

VARIETIES OF STONE

GRANITE

An excellent choice for kitchen counter-tops, floors, and other heavily used surfaces.

Exact and current extraction figures are not available, as data collection from many countries is difficult. Statistics from various sources indicate that the granite quarried in the countries of China, India, and Brazil comprises approximately 2/3 of the granite used worldwide. There are granite quarries in operation in dozens of countries, and it is one of the most popular natural stones on the market. New granite resources are continually being located and developed throughout the world.

Granite has long enjoyed use as an exterior cladding and pavement material, and its inherent strength, abrasion resistance and superior weathering durability are likely to keep it one of the preeminent material selections available to today's architects. Granite has also been employed as the traditional material for municipal curbs, where its strength and durability have been documented with decades of vehicular abuse. In the northern climates where snow melting chemicals are used heavily, granite has resisted the attack of these caustic agents.

Being one of the hardest of the dimension stone types, granite was historically avoided by the smaller, local stone fabricating shops, who favored marbles and limestones due to their easier working properties. A recent boom in the supply of affordable machinery and abrasives technologies eliminated these previous difficulties in fabrication. The use of granite has skyrocketed in residential interior applications as a result. Available in a striking array of colors, granite's durability, longevity, and economy make it ideal for kitchen counter-tops and other heavily used surfaces, including table tops and floors.

Some synthetic surfaces scratch easily, while the hardness of the minerals comprising most granites surpasses that of the utensils that are used on them, resulting in excellent scratch resistance. Granite is typically heat resistant up to temperatures of $\pm 250^{\circ}\text{C}$ ($\pm 480^{\circ}\text{F}$), although direct application of localized heat sources is discouraged, since strong thermal gradients within the stone can initiate cracking. Studies of bacteria retention on common counter-top surfaces have proven granite to be superior to the majority of surfaces employed for that purposes (Ref: MIA Technical Bulletins).

Absorption rates (% water, by weight) of stones in this group range from 0.05% to 0.40%, indicating that the available pore volume capable of harboring a staining agent is very slight. Impregnating repellents are sometimes used to further increase the stain resistance of these materials.

Ideal for foyers, bathrooms, floors and hearths

Marble is a metamorphic rock found in the mountainous regions of most countries of the world. Marble quarried in India, China, Italy, and Spain represents the majority of marble, in terms of volume, that is utilized worldwide. Because of its beauty and elegance, marble is a popular choice for counter-tops, floors, foyers, fireplace facings and hearths, walls, and windowsills.

Marble with its inherent warmth, adds a sophisticated element to the area in which it is installed. Its naturally random appearance, engineering characteristics, and ease of maintenance makes it a premium choice for floors, wall claddings, table tops, wainscot, floors, and vanity tops. Many marbles are well suited for wet area application, which extends the versatility of this material to include tub decks and showers.

The calcite crystal is the basic building block of true marbles. The calcite crystal is vulnerable to attack by mild acids, including those commonly found in kitchen and bar settings. The user selecting marble for these applications should be aware of, and accepting of the maintenance and patina that is to be anticipated with this combination. Acid rain and other weathering elements can also affect exterior marble installations, and exterior applications are generally limited to white marbles, with some exceptions.

Often mistaken for marble is serpentine, which is actually magnesium-silicate based as opposed to calcite based. As a result of the different mineralogy and whole rock chemistry of serpentine, it exhibits greater acid resistance and abrasion resistance than does a true marble. These properties make serpentine a common choice for both kitchen counter and exterior application.

Onyx is often confused with marbles, yet it is a significantly different rock type. Onyx is a sedimentary rock, formed as stalactites and stalagmites in cave interiors. This formation method results in the cryptocrystalline construction of the rock fabric, and it is the size and uniformity of these crystals that contribute to the classic translucent property of most onyx varieties. While vulnerable to chemical and abrasive attack, the decorative appeal of onyx is perhaps unsurpassed by any other material.

Exploring the "quartz-based" stones

The term sandstone refers to the sand sized (0.06 to 2.0 mm) clasts that are cemented together by other agents. Therefore, sandstone could be of any mineralogy, but the overwhelming majority of sandstones on the market are quartz-based.

The durability and performance of sandstone is not as greatly influenced by the sand sized particles, as it is influenced by the cementing agent that binds these particles together. Many types of sandstone are used in cubic sections as sills, coping, water-tables and other exterior features. Exterior cladding is also a common application, although this stone variety is typically used in thicker sections than other stone types due to lower bending strengths. While sandstone has been used in both counter-top and shower lining applications, the varieties that are suitable for these installations are limited.

Quartzite is a metamorphic rock that is formed from sandstone. Quartzite can be of exceptional strength, density, and hardness. The strength, abrasion resistance, and weathering durability of this rock type expand its application possibilities to include most any of the common uses for natural, dimension stone.

SANDSTONE AND QUARTZITE

SLATE AND SOAPSTONE

Versatile, Chemically Resistant Material

A traditional use of both these materials was the laboratory table top in chemistry labs. That application alone should serve as a great testimonial to the chemical resistance of the materials. Being of the softer varieties of dimension stone types, neither of these materials is known for particularly high abrasion or scratch resistance, yet they are both used as a flooring and counter-top products.

