**Heat Flow Analysis**

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**Bonded 1100C Modules**

- **Product Forms**
  - Insulfrax® 1100C Modules
  - Weld-Loc® 1100C Modules
  - Power-Loc® 1100C Modules

**Product Information Sheet**

- **Introduction**
  - Insulfrax® 1100C Modules are a family of high-temperature module products based on Unifrax’s Anchor-Loc® attachment systems. Modules can be used in the Anchor-Loc® systems or in conjunction with Insulfrax 1100C blankets. Insulfrax 1100C Modules can be easily adapted to various steel shell environments by using modular module systems with several different attachment systems.

**Applications**

- **Typical Applications**
  - Furnaces and special kilns
  - Heat treating furnace linings
  - Stacks, ducts, and flue linings
  - Aluminum homogenizing furnace and soaking pits
  - Annealing furnace linings

**Product Safety Data Sheet**

- Refer to the product Material Safety Data Sheet (MSDS) for recommended work practices and other product safety information.
Thread Loc® 1100C Modules

Provided with an all-thread weld stud and flanged nut, the Thread Loc 1100C module is designed for installation on a pre-positioned stud pattern. The Thread Loc attachment system has several advantages:

- Compatibility with mastic coatings, back-up insulation, and foil vapor barriers
- Module design compensates for variations in stud placement
- Access to the welded fastener for full testing before the module is installed

Screw Loc® 1100C Module

A self-tapping screw supplied with each Screw Loc 1100C module easily penetrates mild steel up to 1/2" in thickness. The Screw Loc attachment system provides the following installation advantages:

- Multiple, random anchor placement
- Ease of removal and replacement
- Furnace casing preparation is eliminated
- Low cost installation equipment is readily available

Available Insulfrax 1100C Modules

305 mm x 610 mm (12" x 24"), 305 mm x 305 mm (12" x 12"), 305 mm x 152.5 mm (12" x 6")

Recommended Operating Temperature Limit 1 Construction Module Density

Insulfrax 1100C 1260°C 1100°C Folded Insulfrax S 128 kg/m³
(2300°F) (2012°F) Blanket 160 kg/m³
(10 lb/ft³)

1 Temperature Grade based on European Norm (EN 1094).
2 The recommended operating temperature of Insulfrax products is determined by irreversible linear change criteria, not melting point.

Bonded 1100C Modules

Bonded 1100C modules provide the benefits of Insulfrax fiber in new construction or the upgrade of existing refractory for a wide range of heat processing equipment. The Bonded 1100C modules can be installed as a hot face veneer over existing refractory, or with Unifrax’s Hefty Lock™ hardware as a full thickness lining.

Manufacture of Bonded 1100C modules is based on Insulfrax S Blanket, a high-strength spun fiber blanket. This blanket is folded, then tightly compressed and banded to form the Bonded 1100C block. These bonded modules are offered in two standard densities and a range of thicknesses to provide peak performance in applications operating up to 1100°C (2012°F).

Bonded 1100C Module Installation Over Refractory

Bonded 1100C modules are typically mortared into place over a hot face refractory using .908 kg to 1.36 kg (2 to 3 pounds) of Fiberstick™ mortar per module. This lining over refractory installation technique (veneer) with Bonded 1100C modules offers the benefits of Insulfrax fiber in addition to the performance advantages listed below:

- Reduced heat loss
- Faster furnace cycling
- Increased resistance to thermal shock
- Improved sound absorption
- Low installed cost
- Reduced heat storage
- Reduced fuel costs

Typical applications for Bonded 1100C modules include heat treating furnaces, aluminum processing furnaces, aromatic charcoal furnaces operating under 1100°C (2012°F). For additional information about the installation of bonded module systems, refer to the Fiberwall™ Installation Manual (Form C-729).
Thread Loc® 1100C Modules
Provided with an all-thread weld stud and flanged nut, the Thread Loc 1100C module is designed for installation on a pre-positioned stud pattern. The Thread Loc attachment system has several advantages:
• Compatibility with mastic coatings, back-up insulation, and foil vapor barriers
• Module design compensates for variations in stud placement
• Access to the welded fastener for full testing before the module is installed

