

# Quartzite: A consistent stone that's inconsistently labeled

BY KARIN KIRK

Quartzite is the supermodel of natural stone these days. In many ways, it's nature's perfect stone: classically beautiful like marble, but strong and unflappable like granite. Unfortunately, quartzite has been terribly misunderstood by the natural stone industry and consumers alike. The problem comes down to labeling. Marbles, sandstones, and quartzites are all commonly sold as quartzite. But, marble, sandstone, and quartzite are different stones with different properties. For example, marble is soft while quartzite is hard. If a marble is sold as a quartzite, the customer is likely to be disappointed because the stone won't live up to expectations. This can lead to customer complaints, rework, and possible damage to one's professional reputation.

The good news is that this conundrum can easily be solved; simple diagnostic tests can sort marble from quartzite. The use of these tests is starting to take hold around the stone industry and as a result, the correct stone names are being used more often. But we still have a ways to go. The better we get at evaluating a stone's properties, the less likely we are to be misled by word of mouth or an incorrect label.

## **GEOLOGY TO THE RESCUE**

A key difference in this approach is that it sets aside the name and reputation of a stone and examines the properties instead. The hardness, water absorption, and acid resistance of a slab are the best ways to assess a stone and its performance. The techniques described here are taught in every geology lab, all around the world.

There are two labeling issues that are causing confusion. The first and most

White Macaubas honed quartzite  
Photo courtesy of Aria Stone Gallery



Taj Mahal honed quartzite  
Photo courtesy of Aria Stone Gallery

concerning is when marble is sold as quartzite. The second is when sandstone is labeled as quartzite. We'll touch on those briefly here, then walk through the key ways to distinguish quartzite from other stones.

Super White and Fantasy Brown are some well-known marbles that have been widely marketed as quartzite. This mistake is slowly being corrected, and many dealers now properly categorize Super White and Fantasy Brown as marble. But the problem persists, exacerbated by the stone industry's proprietary renaming of stones, which makes it nigh impossible to keep track of a stone's identity.

Less frequently, sandstones are labeled as quartzite. This one is a little harder to sort out. There's really not much difference between dense sandstone and quartzite. In fact, some quartzites can be more porous than some sandstones. Nonetheless, understanding a stone's tendency to absorb or repel water can help you assess its potential for staining, and thus its suitability for various locations and applications.

Understanding the similarities and differences in the properties of these stones can offer big dividends for you. By learning some geologic detective skills, you'll be less prone to simply take other

people's word for what a given stone might be. You'll learn how to reliably identify a stone and know for sure what it is, so you won't wind up with the wrong stone and a disappointed customer. By matching the right stone for the right job, you can leverage the best traits of each material. In this complex marketplace, professionals who understand quartzite and can share that expertise with customers will have a solid advantage. Arm yourself and your clients with real knowledge.

With the essentials outlined above, let's explore how to use some basic geology to differentiate between quartzite, marble, and sandstone.



Super White marble



Fantasy Brown marble



White Macaubas quartzite



Taj Mahal quartzite



## QUARTZITE, MARBLE, AND THE MYTH OF “SOFT QUARTZITE”

A big part of quartzite’s appeal is that it looks like marble. Then how do you tell it apart from marble? This turns out to be easy, because quartzite and marble have dramatically different properties. Quartzite is hard and will not etch when exposed to typical acids like lemon juice or vinegar. Marble is soft, and etches easily. If you are unsure whether a stone is quartzite or marble, simple diagnostic tests will reliably tell these two stones apart, every time.

There is no such thing as “soft quartzite.” That is a fictional term created to explain why a mislabeled quartzite doesn’t act like a real quartzite. “Soft quartzite” is, in fact, marble. It’s a good idea to avoid this term, which, frankly, is a red flag that someone doesn’t understand quartzite at all.

