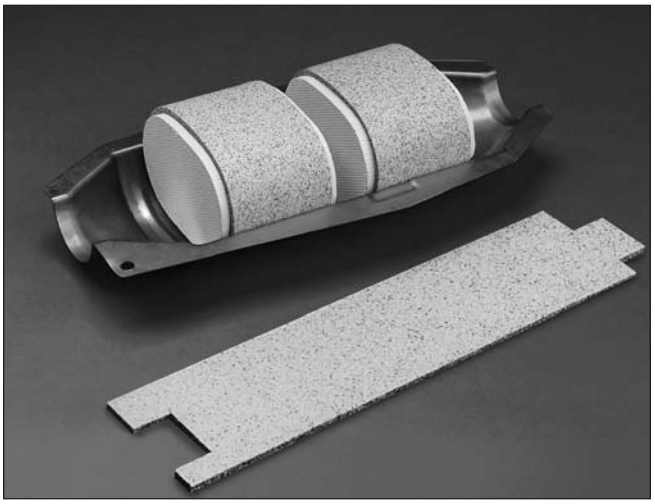
Product Information Sheet

Unifrax XPE®-NV2 Automotive Catalytic Converter Support Mount System



Unifrax XPE® intumescent mat products are developed specifically for mechanical support of ceramic substrates used in catalytic converters for internal combustion engines. As a manufacturer of fibers used in a variety of catalytic converter mounting systems, Unifrax has optimized the fiberization process to reduce shot content, yielding a high fiber index feedstock. When utilized in our state-of-the-art paper manufacturing process, performance properties of XPE-NV2 catalytic converter support mat are maximized.

Market trends for reduced emissions are forcing design engineers to position catalytic converters closer to the engine for higher temperatures and faster light-off. Precats and close-coupled converters are often in a confined space, producing high shell temperature resulting in high gap expansions. XPE-NV2 is a premium support mat which offers improved performance versus traditional intumescent mats in these high gap expansion applications. The clean high-fiber index feedstock also provides added resistance to hot gas mat erosion and degradation from vibrational effects.

Like traditional intumescent mats, XPE-NV2 offers excellent thermal stability with a continuous-use temperature of 750°C average mat temperature. Expansion pressure is provided by vermiculite trapped in structural support matrix of Fiberfrax ceramic fibers. The mat expands with increasing relative thickness when first exposed to temperatures in excess of 325°C.

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

Applications

Engineered to meet the performance requirements associated with typical catalytic converter applications, XPE-NV2 catalytic support mat is used in underbody, close-coupled and manifold converter applications. XPE-NV2 catalytic support mat is designed to exert pressure to resist any movement of the substrate which may be caused by exhaust gas forces or axial acceleration forces. The mat will accommodate tolerance stack-up between the substrate and shell and absorb thermal expansion differences of the catalytic converter system, especially in high-gap expansion applications. For more information regarding XPE-NV2 catalytic support mat, contact Unifrax.

The Unifrax Corporation provides full engineering services to review your catalytic converter design. The service features thermal and mechanical analysis as well as a final design recommendation. Contact the Unifrax Automotive Application Engineering Department at 716-278-3983 for more information regarding XPE-NV2 catalytic support mat, or email aecoordinator@unifrax.com.

Typical Product Properties

Basis Weight (g/m^2):	3100, 4070, 6200
Bulk Density (g/cc):	0.63 +/- 0.1 g/cc
LOI @900C:	15% maximum
Typical Composition:	

	Weight %
Alumina-Silica Fiber*	30 - 40%
Vermiculite	50 - 60%
Binder	5 - 9%

*High Index Raw Material Feedstock

High Gap Expansion – 1000 Cycle Performance

The Unifrax Corporation developed an internal 1000 Cycle test which performs an accelerated aging on the support mat. The test is designed to simulate mechanical cycling associated with expansion and contraction of the shell. The expansion and contraction of the shell are indicative of conditions likely to be experienced during the life of a converter as a result of thermal cycling in day-to-day use.

When a converter is at ambient temperature, the gap between the shell and substrate are under stable conditions. Once the converter is exposed to heat, the shell begins to expand more rapidly and greater than the substrate, resulting in "gap expansion." The result is a larger gap. The more the temperature is increased, the more the gap will grow. If improperly designed, a system will lose mat pressure and erosion will compromise the converter. A mat must be able to function and absorb the increased gap and provide sufficient pressure to maintain converter integrity.

When recommending a mat support system for an application, Unifrax Application Engineering calculates the percent gap expansion based on thermal performance of the system and gas inlet temperature data provided by the OEM. The gap expansion is then used in the 1000 Cycle test to simulate the design.

In the 1000 Cycle test, a 1 in^2 sample of mat is placed between two rams at the required GBD and heated isothermally to operation temperature. The gap between the rams is then cycled between minimum and maximum gap 1000 times. The pressure exerted by the mat between the rams is recorded after each gap cycle at minimum and maximum gap.

