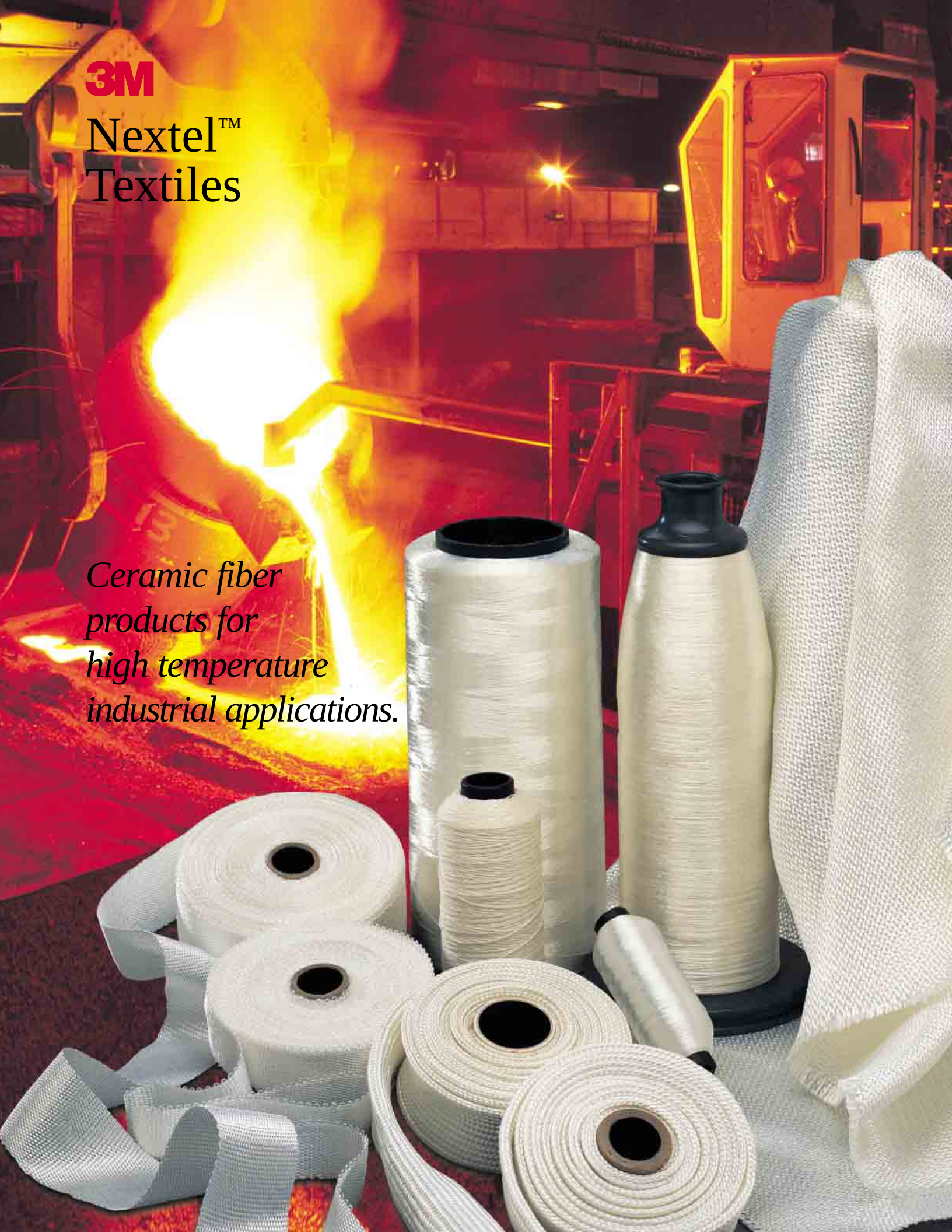

3M
Nextel™
Textiles
Ceramic fiber products for high temperature industrial applications.

Physical Properties

3M™ Nextel™ Fabrics, Tapes, and Sleevings are designed to meet demanding thermal, mechanical and electrical performance requirements, outperforming the useful limits of other high temperature textiles. Nextel 312 Ceramic Fibers and Nextel 440 Ceramic Fibers are continuous polycrystalline metal oxide fibers suitable for producing textiles without the aid of other fiber or metal inserts.

Low Shrinkage

Products fabricated from Nextel ceramic fibers exhibit very low shrinkage, providing excellent dimensional stability.

