

# HEXAVALENT CHROMIUM



**Hexavalent chromium (Cr(VI))** compounds are a group of chemical substances that contain the metallic element chromium in its positive-6 valence (hexavalent) state. Occupational exposures to Cr(VI) occur during the production of stainless steel, chromate chemicals, and chromate pigments. Cr(VI) exposures also occur during other work activities such as stainless steel welding, thermal cutting, chrome plating, painting, and coating processes. Stripping and painting of aluminum surfaces, such as aircraft fuselages and aluminum castings are of particular concern due to widespread use of zinc chromate primers, which have 'etching' properties that enable better paint adhesion. These primers are also finding increasing application on galvanized steel products, including automobiles.

NIOSH considers all Cr(VI) compounds to be potential occupational carcinogens. An increased risk of lung cancer has been demonstrated in workers exposed to Cr(VI) compounds. Other adverse health effects associated with Cr(VI) exposure include dermal irritation, skin ulceration, allergic contact dermatitis, occupational asthma, nasal irritation and ulceration, perforated nasal septa, rhinitis, nosebleed, respiratory irritation, nasal cancer, sinus cancer, eye irritation and damage, perforated eardrums, kidney damage, liver damage, pulmonary congestion and edema, epigastric pain, and discoloration of the teeth.

Cr(VI) compounds vary in solubility from those that are readily soluble to those which are practically insoluble in water. In 1975 NIOSH documented the carcinogenic effects of water-insoluble Cr(VI) compounds. The NIOSH 1988 testimony to OSHA on the air contaminants standard recommended that all Cr(VI) compounds, regardless of their degree of solubility in water, be considered occupational carcinogens. NIOSH is currently reviewing and evaluating the available information on Cr(VI) compounds including the toxicology, health effects, industrial hygiene, and analytical chemistry literature in order to update its 1975 criteria document on Cr(VI).

## SAMPLING INFORMATION

The OLD OSHA limit (PEL) for general industry was a Ceiling\* of 100 ug/m<sup>3</sup>.  
The OLD OSHA limit (PEL) for construction\*\* was an 8-Hour TWA of 100 ug/m<sup>3</sup>.  
This was also expressed as 0.1 mg/m<sup>3</sup> and, somewhat confusingly, 1 mg/10m<sup>3</sup>.  
The NEW OSHA limit (PEL) for all industries is an 8-Hour TWA of 5ug/m<sup>3</sup>.  
This also implies a new Action Level of one-half of the PEL, or 2.5 ug/m<sup>3</sup>.  
The new regulation became effective on 5/29/2006 (90 days after publication).  
The new PEL will be in force after 8/27/2006 (180 days after publication).  
The OLD NIOSH 7600 Method has a practical quantitation limit of 2.8 ug/m<sup>3</sup>.  
The NEW OSHA ID-215 Method\*\*\* has a practical quantitation limit of 0.5 ug/m<sup>3</sup> (still improving - hoping for 0.1 ug or better).  
BE CAREFUL - OSHA ID-215 Version 1 *incorrectly lists the PEL as 0.5ug/m<sup>3</sup>*.  
Use Version 2.



## Notes:

EMSL provides PVC filters to clients for sampling that meet OSHA sample stability requirements.

Plating and other operations where acidic aerosols are produced can reduce the CrVI on samples to CrIII over time. These samples must be analyzed or buffered within 6 days of sampling. You **MUST** indicate plating operations on the COC.

Stainless-steel welding can reduce the CrVI on samples to CrIII over time. These samples must be analyzed within 8 days of sampling. You **MUST** indicate stainless welding operations on the COC.

Any Cr(VI) in a spray-paint sample on the filter must be extracted additionally with a hot 5% NaOH/7.5% Na<sub>2</sub>CO<sub>3</sub> extraction solution with the mixture of phosphate buffer/Mg(II) (see ID-125 Section 3.5.7.). You **MUST** indicate spray-painting operations on the COC.



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\*\*1910.1000(a)(1)

Substances with limits preceded by "C" - Ceiling Values. An employee's exposure to any substance in Table Z-1, the exposure limit of which is preceded by a "C", shall at no time exceed the exposure limit given for that substance. If instantaneous monitoring is not feasible, then the ceiling shall be assessed as a 15-minute time weighted average exposure which shall not be exceeded at any time during the working day.

\*\* See OSHA Interpretation: [http://www.osha.gov/plh/ohaweb/owidisp/show\\_document?p\\_table=INTERPRETATIONS&p\\_id=21778](http://www.osha.gov/plh/ohaweb/owidisp/show_document?p_table=INTERPRETATIONS&p_id=21778)

\*\*\*OSHA ID-215: <http://www.osha.gov/dts/strmethods/norgand/qd215/qd215.pdf>

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