Screw Loc® 1100C Module
A self-tapping screw supplied with each Screw Loc 1100C module easily penetrates mild steel up to 1/2" in thickness. The Screw Loc attachment system provides the following installation advantages:
• Multiple, random anchor placement
• Ease of removal and replacement
• Furnace casing preparation is eliminated
• Low cost installation equipment is readily available

Available Insulfrax 1100C Modules
305 mm x 610 mm (12” x 24”), 305 mm x 305 mm (12” x 12”), 305 mm x 152.5 mm (12” x 6”)

Recommended Operating Temperature
<table>
<thead>
<tr>
<th>Module Type</th>
<th>Temperature Limit</th>
<th>Construction</th>
<th>Module Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulfrax 1100C</td>
<td>1100°C (2012°F)</td>
<td>Folded Insulfrax S Blanket</td>
<td>128 kg/m³ (8 lb/ft³)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>160 kg/m³ (10 lb/ft³)</td>
</tr>
</tbody>
</table>

Temperature is based on European Norm (EN 1094).

Screw Loc® 1100C Module
A self-tapping screw supplied with each Screw Loc 1100C module easily penetrates mild steel up to 1/2" in thickness. The Screw Loc attachment system provides the following installation advantages:
• Multiple, random anchor placement
• Ease of removal and replacement
• Furnace casing preparation is eliminated
• Low cost installation equipment is readily available

Available Attachment Option
A. Weld-Loc® 1100C Module
B. Power-Loc® 1100C Module
C. Thread Loc® 1100C Module
D. Screw Loc® 1100C Module

Bonded 1100C Modules
Bonded 1100C modules provide the benefits of Insulfrax fiber in new construction or the upgrade of existing refractory for a wide range of heat processing equipment. The Bonded 1100C modules can be installed as a hot face veneer over existing refractory, or with Unifrax’s Hefty LocTM hardware as a full thickness lining.

Fabrication of Bonded 1100C modules is accomplished on Insulfrax S Blanket, a high-strength spun fiber blanket. This blanket is folded, then tightly compressed and banded to form the Bonded 1100C block. These bonded modules are offered in two standard densities and a range of thicknesses to provide peak performance in applications operating up to 1100°C (2012°F).

Bonded 1100C Module Installation
Over Refractory
Bonded 1100C modules are typically mortared into place over refractory using .908 kg to 1.36 kg (2 to 3 pounds) of Fiberstick® mortar per module. This lining over refractory installation technique (veneer) with Bonded 1100C modules offers the benefits of Insulfrax fiber in addition to the performance advantages listed below:
• Reduced heat loss
• Faster furnace cycling
• Increased resistance to thermal shock
• Improved sound absorption
• Low installed cost
• Reduced heat storage
• Reduced fuel costs

Typical applications for Bonded 1100C modules include heat treating furnaces, aluminum processing furnaces and heat exchangers operating under 1100°C (2012°F). For additional information about the installation of bonded module veneers, refer to the FiberwallTM Installation Manual (Form C-729).

All heat flow calculations are based on a surface emissivity factor of .90 and an ambient temperature of 27°C (80°F). Variations in any of these factors will result in significant differences in the calculated data.
Thread Loc® 1100C Modules
Provided with an all-thread weld stud and flanged nut, the Thread Loc 1100C module is designed for installation on a pre-positioned stud pattern. The Thread Loc attachment system has the following installation advantages:

• Compatibility with mastic coatings, backup insulation, and foil vapor barriers
• Module design compensates for variations in stud placement
• Access to the welded fastener for full testing before the module is installed

Screw Loc® 1100C Module
A self-tapping screw supplied with each Screw Loc 1100C module easily penetrates mild steel up to ⅜" thick. The Screw Loc attachment system provides the following installation advantages:

