

Solving "Clogged Bleed Holes" Issues in Core Swages

Core swage dies (CSW-1-S or CSW-1-H) or the similar Lead Semi-Wadcutter (LSWC-1) dies have one or more small bleed holes around their circumference, which allow surplus lead to "bleed" off the core to adjust it to a precise weight and volume. Sometimes the bleed holes will appear to be "clogged" and fail to extrude any lead. There are four typical issues:

1. Core length too short.

The internal punch, which fits into the threaded end of the die, has a "head" that rests on a "shoulder" in the press ram when the ram is raised. This establishes where the other end of the punch will come to rest during the swage stroke. The length of the punch head determines the amount of space left in the die for lead cores.

If a punch is made for the "normal" range of weights, and you begin using an extremely light core, the external punch now will reach so far into the die that it blocks the bleed holes. The solution is to get an internal punch with a longer head, to raise the short core closer to the die mouth. A PUNCH-SE punch head extender collar is available for -S type punches, to add to the length of the punch head, which accomplishes the same thing.

2. Too little surplus lead being extruded.

If you are using a cut or cast core that is too close to the finished weight, each stroke will leave a very short piece of lead in the bleed hole without pushing lead out. Eventually these tiny bits of lead can wedge against each other in the bleed hole and create more friction than usual, blocking the holes.

Avoid this by using at least 5-10 grains more lead in the unadjusted rough cores, so that a solid string of lead is extruded. That will make the extrusions long enough to avoid wedging in the hole. Lead extrusions can be used to make fragmenting bullets or melted to make cores.

3. Grit or debris from "range lead" blocking the hole.

Rock, dust, and grit left in the cast cores can get into the bleed holes and block them. The solution is to make sure that range lead has all the contamination, dust, and grit removed. Most of the contamination floats to the top of molten lead. The lead from a bottom-draw pot usually has less contamination. Longer fluxing and skimming pays off in longer die life, also, since fine rock dust is abrasive to the die cavity surfaces as well as being a cause of bleed hole blockage. Also, keep stored lead cores covered and dust free, for the same reason. You can boil them in hot water with detergent, then rinse in hot water and allow them to dry from their own heat, if you suspect they are dusty.

4. Use of lead that is too hard.

The pressure required to flow lead so it fills out a die at room temperature goes up with the square of the hardness. Going from soft lead at Bhn 5 to harder lead at Bhn 10 quadruples (4 x) the pressure! If soft lead flows well at about 5,000 psi, doubling the hardness means it now will take 20,000 psi to get the same results.

The bleed holes in a core swage (or a LSWC-1 lead semi-wadcutter die) are calculated for soft lead flow pressures. The size of hole allows the pressure to build high enough to fill out the shape of the bullet for typical designs, and then to flow out the bleed holes to adjust weight.

If harder lead is used, the pressure may build to dangerous levels compared to the die strength prior to any bleed taking place. Sometimes the operator believes the holes are "clogged" when in fact the lead is simply too hard to flow at normal pressure. Using more pressure may break the die. The solution is to use softer lead, or to obtain a die custom built to handle harder lead (up to a practical limit). Larger bleed holes for hard lead usually do not work well with soft lead.

Note: It is not a problem for a die having multiple bleed holes to bleed lead exclusively from just one hole. Tiny differences in hole position allow lead to flow through the path of least resistance. The other holes are "safety backups", and do not need to simultaneously bleed lead for accurate weight adjustment. They are not necessarily "clogged" if one hole is handling the extrusion.

Saving Your Core Swage or LSWC-1 Die

If the bleed holes in your die appear to be "blocked" or "clogged", do NOT try to "save" the die by doing any of these things (you will destroy the die or render it unrepairable):

1. Do not try to "drill out" the bleed holes.

The bleed holes are made like a venturi, with two orifice sizes. The one you can see on the outside of the die is the relief hole size, not the actual extrusion orifice size. If you put a drill bit into this hole and attempt to "drill out" whatever is filling it, the drill will stick and break off in the hole. At that point the die may be less expensive to replace than to save.

2. Do not try to "melt out" the lead.

The dies are hardened and tempered high-carbide content die steel. They have been carefully heat treated in electronically controlled digital furnaces. Applying enough heat to melt lead may destroy the temper of the die, causing accelerated wear, swelling under swaging pressure, allowing surface galling, as well as converting any lubricant and contamination into a permanent contamination of the diamond lapped surface finish and causing potential chemical reactions between them and the finely finished die interior. It is NOT a solution, because the die is NOT a casting mold. Molds are designed to be heated. Swage dies are not.

3. Do not try to "dissolve out" the lead.

Chemicals such as lead solvents, mercury, ammonia compounds, etc., which have been used to remove leading from gun barrels are not a good idea for bullet swaging dies. In the first place, the amount of lead in a barrel is a thin film compared to the solid mass in a swage die, and the process will take far longer and expose the die too long to the reactions of the chemicals.

Second, the die is much more precisely finished than most gun bores, and is made of different material. The micro-inch diamond lapped die surface is far more sensitive to chemical reactions and has different alloying components, which may be destroyed by the chemical exposure.

Third, there are other materials such as swaging lubricant present in the swage die. Unexpected chemical reactions may take place, which produce byproducts dangerous to the precise finish of the die surface. And it usually does not work anyway.

In most cases, if the bleed holes are actually clogged and not simply failing to extrude for other reasons, it is far better to return the die and let the die makers handle it. In some cases, using higher pressure (to a careful limit) will push the material out. In others, it may be possible to drill out the hole but the die makers have special fixtures and know the proper orifice size, speed and feed rate to avoid breaking off the tiny drill bit. They also have special single straight flute drills for die work, rather than standard twist bits. And finally, they can determine whether it is more economical to try to save the die or to replace it, and won't destroy a die that could have been saved with the proper technique.