

GRACE CONSTRUCTION PRODUCTS

Monokote® Industrial and Petrochemical Fireproofing



**Industrial-Strength Fireproofing
That Works. Anywhere.**

GRACE
Construction Products

When the future is at stake,

Few events are more frightening than a large fire — with the possible exception of fire affecting a business that is an important economic mainstay of a community.

That was the case on the evening of December 11, 1995, when fire engulfed Lawrence, Massachusetts-based Malden Mills, the maker of the hugely successful Polartec® fleece fabric and other specialty textiles.

Malden Mills, New England's largest textile mill, decided to rebuild following its \$500 million loss with a fast-track reconstruction of the nearly century-old facility.

The goal: Create a state-of-the-art textile manufacturing facility that would preserve the jobs of hundreds of dedicated workers and take Malden Mills — safely — into its next hundred years.

Owner Aaron Feuerstein's commitment to his workers and community initiated an accelerated rebuilding program.



Engineers and contractors, under tight time constraints, pushed to design and build a facility using fast-track construction

techniques to get contractors on and off the job quickly. And they needed proven materials — with an emphasis on a durable fireproofing material that could be applied efficiently so that other stages of the project would stay on track.

Their choice: Grace Construction Products' Monokote Type Z-146, high-density, high-production industrial fireproofing.

With over 30 years of experience in fire protection, Grace's Monokote spray-applied cementitious fireproofing materials continue to stand for quality. And stand the test of time.



*Monokote
Type Z-146
application in
progress at
Malden Mills.*

the choice is Monokote®.



Monokote Type Z-146 provides concrete-like protection for high traffic manufacturing environments.

Superior High-Productivity, High-Durability Fireproofing.

For Malden Mills' demanding building engineers and contractors, Monokote Type Z-146 provided a bond strength of 10,000 PSF over bare steel that afforded exceptional durability and fire resistance over leading — and more expensive — industry competitors. That same durability also meant performance that could withstand the rigors of a 24-hour a day manufacturing environment.

Fast Track Application, Reduced Man-Days.

Monokote Type Z-146's unique formula also made it ideal for the fast-application and fast-track construction Malden Mills required. Type Z-146's one-pass application can be spray-applied more quickly, more smoothly, and in larger volume than other products. The result: a shortened construction cycle and fewer man-days needed for project completion.

Monokote Type Z-146. It goes on fast. And works as hard as Malden Mills.

Direct To Steel Fireproofing Products That Can Take The Heat.

The destructive power of fire — to persons, property and the prosperity of entire communities — is well understood. At Grace Construction Products, so are the needs of engineers and architects who are determined to design fire protection that can prevent disaster, without compromising the bottom line.

That's why Grace, with three decades of experience in the industry and a tradition of rigorous field testing, is able to bring building professionals Monokote, a family of cementitious interior and exterior fireproofing solutions for the most demanding design and budget requirements.

The Monokote family provides the fire resistance and in-place performance that can meet the extraordinary building code and insurance industry specifications of Malden Mills. Or the even more demanding needs of petrochemical complexes.

Its exceptional bond strength means Monokote will stay securely attached to the structure, providing optimal resistance to floor-level impacts, and supply unmatched durability which maximizes fire protection integrity.

All Monokote fireproofing products are formulated to facilitate fast application, with pumping and thickness build-up characteristics that are unmatched in the industry.

Moreover, its ability to be sprayed directly to steel for fast-track construction projects eliminates the need for lath installation, resulting in faster application and lower construction cost.

Our petrochemical fireproofing products — Monokote Type PK-140 and Type PK-150 — meet the demanding requirements of the ANSI/UL 1709 hydrocarbon "rapid-rise" fire standard. They are both UL tested and approved for exterior use, offering petrochemical facilities the benefits of rapid application, durability, and superb fire resistance characteristics synonymous with the Monokote name.



Lower portions of the column have been boxed and trowelled smooth. Upper columns feature a natural, contour sprayed finish.

Monokote. Industrial Strength Fireproofing That Works. Anywhere.

