MEGAMARBLE

Design Resources · Technical Guidance

How Absorption Is Tested, and Who Tests It

An absorption figure is only as good as the test behind it. Two standards cover almost every figure you will see: ASTM C97/C97M in the United States and EN 13755 in Europe. Both dry stone specimens, soak them in water and weigh the gain, but they differ in specimen count, drying temperature and how long the stone soaks. This guide explains each procedure, how absorption differs from porosity, who writes the standards, who runs the tests, what a test report should show and what the numbers mean on a project.

ASTM C97/C97M | EN 13755 | ISO/IEC 17025

The two test methods side by side

	ASTM C97/C97M (US)	EN 13755 (EUROPE)
Written by	ASTM Committee C18 on Dimension Stone, Subcommittee C18.01 on Test Methods	CEN Technical Committee 246, Natural stones (secretariat: UNI, Italy)
Specimens	At least 5. Cubes, prisms, cylinders or other regular shapes, 2 to 3 in. (50 to 75 mm)	At least 6 from one homogeneous batch. Cubes, prisms or cylinders of 50 or 70 mm (±5 mm), at least 60 ml
Drying	Ventilated oven at 60 ± 2 °C (140 °F) for 48 h, weighed at 46, 47 and 48 h. Drying goes on only if those three hourly weighings don't agree	Ventilated oven at 70 ± 5 °C to constant mass: two weighings 24 ± 2 h apart differ by no more than 0.1% of the first
Cooling	30 minutes in the room, or in a desiccator if weighing is delayed	In a desiccator, to room temperature
Balance	To 0.01 g	To 0.01 g
Soaking	Fully immersed in filtered or distilled water at 22 ± 2 °C for 48 h	Staged, in tap water at 20 ± 10 °C: water to half the specimen height, three quarters at 60 min, covered by 25 ± 5 mm at 120 min. First weighing at 48 h, then every 24 h until the mass stops changing

Result	Absorption = (B − A) ÷ A × 100, where A is the dry weight and B the soaked, surface-dried weight. The sample result is the mean of the specimens	Absorption = (saturated mass − dry mass) ÷ dry mass × 100 for each specimen, with the mean, to the nearest 0.1%
Edition	The procedure above is from the -18 edition. ASTM lists C97/C97M-26 as current (a -25 edition also exists); we haven't reviewed -26	EN 13755:2008 is current. CEN is running its routine review

EN 13755 reports to the nearest 0.1%, but the number of decimals on a spec sheet doesn't tell you which method was used, so check the standard it names. The two methods give close but not identical results, so compare figures from the same method.



A laboratory drying oven. Both methods start by drying the specimens in a ventilated oven.


A glass desiccator, where dried samples cool without picking up moisture from the air.


An analytical balance. Both standards need weighing to at least 0.01 g.

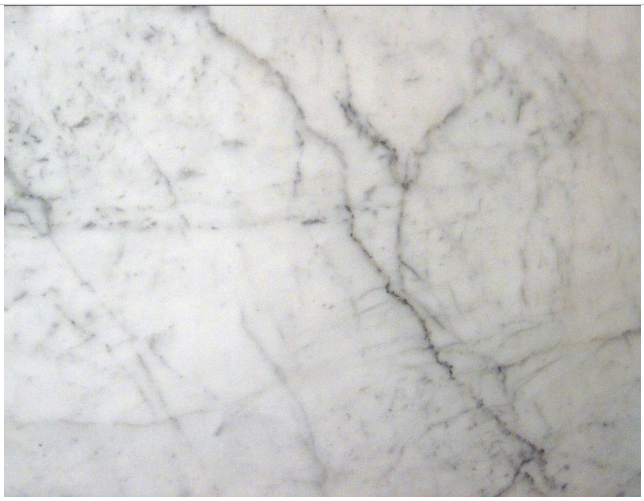
All photos in this guide are illustrative. They don't show Mega Marble's own testing, stone or quarries. The lab photos are from U.S. Geological Survey labs, courtesy of the U.S. Geological Survey (public domain).

Step by step

1. **Sample the stone.** ASTM C1799/C1799M guides how dimension stone specimens are sampled, selected and prepared, so the test predicts how the stone will perform. Under EN 13755, sampling is not the lab's responsibility unless the client asks, so who chose the samples matters.
2. **Cut the specimens.** Regular cubes, prisms or cylinders are cut with a diamond saw or core drill. ASTM C97 bars chisels at any stage; EN 13755 calls for sawing or coring. ASTM wants at least five; EN 13755 at least six.
3. **Dry them.** Specimens go into a ventilated oven. ASTM dries them for 48 hours at 60 °C, longer only if they are still losing weight. EN dries them at 70 °C until their weight stops changing.
4. **Cool and weigh dry.** They cool, in a desiccator where needed, and are weighed to 0.01 g. This is the dry weight.
5. **Soak them.** ASTM submerges them fully for 48 hours. EN 13755 raises the water in stages over two hours, then keeps weighing every 24 hours until the weight is stable.
6. **Weigh wet.** Each specimen is wiped with a damp cloth to remove surface water and weighed promptly. EN 13755 says within one minute.
7. **Calculate and report.** The weight gained, divided by the dry weight, gives absorption as a percentage by weight, for each specimen and as a mean.



