

Ballistics for Handguns

Speer Gold Dots

Caliber	Cartridge Bullet	Grain	Range, Yards	0	25	50	75	100
9mm Luger	<i>Speer Gold Dot JHP</i>	<i>115</i>	Velocity, FPS	1200	0	1047	0	971
			Energy, Ft-Lbs	368	0	280	0	241
	<i>Speer Gold Dot JHP</i>	<i>124</i>	Velocity, FPS	1150	0	1030	0	948
			Energy, Ft-Lbs	364	0	292	0	247
	<i>Speer Gold Dot JHP +P</i>	<i>124</i>	Velocity, FPS	1220	0	1085	0	996
			Energy, Ft-Lbs	410	0	324	0	273
		<i>147</i>	Velocity, FPS	985	0	960	0	924
			Energy, Ft-Lbs	317	0	301	0	279
.357 Sig	<i>Speer Gold Dot JHP</i>	<i>125</i>	Velocity, FPS	1375	0	1203	0	1079
			Energy, Ft-Lbs	525	0	402	0	323
.40 S&W	<i>Speer Gold Dot JHP</i>	<i>155</i>	Velocity, FPS	1200	0	1063	0	974
			Energy, Ft-Lbs	496	0	389	0	326
	<i>Speer Gold Dot JHP</i>	<i>165</i>	Velocity, FPS	1150	0	1043	0	966
			Energy, Ft-Lbs	485	0	399	0	342
	<i>Speer Gold Dot JHP</i>	<i>180</i>	Velocity, FPS	1025	0	957	0	902
			Energy, Ft-Lbs	420	0	366	0	325
45 ACP	<i>Speer Gold Dot JHP</i>	<i>185</i>	Velocity, FPS	1050	0	956	0	886
			Energy, Ft-Lbs	453	0	375	0	322
	<i>Speer Gold Dot JHP +P</i>	<i>200</i>	Velocity, FPS	1080	0	994	0	930
			Energy, Ft-Lbs	518	0	439	0	384
	<i>Speer Gold Dot JHP</i>	<i>230</i>	Velocity, FPS	890	0	845	0	805
			Energy, Ft-Lbs	405	0	365	0	331

Retained Ratio Comparision

Speer (Gold Dot)

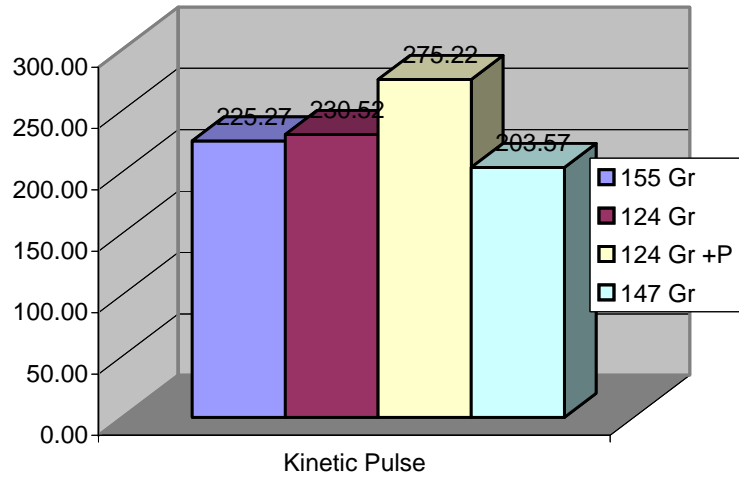
Caliber	Cartridge Bullet	Range, Yards	0 - 50 yds	0 -100 yds	50 -100 yds
9mm Lugar					
	<i>Speer 115 Gold Dot JHP</i>	Velocity, FPS	87.25%	80.92%	92.74%
		Energy, Ft-Lbs	76.09%	65.49%	86.07%
	<i>Speer 124 Gold Dot JHP</i>	Velocity, FPS	89.57%	82.43%	92.04%
		Energy, Ft-Lbs	80.22%	67.86%	84.59%
	<i>Speer 124 Gold Dot JHP +P</i>	Velocity, FPS	88.93%	81.64%	91.80%
		Energy, Ft-Lbs	79.02%	66.59%	84.26%
	<i>Speer 147 Gold Dot JHP</i>	Velocity, FPS	97.46%	93.81%	96.25%
		Energy, Ft-Lbs	94.95%	88.01%	92.69%
.357 Sig					
	<i>Speer 125 Gold Dot JHP</i>	Velocity, FPS	87.49%	78.47%	89.69%
		Energy, Ft-Lbs	76.57%	61.52%	80.35%
.40 S&W					
	<i>Speer 155 Gold Dot JHP</i>	Velocity, FPS	88.58%	81.17%	91.63%
		Energy, Ft-Lbs	78.43%	65.73%	83.80%
	<i>Speer 165 Gold Dot JHP</i>	Velocity, FPS	90.70%	84.00%	92.62%
		Energy, Ft-Lbs	82.27%	70.52%	85.71%
	<i>Speer 180 Gold Dot JHP</i>	Velocity, FPS	93.37%	88.00%	94.25%
		Energy, Ft-Lbs	87.14%	77.38%	88.80%
45 ACP					
	<i>Speer 185 Gold Dot JHP</i>	Velocity, FPS	91.05%	84.38%	92.68%
		Energy, Ft-Lbs	82.78%	71.08%	85.87%
	<i>Speer 200 Gold Dot JHP +P</i>	Velocity, FPS	92.04%	86.11%	93.56%
		Energy, Ft-Lbs	84.75%	74.13%	87.47%
	<i>Speer 230 Gold Dot JHP</i>	Velocity, FPS	94.94%	90.45%	95.27%
		Energy, Ft-Lbs	90.12%	81.73%	90.68%

