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Protective Street Furniture PAS 68 / IWA 14



**Marshalls**

*Creating Better Spaces*







Marshalls has been manufacturing hard landscaping materials for over 120 years and has become the leading supplier of the products that create our urban environment.

Marshalls products are used nationwide by customers who are seeking reliable, high quality goods and services. Whether it's innovative paving, sustainable drainage systems or street furniture, Marshalls is a brand that businesses can trust.

Indeed Marshalls has earned the status of Superbrand for six consecutive years, an award bestowed only upon the most reputable, most influential brands in their field.

We believe it is all a consequence of our passion to create better, safer spaces.



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Following events in recent years, the threat that vehicles pose to the public has been highlighted to unprecedented levels.

Marshalls places an emphasis on the development of physical perimeter security products designed to protect people, places and infrastructure from the threat of vehicle-borne attacks whether intentional or accidental.

Marshalls RhinoGuard™ products have been successfully tested in accordance with BSI PAS68, PAS69 and IWA Standards for vehicle security barriers as set by the Government and key agencies such as The Home Office, Office for Security and Counter-Terrorism, The Centre for the Protection of National Infrastructure (CPNI) and The National Counter Terrorism Security Office (NaCTSO).

The Standard tests a specific vehicle weight impacting a barrier at a specific speed (for example, a 1.5 tonne vehicle crashing into a bollard at 30mph). Testing weights range from 1.5 tonnes to 2.5 tonnes at speeds of either 30, 40 or 50mph.

As an active member of the Perimeter Security Suppliers Association (PSSA), Marshalls designs and supplies products to provide effective hostile vehicle mitigation in proportion with all levels of risk, site vulnerability and project budgets.

**For more information on classifications and designs, please contact us on 0370 600 2425.**



RhinoGuard™ 15/30



RhinoGuard™ 75/30 Seat Frame



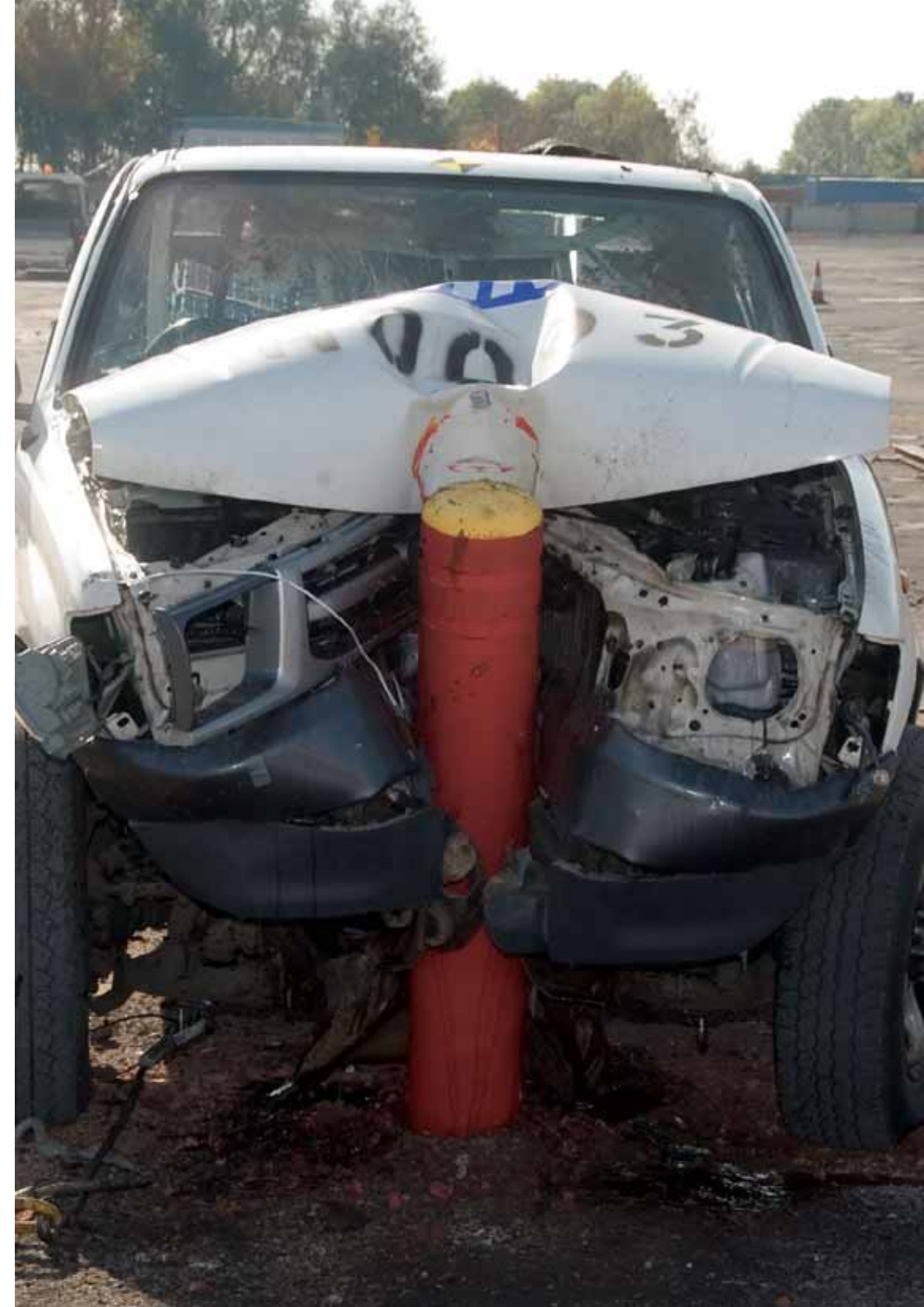
RhinoGuard™ 75/40



RhinoGuard™ 75/30 Seating



RhinoGuard™ 75/30 Shallow mount excavation



## Protective Street Furniture





## Protecting People, Places and Infrastructure



By offering a diverse range of Street Furniture products with integrated protective technology, Marshalls provides a comprehensive solution to protect people, places and infrastructure without compromising the aesthetics of the surroundings.

### Protecting People

The threat to individuals within a public space is at the forefront of consideration for the entire security and protection industry. The vulnerability of people within public spaces to hostile vehicles and accidental collision has never been a more major concern.

### Protecting Places

Crowded places remain an attractive target for terrorists who have demonstrated that they are likely to target places which are easily accessible and readily available. The challenge is to fully secure a public space without restricting the flow of pedestrian traffic or compromising the aesthetics of an area. The term 'Crowded Place' can apply to a wide range of areas throughout the public realm, including:

- City / Town Centres
- Shopping Centres
- Leisure Venues
- Visitor Attractions
- Sports Stadia
- Accident blackspots

### Protecting Infrastructure

The UK's national infrastructure is defined by the Government as: "those facilities, systems, sites and networks necessary for the functioning of the country and the delivery of the essential services upon which daily life in the UK depends". Therefore the protection of critical infrastructure is vital in maintaining the everyday operation of the country.

