Stop Silicosis In Sandblasters Use Silica Substitutes

Something is still killing sandblasters. It is a lung disease called silicosis, and it is preventable. The disease and its cause have been recognized for decades; yet many sandblasters still contract this debilitating and deadly disease caused by the inhalation of silica sand dust.

Because controlling a sandblaster's exposure to silica dust is apparently so difficult, one way of reducing the risk of silicosis to this segment of the work population is by substituting a less toxic material for silica sand during abrasive blasting operations.

Great Britain and the European Economic Community have restricted the use of silica sand as an abrasive blasting material since 1949, and 1966, respectively. The National Institute of Occupational Safety and Health (NIOSH) has recommended since 1974 that silica sand (or other substances containing more than one percent free silica) be prohibited as an abrasive blasting material and that less hazardous substitutes be used.

There are a number of materials available as alternative abrasive blasting media. The major substitute materials are listed inside this bulletin along with some information about each. Additional information regarding particular applications should be obtained from the distributors of the various substitute materials.

Note that the cost per ton is misleading when compared to silica sand because many of the listed substitutes are recyclable and can therefore be reused. A more useful index of actual cost is price per square foot. A formula used in the industry to calculate the cost per square foot is presented on the last page of this bulletin. The real cost will vary depending on the particular application and factors associated with each job. When compared to silica sand in this manner, you will find that the costs of some silica substitutes are competitive.

The health effects of many of the silica substitutes have not been determined, and the materials removed by abrasive blasting are often very hazardous. It is therefore important to remember that no matter what abrasive blasting material you use, you must still employ appropriate control measures (e.g. containment, ventilation, and filtration) as well as provide workers with training and effective personal protective equipment (e.g. respirators and clothing).

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	PRICE*	SPECIAL EQUIPMENT	PROPERTIES
ALUMINUM OXIDE	$660/Ton	None Required (Usually Used in Cabinets or Rooms with Recycling Equipment	Closely Sized Very Hard (MOH 8.5-9)
BAKING SODA (Sodium Bicarbonate)	$900/Ton	Yes (Meters Less Product/Min and Dries Air)	Natural (Flow and Rinse Agents Added) Water Soluble Non-Sparking Non-Flammable
COAL SLAG	$44/Ton	None Required	Hard (MOH 6-7) Angular Uniform Density Low Friability
COPPER SLAG	$50/Ton	None Required	Hard (MOH 7-8) Blocky Sharp Edged
CORN COB GRANULES	$350/Ton	Special Ventilation May Be Required in Enclosed Areas to Control Combustion	Medium Hardness (MOH 4.5) Non-Sparking
DRY ICE (Carbon Dioxide)	$60-80/Ton	Dry Air Required	Natural Gas in Solid State
GARNET	$325/Ton	None Required (Additional components required in order to recycle Media)	Very Hard (MOH 8) Very Heavy (S.G. 4.1) Subangular
GLASS BEADS	$500/Ton	None Required (Usually Used in Blast Cabinets with Recycling Equipment)	Manufactured of Soda Lime Glass
NICKEL SLAG	$70/Ton	None Required	Very Hard (MOH 7-8) Blocky Sharp Edged

NUT SHELLS	$360/Ton	Special Ventilation May Be Required in Enclosed Areas to Control Combustion	Soft Non-Sparking
OLIVINE	$76/Ton	None Required	Natural Mineral Hard (MOH 6.5-7) High Specific Gravity, Angular
PLASTIC MEDIA	$3000-4000/Ton	None Required (Additional Components Required in Order to Recycle Media)	Soft Non-Abrasive Polyester, Urea, Melamine Varieties
STAUROLITE	$75-140/Ton	None Required (Additional Components Required in Order to Recycle Media)	Rounded Grains Hard (MOH 6.5-7) Irregular Shape
STEEL GRIT & SHOT	$425-475/Ton	None Required (Additional Components Required in Order to Recycle Media)	Uniform Size Uniform Hardness Can be Manufactured to Various Specifications

Silica Substitutes continued ...

