Engineered Solutions for Emission Control
Unifrax is a leading producer of high performance specialty products for worldwide emission control, industrial thermal management and fire protection markets. Our purpose, mission and values are based on our commitment to produce high quality specialty products that help our worldwide customers save energy, reduce pollution and improve fire safety. Unifrax was formerly part of The Carborundum Company, a well-known manufacturer of abrasive and refractory products founded in 1891. In 1942, one of our own research scientists, J.C. “Charlie” McMullen, invented ceramic fiber which we later trademarked under the Fiberfrax® name.

Today, our Fiberfrax ceramic fiber product line, revolutionary Insulfrax®, and Isofrax® AES products, Saffil® PCW fibers, glass fibers and other high performance specialty products are available in more than 50 product forms. Our broad product offering, outstanding application engineering expertise, and customer service support provide innovative thermal management solutions and exceptional value to our worldwide customers in the ferrous and non-ferrous metals, industrial ceramics, petroleum products, power generation, ceramic, glass, automotive, fire protection, aerospace, appliance and other industries.

Unifrax worldwide manufacturing and sales facilities are located in the United States, Europe, China, Russia, Japan, India, Korea, South Africa, South America and the Middle East, offering our worldwide customers the high quality products, service and support that have been the Unifrax standard for more than 70 years.
Unifrax invented ceramic fiber, the base material in all support mats and Unifrax products that have been used in over two billion emission control devices. Unifrax products were used in the first catalytic converter produced for General Motors in 1974 and for the first diesel emission control devices for Volvo in 1988.

Unifrax is uniquely positioned to serve the global emission control customer base:
- We offer the widest range of products for the automotive industry.
- We manufacture all our products with the fibers we make.
- We own and control our fiber and mat production facilities, converting operations and distribution.
- Our presence on six continents and in 17 countries gives us the broad global footprint needed to serve our customers worldwide.

Our mission is to become the preferred worldwide supplier for catalytic converter support mats. We intend to accomplish this by providing our customers with the best value and helping them contribute to improving the environment. Our strong focus on product development, manufacturing efficiencies and sophisticated quality control programs positions Unifrax to be your preferred resource for innovative solutions for emission control applications in worldwide markets.
Unifrax is a vertically integrated company offering a complete product portfolio of catalytic support mat and thermal management products for emission control applications worldwide. With more than 70 years of experience in fiber technology, Unifrax is the chosen provider for many high profile automobile and commercial vehicle manufacturers offering time and cost savings in the development process, as well as exceptional quality control and high levels of customer satisfaction.

The integration of Saffil Automotive into the Unifrax emission control business, the establishment of ITM Unifrax-JV in Japan, as well as the acquisition of a number of additional market-related companies in the 2010’s has strengthened and expanded Unifrax capabilities in the worldwide emission control market. Our capabilities include:

**Research & Development.** We develop our own high performance fiber and emission control products.

**Manufacturing, Converting & Distribution.** We own and control our fiber and mat production facilities, converting operations and distribution.

**Technical Service.** We maintain technical excellence centers around the world.
High Performance Materials For Every Requirement

Three Distinct & Proven Fiber Chemistries

Polycrystalline Wool (PCW)
Highly resilient man-made fibers.

Refractory Ceramic Fiber (RCF)
Unmatched experience in RCF technology.

Alkaline Earth Silicate (AES)
Low bio-persistence fibers, not classified under EU regulations.

Product Forms

Needled
Mechanically bonded, organics-free, fiber-only products.

Non-Intumescent
Fiber-only products.

Intumescent
Products containing vermiculite.

“Green” Solutions for Emission Control

Unifrax is a leading producer of low bio-persistence fibers, also known as “green” or unclassified, high temperature AES fibers. Unifrax developed and patented its high resiliency green fiber Isofrax® products for use in support mats in 1996. Our AES fiber support mat and other emission control thermal management products are available with and without vermiculite to meet our customers’ application requirements.
Emission Control Solutions: Light Duty Vehicles

Unifrax emission control products are made to meet the demands of stringent regulations and difficult operating conditions. We offer a wide variety of support mats for both underfloor and close coupled converters in passenger cars and light duty trucks. All products are REACH compliant and are available with optional flexible edge protection treatment.

**PC-Max® Support Mats**

Our highest performing support mat, PC-Max® 2000i is a binder-free, needled, polycrystalline support mat. PC-Max 2000i is manufactured and converted using our unique worldwide supply chain, providing our customers with reduced risk of supply disruption. PC-Max fibers are non-classifiable under GHS.