Kinetic Pulse Transfer (Killing Power)

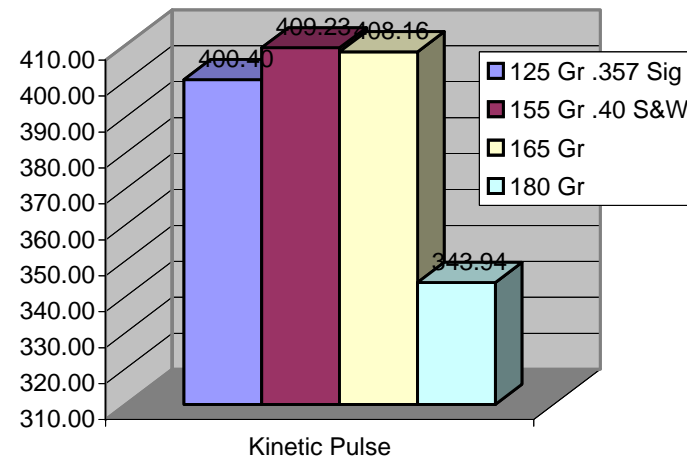
Caliber	Cartridge Bullet	Grain	Kinetic Pulse @ Muzzle	Kinetic Pulse @ 50 Yds	Kinetic Pulse @ 100 Yds
9mm Lugar					
	<i>Speer Gold Dot JHP</i>	<i>115</i>	<i>225.27</i>	<i>149.62</i>	<i>119.35</i>
	<i>Speer Gold Dot JHP</i>	<i>124</i>	<i>230.52</i>	<i>165.62</i>	<i>129.13</i>
	<i>Speer Gold Dot JHP +P</i>	<i>124</i>	<i>275.22</i>	<i>193.60</i>	<i>149.76</i>
		<i>147</i>	<i>203.57</i>	<i>188.46</i>	<i>168.04</i>
.357 Sig					
	<i>Speer Gold Dot JHP</i>	<i>125</i>	<i>400.40</i>	<i>268.15</i>	<i>193.49</i>
.40 S&W					
	<i>Speer Gold Dot JHP</i>	<i>155</i>	<i>409.23</i>	<i>284.46</i>	<i>218.83</i>
	<i>Speer Gold Dot JHP</i>	<i>165</i>	<i>408.16</i>	<i>304.50</i>	<i>241.92</i>
	<i>Speer Gold Dot JHP</i>	<i>180</i>	<i>343.94</i>	<i>279.93</i>	<i>234.38</i>
45 ACP					
	<i>Speer Gold Dot JHP</i>	<i>185</i>	<i>390.55</i>	<i>294.77</i>	<i>234.64</i>
	<i>Speer Gold Dot JHP +P</i>	<i>200</i>	<i>496.70</i>	<i>387.24</i>	<i>317.16</i>
	<i>Speer Gold Dot JHP</i>	<i>230</i>	<i>367.61</i>	<i>314.62</i>	<i>272.02</i>