	APPLICATIONS	**ADVANTAGES**
ALUMINUM OXIDE	Cleaning Hard Metals (e.g. Titanium) Removing Metal Etch Glass Carve Granite	Recyclable
BAKING SODA (Sodium Bicarbonate)	General Paint Removal Stripping Aircraft Skins Cleaning Surfaces in Food Processing Plants Removing Paint from Glass	Less Material Used/Less Cleanup Low Nozzle Pressures (35-90 PSI) Non-Sparking Water Soluble

COAL SLAG	General Paint, Rust & Scale Removal from Steel Paint Removal from Wood Exposure of Aggregates	Less Than 1% Free Silica Inert Fast Cutting Creates Anchor Profile
COPPER SLAG	General Paint, Rust & Scale Removal from Steel Paint Removal from Wood	Rapid Cutting
CORN COB GRANULES	Deburring Paint & Rust Removal from Wood & Metal	Low Consumption Low Dust Levels Biodegradable
DRY ICE (Carbon Dioxide)	Cleaning Aircraft Parts Cleaning Exotic Metals	No Residue Remains Minimal Cleanup
GARNET	General Paint, Rust & Scale Removal from Steel	Lower Nozzle Pressures (60-70 PSI) Low Dust Levels Fast Cleaning Rates Can be Recycled 6-7 Times Low Free Silica
GLASS BEADS	Cleaning & Polishing Deburring	Uniform Size and Shape Recyclable Provide High Luster Polished Surface
NICKEL SLAG	General Paint, Rust & Scale Removal from Steel	Rapid Cutting
NUT SHELLS	Cleaning Soft Materials (e.g. Aluminum, Plastic, Wood) Cleaning Surfaces in the Petroleum Industry	High Removal Speed Non-Sparking Low Consumption
OLIVINE	Clean Light Mill Scale & Rust from Steel 2.5 MIL Profile & Finer	Low Chloride Ion Level Low Conductivity
PLASTIC MEDIA	Cleaning Soft Metals & Composites Cleaning Metal Fabric Screens	Inert Recyclable Does Not Damage Metal Surfaces Low Nozzle Pressures (20-40 PSI)
STAUROLITE		

	Cleaning Corroded, Pitted, Weathered Steel Creating Anchor Profile on New Steel	Lack of Imbedment Good Feathering Low Dust Levels Recyclable 3-4 Times
STEEL GRIT & SHOT	Paint, Rust & Scale Removal from Steel Surface Preparation of Structural Steel in Centrifugal Wheel Units	Can be Recycled 100-200 Times Low Dust Levels Superior Visibility Portable Blast Rooms Available Creates Anchor Profile

Silica Substitutes continued ...

	LIMITATIONS
ALUMINUM OXIDE	Must be Reclaimed and Reused for Economy
BAKING SODA (Sodium Bicarbonate)	May Damage Soft Brick
COAL SLAG	Tendency to Imbed in Mild Steel May Contain Toxic Metals
COPPER SLAG	Tendency to Imbed in Mild Steel May Contain Toxic Metals
CORN COB GRANULES	Does Not Create an Anchor Profile
DRY ICE (Carbon Dioxide)	
GARNET	
GLASS BEADS	Does Not Create an Anchor Profile
NICKEL SLAG	Tendency to Imbed in Mild Steel, Poor Visibility, Might React with Corrosion Inhibitors Used in Wet Blasting May Contain Toxic Metals
NUT SHELLS	Non-Etching Potential Fire Hazard
OLIVINE	
PLASTIC MEDIA	Anchor Profile Limited to Soft Substrates (e.g. Aluminum and Plastic)
STAUROLITE	May Contain Up to 5% Free Silica
STEEL GRIT & SHOT	

Prices are only NJDOH estimates based on the best information available in 1994.

COST PER SQUARE FOOT

A formula for calculating the cost of abrasive blasting per square foot of surface area:

$$\left(\frac{(A*B) + C + D}{X}\right) + E = \text{Actual Cost}$$

where:

A =	delivered cost of abrasive media	$\left(\frac{\$}{\text{TON}}\right)$
B =	consumption rate	$\left(\frac{\text{TONS}}{\text{HOUR}}\right)$
C =	labor cost	$\left(\frac{\$}{\text{HOUR}}\right)$
D =	equipment cost	$\left(\frac{\$}{\text{HOUR}}\right)$
E =	productivity	$\left(\frac{\text{SQUARE FEET}}{\text{HOUR}}\right)$
F =	miscellaneous (e.g. disposal costs)	$\left(\frac{\$}{\text{SQUARE FOOT}}\right)$

FOR MORE INFORMATION CONTACT

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