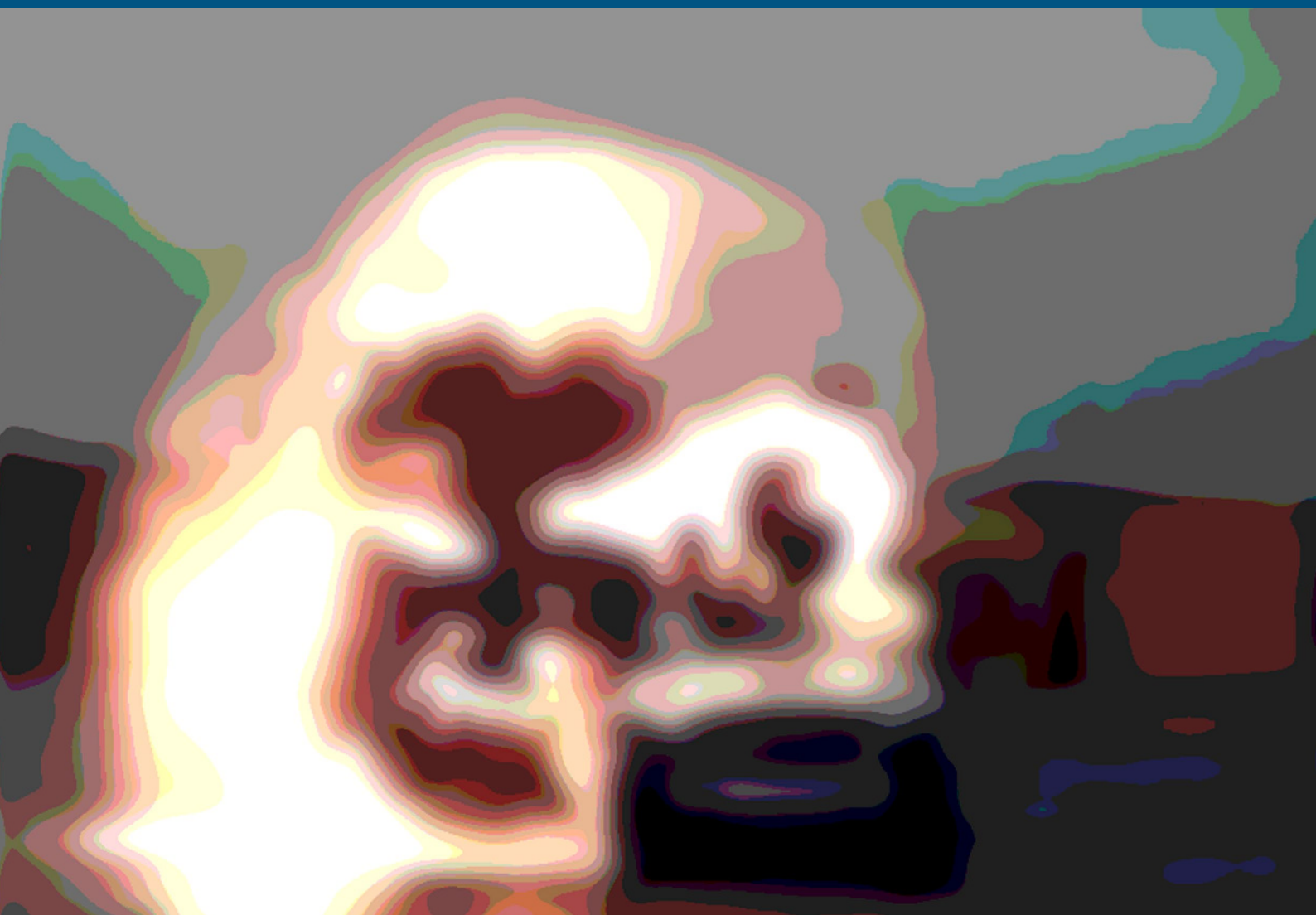


PAS 300:2015

Civilian armoured vehicle – Test methods for ballistic and blast protection



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Foreword

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The PAS process enables a document to be rapidly developed in order to fulfil an immediate need in industry. A PAS can be considered for further development as a British Standard, or constitute part of the UK input into the development of a European or International Standard.

Relationship with other publications

The test methods described in this PAS were developed from the *VSAG 12 Part 2: Civilian armoured vehicles – Ballistic and blast testing handbook* [1] with kind permission from the Vehicle Security Advisory Group (VSAG).

Product testing. Users of this PAS are advised to consider the desirability of third-party testing of product conformity with this PAS. Users seeking assistance in identifying appropriate conformity assessment bodies or schemes may ask BSI to forward their enquiries to the relevant association.

Use of this document

It has been assumed in the preparation of this PAS that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this specification are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is “shall”.

Commentary, explanation and general informative material is presented in italic type, and does not constitute a normative element.

