

HVM Crash Testing Standards Explained



Regulations Evaluating Impact Performance



- Publicly Available Standard (PAS 68 – Latest version 2013
- UK based threat vehicles
- Likely withdrawn 2018

- ASTM F2656 – Latest Version 2015
- North America threat Vehicles
- Superseded “DOS” or SD/STD2.01

- IWA14-1 – Latest version 2013
- Includes all-world threat vehicles contained in PAS 68 & ASTM F2656
- Due for review 2017

Regulations Evaluating Impact Performance



- Publicly Available Standard (PAS 68 – Latest version 2013
- UK based threat vehicles
- Likely withdrawn 2018

- CEN – CWA 16221:2010
- European Workshop agreement
- Combines elements of PAS 68 & PAS 69

- ASTM F2656 – Latest Version 2015
- North America Three Vehicles
- Superseded “DOS” or SD/STD2.01

- IWA14-1 – Latest version 2013
- Includes all-world threat vehicles contained in PAS68 & ASTM F2656
- Due for review 2017

Current HVM Standards



➤ **ASTM F2656-15**

- US standard issued by ASTM (American Society for Testing & Materials)
- Updated in 2015
- Replaces SD/STD2.01 Rev A, US Department of State Standard
- “K” Ratings no longer exist replaced by vehicle categories C, P, M, H

➤ **PAS 68:2013**

- UK standard prepared in conjunction with CPNI / BSI
- Recently undergone 2nd update
- Updated in 2015

➤ **IWA14-1:2013**

- World Standard prepared in conjunction with CPNI /BSI with input from US Department of State
- Combines aspects of ASTM & PAS 68
- All these tests can be conducted at a variety of impact speeds

PAS 68:2013



- 6 Vehicle Categories
- Impact Speed 16-112km/h
- Penetration measured from REAR edge of product structure

■ Product given performance rating made up from:-

1	2	3	4	5	6
Test Classification	Vehicle Mass (class)	Impact Speed	Impact Angle	Penetration	Debris Dispersal

■ Example performance classification

“PAS68:2013 Bollard V/7500(N2)/80/90:0.0/3.6”

IWA14-1 2013



- 9 Vehicle Categories
- Impact Speed 16-112km/h
- Penetration measured from FRONT edge of product structure
- Product given performance rating made up from:-

1	2	3	4	5	6
Test Classification	Vehicle Mass (class)	Impact Speed	Impact Angle	Penetration	Debris Dispersal

- Example performance classification “IWA14-1:2013 Bollard V/7500[N2A]/80/90:0.0”

ASTM F2656-2015



- 6 Vehicle Categories
- Impact Speed 48-100km/h
- Superseded DOS standard and “K” ratings
- Penetration measured from REAR edge of product structure & given a “P” rating 1,2 or 3

■ Product given performance rating made up from:-

1	2	3
Test Classification	Impact Speed (mile/h)	Penetration Rating

- Example Performance Classification “Test Method **F2656 C7:50-P3**”
- A classification of Test Method “**F2656 M:50-P1**” is **equivalent** to “**DOS K12**”

Comparing Product performance codes:



PAS 68:2013

1	2	3	4	5	6
Vehicle Impact	Vehicle Mass (class)	Impact Speed	Impact Angle	Penetration	Debris Dispersal

Example performance classification:

“PAS 68:2013 Bollard V/7500(N2)/80/90:0.0/3.6”

ASTM F2656

1	2	3
Vehicle Category	Impact Speed (mile/h)	Penetration Rating

Example performance classification:

“Test method F2656 C7:50-P3”

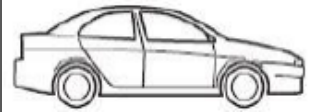

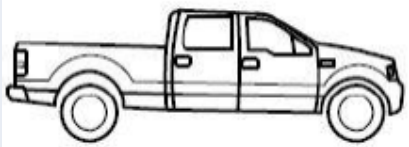
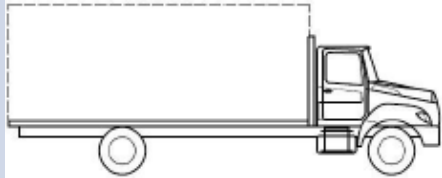
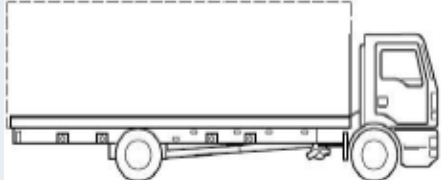

