The Los Angeles Silhouette Club

Cast Bullet Notes Page

NEW! From Ingot to Target: A Cast Bullet Guide for Handgunners NEW!

Life (and bullet casting alloys) Just Got Easier
Alloying With Roto Metals Super Hard
Alloy any antimony (Sb) percentage that you need
< Includes Lead/Antimony/Tin (Pb/Sb/Sn) Recipes >

See Also These Hand loader's References


SAECO # 264 6.5mm 140 Gr.

Cast Bullet Articles Of Glen E. Fryxell
Cast Bullet Alloy / Alloy Maintenance
Heat Treating Lead Alloys
Gas Check Shank Sizes
Hodgdon Powder Burn Rate Chart
Ballistic Formulas & Notes
Boxer Primer Reference Chart
RCBS Shell Holder Reference
Maximum Chamber Pressure - SAAMI Recommendations


Lyman # 225438
22 Caliber 44 Gr. RNGC

THE WORLD'S TOP CAST BULLET CHAT FORUM
CLICK IMAGE FOR LINK

CASTPICS
The source for cast bullet information

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Where Are We?
(Map)

Hollow Point Bullet Mold Service
HOLLOW POINTS - ALTERATIONS - REPAIRS
Have a mould you wish was a hollow point design?
Have a HP design & wish you had a different pin design?
Have a gas check design that you wish was plain base?
Driving bands enlarged to cast a larger diameter bullet.
Specializing in Cramer style Hollow point conversions.

Contact Erik Ohlen @ Hollow Point Bullet Mold Service: M-F 6:30 pm - 8:30 pm and Saturdays 9:00 am - 8:30 pm, Pacific Time: (541) 738-2479 erik@hollowpointmold.com
Hollow Point Bullet Mold Service

High Praise for Erik Ohlen's Craftsmanship

I have a handful of moulds that Erik has converted to make hollow-point or cup-point cast bullets. In every case, the workmanship is first-rate, and the moulds cast beautifully. The HP pins are perfectly centered, they release the bullets very easily, and casting with them is fast and productive. He uses a very clever 2-part collar/pin design that allows the caster to switch (or in some cases adjust) the HP pins to vary the expansion properties of the resulting cast bullet. Several of these moulds are 2-cavity moulds that have had one cavity converted to drop HP bullets. This allows the caster to make both the solid and HP version from the same mould (at the same time, if so desired). Erik offers this service for both rifle and pistol moulds -- I've had him make both types for me, and have been very pleased with the results. Not only does Erik offer to convert moulds to make "traditional" HP's (using a pin held in place with a keeper/collar, along the lines of the classic H&G HP moulds), but he is also the only service that I am aware of that works with the Cramer system of making HP moulds (which uses 2 transverse pins going through one of the mould blocks to keep the HP pin with the blocks). He has repaired an old Cramer HP mould for me, and I can testify, without any reservations, that the quality of his repair work is significantly higher than the original factory HP pin. Casting with the repaired Cramer mould is pure joy (the Cramer design allows for a much faster casting cadence than traditional HP moulds), and the bullets it produces are beautiful. I will gladly work with Erik again (and in fact he and I are working on some experimental ideas right now....).
Merry Christmas everybody!
Glen E. Fryxell
Dec. 25, 2008

Cast Bullet Notes

List of many common bullet lube ingredients including their uses, sources and possible benefits and/or detriments.
For an industry description of common lead alloys use this link - Then Click on "Grades of Lead"
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Commonly Used Bullet Alloys

Alloy	"Average" Composition	Alloy	"Average" Composition
WHEEL WEIGHTS, CLIP-ON	1/2-1% tin, 2-3% antimony, 96-7.25% lead, 1/4% arsenic	FOUNDRY TYPE	15% tin, 23% antimony, 62% lead
WHEEL WEIGHTS, STICK-ON	Pure lead or nearly so	SCRAP RANGE LEAD	Could be (AND IS) anything
LINOTYPE	4% tin, 12% antimony, 84% lead	PLUMBERS LEAD	99%+ pure lead.
MONOTYPE	9% tin, 19% antimony, 72% lead	LYMAN'S No. 2	5% tin, 5% antimony, 90% lead

Common Bullet Metal Melting Temperatures

Metal	Melting Temp.	Notes:
Lead (Pb)	621 degrees	Weight, ductility, obturation.
Tin (Sn)	429 degrees	Reduces surface tension of lead alloy melt up to 750°, better mould fill-out. Reduces the melting temperature of lead. "Slight" hardening & strengthening effect.
Antimony (Sb)	1,166 degrees	Hardens lead alloys, extremely brittle.

