6. Loading Cast Bullets

Keep in mind that cast bullets are more fragile than jacketed bullets. Use Lyman's "M" Die or Multi-Expand Powder Charge Die (for pistol calibers) in the appropriate caliber to flare each case mouth to prevent shaving away bullet metal. Lyman three-die rifle and pistol sets include this important expander die. If you have a two-die set of any brand, the Lyman "M" Die, which may be purchased separately, will expand the set's capabilities to producing excellent cast bullet handloads. See our annual catalog for detailed listings of all reloading dies, including the "M" Die and Multi-Expand Powder Charge Die.

Formula A

9 lbs. Wheelweights
1 lb. 50/50 bar solder

Makes 10 lbs #2 Alloy

Formula B

4 lbs linotype
1 lb 50/50 bar solder
5 lbs lead

Makes 10 lbs #2 Alloy

Composition and Hardness (BHN) of Useful Bullet Alloys

Alloy	Percent Lead	Tin	Antimony	BHN
Monotype	72	9	19	28
Stereotype	80	6	14	23
Linotype	86	3	11	22
Lyman No.2	90	5	5	15
Taracorp Magnum	92	2	6	15
1 to 1 Lead/Lino	92	2	6	15
Electrotype	94.5	3	2.5	12
10 to 1	91	9	—	11.5
16 to 1	94	6	—	11
20 to 1	95	5	—	10
30 to 1	97	3	—	9
Wheelweights	95.5	.5	4	9
40 to 1	97.5	2.5	—	8.5
Pure Lead	100	—	—	5

Printed in the U.S.A. 4/04 IBM - 2996032

Lyman®

Bullet Making Guide

Lyman Products Corporation
475 Smith Street, Middletown, CT 06457

Introduction

Today, many shooters believe that maximum velocity means maximum performance. These shooters, thinking only of jacketed bullets and the hottest possible loads, put together the same high intensity "package" for all shooting requirements. Actually, a round loaded with enough potency to crumple a charging grizzly is neither pleasant to shoot nor truly efficient for such applications as recreational or competitive target shooting. The bullet caster soon learns that over 90% of his shooting, for fun and for game, can be done more effectively and enjoyably at a lower velocity with cast bullets. A cast bullet is only 1/10 the cost of a jacketed one, and an entire lifetime of shooting cast bullets will not wear out the bore of a rifle or pistol.

This booklet covers the essential facts of making cast bullets. For a complete handbook on the subject, we recommend the Lyman Cast Bullet Handbook, 3rd Edition, available from your local Lyman dealer.

Lyman mould blocks-in single, double and four cavity sizes-are available in many different proven bullet designs. Each bullet design is identified by a six-digit number, such as #358429. For a listing of available Lyman, refer to the current annual Lyman catalog.

Detachable mould handles are available in two sizes to accommodate blocks of single, double, or four cavity size. A bullet caster may interchange the blocks on his handles as he wishes, provided he uses only that size block for which the handles are intended. It should be noted that all current single and double cavity moulds require the large mould handles.

Safety Precautions

1. No casting should be done without basic safety garb. This includes long pants, shirtsleeves, sturdy gloves, eye protection (such as goggles), and closed top shoes.
2. Keep all flammable items away from casting area. Do not operate unit on flammable materials such as paper, wood, or carpeting. Keep primers, loaded ammunition, and other shooting accessories away from casting area.
3. Casting should be done in a well-ventilated area. Avoid breathing fumes and dust from furnace.
4. Never allow moisture near molten lead. When moisture is introduced to molten lead, a terrific steam explosion occurs and molten metal sprays not only over the immediate area but also over the bullet caster. This moisture can be introduced by a wet ladle or dipper. ALSO: Never put a COLD dipper into a lead pot as it will act in the same manner as water. Warm it first.
5. Keep children away from casting and reloading areas.
6. Never pick up unit when heated.
7. Never drop poorly formed bullets or sprue cut-offs back into the molten lead in the pot. This can cause molten lead splashes, which can seriously burn the user or damage property. Always use caution when adding bullet metal to a furnace or pot containing molten metal.
8. Do not continue to cast if distracted.
9. Do not eat, drink or smoke while handling lead.
10. Do not run unit dry without lead, except during initial warmup period.
11. Keep the plug dry.
12. Always wash hands after handling lead. WASH YOUR HANDS WELL WHEN DONE. Lead is soft and will rub off on your fingers.
13. Be certain to place and use the melting pot where it cannot be tipped or knocked over. Never leave a unit unattended.
14. When finding lead to use in casting, never use lead from any kind of battery.
15. Keep bench area clean from sprue and droppings. Always clean casting area afterwards. Periodically damp-mop.

