

3M Advanced Materials Division

3M™ Nextel™ Ceramic Fibers and Textiles

for High-Temperature Industrial Applications

3M™ Nextel™ Ceramic Fabrics 312 and 440 are high performance materials used for a variety of high temperature sealing and heat shielding applications. They meet the toughest thermal, mechanical and electrical performance requirements, performing beyond the limits of common high temperature textiles such as aramids, carbon, quartz and glass. They are also oxidation resistant, chemically inert, lightweight, flexible, flame resistant, and electrically insulating at high temperatures. As such, they are an excellent choice for service in high-temperature industries (e.g. door seals, rotary kiln seals, furnace linings).



Furnace Linings

Nextel ceramic fabrics prevent the erosion of ceramic bulk fiber modules. This helps to reduce dust, which can contaminate products and may be a concern for operators and nearby personnel. Reducing erosion of insulation structures may also help reduce maintenance costs and time.

Photo courtesy of Insulcon B.V.

Heat Shields

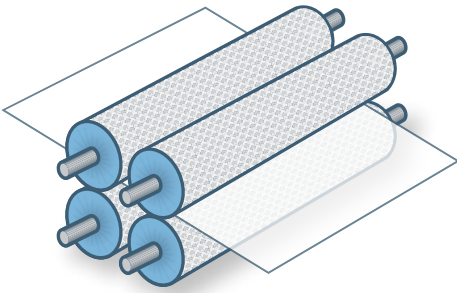
3M™ Nextel™ Ceramic Fabrics, Woven Tapes and Braided Sleeveings can be sewn and converted into an endless number of forms, including heat shields to protect specific areas, pads for assisting the transportation of high-temperature material, ropes for use as gasket material, or even as ties for securing an object within a high-temperature location.



Insulating Collars and End Caps

Several sophisticated manufacturing furnaces used in semiconductor processing industries have process tubes surrounded by a resistive oven, which can have multiple individually controllable heating zones, insulating end zones and removing insulating structures. Insulating collars made from Nextel ceramic fabrics can be placed between the oven end zones and the process tube to provide the required heat insulation for each compartment.

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Tempered glass manufacturing process using rollers in sleeving made from 3M™ Nextel™ Ceramic Braided Yarn

Roller Covers

3M™ Nextel™ Ceramic Braided Sleeving has been used in glass manufacturing furnaces as a roller covering to enable more uniform distribution of heat. Roller coverings also help prevent product defects. Tempered glass is made by uniformly heating annealed glass in a temperature range of 580–680°C, and then immediately cooling it. The glass is carried by ceramic rollers into the furnace, where it is heated using three modes: conduction, convection, and radiation. This super-heated glass then undergoes a rapid cooling process by a uniform and simultaneous blast of air on both surfaces.

Zone Dividers

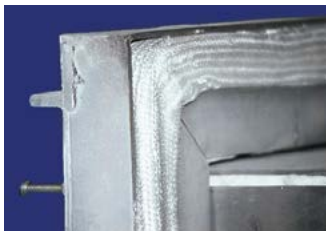
3M™ Nextel™ Ceramic Fabrics can be used as textile separators in heat treating furnaces operating at extremely high temperatures.

Photos courtesy of Insul.Tecno Group Srl



Rotary Kiln Seals

A seal fabricated from Nextel ceramic fabrics helps save energy and can also help to improve safety. One of the operating characteristics of many rotary kilns is that material is constantly sticking to the walls, rotating up to the top and then falling off. When enough material falls at once, slight overpressure may occur, which can cause hot particles to escape out of the openings of the furnace. A seal fabricated using Nextel ceramic textiles at the burner tip helps prevent hot particles from escaping, helping to improve operator safety.



Gasket made with 3M™ Nextel™ Ceramic Fabric 312 and metal mesh cover



Tadpole gasket made from 3M™ Nextel™ Ceramic Fabric used in high temperature furnace door*



Cone tadpole seals made from Nextel fabric (BF-20)*



Tadpole seal fabricated from Nextel ceramic fabric*

*Photos courtesy of Thermostatic Industries, Inc.

Door Seals and Gaskets

Float glass furnaces typically require very tight temperature control and temperature uniformity. These requirements demand reliable door seals. The seals shown above were made using a Nextel ceramic fabric, braided over an insulated core. A typical seal must withstand numerous thermal and mechanical loading cycles. During each cycle, there is a possibility for wear as the seal presses against the surfaces. Seals made with Nextel fabric remain flexible at high operating temperatures, thereby extending the lifetime of the seal.

Seals with complex geometry (e.g. tadpole gaskets) made with Nextel ceramic fabrics can be used where uneven flanges and surfaces are present. The seals can be attached to metal or refractory surfaces by bolting or metal strapping, or by welding.

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Additional Applications

3M™ Nextel™ Ceramic Fibers and Textiles can be used in many other high-temperature industries, including specialty applications such as brazing and structural reinforcement for ceramic matrix composites (CMC). Contact your 3M representative for more information about additional applications.

Technical Support

For more information on Nextel products or design support, call 1-800-367-8905 or visit 3M.com/ceramics.

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