



## Coated Steels: Welding and Cutting Safety Concerns

### INTRODUCTION

Steels are coated to provide a protective covering or a decorative finish. Protective coatings are designed to prevent rusting or to shield the steel from chemical attack.

Coatings found on steels can become airborne or give off fumes, smoke, or dust, during joining and cutting. Some of the coating's dusts, fumes or gases can harm you and their exposure limits should not be exceeded. Exposure limits include:

- Permissible Exposure Limit (PEL): The PEL is set by the Occupational Safety and Health Administration (OSHA) and is a legal employee exposure limit in the U.S.
- Threshold Limit Value (TLV®): The TLV® is published by the American Conference of Governmental Industrial Hygienists (ACGIH) and is a guideline for employers to consider in controlling employee exposures.

### OVERVIEW OF HEALTH HAZARDS

Employers need to know which chemical may be released into the air that may injure welders. Welders must be trained in how to do each process the correct way, and they shall cut or weld only after proper safety precautions have been taken.

Coatings may give off fumes and gases when welding or cutting is performed. A health hazard may be created when its dusts, fumes or gases get into the air in large enough amounts that safe levels are exceeded.

Protective coatings on steels can contain chromium, lead, tin, zinc or other potentially hazardous materials. It is always good for the welder to understand the coating types for the materials he works with. If not, the welder should get this information from his supervisor or employer.

Paints are made up of compounds that may release hazardous materials into the air when heated. Paints are usually used on a "phosphated" and passivated (often with chromium) metal surface. The heat from the arc can cause paints to give off unsafe amounts of gases like carbon monoxide and carbon dioxide. These also increase the risk of suffocation in confined work areas, or those with poor air movement.

Steels coated with plastic materials should not be cut or welded unless proper precautions are taken. It is best to remove the coating to a distance away from the weld or cut where the temperature won't go above the point where the material starts to over heat and break down.

For additional information, see AWS Fact Sheet 1, *Fumes and Gases*.

## HOW TO AVOID HEALTH HAZARDS FROM OVEREXPOSURE

Welders should make sure they know what a coating might give off when heated or burned:

- Obtain the Safety Data Sheets (SDSs) for all materials used.
- Read and understand the specification for coating type and coating weights.
- Find out what hazardous materials are present or might be given off by the coating when it is exposed to the arc or high temperatures.
- Use adequate ventilation whenever an airborne fume gas or dust must be controlled. Use enough ventilation, exhaust, or both to keep the air the welder breathes below recommended safe levels such as the PEL and TLV®.
- Have air monitoring done as necessary to test for exposure levels in the breathing zone of the welder and other persons working nearby.
- Use a respirator when required.
- Orient the work so the welder's head is kept out of the fume plume.
- See AWS Fact Sheet 1, *Fumes and Gases*.
- See AWS Fact Sheet 11, *Hot Work in Confined Spaces*.
- See AWS Fact Sheet 25, *Metal Fume Fever*.

## SUMMARY

Coatings on steels may be a source of exposure to fumes and gases during welding, brazing and cutting. Steel coatings such as rust inhibitors, oils, and paints contain materials that can cause harmful overexposure when breathed. This is why coatings must also be looked at to remove hazards from welding and cutting. The joining of some coated steels requires special types of ventilation. In some cases, the welder must wear a respirator to keep safe.

## INFORMATION SOURCES

ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*, American National Standards Institute, <[www.aws.org](http://www.aws.org)>.

AWS Safety and Health Fact Sheet 1, *Fumes and Gases*, American Welding Society, <[www.aws.org](http://www.aws.org)>.

AWS Safety and Health Fact Sheet 11, *Hot Work in Confined Spaces*, American Welding Society, <[www.aws.org](http://www.aws.org)>.

AWS Safety and Health Fact Sheet 25, *Metal Fume Fever*, American Welding Society, <[www.aws.org](http://www.aws.org)>.

OSHA, Title 29 Labor, Part 1910, Occupational Safety and Health Administration, Code of Federal Regulations, <[www.osha.gov](http://www.osha.gov)>.

*ISO 15011-5, Health and safety in welding and allied processes — Laboratory method for sampling fume and gases — Part 5: Identification of thermal-degradation products generated when welding or cutting through products composed wholly or partly of organic materials using pyrolysis-gas chromatography-mass spectrometry,*  
International Organization for Standardization, <[www.iso.org](http://www.iso.org)>.

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