IWA14-1 2013

1	2	3	4	5
Vehicle Impact	Vehicle Mass (class)	Impact Speed	Impact Angle	Penetration


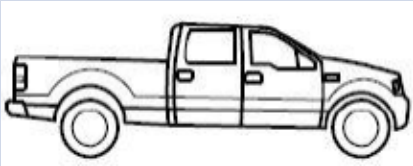
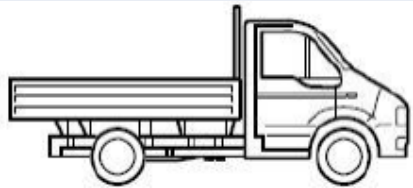
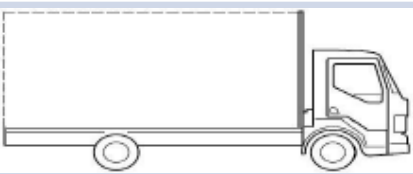
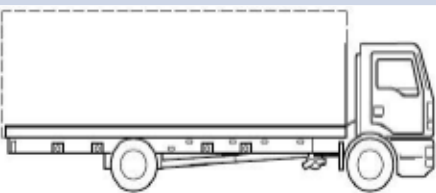
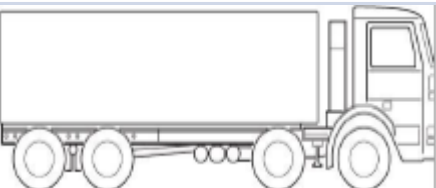
Example performance classification:

“IWA14-1:2013 Bollard V/7500[N2A]/80/90:0:2





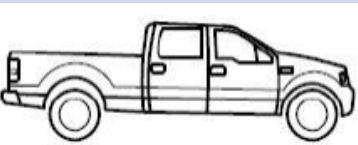
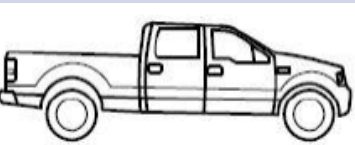
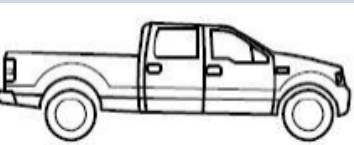
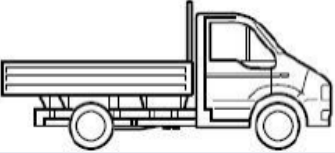
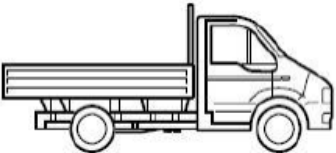
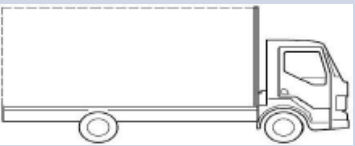

ASTM F2656-15 Vehicles

SC		1100kg
FS		2100kg
PU		2300kg
M		6800kg
C7		7200kg
H		29500kg

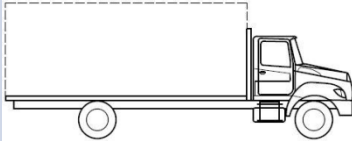
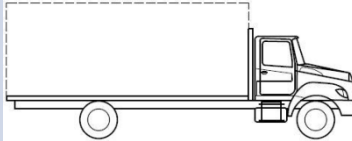
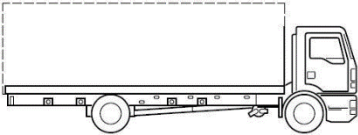
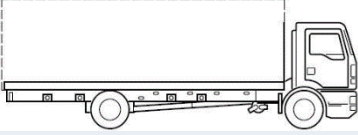
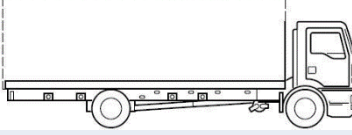
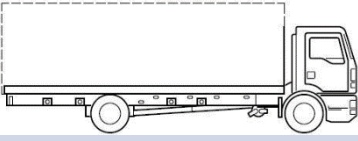
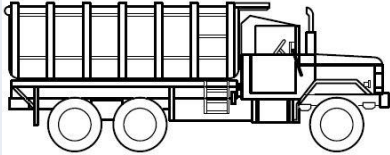
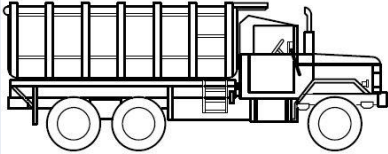
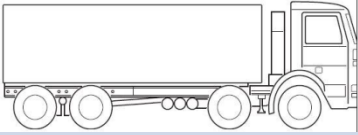
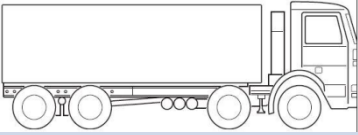
PAS 68: 2013 Vehicles

