E.MIX Thermal Insulation System

MAKE THE WORLD GREEN AND SAFE

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Section 1

Company Introduction
30+ Years of Excellence

Singapore
1. Jurong
2. Sungei Kadut
3. Bernanang
4. Tanjong Kling

Malaysia
5. Yuen Long

Hong Kong
6. Seelong
7. Bemban

Guangzhou, China
8. Zengcheng

Setting New Trends
First-Mover since 1983

1983

- Cement savings of approx. 500k Mt / yr
- Sand savings of approx. 1.2 millions Mt / yr

Introduced Premixed Dry mortars

Singapore

1989

- Paint and Labour Savings

Malaysia

1994

- Labour Savings >50%

Spray plaster

Hong Kong
Section 2

Pre-mixed plastering vs Conventional plastering
Why Premix?

**Premixed System**
- Instant coffee

**Conventional System**
- Coffee beans + Sugar + Cream

**Premixed System**
- Pre-mixed plastering
  - Controlled quality
  - Easy to operate
  - Quick
  - Better house keeping

**Conventional System**
- Conventional plastering
  - Uncontrolled quality
  - Skill required
  - Time consuming
  - Require extra effort on cleaning
Committed to Environmental Protection

Devoted to Promote Green Construction

- Introduce advanced environmental-friendly construction technology since early 90’s
- Organized numerous activities to exchange environmental protection knowledge
- The 1st Thermal insulation product to be certified in Green Label Product Scheme (E.MIX Thermomix Insulation Render)

Participate in the BEAM Society

- Corporate member of The BEAM Society to support eco-efficient development
- Enhancing and refining BEAM to meet the expectations of all interested parties
Total Solutions

- Kitchen / Toilet waterproofing render & tiling system
- External wall thermal insulation spray plastering system
- Internal wall skim coat system
- External wall rendering & tiling system
- Internal floor screed system
- Self-levelling floor system (Underlayment system)
- Rapid hardening concrete repair screed system
- Substrate wall spalling system
- Self-levelling floor system (Heavy duty floor overlayment system)
Section 3

Common Insulation System
Building energy consumption for space conditioning

2010 HK Total energy used for space conditioning in different sectors
Total: 43374TJ or ~1.20x10\(^{10}\) kWh

- Residential: 26%
- Commercial: 66%
- Industrial: 7%

Emitted more than 8400000mt of CO\(_{2}\)eq
Or equivalent to 50.6 millions double decker buses


Photo from: http://home.netvigator.com/~dx2437/main.html
Heat Loss Rate from a Building

- Roof approx. 15%
- Windows and Doors approx. 25%
- Exterior wall without insulation approx. 50%
- Exterior wall with insulation approx. 10 – 15%
- Cellar and ground approx. 10%
Our Approach

Due to enormous amount of energy used for controlling the indoor temperature, our R&D department is targeted to design a product with:

- Good thermal insulation performance to reduce energy use
- Safe material (Excellent fire resistance, Non-toxic, Low VOCs)
- Long lasting
- No addition of extra material to traditional construction system
- Good physical performance
- Simple to use
Common thermal insulation materials used in the World

<table>
<thead>
<tr>
<th>US</th>
<th>UK</th>
<th>Germany</th>
<th>Malaysia</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiberglass</td>
<td>Fibreglass</td>
<td>Glass Wool</td>
<td>Calcium Silicate</td>
<td>Spray Polyurethane Foam</td>
</tr>
<tr>
<td>Mineral Wool</td>
<td>Mineral Wool</td>
<td>Stone Wool</td>
<td>Celular Glass</td>
<td>Extruded Polystyrene Board</td>
</tr>
<tr>
<td>Cellulose</td>
<td>Polystyrene</td>
<td>Expanded Polystyrene</td>
<td>Glass Wool</td>
<td>Expanded Polystyrene Board</td>
</tr>
<tr>
<td>Polyurethane Foam</td>
<td>Polyurethane Foam</td>
<td>Extruded Polystyrene</td>
<td>Polyurethane</td>
<td>EPS Plaster</td>
</tr>
<tr>
<td>Straw Bales</td>
<td>Multi-Foils</td>
<td>Polyurethane</td>
<td>Rockwool</td>
<td>Rock Wool</td>
</tr>
<tr>
<td>Sheep’s Wool</td>
<td></td>
<td>Wood Wool</td>
<td>Ceramic Fiber</td>
<td>Autoclaved aerated concrete (AAC)</td>
</tr>
<tr>
<td>Flax and Hemp</td>
<td></td>
<td></td>
<td></td>
<td>Sintered Hollow Brick</td>
</tr>
<tr>
<td>Cellulose</td>
<td></td>
<td></td>
<td></td>
<td>Glazed Hollow Beads Material</td>
</tr>
<tr>
<td>Wood fibre</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expanded Clay Aggregate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Difficult to control the levelness
2. Relatively bad diffusion, easy to hollow and crack
3. Special protection outfit/equipment is required when application
4. Difficult to control the corner area, window / door frame
5. Flammable, short service life

