BROWNELLS® HI-FORCE 44™ SOLDER

READ & FOLLOW THESE

INSTRUCTIONS

BROWNELLS®
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World's Largest Supplier of
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Brownells Hi Force 44™ Solder is without a doubt, the most useful and versatile solder available to the gunsmith. This solder is a composition of 4% silver and 96% tin with a tensile strength of up to 25,000 psi, yet it flows at the relatively low temperature of only 475° F. It does not require the tremendous heat of "hard" or "silver" solders, often 1000° F. or more, that can ruin bluing and destroy heat-treating. Yet, like most high temperature solders, it is impervious to normal caustic bluing salts. In short, Hi-Force 44 provides the gunsmith with the best of both worlds!

In soldering, the metal surface of the workpiece actually fuses or alloys with the solder. This intermetallic mixture is physically different than either the solder or the metal of the workpieces and normally has a much greater strength than the solder alone. Hi-Force 44 is suitable for use with carbon steel, most stainless steel alloys, brass and copper.

⚠ IMPORTANT SAFETY NOTE ⚠

Because of the high temperature involved in soldering, it is mandatory that you ALWAYS wear protective gloves, safety glasses or full face shield, a heavy duty shop apron, and a long-sleeved shirt. All soldering must be done in a well ventilated area where fumes from any fluxes, solders or combustible material can be dispersed. Always make sure that your workpieces are properly secured in an appropriate vise or holding fixture.

When working with soldering or welding equipment, ensure that your work area is free from all combustible material and that you have an appropriately rated fire extinguisher readily accessible. Be very careful and exercise extreme caution to avoid personal injury or property damage.

HOW TO USE

When soldering, cleanliness is of the greatest importance. All grease, oil and dirt must be cleaned from the surface of the workpiece where soldering is to be done. Make certain the fumes from any solvents used to clean the parts have dispersed BEFORE lighting your torch! ANY material or substance that inhibits the contact and fusing of the solder with the metal of the workpiece MUST be removed. This includes rust, scale, bluing, paint, etc. The surface of the workpiece must be cleaned down to the bare metal. When the metal of the workpiece is exposed to the atmosphere, the process of oxidation begins IMMEDIATELY! Even if you cannot see the oxidation, it *is* there. One of the major functions of a flux is to remove this layer of oxidized metal so the solder can bond with the surface of the workpiece.

When applying heat, either from a propane or oxyacetylene torch, direct the heat ONTO THE WORKPIECE. DO NOT HEAT THE SOLDER! If heat is applied to the solder, the solder will melt, but it will not adhere to the workpiece.

The solder should be melted by the transference of heat from the workpiece. Heat the workpieces and let them melt the solder. If the workpieces are overheated the solder will melt, but it will "bead" and will not adhere. You must control the temperature of the workpieces to within a few degrees of the melting point of the solder, 475° F. If it is too high, the solder will bead up and run off the workpiece; if too low, the solder will not melt. There is no substitute for practice soldering to develop a "feel" for proper heat application. With experience, it becomes easier to judge how much heat should be applied for the best result.

"Mass" also complicates the heating process. Larger workpieces require more heat or a longer time to come up to the proper temperature than do smaller pieces. If two workpieces of different sizes are to be soldered together, the smaller piece will normally require less heating than the larger piece in order to have them achieve the same temperature level simultaneously. Again, practice and experience are required to master the "art" of soldering.

USING ORIGINAL, NON-FLUXED HI-FORCE 44 SOLDER

After cleaning the area of the workpiece to be soldered, heat it to the appropriate temperature and apply the flux to the workpiece. For Hi-Force 44 Solder, we strongly recommend our No. 4 Comet Flux for optimum results. Be very careful with the flux and use sparingly; it will remove bluing! A cotton tipped swab is excellent for applying small, controlled amounts of flux.

When two pieces are to be joined, it is often best to "tin" each of the pieces. "Tinning" is a procedure where a thin coat of solder is applied to the workpieces where they will join. The procedure is simple; first clean, heat and flux the bottom surface of the first part and apply a very thin coat of solder to the joining surface. Remove any excess solder while it is still molten with a clean, cotton patch or felt cloth.

Follow the same procedure on the joining surface of the second part. After both have cooled to where they can be handled, position them as needed for final assembly and clamp together. Apply heat carefully to BOTH parts so both come up to the desired soldering temperature, 475° F., simultaneously. At this point the solder will flow and cool; the two parts will be firmly joined. It is often helpful to use a small amount of flux between the two tinned parts when bringing them up to temperature.

To help "pull" solder to the edge of the seam and give the joint a more finished appearance, apply just a drop of so of flux with a small, pointed, me-tal rod to the seam, or joint, between the two parts just after the solder melts.

Hi-Force 44 **Ribbon** is extremely useful in joining sight ramps to barrels; it eliminates the need to tin the parts. Cut a length of Ribbon about ⅛" to ⅜" shorter than the length of ramp to the soldered, taking into account any screw holes in the ramp or barrel. Remove all bluing, Parkerizing or oxidation from both parts as you would if you were using Hi-Force 55 wire. Apply No. 4 Comet Flux to both parts with a cotton tipped swab. Be careful between the ramp and barrel, and clamp them together using a spring-loaded, Brownells Ramp Soldering Jig. Apply heat carefully to BOTH the ramp and barrel with most of the heat going onto the barrel (the most massive part).

USING FLUXED HI-FORCE 44 SOLDER

Tin the individual parts by heating them to the melting point of Hi-Force 44 and holding the end of the wire against the part. Move the solder around to help the flux flow out of the wire as the wire is melting. When you have a "blob" about the size of a wooden match head on the part, quickly use a cotton tipped swab to move it and its flux around to cover the area being tinned. Leave a uniform, thin layer of solder on the surface. Allow the parts to cool and clamp together into their assembled relationship. Re-heat both parts to the melting point of the solder (about 475° F.) and touch the end of the solder wire to the joint, allowing a little extra solder and flux to flow into the joint. After the joint has cooled, wash with hot soapy water, rinse with clear water, dry and oil.

Any two parts to be joined should be fitted as closely as possible. The tighter or closer the fit, the stronger the solder bond. If the radius on the bottom of a sight ramp, for example, is too small for the barrel, there will be a gap in the center of the bottom of the ramp. Take the time necessary to carefully and precisely fit the ramp to the barrel for as perfect a fit as possible. Failure to do so will lead to a solder joint that has less than maximum strength.

After the solder has hardened, do not attempt to speed up the cooling of the parts by quenching in water or other liquid. Always allow the parts to air cool. If a quench is used, you may cause the solder to crystallize, which will weaken the solder joint.

Hi-Force 44 is an excellent solder for use with stainless steel. However, the heat necessary to cause the solder to flow **may** cause the silicone present in the stainless steel to come to the surface of the steel. This silicone may prevent the solder from adhering.

NOTES ON DETAILING OUT THE FINISHED SOLDER JOB

Hi-Force 44 will not color well with either silver solder black or soft solder black chemicals. Fitting the joint as tightly as possible will leave the smallest line of solder showing. Any excess solder may be scraped, filed or sanded off. Be sure you are down to bare steel before using any touch-up blue or bluing the parts. By being very careful when laying out the job, tinning and soldering, you will have little or no excess solder to clean up, and touching up or bluing will not be necessary.

Many soldering fluxes, if not washed completely off of the parts after the job is finished, will draw moisture and cause rust. Carefully follow the flux manufacturer's instructions regarding cleanup and oiling after the job is finished.

If you have any questions about the use of this or any other Brownells product, do not hesitate to call, or write, for technical assistance.