODUCT	TYPE
10007701	ZEE-Park®	The original and most versatile carpark barrier system.
10008115	ZEE-Park® DeckGuard	For fixing rails to decked or edge-applications.
10008112	ZEE-Park® Sentinel	High-containment carpark barrier.
10008108	ZEE-Park® TruckShield	Heavy-duty barrier solution for separation of heavy vehicles.
10002088	Spring Steel BUFFA™	Elegantly designed, flexible car park barrier protection.
10008306	Column Buffa™	Pole and post protection.
10000547	Rigid Post	High-Impact protection.
	Accessories	Integrated solutions to complement your car park.

## Enhanced Car Park Safety

Carpark Barriers are a type of guardrail system specifically designed to be used in low-speed areas such as car parks, private roads, warehouses and other non-road environments. Ingal Civil Products use a range of options to meet the varied needs of each application which includes semi-flexible posts, restricted space designs, fall protection and balustrade designs.

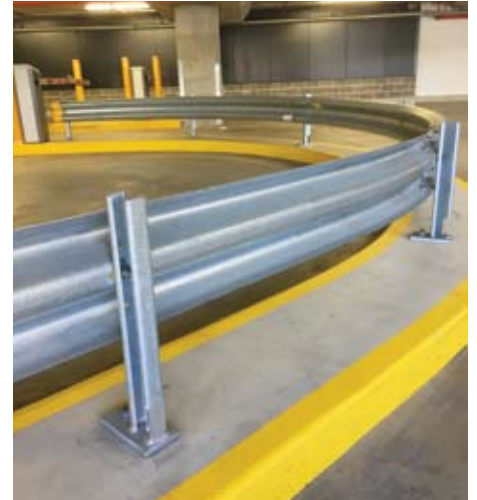
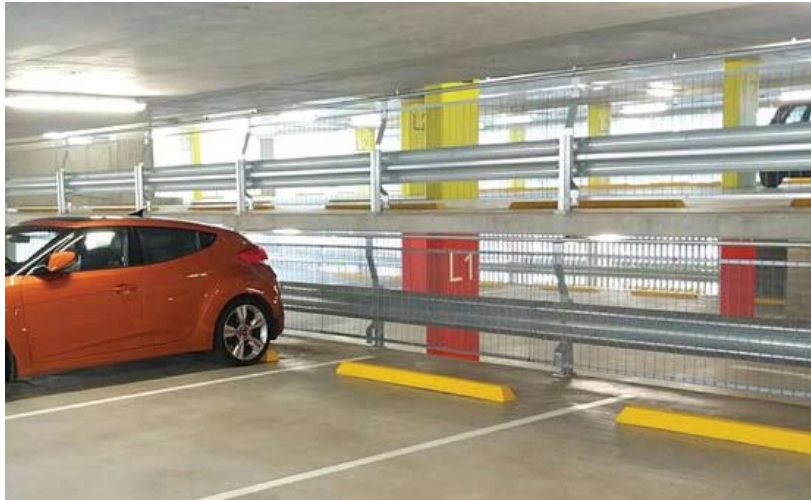




## ZEE-Park®

**AS/NZS 1170.1 COMPLIANT**

*The most versatile car park barrier system available*



### INTRODUCTION

With a light 'nudge' impact, the ZEE Park® Post deforms elastically within tightly controlled limits. When the force is removed the ZEE Park Post springs back to its original position.

With a more severe impact, the ZEE Park Post yields in a consistent and predictable manner, absorbing much of the vehicle's energy - without overloading the anchor or damaging the structure. The innovative ZEE Park Post permanent deflection is directly proportional to the energy of the impacting vehicle. Individual ZEE Park Posts will only need replacement after a substantial impact, and have been proven to effectively absorb over twice the force proscribed by standard AS/NZS 1170.1 for light traffic areas.

- Fully tested & compliant system for peace of mind.
- Suitable for edge protection close to structures or building facades.
- Low initial deflection
- Yielding design prevents damage to footings with larger impacts.
- Consistent high performance with high containment capacity.
- Single anchor design – easier, cost-effective installation.
- Handrail & Anti-Climb Mesh attachments available for BCA compliance.
- Very low footprint (only 100mm x 200mm).
- 100% Australian Made using Australian Steel & Australian Zinc.