Kinetic Pulse Transfer (Killing Power)

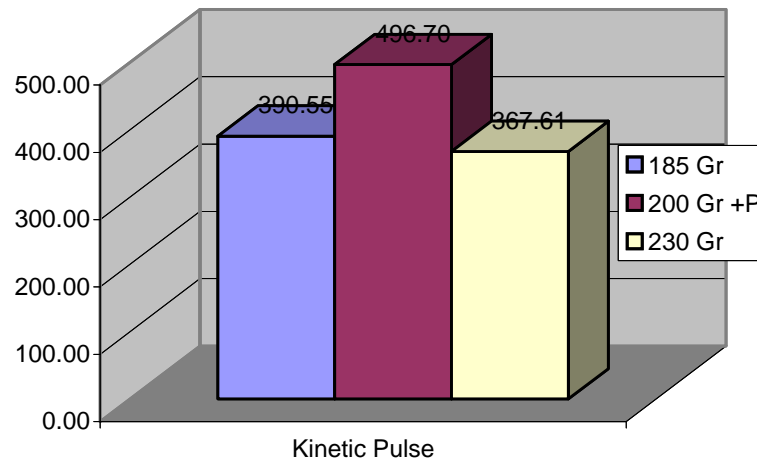
9MM Kinetic Pulse @ Muzzle



.357 Sig-.40 S&W Kinetic Pulse @ Muzzle

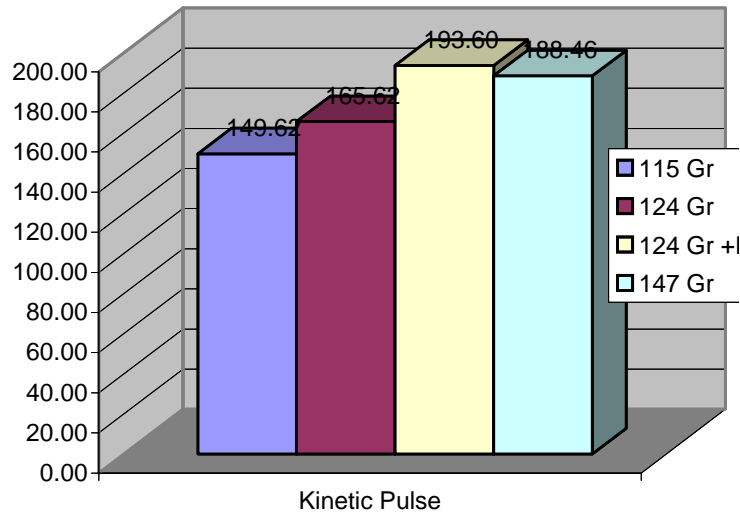


.45 ACP Kinetic Pulse @ Muzzle

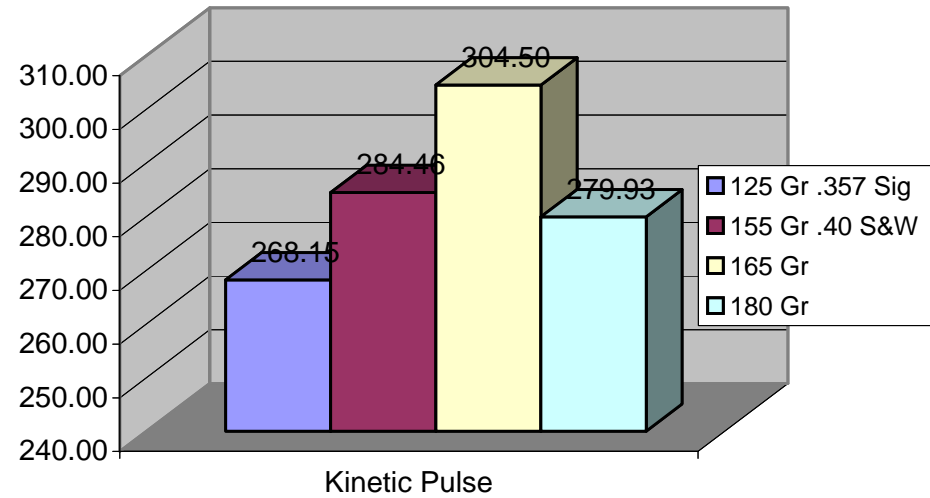


Kinetic Pulse Transfer (Killing Power)

