



Furnace Insulation Module Type FIM

General Information

ZIRCAR Ceramics' Furnace Insulation Modules Type FIM are engineered, pre-assembled insulation systems that provide superior performance in rapid-cycle low-mass furnace applications. FIM Furnace Insulation Modules enable OEM Thermal Process Equipment Manufacturers as well as End User Customers to solve their most unique and challenging furnace chamber applications. FIM Modules are designed and manufactured of a layered and reinforced system of premium grade ZIRCAR Ceramics fibrous ceramic insulation materials encased in an industrial grade shell.

1700°C (3100°F) rated FIM systems incorporate a reinforced hotface layer of ZIRCAR Ceramics' Alumina Type SALI - with some applications as high as 1740°C (3164°F) - In Air.

1800°C (3272°F) rated FIM systems use a ZIRCAR Ceramics' Alumina Type SALI-2 hot face layer - with a maximum application temperature of 1825°C (3317°F)- In Air.

As FIM Modules are custom designed and built to help customers reach their own specific rapid cycle furnace performance objectives, the exact insulation layering and element configurations along with the FIM shell design all incorporate time-tested features. In general, the hot face (Alumina Type SALI-2 or SALI) is installed in relatively small panels fully reinforced and supported by fine grain dense ceramic hardware. This installation technique provides for long life during rapid cycling operation as each panel will expand and contract independent of its neighbor - eliminating much of the crack propagation typical in monolithic installations. With the further utilization of two additional insulation layers an essential temperature gradient is set up within the insulation system minimizing the possibility of overheating of the fibrous insulation. All three insulation layers are encased and supported by an outer shell of a Refractory Hardboard. A welded frame of high grade steel surrounds, supports and protects the entire insulation package. In many FIM systems Heating Element Holders, Element Straps and Clamps, Terminal Boards, Hearth Systems and Thermocouple Ports are provided. MoSi₂ Heating Elements and appropriate Thermocouples are offered as well.

The data presented herein is intended to help the user in determining the appropriateness of this material for their application. This data is a nominal representation of this product's properties and characteristics and therefore should not be used in preparing specifications.

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Our Documents Directory on www.zircarceramics.com provides technical papers and promotional articles on the construction and use of FIM Furnace Insulation Modules. Experienced Technical Sales and Design Staff are available to work with you and exchange useful information to help you achieve your Furnace Insulation Module objectives.

The words of an old furnace builder go something like this: "we make furnaces to sell." What this means is that many furnace builders simply cut corners on both the materials and the designs they build into their furnaces - so they can compete with each other. ZIRCAR Ceramics' Furnace Insulation Modules Type FIM have proven time and time again that using the highest performance furnace insulation material in the right way will always lead to the realization of Cost-Effective High Performance.

The images and graphics on the following pages are intended to illustrate some of the design concepts and construction techniques used in the FIM Module system. Availability of the FIM System is also discussed.