Requirements in this standard are drafted in accordance with *Rules for the structure and drafting of UK standards*, subclause J.1.1, which states, “Requirements should be expressed using wording such as: ‘When tested as described in Annex A, the product shall ...’”. This means that only those products that are capable of passing the specified test will be deemed to conform to this specification.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a PAS cannot confer immunity from legal obligations.

Introduction

PAS 300 describes four test procedures that may be completed on a civilian armoured vehicle (CAV) to assess its performance against ballistic and blast levels. The test methods are set out in a manner to allow each test to be completed independently. If more than one test is required on a CAV then the test order followed is usually ballistics, side blast, under vehicle blast and then roof blast. One or multiple test vehicles may be used to complete testing assuming that all test vehicles are built to the same design specification being tested.

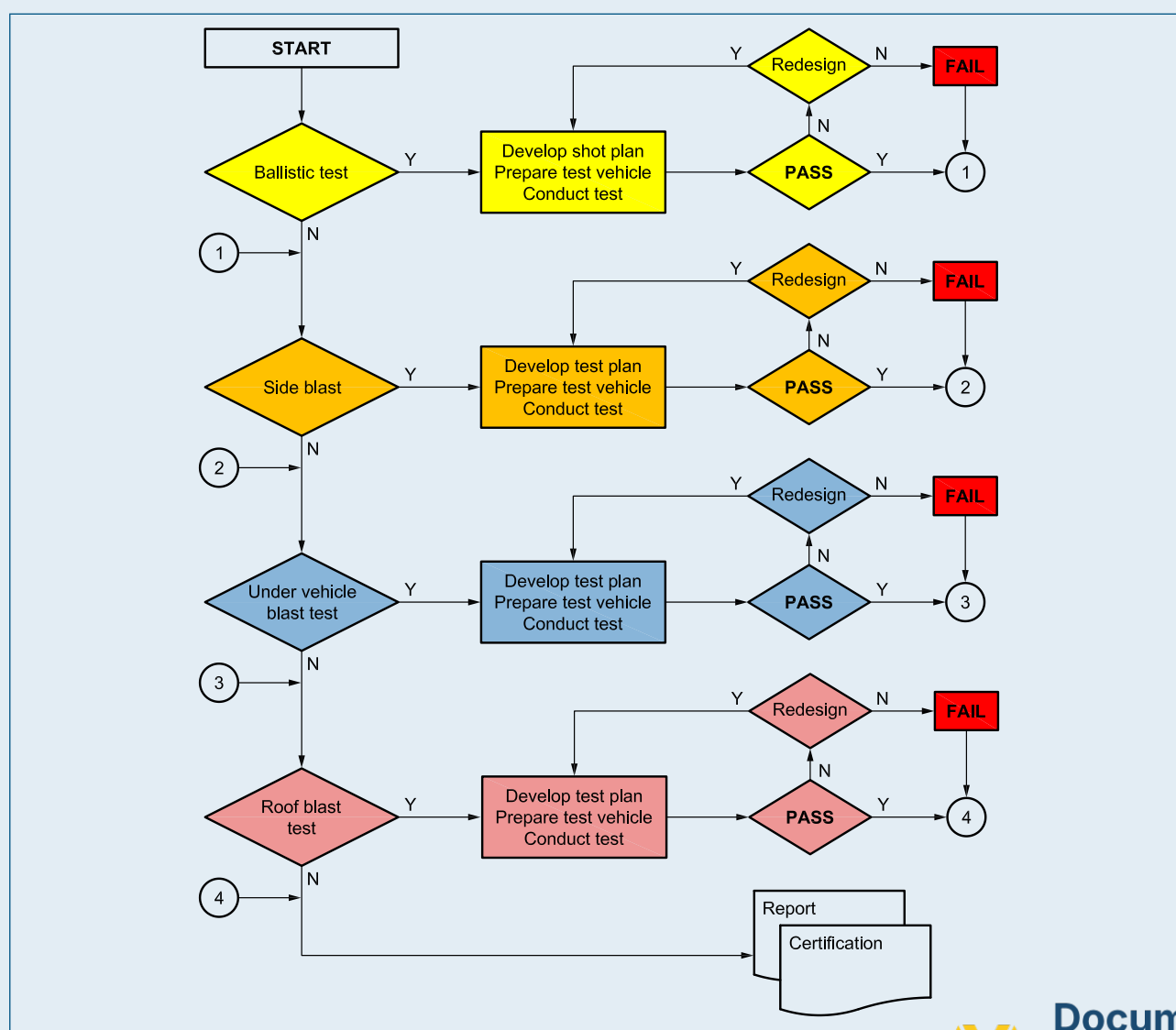
For each test, careful consideration is given to any damage sustained on the test vehicle. If there is a risk of compromising or invalidating any further testing then actions are taken to minimize this risk.

During any phase of testing it may become evident that the CAV design does not achieve a pass in accordance with the defined criteria set out in this PAS. In this situation the party requesting testing may be given the option to submit a redesign for retest. If this option is not taken the test vehicle receives a fail and the next phase of testing is conducted, if necessary.