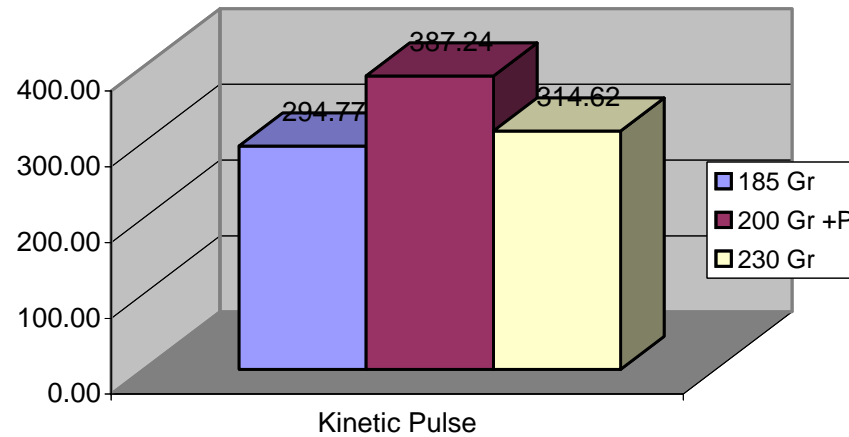
9 mm Kinetic Pulse @ 50 Yds



.357 Sig-.40 S&W Kinetic Pulse @ 50 Yds

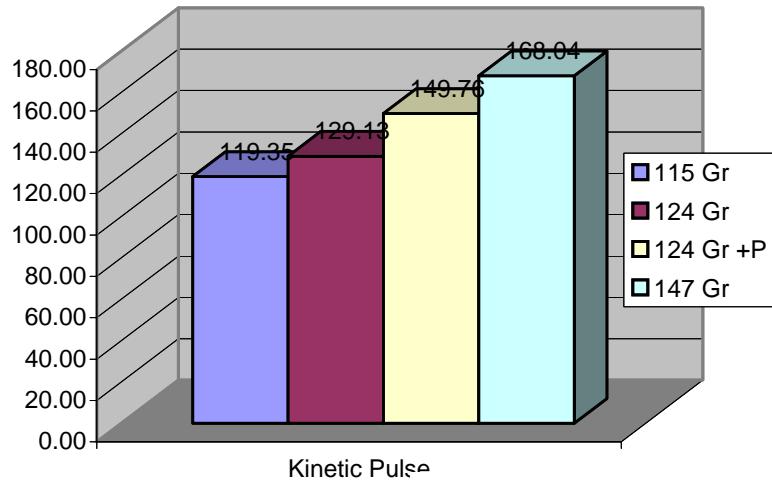


.45 ACP Kinetic Pulse @ 50 Yds

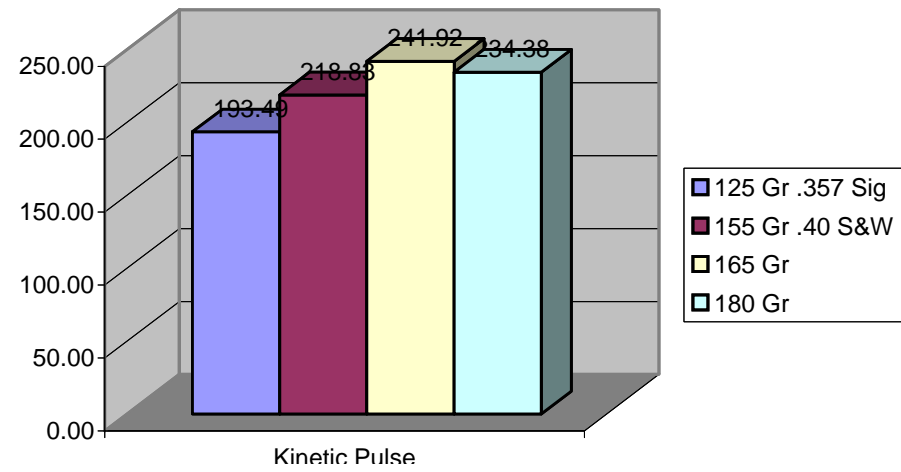


Kinetic Pulse Transfer (Killing Power)