### TESTING FOR HARDNESS IS THE FIRST STEP IN DISTINGUISHING QUARTZITE FROM MARBLE

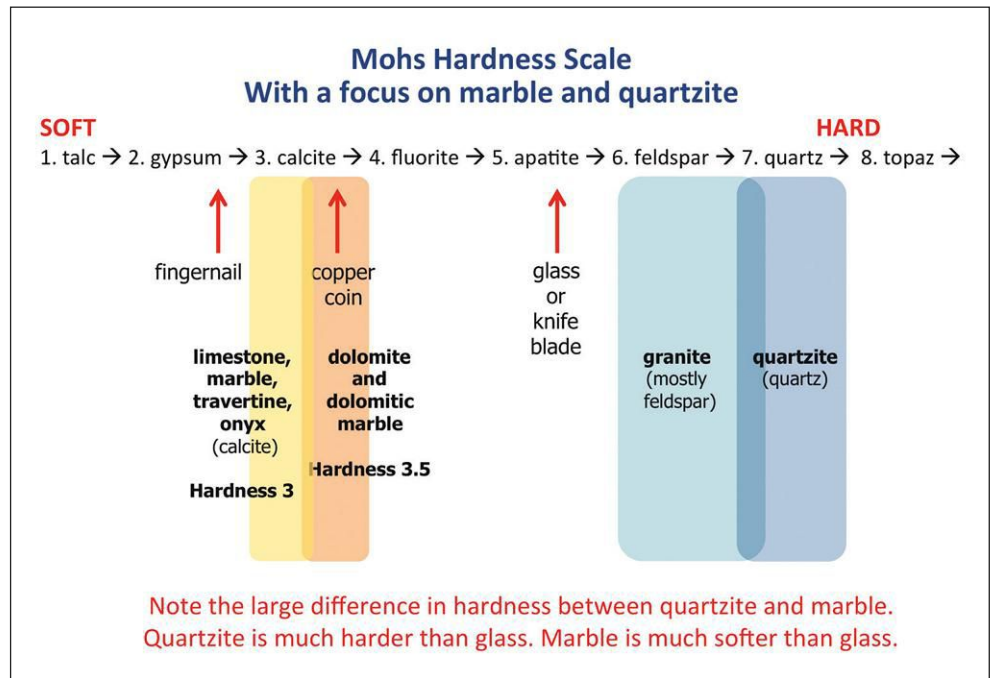
#### The glass test

The simplest way to discern quartzite from marble is to check the hardness. Quartzite will scratch the glass and marble will not. The dramatic difference between the two stones makes it easy to tell them apart.

- Get a glass tile, which are easy to come by in this industry.



The glass scratch test. Photo © Karin Kirk



© Karin Kirk

- Put the tile on a table or flat surface. Don’t hold it in the palm of your hand, or it may break.
- Find a sharp, non-epoxied edge of the stone.
- Try to scratch the tile with the stone. Press hard; put your weight into it.

The stone is harder than glass if:

- It leaves a definitive scratch on the tile that won’t rub off
- You can feel the stone biting into the glass

- You can hear the stone biting into the glass

The stone is softer than glass if:

- The stone glides smoothly along the glass
- There was a mark on the glass, but it rubbed off. (Basically, the stone just drew a line on the glass rather than scratching it.)
- There is no mark left on the glass at all

If the results are not definitive, try it again with a different part of the stone. Some marbles can have small pockets of quartz, so be sure you are testing a representative part of the stone.

#### The knife blade test

If you can’t get a sample piece of the stone, you can still test its hardness. You’ll need to use the tip of a knife blade, an awl, or a sturdy nail. This diagnostic test is particularly handy because you can do it on any slab, even if it’s wrapped in epoxy on the edges.

- Get permission from the stone yard first!



The knife blade test. Photo © Karin Kirk

- Find a spot near the edge of the slab.
- Using just the pointy tip of your knife blade, press straight into the stone and try to scratch it. Press hard.

Evaluating the results:

- This test will make a mark on almost all stones. But is the knife blade scratching the stone or simply drawing on it? Rub your fingernail on the mark to see if it's a scratch or not.
- If the stone is marble, the knife blade will make obvious scratches in the stone.
- If the stone is quartzite, the knife blade will make either no scratch, or a faint mark that you can't feel with your fingernail.
- If you're uncertain about the result, try the knife blade test on a few different types of stone to get a feel for it.

## THE NEXT STEP IS TO CHECK FOR ACID RESISTANCE

### The (diluted) hydrochloric acid test

Although hardness is the simplest way to tell quartzite from marble, acid resistance is another helpful indicator of a stone's properties.

