

Chamber	Caliber	SD(avg)	BW(av g)	MPBR(a vg)	PF(avg) Ratio
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Rifle Chamber Comparison

By [Bob Beers](#)

It has long been my desire to understand how the multitudes of centerfire rifle cartridges relate to one another for the purpose of selecting a suitable cartridge for a specific application. After much head-splitting thought, I decided to attempt a comparison of cartridges by chamber to see if the results would be of any use.

A comparison by chamber requires that one set of numbers must be generated for each unique chamber. To generate a single number set for each chamber, the values for every cartridge (except low or managed recoil cartridges) listed for each unique chamber manufactured by Federal, Remington, Winchester, and Weatherby were averaged and are listed in below (by caliber).

Since recoil is an important factor that must be considered, it seemed reasonable to define an attribute of the cartridge to represent the relative recoil force of each cartridge and chamber.

The force that pushes the bullet out of the barrel of the rifle also pushes the rifle against the shooter and can be calculated as follows:

$$\text{Propulsion Force} = \text{Bullet weight (pounds)} \times \text{Muzzle velocity (fps)}$$

or

$$\text{Propulsion Force} = \frac{\text{Bullet weight (grains)} \times \text{Muzzle velocity (fps)}}{7000 \text{ (grains per pound)}}$$

7000 (grains per pound)

Propulsion force (PF) is very useful in comparing the relative generated recoil of cartridges and chambers. Accordingly, a truly descriptive nickname for PF (propulsion force) could be "Punch Force."

Anecdotal evidence seems to indicate that the .243 Winchester cartridges are generally comfortable to shoot, even for recoil sensitive shooters. Therefore, once the propulsion forces (PF) are calculated, the PF(avg) of each chamber may be compared to the average PF of the .243 Winchester chamber to provide an idea of relative comfort (or discomfort) for the chamber of interest.

Chamber	Caliber	SD(avg)	BW(av g)	MPBR(a vg)	PF(avg) Ratio
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The intent of the PF(avg.) Ratio is to indicate how hard the listed chambers will "punch" the shooter relative to how hard the mild-mannered .243 Winchester would punch the shooter.

For example, the 30-30 Winchester chamber punches 1.31 times harder than the .243 Winchester chamber, the .30-06 Springfield chamber punches 1.67 times harder than the .243 Winchester chamber, the .338 Winchester Magnum chamber punches 2.24 times harder than the .243 Winchester chamber, and .458 Winchester Magnum chamber punches 3.68 times harder than the .243 Winchester chamber. (Relationships between cartridges other than the .243 Winchester are inferred as well and can be calculated, if desired.)

For each of the chambers listed, the following table then summarizes the average size and penetrating characteristics of the bullets evaluated, the average maximum point blank range of the cartridges evaluated, and the average "punch force" of the cartridges evaluated. So, for each chamber, the shooter knows how big the average bullets are, how deep they will typically penetrate, how far they will typically go, and how much it will typically hurt to get them there.

Chamber	Caliber	SD(avg)	BW(av g)	MPBR(a vg)	PF(avg) Ratio
.223 Remington	0.224	0.159	56	290	0.65
.22-250 Remington	0.224	0.146	51	326	0.69
.224 Weatherby Magnum	0.224	0.157	55	321	0.72
.243 Winchester	0.243	0.210	87	304	1.00
6mm Remington	0.243	0.232	96	304	1.09
.240 Weatherby Magnum	0.243	0.228	94	328	1.17
.257 Roberts	0.257	0.255	118	256	1.16

Chamber	Caliber	SD(avg)	BW(av g)	MPBR(a vg)	PF(avg) Ratio
.25-06 Remington	0.257	0.228	106	302	1.20
.257 Weatherby Magnum	0.257	0.236	109	329	1.36
.260 Remington	0.264	0.271	132	281	1.33
6.5 Remington Magnum	0.264	0.246	120	296	1.38
.264 Winchester Magnum	0.264	0.287	140	295	1.52
.270 Winchester	0.277	0.252	136	291	1.46
.270 Weatherby Magnum	0.277	0.251	135	320	1.60
7mm-08 Remington	0.284	0.246	139	277	1.41
.284 Winchester	0.284	0.266	150	276	1.54
.280 Remington	0.284	0.258	146	289	1.54
7mm Remington Magnum	0.284	0.274	155	297	1.67
7mm Weatherby Magnum	0.284	0.272	154	314	1.76
.30-30 Winchester	0.308	0.238	158	211	1.31
.308 Winchester	0.308	0.246	163	266	1.60

Chamber	Caliber	SD(avg)	BW(av g)	MPBR(a vg)	PF(avg) Ratio
.30-06 Springfield	0.308	0.250	166	274	1.67
.300 Winchester Magnum	0.308	0.261	174	293	1.89
.300 Weatherby Magnum	0.308	0.268	178	315	2.06
.300 Remington Ultra Magnum	0.308	0.266	176	320	2.06
.30-378 Weatherby Magnum	0.308	0.273	181	334	2.20
.338 Winchester Magnum	0.338	0.277	221	278	2.24
.340 Weatherby Magnum	0.338	0.279	223	299	2.45
.338 Remington Ultra Magnum	0.338	0.292	234	291	2.47
.338-378 Weatherby Magnum	0.338	0.281	225	314	2.58
.35 Remington	0.358	0.209	188	191	1.43
.358 Winchester	0.358	0.223	200	232	1.79
.350 Remington Magnum	0.358	0.223	200	262	1.99
.35 Whelen	0.358	0.251	225	245	2.05
.375 Winchester	0.375	0.203	200	201	1.58

Chamber	Caliber	SD(avg)	BW(av g)	MPBR(a vg)	PF(avg) Ratio
.375 H&H Magnum	0.375	0.291	286	252	2.66
.375 Remington Ultra Magnum	0.375	0.290	285	268	2.89
.375 Weatherby Magnum	0.375	0.305	300	274	3.01
.378 Weatherby Magnum	0.375	0.290	285	289	3.11
.416 Rigby	0.416	0.330	400	234	3.41
.416 Remington Magnum	0.416	0.330	400	235	3.43
.416 Weatherby Magnum	0.416	0.316	383	266	3.78
.45-70 Government	0.458	0.219	321	166	2.02
.45-70 Government (Garrett)	0.458	0.310	455	166	2.77
.458 Winchester Magnum	0.458	0.328	482	208	3.68
.460 Weatherby Magnum	0.458	0.329	483	254	4.57
.470 Nitro Express	0.475	0.317	500	207	3.86

Caliber: Diameter of the bullet (inches)

Chamber	Caliber	SD(avg)	BW(av g)	MPBR(a vg)	PF(avg) Ratio
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SD(avg): Averaged sectional density of the bullets evaluated (pounds per square inch)

BW(avg): Averaged bullet weight of the bullets evaluated (grains)

MPBR(avg): Averaged maximum point blank range of the cartridges evaluated (yards)

PF(avg) Ratio: Averaged propulsion force of the cartridges evaluated relative to the averaged propulsion force of the .243 Winchester cartridges evaluated (ratio)