

How to Splice Kanthal Heating Element Wire

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Budget Casting Supply¹ sells heavy duty heating element wire able to generate and survive 2300°F. This is great for melting metal but does not lend itself to splicing if it breaks. If you own a TIG welder, then you should be able to reflow the Kanthal. Otherwise, what do you do?

The answer turns out to be rather simple – use a MAPP gas torch, brazing flux, and the power of the furnace being repaired.

The Problem

Due to my own stupidity, I ran my electric furnace at maximum power while it was empty. The result was that the heating element got too hot and thinned in at least one place and later snapped. I've learned my lesson there. That does not mean I give up and install a new element right away. I want to mend the damaged element.

My First Attempt at Splicing

This wire is extremely brittle after it has run in the furnace for even one cycle. Any attempt at bending it causes the wire to snap off. I wanted to form each end into a hook and then use a stainless steel 10-32 screw, washer, and nut to perform the splice.

The solution was to heat the wire until it glowed with my MAPP gas

¹http://www.budgetcastingsupply.com/Heating_Elements_Controllers.php (tested 02/25/2008)

torch. At the same time I used a needle nose pliers to form the hooks. A second pair of hands would be good about now. Wearing safety glasses is essential.

The bolting arrangement did work but was too bulky to fit back down into the slot that holds the element.

My Second Attempt at Splicing

I searched the web for a way to splice heating elements and found a promising lead. The author said to form the ends of the wire into hooks which are then loosely placed together so they just gently touch. The joint is then coated with wet borax². The borax is a flux which will keep air out as the metal flows together.

You then apply power to the element. The electrical connection at the joint is poor so more voltage is dropped across it than any other place along the element. It heats up enough to melt the borax and then melt the wires. Remove power and let the element cool. Then carefully crush the flux residue. Elegant!

Sadly, it did not work. My guess is that this author's heating element was nichrome which melts at a lower temperature than Kanthal. I could see the borax bubble and then melt but the metal did not flow.

A better Way

The idea still had a lot of merit but needed just a bit more heat. This is where the MAPP gas torch came in.

²The person suggests using powdered borax hand soap.



Here you see the ends of my heating element lifted out of their slot. Hooks have been formed in the end.



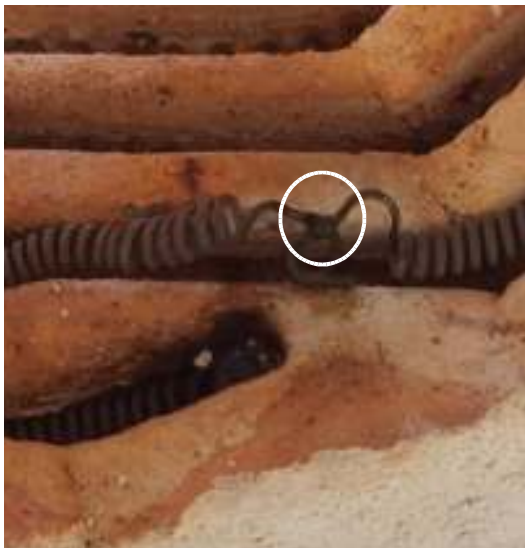
I used Brazing Flux because it was at hand. Note the mixture of flux and water in the little black cap. Water was added until I had a paste. The water will boil off early in the splicing process so it only used to hold the flux in place until heat can start to melt the flux.



I've just slathered some of the paste onto the hooked ends. Some attempt was made to align the ends so if this worked, I would be able to stuff the element back into its slot.

I then applied full power to the element while focusing my MAPP gas flame on the splice. Don't get too close because that wire is electrically hot. Safety glasses on!

In just a few seconds the wire turned cherry red and then I could see a ball of metal form. The torch was then removed and power cut. After a few minutes I took my needle nose pliers and crushed the flux from the wire.



This is not the best picture but hopefully you can see the thickened area where the two ends were hooked inside the white circle. The splice was strong enough to push down into the element's slot.

I have no illusions about this repair. There may be many other thin spots in the element that will break on my next foundry day. But for now, it seems to be holding.

When I do replace this element, I will have to join two 120V elements together in series to get my 240V element. I plan to use this technique. Hopefully that will be the only time I need this procedure in the future.

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