Newly reconstructed Malden Mills manufacturing facility.



Monokote Indust

The Strength to Endure, the

Use Monokote Z-106 in:

- Light Manufacturing Facilities
- High Humidity Areas
- Mechanical Rooms
- Elevator Shafts
- Control Rooms
- Holding Tanks
- Parking Garages

Engineers who are designing fire protection for industrial facilities require specialized products. Products that can comply with, if not exceed, company, code, insurance, and aesthetic requirements. Monokote's growing family of fireproofing products provide the unique performance characteristics that do just that for a broad range of industrial applications.

Monokote Type Z-106



Multi-Purpose Protection For Interior Applications

Vertical trusses are boxed and trowelled using Monokote Type Z-106 at the Dong-A Steel Fabrication Plant in Seoul, South Korea.



Designed for application to exposed, interior surfaces, Monokote Type Z-106 is a medium density, portland cement-based product providing a moisture and damage-resistant surface without the need for protective overcoats. Type Z-106's in-place density offers an important advantage over lighter density products whose durability is questionable when overcoated with a thin hardcoat. Type Z-106 is mill-mixed and requires only the addition of water on the jobsite for easy application. Its prepared consistency allows it to flow more freely for spray application directly to structural steel and galvanized steel decking. In addition, Type Z-106 can be supplied in black or off-white as optional colors and can be spray-applied to various textures or trowel-finished for improved aesthetics in a cost-efficient fire and damage-resistant surface.

Monokote Type Z-106 at South Station Transportation Center, Boston, MA.



Industrial Fireproofing: Versatility to Succeed, Anywhere

That performance is further improved through the value-added expertise of Grace's knowledgeable consultants on matters of in-place performance, fire resistance designs, and fireproofing applications.

In addition to their comprehensive understanding of building code compliance for industrial applications, Grace consultants bring an in-depth understanding of the specialized needs of industrial risk insurer requirements for the petrochemical industry.

Use Monokote Z-146 in:

- Heavy Manufacturing Facilities
- High Tech Clean Rooms
- Mechanical Rooms
- Exterior Structures
- Elevator Shafts
- Transit Facilities
- Vehicle Maintenance Facilities
- Direct Trowel Applications

Monokote Type Z-146

Ultimate Bond Strength For The Toughest Applications

With its superior physical properties, Monokote Type Z-146 is the choice of construction professionals who require the most durable industrial fireproofing material, especially for projects where surfaces are exposed to environmental or climatic conditions.

A high-density, portland cement-based cementitious mixture, Type Z-146 is highly resistant to cracking and damage. Type Z-146 is pre-mixed and requires only the addition of water. It can be applied using equipment ranging from rotor-stator pumps to large hydraulic pumps.

Type Z-146 offers faster application and reduced labor costs, especially when sprayed direct to steel. Colors are available on request. Trowel-finish to a variety of textures for a more customized appearance. Noted for its resistance to air erosion, Type Z-146 can also be used for the most demanding high tech clean room conditions.

Application of Monokote Type Z-146 during construction of the new Malden Mills manufacturing facility.



Monokote Type Z-146 trowelled smooth and finished with an epoxy paint provides a washable, dust free surface for a computer chip assembly plant.



Monokote Type Z-146 boxed and trowelled at Rhode Island's Narragansett Electric co-generation plant.



Monokote Petrochemical Engineered Smart Enough for

Use Monokote Type PK-140 in:

- Petrochemical Facilities
- Chemical Processing Plants
- Gas Processing
- Refinery Facilities
- Specialty Utility Applications
- Pipe Racks
- Approved for Exterior Use
- Direct Trowel Applications

Exterior pipe racks protected with Monokote Type PK-140.

Monokote Type PK-140



Fire Protection That Works As Hard As You Do



Very few products can stand up to the stresses petrochemical facilities must endure and then withstand in a hydrocarbon "rapid-rise" fire. Monokote Type PK-140 petrochemical grade cementitious fireproofing offers a 10,000 PSF bond strength and a fine-tuned chemistry that provides the ultimate in user-friendly application, damage resistance, and fire protection.

