

PUBLICLY AVAILABLE SPECIFICATION

Specification for vehicle security barriers

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 25, an inside back cover and a back cover.

Foreword

This Publicly Available Specification (PAS 68:2007) has been developed for the UK Government's National Security Advice Centre (NSAC) by the Transport Research Laboratory (TRL) in collaboration with the British Standards Institution (BSI).

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Introduction

PAS 68:2007 has been prepared to address the needs of organizations who wish to have assurance that vehicle security barriers will provide the level of impact resistance that they seek.

Many systems are available that are either promoted or considered suitable for use as vehicle security barriers. As their characteristics differ in both function and form, a comparative means of assessing their performance is required.

This PAS identifies impact test tolerances and vehicle performance criteria that need to be met in order to conform to it. Design guidance is provided in PAS 69:2006.

1 Scope

This Publicly Available Specification (PAS) specifies a classification system for the performance of vehicle security barriers and their supporting foundations when subjected to a single horizontal impact.

In the course of this document three alternative assessment methods of determining the performance classification of vehicle security barriers are given:

- the vehicle impact method;
- the pendulum method (only suitable for testing bollards at lower energy levels);
- the design method.

2 Normative references

The following referenced documents are required for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

PAS 69, *Guidance for the selection, installation and use of vehicle security barriers*

BS EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

3 Terms and definitions

For the purposes of this PAS the following terms and definitions apply.

3.1 ballast

weight securely fixed to the vehicle

3.2 cargo

weight representing a dummy (anthropomorphic) if requested, and loose material which is in increments of not more than 25 kg, which is not securely fixed to the vehicle, including fluids, but only where the vehicle is designed to carry such fluids

3.3 fixed bollard

fixed vertical post permanently embedded into specified foundations designed to prevent vehicle access

3.4 impact angle

angle, in the horizontal plane, between the intended impact face and the approach path of the test vehicle into the test item

3.5 impact point

initial point of contact between the test vehicle or pendulum impactor and the test item

3.6 vehicle impact test speed

speed of the test vehicle measured along its approach path at a point no further than 8 m before the impact point

3.7 pendulum test speed

speed of the impactor at the moment of impact

3.8 unladen weight

weight of test vehicle, with standard equipment, quantities of engine oil and coolant, and minimum amount of engine fuel required

3.9 major debris

any single item totally detached from the test vehicle, its ballast, cargo or the vehicle security barrier having a weight of more than 25 kg, as a consequence of the impact and projected beyond the original position of the back face of test item

NOTE Maximum dispersion will be included within test reports to assist in the choice of an appropriate system.

3.10 removable bollard

vertical post designed to prevent vehicle access, mounted in a foundation such that it can be secured in position, but easily removed

3.11 rising bollard

vertical post designed to prevent vehicle access mounted in a foundation such that it can rise to its operational height and be lowered to its minimum height

3.12 rigid test foundation

foundation designed so that it will not move laterally by more than 10 mm, nor rotate by more than 5° from the pre-test position

3.13 test system

vehicle security barrier, the operating equipment required for the test and specified foundations

3.14 test vehicle

commercially available vehicle with an unmodified chassis, load bed and frontal structure used in an impact test to evaluate the performance of a vehicle security barrier

3.15 vehicle penetration

maximum distance between the leading edge of the load platform of a commercial vehicle as marked on the chassis, or the base of the "A" pillar of a car, and the original rear face of the vehicle security barrier, measured during (e.g. by film/video/instrumentation) or after the impact along a line projected from the line of approach of the vehicle

3.16 vehicle security barrier

system designed and installed to bring to rest or redirect an impacting vehicle

4 Vehicle security barrier classification system

4.1 Vehicle impact method

The performance class shall be expressed in terms of a four-part classification as follows.

NOTE The four-part classification code is preceded by the letter V.

Table 1 Performance classification – Vehicle impact test

1	2	3	4
Barrier type	Test weight (kg) and impact speed (km/h)	Vehicle Penetration (m)	Dispersion of major debris (m)
Fixed bollard	4 digit test weight 2 digit impact speed	X.X where X.X is the penetration	Y where Y is the maximum dispersion distance

Table 2 Vehicle impact test criteria

The vehicle weight and impact speed combination shall be selected from one of the combinations specified in Table 2.

Test type	Test weight kg	Impact speed	
		km/h	mph
1 500-48 1 500-64 1 500-80	1 500 Car (medium)	48 ± 3 64 ± 5 80 ± 5	(30) (40) (50)
2 500-48 2 500-64 2 500-80	2 500 4×4 or Pick-up	48 ± 3 64 ± 5 80 ± 5	(30) (40) (50)
3 500-48 3 500-64 3 500-80	3 500 2-axle van	48 ± 3 64 ± 5 80 ± 5	(30) (40) (50)
7 500-48 7 500-64 7 500-80	7 500 2-axle rigid (day cab)	48 ± 3 64 ± 5 80 ± 5	(30) (40) (50)
32 000-48 32 000-64 32 000-80	32 000 4-axle rigid	48 ± 3 64 ± 5 80 ± 5	(30) (40) (50)

NOTE Vehicle speeds have been rounded up to the nearest integral value for both mph and km/h.

EXAMPLE Performance class V rising bollard 1 500 48/1.7/5.2 denotes:

- a rising bollard;
- capable of withstanding an impact by a 1 500 kg car at 48 km/h;
- where the vehicle penetrated 1.7 m beyond the original position of the rear face of the bollard; and
- where major debris landed no more than 5.2 m beyond the original position the rear face of the bollard.

5 Pendulum impact method – Classification code

NOTE The three-part classification code is preceded by the letter *P*.

The combination of pendulum weight and release height shall be selected from one of the combinations specified in Table 3.

Table 3 Permissible values for performance class

Target impact energy kJ	Pendulum weight kg	Release height m
100	1 500	6.7
	2 500	4.0

EXAMPLE Performance class **P rising bollard /2 500/4** denotes:

- a) a rising bollard;
- b) capable of withstanding an impact of 100 kJ;
- c) delivered by a 2 500 kg pendulum with a release height of 4.0 m.

6 Design method – Classification code

NOTE The three-part classification code is preceded by the letter *D*.

EXAMPLE Performance class **D fixed bollard /667** denotes:

- a fixed bollard;
- theoretically capable of withstanding an impact of up to 667 kJ.

The impact energy shall be selected from those specified in Table 4. This will also indicate the speed/vehicle weight combinations which can theoretically be withstood by the device.

Table 4 Permissible values for performance class

Vehicle impact speed km/h (mph)	Vehicle weight kg				
	1 500	2 500	3 500	7 500	32 000
	Impact Energy kJ				
30 (48)	133	222	311	667	2 844
40 (64)	237	395	553	1 185	5 057
50 (80)	370	617	864	1 852	7 901

NOTE Vehicle speeds have been rounded up to the nearest integral value.