MDRX Reloading Performance Testing

Revision: May 31st 2022

Hardware Specifications

- Rifle: MDRX
- Build Date: Late 2020
- Barrel: ES Tactical, 20", .308, 1:10 Twist, 416R – Stainless
- Bipod: Atlas
- Rear Bag: Armageddon Gear Squishy Rear Bag
- Optic: Vortex PST Gen 2 3-15
- Chrono: Labradar
- Muzzle Device: J Comp Gen 2
- MOA Calculation App: Range Buddy

Ammunition

- American Marksman M80 Ball – Re-bulleted to Nereloader 147 Grain FMJBT to 2.8" (Not Bimetal)
    - Bullet SKU: 308bulk147fmjbt250
- Hornady 150 Grain FMJBT #3037, IMR 4166, CCI 200 LRP, Federal Lake Once Fired Brass to 2.7"
- Hornady 150 Grain FMJBT #3037, IMR 4166, CCI 200 LRP, Federal Lake Once Fired Brass to 2.8"
    - Neck Tension Controlled at .02" per ES Tactical Recommendation
- Hornady 178 Grain HPBT #30715, IMR 4166, CCI 200 LRP, Federal Lake Once Fired Brass to 2.8"
    - Neck Tension Controlled at .02" per ES Tactical Recommendation
- Reloaded with a heavily modified Dillion 550C Progressive Reloading Press

Notes

- 10 Rounds of each ammunition were manufactured.
- Between 1 and 4 rounds of each 10 round group was fired in a non-scoring location to check for pressure signs check and Cycle Check/Gas System adjustment
- Images were taken in such a way to minimize double counting holes, however a handful of holes still existed
- In the October Test, someone decided to add extra holes to my target on multiple occasions, ignore some of the odd sized holes.
- All shots were taken off a bench at 100 yards.
- Range Buddy App was used for MOA calculations
- Range Buddy App was calibrated off of 0.75" small target circle

Executive Summary

The MDRX rifle with the ES tactical barrel appears to have about 2.5 moa accuracy potential in 308 with the components selected. ES Tactical barrel appears to have consistent groups in all tests, and no/few fliers were detected in the groups fired.

The IMR 4166 is a new blend of IMR 4064 that includes copper suppressants with similar burn rates to Varget and is quite common in military 7.62 ammo, such as M80 Ball. It is possible the slow burn rate has a negative effect on the MDRX rifle. But as you can see in the test data the performance of the M80 Ball and the 150 grain Hornady FMJBT was similar at equivalent velocities.

The FMJBT 150 Grain IMR 4166 41.8 Grains @ 2.7" was the most accurate load workup followed by HPBT 178 Grain IMR 4166 39.7 Grains @ 2.8.

Reported MDRX Platform Deficiencies

- ES Tactical Reports the Barrel Locking Block flexes the Chassis with higher energy rounds
- ES Tactical reports Locking Block bolts loosen over time and can contribute to barrel movement
- Improperly torqued barrel can contribute to inaccuracies
- Piston System provides torque on the barrel contributing to barrel flex

Future Recommendations

- Testing two above cartridges with Oppressor Blast Deflector
- Conduct a load workup on 125 Grain HP
- Consider chassis improvements to reinforce Barrel Locking Block
- Conduct testing with gas system disabled to turn rifle into bolt action
- Consider a dwell between shots to mitigate barrel heating
- Abandon .308 and switch to lower energy cartridges

Summary

Ladder Planning 147 Grain FMJBT American Marksman M80 Ball Rebulletted							
Powder (Grain)	Predicted Powder Bar Position (mm)	COL (inches)	Accuracy (MOA)	Speed (FPS)	STD (FPS)	Pressure Sign	Gas Setting
N/A	N/A	2.800	3.85	2756.4	27.514	N	S

Ladder Planning 150 Grain Hornady FMJBT - CCI 200 LRP - LC Brass - IMR 4166								
Powder (Grain)	Predicted Powder Bar Position (mm)	COL (inches)	Accuracy (MOA)	Speed (FPS)	STD (FPS)	Pressure Sign	Gas Setting	Follow Test
41.6	3.093	2.700	2.970	2647.556	11.758	N	N-	Y
41.8	3.115	2.700	2.41	2639.875	12.343394	N	N-	
41.8	3.115	2.800	2.62	2609.28571	21.3053601	N	S	Y
42.0	3.137	2.700	2.96	2654.33333	6.10100174	N	S	Y
42.3	3.170	2.700	2.58	2670	20.174241	N	N-	
42.8	3.225	2.700	4.87	2681.7	27.3717007	N	S	
43.3	3.280	2.700	3.48	2718.625	16.2552876	N	S	
43.8	3.335	2.700	3.21	2739.25	24.1751422	N	S	
44.3	3.388	2.700	3.65	2769.1	19.1491514	Y	S	

