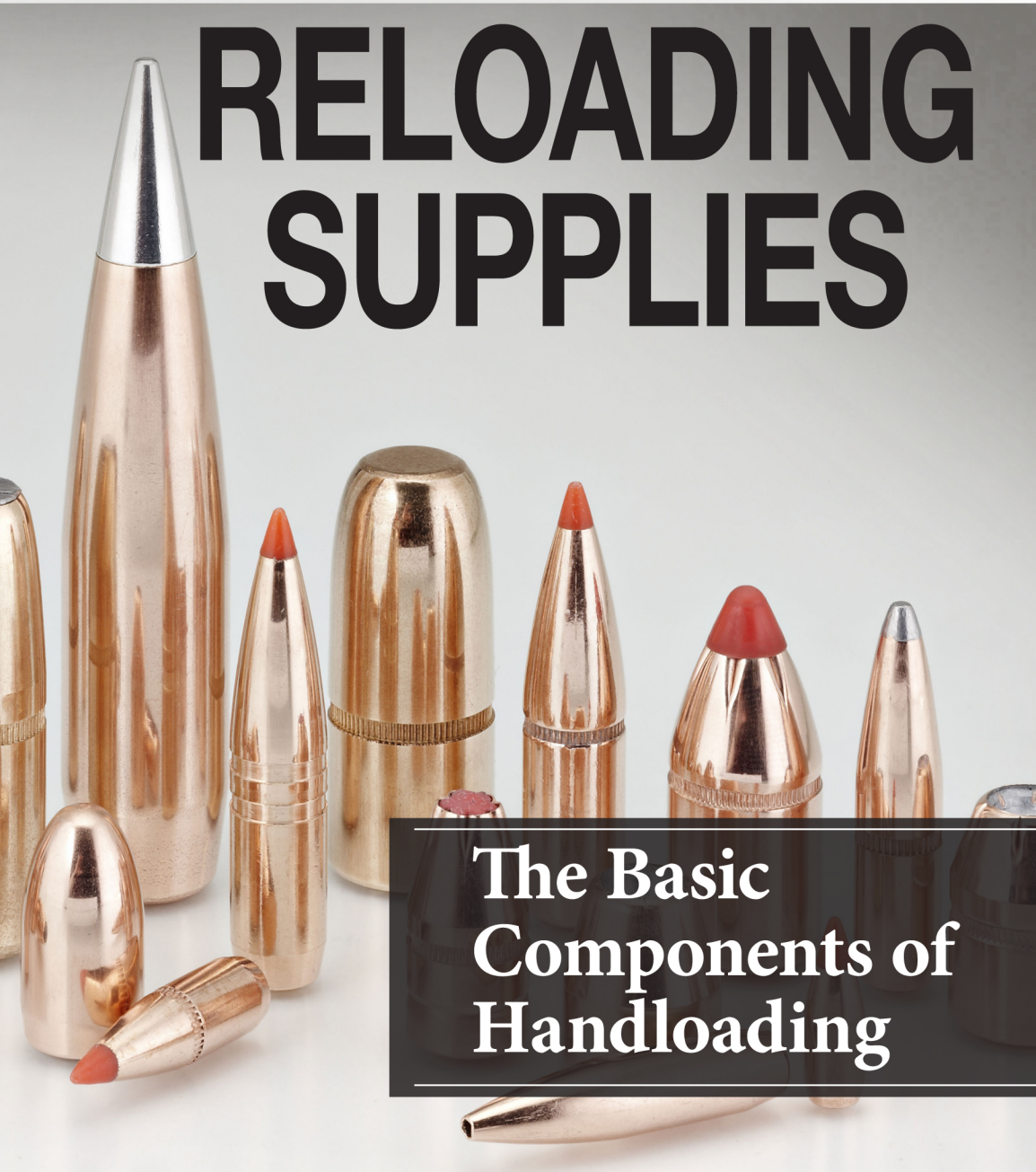
GunDigest

RELOADING SUPPLIES



The Basic Components of Handloading

Metallic Cartridge Components

There are four parts to the basic centerfire metallic cartridge case, whether handgun or rifle (rimfire cases are generally considered to be non-reloadable, as the reloading practices for such cartridges require advanced ballistics knowledge and component handling). The parts to a centerfire metallic cartridge case are the case (usually brass, but sometimes other materials), the primer, the powder, and the bullet. I'm going to walk you through each of these components in more detail in a bit, but before we jump right in, I think it's a good idea to take a step back and look at what goes on in a loaded cartridge when your gun's firing pin strikes the primer.

