

Alkegen Company and Product Information

Prasad Soman / ECMA/ Nov 2022



Agenda

- **Corporate Overview**
 - **Company History**
 - **Product Divisions**
 - **Global Footprint**
 - **Manufacturing Locations**
- **Current and Future Automotive Products**
 - **Ecoflex HBD**
 - **VC-Max 1**
- **New Platform Projects**
 - **Ecolytic – Alternative to Ceramic Substrates**
 - **Si-Fab – Increased Battery Storage**
- **Questions / Open Discussion**

Corporate Overview



More Than A Century Of Growth and Innovation.

Alkegen is committed to customer satisfaction, supplying quality products that meet our customers' application challenges while maintaining the strong spirit of innovation that has always been a hallmark of our business.



Our areas of expertise.



Industrial Thermal Management

Our deep technical experience in fiber material science and highly engineered downstream components allows us to provide high-temperature insulating solutions for industrial furnaces, trough linings, kiln linings, commercial and industrial fire protection, and other industrial applications.

Benefits

- Increased energy efficiency
- Advanced engineering
- Superior fire protection

End Markets

- Steel production, industrial metals, appliances, petrochemicals, ceramics and glass, power generation, fire protection



Emission Control

Our support mats are utilized in emission control devices in a variety of commercial and industrial vehicles.

Benefits

- Protection of high-value catalytic converter substrates
- Compliance with increasingly stringent emission standards

End Markets

- Passenger cars, heavy-duty trucks, power generation, marine, construction equipment



Battery, Filtration & Specialty Glass

We produce microfine glass fibers and pellets used in filtration and battery separator markets.

