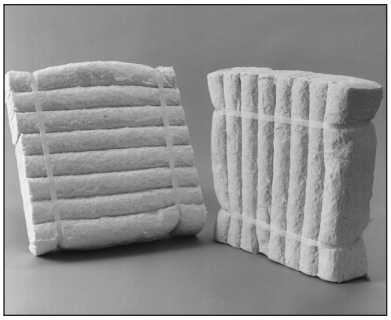
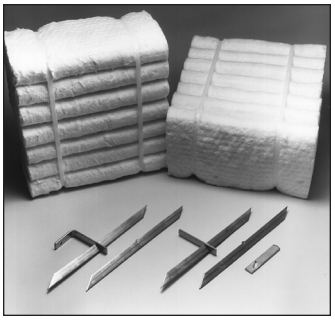
Product Information Sheet

Fiberwall® Bonded Module Systems





Introduction

Fiberwall® Bonded module systems provide fast and simple techniques for effectively insulating all types of heat processing equipment. Bonded modules can be installed with Hefty-Loc™ hardware as a full-thickness, mechanically anchored lining, or as a hot face veneer over existing refractory surfaces in suitable condition.

Fiberwall Bonded modules are constructed with folded and tightly compressed Durablanket® S, Durablanket HP-S or Durablanket 2600 ceramic fiber blanket. They are available in a range of densities and thicknesses to match a wide variety of thermal requirements in applications up to 2450°F. At high temperatures, this folded construction takes advantage of the inherent shrinkage present in all ceramic fiber blanket products by causing the layers at the hot face folds to seal against one another, thereby preventing heat flow to the shell.

Fiberwall Bonded 30 modules are designed for hot face veneering over existing refractory linings at temperatures up to 1538°C (2800°F). The felt used in Bonded 30 modules is made from a 50-50 blend of Fiberfrax® high-purity bulk fibers and Fibermax®, a polycrystalline mullite fiber patented by Unifrax. The use of Fibermax in the felt formulation produces a product which exhibits extremely low shrinkage at elevated temperatures.

Bonded Module Installation: Ceramic Fiber Module Veneer

Refer to the product Material Safety Data Sheet (MSDS) for recommended work practices and other product safety information.

Bonded modules are typically mortared into place over existing refractory using .908 kg to 1.36 kg (2 to 3 lbs) of Fiberstick™ refractory cement per module. This lining over refractory (or veneering) approach not only increases the efficiency of the refractory lining but helps to protect it from further degradation.

For recommended veneering installation procedures, refer to the Fiberwall Installation Manual (Form C-729).

Many furnace operators have chosen this lining over refractory method for upgrading the performance of existing linings because of the ease, speed, and simplicity of installation. A ceramic fiber veneer is often a more financially attractive alternative than completely relining a unit due to the lower installation cost and shorter downtime.

Advantages of Fiberfrax Ceramic Fiber Veneer

- Lower heat losses
- Reduction in overall heat storage
- Faster heat up and cool down cycles
- Lower installation cost
- Easy repairs
- Thermal shock resistance
- High heat reflectance
- Good sound absorption
- Excellent corrosion resistance

Typical Veneering Applications

- Forge furnaces
- Refractory kilns
- Reheat furnaces
- Pyrolysis furnaces
- Ceramic kilns
- Boiler fire boxes
- Brick kilns
- Heat treating furnaces

Unifrax Distributor

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Hefty-Loc Module System

Fiberfrax Bonded modules and Hefty-Loc alloy steel hardware are the components of the Hefty-Loc module lining system. The Hefty-Loc system provides an insulation lining for a variety of heat processing equipment.

The Hefty-Loc hardware consists of two components: a base which is welded directly to the furnace casing, and a tine which passes through the Bonded module and locks into the base.

Hefty-Loc fasteners are stocked in two alloy grades, SS-304 and SS-310, with Inconel 601 available on request.

For recommended installation procedures and to select the proper Hefty-Loc hardware alloy grade relative to module thickness and operating temperature, refer to the Fiberwall Installation Manual, Unifrax Form C-729.

