

## HEXAVALENT CHROMIUM EXPOSURE PROGRAM

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### PURPOSE / SCOPE

Hexavalent Chromium (Cr(VI)) is a heavy metal component of stainless steel. Stainless steel is widely used in industrial processes because of its resistance to corrosion. 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.

The major concern in the mechanical construction industry is the potential for overexposure from fumes created by welding or plasma cutting on stainless steel pipe and ducts, dust from grinding on stainless steel and from skin exposure. In most applications, engineering controls such as using localized exhaust ventilation and good welding work practices will mitigate the chances of overexposure. Respiratory protection will be required when adequate ventilation is not achievable.

It shall be the policy of Winger Companies, herein referred to as Winger, to implement the various requirements of the Chromium Exposure Regulation as required by the U.S. Department of Labor, Occupational Safety and Health Administration §1910.1026. Winger's Chromium Exposure Plan applies to all construction work where an employee may be occupationally exposed to chromium. All work related to construction, alteration or repair is included. Under this plan, construction is to include, but not limited to the following: Fumes from welding processes.

### HEALTH EFFECTS OF OVER-EXPOSURE TO FUMES CONTAINING CHROMIUM AND NICKEL

- ✚ Depending upon the level of exposure, Hexavalent Chromium can irritate the nose, throat and lungs, leading to nasal ulcers, lung cancer, and can cause skin rashes, skin ulcers and permanent eye damage.
- ✚ Stainless Steel contains nickel and chromium. Nickel can cause asthma. Nickel and Chromium can cause cancer. Chromium cancer may not show up for 10 to 40 years.
- ✚ Similar to the effects produced by fumes from other metals.
- ✚ Can cause symptoms such as runny nose, sneezing, coughing, sores in nose and on skin, nausea, headaches, dizziness, and respiratory irritation.
- ✚ Some persons may develop sensitivity to chromium or nickel which can result in dermatitis or skin rash. Prolonged skin contact can result in dermatitis and skin ulcers. Some workers develop an allergic sensitization to chromium. In sensitized workers, contact with even small amounts can cause a serious skin rash. Kidney damage has been linked to high dermal exposures.
- ✚ Chromium can irritate the nose, throat, and lungs. Repeated or prolonged exposure can damage the mucous membranes of the nasal passages and result in ulcers. In severe cases, exposure causes perforation of the septum (the wall separating the nasal passages).
- ✚ Direct eye contact with chromic acid or chromate dusts can cause permanent eye damage.

### EXPOSURE LIMITS

The U.S. Department of Labor establishes maximum limits of exposure to chromium for all workers covered, including a Permissible Exposure Limit and Action Level. The Permissible Exposure Limit, or PEL sets the maximum exposure limit for workers to chromium. The exposure limits for Hexavalent Chromium are as follows:

- ✚ .5 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) of air – When airborne concentrations are at or below this level, the standard is not applicable.

- ✦ 2.5 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) of air – When airborne concentrations are at or above 2.5 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) of air (this is the Action Level), but under 5 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) of air, employers are required to implement certain measures to protect workers from over exposure.
- ✦ 5 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) of air – Airborne concentrations above this level require compliance with more comprehensive requirements of the standard.
- ✦ Regulated areas must be established when an employee's exposure is or is expected to be in excess of the PEL. Regulated areas shall be marked with warning signs to alert employees. Access is restricted to "authorized persons".

Winger will implement an effective engineering and safe work practice controls if the exposure level is above the permissible limit for more than 30 days per year. Medical surveillance must be provided to employees who are exposed above the PEL for 30 days or more per year or exposed in an emergency.

## WINGER INITIAL AIR MONITORING RESULTS

Winger Hexavalent Chromium exposure monitoring results in July of 2006 were recorded at 0.43  $\mu\text{g}/\text{m}^3$  when grinding, and 0.26 and 0.39  $\mu\text{g}/\text{m}^3$  when welding. This testing was implemented by Terracon Engineering and Scientists in the Winger Fab Shop at the Cargill Eddyville facility. Air monitors were placed on the employees shirt lapels and took place over a period of 8 hours. The test results were below the applicable standard level of .5 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) of air.

Tests were also taken in a confined space at the Cargill Eddyville plant on June 3, 2013. Those test results were provided by Galson Laboratories. The test results were recorded at 0.03  $\mu\text{g}/\text{m}^3$ . These tests were well below the applicable standard level of .5  $\mu\text{g}/\text{m}^3$  of air.

## ACTION LEVEL

Action Level is the level at which Winger will begin compliance activities. The Action level, regardless of respirator use, for chromium in this program is an airborne concentration of 50 micrograms per cubic meter as calculated as an 8-hour Time Weighted Average (TWA).

