MARKET OVERVIEW:
The United States is one of the chief producers of dimension stone in the world, having generated an estimated 1.5 million tons in 2006. Sandstone sales are typically the third or fourth largest portion of this market.

Sandstone quarries are common across North America, with over sixty percent of production in the U.S. being sold as flagstone. The largest portions of exports are typically sold to Canada and Mexico. However, the U.S. imports a relatively small magnitude of sandstone. Canada is often the chief source of the material, but it is also purchased from India and Mexico, among others.

<http://www.stoneworld.com/CDA/HTML/a8142955339b7010VgnVCM100000f932a8c0>.

PRODUCTS & APPLICATIONS:

Common Dimensions
Characteristics of quarried stone are dependent upon the attributes of the deposit from which the stone was extracted; each quarry is able to offer a range of products unique in dimensions, color, and structural properties to its deposit. Therefore, it is preferable that the designer and stone supplier collaborate closely prior to and throughout the design process since planning a project around readily available stone reduces the environmental impact of raw material extraction. Nevertheless, the most common dimensions of sandstone on the market are as follows:

BLOCKS: Maximum 10ft x 6ft with height of 5-6ft
SLABS: Maximum 10ft x 6ft with minimum thickness of 1in

Common Building Applications
• Cladding (exterior/interior) • Landscaping
• Paving/Flagging • Statuary

Available Finishes

<table>
<thead>
<tr>
<th>TEXTURED</th>
<th>Bush-hammered</th>
<th>Machine -tooled</th>
<th>Sandblasted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chat-sawn</td>
<td>Rock face</td>
<td>Split face</td>
</tr>
</tbody>
</table>

SMOOTH

| Diamond-Sawn |

Custom finishes may also be available through your stone supplier.

FORMATION & SOURCES:
Sandstone is a sedimentary rock formed when layers of eroded sediment are compressed and cemented with minerals through lithification. The stone is composed mainly of sand-sized grains, or clasts, of quartz cemented with silica, calcium carbonate, or iron oxide.

Sandstone is quarried widely across North America, particularly in the West, Midwest, and Northeast United States.
**INDOOR AIR QUALITY:**

Volatile Organic Compounds (VOCs)

- None emitted directly from sandstone
- May source from adhesives and sealants applied; low-VOC options are available on the market
- Resources: refer to MSDS of chemical(s) used

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**PHYSICAL PROPERTIES:**

A range of sandstones exist on the market, varying in the amount of quartz present in the stone. These varieties can be different in density, hardness, porosity, and aesthetics. Users should verify that the sandstone they plan to use is applicable to the demands of the project and has a successful history in such installations. ASTM test data is the most common data available to compare the properties of any stone, including sandstone.

**ENVIRONMENTAL DATA:**

<table>
<thead>
<tr>
<th></th>
<th>Quarrying</th>
<th>Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embodied Energy (MJ/ft³ stone)</td>
<td>51</td>
<td>2,500</td>
</tr>
<tr>
<td>Embodied Water (gal/ft³ stone)</td>
<td>24</td>
<td>8,400</td>
</tr>
<tr>
<td>Global Warming Potential (kg CO₂ equivalents/ft³ stone)</td>
<td>1.3</td>
<td>50</td>
</tr>
</tbody>
</table>


**PERFORMANCE:**

**Durability**

- Exterior & interior applications: lifetime
- Damage may be caused by acidic cleaners, abrasive contact, or water absorption


**Reuse & Recyclability**

- Ensure reclaimed sandstone meets ASTM specifications before using for structural purposes
- Example applications:
  - Landscaping
  - Retaining walls
  - Fill
  - Re-installation on new buildings
  - Statuary

**ASTM STANDARDS:**

**ASTM C-616 “Standard Specification for Sandstone Dimension Stone”**

- Includes material characteristics, physical requirements, and sampling appropriate to the selection of sandstone for general building and structural purposes.
- Classifies sandstone into three categories: sandstone, quartzitic sandstone, and quartzite. The table below lists the required test values for sandstone; the necessary tests are prescribed by and located in the ASTM standards.

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>SANDSTONE</th>
<th>QUARTZITIC SANDSTONE</th>
<th>QUARTZITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density, min lb/ft³ (kg/m³)</td>
<td>125 (2000)</td>
<td>150 (2400)</td>
<td>160 (2560)</td>
</tr>
<tr>
<td>Absorption by weight, max, %</td>
<td>8.00</td>
<td>3.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Compressive strength, min, psi (MPa)</td>
<td>4000 (28)</td>
<td>10,000 (69)</td>
<td>20,000 (138)</td>
</tr>
<tr>
<td>Modulus of rupture, min, psi (MPa)</td>
<td>350 (2.41)</td>
<td>1000 (6.89)</td>
<td>2000 (13.79)</td>
</tr>
<tr>
<td>Abrasion resistance, min, hardness*</td>
<td>2</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

*Pertains only to stone subject to foot traffic.

Adapted from C-616 “Standard Specification for Sandstone Dimension Stone,” copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM (www.astm.org).