Abrasion Resistance

Nextel 312 fibers demonstrated excellent abrasion resistance after a 30-minute exposure at up to 2000°F (1093°C).

Thermal Mechanical Properties

Products made with Nextel 312 and Nextel 440 ceramic fibers retain greater strength and flexibility at higher temperatures than other refractory textile materials.

Thermal Insulation Properties

Nextel fiber products have excellent resistance to thermal shock, have low thermal conductivity and can be fabricated into excellent high temperature thermal insulators.

Non-hygroscopic

Nextel 312 fiber's smooth, non-porous surface only gains 0.08 percent of its weight after 2 hours exposure to 100 percent humidity.

Electrical Properties

The Nextel ceramic textile's high electrical resistance at elevated temperatures, low shrinkage and low moisture absorption characteristics make it an excellent choice for high temperature electrical insulation applications. Nextel fibers contain no residual acids or chlorides to leach out, which can cause etching of metal.

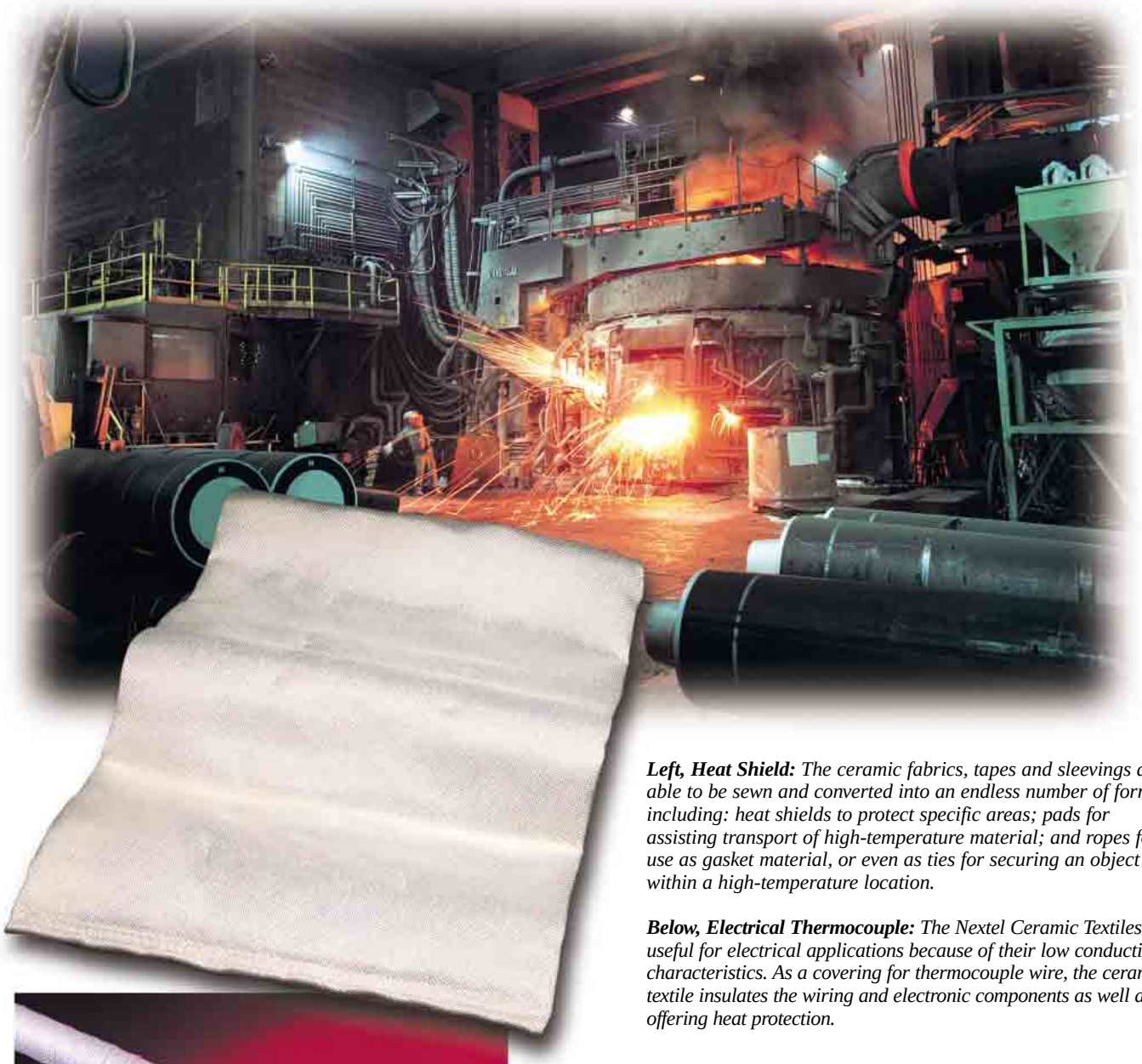
3M™ Nextel™ ceramic fibers maintain excellent flexibility even after continuous exposure to temperatures up to 2200°F.