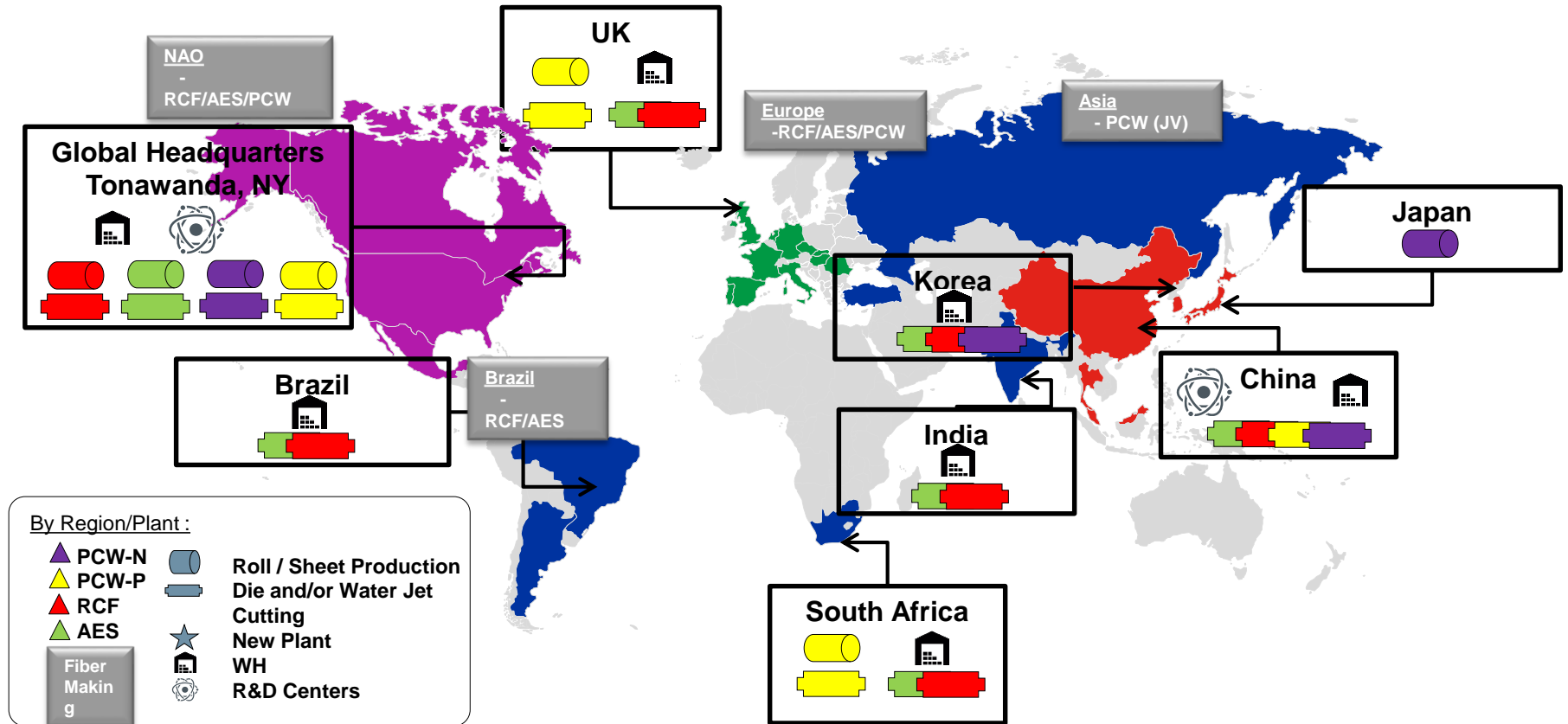
Benefits

- Highly engineered compositions and fiber forms
- Reinforces composite materials and papers
- Improved battery performance

End Markets

- Advanced filtration, separation, insulation, specialty battery

Alkegen EC Global Mat and Fiber Production Sites



Ecoflex HBD - Low cost, non-intumescent, RCF and PCW fiber support mat



Contents

- Material Properties
- Material Performance
 - Peak Cold Compression
