

ELECTRONICS MANUFACTURE-Common processes- Polymer health and safety issues

A range of safety hazards is associated with polymer materials and the processes involved in their use. The hazards are common to all the materials and care should be taken at all times in dealing with them. When using a material with which you are unfamiliar, check the appropriate health and safety documentation before starting work.

As there are a number of features common to the different polymers, a few general guidelines are suggested:

Uncured resins

Once fully cured or polymerised, polymeric materials present no health hazard, but care has to be taken with all uncured resin systems. For example, for volume uses such as floor material, paints, or sealants, epoxy products are usually supplied in 'two-component' form, with separate resin and hardener which are mixed just before application.

The epoxy resin base is an irritant and may give rise to allergies through contact. If product contains solvents which are also epoxy substances (so-called 'reactive solvents'), these may cause an allergic reaction through inhalation.

The amine hardeners are most often corrosive, but products vary from irritant to poisonous. Many amines are sensitising by skin contact, and volatile amines may give off sensitising vapours.

Note that, once an allergic reaction has been suffered, the operator will remain sensitive (potentially for life) and be unable to work with epoxy.

The 'single-component' epoxies used in electronic assembly operations, where the materials are pre-mixed, are less of a hazard. This is because the materials are designed for long pot life and extended cure, so are generally less reactive. However, care should be taken to avoid skin contact, and a sensible level of hygiene is needed in order not to spread the substances and contain any uncured waste.

Solvents

Many polymers contain solvent additives to vary the viscosity and prevent premature curing. Solvents evaporate during dispensing as well as during the curing process. Solvents are generally classed as irritants and care should be taken

not to touch the materials with bare skin and to provide sufficient ventilation (or preferably extraction) to remove the fumes. The solvent remains an irritant in vapour form and can affect people who suffer from asthma.

Dispensing

Dispensing can use relatively high pressure air lines and care should be taken to ensure appropriate screens or protective clothing in case of malfunction. Care should be taken to protect eyes, by the use of safety glasses or goggles where appropriate. The high volume dispensing machine is also mechanically dangerous as it travels at high speeds. Care should be taken to ensure that the appropriate safety procedures are followed when working with this type of equipment.

Moulding

The moulding process is not normally carried out as part of printed circuit assembly, but is common in the assembly of components. Moulding machines are sophisticated machines and incorporate many safety features, but care should be taken as the polymer materials within the machines is heated to high temperatures under very high pressure and are therefore dangerous if operated incorrectly or a machine fails.

Curing

UV light sources used in curing polymer adhesives are applied by controlled exposure units which are made to the required safety standards. These units should not be operated outside their controlled environment as exposure to high intensity UV light can damage your eyes. Read the operating instructions!

In the case of materials which require heating as part of the curing process, care should be taken to protect the operator with the appropriate protective clothing (e.g. safety glasses and gloves) to prevent splash damage, or burning by contact with hot surfaces.

In general the workplace is a safe environment if the appropriate precautions are taken and instructions are followed. Machinery with moving parts is fitted with many safety features: they are for your safety, so do not disable them.

Author: Martin Tarr

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