

# Airgas<sup>®</sup>

an Air Liquide company

## Hexavalent Chromium Cr(VI)



### Protect yourself and your workers from exposure

The Hexavalent Chromium Cr(VI) Standard issued by Occupational Safety and Health Administration (OSHA) states the permissible exposure limit (PEL) for Cr(VI) is  $5\mu\text{g}/\text{m}^3$  (micrograms per cubic meter) as an eight-hour time weighted average (TWA). The action level is  $2.5\mu\text{g}/\text{m}^3$  calculated as an eight-hour TWA. There are three standards for different industries — general, construction and shipyards. The respiratory protection requirements for each standard are similar and require a respiratory protection program, including respirator selection to be in compliance with OSHA 1910.134. For a complete copy of the standard, please refer to OSHA's website at [osha.gov](http://osha.gov).

[Airgas.com](http://Airgas.com)

## What personal protective equipment is available to protect me from the risks of hexavalent chromium exposure?

### Respiratory protection

When an employee's eight-hour exposure to the PEL of  $5\mu\text{g}/\text{m}^3$  cannot be reduced through engineering or administrative controls, employers shall provide respiratory protection for their workers. RADNOR®, 3M and other brands of respiratory protection products are available to help protect against Cr(VI) exposure:

- N95 filters may be used where no oil aerosols are present
- R or P95 filters may be used where oil aerosols are present (refer to packaging for time use limitations)
- Filtering facepiece respirators and half facepiece respirators with appropriate filters may be used up to 10 x PEL of  $5\mu\text{g}/\text{m}^3$  when qualitatively or quantitatively fit tested
- Full facepiece respirators with appropriate filters may be used up to 10 x PEL of  $5\mu\text{g}/\text{m}^3$  when qualitatively fit tested and may be used up to 50 x PEL of  $5\mu\text{g}/\text{m}^3$  when quantitatively fit tested
- Loose-fitting facepieces may be used up to 25 x PEL of  $5\mu\text{g}/\text{m}^3$
- Tight-fitting facepieces, hoods and helmets with supplied air or powered air purifying respirators may be used up to 1000 x PEL of  $5\mu\text{g}/\text{m}^3$

### Protective work clothing and equipment

Where hazards are present or likely to be present from skin or eye contact with Cr(VI), the employer shall provide appropriate personal protective clothing and equipment. Appropriate personal protective equipment typically includes, but is not limited to, the following: hand protection, eye, face and head protection, protective clothing, footwear, hand soaps and eyewash stations.

### What other products might I need to comply with the standard?

Sampling pumps – Worksites shall be monitored to determine the Cr(VI) exposure in your facility

Fume extractors – When Cr(VI) exposures are above the PEL, determine if fume extractors can help reduce the exposure below the PEL

**Consult with an AIHA accredited laboratory and/or your Airgas Safety Specialist for assistance in selecting the appropriate sampling methods and engineering control alternatives as well as the right personal protective equipment products for your application.**

# Hexavalent chromium Cr(VI)

## What is hexavalent chromium?

A metal particle that can occur naturally in rocks but is most commonly produced by industrial processes like welding, chrome plating and similar operations. Technically speaking, an oxidizer (like hexavalent chromium) can only gain electrons from other elements.

## Where is it found?

Cr(VI) compounds exist in several forms. One is in chromates, often used as pigments for photography, as well as in pyrotechnics, dyes, paints, inks and plastics. They're also found in stainless steel, textile dyes, wood preservatives, leather tanning products, anti-corrosion coatings and cement.

## How does exposure occur?

The primary means of human exposure to hexavalent chromium and chromate salts are inhalation, ingestion and skin



contact. Hexavalent chromium can be inhaled when hexavalent chromium dust, mist or fumes are in the air. Operations include the production of chromate pigments and powders, chromic acid, chromium catalysts, dyes and coatings. Employees who are working near chrome electroplating; those who are welding and hotworking stainless steel, high chrome alloys and chrome-coated metal; applying and

removing chromate-containing paints and other surface coatings are affected as well. Airborne particles of chromium dust can also contaminate hands, clothing, hair, food and beverages. Health effects include lung cancer in workers who breathe airborne hexavalent chromium, irritation or damage to the nose, throat, and lungs (if hexavalent chromium is breathed at high levels), and irritation or damage to the eyes and skin (if hexavalent chromium contacts these organs in high concentrations).

## What industries are affected by Cr(VI)?

According to OSHA, the main industries affected, but not limited to, are:

- Stainless steel fabrication
- Manufacturers of heavy-duty coatings and paints
- Electroplating operations
- Producers of chrome-based pigments

**These safety products must be used in accordance with OSHA regulations, the user instructions, warnings and limitations accompanying each product.**

## How does hexavalent chromium affect me physically?

Breathing in high levels of hexavalent chromium can cause irritation 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) can develop a hole (perforate). Breathing small amounts of hexavalent chromium, even for long periods, does not cause respiratory tract irritation in most people. Some people become allergic to hexavalent chromium so that inhaling chromate compounds can cause asthma symptoms like wheezing and shortness of breath. Some people can also

develop allergic contact dermatitis. This occurs from handling liquids or solids containing hexavalent chromium.

Once a person becomes allergic, brief skin contact causes swelling and a red, itchy rash that becomes crusty and thickened with prolonged exposure. Allergic contact dermatitis is long-lasting and more severe with repeated skin contact. Direct skin contact with hexavalent chromium can cause a non-allergic skin irritation. Contact with non-intact skin can also lead to chrome ulcers. These are small, crusted skin sores with a rounded border. They heal slowly and leave scars.

## What applications are most affected by the standard?

Stainless steel welding operations are affected most, followed by spraying heavy-duty coatings and paints (trains, airplanes, automobiles, boats and ships) as well as chrome plating.

## How does this impact me?

Employers must reassess their respirator program taking into consideration the lower exposure limit. More employers may have to provide respiratory protection to employees and assess the feasibility of engineering controls (such as ventilation). If they have not done so already, employers in the affected industries should make an exposure determination to establish whether or not the standard and its requirements apply and, if so, implement the necessary steps for compliance, including selection of proper respirators.

## What steps does OSHA require for employers to comply?

- Limit eight-hour TWA hexavalent chromium exposure in the workplace to  $5 \mu\text{g}/\text{m}^3$  or less of air
- Perform periodic monitoring at least every six months if initial monitoring shows employee exposure at or above the action level to  $2.5 \mu\text{g}/\text{m}^3$  of air calculated as an eight-hour TWA
- Provide appropriate personal protective clothing and equipment when there is likely to be a hazard present for 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 PEL
- Provide respiratory protection as specified in the standard
- Make medical examinations available to employees within 30 days of initial assignment annually to:
  - those exposed in an emergency situation
  - those who experience signs or symptoms of adverse health effects associated with hexavalent chromium exposure
  - those who are or may be exposed at or above the action level, 30 or more days a year and at termination of employment

## Who should perform exposure determination testing?

Anyone can perform the testing as long as the testing is done by the procedures in the OSHA standard. The equipment can be purchased for testing by the employer. An industrial hygienist can be hired to perform the testing for the employer or the employer can call their insurance company and get a recommendation for the correct action to take. Many insurance companies will even hire an industrial hygienist to perform the testing and send the samples to an accredited lab. This is the recommended course of action throughout the field for many shops. The employer will need to check with their insurance company to verify that they are capable and willing to perform this function.

For additional information  
on hexavalent chromium  
and how it can affect you,  
check out:



OSHA-Safety and  
Health Topics:  
Hexavalent Chromium

<https://www.osha.gov/hexavalent-chromium>