



GMA GARNET GROUP

# WHAT'S IN THE BAG:

## Silica limits and blasting operations

[gmagarnet.com](http://gmagarnet.com)



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## Introduction

This discussion paper aims to help inspectors, safety and environmental professionals understand silica, free silica, what is in a bag of GMA Garnet™, and what it means to abrasive blasting operations.



### What is crystalline silica?

Silica is silicon dioxide, a natural, widely abundant mineral that forms a major component of most rocks, sands, and soils. There are non-crystalline and crystalline forms of silicon dioxide. The most common type of crystalline silica is quartz. The amount varies widely amongst different rocks, rock products, and can be found in aggregates like mortar, concrete, and mineral sands.



### Free Crystalline silica and effects on health

When workers inhale the free crystalline silica, the lung tissue reacts by developing fibrotic nodules and scarring around the trapped silica particles. This fibrotic condition of the lung is called silicosis. When the nodules grow too large, breathing becomes difficult, and it may result in death. Silicosis victims are also at high risk of developing other chronic diseases such as lung cancer, chronic bronchitis and tuberculosis.



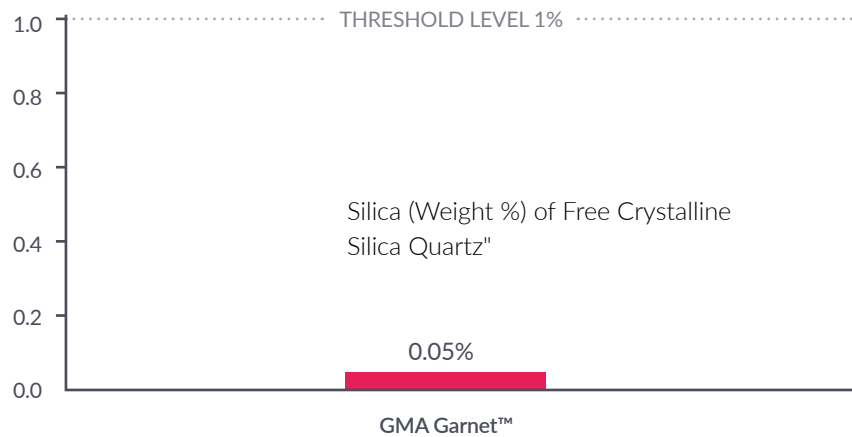
## Free crystalline silica and garnet

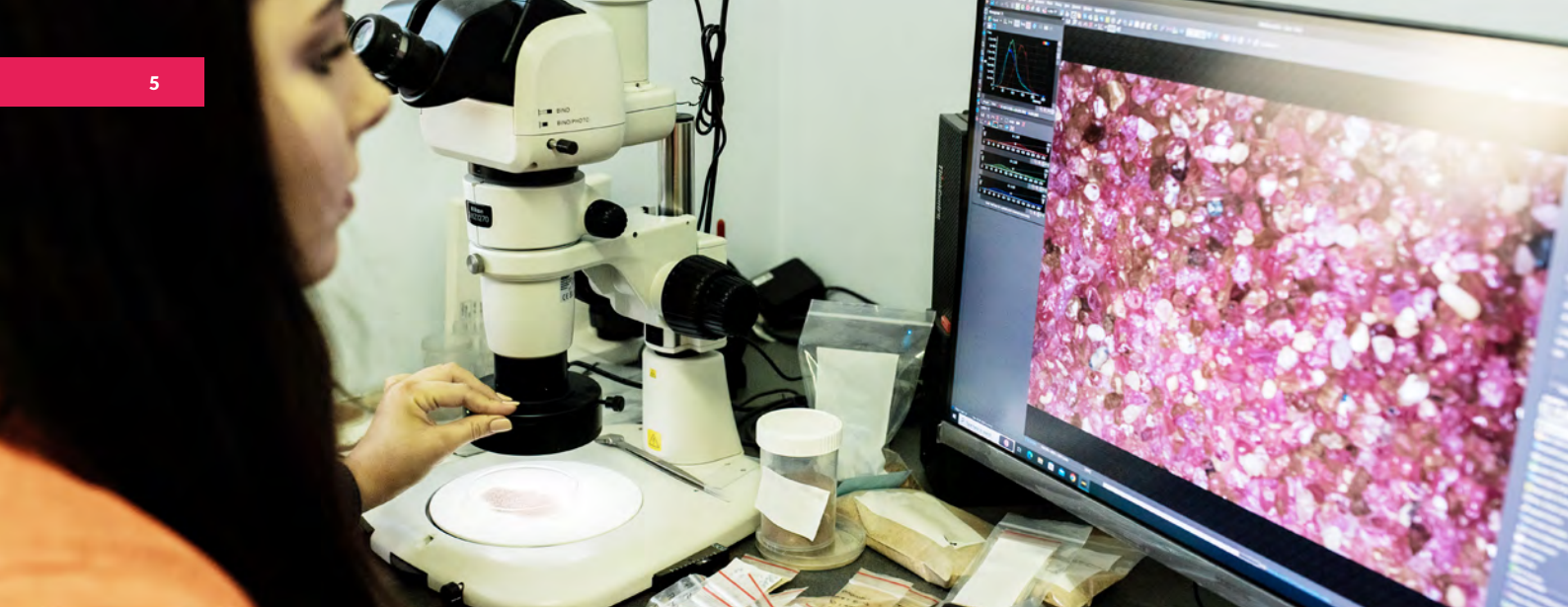
GMA Garnet™ is  
**20x**  
lower than the  
threshold limit.

