



Lead-Free Solders Increase Need for Bench-Top Fume Extraction

Research has shown that the fumes and vapours emanating from lead-free solders may be more dangerous to workers and to the environment than those emitted by traditional lead-containing solders. A study by the Danish Toxicology Centre assessed both the toxicity of lead and the metals used in lead-free alloys. While lead was highly toxic to humans, silver, a standard constituent of lead-free alloys, was found to be several orders of magnitude more eco-toxic than lead. In addition, some of the other metals used in lead-free alloys were shown to have uncertain toxicological results.

As is so often the case, the best intentions seem to have unintended consequences. The long-term health aspects of breathing fumes from lead-free soldering processes have not yet been fully researched. However, it is possible that the health risks posed by alternative alloys may be greater than those posed by lead-containing solders. Many in the industry have accepted on faith that lead-free alloys are safer. If this unproven assumption results in less vigilance in protecting internal air quality, electronics manufacturers may regret this lack of foresight.

Unfortunately, most research projects concerning the use of lead have assumed that eliminating lead will have a positive effect on the health of workers, while ignoring the possible adverse health effects of lead substitutes — particularly at the level of the bench-top where workers are “face to face” with potentially toxic, but invisible, fumes, vapours and gases.

More Airborne Chemicals Likely

Since lead-free processes require higher soldering temperatures, chemicals and materials are likely to become airborne in greater amounts than was the case with lead containing solders. So, it is likely that the use of lead-free solders will increase and not decrease evaporation from metals and fluxes. And the concentration of activators found in fluxes used in lead-free solders — typically chemicals that are allergenic and irritating to the skin and eyes — is often double the level of those in lead-containing solders.

The industry has made great strides in improving internal air quality through the use of fume extraction. In general, electronics manufacturers understand that fume extraction makes financial, medical and legal sense. It would be potentially catastrophic if the move to lead-free ultimately compromises the health of workers.

Fume extraction has always made sense because it produces cost savings in increased operator productivity, reduced staff turnover and fewer sick days, and controlled

healthcare costs. It seems that the move to lead-free has not diminished the need for monitoring and improving internal air quality. On the contrary, the lead-free initiative has amplified the demand for new-generation fume extraction systems that are powerful and highly efficient as well as portable and economical.

Fume Extraction Systems

Consequently, with a lead-free future in mind, manufacturers must ensure that their chosen fume extraction systems for use on the electronics bench-top offer the highest levels of filtration. In fact, a combined HEPA and activated carbon filtration system is required. Anything less will not eliminate the fumes and gases that cause the worst short- and long-term health problems.

One such system, the BVX-200 Fume Extraction System, developed by Impell and available from sister company Metcal, is perfect for protecting operators from the potential harm of lead-free solder vapours and fumes. It incorporates both a pre- and a main filter, the latter being a HEPA filter with an efficiency greater than 99.5 percent, plus an activated carbon filter to remove additional gases. Both the pre- and main filters can be changed independently so as to maximise the working life of each filter and lower the total cost of ownership. A deep-bed gas filter is also available for applications that require a high capacity of gas filtration, such as cleaning with solvents or conformal coatings.

The system is also very powerful, but quiet. It provides a free-blowing airflow of 250m³/h (150cfm) with a maximum suction force of 850 Pa (3.5-in.WC), which is the best suction rating in the unit's class. Designed to be located off the bench-top, so as to maximise the available working area without obstructing the space underneath, this two-arm system can be used with either two 50mm (2-in.) diameter hoses and BVX arms, or one 67mm (2.5-in.) hose and an Omniflex arm.