Title: Metal Welding, Thermal Cutting, Grinding – Respiratory Protection and Ventilation

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<th>Function: Environmental, Health and Safety</th>
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<td>No.: BCF020.057</td>
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<td>Reviewed: 05/16 Effective: 11/09 Supersedes: IH #6</td>
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Preparer: Site Safety Representative
Owner: Manager, Environ, Health & Safety
Approver: VP and Gen. Mgr., Freeport

RECORD OF REVISIONS

<table>
<thead>
<tr>
<th>Date</th>
<th>Rev #</th>
<th>Details of Change</th>
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| 09/09| 0     | • Reformatted Industrial Hygiene Standard #6 (formerly “Hexavalent Chromium VI Program”) and changed it to Safety Standard BCF020.057, “Metal Welding, Thermal Cutting, Grinding – Respiratory Protection and Ventilation.

• Updated Attachment A (formerly Attachment 1) based on current industrial hygiene monitoring data for metal fumes and hexavalent chromium during metal welding, thermal cutting, and grinding operations. |
1. PURPOSE

The purpose of this procedure is to ensure that work activities associated with metal welding, thermal cutting, and grinding meet the respiratory protection and ventilation requirements of applicable OSHA Standards.

2. DEFINITIONS

2.1. APR

Air-purifying respirator.

2.2. ASR

Air-supplied respirator

2.3. Assigned Protection Factor

Assigned protection factors (APFs) are numbers that indicate the level of workplace respiratory protection that a respirator or class of respirators is expected to provide to employees when used as part of an effective respiratory protection program.

Typical APFs for common types of respirators are shown below. Check with the respirator manufacturer to verify the APF for a specific respirator.

<table>
<thead>
<tr>
<th>Type of Respirator</th>
<th>½ Face piece</th>
<th>Full Face piece</th>
<th>Helmet or Hood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air-Purifying Respirator (APR)</td>
<td>10</td>
<td>50</td>
<td>N/A</td>
</tr>
<tr>
<td>Powered Air-Purifying Respirator (PAPR)</td>
<td>50</td>
<td>1,000</td>
<td>25 to 1,000</td>
</tr>
<tr>
<td>Air-Supplied Respirator (ASR) – Continuous Flow Mode</td>
<td>50</td>
<td>1,000</td>
<td>25 to 1,000</td>
</tr>
<tr>
<td>ASR – Pressure-Demand Mode</td>
<td>50</td>
<td>1,000</td>
<td>N/A</td>
</tr>
<tr>
<td>Self-Contained Breathing Apparatus (SCBA) – Pressure-Demand Mode</td>
<td>N/A</td>
<td>10,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>

2.4. Authorized Person

Any person specifically authorized by the employer whose duties require the person to enter a regulated area.
2.5. Employee Exposure

Employee exposure to airborne metal fumes, which would occur if the employee were not wearing respiratory protective equipment.

2.6. GMAW

Gas metal arc welding. Also known as metal inert gas (MIG) welding or metal active gas (MAG) welding.

2.7. GTAW

Gas tungsten arc welding. Also known as tungsten inert gas (TIG) welding or heliarc welding

2.8. Grinding – Incidental vs. Non-Incidental

Non-incidental grinding is grinding that is performed by one worker during one work shift and is performed for 4 hours or more. "Incidental" grinding is the periodic grinding that is performed as part of a welding or thermal cutting task.

2.9. Historical Monitoring Data

Industrial hygiene monitoring data obtained during work operations conducted under workplace conditions closely resembling the processes, types of material, control methods, work practices, and environmental conditions that are in the current operations. (Ref: OSHA 1910.1026(b))

2.10. Objective Data

Industrial hygiene monitoring data from industry-wide surveys or calculations based on the composition or chemical and physical properties of a substance demonstrating the employee exposure to metal fumes associated with a particular product or material or a specific process, operation, or activity. The data must reflect workplace conditions closely resembling the processes, types of material, control methods, work practices, and environmental conditions that are in the current operations. (Ref: OSHA 1910.1026(b))
2.11. **Permissible Exposure Limit (PEL)**

The airborne concentration of a metal fume, usually expressed in milligrams per cubic meter of air, established and enforced by the Occupational Safety and Health Administration.