The party requesting testing may withdraw at any time from further testing.

In line with current practice the tests may be completed with the minimum requirements set out in this PAS. The party conducting the tests seeks to test the most severe conditions. The testing process for this PAS is outlined in Figure 1 below.

Figure 1 – Testing process



1 Scope

PAS 300 describes test methods for assessing the ballistic and/or blast performance of a civilian armoured vehicle (CAV).

This PAS defines test levels for ballistic impact (including handgun, shotgun and rifle), side blast, under vehicle blast and roof blast.

It also includes fragment simulating projectile (FSP) tests as part of the ballistic test.

2 Terms, definitions and abbreviations

2.1 Terms and definitions

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

2.1.1 armour shell

structure to protect the occupant space or critical components

NOTE For example engine parts, fuel tank, fuel lines, auxiliary battery or communication equipment.

2.1.2 attack angle

specified angle between the reference horizontal or vertical plane of the test vehicle (2.1.21) and trajectory of the test projectile (2.1.19)

2.1.3 chest wall velocity predictor (CWVP)

parameter used to assess the likelihood of injury in the human body from blast pressure

2.1.4 complete involuntary unlatching

vehicle door opens as a result of physical damage and/or loading, other than human intervention

2.1.5 data acquisition system (DAS)

equipment used to record experimental data

2.1.6 firing system

weapon or equipment that is capable of achieving the specified test levels

NOTE See Table 1 for ballistic (BA) test levels.

2.1.7 fragment

2.1.7.1 primary fragment

fragment from the test device

NOTE For example, grenade casing fragments.

2.1.7.2 secondary fragment

fragment that might detach from the test vehicle and enter the occupant space

NOTE For example, armour spalling, or heavy, light and soft parts from the test vehicle.

2.1.8 fragment simulating projectile (FSP)

design fragment used to define a test level

2.1.9 ground plate

steel plate used between the hard standing and the test device

NOTE The ground plate reduces damage to the hard standing, reduces uncertainties in the test results and improves repeatability.

2.1.10 lock failure

locked door that can be opened utilizing the outside test vehicle door handle

2.1.11 occupant space

area protected by the armour shell (2.1.1) where the passengers and driver are positioned

2.1.12 opaque armour panel

armour material not constructed from glass

2.1.13 plated axle mass

maximum allowable mass specified for each axle and gross vehicle mass

2.1.14 shot angle

angle between the ballistic trajectory and normal to the armour surface at the impact point

2.1.15 shot distance

measured distance between the barrel muzzle of the firing system and nearest impact surface of the test vehicle

2.1.16 shot spacing

distance on the armour specimen surface between two shots

NOTE The shot spacing is measured between the centre of each impact.

2.1.17 test cell

temporary or permanent construction around the test vehicle to maintain the specified test conditions

2.1.18 test level

predefined level used to specify a minimum ballistic or blast requirement

NOTE For ballistic test levels this covers bullet specification/type, mass, measured velocity and shot distance. For blast test levels this covers charge type, size and stand-off.

2.1.19 test projectile

projectile fired at the test vehicle

2.1.20 test site

location where a test is conducted

2.1.21 test vehicle**2.1.21.1 complete vehicle**

civilian armoured vehicle with at least a fully integrated and completed armour shell, including all trim, door seals, door latches and locks, seats, steering wheel and front dash

NOTE A record may be made of items included in the test vehicle.

2.1.21.2 test specimen

specimen comprising one or more vehicle components that represent parts of a CAV constructed using the same materials, hardware, construction techniques, fixing and mounting method that would be used in the complete vehicle

NOTE Examples of vehicle components include, a door section, part of a door aperture, or door latch and lock mechanism.

2.1.22 transparent armour panel

protection material constructed from glass

2.1.23 vision block

transparent armour panel (2.1.22) where there is a higher likelihood the eye position could be ≤ 50 mm from the back surface of the panel

2.1.24 witness sheet

specified material that is placed behind a test vehicle surface to determine the extent of test projectile perforation and/or test vehicle damage

2.1.25 witness sheet perforation

2.1.25.1 full perforation

hole, of any size, that light is able to pass through in the witness sheet, caused by the test projectile fired at the test vehicle, a fragment of the test projectile or test vehicle debris

2.1.25.2 partial perforation

damage present on the witness sheet, caused by the test projectile fired at the test vehicle, a fragment of the test projectile or test vehicle debris

***NOTE** Damage may include any scratch, dent or deformation that is visually seen or felt. Slight dusting on the witness sheet is not considered damage.*

2.1.25.3 no perforation

neither full perforation nor partial perforation found on the witness sheet

2.2 Abbreviations

For the purposes of this PAS, the following abbreviations apply.