• Multiple, random anchor placement
• Ease of removal and replacement
• Furnace casing preparation is eliminated
• Low cost installation equipment is readily available

Available Insulfrax 1100C Modules

<table>
<thead>
<tr>
<th>Module Type</th>
<th>Temperature Grade</th>
<th>Recommended Operating Temperature Limit</th>
<th>Construction</th>
<th>Module Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulfrax 1100C</td>
<td>1260°C (2300°F)</td>
<td>1100°C (2012°F)</td>
<td>Folded Insulfrax S Blanket</td>
<td>128 kg/m³ (8 lb/ft³)</td>
</tr>
<tr>
<td>Insulfrax 1100C</td>
<td>1260°C (2300°F)</td>
<td>1100°C (2012°F)</td>
<td>Blanket</td>
<td>160 kg/m³ (10 lb/ft³)</td>
</tr>
</tbody>
</table>

Temperature characterized on European Norm (EN 1094).

The recommended operating temperature of Insulfrax products is determined by irreversible linear change criteria, not melting point.

Available Attachment Option

A. Weld-Loc® 1100C Module
B. Screw Loc® 1100C Module
C. Thread Loc® 1100C Module
D. Power-Loc® 1100C Module

Bonded 1100C Modules
Bonded 1100C modules provide the benefits of Insulfrax fiber in new construction or the upgrade of existing refractory for a wide range of heat processing equipment. The Bonded 1100C modules can be installed as a hot face veneer over existing refractory, or with Unifrax’s Hefty Lock™ hardware as a full thickness lining.

Manufacture of Bonded 1100C modules is based on Insulfrax S Blanket, a high-strength spun fiber blanket. This blanket is folded, then tightly compressed and banded to form the Bonded 1100C block. These bonded modules are offered in two standard densities and a range of thicknesses to provide peak performance in applications operating up to 1100°C (2012°F). Bonded 1100C Module Installation
Over Refractory
Bonded 1100C modules are typically mortared into place over hot refractory using .908 kg to 1.36 kg (2 to 3 pounds) of Fiberstick™ mortar per module. This lining over refractory installation technique (veneer) with Bonded 1100C modules offers the benefits of Insulfrax fiber in addition to the performance advantages listed below:

• Reduced heat loss
• Faster furnace cycling
• Increased resistance to thermal shock
• Improved sound absorption
• Low installed cost
• Reduced heat storage
• Reduced fuel costs

Typical applications for Bonded 1100C modules include heat treating furnaces, aluminum processing furnace atmospheres, and furnaces operating under 1100°C (2012°F).

For additional information about the installation of bonded module veneers, refer to the Fiberwall™ Installation Manual (Form C-729).

Insulfrax 1100C Modules

<table>
<thead>
<tr>
<th>Module Type</th>
<th>Temperature Grade</th>
<th>Insulation Thickness – mm (in)</th>
<th>Hot Face</th>
<th>Cold Face</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulfrax 1100C</td>
<td>1260°C (2300°F)</td>
<td>102 (4)</td>
<td>152 (6)</td>
<td>203 (8)</td>
<td>254 (10)</td>
</tr>
<tr>
<td>Insulfrax 1100C</td>
<td>1260°C (2300°F)</td>
<td>160 (6)</td>
<td>254 (10)</td>
<td>305 (12)</td>
<td>381 (15)</td>
</tr>
</tbody>
</table>

All heat flow calculations are based on a surface emissivity factor of .9, an ambient temperature of 27°C (80°F), and a wind velocity of 0 mph. No other factors have been considered in these calculations and the values are not intended for use in the design of complete systems. Where heating and cooling loads vary significantly over a single cycle, the performance of the lining will vary. Bonded 1100C modules are typically mortared into place over hot refractory using .908 kg to 1.36 kg (2 to 3 pounds) of Fiberstick™ mortar per module. This lining over refractory installation technique (veneer) with Bonded 1100C modules offers the benefits of Insulfrax fiber in addition to the performance advantages listed below.