Linotype	464 degrees solid 465 degrees liquid	Casts very well with it's 4% Sn and 12% Sb, No expansion on game, poor choice for steel targets. Poor choice for light and mid-range loads.
Foundry Type	619 degrees	Extremely brittle. NO expansion on game, shatters on steel targets.
WW (clip-on)	463 degrees slushy to 505 degrees molten	Contains enough arsenic/antimony to enable hardening by heat treating. Heat treating WW alloy with 2% tin added increases hardness / strength without adding brittleness as in high Sb linotype metal.

Testing Cast Bullet BHN Tester's

Lyman Devastator HP 202 Gr. 45 caliber fired into 3 feet of water at 800 fps - 11 BHN

The 2008 Cast Bullet BHN Tester Experiment (The Results)

42 different testers using a total of 47 different testing tools. 13 were Cabine Tree, 8 were LBT, 12 were Lee and 9 were SAECO'S. Plus 4 other brands of testers included.

SAECO # 068 200 gr. 45 Caliber SWCBB 5 BHN fired at 800 fps into 3 feet of water and hit the bottom of the plastic drum

See how these cast bullet BHN testers compare with the same alloy lab tested for BHN? How does the people doing the testing and reading the results effect the "usefulness" of the different testers? Is there any consistency with these testers and which brands faired best - worst? Are they a viable tool for working up accuracy loads? CB BHN Tester Experiment

Common Bullet Alloy Hardness

Alloy	BHN	Approximate "Maximum" Chamber Pressure For Lead Alloys (PSI)	
Lead	5	PLUMBERS LEAD, STICK ON WW	13,000 - (Black Powder Only)
WW (stick on)	6	WHEEL WEIGHTS / CLIP-ON	25,000 - Non- Magnum handgun loads, Rifles to 1,900 fps
Tin	7	LYMAN # 2 (alloy varies in LYMAN cast bullet books)	35,000 - Magnum handgun & rifles to 2,000 fps
1 to 40 tin lead	8	QUENCH-CAST WW (DROPPED FROM MOULD INTO COOL WATER)	48,000 - Magnum handgun & rifles to 2,200 fps 55,000 - Jacketed velocities in handguns and rifles with quality bore & balanced load.
1 to 30 tin lead	9		
1 to 20 tin lead	10	Bullet BHN / "Minimum" Chamber Pressure For Lead Alloys (PSI)	
1 to 10 tin lead	11	The formula (from the pages of Handloader Magazine) to determine at what pressure an alloy of given BHN will obturate the base of the bullet and seal the bore. If the bullet is too hard to obturate, gas cutting usually occurs on the base band on the non-driving side of the rifling and barrel leading is likely. Simply multiply the alloy BHN by 1,422. Example: Alloy BHN of 12 multiplied by 1422 = 17,064. An alloy of 12 BHN should be used with a load that develops a "minimum" of 17,000 psi. Need more info on minimum / maximum alloy BHN? These Glen E. Fryxell articles explain alloy BHN in easy to understand language. Example: Alloy BHN of 12 multiplied by 1422 = 17,064. An alloy of 12 BHN should be used with a load that develops a "minimum" of 17,000 psi. Need more info on minimum / maximum alloy	
WW (clip on)	12		
Lead Shot*	13		
Lyman # 2	15		
Water quenched WW	18		
Linotype	22		
Monotype	27		
Oven heat treated WW	30		
Antimony	50		

*Tip: Lead shot has .5 to 1.0% arsenic (As) (depending on the manufacturer) and can be used as a hardening agent when heat treating lead/antimony alloys. $^{1}/4$ of 1% arsenic is all it takes. Adding any more than this adds nothing & will not further harden the alloy. Additional hardening can be achieved by heat

treating when arsenic is present to approximately 30 to 32 BHN.

SAECO Lead Hardness Tester Conversion To BHN

Certified Alloys	SAECO	Brinell
Pure Lead	0 - 1	6
20 - 1	6 - 7	10
Hardball	8 - 9	16
Linotype	9 - 10	18 - 20

38 Special and 358477 HP; loaded round

What does bullet lube do?