 - 1000 cycle Aged Mat Pressure (AMP)
 - Erosion Durability
 - Wrapping
- Summary



Ecoflex[®] HBD Material Properties

- **Fiber chemistry: Polycrystalline mullite and Refractory Ceramic Fiber**
- **Loss on ignition (% organic): 5 - 7%**
- **GBD Range: 0.30 – 0.60 g/cm³**

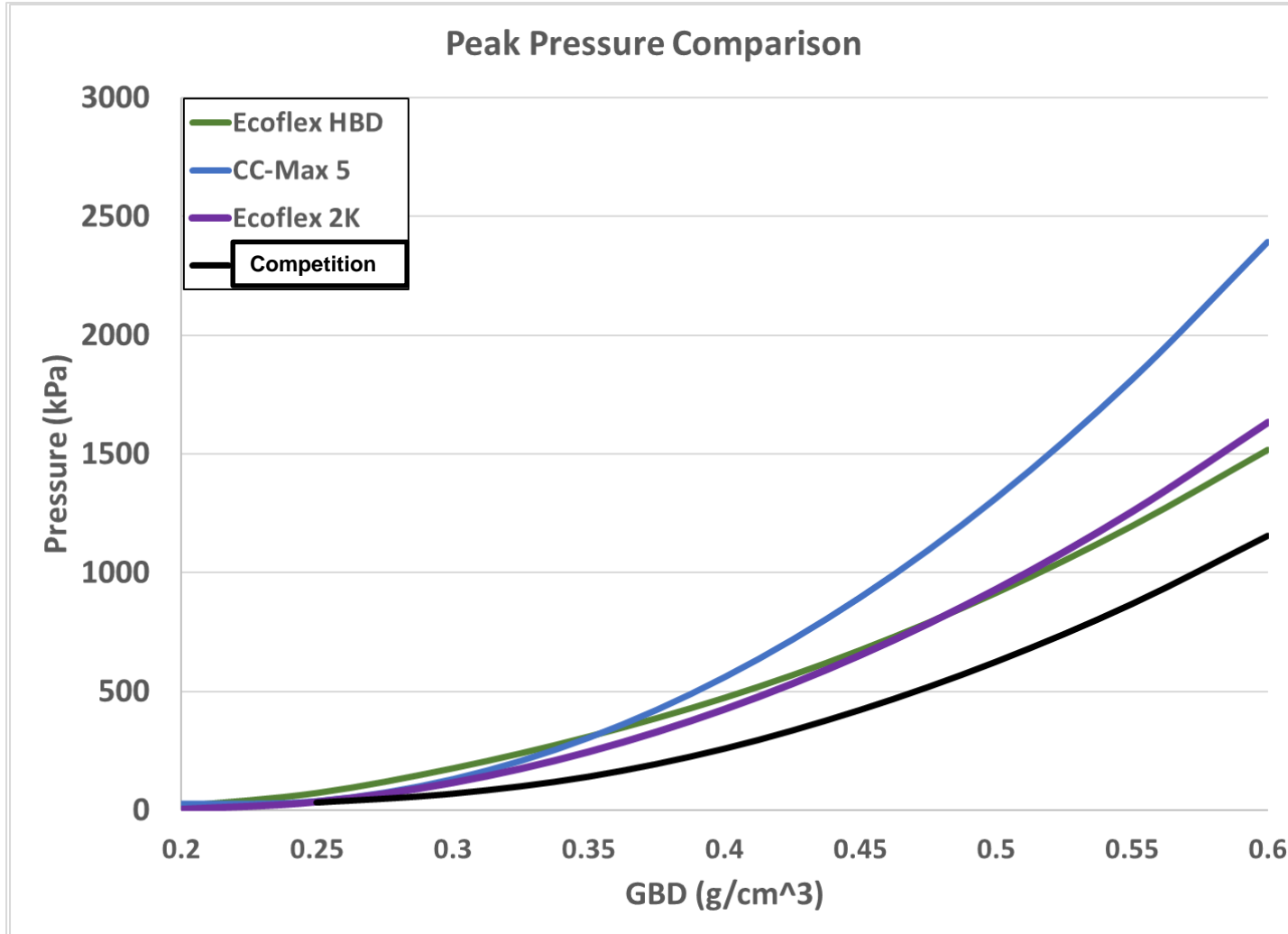
Physical Properties		
Bonded Basis Weight	Nominal Thickness	Target Gap
<i>g/m²</i>	<i>mm</i>	<i>mm</i>
1600	10.0	4.0
2000	12.5	5.0