• Reduced heat loss
• Faster furnace cycling
• Increased resistance to thermal shock
• Improved sound absorption
• Low installed cost
• Reduced heat storage
• Reduced fuel costs

Typical applications for Bonded 1100C modules include heat treating furnaces, aluminum processing furnace atmospheres and furnaces operating under 1100°C (2012°F). For additional information about the installation of bonded module veneers, refer to the Fiberwall™ Installation Manual (Form C-729).
**Insulfrax® 1100C Modules**

**Introduction**

Insulfrax® 1100C Modules are a family of high-temperature module products based on Unifrax Anchor-Loc™ attachment systems. Modules used in the Anchor-Loc™ systems are compatible with Insulfrax® 1100C Insulation Blankets, which is available in Insulfrax® Blanket, Insulfrax® 1100C Modules can be easily integrated into existing shell of beehive type furnaces requiring high thermal insulation and moisture resistance with several different attachment systems.

**Heat Flow Analysis**

**Bonded 1100C/Hefty Lock™ Full Thickness Lining**

<table>
<thead>
<tr>
<th>Insulfrax® 1100C Modules</th>
<th>Thickness (in)</th>
<th>Heat Flow (Btu/h ft² °F)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hot Face</strong></td>
<td><strong>Cold Face</strong></td>
<td><strong>Hot Face</strong></td>
</tr>
<tr>
<td>Insulation Thickness/mm</td>
<td>102 (4)</td>
<td>152 (6)</td>
</tr>
<tr>
<td>191 (78)</td>
<td>227 (90)</td>
<td>206 (79)</td>
</tr>
<tr>
<td>254 (10)</td>
<td>286 (11)</td>
<td>271 (106)</td>
</tr>
<tr>
<td>335 (13)</td>
<td>354 (14)</td>
<td>335 (13)</td>
</tr>
<tr>
<td>406 (16)</td>
<td>425 (16)</td>
<td>406 (16)</td>
</tr>
</tbody>
</table>

**Product Forms**

Insulfrax® 1100C Modules are manufactured in several configurations. A choice of attachment systems is provided to meet the specific operating conditions and heat treating requirements of your furnace casing.

**Weld-Loc® 1100C Modules**

A weld-on attachment is used in each Weld-Loc 1100C module. This stud assembly permits the unit to be torqued on the furnace casing and allows a threaded fastener to be torqued on the stud, securing the module to the plate. Advantages offered by the Weld-Loc module include:

- **High installation speed**
- **Ease and simplicity of installation**
- **Permits random placement of modules on the casing**
- **Systems provide a positive torque test of the weld**

**Power-Loc® 1100C Modules**

A bolt-on attachment is used in each Power-Loc 1100C module to secure the unit to the casing plate. The anchor pin is fastened with a special Hilti powder actuated fastening tool to provide additional attachment strength. Advantages which are offered by the Power-Loc 1100C include:

- **High installation speed**
- **Ease of alignment of modules on the casing**
- **Permits random placement of modules on the casing**

**Heat Flow Analysis**

**Bonded 1100C/Hefty Lock™ Full Thickness Lining**

<table>
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<tr>
<th>Insulfrax® 1100C Modules</th>
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<td>406 (16)</td>
<td>425 (16)</td>
<td>406 (16)</td>
</tr>
</tbody>
</table>

**Product Information Sheet**

For additional information about product performance or to identify the recommended product for your application, please contact the Unifrax Application Engineering Group at 716-786-3986.
**Health and Safety Information**

Insulfrax Thermal Insulation from Unifrax, according to Directive 1999/5/EC, possesses a fiber chemistry within the regulatory threshold of a ‘non-asbestos type fibrous’ substance. Insulfrax products contain no extraneous fibrous inclusions and are designed and manufactured to be free from asbestos. For more information or to identify the recommended product for your application, please contact the Unifrax Application Engineering Group at 716-278-3888.