Nextel can be used in numerous applications, including:

- Tube seals
- Thermocouples
- Horse-tail curtains
- Furnace curtains
- Heat shields
- Ladle covers
- Resistance wire supports
- Conveyor belts
- Expansion joints
- Furnace linings
- Delay table covers
- Seals and gaskets
- Zone dividers

Product Features:

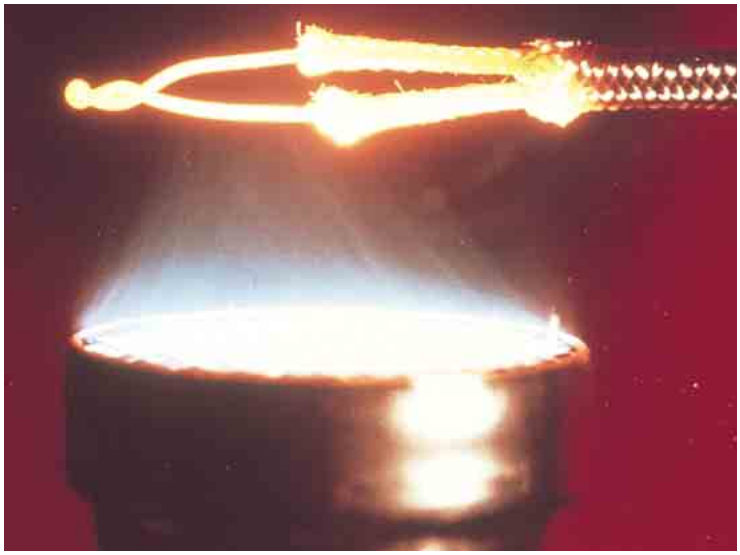
- High temperature limits
- Flexible
- Sewable
- Cutable
- Low electrical conductivity
- High-Strength
- Resists shedding

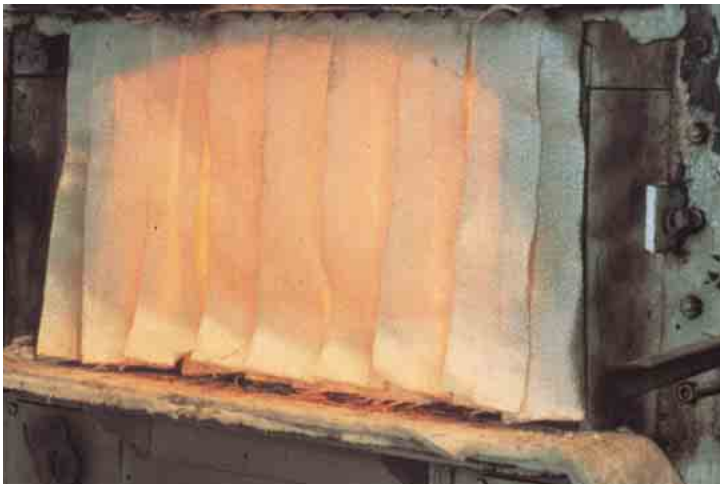


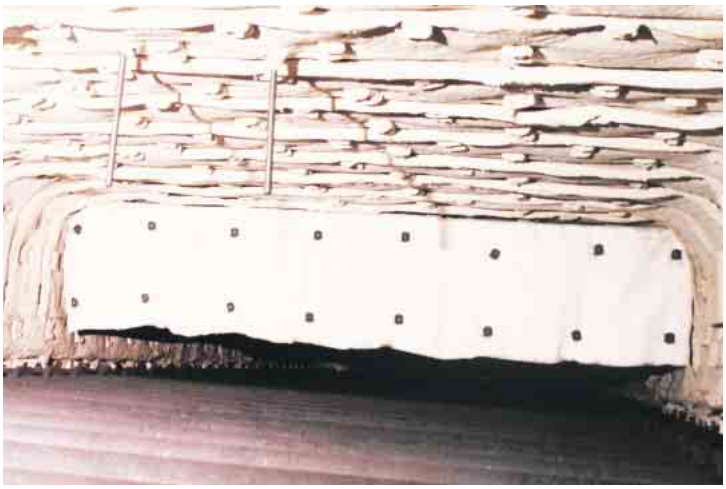
Left, Heat Shield: *The ceramic fabrics, tapes and sleevings are able to be sewn and converted into an endless number of forms, including: heat shields to protect specific areas; pads for assisting transport of high-temperature material; and ropes for use as gasket material, or even as ties for securing an object within a high-temperature location.*

