



INTRODUCTION

The fume from welding processes may contain compounds of chromium, including hexavalent chromium, and of nickel. The composition of the base metals, the welding materials used, and the welding processes affect the specific compounds and concentrations found in the welding fume.

IMMEDIATE EFFECTS OF OVER-EXPOSURE TO FUMES CONTAINING CHROMIUM AND NICKEL

- Similar to the effects produced by fumes from other metals.
- Cause symptoms such as nausea, headaches, dizziness, and respiratory irritation.
- Although some persons may develop a sensitivity to chromium or nickel, which can result in dermatitis or skin rash, there is no evidence in the literature of such sensitivity when exposed to welding fume.

CHRONIC (LONG TERM) EFFECTS OF EXPOSURE TO FUMES CONTAINING CHROMIUM AND NICKEL

- Definite effects are not yet determined
- The National Institute for Occupational Safety and Health (NIOSH) concluded that some forms of hexavalent chromium and nickel and their inorganic compounds should be considered occupational carcinogens (cancer-causing agents).
- NIOSH Criteria Documents 76–129 and 77–164 (listed in Information Sources) contain these conclusions based on data

from the chromate producing industry and from nickel ore-refining processes.

- 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

- Welding fumes containing chromium and nickel are possibly carcinogenic to humans (IARC, NIOSH).
- No determination has yet been made concerning the chronic health effects on welders or users of chromium- or nickel-containing alloys.
- Nevertheless, give consideration to the NIOSH and IARC conclusions.

HOW TO PROTECT AGAINST OVER-EXPOSURE

- Do not breathe fumes and gases.
- Keep your head out of the fumes.
- Use enough ventilation or exhaust at the arc or both to keep fumes and gases from your breathing zone and general area.
- If ventilation is questionable, use air sampling to determine the need for corrective measures.
- Keep exposure as low as possible.

INFORMATION SOURCES

National Institute for Occupational Safety and Health. *Criteria for a Recommended Standard – Occupational Exposure to Chromium (VI)*, NIOSH Publication No. 76–129. Cincinnati, Ohio: National Institute for Occupational Safety and Health.

National Institute for Occupational Safety and Health. *Criteria for a Recommended Standard – Occupational Exposure to Inorganic Nickel (VI)*, NIOSH Publication No. 77–165. Cincinnati, Ohio: National Institute for Occupational Safety and Health.

American Welding Society (AWS) Study. *Fumes and Gases in the Welding Environment*, available from American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33136.

American Conference of Governmental Industrial Hygienists (ACGIH), *Threshold Limit Values (TLV®) for Chemical Substances and Physical Agents in the Workroom Environment*, available from American Conference of Governmental Industrial Hygienists (ACGIH), 1330 Kemper Meadow Drive, Cincinnati, OH 45240.

Occupational Safety and Health Administration (OSHA). *Code Of Federal Regulations*, Title 29 Labor, Chapter XVII, Parts 1901.1 to 1910.1450, Order No. 869-019-00111-5, available from Superin-

tendent of Documents, U.S. Government Printing Office, P.O. Box 371954, Pittsburgh, PA 15250.

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

International Agency for Research on Cancer (IARC). *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans—Chromium, Nickel, and Welding*, Vol. 49 (1990), Oxford University Press, New York, NY 10016.

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 33136.

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