When we pull the trigger, a spring in your gun—this can be a flat spring, a "V" spring, or a coil spring, doesn't matter which, all you need to know for the purposes of this discussion is that the spring provides the energy needed to fire your loaded cartridge—powers a hammer or a striker to impact the rear of your gun's firing pin, whose sole purpose is to put a dent in the center of the primer, which is housed in the center of the base of your brass case. The dent, coming from the firing pin striking the metal side of the primer, creates the pressure needed to ignite the priming mixture. This creates a jet of flame that travels around the anvil and moves forward through a central "flash hole" at the bottom of the primer cup (contained inside the cartridge case head) and begins the process of igniting the powder charge.

Now let's look at what's happening at the other end, the bullet end. Here, the neck walls of the case and the crimp around the bullet (if one is present), hold the bullet in the case, allowing pressure to build from the primer and powder ignitions until a "start pressure" is attained. This is the amount of pressure necessary for the bullet to overcome the forces of the friction between the case neck walls (and possibly crimp) and the bullet they hold. Once this happens, the bullet begins its travel.

Start pressure is important in the firing process, as it sets the stage for all the pressure-related events to follow. Consistency of velocity of the bullet in flight after it leaves the barrel, as well as the minimization of the bullet's vertical dispersion downrange, all start with a consistent "bullet pull," or start pressure, if all other factors are equal.

The start pressure is the beginning of the "pressure curve." The pressure curve is actually two bumps in succession. The initial pressure curve is set up by the bullet pulling out of the case. As the bullet begins to move, pressure in the case behind it drops, as the volume of area within the case is increased by the bullet's forward motion. As the bullet moves through the forcing cone, or "lead," (pronounced "leed") in the barrel, pressure continues to drop. (Bullet seating depth is important at this stage, so that the pressure drop is not too great, and this is something I'll discuss later.)

Now the bullet impacts the rifling, which is smaller in diameter than the bullet. When the bullet reaches this stage in its travel, for the briefest of moments the bullet stops. This is the point that begins the second, major pressure curve, derived from a point predetermined by the first. At this time, the powder really begins to burn at a frantic rate.

Smokeless powders consume themselves at a rate based on the inherent heat and pressure *of the moment*. So let's look, in a slightly different manner, at what's going on when the bullet hits the lead. At that moment, the bullet has stopped and plugged the barrel. The powder now burns violently, creating the gasses and pressure necessary to push the bullet into the rifling, swaging that bullet with the lands and cutting the imprint of the rifling into the projectile as is passes down the barrel. This action is needed to spin the projectile on its axis, stabilizing it on its flight after it leaves the barrel.

The bullet now transits the length of the barrel and is expelled ahead of a large plume of the expanding gasses that once powered it. The bullet continues to make its way downrange, and we are left with an empty cartridge case.

Let's review and think about what was used, lost, and consumed during the process:

1. Primer—impacted, fired, and spent.
2. Primer Cup—remains in the cartridge case and must be removed during the initial stages of the reloading process.
3. Powder—consumed and turned to hot gas and energy to propel the bullet.
4. Bullet—sent downrange never to be seen again (and, if it were found,

it would be unusable again, due to rifling imprints and deformation resulting from the final impact).

With these facts in mind, now we can look at each of the four components in more detail.

CASES

Metallic cartridge cases for your reloading will generally come from previously fired rounds of factory ammunition (known as once-fired brass). The best of these will be the case you previously shot in your own distinct firearm. Every firearm is slightly different in manufacture, with tiny but important differences in chamber, lead, bore, and rifling dimensions, each of these dimensional differences has an impact on the case during firing and so each must be accounted for in the reloading process. Therefore, cases that you obtain that have first been fired in your own gun will, therefore, will be better tailored to reloads meant to function in that same firearm. But let's say you don't have once-fired brass from your gun. Let's say you've purchased a batch of brass in the correct caliber from an online resource. That's perfectly okay to do. Cartridge cases have a set of SAAMI—Sporting Arms and Ammunition Manufacturers' Institute; www.saami.org—specifications governing their dimensions, and these SAAMI specifications have a group of minimum/maximum tolerances to which manufacturers adhere. Manufacturers are free to work within these bounds. Of course, you'll have to consider those minor variations, when engaging in the reloading process.