Technical Data Bulletin

Furnace Insulation Module Type FIM

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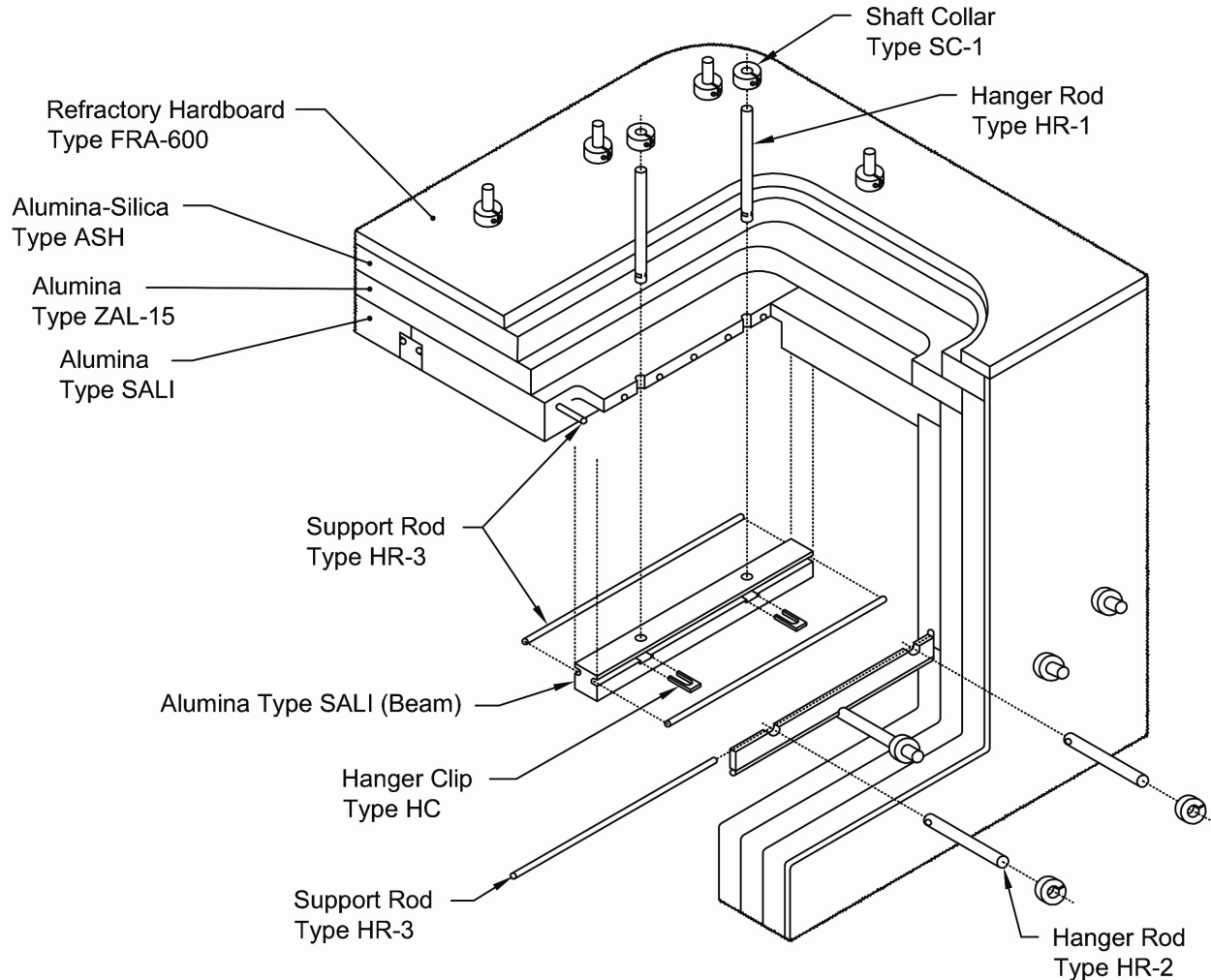
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Construction and Scalability

The "accessories roadmap" below shows some of the basic multi-layer insulation design concepts and dense ceramic hardware used in the manufacture of an FIM Module. As an FIM's hotface layer is reinforced, the weight of this layer, plus the weight of the additional insulation layers are supported by the rugged exterior shell, FIM chambers quite large in size are in successful operation.

Large FIM Furnace Insulation Modules

Many large FIM Modules are in operation today including:
 30"W x 30"L x 26"T Chamber 1700°C Front Loader.
 42"W x 42"L x 32"T Chamber 1700°C Bottom Loader.
 63" diameter x 72" T Chamber 1700°C Bottom Loader.
 36"W x 36"L x 48"T Chamber 1700°C Shuttle Kiln.
 32"W x 40"L x 12"T Chamber 1800°C Bottom Loader
 16"Diameter x 24"T Chamber 1800°C Vertical Tube.



Insulation Materials

All of the ZIRCAR Ceramics insulation materials shown in the "Accessories Map" above are described in detail under the **Rigid Materials** section of our website.

Furnace Accessories

All of the support and hanger components shown in the "Accessories Map" above are described in detail under the **Furnace Accessories** section of our website.



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Suggested Applications

Research and prototype furnace construction.

Production furnaces used for sintering of technical ceramics and other advanced materials.

Production furnaces for sintering of advanced injection molded metals.

