

## Quartzite Need Not be a Confusing Stone

Quartzite has been causing confusion within the natural stone industry. Some people say it etches. Some say it doesn't. Sometimes you hear it's a hybrid between marble and granite. Yet, others report that it's harder than granite. Which is it? Why are there such conflicting reports about quartzite?

The problem with quartzite stems from the fact that it is commonly mislabeled. Some quartzite is the real deal, but sometimes marble or dolomitic marble are labeled as quartzite. Because each of these stones behaves differently, people might understandably conclude that quartzite is variable. But it isn't; quartzite has very consistent properties. Unfortunately it has variable labeling.

The good news is that this problem has an easy solution. You can use basic diagnostic tests to cut through the confusion and learn for yourself which stones are genuine quartzite and which ones are not. Better yet, you can steer your customers toward a stone with properties that are a good fit for their needs, and you won't risk having a customer who is disappointed about the performance of their stone.

The key points of this document are to describe the simple diagnostic tests that can be used to distinguish quartzite from marble, and to encourage their use to clear up confusion about quartzite.

### What is Quartzite?

Quartzite is a metamorphic rock made almost entirely of the mineral quartz. Quartzite begins its geologic life as sand grains, perhaps on a beach, desert dune, or riverbed. Over time, the sand grains become compressed and stuck together to form sandstone. If the sandstone gets buried ever more deeply underneath layers of rocks, it gets hotter and more compressed. With enough heat and pressure, the sand grains lose their original shape and fuse to their neighbors, forming a dense, durable rock. The process is similar to individual snowflakes merging into solid, glacial ice. Quartzite is usually white or light-colored because quartz sand is light colored. Additional minerals carried by groundwater can impart hues of green, blue, or iron-red. Van Gogh and Azul Macaubas quartzites are examples of vivid coloring.

Regardless of color, quartzite is made primarily of one thing: quartz. That's helpful because the hardness and acid resistance of quartz set it apart from the minerals in marble. (Note – The mineral quartz should not be confused with the brands of manufactured countertop materials commonly referred to as “quartz surfacing” which contain crushed quartz with a resin binder.)

### Properties of Quartzite

#### Hardness

One of the appeals of quartzite is its hardness and durability. Not only does this make for a tough stone, but it also makes it easy to tell quartzite from the imposters. Quartz is 7 on Mohs hardness scale. It's nearly twice as hard as glass and harder than a knife blade. These things are easy to test with a sample of stone.

#### Resistance to Acids

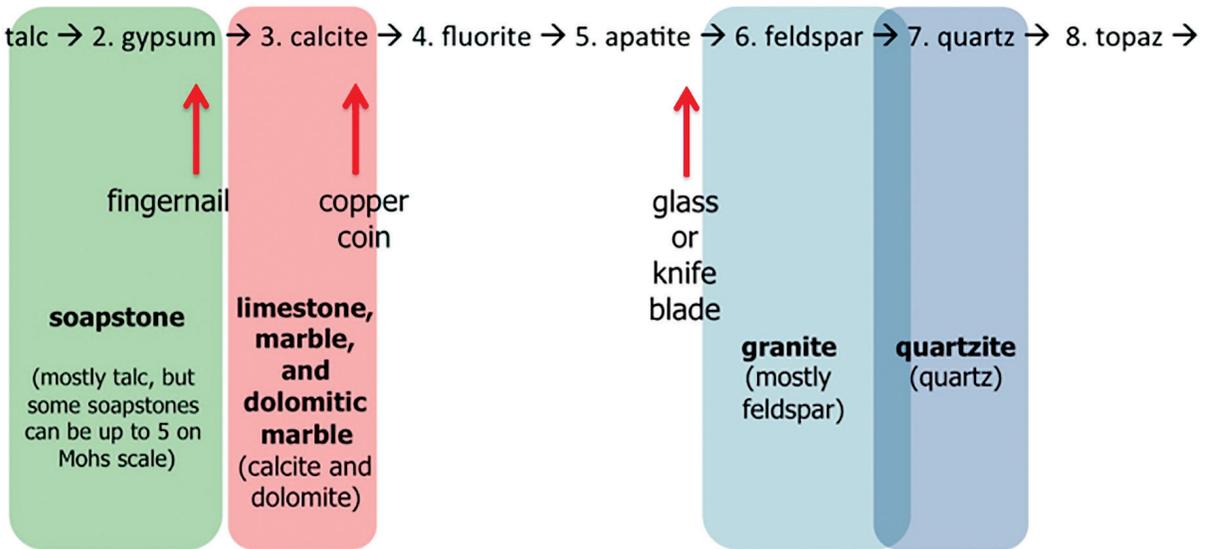
Etching is caused by acids dissolving small areas on the surface of a slab of stone. While this process does not harm a stone, it does blemish the surface. One of the appeals of quartzite is that it does not etch from acids like lemon juice or vinegar. If a rock labeled as quartzite becomes etched from acid, then it is mislabeled. Marble and dolomitic marble, on the other hand, will etch from these acids. Dolomitic marble etches slightly more slowly than regular marble. But quartzite will not etch at all from normal kitchen acids.

