

 <p>VPAM Association of test laboratories for bullet resistant materials and constructions</p>	<p>General basis for ballistic material, construction and product tests</p> <p>- Requirements, test levels and test procedures -</p>	<p>VPAM APR 2006</p> <p>Edition: 2009-05-14</p>
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4 Test conditions

4.1 Tests with standardized types of ammunition

Table 1: Classification of the test levels

Test level	Type of weapon	Calibre	Ammunition and projectile			Test conditions	
			Type	Mass [g]	Manufacturer Type	shot distance [m]	Bullet velocity [m/s]
1	K/L	22 Long Rifle	L/RN	2,6 ± 0,1	Winchester	10 + 0.5	360 ± 10
2	K	9 mm Luger ⁵⁾	FMJ/RN/SC, tinned	8,0 ± 0,1	DAG, DM 41	5 + 0.5	360 ± 10
3	K	9 mm Luger ⁵⁾	FMJ/RN/SC, tinned	8,0 ± 0,1	DAG, DM 41	5 + 0.5	415 ± 10
4 ¹⁾	K	357 Magnum	FMJ/CB/SC	10,2 ± 0,1	Geco	5 + 0.5	430 ± 10
		44 Rem. Mag.	FMJ ^{*)} /FN/SC	15,6 ± 0,1	Speer	5 + 0.5	440 ± 10
5	K	357 Magnum	FM/CB	7,1 ± 0,1	DAG special	5 + 0.5	580 ± 10
6	L	7,62 x 39	FMJ/PB/FeC	8,0 ± 0,1 core 3,6	PS cold hardened	10 + 0.5	720 ± 10
7 ¹⁾	L	223 Rem. ²⁾	FMJ/PB/SCP	4,0 ± 0,1	MEN, SS 109	10 + 0.5	950 ± 10
		308 Win.	FMJ/PB/SC	9,55 ± 0,1	MEN, DM 111	10 + 0.5	830 ± 10
8	L	7,62 x 39	FMJ/PB/HCI	7,7 ± 0,1 core 4,1 hardness 65 HRC	BZ	10 + 0.5	740 ± 10
9	L	308 Win. ³⁾	FMJ/PB/HC	9,70 ± 0,2 core 4,0 ± 0,1 hardness 62 ± 2 HRC	MEN/CBC, FNB, P 80	10 + 0.5	820 ± 10
10	L	7,62 x 54 R	FMJ/PB/HCI	10,4 ± 0,1 core 5,3 hardness 63 HRC	B32	10 + 0.5	860 ± 10
11	L	308 Win. ³⁾	FMJ/PB/WC	8,4 ± 0,1 core 5,9	Nammo, AP 8	10 + 0.5	930 ± 10
12	L	308 Win. ³⁾	FMJ/PB/WC	12,7 ± 0,1 core 5,58 hardness 1330 HV 10	SWISS P AP	10 + 0.5	810 ± 10
13	L	50 Browning	FMJ/PB/HC	43,0 ± 0,5 core 35,0 hardness 55 ± 2 HRC	SWISS P penetrator	⁶⁾	930 ± 20
14	L	14,5 x 114 ⁴⁾	FMJ/PB/HCI	63,4 ± 0,5	B32	⁶⁾	911 ± 20

The rates of twist can be gathered from the dimension sheets (TDCC) of the C.I.P.

Legend for the abbreviations used in table 1

<p>FMJ full metal jacket (steel) FMJ^{*)} full metal jacket (copper) CB coned bullet RN round nose PB pointed bullet FN flat nose L full lead SC lead-soft core FeC mild-steel core SCP lead-soft core steel penetrator HC hard core WC wolfram-carbide FMs full brass I Incendiary</p>	<p>C.I.P. Permanent international commission for the testing of small arms TDCC Dimension sheets of the C.I.P. DAG RUAG Ammotec, Germany Geco RUAG Ammotec, Germany MEN Metallwerk Elisenhuetten Nassau, Germany Nammo Nammo AS, Norway FNB FN Herstal, Belgium Speer Federal Cartridge Company, USA</p> <p>1) In these steps both calibres are to use. 2) twist rates 178 mm ± 5% 3) twist rates 254 mm ± 5% 4) twist rates arbitrary 5) test barrel with a transition of 7,5 mm 6) arbitrary shot distance. Appropriate hits have to be ensured in terms of velocity, oscillation and impact point</p> <p>K handgun L rifle</p>
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The test steps 1 to 14 mentioned in table 1 are listed in increasing order according to their ballistic resistance. Test step 1 offers the lowest, step 14 the highest resistance against penetration. If a test specimen meets a particular level of resistance all underlying levels are also met.

For constructions and vehicles to be tested with a hard core or mild-steel core ammunition, splits, joints and overlaps will be additionally tested with soft core ammunition.

Step 6 and 8 are to be additionally tested with projectile FMJ/PB/SC calibre 7,62 x 39.

Step 9 is to be additionally tested with the projectile in test step 7 calibre 308 Win.

Step 10 is to be additionally tested with projectile type D (FMJ/PB/SC), 11,8 ± 0,1 g, v₀: 810 ± 10 m/s calibre 7,62 x 54R.