In summary, bullet lube is pumped from the lube groove to the barrel surface by compression, linear acceleration and radial acceleration. In addition, lube is injected forward during the firing process, as the result of high-pressure gas leakage into the lube groove. This injection process forms a floating fluid gasket around the bullet, and serves to limit gas cutting and is a kind of ballistic stop-leak. Read the entire article

Comments on Cast Bullet Alloys

A very common misconception is that leading is caused by the bullet being too soft. Historically, tin was used to harden bullet alloys. Today tin is used to lower the surface tension of the molten alloy and allows it to fill out the mould more completely. Antimony hardens lead alloys much more effectively than does tin, in addition, antimony allows the alloy to be hardened via heat treatment, something the chemistry of tin doesn't allow (and arsenic is even better for heat treating than is antimony). Read the entire article

Cast Hollow Points - The Next Generation

It can be argued that the hollow point bullet is one of the most important advances in the development of modern handgun ammunition. Elmer Keith recognized this early on, and around 1930 incorporated hollow points into his pet CB SWC designs (Lyman 358439, Lyman 429421 HP and Lyman 454424 HP). His detailed reports of their accuracy, expansion and deadly performance on small and medium game highlighted the shooting literature for decades. Read the entire article.

Alloy shrinkage of cast bullets

Type Metal	Tin	Antimony	Lead	Hardness	Linear, %
Linotype	4	12	84	18	.65
Monotype	9	19	72	26	.65
Lead	--	--	100	5	1.13
Tin	100	--	--	7	.90
Antimony	--	100	--	50	.47

As an example: the solidification of a nominally .357" diameter bullet cast of Linotype could be expected from the above table to be .0065 X .357" = .0025". In a soft alloy of lead and tin, .01 X .357" = .0035".

Shrinkage - Bullet Diameter, Inches

Alloy	.308	.357	.452
Linotype	.002	.0025	.003
Lyman # 2	.0025	.0025	.0035
Soft Lead	.0035	.004	.005

From the above two tables it can be seen that the softer the alloy and the larger the diameter of the bullet that more shrinkage will occur.

Bullet alloy as-cast & final dia. sized (.308 sizing die)

	Lead	Wheel Weights	Lyman #2	Linotype
As-cast dia.	.309"	.3095"	.310"	.3104"
Sized dia.	.3078"	.3079"	.3084"	.3084"

Bullet alloy contaminants, chemical symbol and sources

Element	Chemical Symbol	Possible Sources
Antimony*	Sb	Wheel weights, batteries, Cable sheathing, Type Metals
Tin*	Sn	Batteries, Wheel Weights, Type metals, Solder
Arsenic*	As	Wheel weights, Lead shot
Iron	Fe	Used type metals
Bismuth	Bi	Cable sheathing
Calcium	Ca	Batteries
Cadmium	Cd	Batteries
Copper	Cu	Batteries
Strontium	Sr	Batteries

*Antimony, tin and arsenic are not contaminants but listed to show their source. Battery lead should be avoided because of the extremely high toxicity of elements such as Strontium. All of the other elements listed in addition to being toxic, cast very poorly, ruin a pot of alloy they are blended with and should be avoided.

Tip: An additional use of the "stick-on" wheel weights. Cast a few bullets for the firearm that you wish to slug the bore of. Clean the bore and then run a clean lightly oiled patch through the bore. At a BHN of 6, stick-on wheel weight bullets make a great bore slug. Use solvent to remove the oil from the bore. Always separate and save stick on weights when processing wheel weights. Add up to 2% tin when casting bore slugs from stick-on wheel weights to aid in mould fill out.

Available Hornady Crimp On Gas Checks By Caliber

22 Caliber	338 Caliber
243 Caliber	348 Caliber
25 Caliber	35 Caliber
264 Caliber	375 Caliber
270 Caliber	416 Caliber
7mm	44 Caliber
30 Caliber	45 Caliber
32 Caliber	475 Caliber

Tip: The size and weight of bullets of a given alloy will vary according to casting temperature. Higher temperatures will result in greater shrinkage as the bullet cools and produce a *slightly* smaller and *slightly* lighter bullet than one cast of the same alloy at a lower temperature.

