

Armor Penetration Table

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German Guns

Gun	Ammunition	Shot type	Weight	Muzzle velocity	Range (Penetration at 30° angle from vertical)				
					100 m	500 m	1000 m	1500 m	2000 m
7.92 mm									
7,92 mm K 98 k 7,92 mm K 41 7,92 mm K 43	S. m. K.	APCR	11.55 g	785 m/s	8 mm	3.5 mm	-	-	-
7,92 mm M G 13 7,92 mm M G 34 7,92 mm M G 42	S. m. K. H.	APCR	12.6 g	-	13 mm	7.5 mm	-	-	-
20 mm									
2 cm Kw K 30 and 38 2 cm Flak 30 and 38	2 cm Pzgr. 2 cm Pzgr. 40	AP APCR	148 g 100 g	780 m/s 1050 m/s	23 mm 40 mm	14 mm 20 mm	- -	- -	- -
28 mm									
s Pz B 41	2,8 cm Pzgr. 41	APCNR	121 g	1430 m/s	60 mm	40 mm	25 mm	-	-
37 mm									
3,7 cm Kw K 3,7 cm Pak	3,7 cm Pzgr. 3,7 cm Pzgr. 40	AP-HE APCR	0.685 kg 0.368 kg	745 m/s 1020 m/s	34 mm 64 mm	29 mm 31 mm	22 mm -	20 mm -	- -
3,7 cm Flak 18 3,7 cm Flak 36 3,7 cm Flak 37 3,7 cm Flak 43	3,7 cm Pzgr. 18	AP	0.685 kg	770 m/s	35 mm	28 mm	21 mm	17 mm	-
50 mm									
5 cm Kw K 5 cm Kw K 40	5 cm Pzgr. 5 cm Pzgr. 39 5 cm Pzgr. 40	AP-HE APC-HE APCR	2.06 kg 2.06 kg 0.925 kg	685 m/s 685 m/s 1050 m/s	53 mm 55 mm 94 mm	43 mm 47 mm 55 mm	32 mm 37 mm -	24 mm 28 mm -	- - -
5 cm Kw K 39 (L/60) 5 cm Pak 38	5 cm Pzgr. 5 cm Pzgr. 39 5 cm Pzgr. 40 5 cm Pzgr. 40/1 Stiel-Granate 42	AP-HE APC-HE APCR APCR HEAT	2.06 kg 2.06 kg 0.925 kg 1.07 kg -	835 m/s 835 m/s 1180 m/s 1130 m/s -	67 mm 69 mm 130 mm 116 mm 180 mm	57 mm 59 mm 72 mm 76 mm -	44 mm 48 mm 38 mm - -	34 mm 37 mm - - -	- - - - -