The Fiberwall Hefty-Loc module lining system provides many installation and design advantages:

- The eleven-gauge stainless steel hardware components provide high strength as well as resistance to corrosive atmospheres.
- Modules are installed in a unidirectional pattern which allows for maximum compression and results in tight, uniform linings providing efficient thermal performance.
- The design provides a tight seal between the fiber and shell. This insures no heat channeling or convection currents will develop.
- A layered backup lining of Durablanket® S or Duraback® insulation is easily installed behind the modular hot face. This practice is an economical method of increasing the thermal performance of the lining. As an additional advantage, the layered backup lining acts as a safety lining which will protect the casing if mechanical damage occurs on the modular hot face.
- Field cutting of modules for special shapes is simplified. Just trim the Bonded module to the desired contour. Hefty-Loc fasteners are laid out to accommodate the hot face module design. This practice completely eliminates the need to cut the attachment hardware.
- When lining process equipment fired by high-sulfur fuels, a stainless steel layer of foil is easily installed over the backup blanket insulation. This layer acts as a vapor barrier, eliminating corrosion to the casing and weld base of the anchors.
- Quickly installed. Simply slip the Bonded module into position then lock the tine to the prepositioned base joint by impaling the module.
- In applications where high velocities are present, the folded module is installed with the edge grain blanket on the hot face. This edge grained fiber is punctured with a nail board then coated with TopCoat™ M or TopCoat 3000 to provide a surface coating resistant to erosion from velocity.
- Installation equipment is readily available.

Bonded modules used in the Hefty-Loc system offer the same advantages as Fiberwall Anchor-Loc® module linings and layered Fiberwall construction when compared to refractory construction.

These advantages are:

- Faster temperature cycling
- Lower heat storage
- Lower fuel costs
- Increased productivity
- Resistance to thermal shock and spaulling
- Lower installation cost
- Easier repairs
- Reduced maintenance

The Hefty-Loc system is used for a wide range of thermal requirements in applications up to 2100°F. Typical applications for the Hefty-Loc system are as follows:

- Stress relieving furnaces
- Annealing furnaces
- Car bottom heat treating furnaces
- Process heaters
- Furnace, kiln and boiler linings
- Incineration equipment and stack linings
- Field steam generators
- Aluminum soaking pits and homogenizing furnaces

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Typical Product Properties

Available Bonded Modules – 305 mm x 305 mm (12" x 12")

Module Type	Temperature Grade	Recommended Operating Temperature
Bonded 22	1260°C (2300°F)	1777°C (2150°F)
Bonded 24	1316°C (2400°F)	1204°C (2200°F)
Bonded 26	1427°C (2600°F)	1343°C (2450°F)
Bonded 30	1649°C (3000°F)	1538°C (2800°F)

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

For Fiberwall Bonded Module applications that will use the Hefty-Loc anchoring system, refer to the Fiberwall Installation Manual, Unifrax Form C-729. Select the proper hardware alloy grade based upon lining thickness and operating temperature.

Typical Product Parameters

Available Bonded Modules – 305 mm x 305 mm (12" x 12")

Module Type	Construction	Module Density
Bonded 22	Folded Durablanket S	112 kg/m^3 (7 lb/ft^3) 149 kg/m^3 (9.3 lb/ft^3)
Bonded 24	Folded Durablanket HP-S	149 kg/m^3 (9.3 lb/ft^3) 171 kg/m^3 (10.7 lb/ft^3)
Bonded 26	Folded Durablanket 2600	149 kg/m^3 (9.3 lb/ft^3) 171 kg/m^3 (10.7 lb/ft^3)
Bonded 30	Edge Grained Bonded 30 Felt	112.1 kg/m^3 (7 lb/ft^3)

Fiberwall Bonded Modules – Ceramic Fiber Veneer

Fiberwall Bonded 22/Superduty Firebrick — **Folded Modules 112 kg/m^3 (7 lb/ft^3)**

		Cold Face Temperature °C (°F)			
Hot Face °C (°F)	Module Thickness – mm (in) Refractory Thickness – mm (in)	0 (0) 228 (9)	51 (2) 228 (9)	76 (3) 228 (9)	102 (4) 228 (9)
649 (1200)		182 (360)	102 (215)	85 (185)	74 (165)
871 (1600)		221 (430)	147 (296)	124 (255)	108 (227)
1093 (2000)		255 (491)	192 (377)	168 (334)	149 (300)

Fiberwall Bonded 24/Superduty Castable — **Folded Modules 149 kg/m^3 (9.3 lb/ft^3)**

