

How to Inspect Fired Primers for Recharging

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Introduction

Reusing a previously fired primer carries some risk of failure in the same way that reuse of fired brass cases carries some risk of failure. While most of us have learned how to spot and discard bad brass cases during its reprocessing, few of us know how to inspect primers. This document seeks to close this gap and is based upon years of successfully cleaning, sorting, recharging, and reusing primers. Some features of bad primers will be obvious, while others may not be. One difficulty of inspecting primers for defects is size. Even the smallest pistol brass (25 ACP) is many times larger than a SP or LP primer cup. This can be challenging for those with 20:20 vision and almost impossible for those who use corrective lens. This is truly a case where being near sighted can be a distinct advantage. If needed, consider obtaining a lighted magnifier to aid in primer inspection. The unit below is an example that can be purchased for only ~\$16 from eBay as of May 3, 2017. Other designs are available from \$5 to \$50.



Now that you are able to see the primers in close detail what should you be looking for?

The Right Stuff

In the same way that federal agents are taught how to spot a counterfeit bill by first learning all the features of a genuine bill, the same thing can be done for ammunition primers. The best primers for reuse are those with a light to moderate firing pin strike that is mostly centered on the cup base. The following images show the exterior and interior of a primer cup with a moderate firing pin strike.



The dimple in this primer can be easily knocked out without distorting or damaging the cup. One surprising thing about firing pin strikes is that the metal directly underneath the strike can flow and is usually slightly thinner than the rest of the cup base. The consequence of this is that a shadow of the firing pin strike remains on most primers after the dimple is removed. See a processed primer below:



Both the exterior and interior of the cup show a slight thinning of the brass at the point where the firing pin struck the cup. Also notice that the edges of the cup base retain the rounded radius of a new unfired primer. This is a feature to look for that helps assure that the cup has not been significantly distorted by high pressures during firing. The most prized primer cups for reuse are those with a light firing pin strike. In these cups the firing dimple can often be removed with virtually no signs that the cup was previously used. These cups are relatively rare to find in a typical random mixture of primers. Perhaps 1 out of 100-200 cups will be found in this condition. The strength and yield properties of these cups should be almost identical to the original primer cup. Using light strike cups may provide you with more confidence if you are concerned about the safety of recharging and reusing primers.

Most primer cups are constructed from the same 70:30 Copper:Zinc alloy that ammunition cartridges are drawn from. Occasionally, you may run across primer cups made from steel, but these are rare and are mainly seen in berdan primed foreign ammunition. Some companies nickel plate their primer cups after punching them out while others leave the cups with their natural brass finish (see below).



Both brass and nickel plated cups can be reused, although my personal preference is for nickel plated cups. The reason why is that nickel is less reactive towards the various primer mixture ingredients and could provide longer shelf life of the recharged primer. Even so, many primers have been made and tested with unplated brass cups and they have functioned identically to those that are nickel plated.

For boxer primers, the anvil will need to be reused as well. It has been my observation that anvils are rarely damaged even in primer cups that are distorted and clearly unacceptable for reuse. Therefore,

after cleaning remove and save all anvils from boxer primers even if the primer cup is deemed to be bad. That way, you will always have more anvils than you will need.



Do not be hesitant to discard any cups or anvils you do not feel confident reusing. Even with strict sorting criteria you should always end up with plenty of cups and anvils. While I generally use a random mix and match of primer cups and anvils, some anvils will just not fit right in some cups. However, it has been observed that anvils made by CCI will fit virtually every primer cup they have been tried in. They are readily recognizable by the stepped ridges on the inside of the anvil (see below).



If you are having problems getting an anvil to fit in a primer cup, discard it and grab a CCI anvil.

