

## Myth Buster: True or False – Glass dust is dangerous to breathe

Tim O'Connell – Rescue 42 – May 2019

### Answer: False

I can hear your thoughts; “What? You’re crazy! Impossible. My Captain says glass dust will kill you!”

But I’m correct. Glass dust produced by cutting auto glass may be mildly irritating to your eyes and lungs, but it’s no more dangerous than any other dust such as dust from a dirt road. Now I’ll prove it.

When we use The Ripper™ (<https://rescue42.com/the-ripper/>) to cut the now-mandatory laminated side windows on highway vehicles to access a dying child in a hot car, a heart attack or non-breathing patient, or to rescue a victim from a burning car, we generate two types of glass particles;

- Glass chips/shards, which are large chunks of glass. They are sharp and dangerous, but are very heavy and don’t go airborne
- Glass dust or fine powder, which can become airborne and get in rescuer/victim’s eyes and respiratory tracts

The chips/shards aren’t much of a problem because they are so heavy that they just fall to the ground, but the dust can go everywhere. This paper discusses the dust, and what the danger is of breathing it or getting some in our eyes.

First and foremost, our lungs and eyes like clean, fresh air. They don’t like any particulates, whether it’s smoke, airborne dirt/dust from a dirt road or glass dust from cutting side windows on a car or truck. I am not in any way saying you should intentionally breathe glass dust or any other dust. Wear eye protection and an N95 mask if you have time. This paper is about what concerns you should have about your own or a trapped victim’s health if you do breathe some glass dust, and whether you need to risk delaying your rescue and risk your patient’s life to protect your airway.

I’ll start with an analogy that may help. I’m a Fireman, and I know a lot about smoke. I know that smoke from a burning car is extremely dangerous, and even a small amount can hurt me. I will take as much time as necessary to don my Breathing Apparatus to protect my eyes and lungs from getting exposed to that dangerous smoke. However, when I go camping, I often get wood smoke from the campfire in my eyes and lungs. While it’s also smoke, burns my eyes and irritates my lungs, I’m not too concerned that it is dangerous or that small amounts will hurt me. They’re both “smoke”, but I can safely treat them differently, and I’m not going to start wearing a Breathing Apparatus to roast a marshmallow.

Silica (Silicon Dioxide SiO<sub>2</sub>), is one of the most prevalent chemicals on our planet. It is found in Quartz, rock, diatomaceous earth and beach sand. In its natural form it is **Crystalline** Silica, and these crystals are generally too big to harm us. When ground, cut, crushed or drilled, a very fine powder is formed. Crystalline Silica in this small size is extremely dangerous to humans. Breathing it can cause Silicosis, severe lung problems and cancer. OSHA has very strict guidelines about exposure to Crystalline Silica.

Very finely powdered Crystalline Silica sand is used to manufacture glass, which means that glass making is a hazardous process. However, when the Crystalline Silica crystals are melted, they change form to **Amorphous** Silica (Non-Crystalline Silica). When this melted mass of Amorphous Silica is rapidly cooled, glass is formed. In fact, chemists call this crystal-melting process “glass transition”, which is where the name for glass comes from. Window glass is simply solidified Amorphous Silica. If it were still crystalline you wouldn’t be able to see through it.

When we cut glass, we don’t produce Crystalline Silica dust. We produce Amorphous Silica dust, which is not hazardous to breathe or get in your eyes. OSHA classifies Amorphous Silica as just an “irritant dust”, which is the same as regular dust from airborne dirt – and smoke from a campfire. All regulations about breathing dangerous levels of Silica are referring to Crystalline Silica, not Amorphous Silica.

While the Federal NIOSH airborne limit for the very dangerous Crystalline Silica is only 0.05mg/m<sup>3</sup>, the IDLH on Amorphous Silica is a whopping 3000mg/m<sup>3</sup>, which is 60,000 times higher than Crystalline Silica. The EPA states “None of the available reports on Amorphous Silica allow for the development of a concentration-response relationship and the establishment of a NOAEL (no-observed-adverse-effect-level). The development of silicosis... is the result of concurrent exposure to Crystalline Silica”.

- **US Environmental Protection Agency - Ambient Levels and Noncancer Health Effects of Inhaled Crystalline and Amorphous Silica: Health Issue Assessment** - Page 5-36
- Download a PDF of the entire EPA Silica report at:  
<https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=12999>

Wikipedia states “Inhaling finely divided Crystalline Silica is toxic and can lead to severe inflammation of the lung tissue, silicosis, bronchitis, lung cancer, and systemic autoimmune diseases such as Lupus and rheumatoid arthritis. Inhalation of Amorphous Silicon Dioxide, in high doses, leads to non-permanent short-term inflammation, where all effects heal”. [https://en.wikipedia.org/wiki/Silicon\\_dioxide](https://en.wikipedia.org/wiki/Silicon_dioxide)

In fact, Amorphous Silica is so harmless that is commonly used in makeup, food, and many other products you use. <https://www.aerosil.com/product/aerosil/en/products/hydrophilic-fumed-silica/>

Crystalline Silica and Amorphous Silica may sound like the same thing to the uneducated, but they are completely different and require different levels of personal protection. Now you’re educated!

By all means put your eye protection and dust mask on if you have time before you cut glass. But if you rapidly need to cut that Federally mandated laminated side window on a car or truck to save a life or apprehend a suspect, and you breathe a little glass dust from the cutter, don’t worry about it.

### **Myth busted!**

Here are several links to web sites that will discuss this issue:

<http://terrazzco.com/osha-silica-rule-glass-dust/>

<https://www.glassblast.com/how-can-glassblast-be-silica-free/>

<https://www.silica-safe.org/ask-a-question/faq>

<https://www.escablast.com/blast-media/crushed-glass/>