Limestone rock cores in core boxes at a USGS aquifer lab. These are drill cores, not absorption test specimens, which are cut as regular cubes, prisms or cylinders. Photo: Chrishera Smith, U.S. Geological Survey, public domain.



Statuarietto white marble from the Carrara region, installed as wall cladding in Charlotte, N.C. Photo: James St. John, CC BY 2.0.

Absorption, porosity and density

These figures are related but not interchangeable, and spec sheets often mix them up.

- **Water absorption:** the water a stone takes up when soaked at normal air pressure, as a percentage of its dry weight. This is what ASTM C97 and EN 13755 measure, and what the ASTM absorption caps refer to.
- **Open porosity:** the volume of pores connected to the surface, as a percentage of the stone's volume. EN 1936 measures it by soaking specimens under vacuum, which drives water into pores a plain soak can leave partly empty. Total porosity also counts closed pores.
- **Density:** weight per unit of volume. ASTM C97 measures it as bulk specific gravity on the same specimens, and the ASTM material specifications set a minimum density alongside each absorption cap. EN 1936 calls it apparent density.
- **Capillary absorption:** how fast water wicks into stone through one face, measured under EN 1925. It matters for paving and stone near damp ground. The method isn't meant for stones with an open porosity below 1%.

Absorption is by weight; porosity is by volume. ASTM C97 notes that absorption by volume is the weight figure multiplied by the bulk specific gravity, so 0.20% by weight in a marble with a specific gravity of about 2.7 is about 0.54% by volume. Open porosity under vacuum can be higher still. Compare like with like: absorption with absorption, by the same method.

Who writes the standards

- **ASTM International, Committee C18 on Dimension Stone:** founded in 1926, with 120+ members and 28 standards. It writes the US test methods (C97 and others) and the material specifications that set the absorption caps (C503 for marble, C568 for limestone, C615 for granite, C1527 for travertine).

- **CEN/TC 246, Natural stones:** the European committee that writes EN 13755 and the other European test methods and product standards for natural stone.
- **ISO/TC 327, Natural stones:** an international committee created in 2020, with ANSI as secretariat, working on definitions, requirements and test methods.

Who runs the tests

Look for a lab accredited to **ISO/IEC 17025**, the international standard for the competence of testing laboratories. An accreditation body, such as IAS or A2LA in the US or ACCREDIA in Italy, checks the lab's technical competence and management system against it. IAS states that it is recognized internationally by ILAC, the international body for accreditation bodies. In its continuing-education course on testing, the Natural Stone Institute warns that "not all labs are created equal."

LAB	WHERE	WHAT THE RECORD SHOWS
Natural Stone Institute Materials Test Laboratory	Oberlin, Ohio, US	Accredited to ISO/IEC 17025:2017 by IAS (certificate TL-1190), with ASTM C97/C97M in its scope. Registered with the US Army Corps of Engineers for C97. Its lab manager is vice-chair of ASTM C18.
Lithos Laboratory, Hellenic Survey of Geology and Mineral Exploration (HSGME)	Acharnes, Athens area, Greece	The ornamental stone lab of Greece's national geological survey, running since 1999. Accredited by E.S.Y.D., the Greek accreditation body, since 2002 (certificate 70-9), to ISO/IEC 17025:2017 since 2020. It runs water absorption at atmospheric pressure and the other tests used for CE marking. It produced the 2021 survey of Greek dimension stones tested to EN 13755.
StoneLab by IMM (IMM CarraraFiere)	Carrara, Italy	Stone testing lab of the Carrara trade fair body. Runs EN 13755 and ASTM C97 absorption tests, including for CE marking, and publishes plain-language explanations of most of its test methods. The page we reviewed doesn't state ACCREDIA accreditation.
Laboratorio del Marmo Verona (Eiseko Prove)	Verona area, Italy	Lists EN 13755 and ASTM tests on natural stone, and publishes articles on standards and testing. The pages we reviewed don't state ACCREDIA accreditation.
University of Florence, Department of Earth Sciences, stone materials laboratory	Florence, Italy	Its 2026 price list offers water absorption at atmospheric pressure to UNI EN 13755, priced per series of 3 specimens. EN 13755 calls for at least 6, so confirm the specimen count when ordering. The price list doesn't state accreditation.
Politecnico di Torino, marble and natural stones laboratory	Turin, Italy	Runs water absorption tests under EN standards. A 2025 thesis records UNI EN 13755:2008 tests at the university. The pages we reviewed don't state accreditation.

