Hostile Vehicle Mitigation
Bristorm Anti-Vehicle Solutions

Hill & Smith Ltd has a long history of the manufacture of highway safety barriers; their extensive product range includes both the Flexbeam corrugated barrier system and Brifen tensioned wire rope systems.

As a founding member of the Hill & Smith Infrastructure Products Group, Hill & Smith Ltd has used its expertise to develop new and novel solutions for the perimeter security market.

Bristorm is now the security division within Hill & Smith Ltd and has developed a range of Hostile Vehicle Mitigation solutions tested at TRL and MIRA to BSI PAS 68 and ASTM F2656. Since 2007, Bristorm has expanded its range to include Bollards and wide range of beam and fencing products all tested to BSI PAS 68, ASTM F2656, IWA 14-1 and BSI PAS 170.

Applications for Bristorm Hostile Vehicle Mitigation systems worldwide include: airports, data centres, banks, cash handling, law enforcement, oil and gas terminals, MOD property, Chemical Plants, Commercial locations and other Critical National Infrastructure.

Technical information can be found on our Xtratech service – xtratech.bristorm.co.uk

xtratech
Quick reference guide

Bristorm Zero Fence
ASTM F2656-07/15 tested and rated

<table>
<thead>
<tr>
<th>Type</th>
<th>Vehicle (Kg)</th>
<th>Speed (mph)</th>
<th>Impact Angle</th>
<th>Standard</th>
<th>Performance Rating</th>
<th>Penetration</th>
<th>Major Debris</th>
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<tbody>
<tr>
<td>Bristorm Zero</td>
<td>6,800</td>
<td>50</td>
<td>90</td>
<td>ASTM F2656</td>
<td>M50 P1</td>
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<td>Bristorm Zero-P2</td>
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Bristorm Fence System
BSI PAS 68 tested and rated

<table>
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<tr>
<th>Type</th>
<th>Vehicle (Kg)</th>
<th>Speed (mph)</th>
<th>Impact Angle</th>
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<tr>
<td>Bristorm 30</td>
<td>7,500</td>
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<tr>
<td>Bristorm 30</td>
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<td>BSI PAS 68</td>
<td>V / 7500 / 64 / 45 : 2.0 / 0.0</td>
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<td>Bristorm 40</td>
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<td>90</td>
<td>BSI PAS 68</td>
<td>V / 7500 / 64 / 90 : 2.0 / 0.0</td>
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<td>Bristorm 50</td>
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<td>90</td>
<td>BSI PAS 68</td>
<td>V / 7500 / 80 / 90 : 2.0 / 12.0</td>
<td>2.0m</td>
<td>12.0m</td>
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<td>Bristorm LP</td>
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<td>90</td>
<td>BSI PAS 68</td>
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<td>Bristorm LP</td>
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<td>90</td>
<td>BSI PAS 68</td>
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<td>4.5m</td>
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Bristorm Beam Fence
BSI PAS 68 tested and rated

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<tr>
<th>Type</th>
<th>Vehicle (Kg)</th>
<th>Speed (mph)</th>
<th>Impact Angle</th>
<th>Standard</th>
<th>Performance Rating</th>
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<th>Major Debris</th>
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<tbody>
<tr>
<td>Bristorm Beam</td>
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<td>BSI PAS 68</td>
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Different fence system layouts and configurations will alter the penetration rating. Please contact our technical department for further information on 01902 499400.
## Bristorm Impeder Bollards

BSI PAS 68 and IWA 14-1 tested and rated

<table>
<thead>
<tr>
<th>Type</th>
<th>Vehicle (Kg)</th>
<th>Speed (mph)</th>
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<td>Impeder 30</td>
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<td>BSI PAS 68</td>
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<td>0.0m</td>
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<td>90</td>
<td>BSI PAS 68</td>
<td>V / 7500 / 48 / 90 : 0.0 / 0.0</td>
<td>0.0m</td>
<td>0.0m</td>
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<td>Impeder 40</td>
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<td>11.1m</td>
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<td>Impeder 50 HD</td>
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<td>50</td>
<td>90</td>
<td>BSI PAS 68</td>
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<td>18.1m</td>
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<td>Impeder 50 Shallow</td>
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<td>50</td>
<td>90</td>
<td>IWA 14-1</td>
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<td>3.0m</td>
<td>20.6m</td>
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## Bristorm Stopper Bollards

BSI PAS 170 tested and rated

<table>
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<tr>
<th>Type</th>
<th>Vehicle (Kg)</th>
<th>Speed (mph)</th>
<th>Impact Angle</th>
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<th>Performance Rating</th>
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<th>Major Debris</th>
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</thead>
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<td>10</td>
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<td>BSI PAS 170</td>
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<tr>
<td>Stopper 20</td>
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<td>20</td>
<td>90</td>
<td>BSI PAS 170</td>
<td>V / 2500 / 32 / 90 : 1.8</td>
<td>1.8m</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Specialists in Hostile Vehicle Mitigation

Bristorm offers a novel range of static anti-vehicle perimeter fencing solutions as well as a range of BSI PAS 68 and BSI PAS 170 Hostile Vehicle Mitigation products.