Ladder Planning 178 Grain Hornady FMJ - CCI 200 LRP - LC Brass - IMR 4166							
Powder (Grain)	Predicted Powder Bar Position (mm)	COL	Accuracy (MOA)	Speed (FPS)	STD (FPS)	Pressure Sign	Gas Setting
37.7	2.669	2.800	2.93	2339.71429	24.892	N	N-
38.2	2.723	2.800	2.99	2393.75	15.9902314	N	N-
38.7	2.778	2.800	2.99	2417.2	28.6489092	N	S
39.2	2.833	2.800	3.39	2432.66667	9.1772666	N	S
39.7	2.888	2.800	2.58	2478.4	11.5342967	N	S
40.2	2.943	2.800	2.66	2502.4	22.6459709	N	S
40.7	2.998	2.800	4.04	2524.2	13.0751673	N	S

Test Data

October 24 2021 Range Day order of Operations

1. Zero with M80 Ball
2. Bore Snake 2X
3. 41.8 Grain Test, then 42.3 Grain Test over 20 minutes(~5 minute dwell between strings)
4. Bore Snake 2X
5. 42.8 Grain Test, 43.3 Grain Test(~5 minute dwell between strings)
6. Bore Snake 2X
7. 43.8 Grain Test, 44.3 Grain Test (~5 minute dwell between strings)

October 24 2021 Range Day Results

Figure 1: IMR 4166 41.8 Grain 150 Grain FMJBT

Figure 2: IMR 4166 42.3 Grain 150 Grain FMJBT

Figure 3: IMR 4166 42.8 Grain 150 Grain FMJBT

Figure 4: IMR 4166 43.3 Grain 150 Grain FMJBT

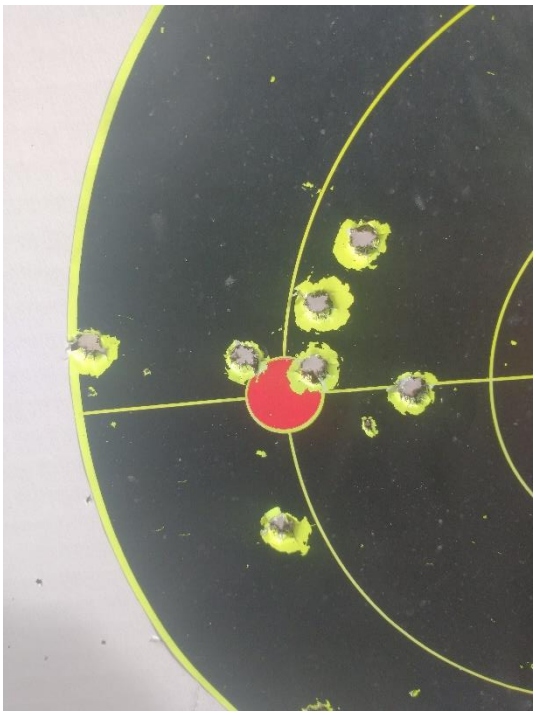

Figure 5: IMR 4166 43.8 Grain 150 Grain FMJBT

Figure 6: IMR 4166 44.3 Grain 150 Grain FMJBT

May 27 2022 Range Day Order of Operations

1. Zero with M80 Ball
2. M80 Ball Test
3. 150 41.6 Grain Test @ 2.7”, 150 42 Grain Test @2.7”, 150 41.8 Grain Test @2.8” (over 20 minutes)
4. Bore Snake 2X
5. 178 40.2 Grain Test, 178 Grain 40.7 Grain Test (over 20 minutes)
6. Bore Snake 2X
7. 178 37.7 Grain Test, 178 38.2 Grain Test, (over 20 minutes)
8. Bore Snake 2X
9. 178 38.7 Grain, 178 39.2 Grain Test,178 39.2, 178 39.7 Grain Test (over 20 minutes)

October 24 2021 Range Day Results

Figure 7: M80 Ball Re-bulleted to FMJBT @ 2.8”

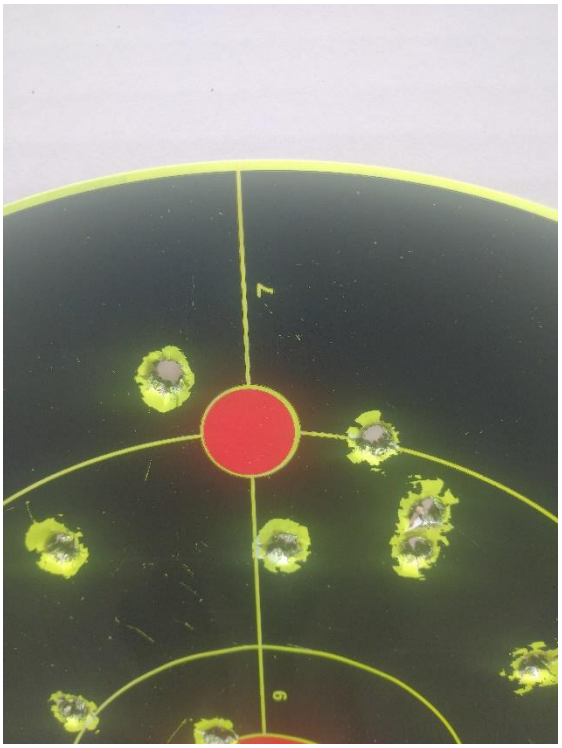

Figure 8: IMR 4166 41.6 Grain 150 Grain FMJBT @ 2.7”