AIS	abbreviated injury score
BA	ballistic test level
CAV	civilian armoured vehicle
CWVP	chest wall velocity predictor
DAS	data acquisition system
FR	fragment test level
FSP	fragment simulating projectile
GVM	gross vehicle mass
HRC	rockwell hardness C scale
RB	roof blast test level
SB	side blast test level
SUV	sport utility vehicle
UB	under vehicle blast test level
VSAG	vehicle security advisory group

3 Ballistic (BA) test method

3.1 Principle

A test vehicle (2.1.21) is fired at, using a firing system and ballistic (BA) test levels selected in accordance with Table 1. A witness sheet positioned behind the test vehicle impact surface is then inspected to determine the level of damage and assessed against the pass/fail criteria.

Fragment testing, using fragment simulating projectiles (FSPs) is included in the ballistic shot plan when specified in the requirement. Where an FSP test is specified a test vehicle is fired at using a firing system and test levels selected in accordance with Table 2 and fragment measured velocity test levels, in accordance with Table 3.

3.2 Ballistic (BA) test levels

3.2.1 The BA test levels shall be selected in accordance with Table 1.

NOTE For example, a 7.62×39 AK47 PS Ball is test level BA-F. A 7.62×51 AP is BA-M. A 7.62×39 API BZ is BA-L.

3.2.2 For any test level selected, the likelihood of any lesser test level presenting an additional hazard shall be assessed and additional tests conducted, if necessary.

NOTE For example, test level BA-G may present a higher hazard against textile/composite armour compared to test level BA-H. Lead core bullets, for example BA-H and BA-J, may present a higher hazard in terms of splash leakage around door apertures compared to the armour piercing bullet BA-L.

3.3 Fragment (FR) test levels

3.3.1 The FR test levels and measured velocity test levels shall be selected in accordance with Table 2 and Table 3.

NOTE 1 For example, a 0.3" FSP with 400 m/s measured velocity is FR-CB. A 20.0 mm FSP with 960 m/s measured velocity is FR-FG.

NOTE 2 Fragment testing may be included as part of the ballistic tests and pass/fail determination. The tests may be conducted using gun-fired FSPs.

NOTE 3 The FR test levels are representative of primary fragments (2.1.7.1) generated from blast threats (including artillery engagement) detonated at different distances.

NOTE 4 Multi-hit testing is not required with FSPs. This is based on the assumption that blast threats are at a sufficient distance so that discrete impacts are more likely.

NOTE 5 Some of the fragment specifications and velocities have been extracted from STANAG 2920 [2] and AEP – 55 Vol.1 (Edition 2) [3].

Table 1 – Ballistic (BA) test levels

Test level	Type of weapon	Bullet specification	Bullet type	Mass g	Measured velocity m/s	Shot distance m	Notes
BA-A	hand gun	9×19 mm	FMJs/RN/SC	8.0 ±0.1	400.0 ±10.0	5.0 ±0.5	
BA-B	hand gun	0.357" magnum (9×33 mm R)	FMJc/CT/SC	10.2 ±0.1	430.0 ±10.0	5.0 ±0.5	
BA-C	hand gun	0.44" magnum (11.1×32.6 mm R)	FMJc/FN/SC	15.6 ±0.1	440.0 ±10.0	5.0 ±0.5	
BA-D	Reserved						
BA-E	Reserved						
BA-F	rifle	7.62×39 mm PS Ball	FMJs/PB/FeC	8.0 ±0.1	720.0 ±15.0	10.0 ±0.5	
BA-G	rifle	5.56×45 mm NATO Ball	FMJc/PB/SCP	4.0 ±0.1	950.0 ±15.0	10.0 ±0.5	For example, SS109
BA-H	rifle	7.62×51 mm NATO Ball	FMJs/PB/SC	9.55 ±0.1	830.0 ±15.0	10.0 ±0.5	
BA-J	rifle	5.56×45 mm M193	FMJc/PB/SC	3.56 ±0.1	990.0 ±15.0	10.0 ±0.5	
BA-K	Reserved						
BA-L	rifle	7.62×39 mm API BZ	FMJs/PB/HC-I	7.7 ±0.2	740.0 ±15.0	10.0 ±0.5	Nominal core hardness 65 HRC
BA-M	rifle	7.62×51 mm AP	FMJs/PB/HC	9.7 ±0.2	820.0 ±15.0	10.0 ±0.5	Nominal core hardness 63 HRC
BA-N	rifle	7.62×54 mm R B32 API	FMJs/PB/HC-I	10.3 ±0.3	860.0 ±15.0	10.0 ±0.5	Nominal core hardness 63 HRC
BA-P	rifle	7.62×51 mm AP (WC)	FMJs/PB/WC	12.7 ±0.1	810.0 ±15.0	10.0 ±0.5	Nominal core hardness 76 HRC
BA-SG	solid lead slug	18.5 ±0.5 (12 gauge cylinder bore)	L	31.0 ±0.5	420.0 ±20.0	10.0 ±0.5	For example, Brenneke slug
Key AP armour piercing CT coned truncated FMJs full metal jacket (steel) FN flat nose I incendiary PB pointed bullet RN round nose SCP lead-soft core with steel penetrator API armour piercing incendiary FeC mild-steel core FMJc full metal jacket (copper) HC hard core L full lead R rimmed SC lead-soft core WC tungsten (wolfram) carbide							
NOTE Other common ballistic standards are listed for comparison in Annex A.							

