Brass Casings

Function:

As your gun's coordinator of primer, powder and bullet, the cartridge case is critical to ballistic performance and firearm function. Reliable, safe and accurate reloads cannot be had with indifferently selected, defective or poorly prepared brass. To avoid a devil's host of ammo problems you must become familiar with proper selection, inspection and preparation procedures. As well, a working knowledge of case design and function will help you optimize your reloads to get the best performance from your gun.

A case is called upon to perform many interrelated functions with complete precision and reliability. It must:

1. Work reliably through the gun's feed mechanism.
2. Fit precisely to the firing chamber and bullet.
3. Orient the bullet to bore and the primer to firing pin hole.
4. Direct the primers' flash and heat to the powder charge.
5. Expand under thousands of PSI chamber pressure to seal the breech without failure.
6. When expended, contract to permit easy extraction.

Modern brass cases do all this with such boring reliability as to invite neglect by handloaders who might understandably be more fascinated by powder charge and bullet combinations than by

primer pockets and case necks. The fact remains, however, that clean, correctly dimensioned brass in perfect condition is essential to success on the range.

Modern cartridge cases are referred to as “brass” because most are indeed drawn from it, though alternative materials are sometimes encountered. Generally, aluminum or lacquered steel cases are Berdan primed and should be considered non-reloadable. To save broken decapping pins learn to recognize Berdan cases and discard them, i.e. CCI Blazer as shown below:

Left: Berdan/CCI Blazer case
Right: Boxer - primed case

Brass Case Types

With 150 years of continuous development, there exist uncounted thousands of various cartridge designs reflecting endless combinations of caliber and case type. Still, the industry has a mania for creating new improvements on the old, proven standbys. Thus, we have the 40 S&W in place of 10mm Norma, or 9x23 Winchester as an alternative to 9mm or 38 Super Auto. With so many common cartridge variations out there, familiarity with cartridge identification and classification is a must.

Left to right: Rimmed, semi-rimmed, rimless, and rebated rim

Most handgun and carbine cartridges can be classified by body style and head design into these basic categories:

Body	Casehead
Straight-walled	Rimmed
Tapered	Semi-rimmed
Bottlenecked	Rimless
	Belted
	Rebated-rimless

The most basic category of case design — rimmed, straight-walled cases — are very easily resized, and their cylindrical shape affords good die support during bullet seating and crimping stages. Such old standards as 44 Special are far more popular than ballistically similar bottleneck rounds like 44/40 for their ease of reloading. With their long tapered shape, the old black powder era bottlenecked rounds (44/40, 38/40, 32/20) feed and chamber reliably in the revolvers and carbines of their day, even when fouled. The larger case capacity afforded by this plan was necessary to achieve the ballistics required with black powder, but is a detriment to consistency with modern propellants and low-density charges. For all of these reasons, straight walled cases are to be preferred for most modern applications where the shooter has a choice.

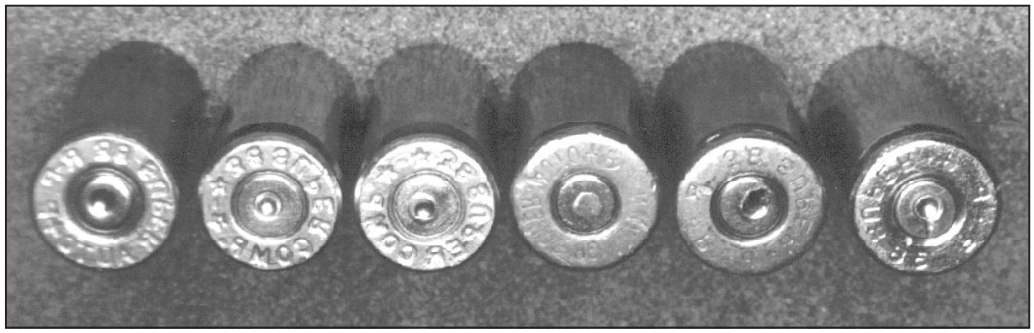
The same disadvantages pertain to bottlenecked auto pistol cartridges and the shooter has scant incentive to choose one where brute force isn't required. For example, the .357 SIG will push our 124 Round Nose to 1360 fps, while the 38 Super can safely achieve 1260 fps without the attendant problems associated with reloading the bottlenecked case *(see section on Action/IPSC in Chapter 4).*