2010 Shanghai Fire (Nov 15)
Extruded Polystyrene Board (XPS)
Expanded Polystyrene Board (EPS)

1. Flammable, short service life
2. Heat Bridge is easily formed
3. Easy to crack (esp. on joint areas)
1. Difficult in mixing and application
2. Two part components, quality is not guarantee
3. Easy to crack and hollow
1. Difficult in fixing and rendering afterwards
2. Commonly use as Fire Barrier Zone

Rockwool
Section 4

_E.MIX_ Thermal Insulation System
E•MIX Thermomix Insulation Render

- Use in both internal and external thermal insulation and replace the layer of render
- Good workability (same as traditional method)
- Comply with insulation render standard GB 18445
- Fire resistance Class A
- Strong enough for tile fixing
- Non-toxic, Low VOCs
- The 1st Thermal insulation product to be certified in Green Label Product Scheme in Hong Kong

Inorganic glassy mineral materials
Insulation Particles in Thermomix

- Glassy inorganic compound
- Close hollow particles
  - Light Weight
  - Insulation
  - Thermal Stable
  - Low Water Absorption
## Thermal insulation materials

<table>
<thead>
<tr>
<th>Thermal Insulation Materials</th>
<th>Density kg/m³</th>
<th>Thermal Conductivity W/(m·K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expanded Polystyrene Board (EPS)</td>
<td>18~25</td>
<td>0.038-0.041</td>
</tr>
<tr>
<td>Extruded Polystyrene Board (XPS)</td>
<td>30~35</td>
<td>0.028-0.03</td>
</tr>
<tr>
<td>Polystyrene particles Slurry (EPS plaster) (Dry)</td>
<td>180-250</td>
<td>0.057-0.06</td>
</tr>
<tr>
<td>Rigid Polyurethane Foam Material</td>
<td>25-45</td>
<td>0.025-0.028</td>
</tr>
<tr>
<td><strong>E.MIX Thermomix Insulation Render</strong></td>
<td>240~400</td>
<td>≤0.07 &amp; ≤0.085</td>
</tr>
<tr>
<td>Autoclaved aerated concrete (AAC)</td>
<td>400-700</td>
<td>0.12-0.18</td>
</tr>
<tr>
<td>Sintered Solid Brick</td>
<td>1600</td>
<td>0.81</td>
</tr>
<tr>
<td>Sintered Hollow Brick</td>
<td>1200</td>
<td>0.43</td>
</tr>
<tr>
<td>Autoclaved Lime and Sand Brick</td>
<td>1400</td>
<td>0.44-0.64</td>
</tr>
<tr>
<td>Reinforced Concrete</td>
<td>2300</td>
<td>1.75</td>
</tr>
</tbody>
</table>
# E•MIX Thermomix Insulation System

<table>
<thead>
<tr>
<th>Properties</th>
<th>GB/T20473-2006 Specs</th>
<th>E.MIX Thermomix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk Density (kg/m³)</td>
<td>&lt; 350</td>
<td>330</td>
</tr>
<tr>
<td>Dry Density (kg/m³)</td>
<td>301 - 400</td>
<td>353</td>
</tr>
<tr>
<td>Compressive strength (MPa)</td>
<td>&gt; 0.4</td>
<td>5.8</td>
</tr>
<tr>
<td>Thermal Conductivity (W/m.K)</td>
<td>&lt; 0.085</td>
<td>0.073</td>
</tr>
<tr>
<td>Linear Shrinkage (%)</td>
<td>&lt; 0.3</td>
<td>0.077</td>
</tr>
<tr>
<td>Tensile Adhesion Strength (MPa)</td>
<td>&gt; 0.05</td>
<td>0.65</td>
</tr>
<tr>
<td>Lost in Comp str after freezing (%)</td>
<td>&lt; 25</td>
<td>13</td>
</tr>
</tbody>
</table>

Other (In-house) targets

| Applied thickness per application (mm)           | -                     | 40 - 50         |
| Setting time at above thickness                 | -                     | 1 day           |
| Pot Life (mins)                                  | -                     | 60              |
E•MIX Thermomix Insulation System

E•MIX Thermomix Insulation Render vs Traditional Cement Sand Render

*This illustration is the comparison between 60mm of E•MIX Thermomix Insulation Render and 60mm of Cement Sand Rendering. It is based on the heat transferred from one direction only with no other factor affecting the system.*
Thermal transmittance (U) for different thickness of Thermomix Insulation Render