## COMPLIANCE PROGRAM

- ✦ Prior to each job where employee exposure exceeds the PEL, Winger will establish a program to reduce employee exposure to the PEL or below. The compliance program will provide the following:
  - ✦ A description of each activity in which chromium is emitted.
  - ✦ Specific plans to achieve compliance and engineering plans where engineering controls are required.
  - ✦ Information on the technology considered meeting the PEL.
  - ✦ Air monitoring data that document the source of chromium emissions.
  - ✦ A work practice program including regulations for the use of protective work clothing, equipment, housekeeping and hygiene guidelines.
  - ✦ An employee should report to their foreman and Winger Safety Director if they feel:
    - They have been exposed to at or above safe levels
    - Experience symptoms of exposure
    - Are exposed to an emergency situation to an uncontrolled release

## ENGINEERING CONTROLS

- ✚ Ventilation such as local exhaust systems that capture airborne Cr(VI) near its source and remove it from the workplace
- ✚ Local exhaust or shop fans to extract fumes from work areas
- ✚ Dust collection systems with Hepa filters
- ✚ Substitute less toxic material or a process that results in lower exposures for a process that causes higher exposures
- ✚ Isolation such as placing a barrier between employees and source of exposure

## SAFE WORK PRACTICES CONTROLS

Safe work practices require maintenance of separate hygiene facilities (change rooms, showers, hand wash facilities and lunch areas), and require proper housekeeping practices.

## HOW TO PROTECT AGAINST OVER-EXPOSURE

- ✚ Use enough ventilation or exhaust at the arc or both to keep fumes and gases from your breathing zone and general area.
- ✚ Use localized exhaust ventilation to remove fumes and gases at their source in still air. Keep the exhaust trunk / hood as close to the fume source as possible in order to keep fumes and gases from your breathing zone.
- ✚ Use air blowers to draw fumes away from you and your immediate work area.
- ✚ If ventilation is questionable, use air sampling to determine the need for corrective measures.
- ✚ OSHA says you must remove all paint and solvents before welding or torch cutting. Follow written instructions. Make sure all residues are removed.
- ✚ Use the safest welding method for the job. Stick welding makes much less fume than flux core welding. Tig welding reduces Cr(VI) emissions by 90%.
- ✚ Use welding rods that produce a low fume. 90% of the fume can come from the rod. Larger diameter rods produce much higher emissions than electrodes of smaller diameter. Welding guns that extract fumes can capture 95% of the fume.
- ✚ In a confined space, follow all the OSHA confined space rules – like air monitoring, not storing torches in the space, and ventilation.
- ✚ Do not breathe fumes and gases. Keep your head out of the smoke plume.
- ✚ Use proper Protective Protection Equipment.
- ✚ Position your welding hood so that fumes will not rise up under it and into your breathing zone.
- ✚ If the ventilation is not adequate, such as confined spaces, respiratory protection is required.
- ✚ When respiratory protection is required, be sure that you have the required training and proper respirator before starting work.
- ✚ Implement good housekeeping procedures. Keep area as free as practicable of accumulations of chromium dust and buildup.
- ✚ Vacuums with Hepa filters should be used to keep dust emissions at a minimum.
- ✚ Do not blow dust from clothing with air hose. Doing so can embed the dust particles into your skin and eyes and expose others to airborne particles.
- ✚ Wash hands and face at the end of every shift and before eating, drinking, smoking, chewing gum, applying cosmetics or using the bathroom.
- ✚ Never eat or drink in areas where Hexavalent Chromium may come in contact with your food, skin or eyes.
- ✚ Keep exposure as low as possible.

## PROTECTIVE CLOTHING AND EQUIPMENT

Winger will provide and ensure the proper use of personal protective equipment where employees are exposed to chromium above the PEL.

- ✦ Wear long-sleeved shirt, welding jacket or welding sleeves
- ✦ Wear long pants
- ✦ Tyvek suits if necessary
- ✦ Wear welding gloves
- ✦ Wear safety glasses or goggles
- ✦ Wear a face shield over eye protection when grinding
- ✦ Wear a welding helmet over eye protection when welding
- ✦ Wear appropriate respirator when needed

## RESPIRATORS

Engineering and safe work practice controls should be provided to reduce exposure to the lowest feasible level. When engineering and administrative controls do not reduce hazards below the OSHA's permissible exposure level (PEL), employees must wear respirators. Winger will provide respiratory protection for the employee at no cost, and must ensure that the respirator is used when:

- ✦ Employee exposure to chromium exceeds the PEL.
- ✦ The employee requests a respirator.
- ✦ Employees must be medically evaluated, respirator fit tested and trained before being issued and instructed to wear a respirator.

## RECORD KEEPING

Winger will establish and maintain an accurate record of all monitoring and other data used to conduct employee exposure assessments. Effective management of worker safety and health protection is a decisive factor in reducing the extent and severity of work related injuries and illnesses and their related costs. Winger is committed to this process.

## TRAINING

Winger has established a training program to educate our employees of this hazard. This topic is also included in the Winger Employee Safety Handbook issued during Winger orientation.

## **SOURCE CREDITS**

U.S. Department of Labor, Occupational Safety and Health Administration, [www.osha.gov](http://www.osha.gov)  
Mechanical Contractors Association of America, [www.mcaa.org](http://www.mcaa.org)  
The ESAB Group, Inc., [www.esabna.com](http://www.esabna.com)  
John Deere  
Agency for Toxic Substances and Disease Registry, [www.atsdr.com](http://www.atsdr.com)  
U.S. Department of Health and Human Services, CDC, NIOSH  
Airgas, Inc., [www.airgas.com](http://www.airgas.com)  
Lincoln Electric, [www.lincolnelectric.com](http://www.lincolnelectric.com)  
Terracon Consultants, Inc.

## **DOCUMENT CONTROL**

Initial Program November 30, 2007  
Revised February 27, 2009  
Revised January 16, 2012  
Revised February 27, 2013  
Revised April 2, 2013  
Revised May 28, 2015  
Revised October 19, 2016  
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