## Mohs Hardness Scale With a focus on marble and quartzite

**SOFT**

**HARD**

1. talc → 2. gypsum → 3. calcite → 4. fluorite → 5. apatite → 6. feldspar → 7. quartz → 8. topaz →



**Note the large difference in hardness between quartzite and marble. Quartzite is much harder than glass. Marble is much softer than glass.**

© 2017 by Karin Kirk for MIA + BSI

### Porosity

Quartzite has a range of porosities. Some, like Taj Mahal or Sea Pearl, have been highly metamorphosed and the minerals are bonded together tightly. White Macaubas and Calacatta Macaubas have been exposed to less intense pressure, so these stones are more porous and will benefit from sealing.

### Simple Diagnostic Tests for Quartzite

There are simple tests that are used to distinguish quartzite from marble. By doing these tests, you don't have to rely on a stone's labeling or what you have heard about it. You can figure out a stone's identity for yourself. You may discover that a stone is incorrectly labeled, in which case the label should be changed. It's worthwhile to learn as much as you can about any stone you are selling.

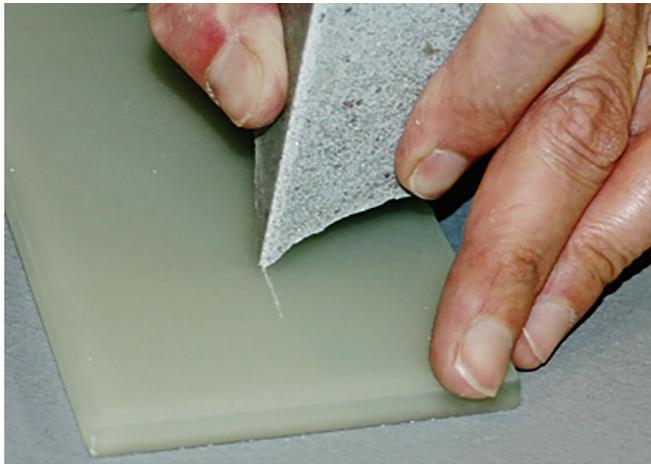
### Test 1: The Glass Test

#### How to do the glass test:

- Use a glass tile.
- Find a rough section of the stone, preferably a pointy edge. Don't use an edge that has been epoxied.
- Put the glass tile on a table, and then try to scratch the tile with the stone. Press hard.
- Inspect the scratch. Is it really a scratch? Or is it a powdered trail of crumbled rock?
- If the stone is variable and has more than one color or type of mineral in it, repeat the test in different places.

#### What the results mean:

- Real quartzite will easily scratch the glass. You'll hear it grind and you'll feel it bite into the glass. The resulting scratch will be obvious.



### The Glass Scratch Test

©2017 Karin Kirk for MIA+BSI

- Non-quartzite will either leave no scratch or a very faint scratch. Often the rock feels slippery against the glass. It doesn't make a noise. It leaves a powdery trail that rubs right off.
- There are a few stones that give an inconsistent result on the glass test. Some parts scratch the glass, while others do not. Or the stone makes a mild scratch on the glass. In general, stones that give a variable or weak result on the glass test are not quartzite. Continue your investigation by doing the etching test as described below.

### What if there is no broken edge to use, such as a full slab with epoxied edges?

- You can do a similar test with a knife blade. Try to scratch the rock with the tip of the blade. Genuine quartzite will be scratched lightly or not at all. Marble or dolomitic marble will be easily gouged.