### Areas which make up the National Infrastructure include: Transport Infrastructure

- Rail network, aviation, maritime.

### Key Utilities

- Gas, water, electricity and nuclear power.

### Emergency Services

- Police, healthcare and the fire services.

### Finance

- Large commercial and economic centres.

A key element of the strategy to protect people, places and our infrastructure from any domestic or international threat is to promote the adoption of protective design principles in the planning and design process of a space. This will help in reducing the vulnerability of our infrastructure to all kinds of threats, from hostile vehicle-born attacks to ram raids and accidental collisions.

### 1. HOSTILE VEHICLE MITIGATION

The primary objective of Hostile Vehicle Mitigation measures (HVM) is to keep hostile vehicles as far away from buildings and people as possible, through a variety of methods and techniques.

The concept of Hostile Vehicle Mitigation involves the careful consideration of a number of factors, including; the effects of blast loading, assessments of vehicle dynamics and potential vehicle approach routes, solutions for vehicle exclusion and traffic calming. Ultimately, it involves the implementation of physical security measures to help create safe 'stand off distances' between hostile vehicles and potential targets.

### 2. RAM RAIDING

Ram-raiding is a variation on burglary in which a vehicle is driven at a location with the intention for perpetrators to breach physical security and to loot it. Commercial properties, shop fronts and ATMs are constantly under threat of attack from ram-raiders if not sufficiently protected.

### 3. VEHICLE RESTRAINT

As more vehicles frequent the country's roads, the threat of accidental collision increases significantly. Effective vehicle restraint must be integrated into the design of an urban space to protect people from vehicle collision in accident blackspots.



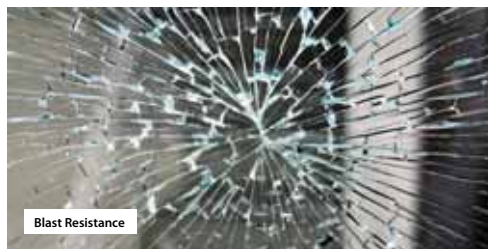
Hostile Vehicle Mitigation



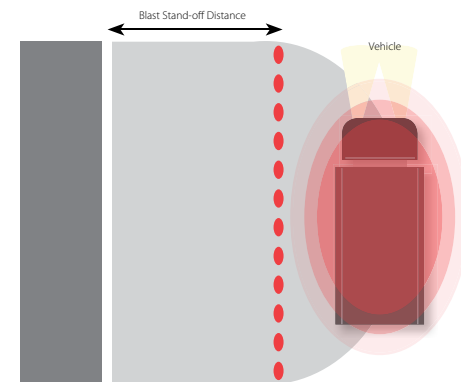
Supermarket Ram-Raid



Vehicle restraint precaution



Blast Resistance



Blast Stand-off Distance

### PAS 68

At the heart of the concept of Hostile Vehicle Mitigation is the BSI PAS 68 standard. PAS 68 specifies a performance classification for vehicle security barriers and their foundations when subjected to a horizontal impact.

PAS 68 involves the physical impact testing of perimeter security products at varying speeds with different vehicle types. This ranges from medium sized saloon cars to large trucks, measuring the penetration of the load carrying part of the vehicle beyond the barrier.

The existence of PAS 68 enables business and organisations to specify assured levels of protection against hostile vehicles, at a level that is in proportion with the risk of attack at their specific site.

### PAS 69

BSI PAS 68 is complemented by the PAS 69 document, which provides guidance on the selection, installation, foundations and use of PAS 68 tested security products, taking into account site specific conditions. PAS 69 suggests a maximum gap of 1.2m between the installed, upright faces of successive security products, to ensure that vehicles are prevented from encroaching freely between the barriers.

### PAS 170

The existing PAS standards are based on average vehicle speed within the UK borders. This means that most of the protective products are impact tested for vehicle speeds between 30 and 50 mph. Will these solutions, though, be sufficient for roads and spaces with an average speed less than 30mph?

The Government is set to introduce the PAS 170 standard, which is proposed to be a low speed test around 20mph. This will help all clients in specifying products fit for the speeds occurring and not over engineering their design or their budget.

Marshalls already has products ready for PAS 170 testing, in order to provide all specifiers with a quick and cost effective solution, when the standard is launched.

Whilst it is only through specifying products successfully tested in accordance with PAS 68 that protective security can truly be assured, this does not necessarily mean that the highest specifications of PAS 68 protection are always required.

Depending on site specific conditions, such as the traversability of the surrounding landscape, it is not always physically possible for larger vehicles to reach the required speeds to carry out a successful attack. In these cases, lower, more cost effective levels of protection can be employed, meaning that tested security and peace of mind can be achieved in proportion with all levels of risk, vulnerability and project budget.

### IWA

IWA is an international Standard for counter terrorism impact testing agreements which incorporates PAS68, PAS69, CEN Workshop Agreement and, eventually, the PAS170 standards. Hence, no matter where you are based or where you want to create a safe and beautiful space, the IWA workshop agreement standardises all counter terrorism impact testing agreements and models and combines them into one, making the testing and specification of products easier and clearer for all specifiers.

The agreement provides guidance on selection, installation and use of vehicle security barriers, to ensure that they are selected and placed as effectively as possible. Marshalls take this an extra step further, by making functional items beautiful as well, so as not to compromise the aesthetics of the surrounding architectural space.

The testing methods and criteria outlined in the workshop agreement are a combination of those outlined in the BSI PAS 68, 69, CEN and American K standards. As such, any products that have been successfully tested to the requirements of IWA are also approved to the requirements of all previous standards as well (PAS68, PAS69, CEN, International American Standards).

Marshalls is an IWA workshop contributor, involved in the development of the actual IWA Standard, together with other International bodies such as the Centre for the Protection of National Infrastructure (CPNI), MIRA, the Norwegian Defence Estates Agency, the Royal Military Academy, Transport Research Laboratory (TRL) and Middle East and US Defence bodies such as the US Department of State and the Army Corps of Engineers.

# Key Design Principles

The main objectives of protective design are to:

- Deter would be intruders, whether these are terrorists or vehicle drivers
- Delay an intrusion for a sufficient time to allow a response force to attend
- Prevent vehicle collision around accidental blackspots

Incorporating appropriate physical security measures into landscape design is an essential part of protecting people, places and infrastructure. However, it is equally important that any measures incorporated are proportionate to the threat, and consider the physical, functional and aesthetic impact on the surrounding environment.

