Selecting and Specifying Ceramic Tile with ANSI and ISO Standards
Learning Objectives

• Review Industry Standards and Resources
  - ANSI - American National Standards Institute
  - ISO – International Standards Organization

• Understand the Coordination these quality standards with your project documents

• Learn how the Standards are changed, frequency and why these changes can benefit your project specification

• Use ANSI and ISO to improve the quality of your project specifications

• Understand how these standards can level the playing field and provide a better project for all
ANSI and ISO Standards

- **ANSI (American National Standards Institute)**
  - Specifications for Ceramic Tile
  - Specification for Glass Tile
  - Specifications for the Installation of Ceramic Tile
  - Specification for Installation Materials for Ceramic Tile

- **ISO (International Standards Organization)**
  - ISO installation material standards for mortars, adhesives, and grouts are more fully described in the following standards:
    - 13007-1 Ceramic Tiles - Grouts and adhesives - Part 1: Terms, definitions and specifications for adhesives
    - 13007-2 Ceramic Tiles - Grouts and adhesives - Part 2: Test methods for adhesives
    - 13007-3 Ceramic Tiles - Grouts and adhesives - Part 3: Terms, definitions and specifications for grouts
    - 13007-4 Ceramic Tiles - Grouts and adhesives - Part 4: Test methods for grouts
 ANSI and ISO

- Both the ANSI and ISO Standards are voluntary standards
- There is no compliance requirement, BUT...
- They are heavily followed by the courts!

ANSI and ISO standards are developed through industry consensus and open committees.
ANSI American National Standard Specifications

Material and Installation Standards

- Revised every five years
- Referred to in TCNA Handbook Methods
- Includes
  - Specifications
  - Environmental Conditions
  - Coverage
- Types of ANSI Standards
  - A108  Installation Standards
  - A118 & A136  Material Specifications
  - A137.1  Specifications for Ceramic Tile
  - A137.2  Specification for Glass Tile
  - A138.1  For Sustainable Ceramic Tile, Glass Tiles and Installation Materials
Important changes to

ANSI A137.1 Standard (Ceramic Tile)
Porcelain Tile Specification

Calibrated – within a certain standard

**Caliber Range**

Min.-0.50% or -0.07 in. Max.0.50% or 0.08 in.

**Warpage Diagonal**

Min.-0.50% or -0.07 in. Max.0.50% or 0.07 in.

Rectified – Edges are cut to be square

**Caliber Range**

Min.-0.25% or -0.03 in. Max.0.25% or 0.03 in.

**Warpage Diagonal**

Min.-0.40% or -0.07 in. Max.0.40% or 0.07 in.
Important changes to ANSI A 108 – Installation Standards

ANSI A108.02 4.3.8 Grout joint size: To accommodate the range in facial dimensions of the tile supplied for a specific project, *the actual grout joint size may, of necessity, vary from the grout joint size specified.* The actual grout joint size shall be at least three times the actual variation of facial dimensions of the tile supplied.

Nominal centerline of all joints shall be straight with due allowances for hand-molded or rustic tiles.

In no circumstance shall the grout joint be less than 1/16”.
4.3.8.1 Running bond/brick joint patterns

The grout joint width shall be increased over the minimum requirement by the amount of edge warpage on the longest edge of the actual tiles being installed.

For example, for a rectified tile exhibiting 1/32” edge warpage on the longest edge, the minimum grout joint for a running bond/brick joint pattern will be 1/8” + 1/32” or 5/32”, on average.

Of necessity, in any installation, some grout joints will be less and some more than the average minimum dimension to accommodate the specific tiles being installed.
Important changes to ANSI A 108 – Installation Standards

4.3.8.2 Running bond/brick joint offset: For running bond/brick joint patterns utilizing tiles (square or rectangular) where the side being offset is greater than 18” (nominal dimension), the running bond offset will be a maximum of 33% unless otherwise specified by the tile manufacturer.

If an offset greater than 33% is specified, specifier and owner must approve mock-up and lippage.
Important changes to ANSI A 118 – Material Standards

New Thin-Set Standard 2012  ANSI A 118.15

\textit{ANSI A118.15 – Improved Modified Dry – Set Cement Mortar}

\textbf{Best} Designed to improve adhesion, reduce Improved Modified Dry-Set Cement Mortar water absorption, and provide greater bond strength and resistance to shock and impact.