Heat Treating Tips
From Handloader Magazine

Tin has the effect of reducing maximum hardness from heat treating as its ratio to other metals increases. Wheel-weights, one to two percent tin, can be heat-treated to a harder level than Lyman No. 2 with its five percent tin content. Linotype, 84/12/4 (lead-antimony-tin) has the lowest hardening potential when compared to other alloys commonly used to produce cast bullets. Webmaster Addendum: In this reference from Handloader on the effects of tin in heat treating linotype and Lyman #2 alloys. Linotype and Lyman #2 alloy's have the lowest hardening potential of common bullet alloys because of the higher tin content (4% & 5%) and lack of arsenic.

The essential metals for heat treating are lead, antimony and arsenic. Tin is optional; although it may aid in an effort to cast more perfect bullets and contribute to ductility. To obtain maximum hardness, a minimum of one to two percent antimony is required in addition to a trace of arsenic. Arsenic is the catalyst. Heat-treating cannot work without it, regardless of the amount of antimony or other trace elements present. Webmaster Addendum: The above quote on arsenic from Handloader "appears" to be in error and should read: "*Arsenic is the catalyst to a greatly enhanced ability to heat treat. 4% antimony has a much better hardening/time curve than 2% alloy and a Pb/Sb alloy will HT w/o As*."

Webmaster Addendum: In the above two references from Handloader the conditions of the testing is not known but I cannot help but wonder if both conclusions were drawn from heat treating non-arsenical

alloys. It appears that non-arsenical alloys such as linotype and Lyman #2 alloys can be heat treated because of their antimony content. Adding a trace (^{1}/4 of 1% to ^{1}/2%) of arsenic in the alloy dramatically increases the hardness that can be achieved by heat treating. The percentage of antimony effects the hardening/time curve. 2% antimony will take longer to achieve final hardness than 4% or 6% antimony alloy but it is the Sb that enables heat treating, not the As.

Available Lyman Slip On Gas Checks By Caliber		
22 Caliber	270 Caliber	35 Caliber
243 Caliber	7mm	375 Caliber
25 Caliber	30 Caliber	41 Caliber
264 Caliber	32 Caliber	44 Caliber
270 Caliber	35 Caliber	45 Caliber
264 Caliber	375 Caliber	

Tip: Wheel weights (.5% tin, ^{1}/4% arsenic, 2-3% antimony, 96-7% lead) will produce bullets having the smallest diameter and heaviest weight of the common bullet alloy's, With such bullets running approximately 3/10 of 1% smaller in diameter and 3% heavier than bullets cast with Lyman # 2 metal. Linotype will produce bullets with the largest diameter and lightest weights of the common alloy's. Linotype alloy will produce bullets approximately 1/10 of 1% larger and 3% lighter than Lyman # 2.

Expected (Approximate) alloy weight variation from bullets cast of linotype

RCBS 44 Cal. 240 Gr. Silhouette

Bullet Weight Linotype - No GC	Bullet Weight 1 - 10 Alloy - No GC	Bullet Weight Wheel Weight - No GC	Bullet Weight Pure Lead - No GC
53.0 gr.	+ 2.3 gr.	+ 2.6 gr.	+ 4.7 gr.
93.0 gr.	+ 4.0 gr.	+ 4.6 gr.	+ 8.3 gr.
118 gr.	+ 5.0 gr.	+ 5.8 gr.	+ 10.5 gr.
147.0 gr.	+ 6.3 gr.	+ 7.2 gr.	+ 13.1 gr.
165.0 gr.	+ 7.0 gr.	+ 8.1 gr.	+ 14.7 gr.
177.0 gr.	+ 7.5 gr.	+ 8.7 gr.	+ 15.8 gr.
237.0 gr.	+ 10.1 gr.	+ 11.7 gr.	+ 21.2 gr.
401.0 gr.	+ 17.1 gr.	+ 19.8 gr.	+ 35.8 gr.

Alloy Recipes

Linotype - 5 pounds

Wheel weights - 5 pounds

Tin	Antimony	Lead
2.25%	8%	89.75%

1% tin can be added

Linotype - 2 pounds

Wheel weights - 5 pounds - 3% Tin

Tin	Antimony	Lead
4.5%	6.3%	89.2%

Nearly Lyman # 2 BHN.