Vehicle Speed km/h (mph)	Vehicle Mass (kg)				
	1500	2500	3500	7500	30000
16 (10)	15kJ	25kJ	35kJ	74kJ	296kJ
32 (20)	59kJ	99kJ	138kJ	296kJ	1185kJ
48 (30)	133kJ	222kJ	311kJ	667kJ	2667kJ
64 (40)	237kJ	395kJ	553kJ	1185kJ	4741kJ
80 (50)	370kJ	617kJ	864kJ	1852kJ	7407kJ
96 (60)	533kJ	889kJ	1244kJ		
112 (70)	726kJ	1210kJ			

The table above provides the kinetic energy values (in kJ) created on impact, for each of the vehicle types and speeds used in BSI PAS 68 and CWA 16221 impact testing.





Introducing protective security into an environment does not mean that the aesthetics of the surrounding area must be compromised. RhinoGuard™ bollard cores have been developed and tested so that they can be specified with cosmetic sleeves in various materials, to complement any surrounding area.

**SLEEVE OPTIONS**

Standard sleeve designs are available in steel and stainless steel and can be specified with reflective banding for increased visibility and safety. Bespoke design commissions for other styles and finishes can also be accommodated on request.

**STEEL**

Steel sleeves are treated with the Akzo Nobel, Interpon PZ 770 system, being first treated with a zinc primer for enhanced corrosion protection and finished with a polyester powder topcoat. Bollards are supplied in Black RAL 9005 as standard; however a full range of RAL colours is also available. Steel sleeves are available in three standard flat top designs; Plain, and with single or double grooved reflective bands.

**STAINLESS STEEL**

Stainless steel sleeves are manufactured from a carefully selected Grade 316L (1.4401). Exceptionally strong and requiring very low maintenance, the material provides higher resistance to corrosion, pitting and staining compared to other grades. Stainless steel sleeves are provided with a brushed satin finish as standard. A bright polished finish is also available on request. Stainless steel cosmetic sleeves are available in six standard styles, which include plain, single and double-banded designs, with a choice of either a flat or mitred top.



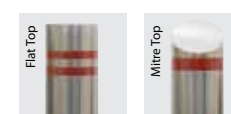
Bollard	Diameter (mm)			Height above ground* (mm)	Foundation Depth Available		Finish Options Available				Standard Banding Options			Top Options	
	Core	Steel Sleeves	Stainless Steel Sleeves		Standard Depth	Shallow Mount	GEO	Power Coated Steel	Stainless Steel	Ferrocast	No Band	One Bands	Two Bands	Flat Top	Mitre Top
15/30	114	168	129	1000	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
25/40	168	194	204	1000	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
75/40	168	194	204	1000	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
75/50 Slimline	194	204	204	1000	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
75/50	244	273	254/273	1000	✓			✓	✓	✓	✓	✓	✓	✓	✓
25/40 SM	168	194	204	1000		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
75/30 SM	194	204	204	1000		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
75/40 SM	244	273	254/273	1000		✓		✓	✓	✓	✓	✓	✓	✓	✓
72/50 SM	244	273	254/273	1000		✓		✓	✓	✓	✓	✓	✓	✓	✓

Mitre Top only available on Stainless steel sleeves

Top Options



Standard Banding Options



# Design Options



## FERROCAST™

Polyurethane Street Furniture

**BESPOKE DESIGN**

**Ferrocast is an engineering grade polyurethane, which can be cast into any shape around a steel core.**

With Ferrocast, it is possible to cast pieces of street furniture which have an appearance and finish identical to cast iron but which have all of the benefits of polyurethane.

Ferrocast is a low-maintenance solution that provides an exceptionally strong, non-ferrous exterior which is completely

resistant to the effects of rust and corrosion. The material contains coloured pigments throughout to match the ultimate paint colour, meaning that in the event of any exterior damage, the appearance of scratches and abrasions are minimised.

RhinoGuard™ Ferrocast bollards can be designed in almost any style to complement any landscape and meet individual project requirements. Bollards can be designed to recreate an existing traditional theme ideal for heritage sites, or to create a more unique contemporary styling.

**GEO STAINLESS STEEL**

The GEO bollard features a bead blasted grade 316 stainless steel body, and is finished with a contemporary machine finished stainless steel cap. Exceptionally strong and requiring very low maintenance, the material provides higher resistance to corrosion, pitting and staining compared to other grades.



## Our Portfolio

**Whilst the main objective of Protective Street Furniture solutions is to ensure that they provide the required levels of security to sites at potential risk, Marshalls believes that it is also vital that landscapes remain functional, attractive and appreciated by the communities that use them.**

Incorporating some of the more traditional methods of hostile vehicle mitigation into landscape design, such as large diameter bollards, can sometimes have a negative visual impact on an architectural space. For this reason, the concept of protective street furniture has received some resistance from those involved in the design of the built environment, as they feel it restricts architects to designing bland, standardised places without any real sense of character or individual identity.

To address this, Marshalls has assembled a highly specialised team of designers and engineers to develop innovative, design-led solutions including bollards, lighting, seating, planters, litter bins, post & rail and cycle stands, creating better and safer spaces for users to enjoy.

### Materials

To provide a solution to fit almost any surrounding, the Protective Street Furniture range utilises materials including:

- Precious Stone
- Polyurethane
- Stainless Steel
- Concrete



The growing demand for less complicated and more cost effective ways to protect people, places and infrastructure without compromising any aesthetics is becoming the preferred choice of specifiers, when it comes to specifying PAS products.

**Marshalls' RhinoGuard™ range of products can give clients, contractors and specifiers a comprehensive, cost effective and aesthetically fitting solution for every architectural design.**

- Our RhinoGuard™ technology integrated in our protective street furniture reassures all clients and public realm users of having a beautiful yet functional and safe space to enjoy.
- Our successful third party testing is proof that all Marshalls protective products are tested and passed, complying with all PAS, IWA and CWA European and International Standards.
- Our products are not over-engineered, keeping the manufacturing, contractor and installation costs to a minimum.
- With the variety of materials used, maintenance is minimal whilst integration with the existing landscape is always achievable, whether the space is traditional or modern.
- Marshalls offers a bespoke design product service, giving an opportunity to integrate protective RhinoGuard™ technology into a variety of different designs.
- Aesthetics are never compromised with Marshalls products. We like to keep people, places and infrastructure protected whilst still providing a visually attractive product, fitting any type of architectural surroundings.

All protective street furniture is complemented by Marshalls paving and drainage. Have a look at our website on [www.marshalls.co.uk/commercial](http://www.marshalls.co.uk/commercial) for a comprehensive list of products under each category.