If you are using "range brass," those pieces of brass in the caliber you want that you've picked up after a session on the range, or brass that has been fired in a firearm other than your own but of like caliber and given to you, inspection and sorting becomes a far more detailed process. With such brass—brass that is the same caliber but not originally fired from your own gun—you need to first be sure the cases are truly for the correct chambering! A .270 Winchester and a .280 Remington can look the same, at first glance. *Always* check the headstamp for caliber designation as a first (and final) act of safety.

Another source of brass commonly used by reloaders is once-fired military brass, but there is a catch. Military brass cases in calibers like 5.56x45mm and 7.62x51mm are not exactly the same as .223 Rem. and .308 Win. (respectively). Differences in operating pressures necessitate thicker case walls in the military brass, making the internal space in those cases smaller, i.e., they have a lower case volume. If you used the

The markings on the bottom of your metallic cartridge case are known as the "headstamp." They generally (emphasis on "generally") tell you the cartridge name and, occasionally, the manufacturer of the original cartridge.

same powder charge in a military case of, say, 5.56, for example, that you used in a commercial .223 Rem., the lower volume in the 5.56 case results in higher pressures. This doesn't mean you can't use once-fired military brass, but you should sort these into their own bin and adjust a reloading recipe accordingly and specifically for that brass only, for the sake of safety. Also, if you decide to use military brass, doing so generally requires that you start with lighter loads than you would with their non-military counterparts (5.56 vs. .223 brass, as an example), in order to minimize the chances of high pressure issues. Truly, though, when starting any new loading regime and new cases, you should always begin with the lightest load listed in the data manual.

As a side note, you should know that military brass cases generally have "crimped–in" primers. Crimped primers are somewhat more difficult to remove; a dedicated "decapping" die is a benefit here, as it can handle this extra task with ease. Too, after removing the primer from such military brass, the remaining crimp ring must be removed from the primer pocket before reloading; without this step, a new primer

This is the thing that holds the rest of your load together. Generally constructed of brass, metallic cartridge cases will sometimes be found made of other materials.

will become damaged in the seating process. I like decapping tools that swage the brass of the case itself back into position, rather than a tool that cuts away the crimp. Cutting out the crimped portion of the primer cup in the case head removes some case material and, therefore, "officially" changes the dimensions from the SAAMI spec. Tools that swage or push the crimp back into position do not *remove* material, rather they *displace* the material back into its original location, as they make the case head and primer pocket ready to receive the new primer. There will be more on primers and their types a little later on.

PRIMERS

Though reloaders often begin their reloading process with their bullet selection, the primer is really where it all begins in the reloading process. There are a number of different primer sizes, and there is variety in the strength of the flash, or energy, of both different sizes and makes of primers. One thing to keep in mind as we examine this topic is the French word *brisance*. This word is used to indicate the amount of flame generated by a specific primer and it's terminology you'll sometimes encounter as you continue your reloading education.

The primer is the component contained and held in the center of the base of the metallic cartridge case. It contains an explosive compound. When struck on its metal side by the firing pin in your gun, it will ignite the powder sitting in front of it within the case, building up pressure to send the bullet out of the case, down the barrel, and out to your target.

In general, you will encounter two *styles* of primers. The first primer type is the Berdan primer, named for its designer, Hiram Berdan. Berdan primers are sometimes found in surplus ammunition. This primer type has two flash holes through the case head in the base of the primer pocket, with a pronounced bump between them. This bump replaces the self-contained anvil in the Boxer primer, which I'll get to in a minute. In a Berdan primer, the priming compound is crushed and ignited between the cup and this protruding portion of the case.

In reloading American metallic cartridges, as well as most other modern cartridges, the primer used will be the "Boxer" primer, so named for its inventor, Edwin M. Boxer. These primers are best distinguished by the single, central flash-hole in the case head's primer pocket. They also have a self-contained anvil, which allows for the crushing and ignition of the priming compound. Boxer-primed cases are the reloadable cases we will discuss throughout this book.