The standard test for acid resistance is a 10% solution of hydrochloric acid. Bottles of pre-diluted acid can be purchased from chemical supply companies. Put an ounce of acid in a dropper bottle and keep this and your glass tile/pocketknife handy when you visit stone yards -- then you'll be able to learn a lot about various slabs, regardless of their labels.

- Put one drop of acid on an unsealed part of the stone.
- Watch closely, and use reading glasses and/or a magnifying glass if necessary.
- On marble (or limestone, travertine, and onyx) the acid drop will make small, fizzy bubbles. That's the stone dissolving.
- On quartzite, nothing will happen. No bubbles, no fanfare. Nothing.

## Things that do not help distinguish quartzite, marble, or sandstone

**The name:** As we've seen, the categories of marble, sandstone, and quartzite are often misapplied. And the trade names are even more confusing. In many cases the same stone goes by several different names. And in other cases, different stones go by the same name. Confusing? You bet. Set aside the name and focus on how the stone performs in tests. The properties are always more important than the label.

**The way it looks:** Marble and quartzite look a lot alike and even a trained pro shouldn't rely on their eye to tell if a stone is made of calcite or quartz. Images on a computer screen are even less helpful. Try not to speculate on a stone based on looks alone.

**The country of origin:** There's a strong tendency to think that stones from China are low quality, while those from Italy are superior. The forces of geology did not favor one nation over any other. Excellent quartzites can be found all over the world. So can inferior ones.

**The price:** Many factors determine the price of the stone, including its availability, popularity, marketing budget, shipping costs, and complexity in fabrication. An expensive stone is not necessarily any more likely to be genuine quartzite.

### The powdered rock acid test

If you didn't see bubbles, that isn't a totally conclusive result. Next, try the powdered rock acid test. This test will tell you if the stone is dolomitic marble, which etches a little more slowly than calcite marble.

- Use the tip of your knife blade to scratch the stone repeatedly and work up a small area of powdered stone. Leave the powder in place on the stone.
- Put a drop of acid on the powdered rock and watch it closely.
- If the stone is dolomite, you'll see small, subtle bubbles on the powdered stone.
- If the stone is quartzite, it will be difficult/impossible to work up any powdered rock to begin with, and no amount of acid will make the stone bubble.

### The lemon test

In place of diluted hydrochloric acid, you can perform a slow version of the acid test. Drip lemon juice or vinegar on the unsealed surface of a slab and wait

at least 15 minutes. Wipe off the acid and examine the stone to look for etching. An etch usually looks like a dull area on a polished surface, but it can also appear like a lighter or darker area. Dolomitic marble may etch more slowly than regular calcite marble, offering a small window of time to wipe up acid spills before serious etching occurs.

## SUMMARY FROM ALL THE TESTS

Ideally, these tests will confirm one another. Quartzite is hard and resistant to acid, while marble is neither of those things. If you do both the hardness test and the etching test, the results ought to match. In other words, it's unlikely to find a stone that's harder than glass yet etches from acid. If your test results don't help clarify things, then retest in different parts of the slab and also try the tests on other types of stone to get a feel for how different stones perform. With a little practice, you'll be able to reliably tell quartzite from marble.

- Find a spot near the edge of the slab.
- Using just the pointy tip of your knife blade, press straight into the stone and try to scratch it. Press hard.

Evaluating the results:

- This test will make a mark on almost all stones. But is the knife blade scratching the stone or simply drawing on it? Rub your fingernail on the mark to see if it's a scratch or not.
- If the stone is marble, the knife blade will make obvious scratches in the stone.
- If the stone is quartzite, the knife blade will make either no scratch, or a faint mark that you can't feel with your fingernail.
- If you're uncertain about the result, try the knife blade test on a few different types of stone to get a feel for it.

## THE NEXT STEP IS TO CHECK FOR ACID RESISTANCE

### The (diluted) hydrochloric acid test

Although hardness is the simplest way to tell quartzite from marble, acid resistance is another helpful indicator of a stone's properties.

The standard test for acid resistance is a 10% solution of hydrochloric acid. Bottles of pre-diluted acid can be purchased from chemical supply companies. Put an ounce of acid in a dropper bottle and keep this and your glass tile/pocketknife handy when you visit stone yards -- then you'll be able to learn a lot about various slabs, regardless of their labels.

