ASTM C652 Lightweight Units

ASTM C652 units offer significant benefits over C216 units for the Architect, Contractor, and the owner. Most significantly because of the slightly increased void area (30% void vs. 24% void) the open body provides for a better fired and more durable unit.

ASTM Requirements

- C216 Units
  - Void area less than or equal to 25%
  - Face shell ¾” or greater

- C652 Units
  - Void area greater than 25%
  - Face shell ¾” or greater (cores > 1½ in²)
  - Face shell ⅝” or greater (cores ≤ 1½ in²)

- Absorption strength and durability, appearance, texture & color, chippage and breakage requirement in ASTM C216 and ASTM C652 are identical.

- ASTM C43 defines facing brick as follows:
  - facing brick, n—brick for general purposes where appearance properties such as color, texture, and chippage are important; see Specification C216 and Specification C652.

Engineer Modular (E/M) Size Units

- Average Overall Size 3 ½ x 2 ¼ x 7 ⅞”
- ASTM C216 Average Weight 4.6 lb (Void 24%)
- ASTM C652 Average Weight 4.1 lb (Void 30%)

Modular Size M/S Units

- Average Overall Size 3 ½ x 2 ¼ x 7 ⅞”
- ASTM C216 Average Weight 3.7 lb (Void 24%)
- ASTM C652 Average Weight 3.4 lb (Void 30%)

Fire Resistance

- Because of the slightly larger void area, building codes allow a greater fire resistance rating for C652 units compared to C216 units.

Fire Resistance Ratings – IBC Code

<table>
<thead>
<tr>
<th>Unit Description</th>
<th>Fire Resistance Rating</th>
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</thead>
<tbody>
<tr>
<td>E/M C652 Unit @ 30% Void Area</td>
<td>65 Minutes</td>
</tr>
<tr>
<td>E/M C216 Unit @ 24% Void Area</td>
<td>60 Minutes</td>
</tr>
</tbody>
</table>

Tech_Bulletin_Light Weight EM & MS Units.doc 01/05/07
Building Code Requirements

- ASTM C 216 Units are called SOLID units
- ASTM C 652 Units are called HOLLOW Units
- ASTM C 652 and C216 Units both qualify as facing brick and comply with requirements of all building codes including: International Building Code (IBC), the International Residential Code (IRC), and the Masonry Standards Joint Committee (MSJC) Building Code Requirements for Masonry Construction ACI 530.

CSI/AIA Specifications –MasterSpec

- Division 4 Section 04810 Unit Masonry Assemblies includes both C216 and C652
- Model specification used by most architects

Sustainability/Green Building Design

- ASTM C652 units provide many benefits as required by ASTM E2129 Standard Practice for Data Collection for Sustainability Assessment of Building Products required by the LEED (Leadership in Energy and Environmental Design Program) including:
  - Minimizes use of raw materials
  - Minimizes energy costs in manufacturing
  - Minimizes stack emissions
  - Minimizes energy lost in transportation

Transportation Costs

- Standard interstate hauler can load 23 cubes of C216 E/M units versus 26 cubes of C652 E/M units

Mortar Usage

- The statement that C652 units require more mortar to lay is a myth. Independent studies at Clemson University and at General Shale show the following:

<table>
<thead>
<tr>
<th></th>
<th>Clemson</th>
<th>General Shale</th>
</tr>
</thead>
<tbody>
<tr>
<td>25% - 10 Hole</td>
<td>5.6 bags/M</td>
<td>6.1 bags/M</td>
</tr>
<tr>
<td>30% - 5 Hole</td>
<td>6.0 bags/M</td>
<td>6.9 bags/M</td>
</tr>
<tr>
<td>35% - 3 Hole</td>
<td>6.8 bags/M</td>
<td>5.9 bags/M</td>
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</tbody>
</table>

The conclusion of both studies show the industry standard estimate of 7-bags/M will not change.

For questions or additional information pertaining to this, or any other General Shale Technical Bulletin, please contact Jim Bryja @ (423) 952-4214 (jim.bryja@generalshale.com)