Gun	Ammunition	Shot type	Weight	Muzzle velocity	Range (Penetration at 30° angle from vertical)				
					100 m	500 m	1000 m	1500 m	2000 m
75 mm									
7,5 cm Kw K (L/24)	K. Gr. rot Pz	APCBC-HE	6.8 kg	385 m/s	41 mm	38 mm	35 mm	32 mm	30 mm
7,5 cm Stu K (L/24)	Gr. 38 HI	HEAT	4.5 kg	452 m/s	45 mm				-
	Gr. 38 HI/A	HEAT	4.4 kg	450 m/s	70 mm				-
	Gr. 38 HI/B	HEAT	4.57 kg	450 m/s	75 mm				-
	Gr. 38 HI/C	HEAT	4.8 kg	450 m/s	100 mm				-
7,5 cm Kw K 40 (L/43)	7,5 cm Pzgr. 39	APCBC-HE	6.8 kg	740 m/s	99 mm	91 mm	81 mm	72 mm	63 mm
7,5 cm Pak 40 (L/46)	7,5 cm Pzgr. 40	APCR	4.1 kg	920 m/s	126 mm	108 mm	87 mm	-	-
7,5 cm Kw K 40 (L/48)	Gr. 38 HI/B	HEAT	4.57 kg	450 m/s	75 mm				-
7,5 cm Stu K 40 (L/48)	Gr. 38 HI/C	HEAT	4.8 kg	450 m/s	100 mm				-
7,5 cm Pak 39 (L/48)									
7,5 cm Kw K 42 (L/70)	7,5 cm Pzgr. 39/42	APCBC-HE	6.8 kg	925 m/s	138 mm	124 mm	111 mm	99 mm	88 mm
7,5 cm Stu K 42 (L/70)	7,5 cm Pzgr. 40/42	APCR	4.75 kg	1120 m/s	194 mm	174 mm	150 mm	127 mm	106 mm
7,5 cm Pak 97/38 (L/36)	7,5 cm Gr. 38/97 HI/A (f)	HEAT	4.40 kg	450 m/s	75 mm				-
	7,5 cm Gr. 38/97 HI/B (f)		4.57 kg						
	7,5 cm Gr. 15/38 HI/B (f)		4.80 kg		90 mm				-
		7,5 cm Gr. 98/97 HI/C (f)							
	7,5 cm K.Gr. Pz.(p)	AP	6.8 kg	570 m/s	61 mm	58 mm	?	-	-
7,5 cm Pak 41	7,5 cm Pzgr. 41 (HK)	APCNR	2.6 kg	1220 m/s	198 mm	172 mm	140 mm	-	-
	7,5 cm Pzgr. 41 (W)	APCNR	2.5 kg	1230 m/s	97 mm	80 mm	70 mm	60 mm	-
7,5 cm le I G 18	7,5 cm lgr. 38 HL/A	HEAT	3,1 kg	221 m/s	75 mm				-
	7,5 cm lgr. 38 HL/B	HEAT	3,5 kg	221 m/s	90 mm				-
76.2 mm									
7,62 cm Pak 36 (L/51)	7,62 cm Pzgr. 39 rot	APCBC-HE	7.6 kg	720 m/s	98 mm	92 mm	80 mm	72 mm	65 mm
	7,62 cm Pzgr. 40	APCR	4.05 kg	990 m/s	-	118 mm*	92 mm*	71 mm*	55 mm*
	Gr. 38 HL/B	HEAT	-	450 m/s	75 mm				-
	Gr. 38 HL/C	HEAT	-	450 m/s	100 mm				-

* Data based on unknown test criteria. Cannot be directly compared to other data in the table.

Gun	Ammunition	Shot type	Weight	Muzzle velocity	Range (Penetration at 30° angle from vertical)				
					100 m	500 m	1000 m	1500 m	2000 m
88 mm									
8,8 cm Kw K 36 (L/56)	8,8 cm Pzgr.	APCBC-HE	9.5 kg	810 m/s	97 mm	93 mm	87 mm	80 mm	72 mm
8,8 cm Flak 36	8,8 cm Pzgr. 39	APCBC-HE	10.2 kg	773 m/s	120 mm	110 mm	100 mm	91 mm	84 mm
	8,8 cm Pzgr. 40	APCR	7.3 kg	930 m/s	170 mm	155 mm	138 mm	122 mm	110 mm
	8,8 cm Gr. 39 HI	HEAT	7.65 kg	600 m/s	90 mm				
8,8 cm Flak 41	8,8 cm Pzgr. 39-1	APCBC-HE	10 kg	980 m/s	194 mm	177 mm	159 mm	142 mm	127 mm
	8,8 cm Pzgr. 40	ACPR	7.3 kg	1125 m/s	237 mm	216 mm	192 mm	171 mm	152 mm
8,8 cm Kw K 43 (L/71)	8,8 cm Pzgr. 39/43	APCBC-HE	9.87 kg	1000 m/s	203 mm	185 mm	165 mm	148 mm	132 mm
8,8 cm Pak 43 (L/71)	8,8 cm Pzgr. 40/43	APCR	7.3 kg	1130 m/s	237 mm	217 mm	193 mm	170 mm	152 mm
105 mm									
s 10 cm K 18	10 cm Pzgr. rot	APCBC-HE	15.56 kg	805 m/s	164 mm	149 mm	133 mm	119 mm	109 mm
10,5 cm le F H 18 (L/28)	10 cm Pzgr.	AP-HE	14.0 kg	470 m/s	63 mm	59 mm	54 mm	50 mm	46 mm
10,5 cm Stu H 42 (L/28)	10 cm Gr. 39 HI/A	HEAT	12.3 kg	495 m/s	80 mm				
	10 cm Gr. 39 HI/B	HEAT	12.1 kg	495 m/s	90 mm				
	10 cm Gr. 39 HI/C	HEAT	12.35 kg	495 m/s	100 mm				
128 mm									
12,8 cm K 40 (L/61)	12,8 cm Pzgr.	APC-HE	26.35 kg	880 m/s	201 mm	176 mm	150 mm	132 mm	120 mm
12,8 cm Pak 80	12,8 cm Pzgr.	APC-HE	26.35 kg	860 m/s	189 mm	166 mm	143 mm	127 mm	117 mm
	12,8 cm Pzgr. 43	APCBC-HE	28.30 kg	845 m/s	187 mm	178 mm	167 mm	157 mm	148 mm
	Gr. 38 HI/C	HEAT	4.80 kg	450 m/s	100 mm				-
150 mm									
15 cm s I G 33	Gr. 39 HI/A	HEAT	25 kg	280 m/s	160 mm				
15 cm Stu H 43 (L/12)									
15 cm s F H 13 (L/17)	Gr. 39 HI/A	HEAT	25 kg	460 m/s	160 mm				
15 cm s F H 18 (L/29,5)	Gr. 39 HI/A	HEAT	25 kg	465 m/s	160 mm				