1. Bullet Moulds and Their Care

Your bullet mould is a piece of precision equipment which, with care and common sense, can easily last a lifetime. Before using a new mould, it must be cleaned with a suitable solvent, such as alcohol or an aerosol degreaser, to remove the protective film of oil. Never cast bullets with oil still in the mould as the oil will vaporize and leave an undesirable baked on residue.

After casting, clean your mould. Wipe off any splashes or smears of lead with a rough rag. If the lead splatters are difficult to remove, re-heat the mould blocks until the lead wipes off easily. Never use an abrasive material or scraping tool to remove lead from the mould. When your mould is clean, allow it to cool, then re-oil it with rust preventative oil. This oil must be removed each time before casting.

Alternatively, store your cool, clean mould in an air-tight container with a bag of desiccant crystals or a piece of VCI paper. Moulds preserved in this fashion do not require cleaning before their next use. Whichever preservative system you choose, store the mould in a dry place of relatively constant temperature. **Note:** Leaving the last bullet in the mould cavities offers little, if any, protection.

From time to time, check the sprue cutter plate. This plate should swing freely, without vertical play. IF too tight, air cannot escape, and the base of the bullet will not fill out properly. If too loose, the sprue will extend beyond the base of the bullet. A bit of graphite or Motor mica, sprinkled between plate and block, will greatly reduce friction.

2. Lead Alloys and Gas Checks

Pure lead is suitable only for muzzle loading conical and roundball projectiles or shotgun slugs, not for centerfire rifle and pistol bullets. In the latter application, it is too soft to adequately resist the thrust against the rifling and will rub off, streaking the bore with lead deposits. To harden pure lead into a better bullet material, tin must be added.

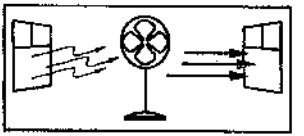
Tin and lead mix well when melted, and a good bullet alloy should always contain tin to enhance castability. The presence of antimony in the alloy, especially for gas check bullets in rifles, has an advantage. It hardens the alloy, making the bullet less liable to gas-cutting and more capable of withstanding higher velocities. Because antimony shrinks less when it cools, bullets of antimony alloy will cast a little larger than softer alloys.

The gas check is a shallow gilded metal cup which must be pressed onto the base of a cast bullet. The purpose of this cup is to protect the bullet base from the burning effect of hot powder gases. Gas check bullets, since they can be driven at higher velocities than plain base bullets, will give flatter trajectories and greater energy. Even with a gas check, however, the lead alloy bullet cannot be driven as fast as some jacketed bullets or it may lose accuracy and lead the bore.

A careful study of the **Lyman Cast Bullet Handbook, 3rd Edition**, will give you recommended loads and velocities for gas check bullets. This data can also be found in the **Reloading Handbook, 48th Edition**, and the **Pistol and Revolver Handbook, 2 Edition. Note:** Gas checks can only be used on bullets which are specifically designed for them. For complete product information, write for your free catalog.

WARNING: Melting lead and casting lead objects will expose you and others in the area to lead, which is known to cause birth defects, other reproductive harm and cancer.

REDUCING EXPOSURE: Lead contamination in the air, in dust, and on your skin is invisible. Keep children and pregnant women away during use and until cleanup is complete.
Risk can be reduced - but not eliminated - with strong ventilation; washing hands immediately after use of these products before eating or smoking; and careful cleaning of surfaces and floors with disposable wipes, after lead dust has had a chance to settle. Use a lead specific cleaner with EDTA, or hand soaps specifically designed to remove heavy metals.



USE STRONG VENTILATION!

3. Mixing Your Own #2 Bullet Alloy

Over the years, Lyman has used several different lead alloy materials as standards for bullet-making. These alloys varied in their composition and were identified as #2 Alloy, #4 Alloy, and #6 Alloy. Today, only the hardest of these alloys, #2 Alloy, is recommended for all centerfire rifle and pistol loads. For muzzle loading bullets and shotgun slugs, use only pure lead. Making #2 Alloy is reasonably easy. A mixture that compares very favorable may be made by melting down a few commonly available components. Some of these materials may contain small traces of other metals, but from a practical standpoint they may be considered "pure".

