Protecting Workers from the Hazards of Abrasive Blasting Materials

Abrasive blasting uses compressed air or water to direct a high velocity stream of an abrasive material to clean an object or surface, remove burrs, apply a texture, or prepare a surface for the application of paint or other type of coating. Employers must protect workers from hazardous dust levels and toxic metals that may be generated from both the blasting material and the underlying substrate and coatings being blasted. This fact sheet provides information on abrasive blasting material, health hazards, and methods to protect workers.

**Abrasive Blasting Materials**
The decision to use a certain type of abrasive material can depend on factors such as cost, job specifications, environment, and worker health.

Commonly used abrasive materials:

- Silica sand (crystalline)
- Coal slag
- Garnet sand
- Nickel slag
- Copper slag
- Glass (beads or crushed)
- Steel shot
- Steel grit
- Specular hematite (iron ore)

Alternative, less toxic blasting materials include:

- Ice cubes
- Dry ice
- Plastic bead media
- Sponge
- Sodium bicarbonate (baking soda)

- Ground walnut shells, ground corn cob and other biodegradable materials
- High pressure water

**** CAUTION ****
Abrasive blasting creates high levels of noise that can cause substantial hearing loss. Always wear hearing protection. Employers must administer a hearing conservation program as required by the OSHA Occupational Noise standard.

**Health Hazards**
Abrasive blasting operations can create high levels of dust and noise. Abrasive material and the surface being blasted may contain toxic materials (e.g., lead paint, silica) that are hazardous to workers.

- Silica sand (crystalline) can cause silicosis, lung cancer, and breathing problems in exposed workers.
- Coal slag and garnet sand may cause lung damage similar to silica sand (based on preliminary animal testing).
- Copper slag, nickel slag, and glass (crushed or beads) also have the potential to cause lung damage.
- Steel grit and shot have less potential to cause lung damage.
- Slags can contain trace amounts of toxic metals such as arsenic, beryllium, and cadmium.
How to Protect Workers from Exposure to Abrasive Blasting Materials

Each abrasive blasting operation is unique, involving different surfaces, coatings, blast material, and working conditions. Before beginning work, employers should identify the hazards and assign a knowledgeable person trained to recognize hazards and with the authority to quickly take corrective action to eliminate them. Use engineering and administrative controls, personal protective equipment (PPE), including respiratory protection, and training to protect workers involved in abrasive blasting activities. Engineering controls, such as substitution, isolation, containment, and ventilation are the primary means of preventing or reducing exposures to airborne hazards during abrasive blasting operations. Administrative controls, including the use of good work and personal hygiene practices, can also reduce exposure. When engineering and administrative controls cannot keep exposures to hazardous materials below OSHA permissible exposure limits, respiratory protection must be used.

Engineering Controls

1. Substitution
   • Use a less toxic abrasive blasting material.
   • Use abrasives that can be delivered with water (slurry) to reduce dust.

2. Isolation and Containment
   • Use barriers and curtain walls to isolate the blasting operation from other workers.
   • Use blast rooms or blast cabinets for smaller operations.
   • Use restricted areas for non-enclosed blasting operations.
   • Keep coworkers away from the blaster.

3. Ventilation
   • Use exhaust ventilation systems in containment structures to capture dust.

Administrative Controls

Perform routine cleanup using wet methods or HEPA filtered vacuuming to minimize the accumulation of toxic dusts.

   • Do not use compressed air to clean as this will create dust in the air.
   • Clean and decontaminate tarps and other equipment on the worksite.
   • Schedule blasting when the least number of workers are at the site.
   • Avoid blasting in windy conditions to prevent the spread of any hazardous materials.

Personal Hygiene Practices

   • Prohibit eating, drinking, or using tobacco products in blasting areas.
   • Provide wash stations so workers can wash their hands and face routinely and before eating, drinking, or smoking.
   • Vacuum or remove contaminated work clothes before eating, drinking or smoking.

Employers can use OSHA’s free On-site Consultation Program for advice on safety and health issues.
• Provide accommodations for end-of-shift showers and change areas with separate storage facilities for street clothes, protective clothing and equipment.
• Keep contaminated clothing and equipment out of the clean change area.

**Respiratory Protection**

An abrasive-blasting respirator must cover the wearer’s head, neck, and shoulders to protect the wearer from rebounding abrasive. Workers must use only respirators approved by NIOSH to provide protection from dusts produced during abrasive-blasting operations.

• Type CE NIOSH-certified blasting airline respirator with positive pressure blasting helmet.

