CTIOA REPORT 2002-4-25

SUBJECT: Direct Bond Thin Set Method Glass Mosaic Tile Over Exterior and Interior Portland Cement Mortar Beds (cured 7 days) and Cementitious Board Units (CBU)

Introduction
This Field Report has been written for the installation of paper faced glass mosaic tile, using a direct bond thin-set method with no requirement for back buttering the glass tile sheets prior to installation. This method can be employed on exterior and interior cementitious substrates, using manufacturer recommended setting systems, combined with specific trowel size and technique.

In 1985, Field Report # CTI 66-2-9 (R85) described back buttering as an essential part of all paper faced glass mosaic tile installations. Since this time millions of square feet of paper faced glass mosaic tile have been put into service using the direct bond thin-set method. With the increasing volume of glass tile sales, combined with the versatility and ease of the direct bond method, the tile industry will benefit by supporting a direct bond method.

Laboratory tests have determined using the direct bond thin-set method, on cement mortar beds, cured 7 days, can achieve higher bond strengths than the wet set or modified grout back butter methods. Additionally, this method has proven to be successful when bonding to cementitious backer units.

Note
Consult glass tile manufacturers, as well as, tile setting adhesive manufacturers for their recommendations regarding specific installation material compatibility.

Limitations
For installations such as murals having tiles of varying thickness, glass mosaics
thinner than 3/16”, and domes (concave and convex), the back buttering technique and box screed methods are considered the preferable techniques.

**Expansion**
Glass tile has a high degree of expansion and contraction requiring the installation of expansion joints. Size, location, and type, must be designated by an architect and shown on drawing details. Typical locations include but are not limited to exterior 12’ on center, between adjoining dissimilar materials, ceilings, and the perimeter. For additional recommendations regarding expansion joints, including applications for extreme temperature variations, refer to ANSI specification A108 AN 3.7 thru 3.7.4.1.1-1999

**Framing (Wood or Metal)**
Maximum variation in backing surfaces 1/8” in 8’ from the required plane. Metal framing should be installed according to ANSI A 108.11-1999

**General Substrate Preparation Recommendations**
All substrates to receive paper faced glass tile should be designed to have a deflection rating of not greater than 1/360 of the span. Make allowance for live load and impact, and all dead load including the weight of tile, grout, and setting bed.

*Caution: Never set glass tile directly over wood products.*

**Concrete**
(Best for exterior freeze thaw areas) New construction light broom finish, cured 28-day minimum. Install over clean, sound, dimensionally stable, existing masonry or concrete. Do not install over cracked or coated surfaces without proper preparation.

**Wire Reinforced Mortar Beds**
(Not recommended for exterior freeze thaw areas)
Follow ANSI A108-B (7day minimum cure time prior to installation). Please specify 3.4 lb. Metal lath on approved steel stud framed applications.

**Cementitious Backer Units (CBU) Interior**
Acceptable CBU standards ANSI 118.9, ASTM 1325
Fiber cement under-layment ASTM C-1288
Follow manufacturers recommendations regarding fasteners.
*Important: Install CBU’s to metal framing following ANSI A 108.11-1999.*

**Submerged and Below Grade**
Cure minimum 21 days after grouting, prior to submersion or heavy water use.

**Material: Paper Faced Glass Mosaic Tile**
During the past decade the tile industry has seen significant growth in paper faced glass tile products. Many of these products resemble the original glass mosaics
manufactured in the 1950’s, featuring surfaces and textures with a variety of characteristics, including chips and other minor imperfections that make hand made glass tile desirable. **Note:** the term “**without chips**”, as noted in CTI 0-106-68, 3. may conflict with products being specified today. In addition to different shapes and sizes, there are tiles of different thickness, which suggest (1) of the same specification should be changed to, *Tessaræ shall be cast in uniform thickness, and uniform size. Specification writer must supply information regarding the particular type and quality of material to be installed.*