Now a wide range of petrochemical installations can benefit from portland cement-based Type PK-140's superior bond strength. They can also take advantage of a product notable for its in-place performance as demonstrated by rigorous bond impact, deflection, and air erosion tests, as well as a full range of UL 263 and UL 1709 fire ratings.

Grace's Monokote Type PK-140 can build to higher thicknesses per pass than competing products for greater applicator efficiency reducing installation time and labor costs.

And Type PK-140 can be applied directly to steel by a wide range of pumping equipment, including: rotor stator, piston or hydraulic pumps. It can also be used with paddle mixers and most continuous mixers. When pumping isn't required or is impractical, Type PK-140's consistency allows engineers the option of specifying trowel application to achieve a smooth poured-in-place appearance.



Towelled over lath and cornerbead provides a clean, finished appearance to pipe rack columns.

Fireproofing Products: the Most Advanced Degrees

Monokote Type PK-150

Cementitious Composition Provides Maximum Durability For Interior And Exterior Use That Weathers Any Storm

For unmatched fire protection in the harshest environments, Monokote Type PK-150 was created to resist weather and freeze/thaw cycling with a distinctive chemistry that extends its longevity. Most importantly, Monokote Type PK-150 protects against hydrocarbon "rapid-rise" fires that can seriously compromise a petrochemical facility's ability to recover and resume production quickly.

Monokote Type PK-150 meets all UL requirements for exterior use and is fire rated in accordance with UL 1709 (ASTM E1529) and UL 263 (ASTM E119). Tests for Coefficient of Thermal Expansion, Compressive Strength, Hardness and other properties, as recommended in API Guidelines, mean that engineers can specify Monokote Type PK-150 with complete confidence and economy.

Monokote Type PK-150 can build to higher thicknesses per pass for faster application direct to steel, or over metal lath, for reduced construction man-days and associated safety concerns.

Applicators install galvanized metal lath and cornerbead in preparation for application of Monokote PK-150 at OxyMar's VCM Facility.



PK-150 delivers optimum protection from accidental impact and abrasion, helping to preserve the fire rating of the column.



Monokote Type PK-150 provides tough, rugged fire protection for OxyMar's new vinyl chloride monomer plant in Ingleside, Texas.

Use Monokote Type PK-150 in Interior or Exterior Applications on:

- Petrochemical Plants
- Chemical Processing Plants
- Gas Processing Facilities
- Specialty Utility Applications
- Interior/Exterior Beams and Columns
- Pipe Rack Beams and Columns
- Vessel Skirts and Supports
- Tank Saddles
- Direct Trowel Applications

Fireproofing Products: the Most Advanced Degrees

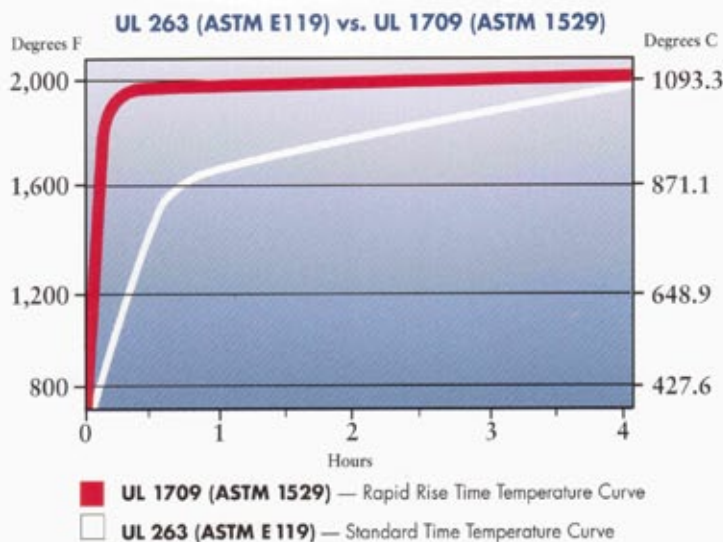
Monokote Type PK-150 high-production application characteristics allows applicators to apply and trowel finish in one simultaneous operation.