2.12. **PAC**

Plasma arc cutting.

2.13. **Poorly Ventilated Area**

Includes, but is not limited to, (1) a space of less than 10,000 cubic feet per welder, (2) a room having a ceiling height of less than 16 feet, (3) a space where partitions, balconies, or other structural barriers significantly obstruct cross ventilation. (Ref: OSHA 1910.252(c))

2.14. **Regulated Area**

Any area, demarcated by the employer, where airborne concentrations of metal fumes exceed or can reasonably be expected to exceed, the permissible exposure limit(s).

2.15. **SMAW**

Shielded metal arc welding. Also known as manual metal arc (MMA) welding or stick welding.

3. **SCOPE**

This procedure applies to work performed by Maintenance, Instrument, Electrical, Operations, or Contract personnel in plant areas where the potential for metal fume exposure exists. This includes metal welding, thermal cutting, and grinding.

This procedure applies to the respiratory protection and ventilation controls that may be needed to control employee exposure to below the permissible exposure limits for metal fumes.
There are other safety and health issues associated with metal welding, thermal cutting, and grinding operations that are not addressed by this procedure and which may require additional control measures. These other issues include, but are not limited to, hot work, confined space entry, hearing conservation, non-ionizing radiation (UV light), and lifting.

4. REQUIREMENTS

4.1. General

4.1.1. When work permits are issued for metal welding, thermal cutting, and/or grinding operations, the Permit Acceptor (contractor or BASF employee) is responsible for knowing and using the correct respiratory protection and ventilation required by this procedure. The Permit Issuer is responsible for advising the Permit Acceptor of area and process-related hazards, if any, associated with the task.

4.1.2. Attachment A contains the detailed requirements for respiratory protection and for ventilation for metal welding, thermal cutting, and grinding operations for various base metals, welding/cutting methods, and environmental conditions.

4.1.3. Attachment B is a form to request variances from the requirements found in Attachment A.

NOTE: Compressed oxygen shall never be used to provide ventilation for any metal welding, thermal cutting, or grinding operations.

4.2. Additional Special Requirements

See OSHA 29 CFR 1910.252 and/or contact a Texas Hub EHS Specialist for other requirements that apply to the following operations:

- Operations utilizing filler metals that contain cadmium
- Operations with brazing or gas welding fluxes that contain fluorine compounds
- Operations with lead-based metals
- Operations with beryllium-containing base or filler metals
- Operations with mercury-bearing materials
- Degreasing operations that are in close proximity to welding
5. RESPONSIBILITIES

5.1. Site Leadership Team

Has primary responsibility for implementation of this procedure.

5.2. Health and Safety Team Leader

Has primary responsibility for the initiation, re-issuance, administration, and/or interpretation of this procedure.

5.3. Employees and Contractors

Have primary responsibility for adherence to procedure including identifying deficiencies in the procedure, and identifying, reporting and correcting activities not in compliance with the procedure.

Employees and contractors who perform metal cutting, welding, and grinding operations are responsible for knowing and using the correct respiratory protection and ventilation required by this procedure.

6. RELATED DOCUMENTS

OSHA 29 CFR 1910.1026 and 1926.1126 – Chromium (VI)

OSHA 29 CFR 1910.252 – Welding, Cutting, and Brazing-General Requirements

OSHA 29 CFR 1926.353 – Ventilation and Protection in Welding, Cutting, and Heating

OSHA 29 CFR 1926.1127 – Cadmium

OSHA 29 CFR 1910.1025 and 1926.62 – Lead

Freeport Site Standard BCF020.056 – Hexavalent Chromium Compliance

Freeport Site Standard BCF020.013 – Respiratory Protection

Freeport Site Standard BCF020.053 – Occupational Exposure to Lead
7. ATTACHMENTS

**BCF020.057 Attachment A** – Minimum Respiratory Protection Requirements for Metal Welding, Thermal Cutting, Grinding Operations

**BCF020.057 Attachment B** – Metal Cutting, Welding, and Grinding Operations Variance Request Form