**Ecoflex® Support Mats**

Our family of Ecoflex® support mats are a cost effective alternative to needled, polycrystalline mats for demanding applications. Ecoflex mats using highly resilient Saffil® and M-Fil® fibers which are non-classifiable under GHS include:

- Ecoflex 200FL
- Ecoflex 400

**CC-Max® and XPE® Support Mats**

Our CC-Max® and XPE® support mats are manufactured using refractory ceramic fiber (RCF) and offer the best value for most common applications including under floor and close coupled.

- CC-Max 4 HP
- CC-Max 5
- XPE-AV2i

PC-Max 2000i support mats for “green” applications.

BMW 1-Series

Chrysler Dodge Ram 2500
Heavy duty vehicles pose challenging design requirements for after-treatment devices. Unifrax offers a range of support mat products to meet a variety of temperature, gap and loading requirements.

**Ecoflex® Support Mats**
Ecoflex® 400 support mats are available as a single layer solution in a wide range of basis weights for quick and easy installation in various gap applications. The highly resilient Saffil and M-Fil fibers offer an ideal solution to high gap expansions commonly experienced in heavy duty diesel after-treatment devices.

**CC-Max® Support Mats**
CC-Max® 5 support mats offer a cost effective alternative to the Ecoflex family of support mats. This product’s unique refractory ceramic fiber formulation provides a support mat with a holding force sufficient for keeping heavy DPF, SCR and DOC intact as the vehicle experiences high vibration and regeneration cycles.

**XPE-MP® Support Mats**
XPE-MP® provides the best value, most cost effective solution designed for heavy duty diesel applications with proven performance on EPA-2007, EPA-2010 and off road systems.
Green Solutions
For Light Duty/Heavy Duty

Isomat® "Green" Support Mats

The Isomat® family of support mats offers the option of using low bio-persistence fibers without compromising product performance. Isomat support mats are manufactured using patented, highly resilient alkaline earth silicate (AES) fibers and are available with and without vermiculite to meet application needs.

Isomat® AV5

Isomat AV5, our premium performance AES fiber mat has been used in approximately 20 million devices in light duty and heavy duty vehicles meeting Euro IV, Euro V and Euro VI regulations.

Isomax® 1

Isomax® 1, our fiber-only support mat made with AES fibers is ideally suited for both light and heavy duty applications where use of low bio-persistence fibers is required.
For more than 40 years, Unifrax has provided thermal management solutions to the automotive industry. Our products are used to meet the stringent quality standards of the automotive industry to protect heat sensitive components, extend equipment life and ensure passenger comfort and safety. Typical passenger car applications include laminate heat shield insulation, and cone insulation for after-treatment devices. Unifrax has also developed insulation solutions for both on road and off road heavy duty, commercial vehicles helping customers to meet demanding skin temperature requirements.

**Isomax® 110**

Isomax® 110 is a needled, shot free, AES fiber blanket. Its low thermal conductivity and high temperature use limit make it ideally suited for insulating SCR, DPF and DOC in heavy duty, commercial vehicles with high regeneration temperatures.

**VC-Max™ 1 Insulation**

VC-Max™ insulation is a molded three-dimensional, high performance, engineering insulation material composed of Saffil polycrystalline, high alumina fibers designed to withstand high vibration and temperature exposure.

**QSP® Insulation**

QSP® insulation is a two-dimensional sheet form, high performance material made of refractory ceramic fibers typically used in all types of after-treatment devices. QSP insulation combines excellent thermal stability at high temperatures, high insulation properties, low erosion profile and low shot content in a lightweight, flexible product that can be cut in all shapes and sizes.
To meet high quality standards with maximum product performance while maintaining cost-effectiveness, Unifrax uses a cross-functional team approach in conjunction with a Staged Gate Process for new product development.

Focusing on customer application needs, our teams of ceramists and engineers have developed a variety of customized laboratory equipment, as well as proprietary test protocols and hot shake testing, to aid in the understanding of key performance criteria. This understanding has led to a successful portfolio of automotive support mat products including XPE and Isomat intumescent mat products, as well as CC-Max, Isomax, Ecoflex and PC-Max non-intumescent mats.

The Unifrax team will work closely with your product development and quality engineers and your manufacturing or commercial staff to identify key performance criteria. Together, we can develop an engineered support mat system with the specific properties required to meet the rigorous performance targets of your after-treatment system.

Our experienced application engineers develop emission control products to detailed customer specifications.

A research scientist performs a chemical analysis using X-ray fluorescence.

A technician prepares to take a fiber surface measurement using nitrogen adsorption.
Unifrax performs rigorous and comprehensive quality control testing necessary for maintaining the quality levels that our customers demand. We are the recipient of a number of prestigious supplier awards and are a preferred supplier throughout the emission control industry.

Unifrax maintains an extensive database network incorporating all major management and operating functions, which allows us to operate a nearly paperless system. Employees are able to access, in real time, customer specifications, part drawings, control plans and customer specific requirements to ensure conformance to our customer’s needs. Our quality certifications include: ISO 9001:2008; ISO/TS-16949:2009.