- Put one drop of acid on an unsealed part of the stone.
- Watch closely, and use reading glasses and/or a magnifying glass if necessary.
- On marble (or limestone, travertine, and onyx) the acid drop will make small, fizzy bubbles. That's the stone dissolving.
- On quartzite, nothing will happen. No bubbles, no fanfare. Nothing.

## Things that do not help distinguish quartzite, marble, or sandstone

**The name:** As we've seen, the categories of marble, sandstone, and quartzite are often misapplied. And the trade names are even more confusing. In many cases the same stone goes by several different names. And in other cases, different stones go by the same name. Confusing? You bet. Set aside the name and focus on how the stone performs in tests. The properties are always more important than the label.

**The way it looks:** Marble and quartzite look a lot alike and even a trained pro shouldn't rely on their eye to tell if a stone is made of calcite or quartz. Images on a computer screen are even less helpful. Try not to speculate on a stone based on looks alone.

**The country of origin:** There's a strong tendency to think that stones from China are low quality, while those from Italy are superior. The forces of geology did not favor one nation over any other. Excellent quartzites can be found all over the world. So can inferior ones.

**The price:** Many factors determine the price of the stone, including its availability, popularity, marketing budget, shipping costs, and complexity in fabrication. An expensive stone is not necessarily any more likely to be genuine quartzite.

### The powdered rock acid test

If you didn't see bubbles, that isn't a totally conclusive result. Next, try the powdered rock acid test. This test will tell you if the stone is dolomitic marble, which etches a little more slowly than calcite marble.

- Use the tip of your knife blade to scratch the stone repeatedly and work up a small area of powdered stone. Leave the powder in place on the stone.
- Put a drop of acid on the powdered rock and watch it closely.
- If the stone is dolomite, you'll see small, subtle bubbles on the powdered stone.
- If the stone is quartzite, it will be difficult/impossible to work up any powdered rock to begin with, and no amount of acid will make the stone bubble.

### The lemon test

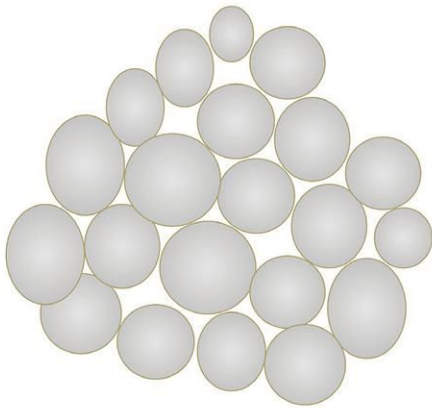
In place of diluted hydrochloric acid, you can perform a slow version of the acid test. Drip lemon juice or vinegar on the unsealed surface of a slab and wait

at least 15 minutes. Wipe off the acid and examine the stone to look for etching. An etch usually looks like a dull area on a polished surface, but it can also appear like a lighter or darker area. Dolomitic marble may etch more slowly than regular calcite marble, offering a small window of time to wipe up acid spills before serious etching occurs.

## SUMMARY FROM ALL THE TESTS

Ideally, these tests will confirm one another. Quartzite is hard and resistant to acid, while marble is neither of those things. If you do both the hardness test and the etching test, the results ought to match. In other words, it's unlikely to find a stone that's harder than glass yet etches from acid. If your test results don't help clarify things, then retest in different parts of the slab and also try the tests on other types of stone to get a feel for how different stones perform. With a little practice, you'll be able to reliably tell quartzite from marble.

