



HOSTILE VEHICLE MITIGATION

Catalogue of Security Equipment HVM – Impact Rated

Rating System Explained



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Introduction

This document provides additional information for users of the '<u>HVM – Impact Rated</u>' chapter in NPSA's Catalogue of Security Equipment. It is intended to aid security practitioners in the selection of appropriate Vehicle Security Barriers (VSBs).

Use of this chapter should typically be done after:

- 1. Identifying and stating that a vehicle borne threat exists to the site, event or asset;
- 2. Operational and user / stakeholder requirements have been gathered;
- **3.** Conducting a site assessment to understand existing vulnerabilities, opportunities, as well as wider security procedures and operations;
- **4.** Quantifying the threat with a vehicle dynamics assessment, conducted by a proven suitably qualified specialist;
- **5.** A technical specification has been produced to enable engagement with barrier manufacturers and installers.

Refer to NPSA's HVM offering on *Operational Requirements* for more information.

	Operational requirement		
Introduction to vehicle borne	How do I assess the strengths and vulnerabilities of my site to vehicle-borne threats?		
threats What is hostile vehicle mitigation?	Once the nature of threat is understood, practitioners should take a methodical and considered approach to determine project objectives and highlight security vulnerabilities:		
Operational requirement	 Develop detailed security requirements for HVM - Operational Requirements (OR) User Requirement Document (URD) if not covered in the detailed requirements - addressing additional business needs e.g. stakeholder liaison, planning and 		
Standards, testing and products	design Q. Practical site assessment - a detailed review of vulnerabilities and opportunities in the environment operational and obvsical security measures		
Design	 Technical assessment - e.g. Vehicle Dynamics Assessment (VDA) at specific locations based on the relevant threat vehicle(s) 		
Build	• Liaison with technical or security experts - e.g. NPSA or <u>CTSAS</u> , or <u>RSES professionals</u> with relevant experience.		
Operate	HVM Operational Requirements Level 2 (word) NPSA recommends a full range of potential threat vehicles and attack methodologies (including a range of impact		
Mitigating the risk to high streets	speeds) are considered when developing HVM Operational Requirements		
Anti-Terrorism Traffic Regulation Order	Vehicle Security Barrier Scoping Document (word)		
Vulnerability of rising arm and swing arm barriers	suppliers		
	Procuring the Services of a Specialist Security Consultant Guidance on aspects of sourcing, procuring, tasking and retaining specialist security consultants		

Context

It is important to emphasise that no security measures are resistant against all threats. You remain entirely responsible for the security measures that you implement and must use your own judgement as to whether and how to implement our recommendations.

Your attention is drawn to the important disclaimer and limitation on liability which is set out in full in the <u>general site terms and conditions</u> on the NPSA website.

VSBs listed in the CSE chapter 'HVM – Impact Rated'

Whilst NPSA will generally seek to include VSBs that can be demonstrated to NPSA's satisfaction to have met the test criteria, there may be circumstances in which NPSA decide that a product is not appropriate for inclusion in this CSE chapter.

In such circumstances, NPSA will seek to provide as much information as is possible in all the circumstances, but accepts no liability for the products not being listed in the CSE.



Scope of the CSE chapter 'HVM – Impact Rated'

All vehicle security barriers listed in this CSE chapter have been tested to one (or more) of the following test methods (informally known as 'standards'):

- ISO 22343-1:2023
- ISO IWA 14-1:2013*
- BSI PAS 68* (several versions)

* standards now withdrawn but results still valid unless changes made to the 'as tested' rated VSB.

Refer to NPSA's HVM offering on <u>Standards, testing and products section</u> for more information.

VSBs in CSE 'HVM – Impact Rated' chapter are listed for their performance only under specific vehicle impact test conditions.

The allocation of a performance rating does not imply a barrier will perform as tested in all sites or applications; and against all threat vehicle scenarios (vehicle class, impact speed, impact angle and multiple impacts).

Refer to NPSA's <u>Due Diligence in the selection and procurement of vehicle security barriers</u> for more information.

Test vehicles

All full scale vehicle impact tests require a vehicle to impact the VSB. Numerous vehicles are used across the standards. The size, mass and structure of vehicles are factors that influence how the VSB will perform when impacted. Other factors are the impact speed and impact angle specified for the test.

The vehicles below are classified in terms of their size, the 'standard' they feature in, their classification (e.g. M1, N1G etc.) and the mass they have in the tests.

