

Troubleshooting The Cold Weld Process

Jim Norton, President of Custom Products & Services, Inc.

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Preparing the Tube for Cold Welding

Regardless of the tube material selected for the cold weld application, proper tube preparation is a critical step in the process. The tube's interior must be totally free of any contamination at the pinch-off point. Sonic or mechanical cleaning methods are much preferred over chemical cleaning prior to pump down, as that produces the most consistent cold welded joints. The exterior must also be polished to remove any oxidation, as these oxide crystals will be harder than the tubing and may compromise the cold welded joint.



The tools available for producing a tubulation pinch-off are equipped with a set of precision carbide rollers that compress the tubing to produce the cold welded joint. Prior to performing the pinch-off, these rollers should be lubricated with a light weight oil to reduce friction during the compression stage. Between each pinch-off cycle, residual metal from the tubing will often remain on the carbide rollers and this

During the pinch-off process, constant and even pressure must be applied to the tube until it severs suddenly. All tubing will work-harden during the tube compression stage, so any interruption in that cycle will likely yield incomplete or unsatisfactory tube separation. contamination should be removed by lightly wiping

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the carbide rollers with a soft towel wetted with a light weight machine oil so the surface is clean and ready for the next pinch-off cycle.

Trouble-shooting a Bad Pinch-off

Problem:

Tool compresses the tubing, but the tube will not separate.

Suggested procedure:

1. Increase jaw closure force on the tool (pump), but do not exceed maximum safe levels as recommended by the tool manufacturer.
2. The tubing may be too hard. If the tool is at the maximum safe pressure setting and the tubing still fails to separate, the specifications of the tubing should be reviewed. Materials such as Copper can actually get harder just sitting on the shelf for extended periods. Secure fresh tubing from your supplier and try the pinch-off again.
3. The tubing may be contaminated, either inside or outside. Clean tubing and try the pinch-off again.
4. If all suggestions listed fail to resolve the issue, contact your tool supplier to assist with further testing.

Problem:

Tubing separates successfully, but will not hold pressure or vacuum

Suggested procedure:

1. In most cases, this is due to a tube hardness issue or tube cleanliness issue. Start by cleaning the tube thoroughly and test again. If the tube still leaks, see suggestion 2.
2. Secure a sample of tubing from a different batch and test again. If the tube still leaks, see suggestion 3.
3. Contact your tubing vendor and secure fresh samples. Be sure to advise the vendor that you are performing a pinch-off, cold weld process with this tubing.
4. Check the carbide pinch-off rollers on your tool for any signs of chipping or excess wear. These rollers must remain perfectly round. Any flat spots or chipping may contribute to the poor results. Replace the rollers if any chipping or wear is detected.

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Problem:

Tubing compresses completely, but will not separate, leaving a very fine web of material that requires the technician to "wiggle" the excess tubing in order to achieve full separation.

Suggested procedure:

1. In nearly every case, this symptom is caused by tubing that is too "soft". The tubing has likely been annealed improperly for use in a cold weld application. When tubing is in this condition, more pinching force from the tool will not solve the problem. Manually wiggling the excess tubing is never recommended, as this could alter the tubulation grain structure in the cold welded joint, resulting in a leak. Secure the correct tubing from your vendor. There are no adjustments required for the tool in this situation.

After Pinch-off

Testing procedures will vary depending upon the application for the tubing being sealed. Typically, tubes that are sustaining a vacuum will be subjected to a helium leak test or examination under a microscope for comparative analysis purposes. For high or low pressure applications, testing procedures will often involve a leak-down test in some form. Whichever testing procedure is used, the process procedures should be duplicated exactly so any tube failure issues can be traced.

Once the tubulation has been successfully pinched-off and a hermetic seal has been confirmed, the processed end of the tube should be protected with a plastic cap, epoxy or sealant as the edge is very sharp and the sealed end is susceptible to damage if bumped or bent. Soldering or brazing the cold welded end of the tubulation is not recommended, as the grain structure can be compromised, thus resulting in a leak.

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