	Average Road Speed	Marshalls Protective Product	
<b>Bollards</b>	<b>Standard</b>	Up to 30mph	RhinoGuard™ 15/30 Protective Core
		30-40 mph	RhinoGuard™ 25/40 Protective Core RhinoGuard™ 75/40 Protective Core
	40-50mph	RhinoGuard™ 75/50 Slimline Protective Core RhinoGuard™ 75/50 Protective Core	
	<b>Shallow Mount</b>	Up to 30mph	RhinoGuard™ 75/30 Shallow Mount Protective Core
		30-40 mph	RhinoGuard™ 25/40 Shallow Mount Protective Core RhinoGuard™ 75/40 Shallow Mount Protective Core RhinoGuard™ 72/50 Shallow Mount Protective Core
		Up to 30mph	EOS 75/30 Protective Seat
<b>Seats</b>	30-40 mph	RhinoBlok™ 72/40 Protective Seat Igneo 75/40 Protective Seat	
	<b>Planters</b>	Up to 40mph	75/40 Protective Planters
40-50mph		75/50 Protective Planters	
<b>Litter Bins</b>	Up to 30mph	GEO Litter bin	
	30-40 mph	GEO Litter bin	
	40-50mph	GEO Litter bin	
<b>Cycle Stands</b>	Up to 30mph	Cycle Stand	
	30-40 mph	Cycle Stand	
	40-50mph	Cycle Stand	



## Decision Making Process

For specification

Vehicle Weight (tn)	Speed (mph)	Bollards Static	Bollards Shallow	Seats	Planters	Litter Bins	Cycle Stands
1.5 <sup>2</sup>	30	X	X	X	X	X	X
2.5 <sup>2</sup>	40	X	X	X	X	X	X
7.2 <sup>1</sup>	40			X	X		
	50		X	X	X	X	X
7.5 <sup>2</sup>	30		X	X	X	X	X
	40	X	X	X	X	X	X
	50	X		X	X	X	X

**X – Available in the Marshalls Protective Street Furniture range**

**X – Available through Bespoke Product Solutions service**

1 – IWA certified

2 – PAS 68 certified

### Choose the right Protective Product for your specification

#### Stage 1 - Choose your rating

Once the appropriate speed rating has been determined, relevant products can be sourced.

#### Stage 2 - Choose your product type

Choose the type of street furniture you would like to specify in your design, i.e. bollards, seats, planters, litter bins, etc.

#### Step 3 - Choose your aesthetic

Choose the Marshalls protective product you need to fulfil your specification from an abundance of individual, stand-alone products to a comprehensive protective range which will complement any type of architectural surrounding.



Providing effective protection of critical infrastructure, people and places, Marshalls introduces the 15/30 Protective Bollard, providing proven levels of performance at a distinct level of protection and budget.

Our successfully crash tested RhinoGuard™ technology is built into the core, with a sleeve being placed over it to provide a more attractive finish in all locations where aesthetics and safety are key.

The core diameter is Ø114mm with three sleeve options: steel, stainless steel and Ferrocast .

The system has been designed and tested showing it meets the requirements of PAS 68 and achieved a successful certificated rating.

## RhinoGuard™ 15/30 Protective Bollard

Product Name	Excavation depth (mm)	Core Diameter (mm)	Height Above Ground (mm)(FGL)	Core Weight (Kg)	Sleeve diameter	Finish
RhinoGuard™ 15/30 Protective Bollard	500	Ø114	1000	90	Ø168	Steel/ Powder Coated
	500	Ø114	1000	90	Ø129	Stainless Steel
	500	Ø114	1000	90	Various	Ferrocast

\* Cap and Core finish also available. For further information, please contact our sales office on 0370 600 2425.  
\* Bolt down version also available

Vehicle: Unladen 1.5 tonne saloon car  
Vehicle Speed: 30mph (48km/h)  
PAS 68 Classification Code: Standard Bollard  
PAS 68:2007:V/1500(M1)48/90:1.3/0.0

*For sleeve style options please see page 6.*







Typical protective PAS68 bollard foundations consist of a combination of concrete and steel reinforcement, with some product available requiring up to 1000mm of depth below ground. However, for many sites requiring safety and protection, the existence of underground utilities and cramped building foundations can prohibit this level of excavation without serious disruption.

Marshalls helps tackle the shallow excavation problem with the RhinoGuard™ 25/40 Shallow Mount Protective Bollard, requiring up to 75% less excavation than some standard PAS68 systems, resulting in a cost effective installation and less time spent on site. Our successfully crash tested RhinoGuard™ technology is built into the core, with a sleeve being placed over it to provide a more attractive finish in all locations where aesthetics and safety are key.

If the application requires protective bollards of standard depth and of a 25/40 PAS68 rating, Marshalls is able to provide you with the version of the RhinoGuard™ 25/40 Protective Bollard.

*The difference is only visible under the ground, meaning the installation will not compromise aesthetics at any cost. It is a perfect solution for sites where medium-sized vehicles can be viewed travelling at average speeds up to 40mph.*

*For sleeve style options please see page 6.*

## RhinoGuard™ 25/40

Standard and Shallow Mount Protective Bollard

Product Name	Excavation depth (mm)	Core Diameter (mm)	Height Above Ground (mm)(FGL)	Core Weight (Kg)	Sleeve diameter	Finish
RhinoGuard™ 25/40 Protective Bollard	600	Ø168	1000	180	Ø194, Ø204	Steel/ Powder Coated
	600	Ø168	1000	180	Ø204	Stainless Steel
	600	Ø168	1000	180	Various	Ferrocast
RhinoGuard™ 25/40 Shallow Mount Protective Bollard	152	Ø168	1000	340 to360	Ø194	Steel/ Powder Coated
	152	Ø168	1000	340 to360	Ø204	Stainless Steel
	152	Ø168	1000	340 to360	Various	Ferrocast

\*Cap and Core finish also available. For further information, please contact our sales office on 0370 600 2425.

### Test 1

Vehicle: Unladen 2.5 tonne 4x4 utility vehicle  
Vehicle Speed: 40mph (64km/h)

PAS 68 Classification Code: Standard Bollard  
PAS 68:2007:V/2500(M2)/64/90:0.0/0.0

PAS 68 Classification Code: Shallow Mount  
PAS 68:2010:V/2500(M2)/64/90:2.3/0.0

Typical protective PAS68 bollard foundations consist of a combination of concrete and steel reinforcement, with some product available requiring up to 1000mm of depth below ground. However, for many sites requiring safety and protection, the existence of underground utilities and cramped building foundations can prohibit this level of excavation without serious disruption.

Marshalls helps tackle the shallow excavation problem with the RhinoGuard™ 75/40 Shallow Mount Protective Bollard, requiring up to 75% less excavation than some standard PAS68 systems, resulting in a cost effective installation and less time spent on site. Our successfully crash tested RhinoGuard™ technology is built into the core, with a sleeve being placed over it to provide a more attractive finish in all locations where aesthetics and safety are key.

If the application requires protective bollards of standard depth and of a 75/40 PAS68 rating, Marshalls is able to provide you with the standard version of the RhinoGuard™ 75/40 Protective Bollard.

*The difference is only visible under the ground, meaning the installation will not compromise aesthetics at any cost. It is a perfect solution for sites where medium-sized vehicles can be viewed travelling at average speeds up to 40mph.*

The system has been designed and tested showing it meets the requirements of PAS 68 and achieved a successful certificated rating.