An auto pistol round must have excellent feeding characteristics ("transfer factor") as well, and the straight walled rounds like 38 Super have that all beat compared to bottlenecked alternatives like .357 SIG. Because they have very short case necks, bottlenecked cases do not hold the bullet as securely against feeding impact while the overbore case diameter of the bottlenecked pistol rounds can cause problems with magazine function in some guns.

Inspection and Pressure Indications

Determining condition and spotting defective brass is crucial to successful reloading. We have seen that brass cases must be ductile and soft enough to expand under chamber pressure without failing. This ductility affects case life. Each cycle of resizing, reloading and firing shortens a cartridge case's usable life, and failure occurs when brass has flowed beyond the resizing dies' ability to restore its proper dimensions or the brass has been stressed beyond its yield point and splits, cracks or separates. The number of reloading cycles a given case will yield is dependent on the chamber pressure it's subjected to, the chamber dimensions it's fired in and the amount of mechanical work required to resize and reload it. Deep extractor gouges may make the brass slip off the extractor prior to ejection, thereby rendering the semi-automatic unusable until the case is manually removed from the chamber.

Left to right: case head collapsed into body; cracked wall; incipient blowout at feed ramp; extractor damage to web and rim.



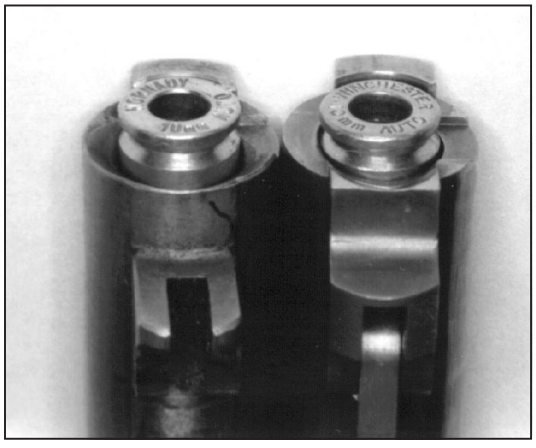
Pressure signs, left to right: normal, flattened, cratered, flowed, pierced/blown, backed out with firing pin drag.

Case failure manifests itself in these ways:

- Case neck splits, due to overworking of brass.
- Case head expansion ("Belted magnum effect").
- Incipient blowout at feed ramp.
- Rim damage from repeated feeding and extraction.
- Loose primer pockets.
- Body splits.
- Case head separation.

Chamber Dimensions and Feed Ramp Throating

Brass expansion is the primary factor in case life. Chamber dimensions must strike a compromise between case support and firearm function. The less a case must expand to fit the chamber and seal the breech, the less resizing work required to reload it and the longer it will last. Pressure being exerted equally in all directions, brass will flow away wherever it is not supported by the chamber or breechface. Thus, cases typically fail at the juncture of body and case head where the ratio of body expansion to base diameter is greatest. A majority of semi-auto pistol chambers are relieved at the feed ramp to facilitate feeding, resulting in a partially unsupported case head. Brass will by nature flow at this point weakening it. Over pressure rounds will likely fail by rupturing through the feed ramp throat, while normal expansion and flow will cause failure eventually. Significant bulging of your brass at the feed ramp is a sign of excessive pressure, brass fatigue and/or an incorrectly throated barrel. At a minimum, your pistol's chamber should support the case body through its web area, but full case wall support to the extractor groove is ideal.



Left: unsupported chamber.
Right: supported chamber with minimal case wall visible at feed ramp intrusion.