Below, Electrical Thermocouple: *The Nextel Ceramic Textiles are useful for electrical applications because of their low conductivity characteristics. As a covering for thermocouple wire, the ceramic textile insulates the wiring and electronic components as well as offering heat protection.*

Above, Pipe Wrap (adhesive tape): *Pipes can be wrapped with ceramic tape to protect the pipe itself from failing when exposed to high temperature environments. Similarly, the ceramic wrap can help insulate a pipe carrying high temperature fluids. The low conductivity and electrical insulation offered by our ceramic tapes allow for innovative applications such as a beaded resistance wire, needed in processing petroleum products. The electrical current is protected from shorting to the steel pipe by the Nextel ceramic tape.*

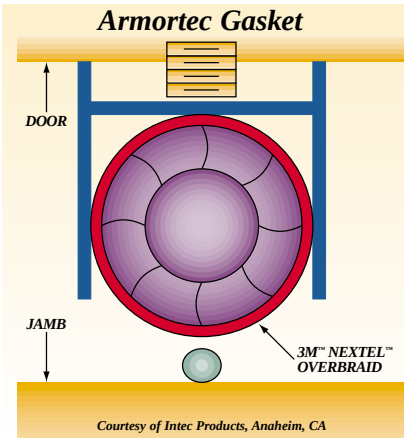






Above, Tube Seal: *Nextel fabrics can help save money, resources and to increase the efficiency of operating a furnace. As a tube seal, the ceramic fabric covers the holes surrounding the tubes so the heat and environment within the furnace operate precisely and predictably. The flexibility of the ceramic fabric, and the design of this tube seal, allow the tubes to expand naturally, without disrupting the furnace environment.*

Below, Door Gasket and Seals: *The fabrics and sleevings can be used for sealing furnace doors or other access panels, as well as for stuffing in and around gaps where high temperatures need to be maintained. The resilience and flexibility benefits of Nextel, even at high temperatures, makes the ceramic fabric an efficient, reliable solution.*



Top to Bottom:

Furnace Curtains: *Nextel Ceramic Fabric has been used as a furnace curtain to help maintain the interior temperatures both by keeping cold air outside and keeping the heat inside.*

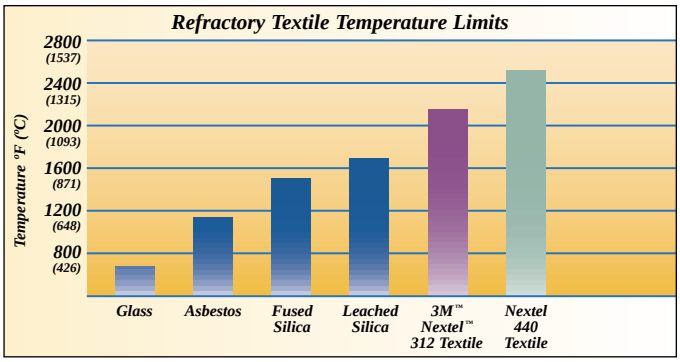
Zone Divider: *Nextel Ceramic Fabric can allow some furnaces to run loads in different temperature ranges simultaneously. By dividing furnace capacity into zones and using our ceramic fabric to help maintain those varying environments, increased output could be realized.*