Cleaning Primers and Anvils

Primer cups and anvils are usually not inspected until they have been cleaned of the soot and residue they contain after firing. Flaws are more easily seen on clean primers and they are safer to handle after removing the toxic lead salts and ash they contain. The easiest way I have found to clean fired primers in bulk is by wet tumbling. A rubber drum is charged about 1/3 full with fired primers then water, dish detergent, and citric acid (e.g. Lemi-shine from the grocery store) are added. The primers are tumbled for about 30 minutes. The dirty water is poured off and the primers rinsed well with water while leaving them in the drum. The drum is refilled with water, detergent, and citric acid and tumbled for another 30 minutes before rinsing. This procedure is repeated 2 to 3 more times until the water is fairly clean after tumbling. The cleaned primers are drained, rinsed, and poured out on a paper towel to dry.

An alternative method is to use an ultrasonic cleaner. The same water, detergent, and citric acid solution works well to “buzz” out the firing residues. For small quantities of primers (i.e. 100-200) this may be the fastest and most convenient method for cleaning primers. The primers can be completely cleaned in one session lasting only 5-10 minutes. After cleaning, the primers are drained, rinsed, and poured out on a paper towel to dry the same way as those that are tumble cleaned.

After putting on safety glasses, the anvils are removed from the cleaned primers by using a pick or other similar tool to get under one of the legs of the anvil and pry it out while holding the cup with a pair of needle nose pliers. Once you do a few, you will get the right feel for removing them without launching the anvil into parts unknown and without crushing or distorting the cup. One recommendation was to use a spinning/twirling motion while removing the anvil to help keep them on your working area. Discard the cup or anvil if either is damaged during removal. If the cleaning step was done well, the only thing that might remain in the cup is paper residue from the original paper foil. It is remarkable that paper can survive the high temperatures and pressures during firing of the primer. None-the-less, it is common to find a paper triangle left behind inside the primer cup that matches the anvil shape. Remove any residue and inspect the primer cups for defects.

WARNING: *Sometimes a live primer that misfired will make it through the cleaning process (i.e. the presence of a primer strike does not guarantee that a primer is not live)! Attempting to remove an anvil from a live primer can be very dangerous. If the primer were accidentally set off during removal, the anvil can be launched towards your face at high velocity. Wearing eye protection while disassembling primers is essential to prevent serious injury.*

It is best to segregate pistol and rifle primers before and after cleaning due to differences in brass thickness. Using recharged rifle primers in pistol rounds can result in misfires since the primer strike in pistols is usually not as strong as those in rifles. Using recharged pistol primers in rifle rounds can result in blown and pierced primer cups due to much higher pressures than the thinner pistol cups were designed to contain. While it is possible to tell the difference between pistol and rifle primers by the feel/force required to knock out the dimple, it is better to not mix them up in the first place.

Primer Cup Defects

1) Flattened primers

Probably the most common problem with fired primers is flattening of the cup against the breech face of the gun. These cups lose the rounded radius of the cup base and can have an almost 90° angle at the junction of the walls and base. The sharp angle is a weak point in the primer cup and is prone to failure. Sometimes machining marks from the breech face are transferred to the flattened base of the primer (and the head of the case as well). These unique markings are one of the ways that fired cartridges can be traced back to a particular firearm. Discard any cups found with this condition as they are unusable.



Flattened primer cups are often found in high pressure magnum pistol and many rifle cartridges. It has been observed that very few LR primer cups are reusable due to this problem.

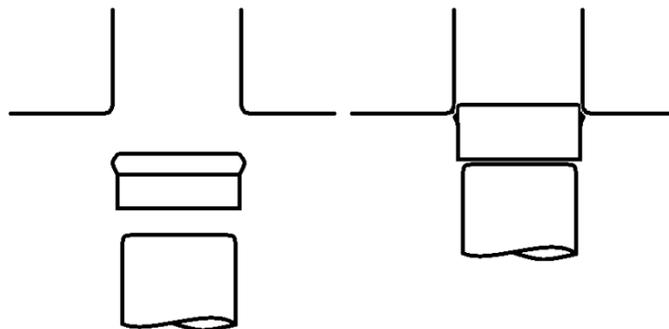
2) Mushroomed Primer Cup

This problem is associated with and often occurs in combination with flattened primer cups. Mushrooming of the primer occurs when high pressure inside the cartridge forces the primer cup partially out of the primer pocket and the unsupported base of the cup expands forming a mushroom shape. If the base of the cartridge subsequently slams into the breech face, the primer can be flattened as well.