Grace Construction Products has focused its leadership position in cementitious fireproofing on research and development efforts of products specifically engineered for the petrochemical industry's unique requirements with Monokote Type PK-150 and Type PK-140.

Offering all of the advantages of the Monokote industrial fireproofing family, Monokote Type PK products are specially formulated to withstand and contain the extreme temperatures characteristic of petrochemical conflagrations. This advanced chemistry allows Monokote Type PK-150 and Type PK-140 to provide unsurpassed protection for the enormous investment petrochemical facilities represent.

Tested To Withstand Any Challenge



As this chart illustrates, not all fires are the same! UL 1709 shows the rapid temperature acceleration that occurs in fires fueled by hydrocarbons. Fuel load in typical office or light industrial occupancies produce a much slower rise in fire temperature (UL 263). Both Monokote Type PK-140 and PK-150 are rated to meet the "rapid rise" requirements of UL 1709.



The "High Performance" Package

Product Support

UL Fire Test Support	<input checked="" type="checkbox"/> Fire Protection Engineering Support on Staff <input checked="" type="checkbox"/> Approved in over 100 UL Fire Resistance Designs
Worldwide Sales & Marketing	<input checked="" type="checkbox"/> Direct, Non-commissioned Sales Organization <input checked="" type="checkbox"/> Highly trained, Industrial Fireproofing Consultants
Worldwide Technical Service	<input checked="" type="checkbox"/> On-site Field Application Support & Training
Worldwide Manufacturing & Quality Control	<input checked="" type="checkbox"/> Grace-owned Manufacturing Facilities <input checked="" type="checkbox"/> In-House Quality Control
Research & Development	<input checked="" type="checkbox"/> Dedicated Fire Protection Research Group <input checked="" type="checkbox"/> In-house, Small-scale Fire Test Laboratories

Industrial Fireproofing Products (ASTM E-119)

	Monokote Type Z-106	Monokote Type Z-146
Density per ASTM E 605	22 pcf	40 pcf
Fire Ratings	1 - 4 hr	1 - 4 hr
Number of U.L. Designs	36	117
Approximate installed cost for a 2 hour rating*	\$1.25-2.50/sf	\$2.50-4.00/sf
Application Thickness/Pass	1/2" - 5/8"	1"
Number of Spray Passes for 2 Hour Rating	1-2	1-2
Standard Color	Grey	Grey
Optional Colors	White, Black	White, Black
Trowellability	Yes	Yes

*E119 applications of spray applied fireproofing are typically not lath reinforced - Exposed applications of spray applied fireproofing typically require Portland Cement based products.

Petrochemical Fireproofing Products (UL 1709)

	Monokote Type PK-140	Monokote Type PK-150
Fire Ratings	1-4 hours	1-4 hours
UL 1709 - All Approvals	Yes	Yes
Density ASTM E 605 nominal	pcf 40-45	pcf 50-55
Corrosion ASTM E 937	Does Not Contribute	Does Not Contribute
Chemical Tolerance	Similar to Concrete	Similar to Concrete
Lath Requirements	Optional	Optional
Number of Spray Passes for a 2 Hour Rating	1	1
Approximate Installed Cost (with lath and corner bead) for 2 Hour Rating (sq. ft.)	\$9-12 per sq. ft.	\$12-15 per sq. ft.
Trowellability	Yes	Yes

Grace Fireproofing Consultants: At your service. And by your side.



Fireproofing is an increasingly complex endeavor. Especially as new products come to market, manufacturing and utility plants become more complicated, and designers cope with a growing maze of code requirements.

For these reasons, Grace Construction Products' team approach in working with our customers puts Grace's highly experienced fireproofing sales and technical experts at your service throughout the design process — from initial design and detailing of specification, to on-site application and inspection, to final sign off.