### PART NUMBER

ZEE-Park	10007701
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# DeckGuard

**AS/NZS 1170.1 COMPLIANT**

*Suitable for edge protection in multi-storey car parks*



## INTRODUCTION

The new ZEE Park® DeckGuard barrier system is an exciting evolution of the proven ZEE Park AS/NZS 1170.1 compliant car park barrier. ZEE Park DeckGuard is designed to allow maximum use of car park floor space, by placing the Flex-Beam guard rail right at the edge of the car park deck. This gives maximum protection with a minimum of space.

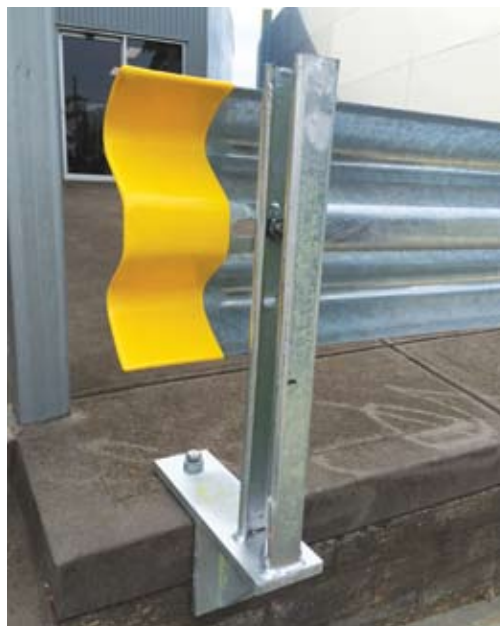
The ZEE Park DeckGuard also uses the proven Ezy-Guard post profile, and is a high-strength semi-rigid system. DeckGuard is tested and designed to exceed the force prescribed under AS/NZS 1170.1 for light traffic areas. This is achieved with a single anchor per post.

The ZEE Park is designed to spring under light 'nudge' impacts, but predictably yield under severe impacts, preventing damage to the car park structure.



### PART NUMBER

DeckGuard 10008115





# Sentinel

**AS/NZS 1170.1 COMPLIANT**

*Suitable wherever high-containment barriers are required*



## INTRODUCTION

ZEE Park® Sentinel has been tested to the 240kN requirement of AS1170.1 for the ends of down ramps. The new ZEE Park Sentinel barrier system is an exciting evolution of the proven ZEE Park AS/NZS 1170.1 compliant car park barrier.

Until now, bespoke barriers were the only option for these locations. Now, with ZEE Park Sentinel, there is a low-cost proprietary system available. Car parks can now be designed with ease – using ZEE Park for deck perimeters and ramp sides, continuing with ZEE Park Sentinel at the ramp ends, or anywhere else a high-strength barrier system is required.

ZEE Park Sentinel uses a heavier-duty version of the proven Ezy-Guard post profile, and is a high-strength semi-rigid system. Sentinel is tested and designed to exceed the 240kN force prescribed under AS/NZS 1170.1. This is achieved with only two anchors per post.

The ZEE Park is designed to spring under light 'nudge' impacts, but predictably yield under severe impacts, preventing damage to the car park structure. Integrates easily with the Ingal range of car park barriers to create a complete solution.



## PART NUMBER

Sentinel	10008112
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# TruckShield

**AS/NZS 1170.1 COMPLIANT**

*Heavy-duty barrier solution for separation of heavy vehicles*



## INTRODUCTION

The new ZEE Park® TruckShield barrier system is an exciting evolution of the proven ZEE Park AS/NZS 1170.1 compliant car park barrier. ZEE Park® TruckShield has been tested to the requirements of AS1170.1 for medium traffic areas, and is suitable for freight terminals, logistics facilities, loading docks, or anywhere separation of heavy vehicles and pedestrians is required.

ZEE Park® TruckShield uses a heavier-duty version of the proven Ezy-Guard post profile, and is a high-strength semi-rigid system. Truck Shield is tested and designed to exceed the force prescribed under AS/NZS 1170.1 for medium traffic areas. This is achieved with only two anchors per post.