**Installation Adhesives for Direct Bond, Paper Faced Glass Mosaic Tile.**
Not all 118.4 latex modified thin-sets, whether spray dried polymer or two-part bonding mortar systems, are recommended for installing mosaic glass tile. However, all of the cement based setting materials recommended for glass tile installations by glass tile manufacturers, as well as, adhesive manufacturers are 118.4 rated. It is the responsibility of the writer of the specification and the installer to confirm the use of recommended setting adhesives as accurate for their intended use. Recommended setting temperatures for these types of setting materials is generally 50-90 degrees Fahrenheit. Keep installation surface out of direct sunlight, and wind, using screens, tarps, and umbrellas, to reduce the problem of skinning over (slight drying of the setting material surface) during installation.

**Caution:** Do not mix adhesives over 150 RPM.

**Workmanship**
Paper faced mosaic glass tile should be set by journeymen tile setters experienced with setting paper faced mosaics under similar conditions. Determine proper trowel size by measuring the glass tile thickness and follow the graph below to determine the appropriate notch trowel size and style.

<table>
<thead>
<tr>
<th>Glass Tile Thickness</th>
<th>Trowel Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/16”</td>
<td>1/8” square notch</td>
</tr>
<tr>
<td>1/4”</td>
<td>3/16” x 3/16” square notch</td>
</tr>
<tr>
<td>5/16”</td>
<td>3/16” x 1/4” V-notch</td>
</tr>
<tr>
<td>3/8” &amp; thicker</td>
<td>1/4” x 1/4” square notch</td>
</tr>
</tbody>
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*The preceding article was researched and written by Scott Fleming, CTC. We wish to thank Mr. Fleming for his excellent report.*
Installing Paper Faced Mosaic Glasstile Using the Direct Bond Method.

Using the flat side of an appropriate sized V-notch trowel to initiate the bond coat, firmly apply the setting material into the substrate.

With additional setting material, using an appropriate sized V-notch trowel, comb the notches full to establish the proper depth of the setting bed.

Using the flat side of the trowel, flatten the notches to achieve a smooth, consistent setting bed.

Apply Tessera mosaics into the setting bed (paper side facing you) using light, even pressure to establish contact.
To achieve a uniform, flat surface tap lightly, using a wooden beating block and a hammer.

Apply subsequent sheets lining up grout joints from one sheet to another.

Unify sheets by tapping lightly from one sheet to the next. *Tip: Do not use rubber floats or steel trowels for this step or step 5.

After 15-30 minutes (floors can be removed sooner) lightly wet paper several times over a 5-10 minute period. When the paper turns dark it is ready to remove.
Removing paper prior to final set allows adjustments to achieve a consistent overall field. Pay particular attention to the joints between sheets to eliminate sheet pattern.

Cure a minimum of 24 hours prior to cleaning with a nylon scrub brush and warm water to remove residual paper and glue, followed by wiping clean with a damp sponge.

Using non-sanded grout for joints 0-1/8”, or standard grade sanded grout for back beveled glass and joints from 1/8”-1/2” apply grout with a rubber grout float forcing grout into joints until full.

Grout joints shall be full and uniformly finished. Due to the impervious quality of glass, grout will take longer to set than with more porous tile. For initial cleaning use dry cheese cloth to wick moisture from grout, as well as avoiding washing the grout out.
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After cheese clothing allow grout to set up followed by smoothing the grout joints with a lightly damp sponge. For final polish of excess grout haze, after grout has cured, use clean, dry, cheese cloth.

Cleaning Recommendations: (based on cure times)

- 0-24 hours, no additional cleaning.
- 24 hours to 10 days, warm water and neutral ph cleaner specifically designed to clean tile.
- Cement based haze, grout cured a minimum of 10 days and longer, sulfamic acid cleaning crystals mixed with warm water using a nylon scrub brush following manufacturers directions rinsing with clean water.
- Latex based haze, grout cured a minimum of 10 days and longer, as well as, areas having other materials that may be adversely affected by acid based cleaners, such as, polished stone, soft glazed ceramics and metal plumbing fixtures use Stone and Tile Stripper.