Type of test vehicle	<i>Test method ('standard')</i> Gross Vehicle Weight Description	Test vehicle classification and mass (kg)	Illustration Taken from: BSI PAS 68 (various), BSI PAS 170-1, ISO IWA 14-1 and ISO 22343-1
Car	ISO 22343-1, IWA 14-1, PAS 68, CWA 16221 2-axle	M1 1500	
4x4 crew or single cab	ISO 22343-1, IWA 14-1, PAS 68, CWA 16221 (newer standards specify crew cab) 2-axle	N1G 2500	
Impact Trolley	PAS 170-1 Equivalent to 4x4 pick-up 2-axle rigid with deformable front	IT 2500	
Flat bed	<i>ISO 22343-1, IWA 14-1, PAS 68, CWA 16221</i> 3500kg GVW, 2-axle rigid flatbed	N1 3500	
	<i>ISO 22343-1, IWA 14-1</i> 8000 or 7500 kg GVW, 2-axle rigid (flat bed, curtain side or rigid box)	N2A 7200	
Day cab	<i>ISO 22343-1, IWA 14-1</i> 14970 or 12000 kg GVW (flat bed, curtain side or rigid box)	N2B 7200	
lorry	<i>ISO 22343-1, IWA 14-1</i> 20500 or 18000 kg GVW, 2-axle rigid (flat bed, curtain side or rigid box)	N3C 7200	
	PAS 68, CWA 16221 7500 kg GVW, 2-axle rigid (flat bed, curtain side or rigid box)	N2 7500	

Type of test vehicle	<i>Test method ('standard')</i> Vehicle classification Gross Vehicle Weight Description	Test vehicle classification and mass (kg)	Illustration Taken from: BSI PAS 68 (various), BSI PAS 170-1, ISO IWA 14-1 and ISO 22343-1
	PAS 68, CWA 16221 18000 kg GVW, 2-axle rigid (flat bed, curtain side or rigid box)	N3 7500	
	ISO 22343-1, IWA 14-1 20500 or 18000 kg GVW, 2-axle rigid (flat bed, curtain side or rigid box)	N3D 12000	
	ISO 22343-1, IWA 14-1 27300 or 29500 kg GVW, 3-axle rigid	N3E 29500 (ISO 22343-1) N3E 24000 (IWA 14-1)	
Day cab goods lorry	ISO 22343-1 26000 kg GVW 3-axle rigid (Tipper)	N3F 24000	
	IWA 14-1, PAS 68, CWA 16221 N3F N3 N3 32000 kg GVW 4-axle rigid (Tipper)	N3F & N3 30000	
	ISO 22343-1 36000 kg GVW 4-axle rigid (Tipper)	N3G 30000	
	PAS 68:2007 only 32000 kg GVW 4-axle-rigid (Tipper)	N3 32000	

Vehicle impact test performance classification

This CSE Chapter features several parameters that enable the user to filter down prospective VSBs based on the <u>operational and user requirements</u>, vehicle dynamics assessment and the technical specification. Some parameters relate to the impact test conducted on a VSB.

All vehicle security barriers listed in this CSE chapter have been tested to one (or more) of the following test methods ('standards'): ISO 22343-1, IWA 14-1 and PAS 68.

VSBs in this CSE chapter are listed for their performance only under those specific vehicle impact conditions, which are listed below.

The VSB performance is generally rated and presented in terms of:

Impact test parameter	Example
Test method ('standard')	ISO 22343-1
Barrier type	Bollard
Test type	V for vehicle impact
Vehicle test weight	7200 kg
Vehicle classification	N3C
Impact speed	48 km/h
Impact angle	90°
Vehicle penetration distance	2.6 m
Major debris distance	5.0 m

Filters available ir this CSE Chapter	1
Vehicle Mass (kg) 🛈	\checkmark
Impact Speed (Km/h)	
Impact Angle (°) 🛈	\sim
Penetration Distance (m) ①	\checkmark
Standard ①	\checkmark
Foundation (i)	\checkmark
Operation ①	\sim
Deployment ①	\sim
Categories / Style of VSB ①	~

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There are numerous differences between the test methods; the most pertinent ones arise within the test performance ratings (or classifications), which contain different parameters.

Refer to NPSA's HVM offering on Standards, testing and products section for more information.



Differences of note are:

ISO 22343-1 and PAS 68 includes major debris dispersal: the distance beyond the original position of the front (ISO 22343-1) or rear (PAS 68) face of the barrier to the location of the furthest item of major debris (\geq 2 kg in ISO 22343-1, \geq 25 kg in PAS 68 *†*).

The vehicle penetration distance is measured from different positions on the VSBs: ISO 22343-1, IWA 14-1 from the front face, PAS 68 from the rear face.

Broadly, it is defined as the maximum distance the leading edge of the:

- load bed for larger goods carrying vehicles: N1, N2 and N3 vehicle classes; or
- 'A' pillar in passenger vehicles: M1 and N1G vehicle classes ...

... travels beyond the vehicle security barrier (measured from the front or rear face).