Support personnel involved in cleanup and other related activities may also need respiratory protection.

When respirators are used, employers must establish a comprehensive respiratory protection program as required by the OSHA Respiratory Protection standard (29 CFR 1910.134).

**Personal Protective Equipment**

• Hearing protection
• Eye and face protection
• Helmet
• Leather gloves that protect to full forearm and aprons (or coveralls)
• Safety shoes or boots

**Worker Training and Hazard Communication**

• Provide training to abrasive blasters and support personnel on blasting health and safety hazards, how to use controls, personal hygiene practices, safe work practices and the use of PPE and respirators.
• Manufacturers are required to include appropriate health hazard information on the blasting materials on safety data sheets (SDS) as required under OSHA's Hazard Communication standard (29 CFR 1910.1200).
• Obtain and read the manufacturer’s SDS for health hazard information on the abrasive blasting material you are using.

For more information on abrasive blasting and control measures see: OSHA's guidance document: “Abrasive Blasting Hazards in Shipyard Employment” (2006); and eTool: Mechanical Removers (Ship Repair).

Disclaimer: This OSHA Fact Sheet provides a general overview of the requirements in OSHA standards related to abrasive blasting. It does not alter or determine compliance responsibilities in these standards or the Occupational Safety and Health Act of 1970. Since interpretations and enforcement policy may change over time, the reader should consult current OSHA interpretations and decisions by the Occupational Safety and Health Review Commission and the courts for additional guidance on OSHA compliance requirements.
Applicable OSHA Standards and Safety and Health Topic Pages

The following table provides links to several OSHA standards (not all-inclusive) that may contain requirements that apply to abrasive blasting operations. For example, the removal of lead paint by abrasive blasting will likely require employers to follow provisions of the OSHA Lead standard. Safety and health topic pages listed here provide employers and workers with information that may be useful for safely conducting abrasive blasting.

<table>
<thead>
<tr>
<th>General Industry</th>
<th>Shipyard Industry</th>
<th>Construction Industry</th>
<th>OSHA Topics Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910.94, Ventilation</td>
<td>1915.33 &amp; 1915.34, Chemical &amp; Mechanical paint removers</td>
<td>1926.57, Ventilation</td>
<td>Ventilation (as it applies to shipyard employment, 1910.94)</td>
</tr>
<tr>
<td>1915.13, Cleaning and other cold work</td>
<td>1910.95, Occupational noise exposure (as per Shipyard “Tool Bag” Directive, CPL 02-00-182)</td>
<td>1926.52, Occupational noise exposure</td>
<td>Noise</td>
</tr>
<tr>
<td>1915.134, Personal Protective Equipment</td>
<td>1915 Subpart I, Personal Protective Equipment</td>
<td>1926 Subpart E, Personal Protective Equipment</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>1910.141, Sanitation</td>
<td>1915.88, Sanitation</td>
<td>1926.51, Sanitation</td>
<td>Permissible Exposure Limits (PELs) &amp; Hazardous and Toxic Substances</td>
</tr>
<tr>
<td>1910.1000, Air contaminants Table Z-1, Limits for air contaminants Table Z-2, Toxic and Hazardous Substances Table Z-3, Mineral dusts</td>
<td>1915.1000, Air contaminants Table Z – Shipyards</td>
<td>1926.55, Gases, vapors, fumes, dusts, and mists Appendix A, Threshold limit values of airborne contaminants for construction</td>
<td>Beryllium</td>
</tr>
<tr>
<td>Beryllium See 1910.1000, Table Z-1 for air contaminants</td>
<td>Beryllium See 1915.1000, Table Z</td>
<td>Beryllium See 1926.55, Appendix A</td>
<td>Beryllium</td>
</tr>
<tr>
<td>Silica See 1910.1000, Table Z-3</td>
<td>Silica See 1915.1000, Table Z</td>
<td>Silica See 1926.55, Appendix A</td>
<td>Silica</td>
</tr>
<tr>
<td>1910.1025, Lead</td>
<td>1915.1025, Lead</td>
<td>1926.62, Lead</td>
<td>Lead (General Industry) Lead (Construction)</td>
</tr>
<tr>
<td>1910.1026, Chromium(VI)</td>
<td>1915.1026, Chromium(VI)</td>
<td>1926.1126, Chromium(VI)</td>
<td>Hexavalent Chromium</td>
</tr>
<tr>
<td>1910.1027, Cadmium</td>
<td>1915.1027, Cadmium</td>
<td>1926.1127, Cadmium</td>
<td>Cadmium</td>
</tr>
</tbody>
</table>