- U=1.5
- U=1.0
- U=0.5

Thermomix Thickness (mm):
- ~25mm
- ~53mm
- ~108mm
Temperature Profile of External Wall Using Thermomix (Winter)

Temperature (°C)

Thermomix Insulation System

Concrete Wall (200 mm)

Internal Render (15 mm)

Thermomix (60 mm)

Coating (8 mm)
Temperature Profile of External Wall Using Thermomix (Summer)

- Concrete Wall (200 mm)
- Internal Render (15 mm)
- Thermomix (60 mm)
- Coating (8 mm)

Temperature (°C) vs. Thickness of Different Layer (mm)
## Scenario 1 – External Insulation Wall – (To Receive Tile)

1. **SUBSTRATE**
2. **E.MIX KEY PLASTER**
3. **E.MIX THERMOMIX INSULATION RENDER**
4. **E.MIX PROTECT PLASTER**
5. **GALVANIZED METAL REINFORCEMENT MESH**
6. **E.MIX PROTECT PLASTER**
7. **E.MIX TILE FIX 383**
8. **TILE**
9. **E.MIX TILE GROUT**
### Scenario 1 – External Insulation Wall – (To Receive Tile)

#### Specification

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Function</th>
<th>Theoretical Coverage</th>
<th>Mixing Ratio</th>
<th>Recommended Thickness</th>
<th>Interval Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) E. MIX Key Plaster 界面砂浆浆</td>
<td>Bonding Agent</td>
<td>1.15 kg/m²/mm</td>
<td>24% - 27% Water</td>
<td>3 mm</td>
<td>1 day</td>
</tr>
<tr>
<td>2) E. MIX Thermomix Insulation Render 高节能保温砂浆浆</td>
<td>Insulation</td>
<td>0.4 kg/m²/mm</td>
<td>70% - 90% Water</td>
<td>10 - 60 mm</td>
<td>3 days</td>
</tr>
<tr>
<td>3) E.MIX Protect Plaster 防水抗裂砂漿 (First Coat 第一层)</td>
<td>Protection</td>
<td>1.1 kg/m²/mm</td>
<td>24 - 27% Water</td>
<td>2 - 3 mm</td>
<td>3 days</td>
</tr>
<tr>
<td>4) Galvanized Metal Reinforcement Mesh 鋼絲網</td>
<td>Reinforcement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) E.MIX Protect Plaster 防水抗裂砂漿 (Second Coat 第二层)</td>
<td>Protection</td>
<td>1.1 kg/m²/mm</td>
<td>24 - 27% Water</td>
<td>3 - 5 mm</td>
<td>3 days</td>
</tr>
<tr>
<td>6) E. MIX Tile Fix 383 383柔韧瓷砖粘结剂</td>
<td>Tile Adhesive</td>
<td>40 Kg/ Bag</td>
<td>24 - 27% (Grey) 27 - 30% (White)</td>
<td>1 day</td>
<td></td>
</tr>
<tr>
<td>7a) E.MIX Tile Grout Fine 顏色填縫劑(窄縫型)</td>
<td>Tile Grout</td>
<td>25 Kg/ Bag</td>
<td>25 - 28% Water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7b) E.MIX Tile Grout Coarse 顏色填縫劑(宽縫型)</td>
<td>Tile Grout</td>
<td></td>
<td>15 - 18% Water (Grey &amp; Others) 18 - 21% Water (White)</td>
<td>~</td>
<td></td>
</tr>
</tbody>
</table>
Scenario 2 – External Insulation Wall – (To Receive Paint)

1. SUBSTRATE
2. E.MIX KEY PLASTER
3. E.MIX THERMOMIX INSULATION RENDER
4. E.MIX PROTECT PLASTER
5. FIBERGLASS REINFORCEMENT MESH
6. E.MIX PROTECT PLASTER
7. E.MIX FINISH
8. PAINT
### Scenario 2 – External Insulation Wall – (To Receive Paint)