A bar graph comparing XPE-NV2 and Traditional Intumescent mat is presented in Figure 1. Data represents the minimum pressure exerted by the mat at maximum gap after the 1000th cycle. Testing was performed at various gap expansions percents. The higher the percent gap expansion, the more aggressive the test. Based on a nominal GBD of 1.03 and average mat temperature of 750°C, both product forms will provide sufficient holding force and meet performance expectations when the gap expansion is less than 8%. However, if the gap expansion is 12%, XPE-NV2 performance is superior and is the product of choice.

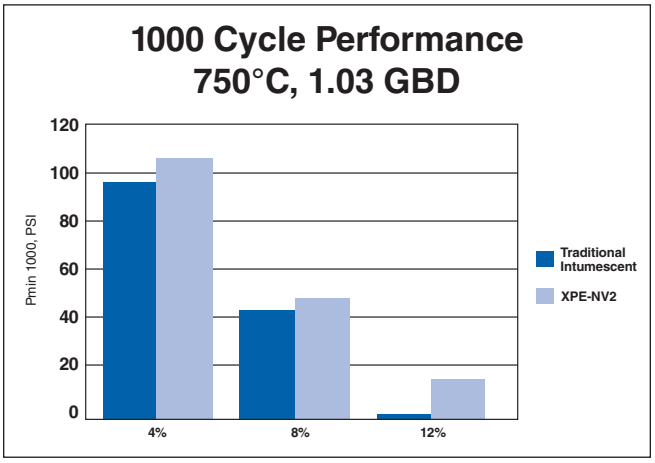


Figure 1: 1000 cycle Pmin versus percent gap expansion.

Canning Performance

XPE-NV2 support mat is typically installed at a nominal gap bulk density (GBD) of 1.00. GBD range is a function of the application but typically falls between 0.85 and 1.15. The compressive force of XPE-NV2 support mat is shown in Figure 2. Ppeak is the maximum pressure measured during canning of the converter. Pres300 is the residual pressure measured five minutes after canning.

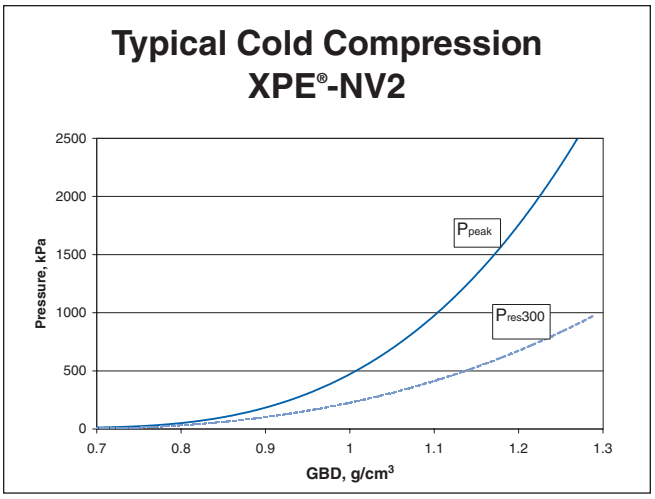


Figure 2: Typical cold compression curves for XPE-NV2 support mat.

Erosion Durability

The durability of a catalytic converter support material is of major importance to long-term converter efficiency and integrity. Mat erosion is most often the result of low mat pressure caused by the inability of a design to maintain targeted GBD. A design is unable to maintain GBD either due to shell spring deformation or when the temperature of the converter causes shell expansion to be too great for the mat to absorb. Pulsating exhaust gases then attack and erode the unsupported mat resulting in bypass and a decrease in converter efficiency. The data provided in Figure 3 was generated at Unifrax in a test apparatus which simulates a 4-cylinder engine running at 6000 rpm. Erosion loss is calculated by measuring the volume loss of support mat material. The lower the measured volume loss, the higher the resistance of the mat to erosion. Unifrax XPE-NV2 offers improved erosion resistance versus traditional intumescent mat products currently available in the automotive market.

Unifrax is a worldwide sales and service organization with several international locations and representatives. Take advantage of our application engineering services or technical exchanges programs. For additional technical information regarding XPE-NV2 or any of our catalytic support mats, please contact us at our corporate headquarters.

Data are average results of tests conducted under standard procedures and are subject to variation. Results should not be used for specification purposes.

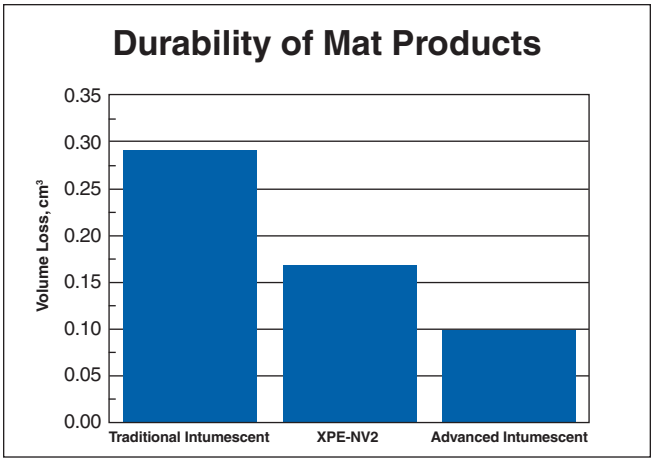


Figure 3: Laboratory Bench Test: Average Erosion Durability measured as volume loss.

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