Czechoslovak Guns

Gun	Ammunition	Shot type	Weight	Muzzle velocity	Range (Penetration at 30° angle from vertical)				
					100 m	500 m	1000 m	1500 m	2000 m
3,7 cm Kw K 34 (t)	3,7 cm Pzgr. (t)	APC-HE	0.850 kg	675 m/s	35 mm	30 mm	23 mm	21 mm	-
	3,7 cm Pzgr. (t) umg.	APC-HE	0.815 kg	675 m/s	34 mm	29 mm	25 mm	22 mm	-
	3,7 cm Pzgr. 40	APCR	0.368 kg	980 m/s	60 mm	39 mm	-	-	-
3,7 cm Kw K 38 (t)	3,7 cm Pzgr. (t)	APC-HE	0.850 kg	741 m/s	36 mm	31 mm	24 mm	22 mm	-
	3,7 cm Pzgr. (t) umg.	APC-HE	0.815 kg	750 m/s	41 mm	33 mm	27 mm	24 mm	-
	3,7 cm Pzgr. 40	APCR	0.368 kg	1050 m/s	64 mm	33 mm	-	-	-
4,7 cm Pak (t)	4,7 cm Pzgr. 36 (t)	APC-HE	1.65 kg	782 m/s	54 mm	48 mm	41 mm	35 mm	-
	4,7 cm Pzgr. 36(ö) umg.	APC-HE	1.44 kg		44 mm	41 mm	34 mm	25 mm	
	4,7 cm Pzgr. 40	APCR	0.825 kg	1080 m/s	100 mm	59 mm	-	-	-

French Guns

Gun	Ammunition	Shot type	Weight	Muzzle velocity	Range (Penetration at 30° angle from vertical)				
					100 m	500 m	1000 m	1500 m	2000 m
13,2 mm M G 271 (f)	13,2 cm Pzgr 821 (f)	APCR	52 g	800 m/s	90°: 22.5 mm	90°: 14 mm	-	-	-
					60°: 12 mm	60°: 8 mm	-	-	-
2,5 cm Pak 112 (f) (34 SA) 2,5 cm Pak 113 (f) (37 SA-L)	2,5 cm Pzgr. 114 (f)	APCR	320 g	920 m/s	35 mm	29 mm	20 mm	-	-
2,5 cm Kw K 121 (f) (35 SA)	2,5 cm Pzgr. 122 (f)	APCR	320 g	950 m/s	90°: 47 mm	90°: 40 mm	90°: 30 mm	-	-
					60°: 35 mm	60°: 30 mm	60°: 20 mm		-
					45°: 18 mm	45°: 16 mm	45°: 15 mm		-
3,7 cm Kw K 143 (f) (38 SA)	3,7 cm Pzgr. 146 (f)	AP	0.70 kg	705 m/s	29 mm	23 mm	16 mm	12 mm	-
3,7 cm Kw K 144 (f)	3,7 cm Pzgr. 144 (f)	-	0.39 kg	600 m/s	25 mm	19 mm	-	-	
4,7 cm Kw K 173 (f)	4,7 cm Pzgr. 176 (f)	AP	1.62 kg	660 m/s	39 mm	33 mm	26 mm	20 mm	-
4,7 cm Pak 181 (f)	4,7 cm Pzgr. 178 (f)	APCBC	1.73 kg	855 m/s	57 mm	50 mm	42 mm	36 mm	
7,5 cm Kw K 251(f) (75 mm SA 35)	PR mle. 1910 non coiffe	AP	6.40 kg	470 m/s	-	40 mm (at 400 m)	-	-	-