### The Knife Blade Test

©2017 Karin Kirk for MIA+BSI

## Test 2: The Etching Test

Quartzite will not etch when exposed to typical household acids, but marble will. Customers can try an etching test with lemon juice or vinegar. But the standard geologic test for acid reaction calls for a 5% to 10% solution of hydrochloric acid. Many fabrication shops already have muriatic acid on hand, which is nearly the same as hydrochloric acid. However, the dilution of the acid is important. A very strong acid will dissolve stones more readily than a diluted one, and it won't help distinguish between different types of stone. Thus, the correct dilution is important. The simplest way to ensure the proper concentration is to order a 5% or 10% dilution of hydrochloric acid from a laboratory supply company. Store the acid in a dropper bottle, and use it whenever you need to distinguish quartzite from marble.

### How to do the acid test:

- Use an unsealed, un-epoxied surface of the stone. Use either the slab surface or a broken edge.
- Place one drop of 5% or 10% hydrochloric acid on the stone.
- Watch for small bubbles forming. Sometimes the bubbles are obvious, and sometimes they are subtle.
- If you don't see bubbles at first, observe the drop of acid with a magnifying glass. Look inside the drop of acid.
- If bubbles are present and easy to see, then the stone contains calcite ( $\text{CaCO}_3$ ). Marble, limestone, and travertine are made of calcite.

### If you see no bubbles or very subtle bubbles, try the powdered rock acid test:

- Use the tip of a pocket knife or other sharp tool to scratch up the surface of the stone and create a small pile of powdered rock.
- (If you can't easily scratch the stone or generate some powdered rock, that's a good indication that the stone is quartzite, not marble.)
- Leave the powder on the stone.
- Put a drop of acid on the powdered rock.
- Observe closely.
- If bubbles are present then the stone contains dolomite ( $\text{CaMgCO}_3$ ). Dolomitic marble looks exactly like regular marble and the powdered rock acid test is the only way to tell them apart.

If you see no bubbles at all, in either test, then the stone does not contain calcite or dolomite. It is quartzite.

If you did the acid test on a polished or honed surface, then you can rinse off the stone, dry it, and then inspect the surface for an etch mark. Etching can look like a lighter area, a darker area, or a place where the shiny finish of the stone has become dulled. If the stone bubbled with acid, then you will almost certainly see an etch mark where the acid was. That means the stone is marble. If you didn't observe any bubbles, then you most likely will not find an etch mark. This would confirm that the stone is quartzite and not marble.

Note that strong acids like in rust stain removers can etch even granite and quartzite. Be sure to use diluted hydrochloric acid for these tests, and advise customers to keep strong acids away from any natural stone.

### Summary of Acid Test to Distinguish Marble, Dolomitic Marble, and Quartzite

When 5% or 10% hydrochloric acid is placed on the stone it...	Bubbles or fizzes readily	▶	Limestone or Marble
	Bubbles weakly	▶	Dolomite or Dolomite Marble
If no reaction is visible, then place acid on a small area of powdered rock, and it...	Bubbles weakly	▶	Dolomite or Dolomite Marble
No acid reaction with either test.		▶	Quartzite

The glass test and acid tests are simple to perform, and it is a good practice to use these tests on every stone that is labeled quartzite. Try it on your existing stock. Try in on new batches. Show your colleagues how to do it. The tests are the only way to definitively tell quartzite from marble. In some cases, you may find yourself re-classifying stones that were incorrectly labeled as quartzite. This will help prevent customers from being confused and disappointed by a stone that does not live up to its billing. It is well worth the time to correctly identify your stones, rather than letting incorrectly identified stones create problems for customers.

### There is No Such Thing as Soft Quartzite

The unfortunate term “soft quartzite” has emerged to try to explain why a rock that is labeled quartzite is actually not hard and durable like real quartzite. There is no such thing as soft quartzite. There is only one kind of quartzite and it's hard and will not etch. If a stone does not have these properties, then it is not quartzite, regardless of what its label says.

Stones labeled as soft quartzite are most likely marble. The term “soft quartzite” has already gained traction within the industry, but it's a misleading term that should be avoided. With all the misinformation that circulates about quartzite, your staff and your customers will appreciate learning the authentic information about quartzite.

We encourage stone dealers to eliminate the term “soft quartzite” and to instead use the correct categories: marble and quartzite. Categorizing stones accurately will help you give clear and consistent information to your staff and customers.