Figure 9: IMR 4166 42 Grain 150 Grain FMJBT @ 2.7”

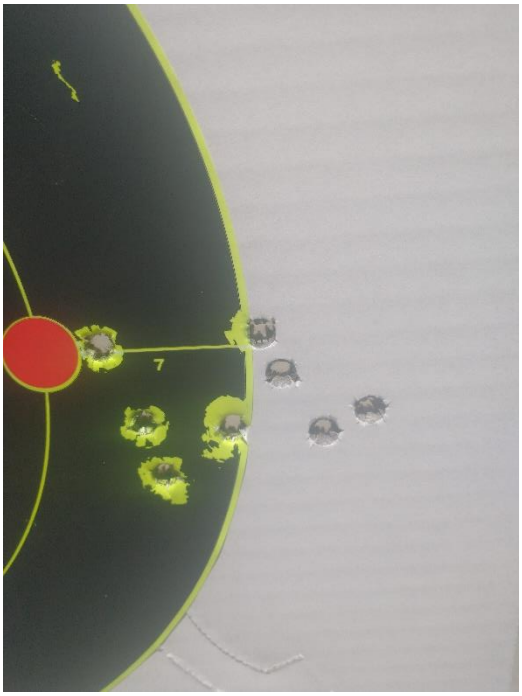

Figure 10: IMR 4166 41.8 Grain 150 Grain FMJBT @ 2.8”

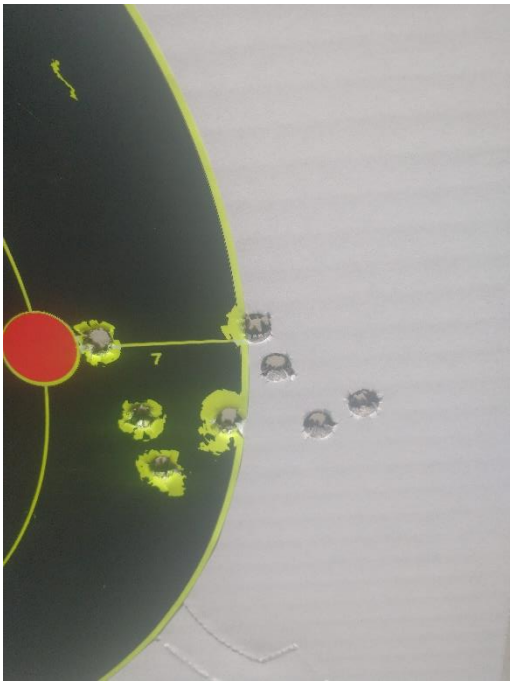

Figure 11: IMR 4166 40.2 Grain 178 Grain HPBT

Figure 12: IMR 4166 40.7 Grain 178 Grain HPBT

Figure 13: IMR 4166 37.7 Grain 178 Grain HPBT

Figure 14: IMR 4166 38.2 Grain 178 Grain HPBT

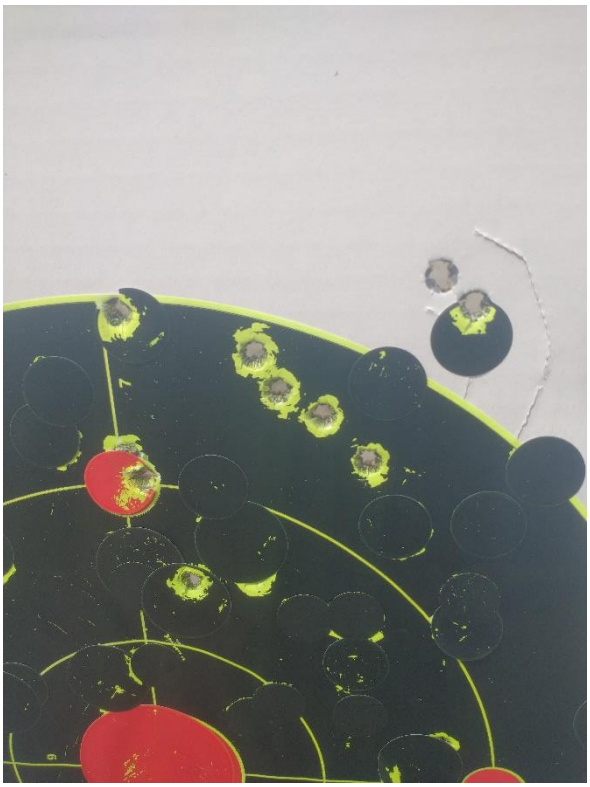

Figure 15: IMR 4166 38.7 Grain 178 Grain HPBT

Figure 16: IMR 4166 39.2 Grain 178 Grain HPBT

Figure 17: IMR 4166 39.7 Grain 178 Grain HPBT