**Is it sandstone or quartzite?  
A magnified view can help tell them apart**

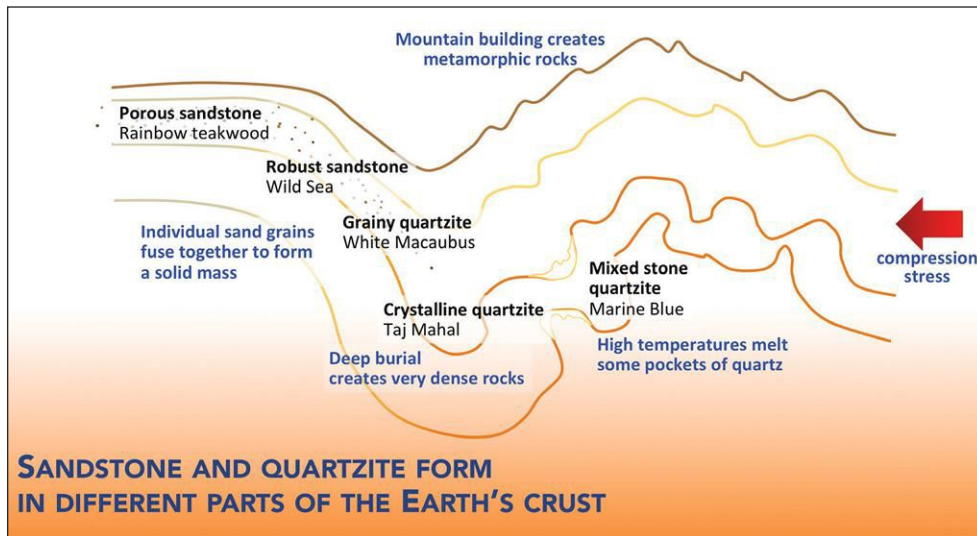


**Sandstone**  
Individual sand grains visible  
(a magnifying glass may help)



**Quartzite**  
No visible grains – the stone is  
stitched together into one solid mass

© Karin Kirk



**SANDSTONE AND QUARTZITE FORM  
IN DIFFERENT PARTS OF THE EARTH'S CRUST**

© Karin Kirk

**FROM BEACH SAND TO  
BULLETPROOF QUARTZITE — THE  
METAMORPHIC JOURNEY**

Sorting out quartzite from marble is the most important part of the quartzite confusion. But assessing the difference between sandstone and quartzite is another helpful concept. The differences between quartzite and sandstone can be less definitive, but well worth taking the time to understand.

Quartzite begins its life as humble sand grains on a beach, river delta, or sand

dune. Overlying layers of sediment bury the sand and press the grains together. Dissolved minerals carried by groundwater act as “cement” that glues the sand into a solid rock. The more deeply sandstone is buried, the more tightly it gets stuck together. Sandstones can range from crumbly to reliably durable, all of which is related to how solidly the sand grains are cemented together.

Sandstone can turn into quartzite if it gets buried deeply within Earth’s crust, where

it’s subjected to heating and compression. This is called metamorphism, where one type of stone becomes another type. Metamorphic rocks don’t melt, but they take on new textures, patterns, and/or mineral contents compared to their former selves.

In the case of quartzite, the mineral content doesn’t change; both sandstone and quartzite are mostly made of quartz. But when sandstone gets heated and squeezed, the sand grains lose their individual identities and become recrystallized into a solid mass. This process is similar to the way snowflakes fuse together to form solid glacial ice.

A key point is that metamorphism is not a black-and-white event. Some quartzites have only been heated a little bit. Others have been subjected to intense conditions. There are grades of metamorphism, and thus, there are grades of quartzite, too. Some quartzites, like White Macaubus, are similar to sandstones in terms of porosity and texture. But others, like Taj Mahal, are high-grade metamorphic rocks and are dense and minimally porous.

**ASSESSING THE POROSITY OF  
SANDSTONES AND QUARTZITES**

Many sandstones are incorrectly labeled as quartzites. But unlike the marble/quartzite mix-up, this situation is not so terrible because sandstone and quartzite are made of the same mineral (quartz) and have similar properties. Thus, customers are not going to end up with a stone that behaves dramatically differently than they expected.