Finding Alloy Components:

Wheelweights are available at many gas stations or automotive tire and service centers.

Bar Solder (50/50 lead-tin) is available from plumbing and hardware stores.

Linotype may be obtained from a local printer, although this material is becoming increasingly scarce and expensive.

Pure Lead may be found at junk yards, or purchased from a local plumber.

4. Bullet Casting

A. Necessary Equipment:

- **Bullet Mould**
- **Mould Handles**
- **Bullet Metal** – Made from appropriate lead alloy. *See section on lead alloys.*
- **Lead Pot or Electric Furnace**
- **Fluxing Material** – Tallow, beeswax. Lyman Ideal bullet lubricant or Marvelux may be used.
- **Lead Dipper** – For pouring and stirring metal.
- **Hardwood Casting Mallet** –For opening and closing the mould sprue cut-off plate.
- **Small Cardboard Box** – To receive sprue, scrap, or rejected bullets from your mould.
- **Cloth Pad** – Any old cloth made with natural fiber material which may be used as a pad to soften the fall of the hot bullets as they drop from the mould. Must not be synthetic since hot bullets may melt it.
- **Protective Clothing** – Includes glasses, gloves and apron for protection against spatters. Shirts should be long-sleeved, trousers full-length, and shoes close-topped. No slippers or sandals.

B. Preparing Metal (Melting & Fluxing)

If using a lead pot, place it securely on a gas or electric stove and put a quantity of bullet metal into the pot. Add metal as needed to raise the level in the pot close to full. Set the lead dipper in the pot to preheat it. If you are using a Lyman Electric Furnace, plug in the furnace and turn the thermostatic control to the three-quarter mark on the scale. Place a quantity of bullet metal into the furnace. After it melts add alloy as needed to raise the pot level from about half to three-quarters full. Adjust furnace temperature as necessary. In about twenty or thirty minutes, when it becomes liquefied and flows freely, the bullet metal will be ready for fluxing. For fluxing, allow adequate ventilation.

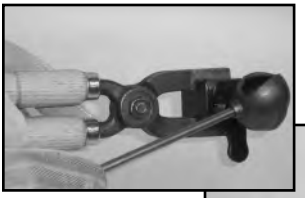


Figure 1

Figure 2

To flux the metal, merely drop in a small bit of tallow, beeswax, bullet lubricant or Marvelux. A smoky gas will rise from the pot. To eliminate this gas, light it with a match (Marvelux does not need to be ignited.) Stir the mixture with the dipper. Metal which has been properly fluxed will have a mirror-bright surface flecked with a small quantity of black or brown impurities. Skim off these small flecks of foreign matter.

Flux the metal whenever it seems to need it.

C. Casting Bullets

Note: All pictures are for demonstration only. Always wear safety glasses or goggles while casting bullets.

When the metal has been fluxed and is hot enough to

Figure 3

Figure 4

pour easily through the dipper, it is ready for casting. Fill the dipper with metal and place the spout of the dipper against the pouring hole in the mould with the mould turned on its side as shown in **Figure 1**. Holding the mould and dipper together, slowly turn them into a vertical position, with the dipper on top of the mould as shown in **Figure 2**. If you are using a Lyman Electric Furnace with the bottom-pour feature, the mould is held about 1/4" below the spout. Be generous with the metal and let extra run onto the mould's sprue cutter plate. This extra metal is called sprue. When it hardens, which takes only seconds, pick up the casting mallet and tap the sprue cutter plate sharply as shown in **Figure 3**. This will separate the sprue from the base of the bullet. Drop the sprue from the base of the bullet into scrap box. With the mould held close to your cloth pad, open the block and let the bullet fall to the pad. If the bullet does not drop readily, use the mallet to rap the handle hinge pivot sharply as shown in **Figure 4**. use only wood (or similar non-marring material) for this purpose. Never strike the mould blocks themselves. Your first bullets will be somewhat flawed because the mould is cool. Casting bullets, one after the other, will bring your mould to the correct temperature. Wrinkled bullets indicate that the mould, or metal, is too cool. Frosted bullets indicate the mould, or metal, is too hot. Good bullets should be clean, sharp, and fill the mould. They need not be bright because their color will depend largely on the mixture of the alloy being used. Antimony alloys are duller in color than those of pure lead. Imperfect bullets should be collected and, along with the sprue and other scrap, returned to the pot. Never dip your cool mould into molten bullet metal because the rapid temperature change may cause permanent block warpage.