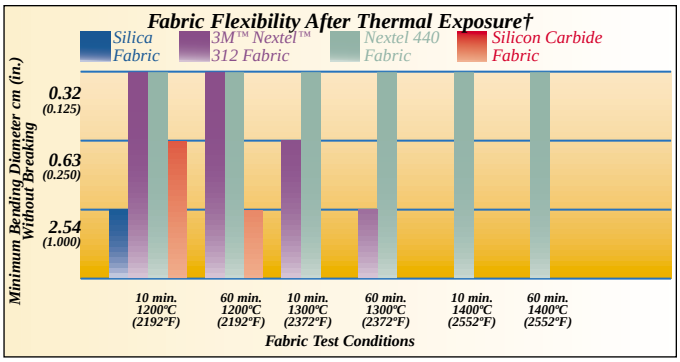
Furnace Liner: *Nextel fabrics can help resolve shedding problems with soft-refractory furnace interiors. The furnace lining application represented here shows how ceramic fabric can be fastened to furnace walls and ceilings, helping to reduce dusting and improve product quality. The higher temperature capabilities of Nextel could extend the duration and viability of the interior insulation.*

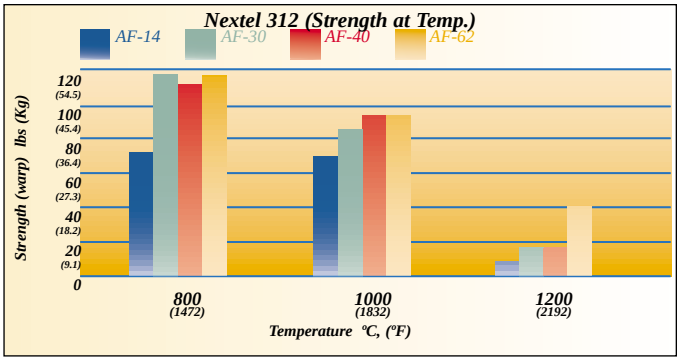
Let us help you solve your high temperature problems. Call us at 1-800-223-1687.

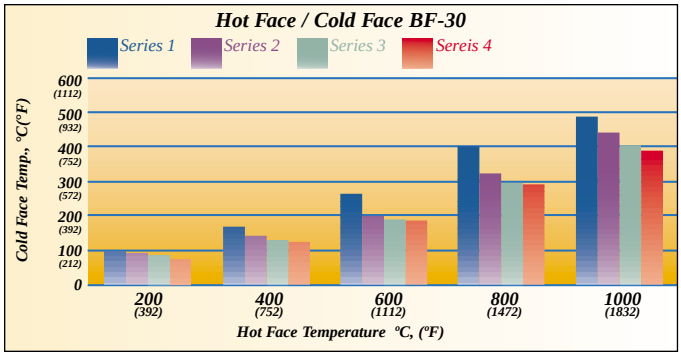
Property	Units	3M™ Nextel™ 312	Nextel 440
Use Temperature*	°F °C	2200 1204	2500 1371
Filament Diameter	µm	10-12	10-12
Crystal Size	nm	<500	<500
Crystal Type		$9Al_2O_3:2B_2O_3$ + amorph. SiO_2	gamma Al_2O_3 + mullite + amorph. SiO_2
Density	g/cm^3	2.70	3.05
Filament Tensile Strength (25.4 mm gauge)	MPa ksi	1700 250	2000 290
Filament Tensile Modulus	GPa msi	150 22	190 27
Surface Area	m^2/g	<.2	<.2
Chemical Composition	wt%	62 Al_2O_3 24 SiO_2 14 B_2O_3	70 Al_2O_3 28 SiO_2 2 B_2O_3
Thermal Expansion (100-1100°C)	ppm/°C	3 (25-500°C)	5.3
Dielectric Constant	(@ 9.375 GHz)	5.2	5.7
Refractive Index		1.570	1.616

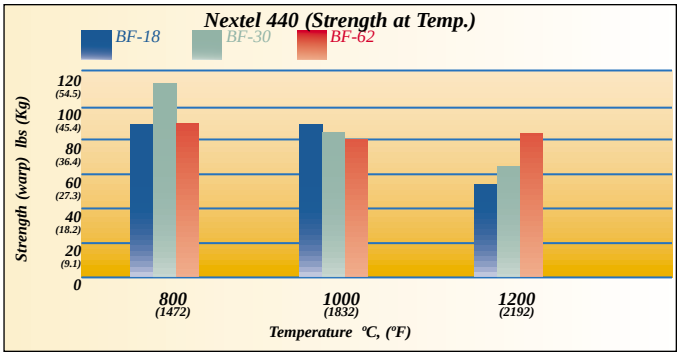
***Application Dependent**











†Reprinted from the SAMPE Quarterly, Vol. 17, No. 1, October 1985. Strength and Flexibility Properties of Ceramic Fabrics, Paul M. Sawko and Huy Kim Tran.

3M

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