**Vehicle: Fully laden 7.5 tonne two axle rigid N2 lorry**  
**Vehicle Speed: 40mph (64km/h)**

**PAS 68 Classification Code: Shallow Mount:**  
**PAS 68:2013:V/7500(N2)/64/90:1.8/0.0**

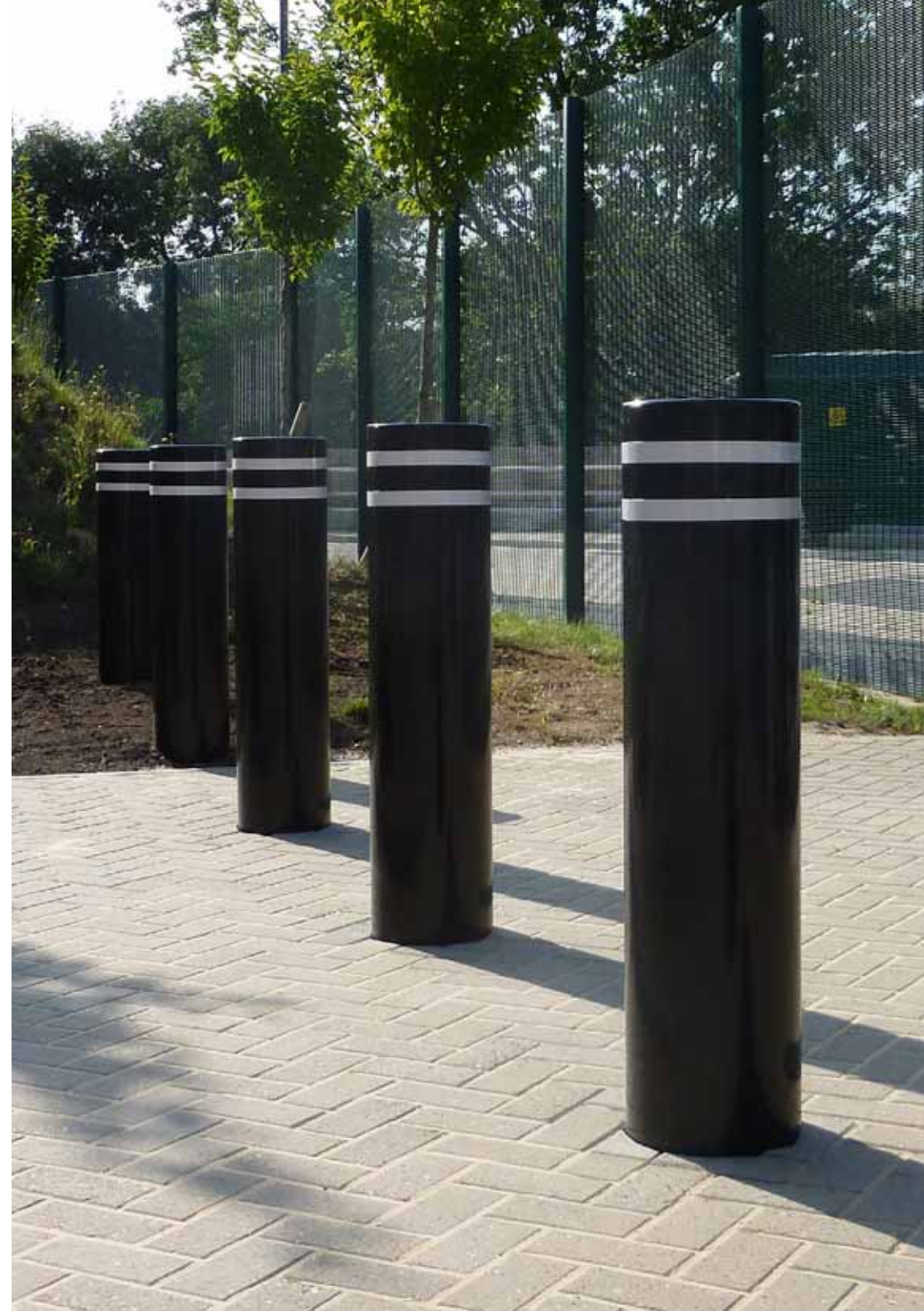
**PAS 68 Classification Code: Standard Bollard:**  
**PAS 68:2010:V/7500(N2)/64/90:8.7/0.0**

Product Name	Excavation depth (mm)	Core Diameter (mm)	Height Above Ground (mm)(FGL)	Core Weight (Kg)	Sleeve diameter	Finish
RhinoGuard™ 75/40 Protective Bollard	600	Ø168	1100	210	Ø194	Steel Powder Coated
	600	Ø168	1100	210	Ø204	Stainless Steel
	600	Ø168	1100	210	Various	Ferrocast
Product Name	Excavation depth (mm)	Core Diameter (mm)	Height Above Ground (mm)(FGL)	Core & Frame weight (kg)	Sleeve diameter	Finish
RhinoGuard™ 75/40 Shallow Mount Bollard	154	Ø244	1000	560	Ø273	Steel Powder Coated
	154	Ø244	1000	560	Ø254mm, Ø273mm	Stainless Steel
	154	Ø244	1000	560	Various	Ferrocast

\*Cap and Core finish also available. For further information, please contact our sales office on 0370 600 2425.

## RhinoGuard™ 75/40

### Standard and Shallow Mount Protective Bollard



For sleeve style options please see page 6.





## RhinoGuard™ 72/50

### Shallow Mount Bollard

Providing effective protection of critical infrastructure, people and places, Marshalls introduces the RhinoGuard™ 72/50 Shallow Mount Protective Bollard, providing proven levels of performance at a distinct level of protection and budget.

Our successfully crash tested RhinoGuard™ technology is built into the core, with a sleeve being placed over it to provide a more attractive finish in all locations where aesthetics and safety are key. The core diameter is Ø244mm with three sleeve options: steel, stainless steel and Ferrocast. The system has been designed and tested showing it meets the requirements of PAS 68 and achieved a successful certificated rating.

*For sleeve style options please see page 6.*

Product Name	Excavation depth (mm)	Core Diameter (mm)	Height Above Ground (mm)(FGL)	Core Weight (Kg)	Sleeve diameter	Finish
RhinoGuard 72/50 Shallow Mount	175	Ø244	1000	644	Ø273	Steel/ Powder Coated
	175	Ø244	1000	644	Ø256, Ø273	Stainless Steel
	175	Ø244	1000	644	Various	Ferrocast

**Vehicle: 7.2 tonne two axle rigid N2 lorry**  
**Vehicle Speed: 50mph (80km/h)**  
**Classification Code: IWA 14-1:2013 Bollard**  
**V/7200(N2A)/80/90:5.7**



Product Name	Excavation depth (mm)	Core Diameter (mm)	Core Weight (Kg)	Height Above Ground (mm)	Sleeve diameter	Finish
RhinoGuard 75/50 Protective Bollard	750	Ø244	303	1000	Ø273	Steel Powder Coated
	750	Ø244	303	1000	Ø254, Ø273	Stainless Steel
	750	Ø244	303	1000	Various	Ferrocast
RhinoGuard 75/50 Slimline protective Bollard	750	Ø194	260	1000	Ø204	Steel Powder Coated
	750	Ø194	260	1000	Ø204	Stainless Steel
	750	Ø194	260	1000	Various	Ferrocast

\*Cap and Core finish also available. For further information, please contact our sales office on 0370 600 2425.