The main difference between sandstone and quartzite is porosity, with sandstone usually being more porous than quartzite. Porous stones are more capable of absorbing water...or red wine. Thus porous stones will stain more readily. Furthermore, the differences in strength among various sandstones are also determined by their porosity. When the sand grains are only



## POROSITY TEST

Put a spoonful of water on an unsealed surface of stone, let sit for ~10 minutes, and wipe off

What happens	Approximate porosity	Suggested uses	Example stones
The stone soaks up water like a sponge	High porosity	Not for use in areas where the stone will get wet	Rainbow Teakwood sandstone
Water leaves a dark shadow that eventually fades away	Moderate porosity	Requires sealing, with repeat applications periodically	Wild Sea sandstone White Macaubus quartzite Infinity White quartzite Zermatt quartzite
Water beads up; once water is wiped away, there is no sign that it was there	Low porosity	Excellent choice for wet areas and hardworking surfaces	Taj Mahal quartzite

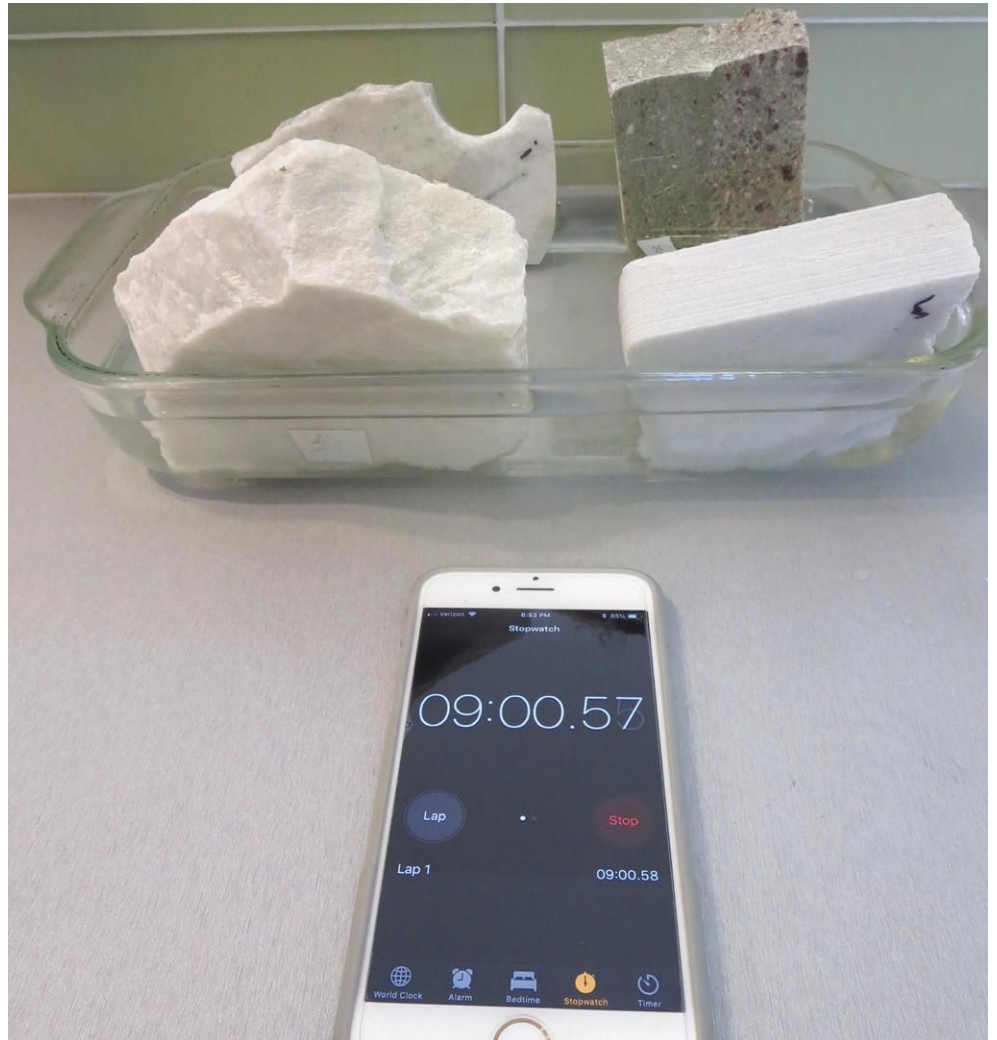
© Karin Kirk

partially cemented together, there is a lot of open space between the grains and the stone can break or crumble. But if minerals have filled in all or most of the pore spaces, the rock tends to be strong.

When evaluating the porosity of a quartzite or sandstone, it's best to think of these stones as a continuum, with varying porosities all across the sandstone/quartzite family. What this means is that each stone needs to be assessed individually. Rules of thumb are not too reliable in this case.