Oxide Crystal Growing and Fiber-Optic Fiber Production furnaces.

Furnaces for heat treatment of specialty glass compounds.

OEM furnace builders as well as individual furnace users.

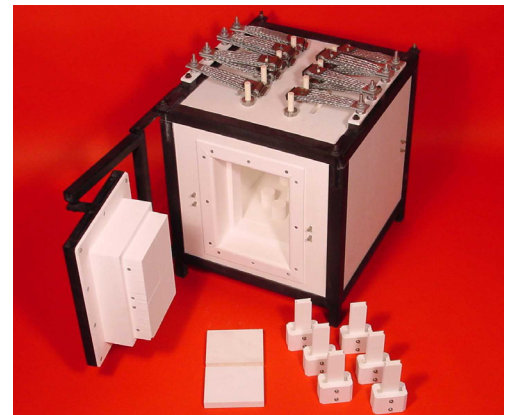
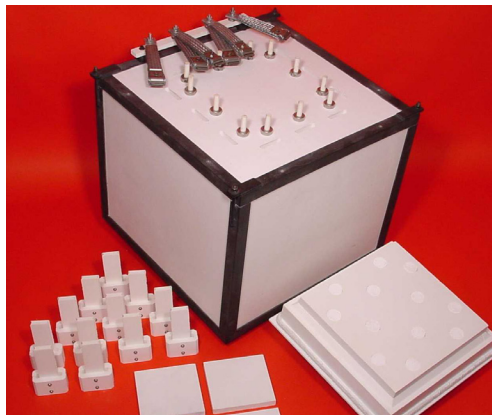
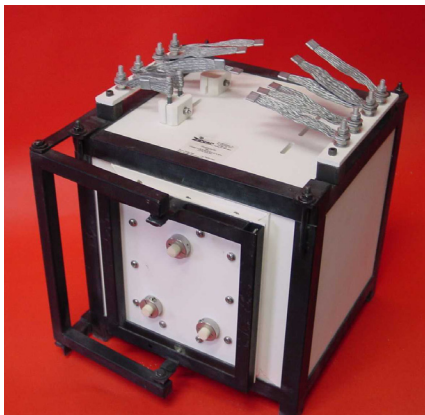
Availability

ZIRCAR Ceramics' FIM Furnace Insulation Modules are custom built to order. There are, however, several high-performance Standard FIM Modules offered with front and bottom loading models available for use in air to 1700°C (3100°F) and 1800°C (3272°F). Standard Modules are supplied complete with heating element holders, element connecting straps and clamps, terminal boards plus hearth plate support posts and hearth plates.

These complete units require only the addition of a protective furnace enclosure and power supply, with temperature controller, to build a complete rapid cycle furnace. Easy to use, FIMs facilitate rapid furnace construction and use components that are easily replaced. Thermocouples and heating elements are available separately. ZIRCAR Ceramics can work with you to source all of the components required to help you build a furnace that solves your unique requirements.

Standard Modules (Shown below left to right)

Item	A28100	A28400	A28500
Temperature, °C (°F)	1700 (3100)	1700 (3100)	1800 (3272)
Loader	Front	Bottom	Front
Working Size	5in.W x 5.5in.D x 5in.H	12in.W x 12in.D x 10in.H	5in.W x 8in.D x 4.75in.H
Chamber Size	7.5in.W x 6.5in.D x 6.25in.H	16in.W x 16in.D x 11.25in.H	9in.W x 10in.D x 8in.H
Heating elements	6 ea., MOSI2, 18-3/6-5.50-5.00-0.98in.	12 ea., MOSI2, 18-6/12-9.50-8.00-1.97in.	6 ea., MOSI2, 19-6/12-6.88-7.87-1.57in.



Custom Modules:

FIM Modules in a wide range of size and shapes and those with unique features, have been designed and fabricated including: Front and bottom loading rectangular boxes, Cylindrical and multi-sided chambers, Units with multiple zones, access and view ports and vertical hinged doors.

To Order:

CUSTOM Modules: Please contact ZIRCAR Ceramics' Technical Sales staff for assistance in solving your unique and demanding Furnace Insulation Module requirements.

