

EMISSIONS FROM WELDING ON EPOXY-COATED METALS

SUMMARY

This report describes the results of a laboratory study that identified the major volatile and particulate materials emitted during shielded metal arc welding of epoxy-coated metal. It also examines potential health effects of these emissions and recommends measures to minimize exposure of welders.

A survey of British Columbia pulp and paper mills identified epoxy coatings as high priority materials for this study. Tests were carried out using General Paint 81-line activated epoxy paint (Epogard 81-212; seafoam green) which is representative of epoxy paints commonly used in B.C. mills.

A complex mixture of volatile organic chemicals is produced during shielded metal arc welding of epoxy-coated mild steel. Volatile emissions consist mainly of aromatic hydrocarbons such as xylenes. Other materials that originated from the paint solvent or epoxy resin were acetaldehyde, methyl isobutyl ketone (MIBK), and butyl Cellosolve (2-butoxyethanol). Formaldehyde, acetone, and phenol were also present, but at lower levels.

The relatively high concentrations of volatile organic chemicals suggest that a significant amount of paint solvent can be trapped in an epoxy coating for extended periods of time.

Pigments in epoxy coatings may increase the toxicity of welding fume. Particulate emissions from Epogard 81-212 contained higher levels of lead than did emissions from uncoated steel. Lead chromate, a pigment in this epoxy paint, was the probable source.

Apart from reactions to the disagreeable odour of charred epoxy coatings, acute health effects of emissions may include headache, nausea, dizziness, and eye, nose, and throat irritation. Welders can minimize their exposure in three ways: removal, ventilation, and respiratory protection. Removal of all traces of epoxy coating prior to welding is the most desirable approach.