**Vehicle: Unladen 7.5 tonne two axle rigid N3 lorry**

**Vehicle Speed: 50mph (80km/h)**

**PAS 68 Classification Code: Standard Bollard**

**PAS 68:2013:V/7500(N3)/80/90:5.4/0.0**

**PAS 68 Classification Code: Slimline Standard Bollard**

**PAS 68:2010:V/7500(N3)/80/90:12.5/21.8**

## RhinoGuard™ 75/50 Protective Bollard

**Providing effective protection of critical infrastructure, people and places, Marshalls introduces the 75/50 Protective Bollard, providing proven levels of performance at a distinct level of protection and budget.**

The RhinoGuard 75/50 protective bollard has a Ø244mm core as standard but is also available as a slimline product that can accommodate the Ø204mm sleeve for a more subtle appearance.

Our successfully crash tested RhinoGuard™ technology is built into the core, with a sleeve being placed over it to provide a more attractive finish in all locations where aesthetics and safety are key.

Both the cores are available with three sleeve options; steel, stainless steel and Ferrocast.

The system has been designed and tested showing it meets the requirements of PAS 68 and achieved a successful certificated rating.

*For sleeve style options please see page 6.*







## RhinoGuard™ 75/30

Shallow Mount Protective Bollard

Product Name	Excavation depth (mm)	Core Diameter (mm)	Height Above Ground (mm)(FGL)	Core Weight (Kg)	Sleeve diameter	Finish
RhinoGuard™ 75/30 Shallow Mount Protective Bollard	152	Ø194	1000	370 to 390	Ø204	Steel Powder Coated
	152	Ø194	1000	370 to 390	Ø204	Stainless Steel
	152	Ø194	1000	370 to 390	Various	Ferrocast

\*Cap and Core finish also available. For further information, please contact our sales office on 0370 600 2425.

**Vehicle: Fully laden 7.5 tonne two axle rigid N2 lorry**  
**Vehicle Speed: 30mph (48km/h)**  
**PAS 68 Classification Code: Shallow Mount**  
**PAS 68:2010-V/7500(N2)/48/90:1.5/0.0**

*For sleeve style options please see page 6.*

**Typical protective PAS68 bollard foundations consist of a combination of concrete and steel reinforcement, with some product available requiring up to 1000mm of depth below ground. However, for many sites requiring safety and protection, the existence of underground utilities and cramped building foundations can prohibit this level of excavation without serious disruption.**

Marshalls helps tackle the shallow excavation problem with the RhinoGuard™ 75/30 Shallow Mount Protective Bollard, requiring up to 75% less excavation than some standard PAS68 systems, resulting in a cost effective installation and less time spent on site. Our successfully crash tested RhinoGuard™ technology is built into the core, with a sleeve being placed over it to provide a more attractive finish in all locations where aesthetics and safety are key.

The core diameter is Ø168mm, supplied with a shallow frame and has three sleeve options: steel, stainless steel and Ferrocast.

The system has been designed and tested showing it meets the requirements of PAS 68 and achieved a successful certificated rating.





## Protective Planters

Integrated RhinoGuard™ Technology

**Introducing trees and planting into urban landscapes provides numerous benefits, with research showing positive effects on social and environmental well-being, evoking a sense of pride of place within communities.**

To facilitate the integration of attractive planting into our public spaces whilst also mitigating the threat of vehicle-borne attacks, Marshalls has developed and impact tested a high strength steel frame, designed to fit inside a range of planters.

The RhinoGuard™ 75/50 Planter Frame provides architects and designers with an ideal alternative to the more traditional methods of hostile vehicle mitigation, offering exceptional levels of security along with the benefits of introducing planting to urban spaces.

The design of the RhinoGuard™ frame allows for the root ball of a medium sized tree to be contained inside the planter, providing landscape architects with the freedom they require to introduce creative planting solutions into the built environment. The high strength frame is designed to fit seamlessly inside a range of cosmetic planter styles in various materials, providing a design-led, high performance security solution that can both aesthetically enhance and protect any scheme.

Planters are available in both traditional and contemporary designs, with a variety of material options, including concrete, timber and steel. For larger schemes, the frame also provides an ideal opportunity for completely bespoke solutions.







# Protective Planters

Integrated RhinoGuard™ Technology

Sineu Graff Marquise Planter



Sineu Graff Optima Planter



Sineu Graff Domino Planter



Product Name	Excavation depth (mm)	Height Above Ground (mm)(FGL)	Width (mm)	Finish
RhinoGuard™ 75/50 Protective Planter Frame	950	955	952	Powder Coated
RhinoGuard™ 75/50 Protective Planter Frame with Glove Planter	950	1090	2000	Precious Stone

**Test 1 (frame)**  
 Vehicle: Fully laden 7.5 tonne two axle rigid N2 lorry  
 Vehicle Speed: 40mph (64km/h)  
 PAS 68 Classification Code: PAS68:2010:V/7500(N2)/64/90:0.0/0.0

**Test 2 (frame)**  
 Vehicle: Unladen 7.5 tonne two axle rigid N3 lorry (empty 18 tonner)  
 Vehicle Speed: 50mph (80km/h)  
 PAS 68 Classification Code: PAS68:2010:V/7500(N3)/80/90:1.7/0.0

**Test 3 (frame with Glove planter)**  
 Vehicle: Unladen 7.5 tonne two axle rigid N3 lorry (empty 18 tonner)  
 Vehicle Speed: 50mph (80km/h)  
 PAS 68 Classification Code: PAS68:2010:V/7500(N3)/80/90:3.8/35.5



The introduction of appropriate physical security measures into crowded places and the critical national infrastructure is essential in ensuring that the UK is protected from vehicle borne threats. It is vital that landscapes remain safe and functional yet attractive, in order to be appreciated by the communities that use them.

Igneo is a modular seating system that offers unique contemporary styling, combined with functionality and exceptional impact performance. It can be specified to any length, using any number of modules, dependant on location and the amount of seating places required. Armrests can be installed between seating sections in most RAL colours available to match individual requirements. The seat is available in two colours as standard, coordinating with Marshalls paving.

- Successfully tested based on Government PAS Standards
- Manufactured from Marshalls' fibre reinforced precast concrete, which makes the seat an extremely durable solution, requiring minimal maintenance
- Supplied with anti-graffiti coating as standard
- Armrests made from Ferrocast for a longer life span and minimal maintenance (optional)

To create a co-ordinated result, Igneo Litter Bin, Chair and Appia Bollard complement the seat, together with the Giove Protective Planter and our stainless steel and Ferrocast sleeved bollards.