Bristorm products are available in a wide range of specifications and offer protection from hostile vehicles from 2,500Kg to 7,500Kg and from 10mph to 50mph.

Hill & Smith Total Perimeter Solutions:

> Zero Fence
Our newest and most advanced perimeter fence offering up to M50 P1 performance

> Impeder Bollards
An extensive range of high performance, high security static bollards tested to BSI PAS 68 or IWA 14-1

> Stopper Bollards
Our newest range of reliable, cost-effective, static Bollards tested to BSI PAS 170 are designed to mitigate errant, slow moving, passenger vehicles in all commercial and vulnerable locations

> Beam
Our combined rope and beam system offering shallow foundation but with an equally strong performance, tested against a 7,500Kg truck at 30mph with under 1m penetration

> Street Furniture
Our unique range of attractive Bollard and Street Furniture sleeves sit comfortably over all Impeder and Stopper Bollards, therefore fulfilling both aesthetic and security requirements
Bristorm Zero is available in a variety of different configurations depending on your specific requirements. The Bristorm Fence deflects and absorbs energy upon impact making the final deceleration and stopping both rapid and destructive.

Bristorm Zero is the latest high performance anti-vehicle perimeter fence from Hill & Smith Ltd.

It is fully tested and rated to ASTM F2656 M50 P1 and can offer Zero Penetration by a 6,800Kg attacking vehicle.

Our Bristorm Zero is available in three different configurations.

Achieving both M50 P1 and M50 P2 ratings, Bristorm can offer a variety of high performance and cost-effective perimeter security solutions that will fulfil your site security and layout requirements.

www.bristormzero.com

Product Features:

- ASTM F2656 M50 P1 tested and rated – under 1 metre
- Fully tested and rated in soft ground
- Zero tension system – no maintenance
- Zero major debris
- New rope mounting bracket technology
- Extended lengths between main anchor posts
- Truck remains outside your perimeter
- Seamless and flexible – corners and angles are no issue
- Can be combined with other Bristorm systems
- Standard Bristorm steel ropes which are easy to handle
- Fully galvanised for erosion protection

**Bristorm Zero System**

ASTM F2656-07/15 tested and rated

<table>
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<tr>
<th>Type</th>
<th>Vehicle (Kg)</th>
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<td>Bristorm Zero-P2</td>
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<td>M50 P2</td>
<td>3.0m</td>
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ASTM F2656-07/15 is the test method that provides a structured procedure to establish a penetration rating for vehicle perimeter barriers subjected to a vehicle impact at 30, 40 and 50mph. Knowing the penetration rating provides the ability to select an appropriate barrier for site-specific conditions around a facility. ASTM F2656 is most commonly recognised across the US and Middle East.
Varied levels of performance to ensure your site is appropriately protected from a perceived vehicular threat. Modular fitment allows you to develop a cost-effective solution that will protect your perimeter from a vehicle-borne attack.

Product Profile
Bristorm 30, 40, 50, LP & IVP. Discrete Wire Rope Perimeter Protection.

Bristorm HVM perimeter fence systems are novel solutions consisting of an arrangement of tensioned standard Bristorm steel ropes each supported on steel line posts and secured by anchor posts.

The high modulus of elasticity of the steel ropes means re-tensioning is not required and all components are fully galvanised at our own facility in the UK. All systems are rated and tested to BSI PAS 68 meaning they can appropriately mitigate a 7,500Kg hostile vehicle travelling at speeds of 30, 40 and 50mph.

Our Bristorm LP and IVP systems are crash tested at 40mph against a 2,500Kg pick-up truck. Our wire rope HVM perimeter fence within integrated personnel fence is a cost-effective alternative designed to protect long stretches of perimeter on uneven ground.