Clip-on wheel weights - 20 pounds

Tin - 6.4 Ounces (2%) (or 9.6 Ounce 3%)

Tin	Antimony	Arsenic	Lead
2 ^{1}/4%	4%	^{1}/4%	93 ^{1}/2%

Oven heat treats to 30 - 34 BHN

Linotype - 3 pounds

Wheel weights - 9 pounds

Tin	Antimony	Lead
1.4%	6%	92.7%

Add 2% tin. Close to Lyman # 2 alloy

Monotype - 2 pounds

Wheel weights - 4 pounds / lead - 3 pounds

Tin	Antimony	Lead
2.2%	6%	91.8%

Add 1% tin. Good Magnum handgun alloy

Stick-on wheel weights 15 pounds - Lino 5 pounds

Lead Shot - 4 ounces / Tin - 9.6 ounces

Tin	Antimony	Arsenic	Lead
3%	1%	^{1}/4%	95 ^{3}/4%

Possible to quench or oven heat treat

Linotype - 4 pounds

Wheel weights - 6 pounds

Tin	Antimony	Lead
2%	7.5%	90.5%

1-2% tin can be added

Monotype - 3 pounds

Wheel weights - 4 pounds / lead - 3 pounds

Tin	Antimony	Lead
3%	7.2%	89.8%

Medium hard alloy. Magnum handgun & rifles to 2,000 fps

Wheel Weights - 9 pounds

50/50 bar solder - 1 pound

Tin	Antimony	Lead
5%	3%	92%

Close to Lyman # 2 Alloy

Clip-on Wheel weights - 10 pounds Stick-on Wheel Weights - 4 pounds		
Tin	Antimony	Lead
.35%	2.2%	97.65%
Trace of Arsenic - About 7 BHN		

Clip-on Wheel weights - 9 pounds Linotype - 2 pounds / Virgin bar tin - 7 ounces		
Tin	Antimony	Lead
4.9%	4.45%	90.65%
Lyman # 2 Alloy duplicate		

Clip-on Wheel weights - 10 pounds Stick-on Wheel Weights - 4 pounds / Tin - 4 ounces		
Tin	Antimony	Lead
2.1%	2.1%	95.8%
Trace of Arsenic - About 7-8 BHN		

Article on cast bullet alloys: Cast Bullet Alloy / Alloy Maintenance
Article on Roto Metals Super Hard w/recipes

Cast Bullet Alloy Sources

ROTOMETALS, INC.

Your Source for Super Hard
Non-Ferrous Metals and Custom Alloys
Call toll free 1-800-779-1102 or visit us online. $99.00+ qualifies for free shipping within the U.S.

The Antimony Man
Tin, lead, antimony, equipment and alloys of lead/tin for BPCR and Schuetzen shooting, Linotype, "Hardcast" handgun alloy and special order alloys.

Bullet Molds - Custom and Standard
MP-Molds
In a review of MP-Molds Glen E. Fryxell made the following statement, to realize what a powerful statement this is consider that Glen owns over 450 molds.
< The mould he sent me is, quite simply, the most beautiful mould I have ever had the pleasure of casting with >

Mountain Molds
You design your own bullet mold using our online design program. Aluminum, brass, or iron mold blocks.
Review of Mountain Molds by Glen E. Fryxell

Tip: The cast HP is one of the best hunting bullets available. Their expansion properties can be tuned to one's wants and needs. The best way to cast high-quality HP's is to cast hot, cast fast, and don't inspect your bullets while you're casting (inspect after you're done). A hot HP pin is a happy HP pin; you will *never* get high-quality HP's from a cold HP pin. - Glen E. Fryxell



Tip: The RCBS cast iron melting pot makes a great ingot mold. Filled half full these handy cakes weigh 5 pounds with flat tops and bottoms making for stable stacking & storage. NOTE: Filled full the pot will make 10 pound ingots but they WILL NOT fit into the RCBS 22 pound lead pot for re-melting.

Cast Bullet Seating Depth

Cast bullets could suffer more from a longer free-bore jump than their jacketed counterparts. Seating the bullet to engrave the rifling in rifles and single shot pistols often improves cast bullet groups (not so long as to wedge the bullet into the rifling, you don't want the bullet pulled from the case when opening the action). Remember that the OAL of the loaded round must function in your action type. Because cast bullets are softer than jacketed, zero free-bore should not increase chamber pressures by any significant amount. Revolver bullets should be seated so the front driving band is started in the throat when the cylinder is loaded whenever possible. Revolver bullets should be sized to a mild snug fit in the throats. All the throats in the cylinder should hold a sized bullet and be able to be pushed through with mild pressure from a pencil.