ANSI A118.4 – Modified Dry-Set Cement Mortar

\textbf{Better} Modified for better bond strength and movement than non modified mortars

ANSI A118.1 – Dry-Set Cement Mortar

\textbf{Good} Non modified, good bond strength
Tile Industry Setting Material Standards – ANSI A118

- **A118.1** Dry-Set Cement Mortar
- **A118.3** Chemical Resistant, Water Cleanable Tile-Setting and –Grouting Epoxy
- **A118.4** Modified Dry-Set Cement Mortar
  - **A118.5** Chemical Resistant Furan Mortars and Grouts for Tile Installation
  - **A118.6** Standard Cement Grouts For Tile Installation
  - **A118.7** High Performance Cement Grouts for Tile Installation
  - **A118.8** Modified Epoxy Emulsion Mortar/Grout
  - **A118.9** Test Methods and Specifications for Cementitious Backer Units
  - **A118.10** Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation
- **A118.11** EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar
  - **A118.12** Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation
  - **A118.13** Bonded Sound Reduction Membranes
- **A118.15** Improved Modified Dry-Set Cement Mortar
  - **A136.1** Organic Adhesives for Installation of Ceramic Tile
Mortar Designations - ANSI

Mortar Test Method ANSI A118.1, A118.4 & A118.15 added mortar designations:

- ANSI A118.1E  E= Extended Open Time
- ANSI A118.4F  F= Fast Set
- ANSI A118.15T T= Non Sag

So an ANSI Standard could look like this:

- ANSI A118.4TE

What happened to ANSI A118.11 EGP Latex Portland Cement Mortar?

We hope the new designation H will be added soon:

- ANSI A118.4H  H= Large & Heavy Tile Mortar

When added to ANSI, the H designation, will be added to
ANSI A118.1, A118.4 & A118.15
BIG News in 2017

**ANSI 137.3** is the Tile Standard for Gauged Porcelain tile – passed & available

**ANSI A108.19** is the Installation Standard for Gauged Porcelain tile – passed & available

ISO has also been working on standards for Europe where the products have been used longer – **In progress**
ANSI American National Standard Specifications

*Material and Installation Standards*

**ANSI A137.3 – Product Standard**

Terminology is:

Gauged—Emphasis on thicknesses where thickness is critical to the conversation; currently focused on thin, but could also be thick

Gauged Porcelain Tiles less than 1 square meter

Gauged Porcelain Tile Panels/Slabs for 1 square meter or larger
Ceramic tiles — Grouts and adhesives —
Part 1:
Terme, definitions and specifications
for adhesives

Contenu d'opérations — Matières de joints et collés —
Parte 1: Terme, definizioni e specifiche relative ai colla
ISO 13007 Classifications Based on Performance

1. Each product is classified according to its:
   
   • **Chemical nature**
     
     - C = Cementitious
     - D = Dispersion (mastic)
     - R = Reaction resin (epoxy & urethane)

   • **Performance levels**
     
     - 1 = Normal
     - 2 = Improved

2. **Product performance levels** are identified within each classification
# CEMENTITIOUS ADHESIVES (MORTARS)

<table>
<thead>
<tr>
<th>Type</th>
<th>Classes</th>
<th>Special Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C =$ Cementitious (thin-set mortars)</td>
<td>1 = Normal</td>
<td><strong>F</strong> = Fast-setting $\leq 6$ hours</td>
</tr>
<tr>
<td></td>
<td>2 = Improved</td>
<td><strong>T</strong> = Slip-resistant</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>E</strong> = Extended open time</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>S1</strong> = Deformable</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>S2</strong> = Highly deformable</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>P1</strong> = Plywood adhesion</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>P2</strong> = Improved plywood adhesion</td>
</tr>
</tbody>
</table>
This **Tensile Adhesion Bond Test** quantifies the amount of vertical force required to pull a tile or stone from a given substrate after a prescribed period of time. This test can be performed both in the lab environment and also on the project site in the field.
OPTIONAL CHARACTERISTICS
– EXTENDED OPEN TIME –

**E**: Maximum open time in which the tile can be adjusted in the adhesive without loss of minimum bond strength

**Where would you use?**
- When extended open time is necessary
- Porous substrates or porous tiles
- Higher temperatures