Russian Guns

Gun	Ammunition	Shot type	Weight	Muzzle velocity	Range (Penetration at 30° angle from vertical)				
					100 m	500 m	1000 m	1500 m	2000 m
Gew 252 (r) Gew 253 (r) Gew 254 (r) Gew 255 (r) Zielfernrohr-Gew 256 (r) Selbstlade-Gew 257 (r) Selbstlade-Gew 258 (r) Selbstlade-Gew 259 (r) Selbstlade-Zielfernrohr-Gew 260(r) Kar 453 (r) Kar 454 (r)	7,62 mm S m K H Br 265/36 (r)	APCR	12.1 g	780 m/s	90°: 18 mm 60°: 11 mm	-	-	-	-
12,7 mm MG 268 (r) 12,7 mm Flzg MG (r)	12,7 mm S m K 725/1 (r)	APCR	51.9 g	860 m/s	90°: 22.5 mm 60°: 12.0 mm	-	-	-	-
	12,7 mm S m K L'Spur Br 727/26 (r)	APCR	43.7 g	895 m/s	90°: 20 mm 60°: 10 mm	-	-	-	-
14,5 mm Pz-Abwehr-Büchse 783(r)	14,5 mm S m K H Br 945/36 (r)	APCR	64.2 g	1000 m/s	30 mm	25 mm	-	-	-
4,5 cm KwK 184(r)/184/1(r) (M1932 and M1937 45 mm L/46)	B-240 and BR-240	AP	1.43 kg	760 m/s	0°: 52 mm 30°: 43 mm	0°: 43 mm 30°: 35 mm	0°: 35 mm 30°: 28 mm	0°: 28 mm 30°: 23 mm	0°: 23 mm 30°: 19 mm
4.5 cm PaK 184/6(r) L/66,2 (M1942)	B-240 and BR-240	AP	1.43 kg	835 m/s	0°: 70 mm 30°: 57 mm	0°: 61 mm 30°: 50 mm	0°: 51 mm 30°: 41 mm	0°: 42 mm 30°: 33 mm	0°: 34 mm 30°: 27 mm
	BR-240P	APCR	0.85 kg	1070 m/s	0°: 110 mm 30°: 70 mm	0°: 81 mm 30°: 52 mm	- -	- -	- -
7,62 cm Kw K L/30,5	7,62 cm Pzgr. 39 rot	APCBC-HE	7.60 kg	575 m/s	72 mm	66 mm	58 mm	51 mm	-
7,62 cm Kw K L/41,5	7,62 cm Pzgr. 39 rot	APCBC-HE	7.60 kg	625 m/s	82 mm	75 mm	67 mm	60 mm	54 mm
7,62 cm FK 288(r) L/42,6 (M1942)	BR-350A	APBC	6.3 kg	680 m/s	0°: 82 mm 30°: 67 mm	0°: 75 mm 30°: 61 mm	0°: 67 mm 30°: 55 mm	0°: 60 mm 30°: 49 mm	0°: 53 mm 30°: 43 mm
	BR-353A	HEAT	3.94 kg	325 m/s	75 mm				
7,62 cm FK 296(r) L/51,2 (M1936)	BR-350A	APBC	6.3 kg	690 m/s	0°: 82 mm 30°: 67 mm	0°: 75 mm 30°: 61 mm	0°: 67 mm 30°: 55 mm	0°: 60 mm 30°: 49 mm	0°: 53 mm 30°: 43 mm
	BR-353A	HEAT	3.94 kg	325 m/s	75 mm				