M1		1100kg
N1G		2500kg
N1		3500kg
N2		7500kg
N3		7200kg
N3		29500kg

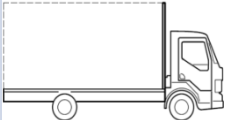
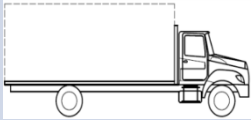
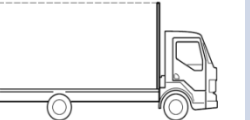
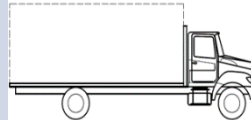
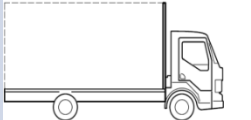
Inter-relation of the Standards – Car/LGV

PAS 68:2013		IWA14-1:2013		ASTM F2656-15	
	1500 M1		1500 M1		1100 SC
					2100 FS
	2500 N1G		2500 N1G		2300 PU
	3500 N1		3500 N1		
	7500 N2		7200 N2A		

Inter-relation of the Standards – Car/LGV

PAS 68:2013		IWA14-1:2013		ASTM F2656-15	
			7200 N2B		6800 M
	7500 N3		7200 N3C		7200 C7
			12000 N3D		
			24000 N3E		29500 H
	30000 N3		30000 N3F		

Most Commonly Compared Vehicle

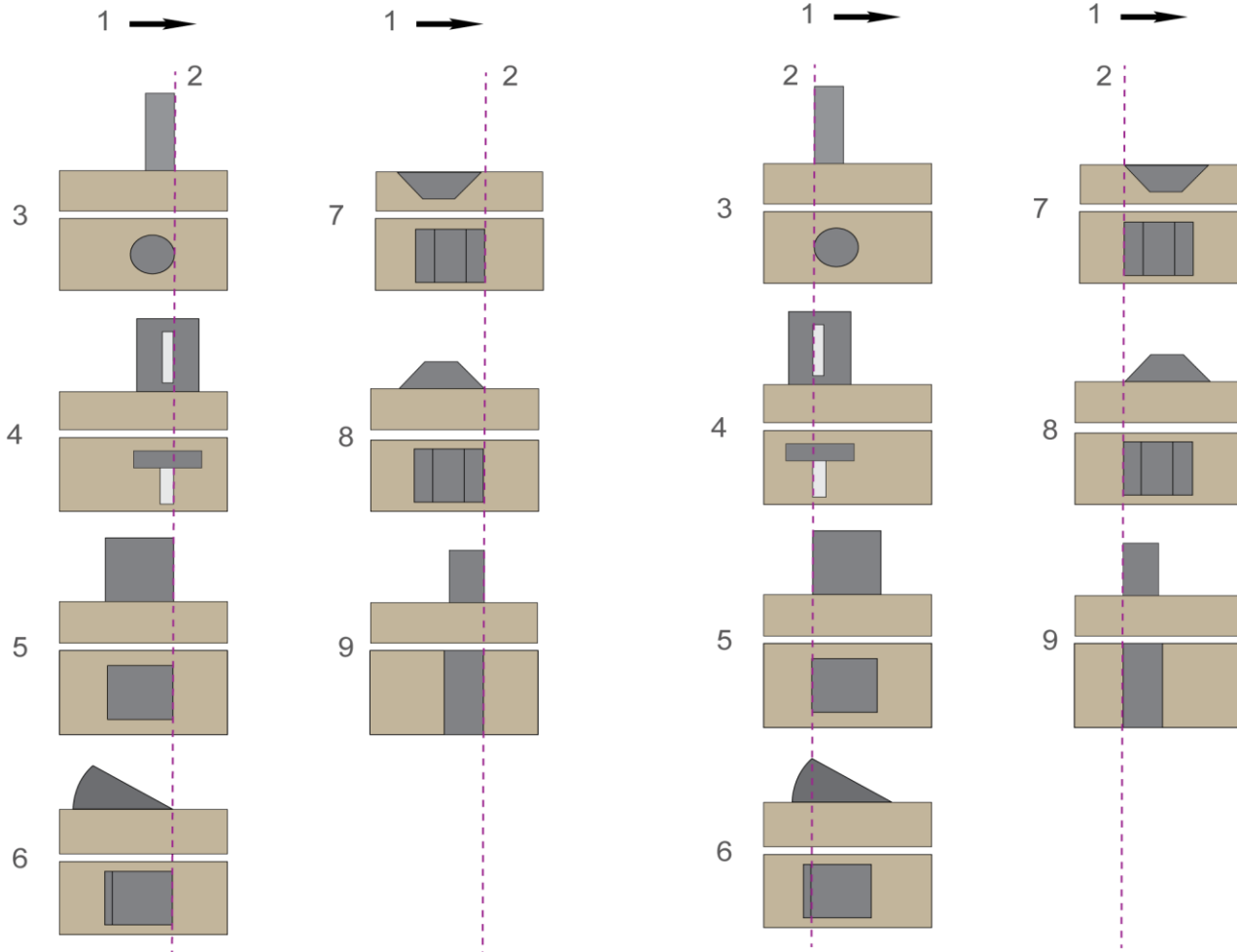
	PAS 68	ASTM F2656	ASTM F2656	DOS SC/STD2.01	IWA 14-1
Vehicle Category	N2	Standard Test Truck (M)	Clas-7 Cab-Over (C7)	Standard Truck	N2A
Impact Mass (kg)	7500	6800	7200	6800	7200
Impact Speed (km/h)	48	50 (30mile/h)	50 (30mile/h)	K4-50 (30mile/h)	48
Impact Energy (kj)	667	656	694	656	640
Impact Speed (km/h)	64	65 (40mile/h)	65 (40mile/h)	K8-65 (40mile/h)	64
Impact Energy (kj)	1185	1108	1174	1108	1138
Impact Speed (km/h)	High Test Speed Not permitted	80 (50 mile/h)	80 (50 mile/h)	K12-80 (50 mile/h)	80
Impact Energy (kj)		1679	1778	1679	1778
					