- Easy installation.
- Australian made.
- Heavy duty car park barrier system.
- Integrates easily with the Ingal range of car park barriers to create a complete solution.
- AS/NZS 1170.1 rating.

## PART NUMBER

TruckShield 10008108





# Spring Steel BUFFA™

*Elegantly designed car park barrier protection*



## INTRODUCTION

An Ingal Spring Steel BUFFA™ is designed to deflect upon impact, reducing the pullout forces on the anchor bolts. The absorption of energy during impact offers a reduced risk of damage to barrier, vehicle and structure.

Classic BUFFA™ Applications:

- Offers protection from glancing blow collisions at low speeds with passenger vehicles.
- Internal and external barrier protection to walls and aluminium cladding in warehouses and logistic depots.
- Perimeter edge and split level protection to multi-storey car parks.
- Ramp protection on multi-storey car parks.
- Protection to high value plant and equipment.
- Head-on impact protection from fork-lift trucks.
- Loading bay ramps.

## PART NUMBER

Spring Steel BUFFA 10002088



- Compliant to loading requirements of AS/NZS 1170.1 "Type F light traffic" 1500kg vehicle travelling at 2m/s.
- Posts are manufactured from high grade spring steel and heat treated for strength and flexibility.
- Post height – 610mm.
- 1 off holding down bolt per post.
- Available with anti-climb mesh infill and/or handrail extensions.
- Rail can be mounted to either side of the post to maximise floor space.
- Crash tested to verify impact performance.
- Exclusive to Ingal Civil Products.

# Column BUFFA™

## *Support column protection*



## INTRODUCTION

The Ingal Column BUFFA™ distributes the impact forces evenly onto the spring steel support posts. The posts are designed to deflect, reducing the pullout forces on the anchor bolts. The absorption of energy during impact offers a reduced risk of damage to barrier, vehicle and structure.

Ingal Column BUFFA™ Applications:

- Offers protection from collisions at low speeds with fork-lift trucks or pallet movers.
- Protects lighting columns, structural columns and racking supports in car parks, warehouses and logistic depots.



- Minimum 750mm internal diameter – also available in 1000mm internal diameter.
- Post height - 610mm.
- Rail width – 150mm.
- Posts are manufactured from high grade spring steel and heat treated for strength and flexibility.
- Available as a single, double or triple hoop system.
- Available in full or semi circle units.
- Post supports can be turned inwards to prevent a trip hazard or damage to tyres.
- Exclusive to Ingal Civil Products.

## PART NUMBER

Column BUFFA

10008306





## Rigid Post

### *Barrier protection for walls*



- Available as C posts or U posts depending upon site requirements.
- Glancing blow collisions at low speeds with light vehicles.
- Internal and external barrier protection for walls in warehouses and logistic depots.

Rigid post consists of C or U shape posts and are particularly suitable for warehouses and industrial applications where guardrail is required.

### Steel Bollards

Ingal Steel Bollards are suitable for situations where a hard-stop is required. Particularly suitable for edge-protection of buildings and around sensitive infrastructure (eg electricity boxes, air conditioning, concrete edges, etc).



Rigid Post

10000547

## Accessories

### *Complete integrated solutions for the ingal range of car park barriers*



Complement your car park and industrial barriers with our complete accessory range:

- Post Caps
- Short W-beam Bullnose Ends
- Wheel Stops
- Corner Protectas
- Plastic Rail Caps
- Steel Bollards



**Fonterra Head Office, Auckland** (office building)  
*Builder – Fletcher Constructions (2016), Architect – Jasmx*  
 2 Level Basement Parking with 189 spaces

Products used:

- Spring Steel Buffa car park barrier system
- Standard Posts
- Handrail with integrated Anti-climb Mesh



**Epworth Hospital Redevelopment – Lee Wing, Richmond**  
 (car park development)

*Builder – Kane Constructions (2016), Architect – Silver Thomas Hanley*  
 Basement Parking with over 250 Spaces

Products used:

- Spring Steel Buffa car park barrier system
- Classic Posts
- Handrail with integrated Anti-climb Mesh



**Calvary Hospital, Canberra** (car park development)  
*Builder – ADCO Constructions (2015), Architect – Daryl Jackson Alastair Swayn*  
 5 Storey Car Park with 704 spaces