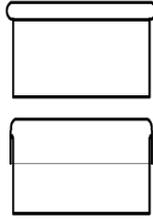


Primers with this condition normally cannot be reused and should be discarded. If the mushrooming is very slight, sometimes it is possible to swage the mushroomed area back into the primer pocket during insertion of the recharged primer. However, be prepared for the primer to unintentionally pop off if the mushroomed area is too big to force back into the primer pocket. As more and more force is applied to try and make the primer go into place, the priming compound can be crushed and ignited.

It is possible to swage slightly mushroomed primers back into shape using a custom bullet resizing die. I have a custom 5mm bullet sizing die made by NOE mold company that is used to fix slightly mushroomed 5mm berdan primers. The justification for going through this trouble is that 5mm primers are completely unavailable in the US and about ½ of these primer cups would have to be discarded for mushrooming if there was no way to repair them. The 5mm primers are lightly lubricated with imperial resizing lube before being pushed through the resizing die. This lube must be removed in a subsequent cleaning step before the resized primers can be used. Be aware that if the swelling is too great, the mushroomed area will be folded over the cup walls as a thin layer of brass rather than swaged back to its original shape. Primers which show this folded condition after swaging should be discarded and are unsafe to reuse.



Swaging mushroomed primers in a custom bullet resizing die



Folded layer of brass over cup walls when the mushroomed area is too big to swage correctly

3) Heavy Firing Pin Strike

Some pistols and rifles give a heavy strike to the primer cup. This creates a deep dimple that cannot be removed without distorting the cup and/or will leave an unacceptably thin area of brass at the strike mark. These cups are unusable and should be discarded. If the anvil was not knocked out of the cup by the heavy strike, they will usually be distorted and unusable.



4) Off-Center Strike

A normal firing pin strike that is off-center but still on the base of the primer cup is not a problem and the primer can be reused. Even so, off-center primer strikes can be a source of misfires and should be investigated and corrected if possible.



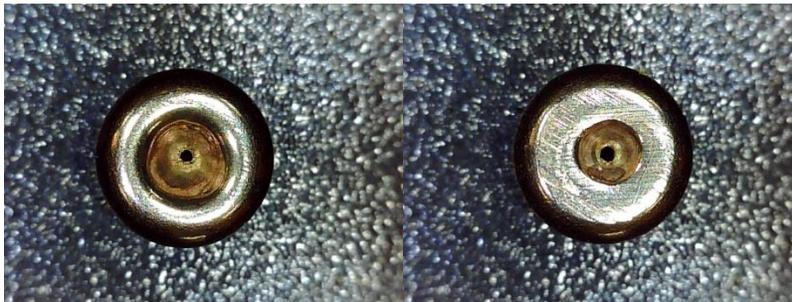
When the dimple is close enough to the wall of the primer to distort it, the primer is unusable and should be discarded. In the example below, the strike is both heavy and off-center. You can also see a large raised area of extruded metal near the center of the primer.



Hopefully, you only see this issue with range pickup brass and not in your own fired rounds. If your gun is causing this condition, a visit to the gunsmith might be needed.

5) Pierced Primers

This condition is actually fairly rare, but important to recognize. If you are working with a light that is at head level, you can hold a suspect primer up to the light to see if a hole is present. There have been a few cases where a pierced primer that was missed during the initial inspection, was noticed when water leaked out of the hole during recharging of the primer using the Eley Prime process.