Garnets vary in quality based on factors such as the deposit, mining practices, and processing controls implemented.

GMA's concentrate in Australia are derived from older rock deposits which have been through millions of years of prolonged attrition to become solid almandine garnet particles. Through GMA's world-class mining and processing procedures, *the free quartz* and other waste materials are virtually removed. Rigorous testing is conducted multiple times a day to ensure high garnet purity and concentration levels. Independent third party tests are also conducted regularly to determine low levels of free crystalline silica and readily available upon customer's request. GMA's free crystalline silica results come well *under the minimum threshold of 1% of weight by volume (usually under 0.1%)*.

SILICA (WEIGHT %) OF FREE CRYSTALLINE SILICA QUARTZ





## SiO<sub>2</sub> (Quartz and Free Crystalline Silica) Reporting in Product Documentation

The “Average Chemical Composition” presented in the Product Data Sheet (PDS) provides the chemical arrangement, type and molecules that make up the garnet. It is the actual chemical elements that make up the garnet grain. This is a common method of reporting the composition of sand, rock and soil samples.

It is important to note that the chemical composition does not represent the physical composition of the product. The relative proportion of SiO<sub>2</sub> reported in the “Average Chemical Composition” table does not represent physical grains of ‘silica sand’ or free silica dust. Rather, the relative proportion of SiO<sub>2</sub> reported has been determined from the Silicon (Si) and Oxygen (O) content contained within the garnet mineral. The garnet mineral is therefore represented in the chemical formula Fe<sub>3</sub>Al<sub>2</sub>(SiO<sub>4</sub>)<sub>3</sub>. Refer to PDS and SDS exerts as shown below.

Upon blasting, the garnet grain does not fragment into SiO<sub>2</sub> (free silica), FeO, and MgO, etc. Upon impact, garnet grain would break into small grains.

**SiO<sub>2</sub> chemical composition on PDS does not mean free crystalline silica.**

**Tip:** Request 3rd Party verification reports on free crystalline silica content in blast abrasive.

**SiO<sub>2</sub> chemical composition referred to in the PDS document is bound within the garnet crystal, and is not free silica.**