#### Specification

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Function</th>
<th>Theoretical Coverage</th>
<th>Mixing Ration</th>
<th>Recommended Thickness</th>
<th>Interval Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) E. MIX Key Plaster (界面砂浆)</td>
<td>Bonding Agent</td>
<td>1.15 kg/m²/mm</td>
<td>24% - 27% Water</td>
<td>3 mm</td>
<td>1 day</td>
</tr>
<tr>
<td>2) E. MIX Thermomix Insulation Render (高节能保温砂浆)</td>
<td>Insulation</td>
<td>0.4 kg/m²/mm</td>
<td>70 - 90% Water</td>
<td>10 - 60 mm</td>
<td>3 days</td>
</tr>
<tr>
<td>3) E.MIX Protect Plaster (First Coat 第一层)</td>
<td>Protection</td>
<td>1.1 kg/m²/mm</td>
<td>24 - 27% Water</td>
<td>2 - 3 mm</td>
<td>3 days</td>
</tr>
<tr>
<td>4) Fiberglass Reinforcement Mesh (玻纖網)</td>
<td>Reinforcement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) E.MIX Protect Plaster (Second Coat 第二層)</td>
<td>Protection</td>
<td>1.1 kg/m²/mm</td>
<td>24 - 27% Water</td>
<td>3 - 5 mm</td>
<td>3 days</td>
</tr>
<tr>
<td>3) E. MIX Finish (柔韧性腻子)</td>
<td>Skim Coat</td>
<td>1.0 kg/m²/mm</td>
<td>38 - 40% Water</td>
<td>0.5-2 mm</td>
<td>3 days</td>
</tr>
</tbody>
</table>
E•MIX Thermomix Insulation System

Scenario 3 – External Insulation Wall – (To Decorative Render)

1. SUBSTRATE
2. E.MIX KEY PLASTER
3. E.MIX THERMOMIX INSULATION RENDER
4. E.MIX DECORATIVE RENDER
### E•MIX Thermomix Insulation System

**Scenario 3 – External Insulation Wall – (To Decorative Render)**

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Function</th>
<th>Theoretical Coverage</th>
<th>Mixing Ration</th>
<th>Recommended Thickness</th>
<th>Interval Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) E. MIX Key Plaster 界面砂漿</td>
<td>Bonding Agent</td>
<td>1.15 kg/m²/mm</td>
<td>24% - 27% Water</td>
<td>3 mm</td>
<td>1 day</td>
</tr>
<tr>
<td>2) E. MIX Thermomix Insulation Render 高節能保溫砂漿</td>
<td>Insulation</td>
<td>0.4 kg/m²/mm</td>
<td>70 - 90% Water</td>
<td>10 - 60 mm</td>
<td>3 days</td>
</tr>
<tr>
<td>3) E.MIX Protect Plaster 防水抗裂砂漿 (First Coat 第一層)</td>
<td>Protection</td>
<td>1.1 kg/m²/mm</td>
<td>24 - 27% Water</td>
<td>2 - 3 mm</td>
<td>3 days</td>
</tr>
<tr>
<td>4) Fiberglass Reinforcement Mesh 玻纖網</td>
<td>Reinforcement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) E.MIX Protect Plaster 防水抗裂砂漿 (Second Coat 第二層)</td>
<td>Protection</td>
<td>1.1 kg/m²/mm</td>
<td>24 - 27% Water</td>
<td>3 - 5 mm</td>
<td>3 days</td>
</tr>
<tr>
<td>6) E. MIX Decorative Render 顏色找平砂漿</td>
<td>Rendering</td>
<td>1.6 kg/m²/mm</td>
<td>(Hand Application)</td>
<td>16 - 18% Water</td>
<td>1-2 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Spray Application)</td>
<td>17 - 19%</td>
<td></td>
</tr>
</tbody>
</table>
Section 4

*E.MIX Thermomix* Insulation Render Application and Properties
Application

E.MIX Key Plaster
Application

E.MIX Thermomix Insulation Render
Application

E.MIX Protect Plaster
Application

E.MIX Tile Fix 383
Application

E.MIX Tile Grout
Adhesive Strength
Adhesive Strength

Average Adhesive Strength: 0.63 MPa
Adhesive Strength on System
Adhesive Strength on System

Average Adhesive Strength: 0.77 MPa
E•MIX Thermomix Insulation System (Spray application)

MTR 714 Kennedy Town (Hong Kong)
E•MIX Thermomix Insulation System (Spray application)

MTR 714 Kennedy Town (Hong Kong)
Section 5

Other *E.MIX* Green Products
• More slides for Malaysia
Supportive of Green Movement

- 19 registered products with SGLS
- Reduced waste in factory by recycling into products if possible. Sold over-sized sand as post-consumer waste for other industry usage.
- Pumping system for Cement into silo to avoid dust pollution
- Shelter for sand stockpile to prevent washing of materials to drains
- Use of pre-consumer waste (by-product) to cut down on carbon footprint
- ISO 14,001 – Environment and Waste management System
Mediacorp Channel 8 and CNA coverage of Emix Industry on Eco Products

Eco Products

EMIX cares for the environment and strongly supports the Building and Construction Authority’s sustainability construction movement. More than 15 EMIX products are certified by the Singapore Green Label seal which is issued by the Singapore Environment Council. EMIX not only uses recycled by-products of waste material for its production but also ensures that its products are packed in paper bags that are sustainably procured.

Watch EMIX being featured in primetime news on Singapore’s national TV channels.