Fortunately, this is not hard to sort out. You can easily check the porosity of stones by putting water on an unsealed sample and watching what happens. Use the chart above to see how the stone stacks up.

If you want a science-fair flair to your assessment, put stones edgewise in a shallow pan of water or food coloring and see if they wick up liquids between the quartz grains or along the fracture lines. You can learn a lot by just observing how water interacts with various types of stones. The more you experiment, the more you'll learn, and the better you'll be at working with stone and recommending particular stones for various projects.



© Karin Kirk

## WHEN IN DOUBT, TRUST THE STONE'S PROPERTIES

The confusion and distrust around the labeling of quartzite is a widespread communication problem in the natural stone industry. We can all be part of the solution, which is to learn as much as we can about the hardness, acid resistance, and porosity of different stones, and to help the design community, colleagues, and customers understand these things, too. Names of stones vary wildly, and people's descriptions of stone are not particularly reliable either.

Most reliable stone companies have current, physical property test data on their stones. The Natural Stone Institute offers stone testing services for eight important physical properties of natural stone. ASTM C1799 states that test results for stone should not be more than three years old. Additionally, if the excavation location of your stone source shifts in the quarry, new stone test data should be collected to ensure that physical properties remain consistent to previous test results. Know your numbers. Know your stone.

The bottom line is to bring a little science

into your day: Investigate stones, perform tests on them, observe how they hold up in different circumstances, and embrace the geologic intricacies that make natural stone a beautiful and desirable material. ■



*Karin Kirk is a geologist and science writer from Bozeman, MT. As a former educator, she has taught thousands of students to identify rocks. Kirk now translates those skills to the natural stone industry, sharing how geologic*

*techniques can be used to resolve some of the confusing aspects of working with stone. Her monthly columns for UseNaturalStone.com and the Slippery Rock Gazette illuminate the geologic backstory of natural stone, from travertine to bluestone to schist. She also teaches an annual stone identification workshop at TISE in Las Vegas. When not thinking about rocks, she writes about energy, climate change, science education, and skiing.*

### Related Resources

**Quartzite Need Not Be a Confusing Stone** – Natural Stone Institute Technical Document  
[www.naturalstoneinstitute.org/resource/library](http://www.naturalstoneinstitute.org/resource/library)

**The Definitive Guide to Quartzite** – <http://usenaturalstone.com/definitive-guide-quartzite>

**Sussing out Sandstone** – <http://usenaturalstone.org/sussing-out-sandstone>

**A Deep Dive Into the Properties of Quartzite** –

<http://usenaturalstone.org/a-deep-dive-into-the-properties-of-quartzite>

**Aria Stone Gallery (quartzite project photos)** – [www.ariastonegallery.com](http://www.ariastonegallery.com)

**Natural Stone Institute Testing Lab** – [www.naturalstoneinstitute.org/lab](http://www.naturalstoneinstitute.org/lab)



## Specify ITS Verified Tile and Stone Installers

### Avoid Costly Installation Problems!



The **Tile Installer Thin-Set Standards (ITS) Verification Certificate** is awarded by the University of Ceramic Tile and Stone (UofCTS) to tile setters and finishers that pass an in-depth, 5-hour online training course specializing in industry thin-set standards and methods for ceramic, stone, glass and other adhered tile applications.

**ITS Verified Installers have been trained so the job can get done right the first time!**

Also available on our website:

Understanding the Basics of Natural Stone and  
Understanding the Basics of Ceramic Tile,  
 5-8 hour online courses for design professionals

[www.UofCTS.org](http://www.UofCTS.org)

[info@UofCTS.org](mailto:info@UofCTS.org)

(866) 669-1550

The UofCTS is a division of Ceramic Tile and Stone Consultants, Inc., [www.CTaSC.com](http://www.CTaSC.com)

## D'AMICO QUARRY



### D'AMICO QUARRY, INC.

1703 BALTIMORE PIKE  
 AVONDALE, PA 19311  
 (610) 268-0115

[WWW.DAMICOQUARRYINC.COM](http://WWW.DAMICOQUARRYINC.COM)

E-MAIL [INFO@DAMICOQUARRYINC.COM](mailto:INFO@DAMICOQUARRYINC.COM)