



Soldering Brazing Welding

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Introducing our new range of rods for welding, brazing and soldering, especially designed to be compatible with our electroplating kits

Aluminum, pot metal, steel, cast iron, stainless, brass and copper
We have a system to suit them all

Soldering

Rod melts below 842°F. That temperature is defined to be 842°F/450°C by the American Welding Society (AWS) but is often rounded to 840°F. If the filler metal melts below 840°F, the process being performed is soldering. Metals that can be soldered include gold, silver, copper, brass, and iron and pot metal. The filler, called solder, melts. The base metal does not melt.

Brazing

Rod melts above 842°F. If the filler metal melts above 840°F the process being performed is Brazing. Metals that can be brazed include gold, silver, copper, brass, and iron and pot metal. The filler, called braze, melts. The base metal does not melt.

Welding

The welding process is completely different from soldering and brazing because both base metals and rod being joined are melted. The temperatures needed to weld various metals are listed here.

Melting Points of Various Metals

Metal	Fahrenheit (f)	Celsius (c)
Aluminum	1218	659
Brass	1700	927
Bronze	1675	913
Cast Iron	2200	1204
Copper	1981	1083
Gold	1945	1063
Lead	327	163

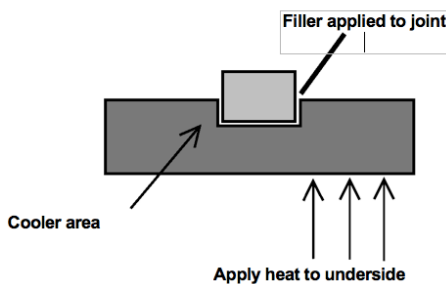
Magnesium	1204	651
Nickel	2646	1452
Pot Metal	787*	419*
Silver	1761	951
Steel	2500	1371
Tungsten	6150	3399
Wrought Iron	2700	1482
Zinc	787	419

*Note Pot Metal in this list.

Pot metal has no specific melting point because the product contents vary with each batch. However, it is safe to say that as the main ingredient is zinc, we should use the Zinc temperature of 787°F/419°C as the guide. Therefore, all Pot Metal will be soldered.

Soldering & Brazing Techniques

Brazing uses filler rods that melt above 840 deg F. The metals being repaired or joined melt at much higher temperatures, so brazing does not affect them. In the case of pot metal, which melts at approximately 650 deg F, brazing would be impossible, because the heat required to melt the rod would melt the pot metal, and therefore ruin the part. Any repair to pot metal would be considered as 'soldering' and it would use a low temperature solder rod.



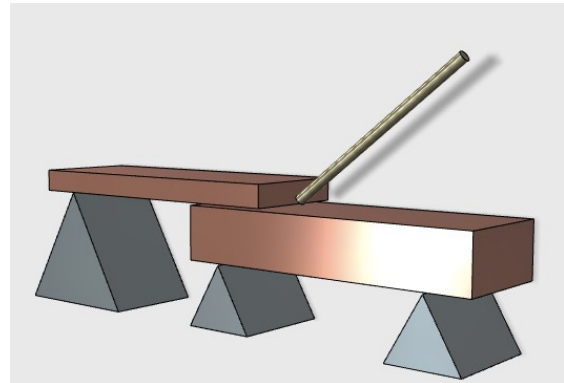
The brazing process functions by having the rod material become very fluid and flow into close fitting joints by capillary action. The parts being joined are heated, the filler rod is placed on the joint, and the heat from the parts melts the rod, sucking the liquid metal into the joint. If the rod is placed further away from the joint, there is a danger that the liquid material will just flow over the surface of the parts and not flow into the joint.

The six steps to brazing.

1. **Fit and Clearance.** The strongest joints are when the clearance gap between parts is approx. .0015" (.038mm). A narrower gap means the liquid filler rod won't adequately run into the joint and may leave gaps. Clearances for 0.001 - 0.005" will still give a tensile strength of 100,000psi. A slip fit will provide the perfect gap for most applications. Metal to metal contact is adequate. As an example, a brass object going into steel hole will give adequate clearance, but when heated to braze temperature, the gap will close completely, preventing filler flow. Because brass expands more than steel, the reverse is applicable. The gap will widen, not shrink. A milled finish will allow better flow than a highly-polished finish.

