



## Chromium and Nickel in Welding Fume

### 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.
- Some persons may develop a sensitivity to chromium or nickel which can result in dermatitis or skin rash.

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

- Definite effects are not yet determined
- Conclusions from the National Institute for Occupational Safety and Health (NIOSH): 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 below) 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): (1) there is limited evidence in humans for the carcinogenicity of welding fumes and gases, and (2) there is inadequate evidence in experimental animals for the carcinogenicity of welding fumes.

### OVERALL EVALUATION

- Welding fumes are possibly carcinogenic to humans (Group 2B).
- No determination has yet been made concerning the 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.

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- 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 (NIOSH). *Criteria for a Recommended Standard: Occupational Exposure to Chromium (VI)*, NIOSH Publication No. 76-129. Cincinnati, OH (telephone: 800-356-4674; web site: <http://www.cdc.gov/niosh/homepage.html>).

National Institute for Occupational Safety and Health (NIOSH). *Criteria for a Recommended Standard: Occupational Exposure to Inorganic Nickel*, NIOSH Publication No. 77-164. Cincinnati, OH (telephone: 800-356-4674; web site: <http://www.cdc.gov/niosh/homepage.html>).

American Welding Society (AWS). *Fumes and Gases in the Welding Environment*, published by the American Welding Society, 550 NW LeJeune Road, Miami, FL 33126; telephone 800-443-9353; Web site: [www.aws.org](http://www.aws.org).

American Conference of Governmental Industrial Hygienists (ACGIH). *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, available from ACGIH, 1330 Kemper Meadow Drive, Cincinnati, OH 45240-1634 (telephone: 513-742-2020; web site: [www.acgih.org](http://www.acgih.org)).

Occupational Safety and Health Administration (OSHA). *Code of Federal Regulations*, Title 29 Labor, Parts 1910.1 to 1910.1450, available from the U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954

(telephone: 800-321-6742; web site: [www.osha.gov](http://www.osha.gov)).

American Conference of Governmental Industrial Hygienists (ACGIH). *Documentation of the Threshold Limit Values and Biological Exposure Indices*, available from ACGIH, 1330 Kemper Meadow Drive, Cincinnati, OH 45240-1634 (telephone: 513-742-2020; web site: [www.acgih.org](http://www.acgih.org)).

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Chromium, Nickel, and Welding, Vol. 49 (1990), Oxford University Press, New York, NY 10016 (telephone: 212-726-6000; web site: [www.oup-usa.org](http://www.oup-usa.org)).

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 (ANSI Z49.1)*, published by the American Welding Society, 550 NW LeJeune Road, Miami, FL 33126; telephone 800-443-9353; Web site: [www.aws.org](http://www.aws.org).

National Institute for Occupational Safety and Health (NIOSH). *Safety and Health in Arc Welding and Gas Welding and Cutting*, NIOSH Publication No. 78-138. Cincinnati, OH (telephone: 800-356-4674; web site: <http://www.cdc.gov/niosh>).

Mine Safety and Health Administration (MSHA). *Code of Federal Regulations*, Title 30 Mineral Resources, Parts 1 to 199, available from the U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (telephone: 202-693-9400; web site: [www.msha.gov](http://www.msha.gov)).

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