Gas Checks

There are two types of gas checks available to bullet casters. They are the Lyman straight walled slip on checks and the Hornady crimp on checks. Which type of check you decide to use is probably a mute point but with both, gas check fit is critical to accuracy. The check must fit flat against and square to the base of the bullet. All gas checks vary in thickness, hardness and dimensions from lot to lot according to normal manufacturing tolerances. Lyman checks average .015" thick. Hornady checks average thickness is.020" and both can vary by .0005" to .0015 including the side thickness of the cup. A common misconception is that gas checks prevent the heat of the burning powder from melting the base of the bullet. This is extremely doubtful as lead absorbs heat slowly and the millisecond the bullet is exposed to this heat could not melt off any lead

Tip: PVC pipe cutters from your local home improvement center cuts bar tin very easily & cleanly. A postal scale will weigh your metals for accurately blending your favorite alloy for repeatability from lot to lot.

Tip: When heat treating lead / arsenic alloy's, the colder the water the faster your bullets will harden. A block of ice in the water to chill it while the bullets are in the oven will bring your bullets to full hardness in 24 - 28 hours. Room temperature water will take 48 to 72 hours to fully harden the alloy. (Addendum: It appears this is not the case with convection ovens but does seems to hold true for conventional cook ovens, see: Heat Treating Lead)

Tip: Bullets in an oven pre-heated to 450 degrees for one hour will heat treat wheel weights (Lead - arsenic - antimony alloy) to approximately 18 BHN. One hour at 475 degrees will harden the alloy to approximately 22 BHN. With the oven just barely below the melting point the alloy Will harden to 30+ BHN. Ovens and thermometers vary as do all alloys, experiment to achieve your desired results.

Tip: Accurate note keeping is as or more important in bullet casting as in handloading.

Tip: Magnum shot is a good source for antimony (4%) and arsenic (1.5-1.75%) for improving the age hardening/time curve in heat treating.

RCBS Cast *Rifle* Bullet Ballistic Coefficients

Bullet	B.C.	Bullet	B.C.
22-055 FN	.159	30-180 FN	.255
243-095	.258	35-200 FN	.243
257-120	.272	357-180 SILH	.210
270-150	.327	375-200 FN	.220
7MM-145 SILH.	.272	44-200 FN	.130
7MM-168 SP	.306	429-240 SILH	.186
30-115 SP	.175	45-300 FN	.207
30-150 FN	.220	45-405 FN	.303
308-165 SILH.	.286	45-500 FN	.365
30-180 SP	.293		

Convection oven for heat treating w/ 3 stacked trays & thermometer.

Aluminum Spaghetti pans with holes enlarged for better water flow. Each pan holds nearly 300 35 caliber bullets.

WARNING:

Warning:
Exposure to Lead is Known to Cause Birth Defects, Other Reproductive Harm & Cancer.
And is especially harmful to children

Warning:
Exposure to Lead is Known to Cause Birth Defects, Other Reproductive Harm & Cancer.
And is especially harmful to children

Handloading and bullet casting are safe hobbies but common sense must be used.
lead, antimony and arsenic are toxic. handling these metals / alloys can be dangerous and are considerably more so when heated to melting temperatures

<< NEVER USE BATTERY LEAD - IT IS EXTREMELY TOXIC TO YOU AND OTHERS AROUND YOU >>

<< Lead is considerably more toxic to young children - Keep children well away from casting areas >>

USE ALL APPROPRIATE CAUTIONS PUBLISHED IN CURRENT UP TO DATE LOADING MANUALS !!

All technical data mentioned, especially handloading and bullet casting, reflect the limited experience of individuals using specific tools, products, equipment and components under specific conditions and circumstances not necessarily reported on this web site and over which The Los Angeles Silhouette Club (LASC), this web site or the author's have no control. The above has no control over the condition of your firearms / equipment or your methods, components, tools, techniques or circumstances and disclaims all and any responsibility for any person using any data mentioned.

ALWAYS
consult recognized reloading manuals
and follow all instructions
for safely handling lead alloys

Cast Bullet Articles of Glen E. Fryxell LASC Front Page Additional Handloaders References