<table>
<thead>
<tr>
<th>Hot Face Cold Face Temperature °C (°F)</th>
<th>Insulation Thickness – mm (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>77 (171)</td>
<td>63 (147)</td>
</tr>
<tr>
<td>56 (133)</td>
<td>51 (124)</td>
</tr>
<tr>
<td>47 (116)</td>
<td>44 (114)</td>
</tr>
<tr>
<td>39 (102)</td>
<td>37 (99)</td>
</tr>
</tbody>
</table>

**Reverse Side Insulation**

Insulfrax Thermal Insulation from Unifrax, according to Directive 92/45/EC, possesses a fiber chemistry within the regulatory threshold of a ‘non-asbestos type fibrous’ substance. Insulfrax products contain no extraneous fibrous inclusions and are designed and manufactured to be free from asbestos. For more information or to identify the recommended product for your application, please contact the Unifrax Application Engineering Group at 716-278-3888.

<table>
<thead>
<tr>
<th>Hot Face Cold Face Temperature °C (°F)</th>
<th>Insulation Thickness – mm (in)</th>
</tr>
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<td>44 (114)</td>
</tr>
<tr>
<td>39 (102)</td>
<td>37 (99)</td>
</tr>
</tbody>
</table>

**Physical Properties**

Insulfrax Photovoltaic ® Modules are manufactured in several configurations. A choice of attachment systems is provided to meet the needs of technologies.

**Weld-Loc® 1100C Modules**

A new weld assembly and same Insulfrax 1100C module that allows a threaded fastener to be torqued on the stud, allowing the module to be easily removed from the stud. Advantages offered by the Weld-Loc module include:

- **High installation speed**
- **Ease and simplicity of installation**
- **High speed torquing of the fastener**
- **Power-Loc® 1100C Modules**

A modular pin mechanically secures each Power-Loc 1100C module to the stainless steel case. The pin and collar is designed with a special Hilti powder actuated fastening tool and power tool. Advantages offered by the Power-Loc 1100C module include:

- **High installation speed**
- **Ease of installation**
- **Power-Loc® 1100C Modules**

A modular pin mechanically secures each Power-Loc 1100C module to the stainless steel case. The pin and collar is designed with a special Hilti powder actuated fastening tool and powder tool. Advantages offered by the Power-Loc 1100C module include:

- **High installation speed**
- **Ease of installation**
- **Power-Loc® 1100C Modules**

A modular pin mechanically secures each Power-Loc 1100C module to the stainless steel case. The pin and collar is designed with a special Hilti powder actuated fastening tool and powder tool. Advantages offered by the Power-Loc 1100C module include:

- **High installation speed**
- **Ease of installation**

For additional information about product performance or to identify the recommended product for your application, please contact the Unifrax Application Engineering Group at 716-278-3888.

**Product Information Sheet**

**Insulfrax® 1100C Modules**

**Introduction**

Insulfrax 1100C Modules are a family of high-temperature module products based on Unifrax’s Anchor-Loc™ attachment system. Modules are used in the Anchor-Loc system to construct fully insulated high-temperature systems. Modules supported in the Anchor-Loc system can be connected together to form a fully insulated, continuous system. Modules are available in a wide range of configurations. A choice of attachment systems is provided to meet the needs of technologies.

**Product Forms**

Insulfrax 1100C Modules are manufactured in several configurations. A choice of attachment systems is provided to meet the needs of technologies.