Typical Composition	
Fiber Weight % Range	93 - 95
Organic Binder Weight % Range	5 - 7

- **Additional basis weights available upon request**
- **Target GBD = 0.40 g/cm³**

Cold Compression: Peak Pressure

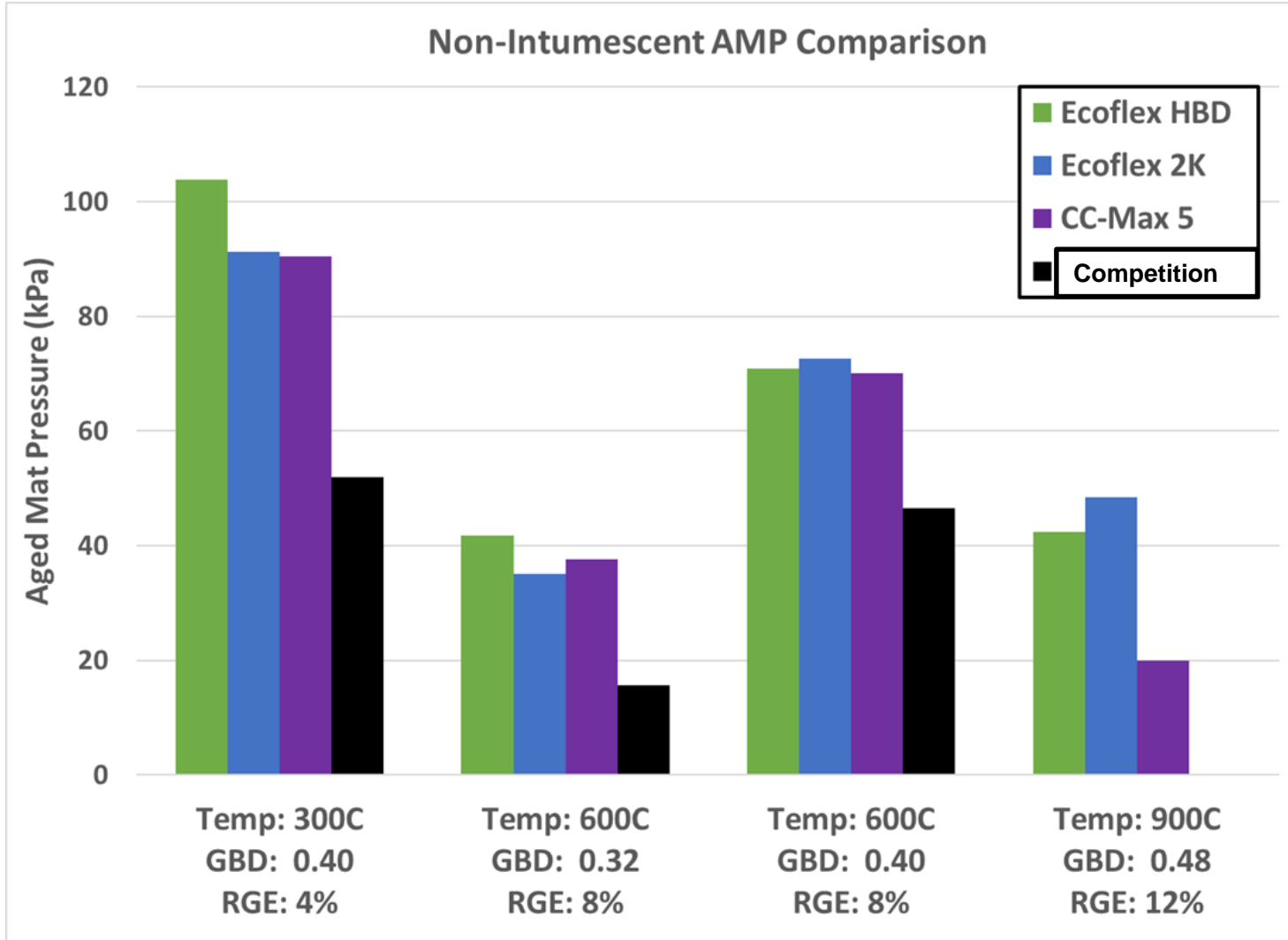
MTS Machine: 25 mm/min
3 Lots Averaged Data, n=9