Table 2 – Fragment (FR) test levels

Test level	FSP	Diameter mm	Mass g	Distance m	HRC kgf
FR-A	0.22" FSP	5.5 ±0.10	1.10 ±0.03	10.0 ±0.50	30 ±2
FR-B	0.25" ball	6.5 ±0.06	1.13 ±0.03	10.0 ±0.50	55 ±3
FR-C	0.3" FSP	7.5 ±0.10	2.84 ±0.03	10.0 ±0.50	30 ±2
FR-D	10 mm ball	10.0 ±0.10	4.11 ±0.03	10.0 ±0.50	55 ±3
FR-E	0.5" FSP	12.5 ±0.10	13.39 ±0.13	10.0 ±0.50	30 ±2
FR-F	20 mm FSP	20.0 ±0.10	52.73 ±0.26	10.0 ±0.50	30 ±2

Table 3 – Fragment measured velocity test levels

Index	A	B	C	D	E	F	G	H	I	J	K
Measured velocity m/s	300 ±20	400 ±20	520 ±20	630 ±20	700 ±20	770 ±20	960 ±20	1 000 ±20	1 250 ±20	1 500 ±20	1 800 ±20

3.4 Test vehicle

A complete vehicle (2.1.21.1) shall be used to complete the ballistic test procedure.

NOTE A complete vehicle or test specimens (2.1.21.2) may be used for retesting.

3.5 Apparatus

3.5.1 Bullet or FSP loading equipment, capable of achieving the bullet and FSP specified measured velocities

3.5.2 Firing system, capable of firing the full range of BA and/or FR test levels in accordance with Tables 1, 2 and 3. The firing system shall have the capacity to be rotated to any angle in the horizontal and vertical planes specified in the shot plan (3.6.1)

3.5.3 Mass measuring equipment, that is calibrated and capable of measuring to an accuracy of at least ($\pm 1.0 \times 10^{-5}$) kg

3.5.4 Shot angle measuring equipment, capable of measuring the angles given in the shot plan to an accuracy of at least $\pm 1.0^\circ$

3.5.5 Temperature and humidity measuring equipment, capable of measuring temperature with an accuracy of at least $\pm 0.5^\circ\text{C}$ and $\pm 1\%$ humidity respectively

3.5.6 Test cell, temporary or permanent construction around the test vehicle capable of protecting the test vehicle from adverse weather conditions and achieving a temperature of $(20 \pm 10)^\circ\text{C}$

3.5.7 Velocity measuring equipment, that is calibrated and capable of measuring the velocities given in Table 1 or Table 3, to an accuracy of at least $\pm 0.5\%$

3.5.8 Witness sheet 1, consisting of an aluminium alloy sheet 2024 T3 or T4, AlCuMg ISO/R209 with a thickness of (0.5 ± 0.05) mm and a tensile strength of (440 ± 40) N/mm

NOTE 1 Witness sheet 1 is used for all ballistic testing, except when testing vision blocks (2.1.23).

NOTE 2 Alternative materials may be used (e.g. polycarbonate) provided it can be demonstrated they have similar characteristics to the material stated above. For example the impact velocity required to perforate (0.5 ± 0.05) mm 2024 T4 Al using a 4.4 mm 0.36 g spherical steel pellet, with at least 0.99 probability, is (175 ± 25) m/s.

3.5.9 Witness sheet 2, consisting of an aluminium alloy foil with a thickness of (0.05 ± 0.01) mm

NOTE Witness sheet 2 is used for testing vision block in test vehicles where there is a higher likelihood the eye position could be ≤ 50 mm from the back surface of the vision block.

3.6.1.3 The test vehicle shall be zoned in accordance with Figure 2 for a saloon CAV, or in accordance with Figure 3 for a sport utility vehicle (SUV) CAV. For any other CAV types zoning shall follow a similar approach.

3.6 Test set up

3.6.1 Shot plan

3.6.1.1 The party completing the testing shall be responsible for the approval of the shot plan after inspection of the CAV design and the test vehicle. As a minimum, the inspection shall include a close examination of the design to identify potential vulnerabilities around the following areas:

- a) door apertures;
- b) handles;
- c) latches;
- d) locks;
- e) armour joints;
- f) hole cover plates;
- g) bolt fixings;
- h) welds;
- i) wheel arches;
- j) glass structural supports (e.g. internal framing to support side door glass);
- k) glass framing/supports and overlaps with the opaque armour;
- l) fuel line protection;
- m) fuel tank protection;
- n) auxiliary battery; and
- o) any engine component protection.

