FLUXES FOR ARC WELDING AND BRAZING: SAFE HANDLING AND USE

INTRODUCTION

Fluxes are used in various arc welding processes, such as Submerged Arc Welding (SAW) and Electroslag Welding (ESW). Fluxes are also used in most brazing applications. Fluxes are available in various forms such as granules, powder, paste, or liquid. There are potential hazards when dealing with fluxes.

HAZARD OVERVIEW

Potential hazards associated with handling and using fluxes include the following:

- Inhaling toxic or corrosive flux dust
- Breathing welding fumes and gases
- Getting flux on skin and in eyes
- Swallowing toxic or corrosive flux or dust
- Breathing and swallowing flux particles during recovering and grinding.

The makeup and amount of these hazardous materials varies depending on the flux and the process.

ACUTE (SHORT TERM) EFFECTS OF OVEREXPOSURE

Acute overexposure to flux may cause symptoms such as:

- General overexposure may cause irritation, burning, and bleeding of exposed tissue, as well as headache, dizziness, and shortness of breath.
- Dust, fumes and gases may irritate the skin, eyes, and respiratory system.
- Toxic, corrosive, or oxygen–depleting gases can cause fluid in the lungs, suffocation, and death.
- Fumes containing chromium or nickel compounds may irritate the skin and respiration tract and cause Metal Fume Fever (see Fact Sheet Number 25).
- Flux products containing both fluoride and hydrogen compounds may produce corrosive and toxic hydrofluoric acid which can cause irritation to skin, eyes, and the nose and throat.
- Swallowing or breathing barium oxide dust or fume can result in abdominal pain, vomiting, paralysis, and death.

CHRONIC (LONG TERM) EFFECTS OF OVEREXPOSURE

Long term overexposure to inhalable welding fumes may lead to their accumulation in the body. The effect is cumulative, depending on concentration and time of exposure. The accumulation, evident from x-ray examination, may or

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may not result in reduced lung function or disease. Smoking or other non-welding exposure to hazardous particles may cause or aggravate this type of lung accumulation condition. Chronic fluoride absorption can cause calcium loss from bones and can discolor or spot teeth. Prolonged exposure to manganese oxides may affect the central nervous system, causing tiredness, fatigue, sleepiness, muscular weakness, emotional disturbances, walking (muscle spasms). Chronic overexposure to respirable crystalline silica may result in silicosis, a disabling lung disease, and is also a listed carcinogen. Nickel and chromium VI compounds, when present, and when inhaled over long periods, are carcinogenic. Nickel fumes may also cause fibrous masses and fluid in the lungs.

OVERALL EVALUATION OF POTENTIAL HAZARDS

Fluxes are safe and useful when handled and used properly and when recommended safety procedures are followed. The major hazards to avoid are overexposure by breathing, swallowing, or inhaling the dust or fumes and gases, especially those containing respirable crystalline silica and fluorides. If the application recovers used flux, as is common in Submerged Arc Welding (SAW), and then reuses or grinds the flux for reuse, overexposure to dust happens quickly if precautions are not taken.

Some submerged arc welding fluxes may contain very small quantities of naturally occurring radioactive material (NORM). Flux materials containing sufficiently low concentrations of NORM are not subject to federal radiation control regulations. These fluxes do not present an environmental or health hazard. Contact the flux manufacturer for further information.

HOW TO PROTECT AGAINST OVEREXPOSURE

- Read and follow Safety Data Sheets (SDSs).
- Wear proper hand, face, and body protection when handling or when otherwise exposed to fluxes and their dust, fumes and gases—this means protective (leather, rubber) gloves, goggles, and full clothing with long sleeves and long pants (not shorts).
- Avoid breathing the dust or fumes and gases. Keep your head out of the fumes, dust, and gases. Use enough ventilation, exhaust at the arc, or both, to keep fumes, dust, and gases from your breathing zone and the general area. When necessary, wear an approved mask or respirator.
- Do not eat, drink, or smoke to avoid ingestion through hand to mouth activity in areas containing flux dust or fume.
- Remove PPE and wash your hands after leaving the work area to avoid ingestion through hand to mouth activity such as eating, drinking, or smoking.
- During brazing, do not overheat the fluxes. Follow the manufacturer’s recommended procedures. Overheating results in the generation of, and potential exposure to, excessive fumes and gases.

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INFORMATION SOURCES

ACGIH, *Threshold Limit Values (TLV®) for Chemical Substances and Physical Agents in the Workroom Environment*, American Conference of Governmental Industrial Hygienists, <www.acgih.org>.

TLV is a registered trademark of the ACGIH.

ANSI. Z49.1, *Safety in Welding, Cutting, and Allied Processes,* American National Standards Institute available from American Welding Society, <www.aws.org>.

AWS, *Safety and Health Fact Sheet No. 1, Fumes And Gases,* American Welding Society, <www.aws.org>.

AWS, *Safety and Health Fact Sheet No. 25, Metal Fume Fever,* American Welding Society, <www.aws.org>.

AWS F1.3, *A Sampling Strategy Guide for Evaluating Contaminants in the Welding Environment,* American Welding Society, <www.aws.org>.

AWS Study, *Fumes and Gases in the Welding Environment*, American Welding Society, <www.aws.org>.

OSHA, *Code of Federal Regulations, Title 29 Labor, Part 1910*, Occupational Safety and Health Administration <www.osha.gov>.

NIOSH Publication No. 88-110, *Criteria for a Recommended Standard: Welding, Brazing, and Thermal Cutting,* National Institute for Occupational Safety and Health Publication, <www.cdc.gov/niosh>.

For specific information, refer to the applicable Safety Data Sheet (SDS) available from the manufacturer, distributor, or supplier of the specific flux.

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