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## **Break-In and Cleaning**

### **BREAK-IN**

With any premium barrel that has been finish lapped—such as your Krieger barrel—, the lay or direction of the finish is in the direction of the bullet travel, so fouling is minimal. This is true of any properly finish-lapped barrel regardless of how it is rifled. If it is not finish-lapped, there will be reamer marks left in the bore that are directly across the direction of the bullet travel. This occurs even in a button-rifled barrel as the button cannot completely iron out these reamer marks.

Because the lay of the finish is in the direction of the bullet travel, very little is done to the bore during break-in, but the throat is another story. When your barrel is chambered, by necessity there are reamer marks left in the throat that are across the lands, i.e. across the direction of the bullet travel. In a new barrel they are very distinct; much like the teeth on a very fine file. When the bullet is forced into the throat, copper dust is released into the gas which at this temperature and pressure is actually a plasma. The copper dust is vaporized in this gas and is carried down the barrel. As the gas expands and cools, the copper comes out of suspension and is deposited in the bore. This makes it appear as if the source of the fouling is the bore when it is actually for the most part the new throat. If this copper is allowed to stay in the bore, and subsequent bullets and deposits are fired over it; copper which adheres well to itself, will build up quickly and may be difficult to remove later. So when we break in a barrel, our goal is to get the throat polished without allowing copper to build up in the bore. This is the reasoning for the “fire-one-shot-and-clean” procedure.

Barrels will vary slightly in how many rounds they take to break in because of things like slightly different machinability of the steel, or steel chemistry, or the condition of the chambering reamer, etc... For example a chrome moly barrel may take longer to break in than stainless steel because it is more abrasion resistant even though it is the same hardness. Also chrome moly has a little more of an affinity for copper than stainless steel so it will usually show a little more “color” if you are using a chemical cleaner. (Chrome moly and stainless steel are different materials with some things in common and others different.) Rim Fire barrels can take an extremely long time to break in – sometimes requiring several hundred rounds or more. But cleaning can be lengthened to every 25-50 rounds. The break-in procedure and the cleaning procedure are really the same except for the frequency. Remember the goal is to get or keep the barrel clean while polishing out the throat.

Finally, the best way to break-in the barrel is to observe when the barrel is broken in; i.e. when the fouling is reduced. This is better than some set number of cycles of “shoot and clean” as many owners report practically no fouling after the first few shots, and more break-in would be pointless. Conversely, if more is required, a set number would not address that either. Besides, cleaning is not a completely benign procedure so it should be done carefully and no more than necessary.

### **CLEANING**

*This section on cleaning is not intended to be a detailed instruction, but rather to point out a few “do’s and don’ts”. Instructions furnished with bore cleaners, equipment, etc. should be followed unless they would conflict with these “do’s and don’ts.”*

You should use a good quality straight cleaning rod with a freely rotating handle and a rod guide that fits both your receiver raceway and the rod snugly. How straight and how snug? The object is to make sure the rod cannot touch the bore. With service rifle barrels a good rod and guide set-up is especially important as all the cleaning must be done from the muzzle and even slight damage to the barrel crown is extremely detrimental to accuracy.

There are two basic types of bore cleaners – chemical and abrasive. The chemical cleaners are usually a blend of various ingredients including oils and ammonia that attack the copper. The abrasive cleaners generally contain no chemicals and are an oil, wax, or grease base with an extremely fine abrasive such as chalk, clay, or gypsum. They clean by mechanically removing the fouling. Both are good, and we feel that neither will damage the bore when used properly.

So what is the proper way to use them? First, not all chemical cleaners are compatible with each other. Some, when used together at a certain temperature, can cause severe pitting of the barrel – even stainless steel barrels. It is fine to use two different cleaners as long as you completely remove the first cleaner from the barrel before cleaning with the second. And, of course, never mix them in the same bottle.

Follow instructions on the bottle as far as soak time, etc... Always clean from the breech whenever possible, pushing the patch or swab up to the muzzle and then back without completely exiting the muzzle. If you exit the muzzle, the rod is going to touch the bore and be dragged back in across the crown followed by the patch or brush. Try to avoid dragging things in and out of the muzzle. It will eventually cause uneven wear of the crown. Accuracy will suffer and this can lead you to believe the barrel is shot out, when in fact, it still may have a lot of serviceable life left. A barrel with a worn or damaged crown can be re-crowned and accuracy will usually return.

The chemical cleaners may be the best way to clean service rifle barrels that must be cleaned from the muzzle – i.e. M1 Garand, M14, etc... because this method avoids all the scrubbing necessary with the abrasive cleaners and the danger of damaging the crown. But again, as long as the rod doesn't touch the crown, abrasive cleaners should be fine.

Abrasive cleaners work very well. They do not damage the bore, they clean all types of fouling (copper powder, lead, plastic), and they have the added advantage of polishing the throat both in "break in" and later on when the throat begins to roughen again from the rounds fired. One national champion we know polishes the throats on his rifles every several hundred rounds or so with diamond paste to extend their accuracy life.

Again, as with the chemical cleaners, a good rod and rod guide is necessary. A jag with a patch wrapped around it works well. Apply the cleaner and begin scrubbing in short, rather fast strokes of about two to four inches in length. Concentrate most of the strokes in the throat area decreasing the number as you go toward the muzzle. Make a few full-length passes while avoiding exiting the muzzle completely, but do partially exit for about six strokes. You can avoid accidentally exiting by mounting the rifle in a vise or holder of some sort and blocking the rod at the muzzle with the wall or something to keep it from completely exiting.

This sheet is intended to touch on the critical areas of break-in and cleaning and is not intended as a complete, step-by-step guide or recommendation of any product.

The following is a guide to "break-in based on our experience. This is not a hard and fast rule, only a guide. Some barrel, chamber, bullet, primer, powder, pressure, velocity etc. combinations may require more cycles some less!

It is a good idea to just observe what the barrel is telling you with its fouling pattern. But once it is broken in, there is no need to continue breaking it in.

Initially you should perform the shoot-one-shot-and-clean cycle for five cycles. If fouling hasn't reduced, fire five more cycles and so on until fouling begins to drop off. At that point shoot three shots before cleaning and observe. If fouling is reduced, fire five shots before cleaning. It is interesting to shoot groups during the three and five shot cycles.

**Stainless**

5 one-shot cycles  
1 three-shot cycle  
1 five-shot cycle

**Chrome Moly**

5-25 one-shot cycles  
2 three-shot cycles  
1 five-shot cycle

*Thank you for choosing a Krieger barrel.*