Products used:

- Spring Steel Buffa car park barrier system
- Classic Posts



**Northern Beaches Hospital, Sydney** (car park development)  
*Builder – CPB Contractors (under construction), Architect – Bligh Voller Nield*  
 9 Levels (7 storey & 2 basement levels) with 1400 spaces

Products used:

- ZEE Park
- Deck Guard
- Handrail with integrated Anti-Climb Mesh



**The Icon, St. Kilda**  
 (landmark residential building with strong architectural focus)  
*Builder – Pace Development Group (2015), Architect – Jackson Clements Burrows*  
 2 Level Podium Parking

Products used:

- Spring Steel Buffa car park barrier system
- Classic Posts



**Crown Casino, Perth** (car park development)  
*Builder – PS Structures (2015), Architect – Hames Sharley Architects*  
 6 Level Car Park with 1500 spaces

Products used:

- Spring Steel Buffa car park barrier system
- Standard Posts
- Handrail with integrated Anti-climb Mesh





# Installation Rigs



PART No.	PRODUCT	APPLICATION
10002069	Orteco Heavy Duty Post Driver HD1000	Powerful, fast and easy to operate Post Driver. Reduce installation time on large scale guardrail projects (available to rent or purchase).

# Orteco Heavy Duty Post Driver

## *Safety barrier installation rig*

### **COST EFFECTIVE**

Available for hire or sale.

### **POWERFUL**

1200 Joules per blow with 570-1180 blows per minute.

### **EASY TO USE**

Intuitive and responsive controls.

### **ADAPTABLE**

Available with any of the following attachments:  
254mm Down-the-Hole Hammer, Post extractor kit, 300mm Auger.



- Available attachments.
- 254mm down the hole hammer.
- Post extractor kit.
- 300mm Auger.
- Alternating use of post driver and down the hole hammer with no dismantling.
- Suitable for all guardrail post.

## **INTRODUCTION**

The self-propelled Ingal Heavy Duty Post Driver is specially designed for large-scale guardrail projects that require a heavier and more powerful machine. A few simple commands move the machine from the 'shipping' position to the 'working' position reducing valuable set-up time.

The vertical column can be hydraulically positioned when installing on steep sites and is conveniently lowered during transportation. The column also extends up to 1.4m horizontally allowing the machine to be positioned a safe distance from the edges of steep embankments.

The translation control panel is located away from the vertical column ensuring operator safety and providing precise movement. The hammer is able to drive all types of guardrail posts and is encapsulated and cushioned to reduce noise and vibration.

The down the hole drilling system allows the operator to alternate between drilling and post driving without any dismantling minimising disruption to production.

## **SPECIFICATIONS**

Electric start	12 volt
Fuel tank capacity	60 litres
Noise level	75dbA @ 2600 rpm
<b>HYDRAULIC SYSTEM</b>	
Tank capacity –	160 litres
Pump capacity –	110 litres/min @ 2600rpm
Max. operating pressure	18 Mpa
<b>PILE DRIVER</b>	
Power per blow	1200 Joules
Blows per minute	570 to 1180
Oil flow rate	80 to 110 litres/min
<b>MACHINE DIMENSIONS</b>	
Dimensions	2125mm wide x 2369mm long
Total mass	4000kg
Crawler width	280mm
Max. height in transport	2850mm