Reduced Peak Pressure from CC-Max 5

**1000 Cycle, Aged Mat Pressure Testing
Isothermal Temperature Conditions**

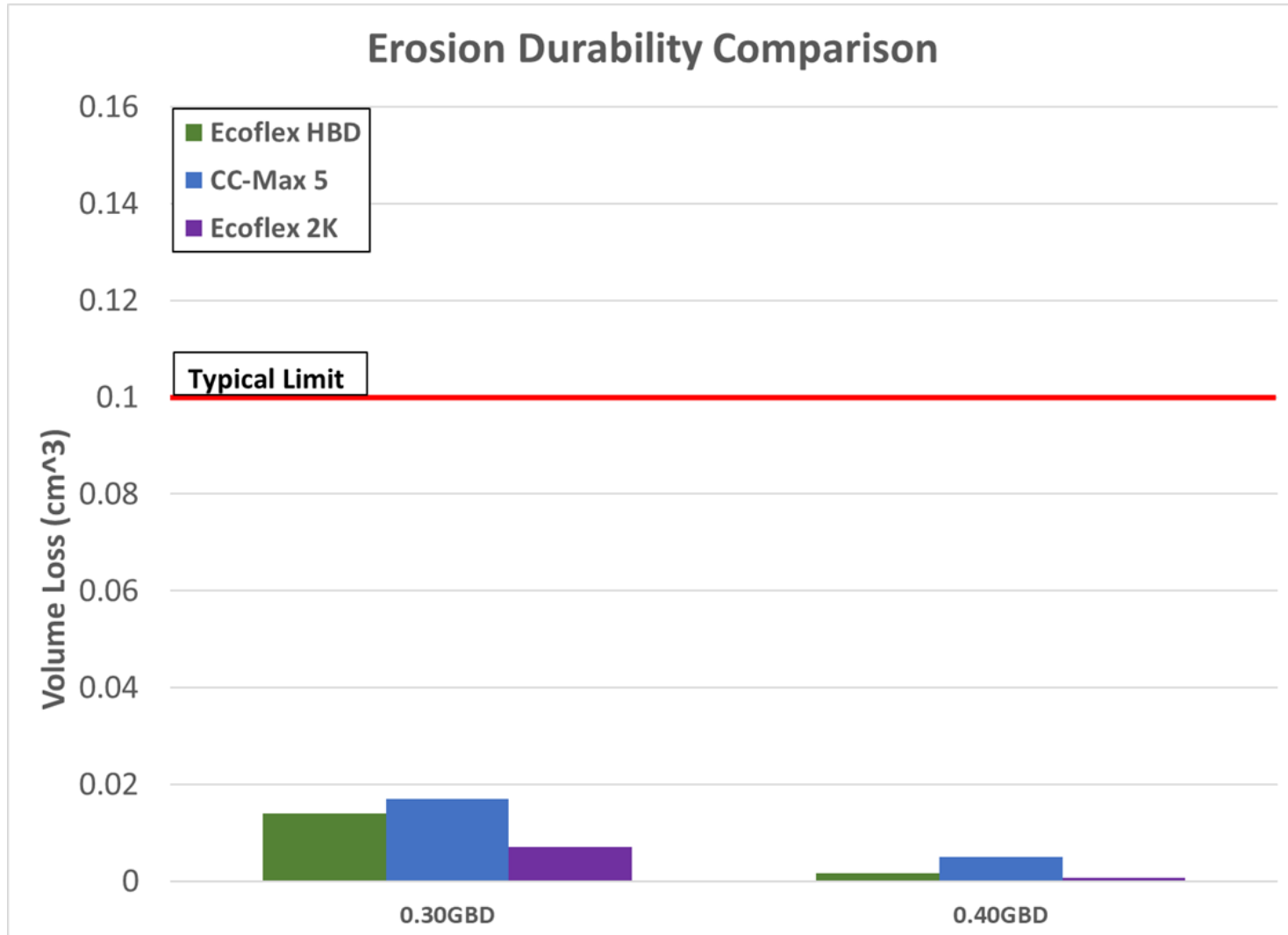
MTS Machine: 10 mm/min
n = 1



**Similar
performance
to Ecoflex 2K**

Erosion Durability

Erosion Tester 1.6 bar, 50 mins
n = 18

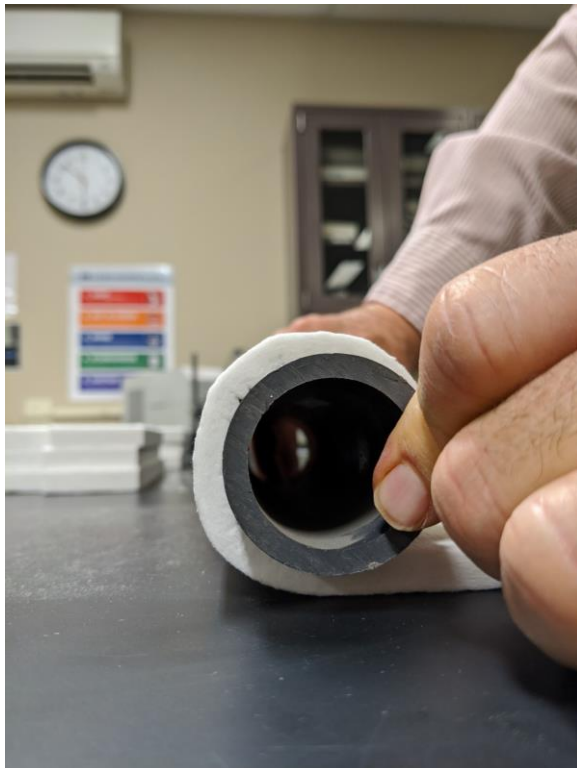


Similar performance to CC-Max 5 and Ecoflex 2K

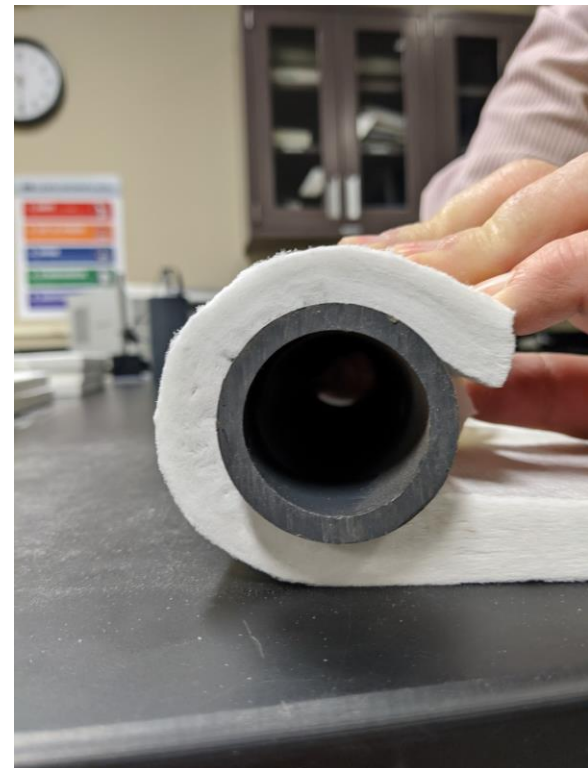
Wrap Testing

Basis Weight (g/m ²)	Nominal Thickness (mm)	Diameter Wrapped	Lot	N	Result
1600	10.0	75 mm	1,2,3	3	No Cracking
2000	12.5	120 mm	1,2,3	3	No Cracking

1600 g/m² BW



2000 g/m² BW



Summary

- Unifrax now offers a low cost, non-intumescent, hybrid fiber emission control mounting mat
- Cost competitive material
- Compatible with all substrate types including high porosity ultra-thin wall
- Basis weights mentioned are available for customer sampling/testing now
 - *other basis weights are also available upon request*