Product Features:
- ✔️ Tested to BSI PAS 68
- ✔️ 4 versions available – up to 7,500Kg/50mph N3 performance
- ✔️ Economic, subtle and efficient operation
- ✔️ Allows clear line of site
- ✔️ Low maintenance
- ✔️ Quick installation in all ground types
- ✔️ Modular fitment – different levels of protection available in the same fence line
- ✔️ Foundations remain in place after impact
- ✔️ Immobilises attacking vehicle
- ✔️ Ability to withstand subsequent encroachment

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<td>Bristorm 40</td>
<td>7,500</td>
<td>40</td>
<td>45</td>
<td>V / 7500 / 64 / 45 : 2.0 / 0.0</td>
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<tr>
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<td>V / 2500 / 48 / 90 : 1.64 / 2.86</td>
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</tr>
<tr>
<td>Bristorm IVP</td>
<td>2,500</td>
<td>40</td>
<td>90</td>
<td>V / 2500 / 64 / 90 : 3.2 / 4.5</td>
<td>3.2m</td>
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</table>

BSI PAS 68 identifies impact test methods, tolerances, test vehicle type and vehicle performance criteria that need to be met in order to conform to PAS 68. PAS 68 cites a classification system for the performance of vehicle security barriers and their supporting foundations when subjected to a single horizontal impact by a 7,500Kg truck travelling at 30, 40 and 50mph. This standard is most commonly recognised across the UK and Europe.
Shallow and surface mount, tensioned HVM barrier offers 0.3 metre penetration by a 7,500Kg truck travelling at 30mph.
Suitably installed across industrial sites and Critical National Infrastructure where underground services are present.
Quick installation and reliable performance.
Bristorm Beam uses combined technologies of rope and specially developed beam. This system consists of shallow end foundations of just 500mm deep and line posts then can be surface or shallow mounted into a 250mm deep ground beam.

It is ideal when underground services are present and if a penetration of less than 1 metre is required to mitigate a 7,500Kg truck travelling at 30mph. With zero major debris and a corrugated beam profile, it can be appropriately installed into heavily built up locations thus ensuring the protection of pedestrians and asset throughout, e.g. Industrial yards or distribution sites.

Product Features:
- Tested to BSI PAS 68
- Industry Leading – low penetration of 0.3m with zero debris
- Shallow foundation of 500mm at each end only
- Surface mounted line posts – or shallow beam of 250mm if required
- Economical and robust alternative to fence and bollards
- Fast installation with reduced civils

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<td>90</td>
<td>V / 7500 / 48 / 90 : 0.3 / 0.0</td>
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</table>
Impeder Bollards are the highest security bollards available in the UK. Tested to BSI PAS 68 or IWA 14-1, Impeder Bollards offer variations in performance, thus allowing you to mitigate the vehicular threat perceived in that specific location.

Simple tested protection from hostile vehicles.
High security, high performance Bollards tested to BSI PAS 68 or IWA 14-1.

Bristorm Impeder Bollards are manufactured from steel tubes and cast into concrete foundations. They can be installed in small groups or as a complete perimeter line to ensure hostile vehicles, travelling at 30, 40 or 50mph, are mitigated.

Product Features:
- Tested to BSI PAS 68 or IWA 14-1
- Economical option for short lengths of perimeter
- Can integrate with other Bristorm products
- Shallow mount versions available
- Immobilises attacking vehicle
- Ability to withstand subsequent encroachment
- Certain models available as removable
- Under 1m penetration version available
- All galvanised as standard – EN ISO 1461:2009
- Stainless steel or powder coat finishes available – see Bristorm Street Furniture

Bristorm Impeder Bollards
BSI PAS 68 and IWA 14-1 tested and rated

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<td>90</td>
<td>V / 7500 / 48 / 90 : 0.0 / 0.0</td>
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<tr>
<td>Impeder 30 Shallow</td>
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<td>90</td>
<td>V / 7500 / 48 / 90 : 0.0 / 0.0</td>
<td>0.0m</td>
</tr>
<tr>
<td>Impeder 40</td>
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<td>90</td>
<td>V / 7500 / 64 / 90 : 3.3 / 0.0</td>
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<tr>
<td>Impeder 50</td>
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<td>90</td>
<td>V / 7500 / 80 / 90 : 10.6 / 11.1</td>
<td>10.6m</td>
</tr>
<tr>
<td>Impeder 50 HD</td>
<td>7,500</td>
<td>50</td>
<td>90</td>
<td>V / 7500 / 80 / 90 : 0.8 / 18.1</td>
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<td>90</td>
<td>V / 7200 / 80 / 90 : 3.0</td>
<td>3.0m</td>
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PAS 170 is the newest Hostile Vehicle Mitigation standard to be published by the CPNI.
It is designed to provide a guaranteed level of protection to pedestrians and infrastructure within crowded locations.
Bristorm Stopper Bollards are the first UK Bollards to be rated against BSI PAS 170.