		Cold Face Temperature °C (°F)			
Hot Face °C (°F)	Module Thickness – mm (in) Refractory Thickness – mm (in)	0 (0) 228 (9)	51 (2) 228 (9)	76 (3) 228 (9)	102 (4) 228 (9)
1093 (2000)		210 (410)	166 (330)	148 (298)	133 (271)
1149 (2100)		216 (421)	174 (345)	156 (313)	141 (286)
1232 (2250)		226 (438)	186 (367)	168 (335)	153 (308)

Fiberwall Bonded 2600/Superduty Plastic — **Folded Modules 149 kg/m^3 (9.3 lb/ft^3)**

		Cold Face Temperature °C (°F)			
Hot Face °C (°F)	Module Thickness – mm (in) Refractory Thickness – mm (in)	0 (0) 228 (9)	51 (2) 228 (9)	76 (3) 228 (9)	102 (4) 228 (9)
1232 (2250)		232 (450)	189 (372)	170 (338)	154 (310)
1288 (2350)		239 (462)	197 (386)	179 (354)	163 (325)
1343 (2450)		245 (473)	205 (401)	187 (368)	171 (340)

Fiberwall Bonded Modules – Ceramic Fiber Veneer (Cont'd.)

Fiberwall Bonded 30/Superduty Plastic

Hot Face °C (°F)	Module Thickness – mm (in) / Refractory Thickness – mm (in)	Cold Face Temperature °C (°F) 0 (0) / 228 (9)	51 (2) / 228 (9)	76 (3) / 228 (9)	102 (4) / 228 (9)
1343 (2450)		245 (473)	212 (414)	197 (387)	183 (361)
1427 (2600)		254 (490)	224 (435)	209 (409)	196 (384)
1538 (2800)		266 (511)	238 (461)	225 (437)	212 (414)

Fiberwall Bonded Modules – Hefty-Loc Lining

Fiberwall Bonded 22 — Folded Modules 112 kg/m³ (7 lb/ft³)

Hot Face °C (°F)	Lining Thickness – mm (in)	Cold Face Temperature °C (°F) 102 (4)	152 (6)	203 (8)	254 (10)
649 (1200)		77 (171)	63 (146)	56 (132)	51 (123)
982 (1800)		136 (277)	108 (227)	93 (199)	83 (180)
1093 (2000)		160 (320)	128 (262)	108 (227)	96 (204)

Fiberwall Bonded 22 — Folded Modules 149 kg/m³ (9.3 lb/ft³)

Hot Face °C (°F)	Lining Thickness – mm (in)	Cold Face Temperature °C (°F) 102 (4)	152 (6)	203 (8)	254 (10)
649 (1200)		73 (164)	60 (140)	53 (127)	48 (119)
982 (1800)		127 (260)	101 (214)	86 (187)	77 (170)
1093 (2000)		148 (298)	118 (244)	100 (212)	88 (191)

Fiberwall Bonded 24 — Folded Modules 149 kg/m³ (9.3 lb/ft³)

Hot Face °C (°F)	Lining Thickness – mm (in)	Cold Face Temperature °C (°F) 152 (6)	203 (8)	254 (10)	305 (12)
871 (1600)		86 (186)	74 (165)	66 (151)	61 (141)
1038 (1900)		109 (228)	93 (199)	82 (180)	75 (167)
1149 (2100)		126 (259)	107 (225)	95 (203)	86 (186)

Fiberwall Bonded 24 — Folded Modules 171 kg/m³ (10.7 lb/ft³)

Hot Face °C (°F)	Lining Thickness – mm (in)	Cold Face Temperature °C (°F) 152 (6)	203 (8)	254 (10)	305 (12)
871 (1600)		83 (181)	72 (161)	64 (147)	59 (138)
1038 (1900)		104 (220)	89 (193)	79 (174)	72 (161)
1149 (2100)		121 (249)	102 (216)	91 (195)	82 (179)

All heat flow calculations are based on a surface emissivity factor of .90, an ambient temperature of 27°C (80°F) and zero wind velocity, unless otherwise stated.

All thermal conductivity values for Fiberfrax materials have been measured in accordance with ASTM Test Procedure C-177. When comparing similar data, it is advisable to check the validity of all thermal conductivity values and ensure the resulting heat flow calculations are based on the same condition factors. Variations in any of these factors will result in significant differences in the calculated data.

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.

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