Gun	Ammunition	Shot type	Weight	Muzzle velocity	Range (Penetration at 30° angle from vertical)				
					100 m	500 m	1000 m	1500 m	2000 m
100 mm D-10T, D-10S L/59 100 mm BS-3 L/59,6 (M1944)	BR-412	AP	15.88 kg	895 m/s	0°: 155 mm 30°: 125 mm	0°: 135 mm 30°: 110 mm	0°: 115 mm 30°: 95 mm	0°: 100 mm 30°: 80 mm	0°: 75 mm 30°: 60 mm
	BR-412B	AP	15.88 kg	895 m/s	0°: 160 mm 30°: 130 mm	0°: 150 mm 30°: 120 mm	0°: 135 mm 30°: 110 mm	0°: 125 mm 30°: 100 mm	0°: 105 mm 30°: 85 mm
	BR-412D (from late 1944)	AP	15.88 kg	887 m/s	0°: 200 mm 30°: 150 mm	0°: 185 mm 30°: 140 mm	0°: 170 mm 30°: 130 mm	0°: 155 mm 30°: 120 mm	0°: 125 mm 30°: 100 mm
10,7 cm Pak 352(r) L/38 (M1910/30)	BR-420	AP	18.86 kg	655 m/s	0°: 117 mm 30°: 95 mm	0°: 111 mm 30°: 90 mm	0°: 103 mm 30°: 84 mm	0°: 95 mm 30°: 78 mm	0°: 89 mm 30°: 72 mm
107 mm M-60 L/48 (M1940)	BR-420	AP	18.86 kg	730 m/s	0°: 137 mm 30°: 111 mm	0°: 130 mm 30°: 106 mm	0°: 121 mm 30°: 99 mm	0°: 113 mm 30°: 92 mm	0°: 106 mm 30°: 86 mm
12,2 cm K.390/2(r) (M1931/37)	BR-471	APHE	25 kg	780-800 m/s	-	0°: 150 mm 30°: 122 mm	0°: 138 mm 30°: 113 mm	-	0°: 118 mm 30°: 96 mm
	BR-471B (from early 1945)	APHEBC	25 kg	780-800 m/s	-	0°: 157 mm 30°: 128 mm	0°: 147 mm 30°: 120 mm	-	0°: 129 mm 30°: 105 mm

Polish Guns

Gun	Ammunition	Shot type	Weight	Muzzle velocity	Range (Penetration at 30° angle from vertical)				
					100 m	500 m	1000 m	1500 m	2000 m
Karabin Przeciwpancerny wz.35 Germany: PzB 35(p) - PzB 770(p)		AP		1280 m/s		20 mm (at 300 m)	-	-	-

Swedish Guns

Gun	Ammunition	Shot type	Weight	Muzzle velocity	Range (Penetration at 30° angle from vertical)				
					100 m	400 m	600 m	800 m	1000 m
37 mm pansarvärnskanon m/38 Germany: 3,7 cm PaK 36(p)	37 mm sk ptr m/34 slpprj m/38	AP-T	0,735 kg	785 m/s	45 mm (at 200 m)	40 mm	35 mm	32 mm	29 mm
	37 mm sk ptr m/34 slpgr m/39	APHE-T	0,740 kg	775 m/s	39 mm				30 mm (at 900 m)
	37 mm sk ptr m/34 slpprj m/49	APDS-T		1150 m/s	65 mm (at 200 m)	62 mm	58 mm	55 mm	52 mm

This tables give the penetration figures of the most common German guns used to combat armored vehicles.

Some of the guns captured from other countries and pressed into German service are also listed.

Some of these guns saw limited used, while other, such as the Czechoslovak 37 mm and 47 mm guns, and the Russian 76.2 mm guns, became an integral part of the German arsenal.

When using the test results, it is important to bear in mind the following:

Test plates were placed at an angle of 60 degrees from horizontal (30° from vertical), to simulate how perfect alignment is rarely possible in combat.

The tests from which the numbers were taken generally use high-quality armor plates and ammunition. Real numbers could therefore vary in combat conditions.

Some of the ammunition types were very rare. As the war progressed, German tungsten supplies became very low.

As a result, APCR ammunition production was either halted, or switched to less effective hardened steel.

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