## Igneo 75/40

### Protective Seat



Product Name	Seat Span (mm)	Seat Height (mm)/(FGL)	Finish
Igneo 75/40 Protective Seat - centre section	1102	474	Concrete
Igneo 75/40 Protective Seat - left/right section	1037	474	Concrete

\* Please note, the installed spacing between Igneo seating and the outer face of the next successive security measure should be a maximum of 900mm

**Vehicle:** Fully laden 7.5 tonne two axle rigid N2 lorry  
**Vehicle Speed:** 40mph (64km/h)  
**PAS 68 Classification Code:**  
**Test 1: Centre:** PAS68:2010-V/7500(N2)/64/90:3.7/0.0  
**Test 2: Off Centre:** V/7500(N2)/64/90:3.5/0.0







## EOS 75/30

### Protective Seat

Product Name	Seat Span (mm)	Height Above Ground (mm)(FGL)	Finish
EOS 75/30 Protective Seat	1800	875	Ferrocast and Timber

\*Please note, the installed spacing between the 75/30 Seat Frame and the outer face of the next successive security measure should be a maximum of 900mm

**Vehicle: Fully laden 7.5 tonne two axle rigid N2 lorry**

**Vehicle Speed: 30mph (48km/h)**

**PAS 68 Classification Code:**

**Test 1: Front Facing (Centre): PAS68:2010:V/7500(N2)/48/90:0.0/0.0**

**Test 2: Back facing (Centre): V/7500(N2)/48/90:3.1/0.0**

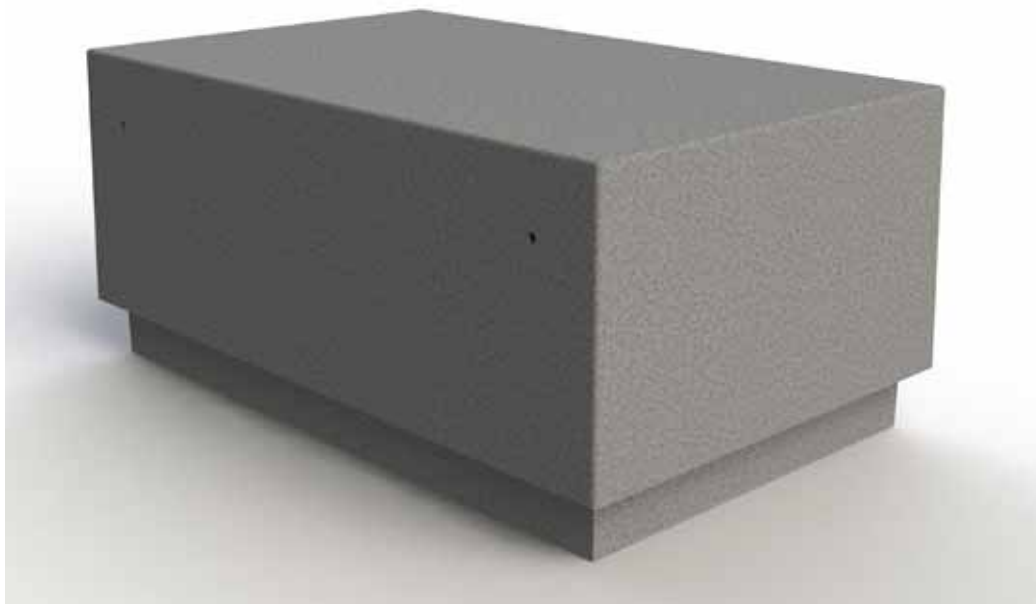
**Test 3: Back facing (Off Centre): V/7500(N2)/48/90:2.7/0.0**

**Introducing adequate seating facilities is an essential aspect of public realm design. Seating provides people with areas to rest and enjoy their surroundings, and can contribute towards the overall character and identity of an outdoor space.**

Marshalls has developed and impact tested an innovative frame structure, designed to fit seamlessly inside an array of seating styles, providing the ultimate in integrated security solutions. This highly engineered RhinoGuard™ technology signals a remarkable breakthrough in the security industry, enabling exceptional levels of protection to be incorporated into the natural street scene, whilst enhancing both the functionality and design of our public spaces. The structure has been developed to enable seating styles in various materials to be designed around it to coordinate with any environment, and is supplied shrouded with the elegant 'EOS' design as standard.

The seat ends are manufactured using our durable Ferrocast polyurethane material, and can be supplied in a wide selection of RAL colours to coordinate with the surrounding environment. Seating slats are manufactured from FSC sourced Iroko hardwood timber, whilst a perforated steel front panel adds to the contemporary design. Utilising the experience and knowledge of our team of design engineers, we can develop bespoke seating styles in many materials, to disguise the crash tested structure and meet the requirements of any project.

To create a co-ordinated result, our Giove Protective Planter and our stainless steel and Ferrocast sleeved bollards are a great choice.



# RhinoBlok™ 72/40

Protective Seat



Protecting people, places and existing infrastructure is very important in all spaces, from traditional to commercial and urban environments. However, keeping spaces and its people safe does not have to compromise the aesthetics of the surrounding areas.

Marshalls introduces the RhinoBlok™ 72/40 Protective Seat, a seat which has inner strength, outer beauty and protects people, places and infrastructure without compromising the appearance of the space.

RhinoBlok™ is made from concrete and comes in a variety of finishes: plain smooth grey, stone effect finish to integrate with existing paving or you can add a timber cladded top for a natural look. RhinoBlok™ can also be utilised as the basis of a timber planter, making it harder to be detected while keeping the aesthetics of the surrounding space.

The seat has been designed and tested showing it meets the requirements of IWA14-1:2013 and achieved a successful certificated rating.

Vehicle: 7.2 tonne N2A lorry  
 Vehicle Speed: 40mph (64km/h)  
 IWA14-1:2013 Classification Code: Blok V/7200(N2A)/64/90:19.3

Product Name	Length (mm)	Width (mm)	Height Above Ground (mm)(FGL)--	Weight (Kg)	Finishes	Order Code
RhinoBlok™ 72/40 Protective Seat	1600	1000	580	2500	Plain (smooth grey)	CQP9070100
	1600	1000	580	2500	Plain with timber top	CQFM4500100
	1600	1000	580	2500	La Linia Mid Grey Stone Effect	CQFM4502100
	1600	1000	580	2500	Saxon Buff Stone Effect	CQFM4502200
	1600	1000	580	2500	Conservation Silver Grey Stone Effect	CQFM4502300
	1600	1000	580	2500	La Linia Mid Grey with Timber Top	CQFM1502150
	1600	1000	580	2500	Saxon Buff with Timber Top	CQFM4502250
	1600	1000	580	2500	Conservation Silver Grey with Timber Top	CQFM4502350





Litter Bin      Cycle Stand      Living Green Wall      Fingerpost      Lighting Solution      Lightstack      Bollard      Illuminated Bollard      Marker Bollard      Monolith

**GEO**  
 Coordinated Range

BEFORE



AFTER



**The coordinated GEO range with integrated RhinoGuard™ Protective Technology reflects the best of modern urban design: simplicity, sustainability and robust materials in a low profile form.**

The GEO "shadow gap" design theme continues throughout the product range to enhance the sense of place and identity. This enables a consistent project signature to be established and helps minimise visual clutter.