### Things That Do Not Help Distinguish Quartzite from Non-Quartzite

The country of origin, price, or the names of a stone are not reliable indicators of what type of rock you've got. In many cases, it's not even possible to tell marble and quartzite apart visually. Information about a stone's origin is often passed along by word of mouth, which can perpetuate incorrect information. But you can look beyond what you hear about a stone and use the diagnostic tests to find out what it really is.

Quartzite and marble can look very similar, but they have dramatically different properties. This is why testing the stones is the only assured way to tell them apart. Images from MSI Stone.



Taj Mahal Quartzite



Emperador Light Marble

**Image Sources:**

Left: [www.msistone.com/quartzite/taj-mahal](http://www.msistone.com/quartzite/taj-mahal)

Right: [www.msistone.com/marble/emperador-light](http://www.msistone.com/marble/emperador-light)

### What's the Difference Between Quartzite and Granite?

Granite is a whole separate category of rocks that form from liquid magma. Visually, granite has distinct flecks of darker colors in it, while quartzite has either no dark colors at all, or has subtle, flowing areas of different colors.

Granite and quartzite have similar properties. They are both harder than glass, and neither will be etched by acids. But geologically, they are different classes of rocks and they should be marketed as such.

## What's the Difference Between Quartzite and Sandstone?

Quartzite and most sandstones are made of the same mineral – quartz. The difference is in how the minerals are held together. Sandstone is made of sand-sized particles that are held together with mineral cement. Mineral cements are typically silica or calcite that are dissolved in groundwater. As groundwater passes through the sand grains, minerals precipitate out of the water and attach to the sand grains, acting as “glue” that holds the grains together. Some sandstones are porous and loosely cemented (Palomino, Stonewood, Rainbow Teak) while some are tightly cemented (Wild Sea). With quartzite, the grains are fused together with little to no space between each grain. Quartzite does not contain individual sand grains. Instead, the rock is a solid, crystalline mass. Thus, quartzite is much less porous than sandstone.

### Potentially Confusing Stones

There are a few stones that can yield conflicting results from the scratch test and the etch test. In some cases, marble will scratch glass. This is because certain marbles contain minor amounts of quartz. This does not mean the stone is a hybrid of marble and quartzite. It is still marble, and should be sold as marble and treated as marble. A few specific examples are discussed below.

#### Super White

Super White is one of the stones that is frequently caught in the quartzite vs. marble mystery. Most commonly, Super White is dolomitic marble. That means it won't scratch glass and it will etch with acids. Dolomitic marble ( $\text{CaMgCO}_3$ ) is slightly slower to etch than regular marble ( $\text{CaCO}_3$ ), which can lead people to think that the stone won't etch. But it will still etch.

Some Super White has minor amounts of quartz mixed in with the marble. When doing the glass test with Super White, be sure to test a few different areas to get a sense for the overall rock. You may find that there are some



Super White May Contain Some Quartz\*

©2017 Karin Kirk for MIA+BSI

areas that scratch glass and others that don't. This small amount of quartz does not change the overall performance of the stone. It is still dolomitic marble and needs to be treated as such.

#### Fantasy Brown

This is another stone that can be a bit confusing. Fantasy Brown is made of layers that have been folded and squeezed together. Some of the layers are marble, and some are quartzite. It's best to treat this rock as marble. Do the glass or acid tests on each layer individually and you will be able to tell which layers are marble and which are quartzite.

### The Diagnostic Tests are Your Friend

The confusion surrounding quartzite and marble is understandable. The stones look alike, and the abundance of conflicting information further muddies the water. Thankfully, the properties of quartzite make it easy to distinguish from other stones. Exploring the properties of different stones can give you confidence to know what stone you have. So try the tests and see what you find - there is no substitute for firsthand knowledge.

---

**MIA+BSI extends special thanks to Karin Kirk, M.S., for her original draft, guidance and consultation producing this technical bulletin.**

*Karin Kirk is a geologist and educator with over twenty years of experience. She currently works as a freelance science writer and education consultant.*



---

380 East Lorain St. | Oberlin, Ohio 44074 USA | 440.250.9222 | [www.naturalstoneinstitute.org](http://www.naturalstoneinstitute.org)



---

*This technical bulletin contains general guidelines. MIA+BSI and its member companies are not responsible for any use or misuse that causes damage of any kind, including loss of rights, materials, and personal injury alleged to be caused directly or indirectly by the information contained in this document. This bulletin is intended as an educational tool for natural stone professionals and other stakeholders (e.g. architects, interior designers, etc.).*