

## How bad, I mean good does my ammo have to be.

After the article on vertical shrinkage people asked how good does my ammo have to be. Especially when you read service rifle shooters say use load X, drop it and go shoot. Often times those loads work but lets see just how bad a load has to be. For our example we will be using 77gr SMKs at 2,720fps, and 80gr SMKs and 2,700fps. If you haven't read the other article what we are doing is holding the rifle at a constant angle. We then adjust the velocity of the load until the drop either causes the bullet to go out the bottom of the ring, or out of the top. If you want to stop reading you can, truly what you are going to find out is you can drop all your powder charges, including 600yd and you will have stuff capable of shooting X's, IF you hold dead center every time.

For across the course 75% of the match is shot at the 200yd and 300yd line on the SR and SR3 target respectively. Both targets have the same ring dimensions a 3" X ring and a 10" 10 ring. The final stage is shot at 600yd on the MR1 target which has a 6" X ring and a 12" 10 ring

Lets first look at how good our ammo has to be in order for it to stay in the 10 rings at all the yardlines.

	Avg (fps)	elevation (MOA)	Low (fps)	High (fps)	Spread	Low spread from avg	High spread from avg
77gr	2720	5.8	2120	4500	2380	600	-1780
		8.57	2420	3165	745	300	-445
80gr	2700	19.35	2585	2835	250	115	-135

This quickly has become an exercise in futility as nobody loads ammo this bad, but lets continue. As you can see at the 200 yard line our 77gr ammo with an average speed of 2,720fps can have a speed ranging from 2,120fps to 4,500 fps and still stay in the 10 ring. For 300yards I can vary from 2,420 to 3,165fps. At 600 yards the ammo needs to be a little bit better it can vary from 2,585 to 2,835 fps. Now even the worst of reloaders can reload better than that. So how much of a charge is

that actually varying. For this we will use Varget, 77s at Mag length and 80s at 2.42" OAL. Quickload was used to approximate the speeds.

77gr	200yd	300yd
Average	24.1gr	24.1
Low	18.8gr	21.5
High	38.8gr	28.1
80gr	600yd	
Average	24.5	
Low	23.4	
High	25.7	

As you can see even the worst reloading equipment is going to be able to drop ammo good enough to hold the 10 ring. It would be impossible to put in enough Varget to blow a bullet out the top at 200yd, and 99% impossible at 300yd unless you drop tube, vibrate and purposely try to. Even at 600yd you are talking a full grain either way.

So we want to be better than a 10 ring shooter we want to have X ring ammo. So as expected the tolerances tighten up a little.

X ring	Avg (fps)	elevation (MOA)	Low (fps)	High (fps)	Spread	Low spread from avg	High spread from avg
77gr	2720	5.8	2400	3100	700	320	-380
		8.57	2572	2880	308	148	-160
80gr	2700	19.35	2640	2765	125	60	-65

For the X ring it is least now feasible to be able to blow rounds out the top of the target or maybe even have them drop out the bottom. So how much will the charge have to vary?

77gr	200yd	300yd
Average	24.1gr	24.1gr
Low	21.4gr	22.8gr
High	27.6gr	25.7gr
80gr	600yd	
Average	24.5	
Low	23.94	
High	25.1	

We are going to ignore 200 because that isn't possible. 300Yd is a difference of 1.3 and 1.6gr. That isn't really even possible BUT if something got hung up and it didn't dump a full charge like my Harrel sometimes does that could cause you to drop out of the X ring. The most interesting thing is 600yd. Notice the charge can vary by .5gr approximately either way and it will stay in the X ring. A stock Dillon 550 dropping Varget (not friendly to powder drop) can do this if not better. The key is making sure your highs and lows are not above and below what is listed here.

One thing that is interesting at 200yd and 300yd lines ballistically you have a lot more room for a change in speed going out of the top than you do out of the bottom. Reason being is because you are working with good old Mr. Gravity. Now what does that mean practically, if you have a good enough hold and you know where the zero is for that yard line with ammo at your average velocity, you want to set your elevation up waterline to a little above. Reason being statistically you are more linkely to lose rounds going low (low velocity) than rounds going out the top (high velocity). This is so long as you break shots in the middle all the time. You set up a little high and break a shot high it can go out the top very easily :).

Now in the other article we talk about Standard Deviation how good does it have to be so the majority of our shots will go in the 10 or X ring at the various yard lines. For this we are going to say so we have 99.7% of our shots (3<sup>rd</sup> SD) in the rings.

	10 Ring	X Ring
200yd	793.3	233.3
300yd	248.3	102.7
600yd	83.3	41.7

Now I've worked up some bad loads but never had a SD that high if the chronograph was

working properly. Now all of this being said this is also assuming there is no environmental issues happening and the rifle is perfectly still. A shooter moves/wobbles so the above values have to be better. But looking at the values for 300 and 600 even if you take the SD and divide that by half, you still have a pretty bad load that will be able to stay in the 10 or X ring so long as the shooter does his/her part.

With match rifle this will be even more apparent as faster speeds better bullets give you a wider margin yet.

So the bottom line here is quite simple what people say is correct load “load X” and go practice. In across the course or sling prone points are not lost because of loads. Points are lost because of position, shot execution and not reading the wind. So do not waste your time developing the pinpoint accurate load. Find something that works in your gun and go shoot.