Understanding the performance criteria

VSB datum line

PAS 68

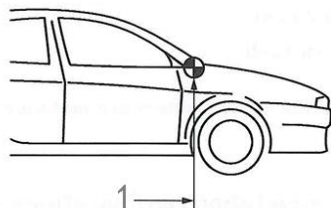
IWA 14-1 & ASTM F2656



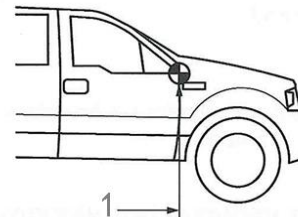
Key

- 1 = Direction of impact
- 2 = VSB datum line (the point from where penetration of the vehicle is measured)
- 3 = Bollard
- 4 = Gate / rising/swing arm barrier
- 5 = Planter
- 6 = Road Blocker
- 7 = Ditch
- 8 = Bund/ Berm
- 9 = Wall

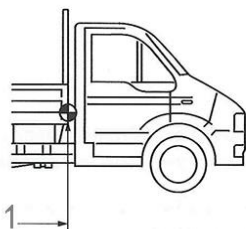
The Vehicle Datum Point



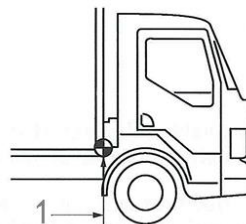
Car (M1)



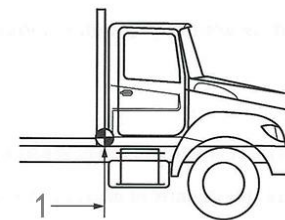
4x4 crew cab pick-up (N1G)



Day cab vehicle (N1)



Day cab vehicle (N2A, N3C, N3D
& N3F)



Day cab vehicle (N2B & N3E)