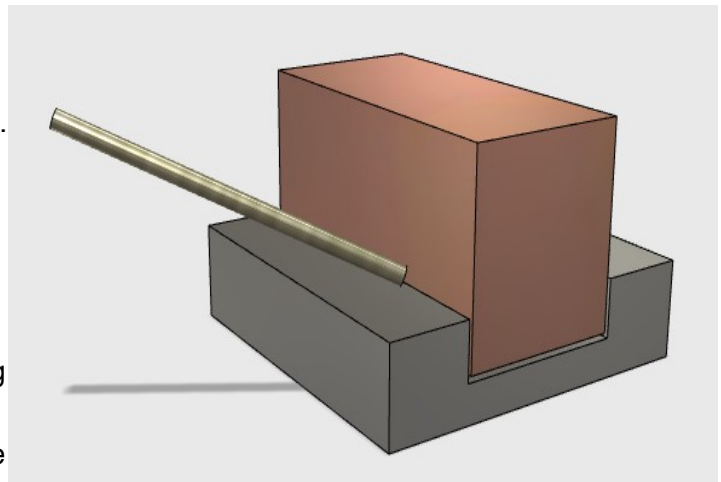
2. **Cleaning.** It should be common sense that a dirty surface will cause problems, so always carry out degreasing, paint and dirt removal, corrosion removal and rough up the surface to increase filler flow. Sand blasting is ideal, but not always practical, so use emery paper or a small grinder.

3. **Flux.** The flux is there to improve flow and prevent oxides forming when the heat is applied. It is NOT a cleaner. Some CASWELD products have the flux included in the rods, others are liquids or powders. Flux the part and commence brazing as soon as possible. It is better to use plenty of flux, so don't skimp on this. As a general rule, if the flux becomes completely clear, this shows the part is at the right temperature.



4. **Assembly.** The parts to be joined need to be placed together in such a manner that they are unlikely to move during brazing. Some angle iron can give a thin edge which will reduce heat being transferred to it. Bricks can raise the parts to allow the heat source to get underneath the are being brazed, as this will assist the capillary action of the molten filler rod. Rounded corners of the parts can also assist in the capillary action.

5. **Brazing the parts.** Always heat the biggest part first. Sometimes the residual heat from doing this is sufficient to heat the smaller or thinner part. Try to heat them uniformly. Keep the torch moving at all times. Do not heat the braze area directly. The best indicator is the flux. It should change appearance uniformly. Hold the braze rod against the joint area, and a piece should fall off and be sucked into the joint by capillary action. To improve flow, add more flux by brushing or dipping the rod into the flux. Heat the part on the opposite side of the joint if possible as the molten metal will be drawn towards the hotter area. The rule here is, the hotter the molten metal, the more fluid it is, so the more it flows into the joint. Imagine pouring water into a joint compared to honey. The water will run straight through, the honey won't.



6. **Cleaning the joint.** The easiest way to clean off flux is to quench the hot joint in warm or hot water, as the flux is water soluble. Ensure the joint has cooled sufficiently so the filler has solidified. A dilute bath of 25% Muriatic acid added to water will also clean off stubborn flux.



CASWELD™ SS

Stainless, steel, copper, brass and bronze, and cast iron

CASWELD SS™ is a true brazing rod with a melt point of 1145°F. It is your best solution for the repair of parts requiring good mechanical strength beyond soldering. It will join ferrous and non-ferrous metals including stainless, steel, copper, brass and bronze, and cast iron. It is a silver based rod and provides an excellent color match for stainless.



CASWELD™ PM

Repair and restoration of Pot Metal, Stainless Steel, Steel, Copper, Brass.

CASWELD™ PM with its low temperature melt of 440°F, is your best solution for the repair of most mixes of Pot Metal. Because this temperature is way below the 780°F melt point of Pot Metal, there is little chance of damage to precious parts. Unlike welding, where the rod and the subject need to be the same temperature, **CASWELD PM** uses soldering sources of heat like a propane torch.

CASWELD™ PM uses a metal filled flux to prepare and assist in 'wetting out' the rod. After cleaning, heat the area, then brush a thin layer onto the area being filled or joined, continue heating until the flux metal wets out, then apply the **CASWELD PM** rod. Do not heat the rod. If there is extensive pitting, it is advisable to plate with Flash Copper before carrying out this

repair. This will ensure all areas are protected.

CASWELD™ PM can be plated over with our Flash Copper system.



CASWELD™ AL

Repair and restoration of Aluminum and its alloys

CASWELD™ AL with its low temperature melt of 710°F, is your best solution for the repair of all grades of aluminum and most aluminum alloys. Because this temperature is way below the 1200°F melt point of Aluminum, there is no chance of damage to precious parts. Unlike welding, where the rod and the subject need to be the same temperature, **CASWELD AL** uses soldering sources of heat like a propane torch or for larger items, an oxyacetylene torch.

CASWELD™ AL is a specially designed rod. To apply the flux, heat the rod and dip it in the flux, which prevents oxides forming, makes metal flow better, reduces fumes, improves joint strength and makes easier cleanup.

CASWELD™ AL can be anodized.

Purchase Casweld™ Products at caswellplating.com/casweld or call 855-CASWELL

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