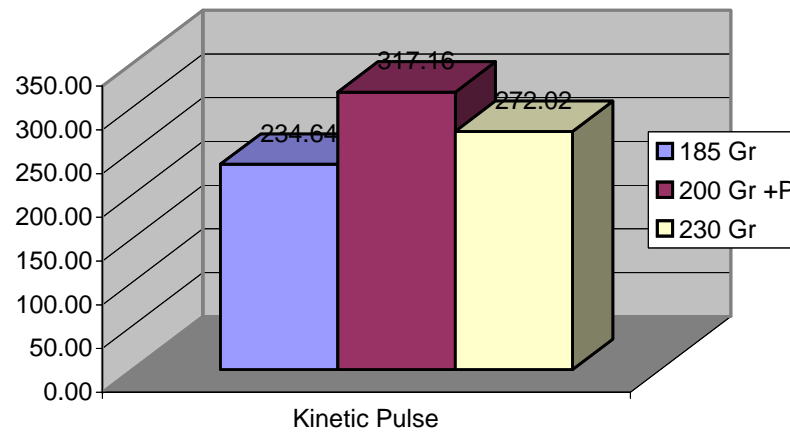
9mm Kinetic Pulse @ 100 Yds



.357 Sig -.40 S&W Kinetic Pulse @ 100 Yds



.45 ACP Kinetic Pulse @ 100 Yds



Kinetic Energy Generated

Caliber	Cartridge Bullet	Grain	Kinetic Energy @ Muzzle	Kinetic Energy @ 50 Yds	Kinetic Energy @ 50 Yds
9mm Luger					
	<i>Speer Gold Dot JHP</i>	<i>115</i>	367.64	279.87	240.72
	<i>Speer Gold Dot JHP</i>	<i>124</i>	364.07	292.05	247.40
	<i>Speer Gold Dot JHP +P</i>	<i>124</i>	409.74	324.08	273.09
	<i>Speer Gold Dot JHP</i>	<i>147</i>	316.63	300.76	278.63
.357 Sig					
	<i>Speer Gold Dot JHP</i>	<i>125</i>	524.67	401.61	323.09
.40 S&W					
	<i>Speer Gold Dot JHP</i>	<i>155</i>	495.52	388.83	326.45
	<i>Speer Gold Dot JHP</i>	<i>165</i>	484.45	398.49	341.83
	<i>Speer Gold Dot JHP</i>	<i>180</i>	419.84	365.99	325.13
45 ACP					
	<i>Speer Gold Dot JHP</i>	<i>185</i>	452.81	375.37	322.41
	<i>Speer Gold Dot JHP +P</i>	<i>200</i>	517.90	438.70	384.03
	<i>Speer Gold Dot JHP</i>	<i>230</i>	404.46	364.59	330.89

Momentum Generated

Caliber	Cartridge Bullet	Grain	Momentum @ Muzzle	Momentum @ 50 Yds	Momentum @ 50 Yds
9mm Lugar	<i>Speer Gold Dot JHP</i>	<i>115</i>	0.61	0.53	0.50
	<i>Speer Gold Dot JHP</i>	<i>124</i>	0.63	0.57	0.52
	<i>Speer Gold Dot JHP +P</i>	<i>124</i>	0.67	0.60	0.55
		<i>147</i>	0.64	0.63	0.60
.357 Sig	<i>Speer Gold Dot JHP</i>	<i>125</i>	0.76	0.67	0.60
.40 S&W	<i>Speer Gold Dot JHP</i>	<i>155</i>	0.83	0.73	0.67
	<i>Speer Gold Dot JHP</i>	<i>165</i>	0.84	0.76	0.71
	<i>Speer Gold Dot JHP</i>	<i>180</i>	0.82	0.76	0.72
45 ACP	<i>Speer Gold Dot JHP</i>	<i>185</i>	0.86	0.79	0.73
	<i>Speer Gold Dot JHP +P</i>	<i>200</i>	0.96	0.88	0.83
	<i>Speer Gold Dot JHP</i>	<i>230</i>	0.91	0.86	0.82