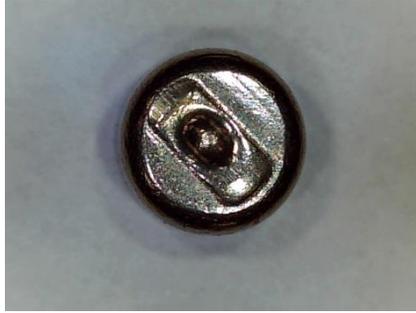


From these images, you can see that pierced primers can happen in both heavy and moderately struck primers. These primers are unsafe to reuse and must be discarded.

6) Miscellaneous Issues

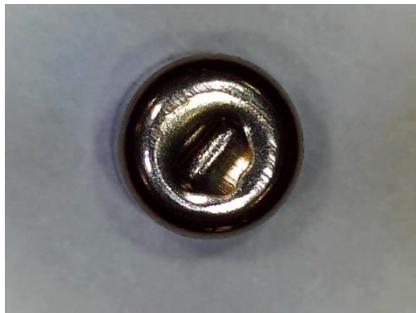
As you inspect many thousands of primers, you encounter all kinds and degrees of odd problems. Here is a sampling.

- a. The first odd primer issue is caused by firing in a glock pistol. As if we needed another reason to dislike glocks with their lead unfriendly polygonal barrels, and guppy bellied brass from the lack of chamber support in some models, we find that the breech face of some guns leaves a distinctive raised rectangular area on the primer cup.



The good news is that with a little extra work the raised area can sometimes be hammered down during removal of the firing pin dimple and the primer can be reused. However, as with all these miscellaneous problems, discard these primers if you don't feel comfortable using them, or cannot fix them to your satisfaction.

b. Frankly, I have no idea what kind of pistol uses an elongated firing pin, but apparently some do. Although they look odd, these dimples can usually be removed with normal techniques and the primers can be reused as normal.



c. The primer below has a firing pin smear. This is caused when the firing pin does not withdraw quickly enough as the fired case is ejected causing it to be dragged across the primer. When the smear reaches the edge of the primer like in this example, it is best to discard the primer. Less severe examples may be salvageable.



If you encounter this situation with your own guns, you should check the condition and lubrication of the firing pin (and firing pin spring in guns that use one) since this could lead to a dangerous slamfire situation. It could also lead to premature wear or breakage of the firing pin.

d. If the firing pin hole is much larger than the firing pin itself, the base of the primer can be extruded into the open space around the firing pin. This example shows a raised ring of metal around the firing pin strike.



This example is bad enough that the primer should be discarded. Less severe examples can sometimes be salvaged, but should be judged strictly.

e. The primer below is an “outy” instead of an “inny”. This is occasionally caused by high internal pressure. I have personally seen this problem in some very special experimental 25 ACP rounds that I made. The primers were expanded out far enough so that the cases would not fit into the shellholder for depriming. A much more common cause is depriming cases with crimped primers (see below).



The force required to remove a crimped primer can be high enough that it forces the base of the cup outwards. If the problem is not too severe, these primers can be easily fixed by hammering the expanded area back to its normal shape and then removing the dimple. In some cases, the anvil is stuck deeply in the cup and cannot be removed without damaging the cup.

f. Unfortunately, no example image of a cracked primer cup is currently available. However, this problem sometimes occurs while trying to force an overly large anvil into a recharged primer cup (i.e. a mismatch between the cup ID and anvil OD size). This condition has been spotted in the past by water leaking out of the cracked area onto the work surface during primer recharging. These primer cups must be discarded. However, since the primer has already been recharged, rather than attempting to remove the moist primer compound, they can be safely popped off in an empty case after drying.

Acknowledgements

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Useful Links

1. Homemade Primer Course

<http://www.aardvarkreloading.com/resources/Homemade%20Primer%20Course%202016-02-29.pdf>

2. Test firing homemade primers ("Commercial vs 'Kid Cap' vs H48")

<https://www.youtube.com/watch?v=0JqEkmaZ4bc&index=9&list=UUWUfs-Gt2trsDvZuFrNzFzg>

3. Do Not Attempt To Deanvas Live Primers

<https://www.youtube.com/watch?v=yKUI2d9AiAY>