

Hexavalent Chromium

OAR 437
Division 2/Z
Division 3/Z
Division 4/Z
Division 5/Z

Hexavalent Chromium

Workers in many different occupations are exposed to hexavalent chromium (Chromium (VI)), increasing the risk of developing serious adverse health effects. Occupational exposures occur mainly among workers who handle pigments containing dry chromate and spray paints and coatings containing chromate; operate chrome plating baths; and weld or cut metals containing chromium, such as stainless steel. Stainless steel welding involves the greatest exposure to Chromium (VI).

Sources of hexavalent chromium

Uses	Chromium (VI) chemicals
Pigments for paints, inks, plastics	Lead chromate (yellow, chrome green, molybdenum orange), zinc chromate, barium chromate, calcium chromate, potassium dichromate, sodium chromate
Anti-corrosion coatings	Chromic trioxide (chromic acid), zinc chromate, barium chromate, calcium chromate, sodium chromate, strontium chromate
Stainless steel	Chromium (VI) is given off when stainless steel is cast, welded, or plasma torch cut
Textile dyes	Ammonium dichromate, potassium chromate, sodium chromate
Wood preservatives	Chromium trioxide
Leather tanning	Ammonium dichromate

Other sources include chrome plating, smelting of ferrochromium ore, and impurities present in portland cement.

Federal OSHA's [Small Entity Compliance Guide for the Hexavalent Chromium Standards](#), Appendix II, is a good reference to identify industry operations or processes associated with occupational exposures.

How hexavalent chromium can harm employees

Hexavalent chromium exposure can occur through direct contact or it can enter the body by breathing air containing the contaminant or by being swallowed. Workplace exposure to Chromium (VI) may cause the following health effects:

Cancer — Chromium (VI) is classified as a known carcinogen. Workers exposed to hexavalent chromium in the workplace have much higher rates of lung cancer.

Respiratory system effects — Chromium (VI) is a respiratory tract irritant to the nose and throat. Symptoms may include runny nose, sneezing, coughing, itching, and a burning sensation. Repeated or prolonged exposure can cause sores to develop in the nose and result in nosebleeds. If the damage is severe, the nasal septum (wall separating the nasal passages) develops a hole (perforation).

Some employees can become allergic to hexavalent chromium so that inhaling chromate compounds can cause asthma symptoms such as wheezing and shortness of breath.

Eyes — Chromium (VI) is an eye irritant. Direct eye contact with chromic acid or chromate dusts can cause permanent eye damage.

Skin effects — Chromium (VI) compounds are not only powerful skin irritants but also can be corrosive. Contact with non-intact skin can also lead to chrome ulcers. These are small crusted skin sores with a rounded border. Ulcers can penetrate deep into soft tissue or become the site of secondary infections. They heal slowly and leave scars. Common sites for these ulcers include the nail root, knuckles and finger webs, back of the hands, and forearms.

Some workers develop an allergic skin reaction, called *allergic contact dermatitis*. This occurs from handling liquids or solids containing hexavalent chromium. Once a worker becomes sensitized, contact with even small amounts can cause a serious skin rash. Allergic contact dermatitis is long-lasting and more severe with repeated skin contact.

Web site:
www.orosha.org

Salem Central Office
350 Winter St. NE, Rm. 430
Salem, OR 97301-3882

Phone: (503) 378-3272
Toll-free: (800) 922-2689
Fax: (503) 947-7461





Hexavalent Chromium continued

OR-OSHA requirements

OR-OSHA has adopted regulations to protect workers exposed to Chromium (VI) in the workplace.

The hexavalent chromium standard requires employers to:

- Limit eight-hour time-weighted average hexavalent chromium exposure in the workplace to 5 micrograms or less per cubic meter of air.
- Perform personal air monitoring at least every six months if initial monitoring shows worker exposure at or above the action level (2.5 micrograms per cubic meter of air calculated as an eight-hour time-weighted average).
- Provide appropriate personal protective clothing and equipment when there is likely to be skin or eye contact.
- Implement good personal hygiene and housekeeping practices to prevent hexavalent chromium exposure.
- Prohibit employee rotation as a method to achieve compliance with the permissible exposure limit.
- Provide respiratory protection as specified in the standard.
- Provide medical exams:
 - ◆ Within 30 days of initial assignment for workers who are or may be exposed at or above the action level for 30 or more days a year
 - ◆ Annually
 - ◆ To workers exposed in an emergency situation
 - ◆ When employees experience signs or symptoms of adverse health effects associated with Chromium (VI) exposure
 - ◆ At employment termination



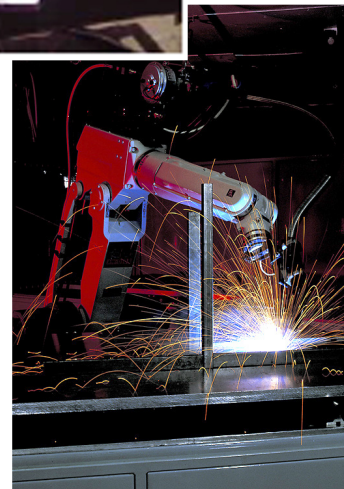
Weighing Cr(VI) pigment for colored glass production (courtesy National Institute for Occupational Safety and Health (NIOSH))



Filling molds in a foundry (courtesy National Institute for Occupational Safety and Health (NIOSH))



An employee welds a stainless steel flange using a tungsten inert gas (TIG) welding process (courtesy Bath Iron Works).



Resources

For the full text of OR-OSHA's hexavalent chromium standard, refer to Division 2/Z, 1910.1026 and Division 3/Z, 1926.1126. Division 4 references back to Division 2. Rules are found at OR-OSHA's Web site, www.orosha.org/rules_laws.html.

Related resource links

Federal OSHA

www.osha.gov/SLTC/hexavalentchromium/index.html

www.osha.gov/Publications/OSHA_small_entity_comp.pdf

NIOSH

www.cdc.gov/niosh/topics/hexchrom/

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Division 3/Z
Division 4/Z
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The Standards and Technical Resources Section of Oregon OSHA produced this fact sheet to highlight our programs, policies, or rules. The information is from the field staff, research by the technical resources staff, and published materials. We urge readers to also consult the rules as this fact sheet information is not as detailed.

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