**Class E**
Extended open time – tensile adhesion strength \( \geq 0.5 \text{ N/ mm}^2 \) (72.5 psi) after 30 minutes *(extends from 20 to 30 minutes)*
ISO 13007
– Transverse Deformation –

• **S**: The ability of the mortar to accommodate varying movements between the tile and the substrate

• **S1**: Deformable adhesives deflect $\geq 2.5$ mm (0.1") and $< 5$ mm (0.2")

• **S2**: Highly deformable adhesives deflect $\geq 5$ mm (0.2")
‘Polymers’ make a mortar deformable

• **Latex polymer additives in mortars**
  • Latex polymers wrap around the sand and cement particles
    • Liquid-latex polymer
    • Dried-latex polymer
  • Improves the performance characteristics of cementitious mortars
    • Making them deformable/flexible (*ISO 13007 S1 or S2*)
    • Improving tensile strength
    • Improved resistance to water and chemicals

• **Monomers – building blocks for polymers**
  • Small molecule that becomes chemically bonded to other monomers, like links in a chain, to form a polymer

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Polymer bridging the voids within a cement matrix, improving deformability/flexibility

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Latex  

Polymer
When to Specify a S1 or S2 Mortar?

Suspended Slab – System Deformation

- When the entire installation system (suspended slab, tile or stone, cementitious mortar, grout joints, flexible sealant joints...) deforms due to load and deflection = **Curvature**
  - Moving and stationary ‘loads’ at weakest point on bridge = **Downward Deflection**
  - Causing the entire installation to “raise up” on the ends = **Curvature**
- The “pne size fits all” mortar **cannot meet all** the project requirements!
ADHESION TO EXTERIOR- GRADE PLYWOOD

P: Adhesion to Exterior-Grade Plywood

Class P1: Normal Adhesion to EGP
Tensile adhesion strength of \( \geq 0.5 \text{ N/mm}^2 \) (72.5 psi)

Class P2: Improved Adhesion to EGP
Tensile adhesion strength of \( \geq 1 \text{ N/mm}^2 \) (145 psi)
## DISPERSION ADHESIVES

### — MASTICS —

<table>
<thead>
<tr>
<th>Type</th>
<th>Classes</th>
<th>Special Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>D = Dispersion (mastics)</td>
<td>1 = Normal</td>
<td>A = Accelerated drying (only with D2 mastics after 7-day air cure &amp; water immersion)</td>
</tr>
<tr>
<td></td>
<td>2 = Improved</td>
<td>T = Slip-resistant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E = Extended open time</td>
</tr>
</tbody>
</table>
**D**: Ready-to-use dispersion adhesives commonly known as “mastics”

**D1**: Normal adhesion mastics
Shear adhesion strength of $\geq 1 \text{ N/mm}^2$ (145 psi)

**D2**: Improved adhesion mastics
Adhesion strength of $\geq 0.5 \text{ N/mm}^2$ (72.5 psi) after water immersion
Adhesion strength of $\geq 1 \text{ N/mm}^2$ (145 psi) at elevated temperatures
D1: Normal adhesion

Where would you use?

- Interior only
- Dry areas

Commercial and residential walls
**D2**: Improved adhesion with resistance to water

**Where would you use?**
- Interior only
- Intermittent wet areas

Bathroom surround
# REACTION RESIN ADHESIVES

– Epoxies & Urethanes –

<table>
<thead>
<tr>
<th>Type</th>
<th>Classes</th>
<th>Special Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>R = Reaction resin (epoxy &amp; urethanes)</td>
<td>1 = Normal</td>
<td>T = Slip-resistant</td>
</tr>
<tr>
<td></td>
<td>2 = Improved</td>
<td></td>
</tr>
</tbody>
</table>
R1: Normal-adhesion reaction resin

Shear adhesion strength of $\geq 2 \text{ N/mm}^2$ (290 psi)

Where would you use?

• Moisture-sensitive stones
• Chemical-resistant applications
• Difficult-to-bond substrates such as steel
R2: Normal-adhesion reaction resin

Shear adhesion strength of $\geq 2 \text{ N/mm}^2$ (290 psi)

Where would you use?