Where a row says a page doesn't state accreditation, that describes the page, not the lab: a lab may hold accreditation it doesn't publish. Ask any lab for its accreditation certificate and scope before relying on its report.



Marble quarries above Vagli Sopra, Apuan Alps, photographed in 1993. The Vagli area is a source of Calacatta Vagli and Arabescato Vagli. Photo: Roy Luck, CC BY 2.0.

How testing fits CE marking in Europe

Natural stone sold for building in the EU falls under the Construction Products Regulation (EU) 305/2011. Product standards such as EN 1469 (slabs for cladding), EN 12057 (modular tiles) and EN 12058 (slabs for floors and stairs) set which properties must be declared. EN 1469 says water absorption, where required, is determined by EN 13755. The manufacturer has the product type-tested and issues a Declaration of Performance, which supports the CE mark. Ask European suppliers for the Declaration of Performance, and for the test report if one is available.

In the US there is no CE equivalent. Specifiers rely on ASTM test reports where they are available.

What a test report should show

Drawn from the reporting clauses of EN 13755 (clause 9) and ASTM C97 (section 9):

- A unique report number, and the lab's name, address and accreditation
- The standard and its edition, such as EN 13755:2008 or ASTM C97/C97M-18
- Who supplied the sample, the stone's trade name and petrographic name, and its origin or lot
- The date the sample was received and the date of testing
- The number and dimensions of the specimens
- Each specimen's dry and soaked weights or absorption, and the mean
- Any deviation from the standard, with the reason

Not every stone comes with a report, so ask for one if it is available. A report applies to the stone that was tested, so ask how the samples relate to the slabs you are buying.

What the numbers mean on a project

A test figure only means something against the use. Absorption caps and published figures by stone are in our companion guide, Absorption Rates Across Natural Stone Categories.

- **Kitchens and countertops:** absorption is used as a predictor of stain resistance, and the Natural Stone Institute notes that a highly absorbent stone may be more prone to staining. Sealers slow absorption but don't make stone stain-proof. NSI recommends penetrating sealers (impregnators) for surfaces that often meet water and oils, and says most granite countertops don't need sealing. Absorption says nothing about acid: marble, limestone, travertine and onyx can etch from lemon or vinegar whatever their figure, and ASTM C1528 notes that repellents won't protect against it.
- **Floors:** interior floor design relies on absorption alongside flexural strength, abrasion and slip resistance. ASTM C1528 notes that moisture trapped below a highly polished finish can appear as a stain.
- **Showers and wet areas:** NSI's maximums for shower use are marble 0.20%, granite 0.40%, quartzite 1%, slate 0.25% and high-density limestone 3%. For marble, ask for its NSI soundness group and the finishing used. The groups describe how a marble behaves in fabrication, not its merit or value. Group A has no geological flaws or voids; B has occasional small holes filled at the factory; C has common flaws, voids, veins and lines of separation, repaired by filling, sticking or reinforcing; D has more of the same. Mesh backing is now common on slabs for safe handling, and on its own doesn't indicate the group. NSI advises avoiding C and D in wet areas, saunas and steam rooms.
- **Exteriors and paving:** NSI notes that less dense stones with higher absorption may be more vulnerable to degradation, including from freeze-thaw. Absorption is sometimes used to predict freeze-thaw resistance, but for exposed stone NSI advises studying absorption, porosity and permeability together, and asking for freeze-thaw data.

The figure for the lot being supplied matters more than the category: NSI puts granite at 0.05% to 0.40%, so two granites can both meet the cap while one absorbs eight times as much water as the other.



The edge of a marble quarry in the hills above Golden Beach, Thassos, Greece. Photo: wallygrom (Leonora Enking), CC BY-SA 2.0.

Photo credits

- Laboratory drying oven: Nadine Lepore, USGS Kentucky Sediment Laboratory. Courtesy of the U.S. Geological Survey, public domain. Source
- Glass desiccator: Donna Beaver Pizzarelli. Courtesy of the U.S. Geological Survey, public domain. Source
- Analytical balance: USGS M3 Research Laboratory. Courtesy of the U.S. Geological Survey, public domain. Source
- Rock core samples: Chrishera Smith. Courtesy of the U.S. Geological Survey, public domain. Source
- USGS photos were cropped to a common shape.
- Statuarietto White Marble: James St. John, CC BY 2.0. Source
- Marble quarries above Vagli Sopra, Alpi Apuane (1993 slide): Roy Luck, CC BY 2.0. Source
- "The edge of another quarry" (Thassos): wallygrom (Leonora Enking), CC BY-SA 2.0. Source

Sources

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