5. Lubricating and Sizing

A. Necessary Equipment

• **Bullets** — You have cast these already.
• **Gas Checks** — If your bullet design requires them.
• **Lyman Bullet Lubricant** — Either Orange Magic, Ideal, or Alox/beeswax.
• **Lyman #4500 Lubricator & Sizer** — With correct top punch and sizing die for sizing your style and caliber bullet.
• **Lyman Gas Check Seater** — Now delivered with our #4500 Lubricator/Sizer. Also available separately, and fits old #450's and the RCBS Lube-A-Matic.
• **Lyman Lube/Sizer Heater** — Was designed for today's high temperature lubes. It heats the 450 Lube/Sizer to the right temperature, allowing smooth, effortless bullet lubrication. Not needed if the 4500 with built-in heater is used.

Before your newly-cast bullets can be loaded into cartridges, two further operations are necessary. These are:

1. Lubricating: Casting bullets are designed with lubricating grooves around their circumference. These grooves must be filled with a suitable lubricant to prevent barrel leading and maximize accuracy. Lyman Alox Bullet Lubricant is generally recommended for this purpose.

2. Sizing: Lyman bullet moulds are designed to cast bullets slightly oversize, compared to a given jacketed bullet diameter, in order to properly fit the sometimes wide range of factory barrel dimensions in the same caliber. This larger diameter ensures the cast bullet has sufficient diameter so that it may be sized down to the various specific requirements of the shooter. Since the as-cast bullet's diameter and weight relate to the metal alloy used, Lyman centerfire bullets have been designed with #2 Alloy as standard. With a different bullet metal, there will be minor variations in weight, length and diameter. Passing bullets through a bullet sizing die gives them their finished sized diameters.

B. Choosing a Bullet Sizing Die

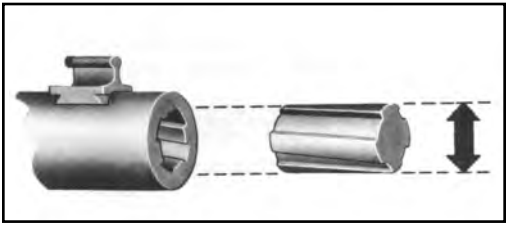


Figure 5

The correct sized diameter for your cast bullet depends upon the groove diameter of your gun. The exact sized diameter is a determination that only you can make. Experienced shooters usually prefer bullets sized above exact groove diameter.

Figure 5 shows how to determine the groove diameter of your gun. Carefully drive a SOFT lead slug through the lightly lubricated bore. The slug should be large enough so the some excess lead is shaved off as it enters the muzzle. Insert a cleaning rod into the breech and carefully tap the slug back out of the barrel. With a micrometer, measure the diameter of this slug at its WIDEST POINT. This is the groove diameter of your firearm at the smallest part of the rifling. Using a sizing die up to a couple of thou-

sandths of an inch larger than the slug will be best. The Lyman #4500 Lube/Sizer sizes bullets to a uniform diameter. It also forces lubricant, under pressure, into bullet grooves and seats gas checks when required-all in one simple operation.

Figure 6

Place the gas check, if one is required, in the center of the sizing die, as shown in **Figure 6**. The bullet is placed, base down, on top of the gas check. If a gas check is not being used, place the bullet, base down, in the center of the sizing die. Align the point of the bullet so that it centers itself in the top punch and pull the handle down firmly. Hold the handle down firmly while turning the ratchet handle slightly to force the lubricant into the bullet grooves. See **Figure 7**.

When you raise the handle, the bullet will be ejected, completely sized, lubricated, and ready for loading. However, if the gas check will not fully seat on the bullet using only finger pressure, the Lyman Gas Check Seater should be employed for best result. To install, raise the #4500's push rod until its top bears against the bottom of the sizing die. Then slip the Gas Check Seater around the threaded push-rod adjusting screw so that the push rod is held at the base of the sizing die. Next, a gas check is set, cup-side up, in the center of the sizing die and a bullet guided into it as you pull down on the operating handle. Use only enough force to fully seat the gas check. After all the gas checks have been installed, remove the Seater and size and lubricate normally. Use of the Gas Check Seater ensures the squarest possible bullet base regardless of the type of gas checks used. A good square bullet base translates into improved accuracy.

Figure 7