Standard Boxer primer sizes are Small Pistol, Large Pistol, Small Rifle, and Large Rifle. You also will find magnum versions of these for specific cartridge and load applications. Each primer type is made specific to its intended purpose, with rifle primers having heavier metal

in their cups to withstand greater pressures. Magnum primers also have heavier cups, though to a different degree. *Never* substitute another primer type, size or brand for the specified one in the loading data manual, as this can create both a functional and a safety problem with the finished cartridge.

To determine the correct primer, you should consult the load data from your powder and/or bullet manufacturer's reloading book (more on that in the bullet section of this chapter). That data will list not only the size, but the brand of primer used in each and every load development and pressure testing. This is critical, as the same size primer from different manufacturers may have a different level of *brisance*. (And now we have used the cool word we learned in context. Consider yourself less of a novice!)

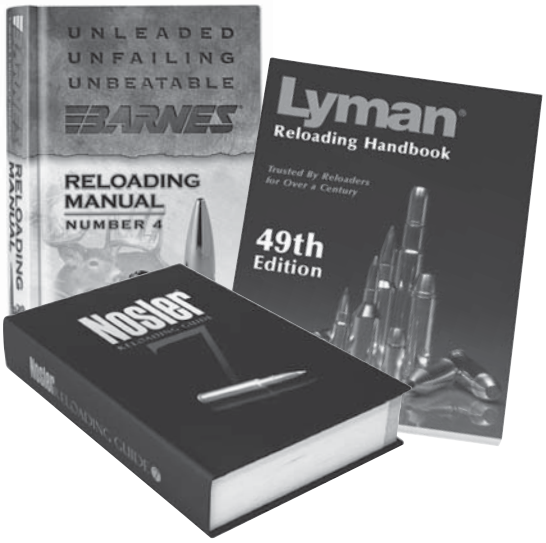
POWDERS

Modern smokeless powders burn at a predetermined rate based on their makeup and coatings. At their most basic, powders are generally found in two chemical forms, one based in cotton fiber, the other based in a cellulose or paper-like materials. In their simplest forms, your gunpowder is made by soaking one of these base materials in nitroglycerine and then shaping, forming, extruding, cutting it, etc., to produce the desired structure that will not only flow through the powder measure and into the cases you're reloading, but one that will also have an impact on the rate of burning (that burn rate is based on the surface area of the powder). Finally, a series of chemical coatings are employed that will also help control the rate at which the powder burns.

It's important to distinguish that today's modern smokeless powders do *not* explode! Properly and technically, they burn at a high rate. This burn creates immense volumes of gas that force the bullet forward from the case in which it's held and propel it down the barrel.

Now, an library of books on powder history, design, and manufacture could be created. There are, literally, hundreds, if not thousands, of powder "numbers" or names that have been sold for

There is an almost endless variety of smokeless gunpowders available to the reloader.



Reloading manuals are generally available from the big names in component manufacturing, like Barnes, Nosler and Sierra, but also are available from component and press makers, such as Lyman, as well as powder manufacturers. Pick just one to start and get to know your press before you start loading for everything under the sun.

reloading over the last century. For the sake of this discussion, we can keep things fairly simple.

The Internet has, in many ways, replaced the "basic" and free powder manuals of old, though most manufacturers do still produce these, as do many bullet manufacturers. I have found the Hodgdon Load Data Center at www.hodgdon.com to be a fast and easy resource for finding the correct powder for your reloading application. After entering the cartridge you wish to load into Hodgdon's search base, the system will generate a printable table of powders, primers, and specific loading data for the bullet/s you choose. The site is so functional and provides such worthwhile information that I added a long-range Wi-Fi link in my garage loading room, just to have access to this information. Hodgdon-branded, IMR, and Winchester powders are all listed on this system.

When I consider a powder, I look at the broader scope of cartridge applications. This helps to control costs and keep space considerations in check, for instance, if one powder will serve the loading needs for a number of cartridges I use.

BULLETS

Bullets for metallic cartridge reloading come in as dizzying an array of shapes and sizes as do powders, and in far more than the variety of rounds themselves, because nearly every cartridge is capable of firing more than one bullet weight and shape. So how do you choose? Where do you start?

