



INTRODUCTION

Fumes are poisonous and can kill. Overexposure may cause death. Some fume and dust from welding processes (including brazing, soldering, and thermal spraying) may contain cadmium or cadmium oxide compounds. The specific form and concentration of cadmium present in the fume and dust are dependant on the composition of the filler metal, base metals, metal coatings, atmosphere, flux, and the welding process.

ACUTE (SHORT TERM) EFFECTS OF OVEREXPOSURE TO CADMIUM

- Similar, but much more severe, to the effects produced by fume and dust from other metals.
- Inhalation exposure to high concentrations of fume may cause symptoms such as nausea, headaches, dizziness, nervousness, lung complicatons, and death.

CHRONIC (LONG TERM) EFFECTS OF OVEREXPOSURE TO CADMIUM

- Long term exposure to cadmium oxide fume and dust has caused severe chronic effects, kidney failure, and may, with longer exposure and/or higher concentrations lead to severe respiratory disease and death.
- Inhalation of cadmium by smokers may accelerate the development of respiratory diseases.
- There is evidence that long term exposure to cadmium may cause lung cancer. OSHA has defined cadmium as a carcinogen with

no further categorization. Observations are difficult to interpret because of inadequate data and confounding factors.

- Conclusions from the International Agency for Research on Cancer (IARC Group 2B): (1) there is limited evidence in humans for the carcinogenicity of welding fumes, and (2) there is inadequate evidence in experimental animals for the carcinogenicity of welding fumes. (The IARC classification 2B means that the agent is possibly carcinogenic to humans. By contrast, a 2A designation would mean that the agent is probably carcinogenic to humans.)

OVERALL EVALUATION

- Overexposure to cadmium may cause death.
- Cadmium exposure is possibly carcinogenic to humans (IARC Group 2B).

HOW TO PROTECT AGAINST OVER-EXPOSURE

- Comply with OSHA regulations for cadmium.
- Identify composition of all base metals, coatings, and consumables; substitute non-cadmium containing materials wherever possible.
- Read and follow the Material Safety Data Sheets (MSDS's) for cadmium containing products.
- Do not breathe fumes and gases. Avoid even brief exposure to high concentrations.
- Keep your head out of the fumes.

- Use enough ventilation, exhaust at the arc, or both, to keep fumes and gases from your breathing zone and the general area.
- If ventilation is questionable, use air sampling to determine the need for

corrective measures—air supplied respirators may be required.

- Avoid ingestion. Do not eat or smoke in areas containing cadmium fume or dust.
- Keep exposure as low as possible.

INFORMATION SOURCES

Agency for Toxic Substances and Disease Registry (ATSDR), *Toxicological Profile for Cadmium—1998*, available from the Agency for Toxic Substances and Disease Registry, Dept. of Health and Human Services—Div. of Toxicology, 1600 Clifton Road, N.E.—M.S.E-29, Atlanta, GA 30333.

National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161.

World Health Organization (WHO), *IPCS Environmental Health Criteria 134—Cadmium*, available from the WHO Publications Center, 49 Sheridan Avenue, Albany, NY 12210.

Organization for Economic Cooperation and Development (OECD), *Risk Reduction Monograph No. 5: Cadmium—OECD 1994*, available from the Organization for Economic Cooperation and Development, Environmental Health and Safety Division, Zrué André-Pascal, 75775 Paris Cedex 16, France.

National Institute for Occupational Safety and Health (NIOSH). *Registry of Toxic Effects of Chemical Substances, and IDLHs*. Cincinnati, Ohio: National Institute for Occupational Safety and Health, Robt. Taft Labs, 4676 Columbia Pkwy, Cincinnati, OH 45226.

International Agency for Research on Cancer (IARC). *IARC Monographs on the Evaluation of Carcinogenic Risk to Humans—Cadmium and Cadmium Compounds*, Supplement 7 and Vols. 43–61 (1990). Oxford University Press, New York, NY 10016.

American Welding Society (AWS) Study. *Fumes and Gases in the Welding Environment*, available from American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

American Conference of Governmental Industrial Hygienists, *Documentation of the Threshold Limit Values and Biological Exposure Indices*, Sixth Edition, and *Guide to Occupational Exposure Values*, available from American Conference of Governmental Industrial Hygienists (ACGIH), 1330 Kemper Meadow Drive, Cincinnati, OH 45240.

Deutsche Forschungsgemeinschaft (DFG). *Maximum Concentration Values in the Workplace (MAKs)*, available from Federal Republic of Germany – Commission for the Investigation of Health Hazards of Chemical Compounds in the Workplace, Kennfayallee 40, D-5300 Bonn-BadGodesberg, Germany. *National Toxicology Program (NTP) Animal Report on Carcinogens*, available from National Toxicology Program, P.O. Box 12233, Research Triangle Park, NC 27709-2233.

Occupational Safety and Health Administration (OSHA). *Code Of Federal Regulations*, Title 29 Labor, Chapter XVII, Part 1910.1027, Cadmium, Order No. 869-019-00111-5, available from Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954.

Environmental Protection Agency (EPA). *Integrated Risk Information System (IRIS)* database, National Institute of Environmental Health Sciences (of Dept. of Health and Human Services) and Dept. of Energy, available from Miles Kahn, P.O. Box 37133, Washington, DC 20013-7133.

The following references include the specific precautionary methods used to protect against exposure to fumes and gases:

American National Standards Institute (ANSI). *Safety in Welding, Cutting, and Allied Processes*, Z49.1, available from American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

National Institute for Occupational Safety and Health. *Safety and Health in Arc Welding and Gas Welding and Cutting*, NIOSH Publication No. 78-138. Cincinnati, Ohio: National Institute for Occupational Safety and Health.

Mine Safety And Health Administration (MSHA). *Code Of Federal Regulations*, Title 30 Mineral Resources, Parts 1-199, available from Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954.

Occupational Safety and Health Administration (OSHA). *Code Of Federal Regulations*, Title 29 Labor, Chapter XVII, Part 1910, Order No. 869-019-00111-5, available from Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954.

International Cadmium Association (ICdA). *Using Cadmium Safely*, available from International Cadmium Association, P.O. Box 924, Great Falls, VA 22066-0924.