

Dan Newberry's – Optimal Charge Weight Load Development – Instructions

Warning! It is assumed that you are an experienced handloader who follows safe handloading practices. If you have not read and understood the basic instructions in a reputable loading manual (such as Sierra, Lyman, Speer, Nosler, Lee, or Hornady), please DO NOT continue here until you have done so. It is not my intention to bring the novice up to speed on case prep, safe bullet seating length, and such. There are scores of volumes written on these very basic handloading issues, so repeating such instructions here would seem redundant.

1. Decide on the bullet you want to use.
2. Choose a powder. This is probably the most important step in the whole process. As a rule, you should choose the slowest burning powder practical. There seem to be plenty of exceptions here, so if you have it on good authority that a slightly faster powder works well with the bullet/cartridge combo you're using, feel free to choose that powder. A couple of examples would be IMR 4350 in the 30-06 and IMR 3031 in the .243 Winchester. An aside: When in doubt, consult the Nosler manual for their "most accurate powder tested." That powder nearly always gives good results in the application listed.
3. Consult at least three load data sources for maximum charge weight for the powder you've selected. Powder manufacturers are the most reliable source. You must then decide on what your maximum charge will be.
4. Back away from the maximum charge by 7 to 10 percent, and load one test round with this charge. Add 2% to the charge weight, and load another cartridge with that charge. Load a third test cartridge with the next 2% graduation. You will use these three cartridges for sighters, and more importantly to determine pressure tolerance in your individual rifle.
5. Add another 2% or so to the charge level used in cartridge #3 of step 4, and load three rounds with this charge weight. Add .7% to 1% to this charge, and load three more. Add that same graduation again, and load three more. Continue adding the chosen graduation until you have moved ONE increment above your chosen maximum powder charge.
6. The seating depth for all test loads should of course be the same. I normally seat the bullet a caliber's depth into the case, or to magazine length--whichever is shorter. I don't believe loading to approach the lands is necessary, or even desirable in most situations. So long as the bullets are seated straight, with as little runout as possible, the advantages of loading close to the lands are largely over-stated. This said, be certain that the seating depth you choose does not cram the bullet into the lands. Stay at least .020" or so off the lands for these excercises.

7. The primer brand you choose is entirely up to you. Use magnum primers only with magnum chamberings, as their added pressure can distort the OCW conclusions on standard chamberings.
8. At the range, you should set up 5 to 7 targets at 100 yards. The number of targets you use will depend on how many "sets" of cartridges you loaded. Be sure the targets are identical, and level. I like to use a simple black square, drawn on a white background with a large felt tip marker. I draw the square about 3/4" (interior dimension) for my 9 power scope setting. This allows a "tight fit" of the crosshairs in the square, and thus a repeatable sight picture. For higher power scopes, draw the square smaller, and vice versa.
9. You can also put up one "sighter" target, and use the initial reduced rounds to get the POI on paper, as close to the bullseye as possible.
10. Your barrel should of course be clean before starting. Depending on the number of rounds you will fire, you may decide that it is necessary to clean half way through the string, fire a couple foulers, and allow a couple of minutes to cool before continuing. With custom barrels, you may be able to fire 25 shots or more before fouling begins spoiling group sizes. With factory barrels, I wouldn't fire more than 15 to 18 shots before cleaning... This is all relative, of course.
11. After you have fired the sighters and confirmed that there are no pressure signs (hard bolt lift, flattened primers, etc.) you allow the barrel to cool for an adequate amount of time (use common sense--the hotter it is outside, the longer it will need to cool) you will then fire your first shot from the first group of the graduated charges. You fire this shot at target number 1.
12. Allow the barrel to cool, then fire a shot from the second graduation at target number 2. Wait for cooling of the barrel, then fire a shot from the third graduation at target number 3. Continue this "round robin" sequence until you have been through all of the targets three times. At this point you will have a three shot group on each of the targets.
13. It is assumed that you are an experienced reloader, and that you know to watch for pressure signs on each of the increasing charges. Fire the subsequent charge only if there are no pressure signs on the previous charge. You can safely fire the heaviest charge you loaded so long as the next charge under it showed no pressure signs. This "heaviest charge" should be about 1% over your selected maximum charge, but will be safe so long as the next lowest graduation showed no pressure signs.
14. Triangulate the groups. This means to connect all three shots in a triangular form, and determine the center of the group, and plot that point on the target. Measure this point's distance and direction from the bullseye, and record the information somewhere on the target. Do this for all of the targets. If you have a called flyer, you should

discount that shot, or replace it in the group if you have an additional round loaded with that charge.

15. You will now look for the three groups which come the closest to hitting the same POI (point of impact) on the targets. The trend of the groups should be obvious, normally (but not always!) going from low and favoring one side, to high and favoring the other side. But along the progression, there should be a string of at least three groups that all hit the target in the same relative point.

16. After you have carefully measured group sizes and distances and directions from the bullseye, you will know which three groups come the closest to hitting the target in the same POI. You now choose the powder charge which represents the center of this string. For example, if 34.7, 35.0, and 35.3 grains all grouped about 1.5 inches high, and about 3/4 of an inch right of the bullseye, you would choose the 35.0 grain charge as your OCW (optimal charge weight). This charge will allow 34.7 and 35.3 grain charges to group right with it. This will be a very "pressure tolerant" or "resilient" load.

17. Remember, don't get "bowled over" by a tiny group which falls outside the OCW zone. You can tune any of the groups to be tiny with bullet seating depth changes. After you have determined the OCW, you may want to try seating the bullets deeper or longer in .010" increments to see where your particular rifle does its best. If you're a real stickler for accuracy, you can do another "round robin" test using varied seating depths, perhaps in .003" increments. Look for at least two seating depth stages that hit the same POI and group tight as well. This said, I have often found that OCW recipes are so reliable that seating depth alterations--especially for game hunting cartridges--often don't seem necessary.

18. Your next step would be to confirm your load recipe at the maximum range you will expect to use it. Load one round about 1% below, and another round about 1% above the OCW charge, and fire a three shot group with these two charges plus the standard charge at the maximum range you will require the load to be accurate at. You should note MOA, or very close to MOA grouping...

19. The OCW load development plan works best with rifles and shooters that are actually capable of MOA accuracy. If your rifle has not shown a propensity for reasonable accuracy, you may want to have it corrected before wasting time and material with additional load development. If you are not confident that you are at a level where you can shoot consistent MOA groups, you may want to hold off on intricate load development until your skills are better honed. Lots of practice with a scoped .22 LR is invaluable...

20. I would sincerely recommend using shooting glasses during the firing sequences of ANY load testing. You can never be too careful here... And please know that anytime you embark on load development, you're basically on your own. Just like any provider of load data or development instructions, I must mention that I accept no responsibility whatsoever for any occurrences which are outside the realm of your expectations...