**Weld-Loc® 1100C Modules**

A new weld assembly and same Insulfrax 1100C module that allows a threaded fastener to be torqued on the stud, allowing the module to be easily removed from the stud. Advantages offered by the Weld-Loc module include:

- **High installation speed**
- **Ease and simplicity of installation**
- **High speed torquing of the fastener**
- **Power-Loc® 1100C Modules**

A modular pin mechanically secures each Power-Loc 1100C module to the stainless steel case. The pin and collar is designed with a special Hilti powder actuated fastening tool and power tool. Advantages offered by the Power-Loc 1100C module include:

- **High installation speed**
- **Ease of installation**
- **Power-Loc® 1100C Modules**

A modular pin mechanically secures each Power-Loc 1100C module to the stainless steel case. The pin and collar is designed with a special Hilti powder actuated fastening tool and powder tool. Advantages offered by the Power-Loc 1100C module include:

- **High installation speed**
- **Ease of installation**

For additional information about product performance or to identify the recommended product for your application, please contact the Unifrax Application Engineering Group at 716-278-3888.

**Product Information Sheet**

**Insulfrax® 1100C Modules**

**Introduction**

Insulfrax 1100C Modules are a family of high-temperature module products based on Unifrax’s Anchor-Loc™ attachment system. Modules are used in the Anchor-Loc system to construct fully insulated high-temperature systems. Modules supported in the Anchor-Loc system can be connected together to form a fully insulated, continuous system. Modules are available in a wide range of configurations. A choice of attachment systems is provided to meet the needs of technologies.

**Product Forms**

Insulfrax 1100C Modules are manufactured in several configurations. A choice of attachment systems is provided to meet the needs of technologies.

**Weld-Loc® 1100C Modules**

A new weld assembly and same Insulfrax 1100C module that allows a threaded fastener to be torqued on the stud, allowing the module to be easily removed from the stud. Advantages offered by the Weld-Loc module include:

- **High installation speed**
- **Ease and simplicity of installation**
- **High speed torquing of the fastener**
- **Power-Loc® 1100C Modules**

A modular pin mechanically secures each Power-Loc 1100C module to the stainless steel case. The pin and collar is designed with a special Hilti powder actuated fastening tool and power tool. Advantages offered by the Power-Loc 1100C module include:

- **High installation speed**
- **Ease of installation**
- **Power-Loc® 1100C Modules**

A modular pin mechanically secures each Power-Loc 1100C module to the stainless steel case. The pin and collar is designed with a special Hilti powder actuated fastening tool and power tool. Advantages offered by the Power-Loc 1100C module include:

- **High installation speed**
- **Ease of installation**

For additional information about product performance or to identify the recommended product for your application, please contact the Unifrax Application Engineering Group at 716-278-3888.

**Product Information Sheet**

**Insulfrax® 1100C Modules**

**Introduction**

Insulfrax 1100C Modules are a family of high-temperature module products based on Unifrax’s Anchor-Loc™ attachment system. Modules are used in the Anchor-Loc system to construct fully insulated high-temperature systems. Modules supported in the Anchor-Loc system can be connected together to form a fully insulated, continuous system. Modules are available in a wide range of configurations. A choice of attachment systems is provided to meet the needs of technologies.

**Product Forms**

Insulfrax 1100C Modules are manufactured in several configurations. A choice of attachment systems is provided to meet the needs of technologies.

**Weld-Loc® 1100C Modules**

A new weld assembly and same Insulfrax 1100C module that allows a threaded fastener to be torqued on the stud, allowing the module to be easily removed from the stud. Advantages offered by the Weld-Loc module include:

- **High installation speed**
- **Ease and simplicity of installation**
- **High speed torquing of the fastener**
- **Power-Loc® 1100C Modules**

A modular pin mechanically secures each Power-Loc 1100C module to the stainless steel case. The pin and collar is designed with a special Hilti powder actuated fastening tool and power tool. Advantages offered by the Power-Loc 1100C module include:

- **High installation speed**
- **Ease of installation**
- **Power-Loc® 1100C Modules**

A modular pin mechanically secures each Power-Loc 1100C module to the stainless steel case. The pin and collar is designed with a special Hilti powder actuated fastening tool and power tool. Advantages offered by the Power-Loc 1100C module include:

- **High installation speed**
- **Ease of installation**

For additional information about product performance or to identify the recommended product for your application, please contact the Unifrax Application Engineering Group at 716-278-3888.