- Moisture-sensitive stones
- Chemical resistant applications
- Difficult-to-bond substrates such as steel
- Industrial plant installations
- Exposure to higher temperatures – thermal shock; up to 212°F (100°C)
# CEMENTITIOUS GROUTS

<table>
<thead>
<tr>
<th>Type</th>
<th>Classes</th>
<th>Special Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG = Cementitious grouts</td>
<td>1 = Normal</td>
<td><strong>F</strong> = Fast-setting grouts ( \leq 24 \text{ hours} )</td>
</tr>
<tr>
<td></td>
<td>2 = Improved</td>
<td><strong>A</strong> = High abrasion resistance</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>W</strong> = Reduced water absorption</td>
</tr>
</tbody>
</table>
CG1: Normal cementitious grouts

Where would you use?

- Ceramic & porcelain installations
- Installations not exposed to extreme changes in temperature and moisture

Residential and commercial buildings

Shower walls and floors
CG2: Improved cementitious grouts

Where would you use?

- Ceramic and porcelain Installations
- Areas subject to prolonged moisture exposure
- Thermal shock
- High traffic areas
- Commercial and industrial applications

Where would you use?

- High traffic areas
- Pools and fountains

F: Fast-setting \( \leq 24\) hours (quick-turnaround projects)

A: High abrasion resistance
(constant foot and cart traffic on the grout surface)

W: Reduced water absorption
(intermittent and immersion water applications)
<table>
<thead>
<tr>
<th>Type</th>
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<th>Special Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>RG = Reaction resin grouts</td>
<td>Normal</td>
<td><strong>Higher-performance</strong> characteristics than improved cementitious grouts (CG2FAW)</td>
</tr>
</tbody>
</table>
REACTION RESIN GROUTS
– Epoxies & Urethanes –

RG: Reaction resin grouts

Where would you use?

- Industrial installations
- Exposure to areas of higher temperatures up to 212°F (100°C)
- Food-processing areas
- Chemical resistance

Dairies, chemical plants, food processing
Who Benefits With ISO AND ANSI?

**Architect**
- Able to specify products that meet proper performance characteristics for project
- Able to generate completely generic reference specifications, yet setting the level of quality that best matches the project
- By allowing competitive product that meet the spec, they should receive a more competitive bid

**Owner**
- More assured in getting what he is paying for – life cycle of building
- Receiving an installation that will perform as expected
- May be able to secure better warranty
Who Benefits With ISO AND ANSI?

**Tile contractor**

- All competitors should be bidding equivalent products – it evens the playing field

- Can easily compare different manufacturers’ products for performance

- Can be confident in product specifications being “tailored” for installation

- More confident in offering warranty
Who Benefits With ISO AND ANSI?

Tile contractor

ANSI A108.01 General Requirements: Subsurfaces and Preparations by Other Trades - 2013

3.8 Damage to tile work After completion and cleaning, the obligation of the tile contractor ceases as to damage or injury which may be done to the tile work by others.
Who Benefits With ISO AND ANSI?

Tile contractor

ANSI A108.19 is the *Installation Standard* for Gauged Porcelain tile

**Related Work Specified in Other Sections** 4.3 Cure concrete slabs that are to receive tile before tile application. **Do not use liquid curing compound, sealers, admixtures or other materials that may prevent bonding of tile setting materials to slabs.** It is the design professional, building owner and/or the general contractor’s responsibility to notify the tile/stone installation contractor in writing if and where any curing compounds, admixtures or post applied sealers, coatings and/or other materials that may inhibit/prevent tile bonding and/or bonding performances have been applied to any surfaces to receive tile before the installation is to begin.
Who Benefits With ISO AND ANSI?

Tile contractor

ANSI A108.19 is the *Installation Standard* for Gauged Porcelain tile

**Jobsite Requirements 7.3** The general contractor is responsible to *protect the installation* once all work is complete and to restrict traffic. Tile Installer is not responsible for damage caused by other trades after the installation process.
Where Would We Be Without Standards?
ANSI and ISO

Summary

Definition: “Specify” to describe or define an object, idea, or concept in such detail that it is easily understood by most people.

Specifications detail the **qualitative** requirements of a project.

Use of materials and methods not specifically designated by the architect will, of necessity, be determined by the tile contractor.

Take control of your quality, use current versions of ANSI and ISO standards for communicating your project specific needs.
Thank you!

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