ISO 22343-1 has a maximum vehicle penetration distance of 25 metres.

The other standards do not have a maximum.

Refer to NPSA's HVM offering on *Standards, testing and products section* for more information.

† PAS 68:2010 and 2013 require a minimum of 25 metres clearance on a firm surface behind the VSB and therefore, where the penetration distance or majors debris dispersal are greater than this, a value of 25.0 will be given in the PAS 68 classification. If available, the exact value will be noted in the observations but may be subject to external influences i.e. hitting other obstructions.

ISO 22343-1:2023 example performance rating					
Vehicle Impact	Vehicle Mass (class)	Impact Speed	Impact Angle	Vehicle penetration distance	Major debris distance
V 7200 kg [N3C] 48 km/h 90° 2.6 m 5.0 m					
ISO 22343-1:2023 Bollard V / 7200 [N3C1 / 48 / 90 : 2.6 / 5.0					

IWA 14-1:2013 example performance rating					
Vehicle Impact	Vehicle Mass (class)	Impact Speed	Impact Angle	Vehicle penetration distance	-
V	7200 kg [N2A]	64 km/h	90°	3.6 m	-
IWA 14-1:2013 Bollard V / 7200 [N2A] / 64 / 90 : 3.6					

PAS 68:2013 example performance rating					
Vehicle Impact	Vehicle Mass (class)	Impact Speed	Impact Angle	Vehicle penetration distance	Major debris distance
V	7500 kg (N3)	80 km/h	90°	2.2 m	5.4 m
PAS 68:2013 Bollard V / 7500 (N3) / 80 / 90 : 2.2 / 5.4					



Categorising Vehicle Security Barriers

This CSE Chapter features several parameters that enable the user to filter down prospective VSBs based on the operational and user requirements. Some parameters relate to the **VSB characteristics** (below) and others relate to the impact test criteria.

Activity - movement of barrier

Active	Barrier that may be opened to enable passage of vehicles	
Passive	Static system with no moving parts	
Foundation – amou	Int of ground depth required	INDATION
A	Freestanding with no ground fixings	PALGPOUND
Ар	Surface mounted but pinned or bolted to the ground	TURN
В	Depth less than or equal to 0.5 metre below ground level	

C Depth greater than 0.5 metre below ground level

Styles of VSB – provide different functions (accessibility, aesthetics, demarcation)

Blocker	Active access control unit, typically retracting into the ground
Bollard	Passive post or active access control post (typically retracting vertically)
Door	Active access control system in a wall
Fence	Continuous passive barrier that is impermeable to pedestrians
Gate	Active access control system typically rising, swinging or sliding
Perimeter	Continuous demarcation preventing vehicle passage. Can be pedestrian permeable (e.g. bollard) or modular (extendable in specific units) and may be active or passive
Portal	Pedestrian access point, often part of a perimeter
Street furniture	Passive objects with a public realm purpose and are also vehicle impact rated. Examples: bus shelters, control cabinets, cycle racks, litter bins, planters, post boxes, railings, seating, signage, telephone boxes, traffic posts
Vehicle as barrier	A driveable vehicle positioned to provide (usually temporary) hostile vehicle mitigation









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Operation - motion to open active VSBs, allowing vehicle access

RetractableVertical or rotating movement in the vertical plane, towards ground levelRisingVertical or rotating movement in the vertical plane, away from ground levelSlidingHorizontal movement to the sideSwingingPivoting in the horizontal plane

Measurements & units

Unless otherwise stated in this CSE Chapter: All dimensions are in millimetres (mm) All masses are in kilograms (kg) The measurements of the different styles of VSB will detail (where available): Blocker height, width (of front face) Bollard height, diameter Door aperture height, aperture width Fence height, length of fence line upper and lower height of arm or boom, aperture width Gate Perimeter height, length Portal aperture height, total height, aperture width, total width Street furniture height, width (of front face), depth (front to rear face) Vehicle as barrier mass, height, width (facing threat vehicle)



The 'HVM – Delay Rated' CSE Chapter

There is also a neighbouring CSE chapter, <u>'HVM – Delay</u> <u>Rated'</u>. Security Equipment listed in this CSE Chapter has been allocated a rating in accordance with NPSA's Vehicle Attack Delay Standard (VADS). VADS provides a means for testing VSBs against aggressive and repetitive vehicle impacts, rather than the single impact methods listed above.

For organisations concerned with vehicle borne threats, including Vehicle As a Weapon attacks, VADS rated VSBs are not a substitute for ISO 22343-1, IWA 14-1 and PAS 68 rated vehicle security barriers.



VADS rated VSBs provide an alternative risk-based option for event managers and other risk owners: pragmatic, affordable and achievable levels protection, typically for, but not exclusively, temporary events.



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