For shots on the door armour the exact location of the internal framing and other components shall be identified so they can be taken into consideration.

3.6.1.2 Each shot shall be assigned a unique number.

NOTE An example ballistic shot plan-test log template is given in Annex B. The ballistic shot plan-test log includes shot number, shot zone, armour material, bullet or FSP type, specified horizontal and vertical attack angles, specified measured velocity, actual measured velocity, result and shot validity.

Figure 2 – Shot zones for saloon type CAV

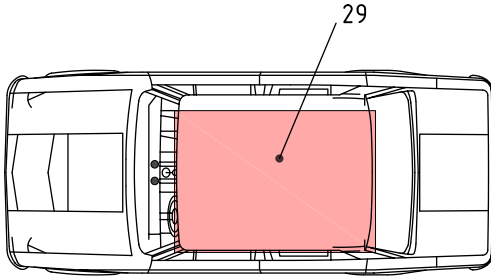
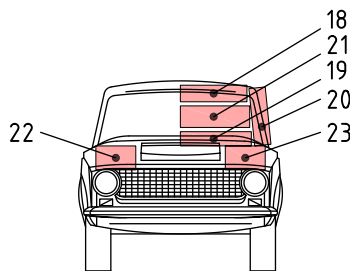
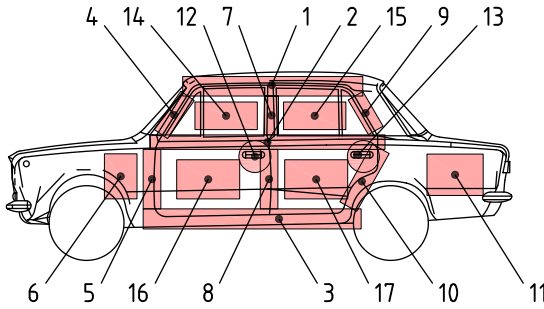
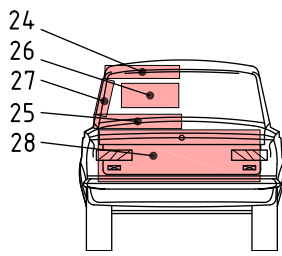
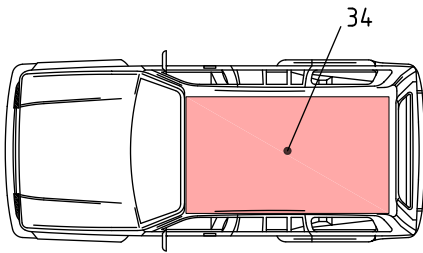
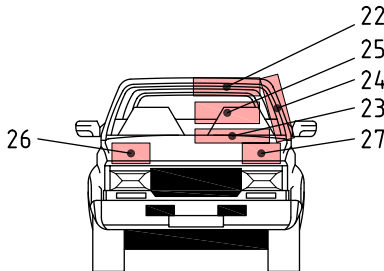
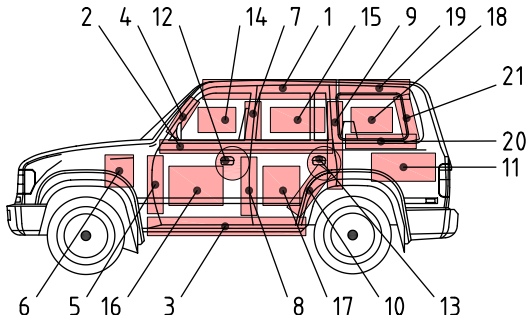
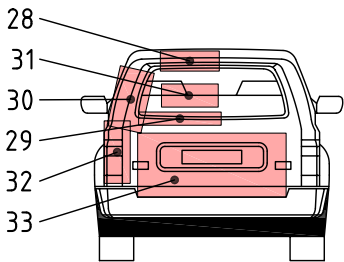
		
a) Plan	b) Front elevation	
		
c) Elevation	d) End elevation	
Shot zones		Minimum number of shots
1	Cant rail	8
2	Door body glass joint	8
3	Door sill	8
4	"A" post upper	4
5	"A" post lower	4
6	Side front fender	3
7	"B" post upper	8
8	"B" post lower	8
9	"C" post upper	4
10	"C" post lower	4
11	Rear fender	3
12	Front door latch and lock	5
13	Rear door latch and lock	5
14	Front door glass	3
15	Rear door glass	3
16	Front door panel	6
17	Rear door panel	6
18	Front glass/roof joint	4
19	Front glass/fire wall joint	4
20	Front glass "A" post joint	4
21	Front glass	3
22	Fire wall left	3
23	Fire wall right	3
24	Rear glass/roof joint	4
25	Rear glass/fire wall joint	4
26	Rear glass	3
27	Rear glass "C" post joint	4
28	Rear fire wall	6
29	Roof	6
Total		138