### PRODUCT DATA SHEET - PREMIUMBLAST™

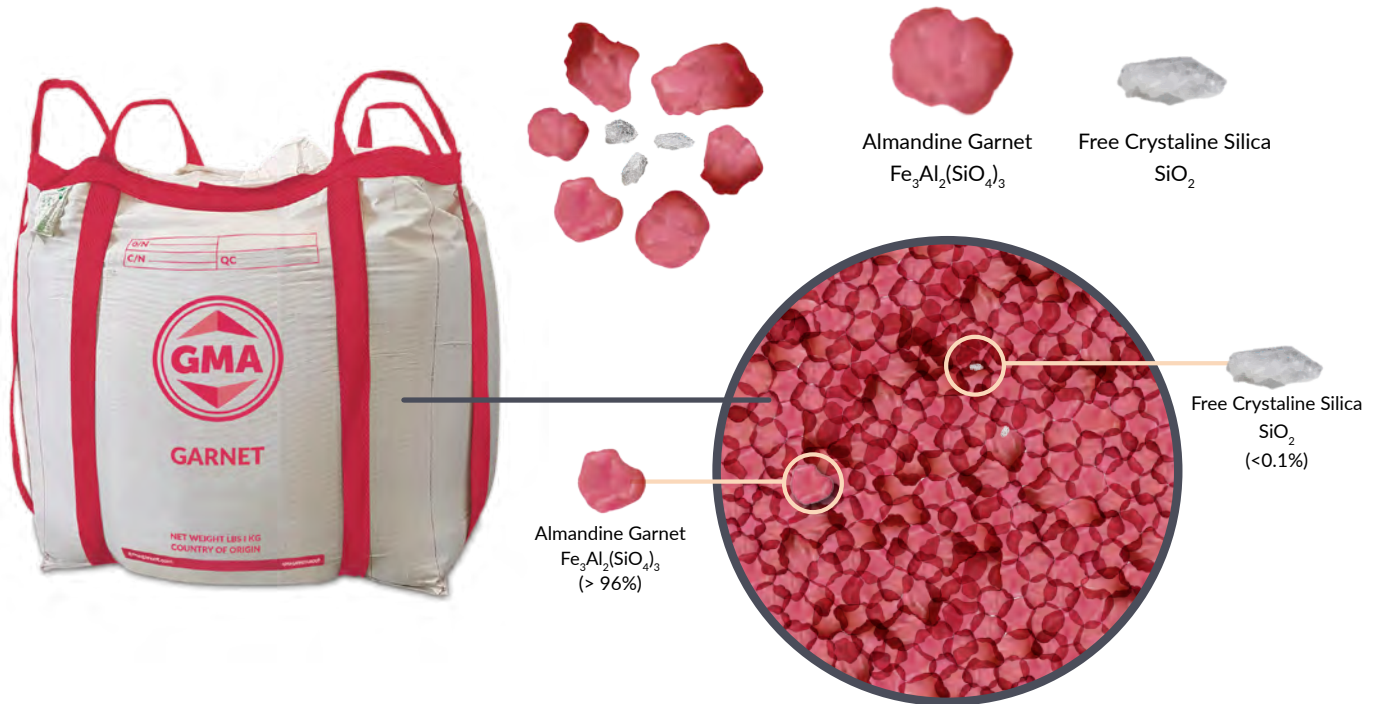
Average Chemical Composition (Typical)		
SiO <sub>2</sub> *	.....	37%
Al <sub>2</sub> O <sub>3</sub>	.....	21%
FeO	.....	30%
Fe <sub>2</sub> O <sub>3</sub>	.....	2%
MgO	.....	6%
CaO	.....	2%
TiO <sub>2</sub>	.....	1%
MnO	.....	1%

\*Refers to SiO<sub>2</sub> bound within the lattice of the homogeneous garnet crystal (not free silica)

Data obtained from GMA Garnet™ Australia product line.

## Understanding what's in the Bag

As per GMA's SDS, a bag of GMA Garnet has greater than 96% of almandine garnet and less than 0.1% of free crystalline silica (refer to diagram below).



### SAFETY DATA SHEET : Composition / Information on ingredients

This material is a natural mixture of almandine garnet and other trace minerals.

Chemical Identity	Common Name	CAS Number	Proportion (weight %)
$\text{Fe}_3\text{Al}_2(\text{SiO}_4)_3$	Almandine Garnet	1302-62-1	Greater than 96%
$\text{FeTiO}_3$	Ilmenite	12168-52-4	Less than 3.5%
$\text{CaCO}_3$	Calcium Carbonate (free)	471-34-1	Less than 1%
$\text{ZrSiO}_4$	Zircon	14940-68-2	Less than 0.1%
$\text{SiO}_2$	Crystalline Silica (free)	14808-60-7	Less than 0.1%

Data obtained from GMA Garnet™ Australia product line.





## Reliable supply and performance

“In the 1970's GMA pioneered the use of garnet minerals as a natural industrial abrasive.”

### **Security of supply - fully integrated global business**

GMA is the only company that owns the supply chain from the mine to customer. Being a fully integrated global business, we are able to maintain an uninterrupted high-quality, consistent garnet supply to our customers.

We own and operate mines in Australia and the USA, and have long term agreements with a significant supply source in South Africa. These operations provide us with an ample, consistent, and secure garnet supply.

## Our Supply Chain



### Restoration

The tailings sands are returned to the mined area which is rehabilitated to its former environment.

1



### Mining

Garnet rich sand is mined and transported to our 24/7 'Wet' plant for processing.

