



## FLUX VOIDS IN SOLDER WIRE

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Solder wire consists of a soft solder alloy with a flux core. The solder wire is produced by an extrusion process to form a relatively thick wire (about 15mm). During pressing liquefied flux flows into the wire through a nozzle. After extrusion of the wire it is drawn to the final diameter in several steps.

After pressing samples were taken to determine the flux content by gravimetric analysis. Therefore a piece of wire is cut off and melted, the flux flows out and the remaining metal is weighed again. The flux content is calculated from the weight difference. An automatic, non-destructive method for continuous inspection of the flux content of solder wire does not exist.

Further drawing process steps cannot be interrupted for flux content testing. If the final diameter is reached, the wire is wound and the flux content is checked randomly. Testing is done by gravimetric analysis, as described above and on spooling by checking every reel. For this purpose, depending on the specific weight of the solder wire, the number of windings per reel will be determined and set on the machine. At the end of the spooling process the weight of the reel is checked.

The specific weights of the reels depend primarily on the solder alloy, but to a lesser degree also on the flux content. The density ratios of solder and flux are in the range of about 7-10:1, and the flux contents at 1 - 3.5 weight percent. Due to the very different physical properties of solder and flux, solid and flux-containing wires can be clearly distinguished. But smaller flux defects or flux voiding cannot be detected with these test methods.

During pressing and drawing of the wire significant amounts of energy are introduced into the material. This energy is required for the deformation of the solder. It is partially converted into heat energy. Under these conditions temperature peaks can occur, which ends up into thermal stress for the flux. This may include for example small gas bubbles in the flux. In most cases these are very small, which can not be detected during pressing and are not noticed on inspection of flux content. When the wire is drawn down to the final diameter, the flux core will be reduced in the same ratio.

Therefore, at smaller wire diameters and low flux percentages, a void can lead to a section of wire with no or insufficient flux. Due to the volume and weight ratios, it is normally only a short length of wire, compared with the total length (max. in the range of meters). In some rare cases several flux voids can be found on one reel.

When this problem occurs, it is recommended to unwind some turns of wire the reel, then testing again, normally you can continue soldering without further difficulties.

### SUMMARY

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**During manufacturing of solder wire there may be process-related discontinuity in the flux core. A non-destructive test method (hundred-percent inspection) does not exist. These flux voids are not detectable, but are limited to relatively small sections of wire. After discarding the affected portion (1-4 m are enough in most cases), the remaining wire can be continued processing.**

For information on this topic we will be at your service

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