Accelerated aging tests are used to predict performance in the field.

Our state-of-the-art pilot scale equipment allows us to study various formulations quickly and efficiently.

Comprehensive quality control testing maintains the demanding quality levels required by our customers.
Unifrax has a diverse set of manufacturing technologies that can be used to develop desired properties in the product. Closed loop, computer controlled and wet laid papermaking processes can be used to deliver products with best-in-class weight and thickness control. Unifrax utilizes its more than 70 years of experience in needling technologies to bring top performing support mats to our worldwide customers. Our patented water jet process is capable of cutting complex shapes with extreme precision while rendering them dust free.
Unifrax maintains state-of-the-art converting facilities around the world providing reliable delivery of high quality, just-in-time products to the customer’s site. All our processes, including manufacturing and converting are linked with a redundant bar coding system providing full traceability and supply chain integration.

Online gauging provides process feedback and insures product consistency and quality.
### Mounting Mat Quick Reference

<table>
<thead>
<tr>
<th>Mat Type</th>
<th>Basis Weight</th>
<th>Thickness</th>
<th>Fiber Type</th>
<th>Class</th>
<th>Org. Binder</th>
<th>Gas Temp (°C)</th>
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<tbody>
<tr>
<td></td>
<td>Nom</td>
<td>mm</td>
<td></td>
<td>EU</td>
<td>DE°</td>
<td>US</td>
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<td>6.8 - 18</td>
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<td>GC-Max 9 (Needled)</td>
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<td>PCW</td>
<td>NC</td>
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<td>7.7 - 20.6</td>
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Other basis weights are available upon request. Please consult with a Sales or Applications Engineer for details.

*The DE (German) classification is not for fibers, but “workplace dust” following TRGS 905.

### Insulation Quick Reference

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Availability*</th>
<th>Thickness/BW</th>
<th>Unit</th>
<th>Free Density*</th>
<th>Fiber</th>
<th>Fiber EU</th>
<th>DE°***</th>
<th>US</th>
<th>Class</th>
<th>Org. Binder</th>
<th>Temp* (°C)</th>
<th>Product Form</th>
<th>Current Application</th>
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<td>g/m²</td>
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<td>AES¹</td>
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<td>1175</td>
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<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>Very High</td>
<td>1175</td>
<td>Needle, 2D Cut Parts</td>
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<td>230</td>
<td>AES³</td>
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<td>NC</td>
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<td>2D Cut Parts</td>
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<td>RCF</td>
<td>1b</td>
<td>2</td>
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<td>10</td>
<td>1200</td>
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<td>64, 96, 128</td>
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<td>NC</td>
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<td>1100</td>
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<td>Frywrap</td>
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<td>1100</td>
<td>Scrim-Encapsulated</td>
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<td>96, 128</td>
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<td>NC</td>
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<td>Medium</td>
<td>1100</td>
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<td>Medium</td>
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<td>Putty</td>
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<td>1100</td>
<td>Putty</td>
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*All data shown are nominal values and do not represent product specification.

**Currently under development

***The DE (German) classification is not for fibers, but “workplace dust” following TRGS 905.

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1. Mullite Polycrystalline Wool (PCW)
2. High-Alumina Polycrystalline Wool (PCW)
3. Calcium-Magnesium Silicate (AES)
4. Magnesium Silicate (AES)
Unifrax emission control products are backed by more than 70 years of innovative thermal management experience. 

1942
Refractory ceramic fiber is invented by J.C. “Charlie” MMullen, a research scientist at The Carborundum Company in Niagara Falls, New York USA.

1974
The first submerged electrode furnace (SEF) for the production of ceramic fiber is built and the Fiberfrax Durablanket® line is introduced.

1993
Introduction of Insulfrax specialty glass fiber products, a breakthrough in insulating materials offering enhanced solubility characteristics.

1996
The Carborundum Company North American Fibers Division becomes a stand alone company doing business as Unifrax Corporation.

1998-1999
Introduction of Isofrax Thermal Insulation, a revolutionary fiber designed to meet European regulatory requirements, and the recipient of the prestigious R&D 100 Award in 1999.

2007-2008
In 2007, Unifrax acquires Keraunion, a ceramic fiber producer in Dubi, Czech Republic which becomes Unifrax Czech, followed by the opening of a new ceramic fiber facility in Suzhou, China in 2008.

2011
Unifrax acquires a variety of market-related companies including Refractory Specialties Incorporated, Specialty Ceramics, Inc., VacuForm, Bondlye and Saffil.

2013
Unifrax enters into a joint venture agreement forming ITM Unifrax in Japan.

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