Primer Pockets

Another indication of case fatigue is loose primer pockets, caused by case head expansion. Such cases must be discarded. Loose primer pockets permit leakage which will damage your gun's breech face. In low pressure cartridges like 45 ACP or 38 Special, loose primer pockets will not appear for many reloading cycles. Generally, such cases present with neck splits or rim damage before loose primer pockets develop. That's not necessarily true with high pressure jobs like 9x23, 38 Super or 40 S&W when loaded to maximum. Case head expansion cannot be fully corrected through resizing, and is directly related to chamber pressure and chamber size. Watch carefully and discard all brass with loose pockets, bulged, unresizable case head diameter or obvious swelling in the extractor groove. Sort out and keep track of your cases. You should know how many firings each piece has endured, and if you experience failures you need to reexamine your loads. Case life is shortened drastically as pressure rises; backing off 5% or 10% can make a huge difference. And while there is no absolute rule, you should accept no load combo which won't permit a minimum case life of six firings without obvious damage.

Case Necks

Case neck splits, on the other hand, are somewhat preventable, since they are usually caused by repeated belling and crimping. It makes much sense to bell the case mouth no more than is required to cleanly seat the bullet without shaving. A flare inside diameter that's .010" over bullet diameter is usually adequate. Crimp dimensions are called out for each cartridge/bullet combination; **excess crimp beyond stated values is never recommended and is potentially hazardous.** Excessive crimping will raise chamber pressure, distort the bullet and can affect headspace! Be careful.

Brass Case Cleaning and Polishing

Fired cases must be prepared for reloading by removing the spent primer, dirt, fouling and lead residues, and resizing to original dimensions. Resizing and spent primer removal (decapping) is commonly performed as the first operation on your reloading press, though some shooters prefer to size and decap before they clean their brass to remove fouling from the primer pockets as well.

Case cleaning can be accomplished wet, by washing your brass in a water based detergent solution, or dry by tumbling your brass in an abrasive media. Either way, remember that lead residues will be present that you must protect yourself and others from lead exposure. **Gloves and an appropriate respirator are required.** I do not prefer wet cleaning of brass. Although wet cleaning does reduce exposure to airborne lead residue it is messy, time consuming and safe disposal of waste water and detergent is problematic. Washed brass will discolor and develop verdigris; while perhaps not unsafe, such ugly stuff inspires no confidence. Much easier and more effective is tumbling in media. Various vibrating case cleaners, rock tumblers, media separators and basketry are available to the reloader. Select a machine larger than you think you will need; the bigger units are more cost effective and efficient. The typical cleaning process is a three stage affair:

- First, shake out your cases to remove range dirt and knock out loose spent primers. Discard any cases with missing primers before continuing.
- Second, tumble your brass in a coarse media to clean them. Corn cob grit (chicken scratch at the feed store) works very well. Run them for about 2 hours or so. Separate out.
- Third, polish your cases in crushed walnut hulls. You can use one of the liquid polish additives, but this isn't necessary. Your finished cases should be clean, uniform in appearance and devoid of heavy residues or powder fouling. (A mirror polish is neither necessary nor desired.)

Avoid unnecessary lead exposure; wear gloves and a proper respirator when handling media. Be sure to read and follow the manufacturer's instructions and precautions when tumbling your cases. Your media degrades and becomes contaminated with use. Media is cheap; discard it when you see evidence of poor performance.

Ideally you should sort and inspect your brass both before and after cleaning and polishing. Certain stress failure symptoms (such as the ring identifying an incipient head separation) can be masked by the cleaning process, while cracks and bulges might be more easily detected afterwards.

Finally, there is the question of whether to deprime before cleaning and polishing for the purpose of accessing and cleaning out the primer pocket. Generally, the residue that remains behind in the pocket is minor and doesn't interfere with primer seating or ignition. However, for critical applications, cleaning the primer pockets isn't a bad idea. Resize and deprime brass after cleaning, but before you run them through the polishing media. You can use a manual primer pocket cleaning tool, or just tumble them again. Generally no amount of tumbling in media will do as good a job as a quick twist with a handheld tool. After polishing deprimed brass, be certain to run them through the resize and deprime stage again to remove stuck media from the flash holes. Failure to do this invites misfires.