Finally, A True Dross Eliminating Product

DEFINTION OF DROSS

Dross is the formation of an insoluble solder oxide when the molten alloy is exposed to oxygen. It interferes with the soldering process causing solder defects. Dross can cause missing solder or skips, bridging or solder shorts as well as inclusions causing poor joints and voiding. Dross causes expensive rework and represents wasted solder, replacement solder that does not go on the finished assembly but still must be bought and therefore becomes part of the cost of the assembly. Dross is truly a non-value added cost and this costs increases dramatically with lead-free alloys. Dross makes up the majority of the hazardous waste for many electronic manufacturing facilities.

Many methods have been tried to reduce or eliminate dross. Equipment manufacturers have introduced designs to clop or squeeze dross that have not been successful due to the adverse environment and high temperatures. Nitrogen is one method that has been used to try to reduce the formation of dross but is not applicable in many areas due to the high operating costs. Chemical methods, such as powders, have also been tried but these try to reduce the dross after it is formed.

POWDERS

Dross reducing powders have been available for many years. They all seem to be enticing when first introduced until a user actually tries one of them. The dross reducing powders are inorganic chemicals that produce a chemical reaction on the surface of the solder dross. With some of the powders, the reaction is actually an oxidizing process that speeds up the oxidation of the metal in an attempt to separate the oxides from the dross. Many of the powders use chemicals such as zinc chloride or ammonium tetrafluoroborate that are considered hazardous and toxic. This is the concern with the powder type dross reduces as they give off toxic smoke and require a breathing apparatus for maintenance personnel. Depending upon the exact chemical formulation, a powder can release derivatives of hydrogen fluoride, which is a hazardous acid, when heated to the breakdown temperatures. Inhalation of such materials is extremely unhealthy.

In addition, powders are added to the solder pot after the dross has already formed and are applied during the maintenance of the solder pot. The typical procedure is to lower the solder bath temperature below 450°F (232°C), apply a layer of powder to cover all of the dross and then manually chop it into the dross. The remaining dross is then removed along with the powder mess. However, some of the powder may remain in the solder pot and causes further oxidation which produces additional dross. Since powders reduce the dross after formation, they reduce solder purchases by typically by 20-30% at best.

Special handling and shipping care must be observed as the powders are classified as toxic solid, corrosive.

MS2™ MOLTEN SOLDER SURFACTANT MODE OF ACTION

A new dross eliminating process consists of a material that is a surfactant that eliminates dross from all molten solder alloys. There are formulations optimized for both leaded and lead-free alloys. Any and all solder alloys respond to the dross elimination properties of this material. It reduces virtually all costs associated with dross related hazardous waste and greatly reduces the amount of hazardous waste generated. When using the material there is no need for manual or mechanical dross removal. This new process reduces solder purchases by 40% to 75% based on production volumes. It does not mix with the clean metal and only reacts with dross and it does so without generating fumes or odor.

When the surfactant contacts a molten solder bath it performs two functions. First, it forms an oxygen barrier over the surface of the molten metal. This oxygen barrier is achieved both by the bulk material spreading across the molten metal and by a monolayer film of the material that covers areas that appear free of the bulk material. This barrier prevents further oxidation of the metals in the bath from occurring on the top of the solder pot's reservoir.

Secondly, the active ingredients in the surfactant complexes with metal oxides in the solder bath and render them soluble in the bulk material. Oxides in the dross that is on the solder pot surface are sequestered in the initial treatment of surfactant onto the pot and any small amounts of oxide that form on the flowing wave are also reacted when contacting the material. The resulting organometallic complex that is formed between a metal oxide particle and the material remains suspended in the bulk material and is sequestered from the bulk metal. This spent material builds up with time and use until it is removed periodically.

MS2 does not react with metal in its native, chemically reduced, state. When metal oxides are sequestered by it in solder pot dross, the interconnected metal oxide matrix in the dross is opened and any valuable clean metal that is caught up in the dross matrix is dispersed back into the solder bath and remains unaffected by the material. /the surfactant is unique in its dual role as a heat stable oxygen barrier and as an oxide scavenger. MS2 works with no discernible smoke or odor. The starting material is non-toxic and non-irritating and the resulting spent material organometallic waste presents no inhalation or contact hazard.

No change in process fluxes or process parameters are necessitated by the use of MS2. What ever flux and alloy that was in use prior to the addition of the surfactant can continued to be used.

The photographs below show a comparison of a lead-free solder pot in normal operation without MS2 and with MS2.

Photo 1: Lead-free solder pot with normal build-up of dross.

Photo 2: Lead-free solder pot with MS2 and no dross.

Photo 3: Lead-free solder pot with wave not running showing MS2 on the shiny dross free solder surface.

MS2™ is shipped without any special storage or handling requirements. Additional EHS and Toxicology Data are available on our website: www.pkaymetal.com.