



Government of
Western Australia

Soldering in the workplace: Rosin Fluxes

ROSIN CORE

**WorkSafe
Western
Australia
COMMISSION**



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Rosin or colophony fluxes used in metal soldering can cause health problems if fumes are inhaled or if flux gets on the skin.

Short term problems can include nose, sinus, eye and throat irritation and skin rashes, and long term problems may include asthma and dermatitis.

Those most likely to be affected are people who do a lot of hand soldering, typically while repairing electrical or electronic equipment.

What are the symptoms?

Early symptoms of exposure include:

- watering, prickling eyes;
- running or blocked nose;
- sore throat;
- coughing, wheezing, tight chest and breathlessness; and
- itchy skin and dermatitis.

Chronic exposure may lead to asthma and may exacerbate existing asthma or respiratory problems in workers.



What jobs are affected?

Some manufacturing of electrical and electronic items requiring soldering is done in Western Australia. Most soldering in manufacturing is automated and enclosed when large numbers of an item are produced. Hand soldering is done where small numbers are involved or the work is very intricate.

Hand soldering is done mainly in small businesses by people repairing phones, TVs, radios, computers, domestic appliances, electrical circuit boards, automotive wiring and a wide range of electrical and electronic equipment.

Those most at risk are people whose work requires constant hand soldering in poorly ventilated workplaces.

What is soldering flux?

Solder is an alloy, usually of tin and lead, which is melted to join other metal surfaces.

Flux is a sticky liquid or paste used to react with and remove compounds from the surface of the connection, to improve the flow of the molten solder, and to prevent oxidation during the heating cycle.

Rosin fluxes are made from extracts of pine tree gum, and are known to be associated with particular health problems.

Fluxes made from substances other than pine gum extract are available, but are not always suitable as replacements for colophony. They may have other unidentified health risks.





What are the hazards?

When heated during soldering, rosin fluxes give off fumes containing many chemical compounds.

These can cause irritation and health problems if inhaled.

Skin contact usually happens when people get flux on their hands while it is being applied to metal surfaces before soldering.

What are the different methods?

There are three main techniques for applying solder:

1. hand soldering using a soldering iron at 200 - 450°C;
2. flow or wave soldering, such as when circuit boards are pre-treated with flux and mechanically fed over a “wave” of molten solder; and
3. oven baking, when a solder and flux paste is applied and oven baked to melt the solder.

What are the risks?

Manual soldering with a hand-held soldering iron poses the highest risk of fume exposure because the operator’s head is likely to be close to fumes coming from the workpiece.

Use of paste or liquid fluxes increases the risk of skin contact.

Rosin core solder, in which rosin is contained within a fine tube of solder, is the least likely to result in skin contact during hand soldering.

Flow and oven bake soldering, used in manufacturing, are less likely to expose workers to fumes because the workpiece is usually isolated and the fumes extracted with mechanical ventilation systems.



Limit the time a worker spends soldering.
Train workers to use breeze or ventilation to reduce
the risk of exposure.

How are risks controlled?

Risks in soldering can be controlled by applying risk control steps in the following order of importance:

- 1. Elimination:** If possible, eliminate soldering completely, such as by crimping or twisting electrical wire connections, using fastening screws or bolts, and using compression fittings on plumbing work.
- 2. Substitution:** Fluxes that do not contain rosin are available and may be used as a substitute in some circumstances. Changing to rosin free fluxes may however affect the quality, tolerances, performances and costs. They may also have health effects that are significant. Information should be sought on the possible detrimental health effects of alternatives. All these factors need to be carefully weighed up before any change is made.
- 3. Isolation:** Separate the worker from the fume by physical barriers as in most automated soldering processes.
- 4. Engineering controls:** Where soldering work is done frequently, use local exhaust ventilation to capture fumes at the workpiece – eg a hood on a flexible arm, tip extraction on the soldering iron itself, or a fume cabinet connected to an exhaust system. Ducts can become blocked with rosin fumes and need to be checked regularly.
- 5. Administrative controls:** Consider rostering or limiting the amount of time a worker spends doing soldering work, or training workers to use any breeze to remove fume from their breathing zone.

6. Personal protective equipment: Though sometimes essential, this should be only a last resort to prevent exposure. The type of respirator used would depend on the amount of fume present. As a minimum, a combined particulate and organic filter would be required. Suitable gloves and other protective clothing may be needed where there is risk of skin contact, and eye protection if there is risk of splash from liquid flux.

What the law says

The Occupational Safety and Health Act 1984 says that as far as is practicable, employers must provide and maintain a work environment in which employees are not exposed to hazards. This includes providing a safe system of work, information, training, supervision and, where appropriate, personal protective equipment.

The Act says employees must take reasonable care of their own safety and health and avoid adversely affecting the safety and health of others. They must comply, as far as possible, with safety instructions, use personal protective equipment provided and report hazards or injuries.

The Occupational Safety and Health Regulations 1996 set down requirements for workplaces that use hazardous substances. These cover things such as:

- labelling of containers;
- Material Safety Data Sheets (MSDS);
- induction and safety training;
- record keeping;
- risk assessment and control; and
- health surveillance.

The Regulations say employers, main contractors and self employed persons must:

- identify hazardous substances;
- assess the risk of injury or harm; and
- reduce the risk by:
 1. preventing exposure to the hazardous substance;
 2. means other than personal protective equipment; or
 3. where 1 and 2 are not practicable, by the use of personal protective equipment.

Further Information

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