You have to start with the basic bullet shapes. They are as follows, with abbreviations you'll likely see in reloading recipe data:

- Full Metal Jacket (FMJ)
- Round-Nose (RN)
- Jacketed Hollowpoint (JHP)
- Hollowpoint (HP)
- Wadcutter
- Semi-Wadcutter (SWC)
- Solid
- Boat-tail Hollowpoint (BTHP)
- Solid-Core
- Pointed Soft-Point (PSP)
- Jacketed Soft-Point (JSP)
- Ballistic Tip
- Semi-Point (SMP)
- Lead Round-Nose (LRN)

Sometimes you'll see some of this nomenclature used together. Thus, a boat-tail jacketed hollowpoint is expressed BTJHP. Now, again, these are the basics of bullet shapes and general design. Every bullet maker has its own propriety bullets beyond that, something that offers the reloader dozens of options for even a single caliber. For instance, in 9mm, Sierra offers six varieties, Hornady 14—that's 20 different toppers for your 9mm Browning Hi-Power, and that's just from two component makers! Add in Barnes, Winchester, Remington, and bullets from easily enough other makers to make you take off your mittens to count, and you can see how much variety you can experience with reloading.

But back to the question of how do you choose. First consider what it is you want to reload for? Are you punching holes in paper at 50 or a 100 yards, or do you need to knock over steel at 500 yards? Are you loading for self-defense or for taking down a big-game animal? Once you've narrowed the available field of bullet choices by purpose, the easiest way to choose from that group is to pick one reloading manual from one of those bullet makers (Barnes, Sierra, and Hornady manuals are terrifically composed), and study the recipes for the caliber you want to reload. In each of those books you'll see the powder and primer recommendation and other crucial information to make it all go together correctly; and, because the powder is matched to a particular load with a particular bullet weight and shape, this is where you'll make your powder and primer selections, too.

These books are *essential* to reloading, and they are something you will use, *must* use, every time you begin to reload. This is true whether you've reloaded your pet load 200 times or you're experimenting with a new load or caliber. The reason, of course, is safety. Reloading isn't like throwing together a grilled cheese sandwich, which you've made a thousand times and which doesn't require a cookbook. You're handling explosive and near-explosive components (primers and powder) that will do what they do in a container of metal (your gun), and over- or under-loading your round can produce catastrophic results—and I do not mean a bad group on your target.

If this is your very first time reloading, pick just one manual from one bullet maker. Pick one bullet and load you believe will work well in your gun for your intended shooting purpose, likely one comparable to the factory load you've been shooting, and experiment. Indeed, experimentation is a good deal of what reloading is about. Just be careful as you go. Work up one load at a time. Do not switch loads in the middle of a session. Separate your loads, label them accordingly, and keep records of how they performed in your gun. That's how you reload successfully and stay safe doing it.

SAFETY

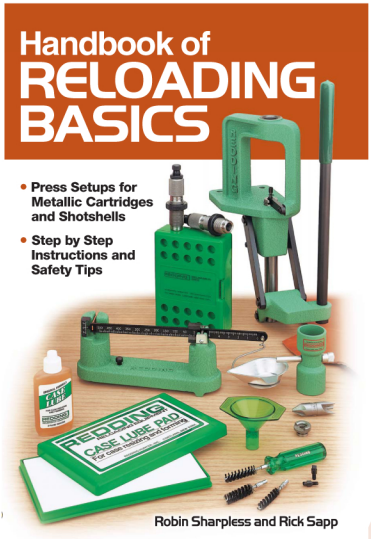
Safety is always the first consideration, when we are reloading any cartridge. Like all activities, there is some risk involved, but this risk can certainly be minimized, even nearly eliminated, with a good routine of safety practices.

Safety glasses should be worn during any reloading activity. The work area should be clean and well organized, so that handling accidents do not occur. Please take time to consider the movements required in the reloading process and then place the components you will handle—cases, bullets, powder, and primers—in convenient and easy to reach locations. Reaching across the workspace leads to spills and accidents.

There should be no food in the area. Depending on what you are loading, there can be trace amounts of residual lead. We do not want our food to be contaminated with lead, nor do we want our components contaminated with food residues. Always wash hands immediately following your reloading session to be sure you do not carry lead or any other substance to a food source.

There should be no smoking—at all, period. Powder and primers can be accidentally ignited, and while powder burns rather than explodes, it does burn very hot and very fast. Think of powder as you would any highly energetic flammable substance. Store it in its proper container and follow the directions supplied by the manufacturer at all times.

Your handloaded ammunition can look and perform every bit as well as fresh factory ammunition—and often even better!



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