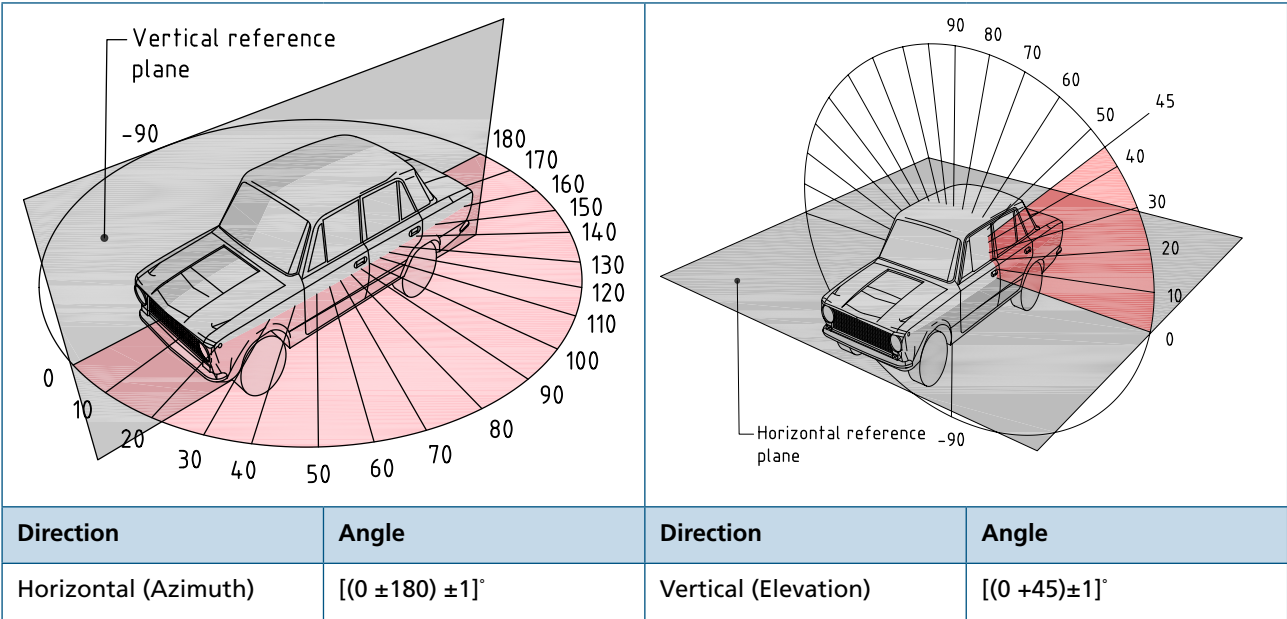
Figure 3 – Shot zones for SUV type CAV

		
a) Plan	b) Front elevation	
		
c) Elevation	d) End elevation	
Shot zones		Minimum number of shots
1	Cant rail	8
2	Door body glass joint	8
3	Door sill	8
4	"A" post upper	4
5	"A" post lower	4
6	Side front fender	3
7	"B" post upper	8
8	"B" post lower	8
9	"C" post upper	4
10	"C" post lower	4
11	Rear fender	3
12	Front door latch and lock	5
13	Rear door latch and lock	5
14	Front door glass	3
15	Rear door glass	3
16	Front door panel	6
17	Rear door panel	6
18	Rear light glass	3
19	Rear cant rail	4
20	Rear light/fender joint	4
21	"D" post upper	4
22	Front glass/roof joint	4
23	Front glass/fire wall joint	4
24	Front glass "A" post joint	4
25	Front glass	3
26	Fire wall left	3
27	Fire wall right	3
28	Rear glass/roof joint	4
29	Rear glass/rear door joint	4
30	Rear door aperture upper	4
31	Rear glass	3
32	Rear door aperture lower	4
33	Rear door panel	6
34	Roof	6
Total		157

NOTE If the rear load space is not armoured, the shot zones for a saloon type CAV apply



Figure 4 – Minimum requirement for attack angles



3.6.1.4 The BA test levels shall be selected in accordance with 3.2.

3.6.1.5 Where FSP testing is specified, the FR test levels shall be selected in accordance with 3.3.

3.6.1.6 Shot angles (2.1.14) shall be selected to assess the ballistic performance of the armour and to test the most vulnerable angles. To facilitate the firing system placement relative to the test vehicle the shot angle shall be transposed into the attack angle (2.1.2) that is relative to the horizontal and vertical reference planes defined for the test vehicle.

The horizontal and vertical reference planes and attack angles shall be defined in accordance with Figure 4. The horizontal plane shall be parallel with the test arena surface and the vertical plane shall be at a right angle to the horizontal plane.

The horizontal attack angle shall be measured from the vertical plane and defined from $(0 \pm 180)^\circ$ with 0° oriented on the front of the test vehicle. The vertical attack angle shall be measured from the horizontal plane and defined from $(0 + 90)^\circ$.