2



### Wet Plant

Water and centrifugal forces are used to separate the garnet from lighter waste minerals, leaving a high quality garnet concentrate.

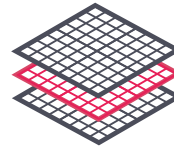
5



### Final Quality Control

Final laboratory testing ensures the highest quality standards are met.

4



### Dry Plant

Magnetic separators remove impurities and the pure garnet is screened and graded into the correct size particles.

3



### Quality Control

The concentrate is sample tested in the laboratory to ensure consistent product quality.

6



### Packaging

GMA Garnet is packaged into one-tonne or two-tonne bulk bags and 25kg paper bags.

7



### Distribution

GMA Products are distributed in 80 countries via our warehouses and over 100 distributor outlets worldwide.

8



### Customer Service

Dedicated sales team assist customers in selecting the best products and logistics arrangements.

9



### Technical Support

Our experts support customers in solving technical challenges and maximizing productivity and performance of their projects.



## Rigorous sampling process

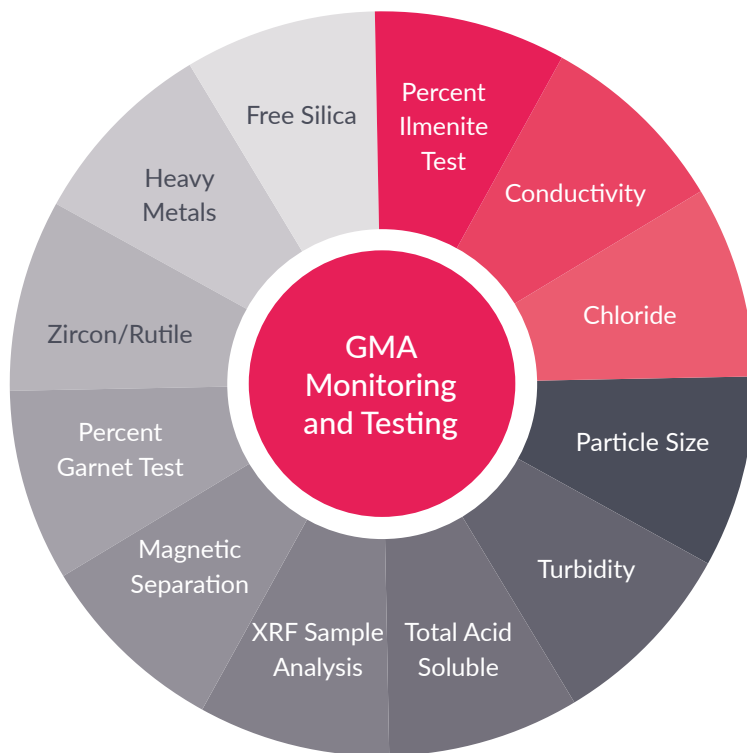
Samples are taken every two hours to ensure GMA's processed garnet are of the highest standards. For more than 40 years, we have developed advanced monitoring and processes that are embedded into our operations.

Particle is regularly conducted to ensure that we meet the highest industry and product quality standards. The analytical information from these results is used to ensure the accuracy of the PDS and SDS of GMA products. GMA undertakes rigorous internal and external product testing before packaging and dispatching garnet product to customers (refer to image below).



Independent reports are performed regularly to ensure product accuracy.

### GMA GARNET™ PRODUCT MONITORING AND TESTING



**Tip:** Request Third Party Reports to ensure product safety and integrity.

To ensure accuracy, third party product testing reports are also available upon request.

Test	Frequency
Particle Size	Completed every 2 hours
Turbidity	Completed per batch
Total Acid Soluble	Weekly
XRF analysis	6 monthly
Zircon/ Rutile	
Magnetic Separation	Completed every 2 hours during production
Percent Ilmenite test	
Heavy Metals	6 monthly
Free Silica	6 monthly
Conductivity	per 24 hours (Production)
Chloride	per 24 hours (Production)



## The preferred industry choice

GMA has been in business for over 40 years, supplying high-quality garnet abrasives. GMA offers a complete range of garnet abrasives for any surface preparation requirement from removing resistant coatings and heavy rust, to fast millscale removal and specialty coating requirements.

GMA Garnet™ is approved by leading paint manufacturers and is the preferred abrasive among global oil & gas companies, full-service shipyards and international fabricators.

**Find out more about how we can work together to keep your worksite and workers safe when using GMA Garnet™ abrasives.**



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