



Beschussamt Ulm

- Staatliche Prüfstelle für Waffen- und Sicherheitstechnik -

Proof House Ulm
Banc d'épreuves d'Ulm

Test report **Ballistic testing plastic fuel tank**

Test report number **DSM 00 004 (S 03 0025 01 / B)**

Client TSS International B.V.
Middenbaan 105 B
P.O. Box 2013

NL-2990 DA Barendrecht

Test details Penetration testing as per specifications of the client.
Shooting at a fuel-filled tank with various calibres and types of
ammunition. (See table pages 3 through 7).
Target point as per specifications of the client. (See photos pages 8
through 10).

Test standards Evidence of the sealing at the ballistic point of entry and exit of a
specially armoured plastic tank based on a chemical reaction in
combination with the type of ammunition and time (see table pages 3
through 7).

Type of test Chosen and supplied by client.

**Date of receipt
of test sample** 27 January 2000

Date of test 3 February 2000

Testing official B. Kurz

Participants Mr van Beveren
Mr Huyzen

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Test details

Information on types of weapons and ammunition (see table pages 3 through 7)

Context of request Angle of entry 90°
Shooting distance 10 m
Order of shooting and location of target As per specifications of the client (see table pages 3 through 7 and photos pages 8 through 10)

Test sample:

Type Fuel tank (plastic tank with special outer coating)
Dimensions approx. 360 mm x 500 mm x 1200 mm
Quantity 1
Contents approx. 45 litres (super unleaded petrol)
Description of sample TSS plastic fuel tank (Mercedes Benz G Class, petrol)
Positioning of sample



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Execution

Shooting

Shooting order	Shooting angle	V (m/s)	Ballistic specifications/results
1.	90°	434	<p>Weapon: Bolt action system Barrel-length: 476 mm Calibre: .357 Magnum Bullet: Full Steel Jacket, coned, soft core. Bullet weight: 10.20 grams</p> <hr/> <p>Bullet pierced through complete tank assembly, exit opening slightly torn <u>Entry opening (front of tank)</u> -fuel leakage: no fuel loss, entry opening closed immediately after entrance of bullet</p> <p><u>Exit opening (rear of tank)</u> -fuel leakage: no fuel loss, exit opening closed immediately after exit of bullet.</p>
2.	90°	403	<p>Weapon: Sub-machine gun MP5 Barrel-length: 250 mm Calibre: 9 mm Luger Bullet: Full Steel Jacket, round nose, soft core Bullet weight: 8.00 grams</p> <hr/> <p>Bullet pierced through complete tank assembly, exit opening slightly torn <u>Entry opening (front of tank)</u> -fuel leakage: no fuel loss, entry opening closed immediately after entrance of bullet</p> <p><u>Exit opening (rear of tank)</u> -fuel leakage: no fuel loss, exit opening closed immediately after exit of bullet</p>



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Shooting order	Shooting angle	V (m/s)	Ballistic specifications/results
3.	90°	444	<p>Weapon: Bolt action system Barrel-length: 508 mm Calibre: 44 Remington Magnum Bullet: Full metal Jacket, flat nose, soft core Bullet weight: 15.60 grams</p> <hr/> <p>Bullet pierced through complete tank assembly, exit opening slightly torn. <u>Entry opening (front of tank)</u> -total amount of fuel loss after 5 min.: approx. 30 drops -time before self-closure: 5 min.</p> <p><u>Exit opening (rear of tank)</u> -fuel leakage: no fuel loss, exit opening closed immediately after exit of bullet</p>
4.	90°	444	<p>Weapon: Bolt action system Barrel-length: 508 mm Calibre: 44 Remington Magnum Bullet: Full Metal Jacket, flat nose, soft core Bullet weight: 15.60 grams</p> <hr/> <p>Bullet pierced through complete tank assembly, exit opening torn out approx. 4 cm along a rounded part of the tank <u>Entry opening (front of tank)</u> -total amount of fuel loss after 1 min.: approx. 20 drops -time before self-closure: 1 min.</p> <p><u>Exit opening (rear of tank)</u> -fuel loss after 2 min.: approx. 50 drops per min. -fuel loss after 10 min.: approx. 35 drops per min. -after one hour no complete self closure -total amount of fuel loss after 1 hr.: approx. 120 ml</p>