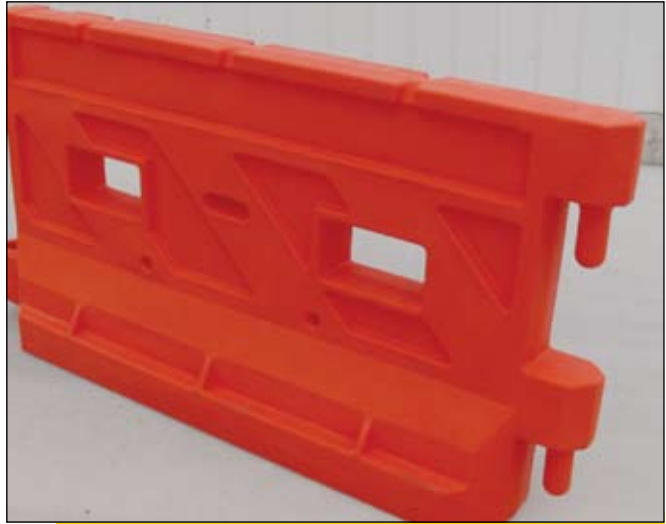




## TEMPORARY BARRIERS



**ArmorZone™**

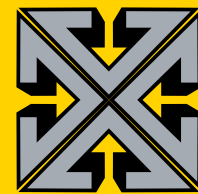


**ArmorCade™**



**BG800®**

# Temporary Barriers



**INGAL**  
CIVIL PRODUCTS  
A **valmont**  COMPANY



# Temporary Barriers



## QUICK REFERENCE GUIDE

PART No.	PRODUCT	APPLICATION
10200005	ArmorZone™	Crash tested, high performance temporary work-zone barrier protection.
10200300	ArmorCade®	Temporary solution for pedestrian, cyclist and vehicular management.
10100874	BG800®	Portable steel barrier to protect both motorists and construction workers.





# ArmorZone™

*High performance temporary work-zone barrier*

**NEW PRODUCT**

**MASH TL2 COMPLIANT**

**NCHRP-350 COMPLIANT**

## SAFETY

Provides work-zone protection to temporary construction sites and other roadside activities.

## ATTRACTIVE

Economical to transport, fast to install and relocate.

## SAFE

Crash tested to MASH TL2 and NCHRP-350 standards for speeds up to 70km/h.

## RAPID INSTALLATION

Water filled barrier is rapidly deployed by only 2 personnel.  
Up to 156m transported per truck.





## INTRODUCTION

The water-filled nature of the ArmorZone™ barrier simplifies its deployment and transportation while increasing safety during the installation process as the empty barriers only weigh 50 kg and are easily handled by two operators.

The ArmorZone™ barrier has been crash tested at 70 km/h as a longitudinal barrier with terminal ends and accepted by controlling road authorities as a “temporary system”. Upon impact with a wide range of vehicles ArmorZone™ safely re-directed them from impact at angles up to 25° and speeds up to 80 km/h (EN1317, TB31, N1). Safe and predictable trajectories were observed during the tests.

ArmorZone™ deployment involves interlocking the 2.16 m long units with a unique connecting pin and filling each barrier with 520L of water. ArmorZone™ can be deployed straight or with low curvature, on either roadside or median applications, in speed zones up to 70 km/h. The ArmorZone™ barrier has many advantages in the market place including high durability, high performance, fast (and safe installation) at a very competitive cost.

ArmorZone™ is accepted by controlling road authorities as a “temporary system”. It has been designed with ease of deployment and removal in mind. It excels in durability while performing with a very competitive deflection in its market category. All this being possible due to its unique HDPE formula which places ArmorZone™ in a league of its own as the ideal temporary barrier for the civil construction market.

- Excellent work zone barrier protection.
- Exceptionally good vehicle control and low deflection.
- Simple to use end treatment available.
- Easy install and transportation.
- Smooth surfaces and geometry, more forgiving on vulnerable road users.
- Container “friendly” dimensions allow for effective shipping (84 units fit in a 40’ container).
- Stabilised HDPE modules strong enough to absorb nuisance impact without repair.
- Environmentally friendly – 100% recyclable.
- 120m/h deployment rate.

## SPECIFICATIONS

Overall Length	2160mm (effective 2000mm)	
Height	870mm	
Width	450mm	
Material	HD Stabilised PE (UV8)	
Connecting Pin	Galvanised Steel	
	<b>NCHRP-350</b>	<b>MASH</b>
Weight	50kg (570kg when full)	56kg (496kg when full)
Water Required	520L (per unit)	440L (per unit)
Deflection	1.5m (50 km/h)	2.16m (50 km/h – TL1)
	2.1m (70 km/h)	4.1m (70 km/h – TL2)
Leading point of need	16m	24m

## PART NUMBER

ArmorZone®	10200005
ArmorZone® End Treatment	10200007





# ArmorCade®

### *Temporary delineator*

<b>ADAPTABLE</b>	Innovative design for adaptable use.
<b>EASY TO STORE</b>	Units are stackable so they are easy to store in a small space.
<b>COST SAVINGS</b>	Low cost of procurement.
<b>EASY TO INSTALL</b>	Secure connection can be installed from straight up to a 90° curve.