Product Profile

BSI PAS 170 is a Publically Available Specification, sponsored by the CPNI.

PAS 170 describes an efficient way of testing the performance of a single bollard when hit by a 2500Kg vehicle at low speed.

It is a quick, and proportionate way of testing static bollards that will provide proven protection for many applications.

PAS 170 tested Bollards will typically protect areas that may be hit by a passenger vehicle accidently or by vehicle criminal at up to 20mph.

Cost-effective solutions with a measurable performance.
Medium security, cost-effective Bollards tested to BSI PAS 170.

Bristorm Stopper Bollards will appropriately protect pedestrians and infrastructure from accidental or intentional vehicular collisions, such as a ram raid attack. Manufactured from steel tubes and cast into concrete, Bristorm Stopper Bollards provide a guaranteed level of performance making them ideal across all retail, commercial and vulnerable locations.

Product Features:

- Fully tested anti-ram bollard solution
- Ideal for commercial and retail parks, car parks and city centres
- Reliable system with guaranteed performance
- No maintenance
- Proven anti-ram performance
- Mitigate errant passenger vehicles – intentional or accidental collisions
- Galvanised as standard – EN ISO 1461:2009
- Simple foundation, no rebar cage
- Bristorm Stopper Bollards are the first UK Bollards to be rated against BSI PAS 170

Bristorm Stopper Bollards

BSI PAS 170 tested and rated

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<tr>
<th>Type</th>
<th>Vehicle (Kg)</th>
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<td>0.1m</td>
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<tr>
<td>Stopper 20</td>
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<td>20</td>
<td>90</td>
<td>V / 2500 / 32 / 90 : 1.8</td>
<td>1.8m</td>
</tr>
</tbody>
</table>
Combining aesthetics and HVM to ensure all retail, commercial and crowded locations are kept safe and secure.
Combing aesthetics and HVM. Quality and Performance.

Bristorm Street Furniture and sleeves come in a variety of finishes to ensure they can be fully integrated into any commercial environment. All Bristorm Sleeves fit over all Bristorm Impeder and Stopper Bollards meaning the required performance can still be implemented to ensure the protection of pedestrians and infrastructure from a vehicle-borne attack.

Bristorm have the resources and capabilities to develop novel and bespoke solutions that match the requirements detailed within a brief, without the product performance being compromised.

The current range of solutions:
- Stainless Steel Bollard Covers
- Cycle Hoops
- Living Walls
- Pedestrian Guardrail
- Planters

Product Features:
- Mitre, Flat and Dome Bollard tops available
- Variety of sizes available upon request
- Stainless steel or powder coating finish
- Additional branding and reflective strips available
- Bolt down or cast-in foundations

Bristorm has a range of services that will allow you to integrate an appropriate HVM Solution:
- Site visits
- Advise on systems available
- Advise on current HVM standards
- Technical presentations

Contact us for more information on 01902 499400 or email info@bristorm.com
Product Features:
- Bollard core tested to BSI PAS 68 or BSI PAS 170
- Stainless steel, anodized aluminium, aluminium brush galvanised finish
- Dome, Mitre or Flat tops
- Variety of colours and reflective strips available
- Sleeve fixed surface level or below
- Additional branding solutions available
- Integrated LED lighting
- Modular LED cap
- Variety of hoop configurations and designs available

Product Features:
- Posts tested to BSI PAS 68 or BSI PAS 170
- Variety of finishes available
- Variety of panel configurations and designs
- Secured above or below surface level
- Additional branding solutions available
### Bristorm Planters

**Product Features:**
- ✔ Core tested to BSI PAS 68 or BSI PAS 170
- ✔ Variety of finishes available
- ✔ Simple drainage system
- ✔ Different sizes and shapes available upon request
- ✔ 1 Bollard for 1 Planter unit

### Bristorm Living Walls

**Product Features:**
- ✔ Core tested to BSI PAS 68 or BSI PAS 170
- ✔ Variety of finishes available
- ✔ Simple drainage system
- ✔ Shallow mount and zero penetration available
- ✔ Aesthetically pleasing crash rated protection
- ✔ Can be planted up to provide wall of colour or greenery
- ✔ 2 Bollards for 1 Living Wall unit
Simple access to our system drawings and installation guidance:

xtratech.bristorm.co.uk
Bristorm offers an unparalleled level of access to over 10 years of Hostile Vehicle Mitigation (HVM) system knowledge.