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Shooting order	Shooting angle	V (m/s)	Ballistic specifications/results
5.	90°	444	<p>Weapon: Bolt action system Barrel-length: 508 mm Calibre: .44 Remington Magnum Bullet: Full Metal jacket, flat nose, soft core Bullet weight: 15.60 grams</p> <p>Bullet pierced through complete tank assembly, exit opening slightly torn <u>Entry opening (front of tank)</u> -total amount of fuel loss after 1 min.: approx. 20 drops -time before self-closure: 1 min.</p> <p><u>Exit opening (rear of tank)</u> -fuel leakage: no fuel loss, exit opening closed immediately after exit of bullet</p>
6.	90°	832	<p>Weapon: Bolt action system Barrel-length: 305 mm Calibre: 7.62 x 51 mm Bullet: Full Metal Jacket, pointed, soft core Bullet weight: 9.50 grams</p> <p>Bullet pierced through complete tank assembly, exit opening slightly torn <u>Entry opening (front of tank)</u> -fuel leakage: no fuel loss, entry opening closed immediately after bullet entry</p> <p><u>Exit opening (rear of tank)</u> Fuel leakage: no fuel loss, exit opening closed immediately after bullet exit.</p>



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Shooting order	Shooting angle	V (m/s)	Ballistic specifications/results
7.	90°	444	<p>Weapon: Bolt action system Barrel length: 305 mm Calibre: 7.62 x 51 mm Bullet: Full Metal Jacket, pointed, soft core Bullet weight: 9.50 grams</p> <p>Bullet pierced through complete tank assembly, exit opening slightly torn. <u>Entry opening (front of tank)</u> -fuel leakage: no fuel loss, entry opening closed immediately after entry of bullet</p> <p><u>Exit opening (rear of tank)</u> -total amount of fuel loss after 1 min.: approx. 10 drops -time until self closure: 1 min.</p>
8.	90°	826	<p>Weapon: Bolt action system Barrel-length: 254 mm Calibre: 7.62x51 mm Bullet: Full Metal Jacket, pointed, hard core Bullet weight: 9.75 grams</p> <p>Bullet pierced through complete tank assembly, exit opening slightly torn. <u>Entry opening (front of tank)</u> -fuel leakage: no fuel loss, entry opening closed immediately after bullet entry</p> <p><u>Exit opening (rear of tank)</u> -total amount of fuel loss after 1 min.: approx. 15 drops per min. -time until self-closure: 4 min. -total amount of fuel loss: approx. 10 ml</p>



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Shooting order	Shooting angle	V (m/s)	Ballistic specifications/results
9.	90°	826	Weapon: Bolt action system Barrel-length: 254 mm Calibre: 7.62 x 51 mm Bullet: Full Metal Jacket, pointed, hard core Bullet weight: 9.75 grams
			Bullet pierced through complete tank assembly, exit opening slightly torn. <u>Entry opening (front of tank)</u> -fuel leakage: no fuel loss, entry opening closed immediately after entrance of bullet <u>Exit opening (rear of tank)</u> -fuel leakage: no fuel loss, exit opening closed immediately after exit of bullet
10.	90°	728	Weapon: Bolt action system Barrel-length: 240 mm Calibre: 7.62 x 39 mm Bullet: Full Metal Jacket, pointed, hard core, incendiary filling. Bullet weight: 7.65 grams
			Bullet pierced through complete tank assembly, exit opening slightly torn. <u>Entry opening (front of tank)</u> -fuel leakage: no fuel loss, entry opening closed immediately after entrance of bullet <u>Exit opening (rear of tank)</u> -fuel leakage: no fuel loss, exit opening closed immediately after exit of bullet

The specified bullet velocities are average velocities with a measurement sequence of $n = 10$. Because the tank was filled with fuel, the shooting had to be carried out in a stone quarry without bullet velocity measurement.



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Photo documentation of shooting



Test sample front after the 5th shot.



Test sample rear after the 5th shot



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Photo documentation of shooting



Test sample (rear) after the 7th shot



Test sample (front) after the 9th shot



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Photo documentation of shooting



Test sample (rear) after the 9th shot

The test sample corresponds with the specifications
of the client.



Frieß
Director of the Proof House Ulm

Ulm, 11th February 2000

B. Kurz
Technical Employee