## INTRODUCTION

The latest solution for temporary pedestrian, cyclist and vehicular management.

ArmorCade is made up of 2.0m long plastic units (MDPE) that join together using integral interlocking lugs to form a continuous delineator.

Through innovative design, ArmorCade can be installed straight or with acute radius curves, up to 90 degrees if required.

- Made in New Zealand for superior quality and durability.
- Low procurement costs.
- Low long distance shipping costs: 144 units fit into a 40' container.
- Low transportation costs: 60 units fit a 6m truck deck.
- Easy installation with no steel pins required.
- Long lifespan due to quality MDPE construction.
- 100% recyclable – no internal or external steel.
- Economical use of water (optional).

## SPECIFICATIONS

Secure Connection	Yes
Stackable	165.5kn
Movable	Yes
Adaptive Radius	Up to 90°
Weight	20kg
Length	2000mm
Height	1000mm
Base Width	380mm



## PART NUMBER

ArmorCade®	1020300
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# BG800<sup>®</sup>

### *High-Performance Portable Steel Safety Barrier*

**MASH TL3 COMPLIANT**

**PAS 68 Security Testing COMPLIANT**

#### **EASILY INSTALLED**

Unique connector design allows installation of up to 300 metres of barrier per hour – Quicker to install than concrete barrier.

#### **DURABLE**

Proven to withstand multiple design impacts without need for major repair or replacement.

#### **COST SAVINGS**

Only 90kg/m making it quick to install or remove and economical to transport (up to 4 times more barrier per load than concrete).

#### **VERSATILE**

Available in 6 and 12 metre section lengths with special angle sections for tight radii.





## INTRODUCTION

BG800 portable steel barrier is the latest in road barrier technology, designed to protect both motorists and construction workers. Rigorously tested to meet the highest demands throughout the world, BG800 has achieved the highest performance levels of any portable steel barrier for NCHRP350 TL-1, TL-2, TL-3 or TL-4, MASH TL-3, EN1317-2 N2 & H2 and Security PAS 68.

BG800's unique stepped profile has proven to reduce damage to both vehicle and barrier during impact, minimising the need for repair or replacement. During impact, BG800 provides an extremely shallow exit angle for the vehicle, minimising the risk of secondary accidents.

BG800's galvanised steel structure offers an expected life cycle of 25 years and with its exceptional durability, the need for replacement through handling or impact damage, unlike similar portable barriers, is greatly reduced.

At only 90kg per metre and with 6 or 12m modules available, up to 216m can be loaded on a truck bed, providing high savings in transportation when compared with similar concrete or steel systems. In addition, BG800's 'Quick-Link' connection allows for rapid installation, at speeds of up to 300m per hour with just three operatives – offering clients and contractors a vast saving in both time and labour resources when compared to conventional high performance portable systems.

**Additional options to adapt the barrier for specific requirements:**

## BG800 Portable

BG800 provides portable protection at work zones as well as emergency protection of bridge parapets and guardrail impact sites. Offering high performance protection with cost-effective transportation and ease of installation. Gates can be included within the runs for providing temporary access during maintenance or construction works.

## BG800 Wheeled

Allows for longitudinal or lateral movement of the barrier to accommodate work zone requirements. Ideal for repetitive regular maintenance operations where barrier lengths of 200-500m can be moved short distances.

## BG800 Permanent

For use on structures or as a high performance median barrier. The light weight system is ideal for use on structures with weight limits such as bridges. Durable in comparison to guard rail or parapets and can withstand multiple impacts without the need for replacement.

- Tested to MASH TL-3.
- Unique stepped profile with narrow footprint - only 540mm.
- Lightweight and quick install - 90kgs per metre, 300m per hour.
- 6m & 12m section available - up to 144m transported on a single truck.
- Six metre sections with a speedy 'Quick-Link' connection.
- Rapid deployment, installation/removal.
- Easily relocated to provide positive protection of work areas.
- Relocate locally without need for transportation or lifting equipment.