Soapstone is highly heat resistant, and has been used in fireplace surrounds frequently to take advantage of this property.

Slate, being of laminar construction, has the ability to be processed into thin sheets and still maintain serviceable strength and rigidity. This property makes slate the only dimension stone having been used for blackboards and roofing shingles. It was also traditionally used as the cloth-covered playing surface of billiards tables

TRAVERTINE, LIMESTONE, AND DOLOMITIC LIMESTONE

An earthy appeal, indoors and out.

Limestone deposits exist in all continents of the earth. Despite the common and traditional reference to "travertine marble", travertine is really a type of limestone. It is actually the terrestrial (land) formed version of limestone, as opposed to the marine based formations of many other limestone varieties. Featuring their soft earth tones, decorators integrating these stones into their design have great flexibility in selecting complimentary colors for other interior elements.

Many varieties of both materials have enjoyed a successful history of exterior application, and some of the most prominent government and financial institutions worldwide proudly display limestone as their exterior cladding. Despite the popularity of exterior vertical limestone applications, the number of limestone varieties with successful history in exterior paving applications, particularly in freeze/thaw environments, is relatively limited.

Since these stones are some of the softer varieties of natural stone materials, they have long been a popular choice for intricately carved features and moldings, as well as statuary.

Limestone and travertine, like marble, are of a calcium carbonate base, and as such, are vulnerable to alteration by exposure to mild acids. A wide variety of stones are included in this group, and absorption varies from slight (<1%) to high (>10%). The combination of acid sensitivity and absorption limit the number of varieties that are suitable for counter-top applications, and the user of limestone counter-tops should be well educated in its properties to accurately anticipate its behavior in service.

Another form of limestone exists, which is dolomite. Dolomite is based on the dual carbonate of calcium-magnesium carbonate, and the properties of this stone are influenced by this difference in composition. Dolomites generally have higher densities, lower absorptions, greater compressive and bending strengths, and higher abrasion resistance than the calcium carbonate based limestones. These property differences offer some application choices for dolomites where other limestone varieties are marginal or unsuitable performers.

SCIENTIFIC VERSUS COMMERCIAL DEFINITION

Stones, and the minerals of which they are composed, have been studied with keen interest in the earth science fields for centuries. *Geology* is the study of the formation and history of the earth, while *petrography* is the study of rocks and the minerals of which they're made. Geologists and petrographers worldwide have defined hundreds of different rock types, based on their mineral composition, texture, and method of formation. Commercially, the use of the exact scientific rock definition would be a cumbersome and unnecessarily complicated practice. Furthermore, there are many rocks which are not clearly within one definition or another, but rather "straddling the fence" between two definitions. This point is further elaborated by the U.S. Geological Survey (USGS), Department of the Interior:

Scientific and commercial descriptions of various dimension stone types overlap. The scientific description of dimension stone types is focused primarily on the stone's geographic locality and mineralogical composition, whereas the commercial description is focused primarily on the locality and color of the stone.

Historically, it has been commercial practice to group stones within performance and behavioral groups as opposed to true scientific definition. This is recognized in several in ASTM International standards.

While scientifically there are hundreds of rock type identifications, only nine groups are commonly acknowledged commercially: *Granite, Limestone, Marble, Onyx, Quartzite, Sandstone, Serpentine, Slate, Soapstone, and Travertine*. This means that some rocks are included in groups which are not perfectly coincident with their scientific definition. High density and/or partially metamorphosed limestones, especially those capable of taking a polish, are oftentimes included in the marble group, because they appear, behave and perform more similarly to marble than to limestone. Most igneous rocks, such as gabbro, diabase, anorthosite, sodalite, gneiss, basalt, and many others are included in the granite group because they behave and perform similarly to granite. There are even a few non-igneous rocks (e.g. silicate-based conglomerates) that are commercially grouped with granites. Therefore, if you purchase a Crema Marfil "marble" vanity top, don't be surprised if your geologist friend visits your home and insists that it is limestone, because scientifically it is. Likewise, don't be surprised of the same geologist friend informs you that your Paradisio "granite" bar top and your Absolute Black "granite" kitchen island are really gneiss and gabbro respectively, because scientifically that's what they are. The key is performance. If a rock is sold within the granite group, the rock should be expected to have performance in that application that is similar, or in some cases superior, to that of a true granite.

It is a fundamental position of the Marble Institute of America that there exists no such thing as a "bad stone". There do exist however, inappropriate selections for a given application, and also unrealistic expectations of a given stone type in a specific application. The informed selection of natural stone products is also influenced by the tastes of the end user. To some, natural wear, etching, or weathering bring about a hidden charm, or natural "patina" as the stone displays signs of its yielding to the forces encountered in its service. To others, the only acceptable performance is for the stone to maintain its pristine, "as new" look for the entire duration of its service life. Selections of natural stone types are available to satisfy both users, but the proper research must be completed to assure that the selected stone will perform in service with the desired behavior.

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Source: [Marble Institute of America](#)