

# Fact sheet

on the testing of civilian armoured vehicles  
according to the federal guideline  
for ballistic and blast protection (TR-SB)

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## OFFICE

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## 1 INTRODUCTION

- The federal guideline for ballistic and blast protection (TR-SB) describes a procedure to obtain reproducible testing of civilian armoured vehicle protection. It aims towards a reliable comparison of products for public procurement.
- The guideline consists of TR-SB „Beschusshemmende Anforderungen“ (ballistic protection requirements) and TR-SB „Sprengwirkungshemmende Anforderungen“ (blast protection requirements). These documents specify the requirements, classification and testing procedure for civilian armoured vehicles.
- Deviations from the testing procedure are not permissible. Testing of ballistic requirements is done prior to the blast protection requirements.
- Acceptance of testing facilities is regulated within TR-SB guideline for quality assurance. Only approved testing facilities can perform tests according to TR-SB.
- Public authorities can request copies of the TR-SB guidelines from the office mentioned above.

Approved testing facilities (as of October 2024):

- Beschussamt (Proof House) Mellrichstadt
- Beschussamt (Proof House) München
- Beschussamt (Proof House) Ulm

## 1.1 Transitional regulation for the recognition of BRV/ERV3<sup>1</sup> tests

For procurement, vehicles which have passed a test according to BRV version 3 (15.03.2021) or ERV version 3 (01.03.2021) shall be recognised as having equivalent properties to a test according to TR-SB as of 23.01.2024 (ballistic and blast protection requirements).

These tests must have been carried out by a testing facility approved in accordance with TR-SB. This transitional regulation shall apply until one of the guidelines has been changed.

## 2 BALLISTIC PROTECTION REQUIREMENTS

Civilian armoured vehicles must provide ballistic protection from all angles of attack. The following parts of the vehicles will be tested according to one of the levels mentioned in 2.1:

- Side parts and hinges with A, B, C, D pillars including doors with glazing
- Front and windscreen
- Rear side and rear window
- Roof
- Floor (only on request)

### 2.1 Ballistic protection levels

Ballistic protection of vehicles is classified according to the following scheme:

Test level according to VPAM-APR <sup>2</sup>	Vehicle classification according to TR-SB
1	VR1
2	VR2
3	VR3
4	VR4
5	VR5
6	VR6
7	VR7
8	VR8
9	VR9
10	VR10

### 2.2 Testing procedure

Armouring materials must be pre-tested by an approved TR-SB testing facility or a member of the VPAM. For the ballistic protection levels VR6 to VR10, which are tested with either armour-piercing or Fe-core ammunition, the joints must additionally be tested with soft-core ammunition.

For the roof, the upper limit for the angle of attack may be reduced to 45° or 30° in the specified classes. In this case, all angles from 0° to 45° or 0° to 30°, are tested based on the analysis of vulnerabilities. The door joints are not subject to the angle of attack restrictions. Testing of the transparent area may be restricted to horizontal angle of attack for classification levels VR8, VR9 and VR10.

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<sup>1</sup>: Vehicle test guidelines of the VPAM (Association of Test Laboratories for Attack Resistant Materials and Constructions)

<sup>2</sup>: Guideline for General Basics of Ballistic Material, Design and Product Tests

Ballistic testing of the underbody area shall be carried out only on request.

### 2.2.1 Battery packs

Ballistic testing of battery packs (voltages of 48 V and higher) installed in the vehicle, such as lithium-ion cells, can be carried out on request. In this case, ballistic protection of the battery pack is tested to exclude an increased hazard potential.

Details on the testing of battery packs are covered in a supplementary guideline.

## 2.3 Certificates

Reduced angle of attack testing of the roof and the transparent area must be indicated in the certificate.

### Examples of test descriptions in the certificate:

#### Example 1:

Test level 7 according to VPAM APR, roof testing angle of attack  $\leq 45^\circ$ , transparent area without restriction.

*„VR7, Dachbereich 45°, durchsichtiger Bereich ohne Einschränkung“*

#### Example 2:

Test level 8 according to VPAM APR, roof testing angle of attack  $\leq 30^\circ$ , transparent area restricted to horizontal angle of attack.

*„VR8, Dachbereich 30°, durchsichtiger Bereich in Einbaulage“*

#### Example 3:

Test level 9 according to VPAM APR, no restrictions.

*„VR9, ohne Einschränkung“*

## 3 BLAST PROTECTION REQUIREMENTS

Fragmentation charges (e.g. hand grenades) are used to test blast protection requirements of roof and floor.

Side blast is tested by a high-explosive charge to simulate a roadside attack.

For the roof, floor and side blast test, the charge used for testing is indicated in the certificate. A rating for vehicle occupant protection is given on a scale of one to three stars, with three stars being the most protective.