Years of experience and ongoing training make Grace Industrial Fireproofing representatives a unique industry resource with an unsurpassed understanding of fire resistance classifications, fireproofing applications and in-place performance. Their services include:

- Consultation and assistance in product selection
- Interpretation of UL design criteria
- Designing and detailing fireproofing that meets long-term needs of building owners
- Fireproofing solutions that meet or exceed building code and insurance requirements
- Field assistance for applicators in choosing the most cost-effective installation options and fire protection thicknesses.
- On-site technical support to maximize product yields and minimize application costs

For fireproofing projects that leave nothing to chance, call your Grace representative to learn more about the superb performance of Monokote's complete line of products designed to safeguard your future. And your budget.



KEY FIRE PROTECTION PRODUCTS SALES LOCATIONS

WORLDWIDE HEADQUARTERS

W.R. Grace & Co.-Conn.
62 Whittemore Avenue
Cambridge, MA 02140
USA

1-800-778-2880

Tel. 617-876-1400
Fax 617-498-4311

ASIA

Hong Kong

W.R. Grace (Hong Kong) Ltd.
Devon House, 20th Floor
979 King's Road
Quarry Bay
Tel. 852-2-590-2828
Fax 852-2-856-0709

Korea

70-1, Namdong Industrial Complex
639, Kojan-Dong, Namdong-Ku
Inchon City, Korea 405-310
Tel. (82)-(32)-814-2054~7
Fax (82)-(32)-814-5674

AUSTRALIA

W.R. Grace Australia Ltd.
A.C.N. 004 207 532
Block M Regal Street,
Regents Park Estate
391 Park Road
Regents Park, N.S.W. 2143
Tel. 61-2-896-8396
Fax 61-2-896-8397

CANADA

Toronto Area

W. R. Grace and Co.
Canada Ltd.
294 Clements Road West.
Ajax, Ontario L1S 3C6
Tel. 905-683-8561
Fax 905-683-5947

Québec

W. R. Grace et Cie du Canada Ltée
255, avenue Lafluer
Lasalle, Québec H8R 3H4
Tel: 514-366-3362
Fax: 514-366-0727

EUROPE

United Kingdom

Grace Construction Products
Ajax Avenue
Slough, Berks SL1 4BH
Tel. 44-175-369-2929
Fax 44-175-369-1623

LATIN AMERICA

Argentina

Grace Argentina S.A.
Primera Junta 550
1878 Quilmes
Buenos Aires, Argentina
Tel. 54-1-229-0146
Fax 54-1-229-0193

UNITED STATES

Service Centers

Grace maintains sales offices in every major metropolitan area. To locate your local Grace Fireproofing representative, or to obtain additional product information, contact your local service center by dialing **1-800-778-2880**.

Eastern Region

Massachusetts

62 Whittemore Ave.
Cambridge, MA 02140

Southern/Central Region

Alabama

2601 Commerce Boulevard
Irontdale, AL 35210

Western Region

California

2500 S. Garnsey Street
Santa Ana, CA 92707



Samsankatu 4
20520 Turku
Finland

tel. +358 10 830 1600

GRACE
Construction Products

Web Visit our website at: www.gcp-grace.com

Photography Credits: Malden Mills new construction with permission of Nick Wheeler.
Malden Mills fire, John Bohn and David Ryan/ The Boston Globe.

W. R. Grace & Co.-Conn. 62 Whittemore Avenue Cambridge, MA 02140-1692

Monokote is a registered trademark of W.R. Grace & Co.-Conn. Polartec is a registered trademark of Malden Mills.

We hope the information given here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the user's consideration, investigation and verification but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. Grace Construction Products, W.R. Grace & Co.-Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, W.R. Grace & Co. Canada, Ltd., 294 Clements Road West, Ajax, Ontario, Canada L1S 3C6.

This product may be covered by patents pending. © 1998 W.R. Grace & Co.-Conn.
IF-002 Printed in U.S.A. 11/97 CCD/UP/10M

Printed on recycled paper