## SPECIFICATIONS

Length:	6m or 12m
Height:	800mm or 920mm
Width:	540mm
Weight:	90kg per metre



## PART NUMBER

BG800	10100874
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# Emergency Access Gate



## ADAPTABLE

Connections to both concrete and guardrail systems.  
Multiple opening options – sections hinged or completely removed.

## SAFER

Crash tested to NCHRP-350 TL3.

## COST SAVINGS

Opens quickly – only two operatives required. Low maintenance.

## PORTABLE

Ideal solution for access within temporary construction barriers.

PART No.	PRODUCT	APPLICATION
10100800	Emergency Access Gate	Provides access between temporary or permanent barriers.

# Emergency Access Gate

**NCHRP-350 TL3 COMPLIANT**

## *Emergency, maintenance or construction access gate*

### INTRODUCTION

Emergency Access Gate has been designed as a quick and easy means to provide an open access between temporary or permanent barriers for emergency vehicles or a works access during highways construction.

When in situ the Emergency Access Gate is a high performance longitudinal barrier meeting the performance requirements for NCHRP 350 and EN1317. However when required, the gate can be opened easily by two operatives within a matter of minutes.

Designed as a modular system, Emergency Access Gate can provide openings as small as 6m and can be extended using 3m or 6m modules to the required gate size.

Highly durable due to the BG design, the gate has demonstrated that easy opening is still possible after a design impact (2000kg pickup, 25 degrees and 100 km/h). The specially developed wheel sets stored within the gate allow for both longitudinal and lateral movement, providing the operator with multiple opening and storage options. Heavy duty, galvanised steel components offer minimum maintenance requirements with a maximum life expectancy.

- Durable design – proven to open after 'design' impact.
- Connections to both concrete and guardrail systems.
- Portable solution – used for access within temporary construction barriers.
- Multiple opening options – sections hinged or completely removed.
- Modular 6m sections.
- Low maintenance.
- Opens quickly – only two operatives required.

### SPECIFICATIONS

Module Length	3 & 6m (Per Unit)
Minimum Opening	4.7m
Maximum Opening	28.7m
Height	915mm
Width at Base	540mm
Width at Top	474mm
Weight (Per Metre)	135kg
Maximum Deflection	1.07m (2000kg, 100km/h @ 25deg)

### PART NUMBER

Emergency Access Gate	10100800
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# Noisewall



PART No.	PRODUCT	APPLICATION
TBA	Genus Noisewall™	High performance acoustic protection for road, rail, and urban environments.

# Genus Noisewall™

## Acoustic Protection

## NEW PRODUCT

<b>PERFORMANCE</b>	Tested and proven.
<b>CERTIFICATION</b>	To international standards.
<b>MANUFACTURING</b>	To quality assured ISO 9001.
<b>INSTALLATION</b>	Speed and simplicity.
<b>ENVIRONMENT</b>	Sympathetic and 100% recyclable.
<b>PRICE</b>	Initial outlay and cost of life.

## INTRODUCTION

Tested, certified and proven performance. The Genus Noisewall™ is a patented high performance acoustic protection for road, rail, and urban environments. The Genus Noisewall acts as a resonant absorber as well as a reflective barrier.

Constructed using the latest in advanced polymers and engineered to maximise acoustic performance, the Genus Noisewall also features high impact resistance. The Genus Noisewall is resistant to growing lichen or moss, and combined with an easy to clean and graffiti resistant surface makes it ideal for maintaining its appearance over time.

The intelligent panel features a one-piece moulding meaning no assembly is required and can be rapidly installed. The durable, highly UV stable polymer is adaptable to having custom panel face designs and colours made to suit the situation. The Genus Noisewall is not only functional but can also be architecturally and aesthetically designed to suit its installed environment.

- Panel STC 36.
- Ease and speed of installation.
- No fixings required to attach to columns.
- Double tongue and groove to minimise noise transmission through horizontal joints.
- Built-in acoustic seal around posts.
- Light weight - only 50kg per 4m panel.
- Optional stiffening steel bar simply dropped between panels to increase wind load rating.
- Architecturally and aesthetically adaptable.