Kinetic Pulse – Kinetic Energy

The formula for kinetic energy for a bullet in motion is : or symbolically:

$$\mathbf{ke = (.5 * m * v ^ 2) / 225218 \text{ in units of ft-lbs.}}$$

The formula for momentum of a bullet in motion is momentum is equal to mass times velocity and it's unit of measure is the (slug ft/sec) or symbolically:

$$\mathbf{momentum = (m * v) / 225218 \text{ slug ft/sec.}}$$

225218 resolves mass in terms of grains which is the common unit of mass for a bullet. There are 7000 grains in a pound. Or 7000 grains = 1 lb of mass or .0310815 slug.

The force a bullet exerts on impact is a ratio to the time it takes to stop the bullet divided into the momentum or symbolically:

$$\mathbf{Force = momentum / (time to stop) \text{ or } F = mv/t}$$

If a bullet hits an object and it stops in 1/10000 of a second the force is for a bullet traveling a 2000 ft/s and weighing 180 gr is for example
Force = ((180 gr * 2000 ft/s) / 225218) / .0001 = 15984.6 lbs .

Volume in crater of water = f * kinetic energy * momentum where f is some factor to compensate for medium consistency. Since the bullets were always fired into the same medium it can be eliminated.

I have named this "volume of the crater" as the KINETIC PULSE or KILLING POWER (if you are a hunter) or for short reference as KP.

KP can be considered a unit of measure for the physics purist.

Therefore KP = kinetic energy * momentum or in symbolic formula using the units of physics:

$$\mathbf{KP = (mv)(.5mv^2)}$$

Now an example for the soldier. Which would you take into battle the .45 acp or the 9mm luger? Below is typical data profile specifications using the KP formula:

.45 acp

320.3 kp 230 gr 850 ft/s 368.9 ft-lb 0.868 slug ft/s

9mm luger

225.2 kp 115 gr 1200 ft/s 367.6 ft-lb 0.613 slug ft/s

Note the energy is nearly identical. But the *stopping power is not!*
PS check the 200 yard specs!

.45 acp 200 yard specifications

240 kp 230 gr 772 ft/s 304 ft-lb 0.788 slug ft/sec

9 mm 200 yard specifications

95 kp 115 gr 900 ft/s 207 ft-lb 0.478 slug ft/sec

One thing that has not been considered is the rotation of a rifled bullet. Let us take the 30-06 with a 150gr bullet exiting the muzzle at 3000 ft/s. What is the rotational velocity of the bullet and what is the MAXIMUM POSSIBLE kinetic pulse and kinetic energy and momentum of this rotation? The bullet is .308 inches in diameter and moves down a 1 in 10" rifling twist. The outside circumference of the bullet is $\pi * .308$ or .9676105 inches.

The bullet rotates at:
((velocity) times
(circumference of bullet) times
(length of 1 foot divided by twist rate))
all divided by the number of inches in a foot.

Or symbolically as:

$(v * \text{Circumference} / 12 / (\text{twist rate})) / 12$

Or numerically as:

$(3000 \text{ ft/s} * .9676105 * 12 / 10) / 12 = 290.28316 \text{ ft/s}$

The outer diameter of the bullet travels at 290.283 ft/s and the very center of the bullet does not travel at all--that is rotationally. Now let us pretend that the mass of the bullet is all in the surface of the bullet of 150 grains. This means the bullet is hollow. What is the maximum kinetic pulse, energy and momentum?

5.42 kp 28.061 ft-lb 0.193 slug ft/s
5988 kp 2997.142 ft-lb 1.998 slug ft/s

By percentage:

.09058 % kp
.93625 % ft-lb
9.65965 % slug ft/s

Remember most bullets are solid so these figures are very high and the actual figures are much less. It is nearer to one half or less of those values due to the shape of the bullet or *APPROXIMATELY*:
2.71 kp 14.03 ft-lb 0.0965 slug ft/s