Standard Modules: Please contact ZIRCAR Ceramics' Technical Sales staff for a quotation on one of the Standard FIMs offered.



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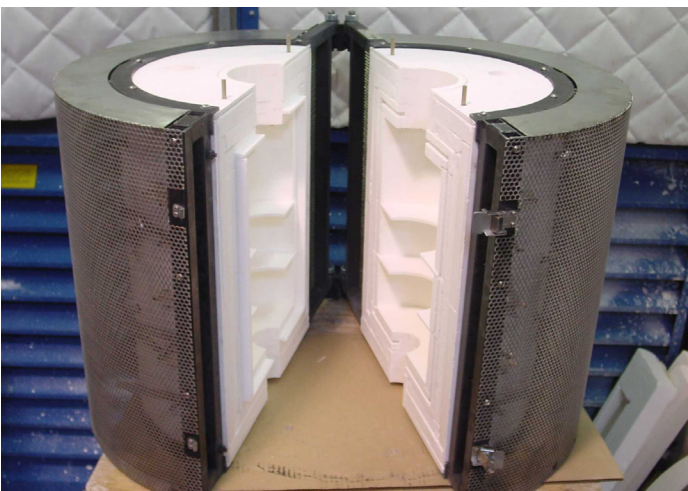
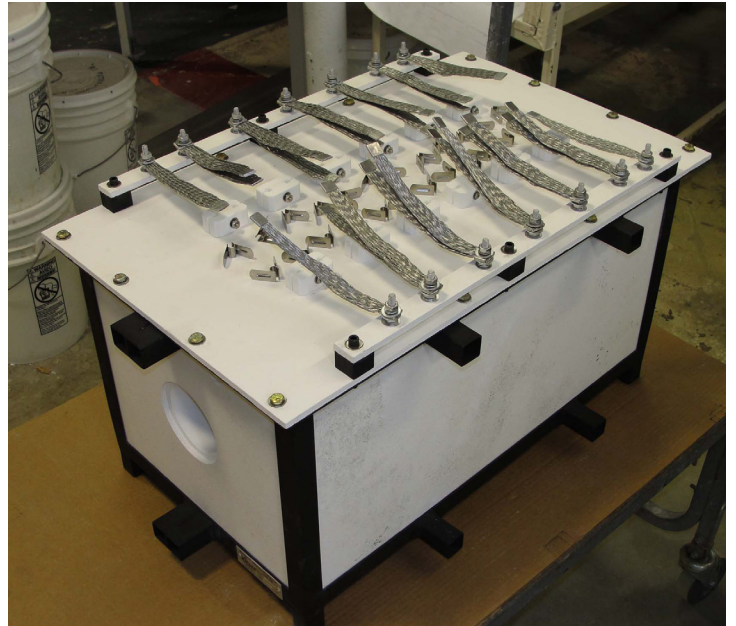
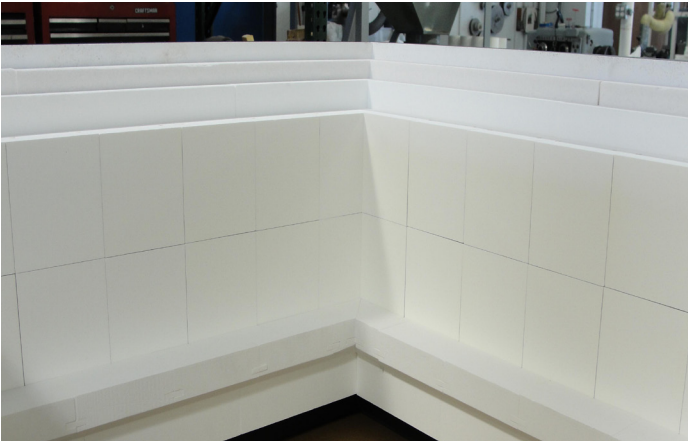
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ZIRCAR Ceramics' FIM systems are high-performance solutions to some of the most unique and demanding furnace chamber requirements. Shown above are just a few examples of how we can put this technology to work for you. We look forward to helping you build your next high temperature furnace.



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Revision Date Jan. 2, 2017