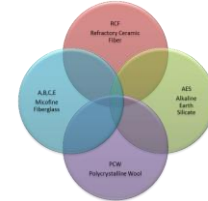
VC-Max 1 - Molded Insulation



Alkegen is a vertically integrated manufacturer of high-temperature insulation

We Make the Fiber

- Only manufacturer to offer all fiber chemistries
- Global supply chain
- 100% control over product (powder to part)



We Make the Product

- Widest product variety
- Products for any application
- Joint development for customer-focused solutions



We Provide Global Customer Support

- Local sales and service
- World-wide technical support
- 37 Manufacturing facilities in 12 countries



Unifrax Product Form Examples



Heavy-Duty Diesel

- ❑ Multiple HDD applications
- ❑ Custom shapes and sizes



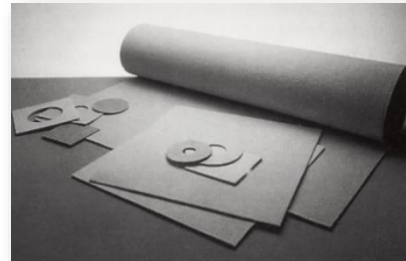
2-D Cone & 3-D Molded

- ❑ Exhaust & downpipe insulation
- ❑ Complex geometries



Blankets

- ❑ Heat shields



Papers

- ❑ Heat shields
- ❑ Gaskets, seals

Molded (3-D Shape) Products

VC-Max 1 - Vacuum Formed Shapes

- > Capable of multi-thickness within a finished part for variable gaps
- > More complex product forms possible
- > Easy handling and mounting
- > PCW based product



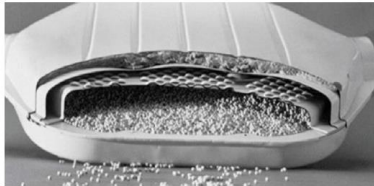
Ecolytic -Alternative to Ceramic Substrates



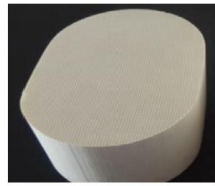
Ecolytic- Alternate to Substrate



Traditional Honeycomb



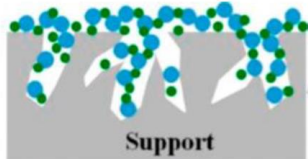
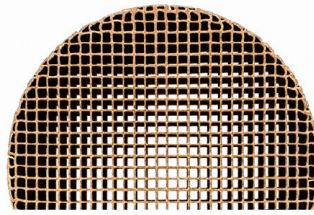
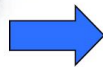
1970s Ceramic Beads



1980 → Honeycomb

1980s → Present – Incremental Changes

Limited, incremental improvements from 1970s



● Alumina Carrier ● PGM
Support
Not All Catalyst Is Available

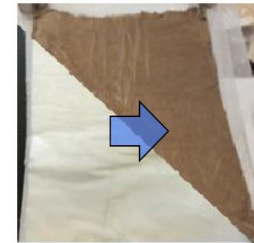


Obvious Path, Less Efficient Catalyst

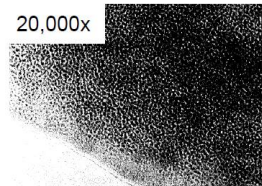
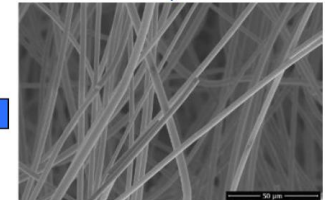


Unifrax Concept

- ✓ Same Durable Composition
- ✓ Controlled Back Pressure
- ✓ Strong Catalyst Adhesion



Catalyst Applied Directly To Fibre



20,000x

High Surface Area Porous Fibre > Catalyst Availability

Tortuous Path, More Catalyst Interaction

Si-Fab - Increased Battery Storage



SiFab- Silicon Fiber Anode Technology

A proprietary silicon fiber anode battery technology that enables greater energy density, faster charges, and longer battery life.

Advanced silicon anode technology.

SiFAB is a game-changing technology that will transform the battery industry. This revolutionary silicon fiber anode material enables higher energy density than current technologies and can be used in existing manufacturing processes. SiFAB has successfully been tested with incremental Si loadings of more than 40%.

Applications.

SiFAB is the next wave in battery innovation. The structurally stable advanced Si anode offers cell makers a drop-in solution and can be optimized for various applications. It enables space maximization, lighter weight, extended usage between charges, faster charge time, and improved performance.

Questions / Open Discussion