The range consists of a bollard, lightstack, living wall, fingerpost, litter bin and lamppost, all with the possibility of integration.

*The GEO Living Wall with integrated protective technology combines natural landscaping with the requirement to protect and secure a public space. The 1m high unit features three upright PAS68 certified GEO bollards with an integrated steel frame to encourage extensive plant growth throughout the product. The product utilises winter hard ivy to ensure dense growth all year round with limited maintenance.*

**For more information, please contact our sales office on 0370 6002425.**

**Problem**

The client BAM Construction was seeking a solution to protect the glass frontage of the shops and restaurants located at this leisure park. A depth restriction of 200mm was placed on any installed products.

The client was seeking protective products which complemented the modern surroundings of the leisure park.

The client also required a range of other street furniture products, such as cycle and motorcycle stands.

**Solution**

Marshalls worked with the client to find the best solutions for this project. Because of the depth restriction placed on installation in certain areas, 5 No RhinoGuard™ 25/40 Protective bollards and 25 No 25/40 Shallow Mount Protective Bollards were chosen. The client opted for Stainless Steel Sleeves, which offer a sleek and modern aesthetic to the products. All of the chosen products are PAS68 rated classified, reassuring clients and space users of the safeguarding of the space, people and infrastructure.

To avoid delays, Marshalls worked closely with BAM to ensure that they could excavate foundations prior to the products being delivered to site to enable them to move on to other areas of the project.

A range of other street furniture products were also supplied by Marshalls, such as standard stainless steel and steel powder coated bollards, Cycle Stands and Motorcycle Stands.

**Benefit**

Marshalls worked with the client to seek the best possible solutions for this project. The chosen bollards offer the required level of protection whilst also allowing for shallow installation and enhancing the aesthetics of the project.

Marshalls was also able to offer a range of highly durable, functional and aesthetically pleasing street furniture solutions for this project.



**BAM Construction**

A Large Leisure & Shopping Park located in the South East of England







### Problem

In 2013, the client Land Securities completed a large outlet village in the South East of England. As a key part of the public realm part of the project, the client sought protective street furniture solutions which would not only offer the required level of protection but would also complement the surroundings of the shopping centre.

The client approached Marshalls to seek advice on what solutions would work best bearing in mind that the development sits on top of a major road tunnel and therefore only products which require shallow installation would be appropriate.

The client was also seeking solutions which would suit the modern aesthetic of the development and which would enhance the surroundings.

### Solution

The client opted to use a range of different types of protective street furniture solutions on this project.

Marshalls recommended the use of RhinoGuard™ 75/30 Shallow Mount Protective bollards, as well as Igneo seating and Giove Protective Planters with integrated Rhinoguard™ technology to break up the line of the bollards.

The RhinoGuard™ 75/30 Shallow Mount Protective bollards only require a depth of 152mm for installation; they have been successfully crash tested in accordance with the BSI PAS 68 Standard, creating effective hostile vehicle mitigation measures and protecting people, places and existing infrastructure.

The large Giove Protective Planter features a large capacity which is designed to accommodate the root ball of a tree.

The Igneo modular seating system offers unique styling, combined with functionality and exceptional impact performance. The Igneo seat has been successfully crash tested in accordance with PAS 68 Standards as set by the Government and it is manufactured from Marshalls' fibre reinforced precast concrete.

### Benefit

The chosen products offer the required level of protection, however they do not look like protective items, instead they are attractive additions to the shopping centre. The large Giove Planters house mature trees which not only attract biodiversity but also offer shade and a pleasing aesthetic. The protective seating, ultra modern in design, is highly durable and offers areas for shoppers to rest.



## Land Securities

A large outlet shopping village in the South East of England







Lighting Columns, Exhibition Road, London



Bespoke Lighting Columns, Canary Wharf



Bespoke Handrail System, The Sage, Gateshead Quays, Newcastle

## Woodhouse Bespoke Product Solutions Service

Bespoke Product Solutions Service

Marshalls Street Furniture promises to bring your vision to life through our bespoke product solutions service.

Our design experience and production expertise are your guarantee of success. We strive to offer a unique service that supports you from your first concept sketches right through to installation of the finished product.



Bespoke LED illuminated balustrade/parapet, Manor Road, Coventry



Cycle Parking, Canary Wharf





Marshalls 360 brings together our design, technical, engineering and consultancy expertise to offer you a support programme like no other. With a full suite of services, all designed around you, Marshalls 360 helps you add certainty to each and every project – **all for no additional cost.**

### Design and Technical Services

Enjoy comprehensive support with a range of services including pre-construction appraisals, product sampling and CAD facilities. And because it's Marshalls, you can be sure it's all backed by a seamless after-sales service.

### Construction Services

Discover the UK's leading traffic planning software, with real-time tracking and priority delivery scheduling. With 12 strategically positioned distribution centres across the UK, our expert construction detailing team is always on hand to make sure your project goes smoothly from start to finish.

### Skills Services

We're dedicated to helping you maintain the highest standards. With RIBA-accredited CPD seminars, bespoke Machine Lay training and in-depth toolbox talks, Marshalls 360 skills services ensure your skill set stays up to date.

Street Furniture

# Marshalls 360

Designed Around You

### Maintenance Services

Give your projects the longevity they deserve with post-construction cleaning regime and a full selection of O&M Manuals. Plus, improve your working practices with our reinstatement and repair advice.

### Accreditation Services

Take a holistic approach to sustainability with specification data and certification alongside our wide-ranging advice on environmental, economic and social issues. Benefit from a business model that provides you with an ever-increasing range of sustainable products.

**To find out how your project could benefit from Marshalls 360, visit [marshalls.co.uk/360](http://marshalls.co.uk/360) or speak to a member of our team today.**





Motis Shelter, Birmingham



Ollerton Sheffield Cycle Stands, Cleveleys



GEO Signage & Fingerpost Combination, Blackpool



GEO Indirect Parklight, Coventry



GEO Illuminated Bollard, Camden



Signage, London



Escofet Equal Seat, Olympic Village



Illuminated Handrail, Glasgow



Saturn Shelter, Wellington Academy



Protective Glove Planter, Cleveleys



Igneo Seat and Litter Bin, Seaton



GEO Pennant Cycle Stands, Kings College