Key

1 = Vehicle Datum Point

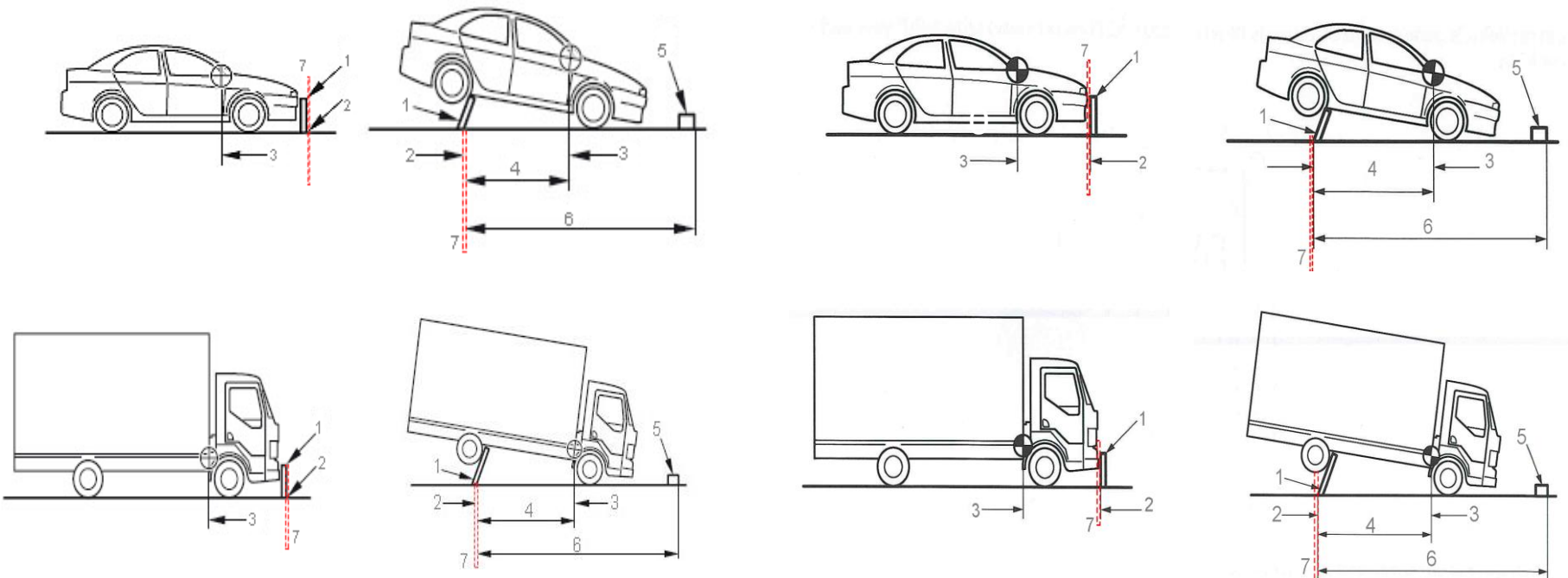
M1 & N1G vehicles; reference line passing through the centre of the A-pillars at the lowest point of the windscreen.

N1, N2 or N3 day cab vehicles: reference line intersecting the load bed and the headboard

How penetration is measured

PAS 68

IWA 14-1



Key

1 = Vehicle Security Barrier / test item
2 = VSB datum line
3 = Vehicle datum point
4 = Vehicle penetration distance

5 = Major debris
6 = Major debris distance
7 = Indication of change in position of penetration measurement

FAQ / Misconceptions regarding vehicles / tests



- “My client wants an ASTM K12 test”

“K” ratings have never existed in ASTM. “K” ratings were superseded in 2007 by the introduction of ASTM 2656. The Department of State K12 should correctly be referred to as an ASTM M50.

- What is the equivalent of an ASTM M50 test in PAS68/IWA14-1?

The closest equivalent test is V/7500(N3)/80/90 or IWA14-1:2013 V/7200[N3]/80/90. This is N3 (18T rated vehicle massed to 7500kg or 7200kg) at 80km/h and 90deg.

- What is the difference between an IWA14-1, ASTM and PAS68 tests?

In addition to the vehicle dimensions and impact energy variances, there is a difference in test conditions. Under ASTM the product must be installed into a low cohesive compacted soil. PAS68 does not define an installation configuration. IWA14 describes both in soil or “site specific”/“rigid” installation.

- Does the introduction of IWA14-1 obsolete or negate previous testing standards?

No, IWA 14-1 does not negate or obsolete testing carried out to the PAS 68 or CWA 16221 criteria. IWA 14-1 is a progression of these testing standards and combines elements of the ASTM standard & PAS 68 to produce a cohesive standard.

Contacts:



Further information can be obtained from:

PSSA – Perimeter Security Suppliers Association

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