NOTE 1 If the test vehicle presented for the test does not have sufficient area to complete all the ballistic and FSP testing then a second complete vehicle, or test specimens may be used.

NOTE 2 The sequence of shots and location should be arranged in a manner so as not to compromise or invalidate later shots. Where the same test vehicle is used for blast testing then the ballistic testing should be confined to the front, rear and opposite side of the intended blast tests so the shot positions do not present a risk of invalidating blast testing.

NOTE 3 This method assumes the CAV is tested in the horizontal plane, if the test vehicle is tilted to achieve the vertical attack angle then CAV suspension movement should be accounted for.

The minimum number of shots in each zone shall be selected in accordance with Figure 2 or Figure 3. The minimum requirement for attack angles (2.1.2) shall be horizontal $(0 \pm 180)^\circ$ and vertical $(0 + 45)^\circ$ selected in accordance with Figure 4. The shot validity shall conform to the ballistic validity criteria in accordance with Annex I. The sequence of five shots on the latch, lock and door handles shall start with the most vulnerable locations.

NOTE 4 The minimum number of shots in a zone may be either all of one ammunition level or multiple levels if testing lesser threats, including FSPs. For example, if a minimum of four shots are required, it may include one for each test level or all the same test level, it does not mean to test four shots at each test level.

3.6.2 Test condition

The ballistic test shall be carried out within a temperature range of $(20 \pm 10)^\circ\text{C}$.

NOTE 1 There are no humidity constraints.

NOTE 2 If necessary the test vehicle may need to be enclosed within a test cell (3.5.6) to achieve the correct temperature.

3.6.3 Preparation of test vehicle

3.6.3.1 The test vehicle (3.4) shall be visually inspected without magnification, to determine if there are defects or other damage that affect the test procedure or results. If any defects or damage are present these shall be rectified prior to testing.

NOTE 1 Examples of defects or damage may include dents or cracks in the armour, cracked glass, or incorrect door aperture closure.

NOTE 2 The test vehicle may need to be drained of fluids.

3.6.3.2 The test vehicle shall be conditioned at a temperature in accordance with 3.6.2 for at least 12 hrs prior to testing.

3.6.3.3 The test vehicle mass shall be configured to achieve the normal operational driving stance in the horizontal and vertical planes. This shall ensure the test vehicle is correctly orientated with the reference horizontal and vertical planes (3.6.1.6) and the attack angles are consistent with the shot plan.

3.6.4 Preparation of bullet and/or FSP

Bullets, FSPs, and cartridges (including primers) shall be undamaged.

3.6.5 Firing system placement

The firing system (3.5.2) shall be placed at the shot distance specified by the test levels given in Table 1 or Table 2. The distance shall be measured from the muzzle of the barrel to the impact surface of the test vehicle. The attack angle specified in the shot plan shall be within $\pm 1^\circ$.

NOTE In exceptional circumstances the shot distance may be altered provided a valid shot can be achieved (see Annex I). An example of an exceptional circumstance may be where restrictions on space do not allow the firing system to be placed within the shot distance specified.

3.6.6 Velocity measuring equipment placement

The velocity measuring equipment (3.5.7) shall determine a velocity at a point ≤ 2.5 m from the impact surface of the test vehicle.

3.6.7 Witness sheet placement

Witness sheet 1 (3.5.8) aluminium alloy sheet for testing opaque and transparent zones shall be placed internally ≤ 150 mm behind and parallel to the back face surface at the impact point.

Witness sheet 2 (3.5.9) aluminium alloy foil for testing vision block (2.1.23) zones shall be placed internally at a reduced distance of (50 ± 5) mm behind and parallel to the back face surface at the impact point.

For all shots, and where possible, the witness sheet coverage shall extend a minimum (500 ± 10) mm radially from the impact point.

NOTE If there is any doubt on the extent of coverage for the witness sheet then the complete surface behind the test position should be covered.

3.6.8 Shot spacing

The shot spacing on all armour panels (including transparent panels) for bullets and FSPs shall be three impacts arranged in an equilateral triangle with a side length of (120 ± 10) mm.

The shot spacing on apertures or joints that contain transparent armour panels shall be (120 ± 10) mm.

The shot spacing for apertures and joints that do not contain transparent armour panels shall have spacing to facilitate the shot plan but not less than three bullet calibres for the bullet being fired.

The shot spacing on door handles, latches and locks shall have spacing to facilitate the shot plan but not less than three bullet calibres for the bullet being fired.

3.7 Test procedure

NOTE Testing should conform with the test site local safety procedures at all times.

3.7.1 Using the temperature and humidity measuring equipment (3.5.5) measure the temperature and humidity and record results in the ballistic shot plan-test log (see Annex B). The test temperature shall be in accordance with 3.6.2 and 3.6.3.2.

NOTE There are no humidity constraints but humidity should be recorded in the ballistic shot plan-test log.

3.7.2 Visually inspect the test vehicle for damage in accordance with 3.6.3.1.