## SPECIFICATIONS

Panel Length	3980mm
Effective Panel Height	800mm
Capping Height	200mm
Custom Colours	Yes
Panel Material	UV Stabilised PE
Stiffening Bars	Galvanised Steel
Weight (per panel)	50kg



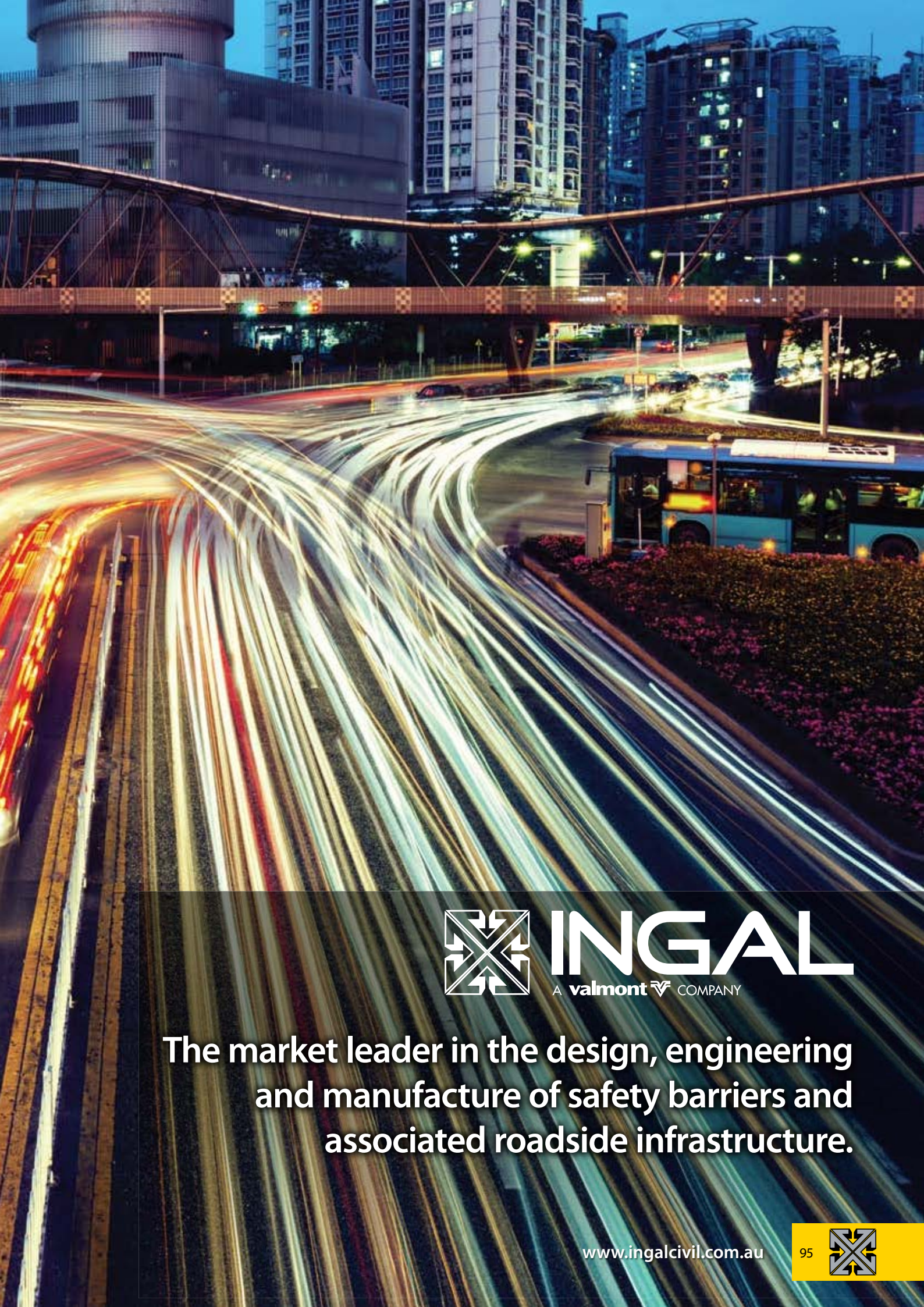
The Genus Noisewall™ is manufactured by **GENUS**











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**The market leader in the design, engineering  
and manufacture of safety barriers and  
associated roadside infrastructure.**

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95







# INGAL

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