

Selection & Specification Data

Generic Type	Cementitious inorganic fireproofing formulation.
Description	Single powder component mixed with clean, potable water before application. Recommended uses for the fire protection of structural steel, bulkheads, and upgrading the fire resistance of existing concrete. Recommended areas of application are refineries, petrochemical, pharmaceutical facilities, pulp and paper mills, offshore platforms, nuclear and conventional power plants, factories, warehouses, institutional and biomedical facilities.
Features	<ul style="list-style-type: none"> • Easily applied by spray or trowel • Lightweight – one-third the weight of concrete for equal fire protection • Excellent physical properties – hard, durable • Nonflammable – during or after application • Asbestos-free – complies with all US EPA and OSHA regulations • Chloride and sulphide free – no special priming required • Non-friable – high impact strength • Single package – mixed with clean, potable water at the job site • Tested & approved for exterior use by Underwriters Laboratories, Inc • Quality Manufactured – strict Carboline quality standards monitored by UL • Unique crack-free formulation
Finish	If a smooth finish is required, this may be done by trowel, roller or brush typically within 1 to 2 hours after final application of Pyrocrete 241. (Refer to separate Application Data)
Primers	Pyrocrete 241 neither promotes nor prevents corrosion. The fireproofing should not be considered as part of the corrosion protection system. For applications where primers are required, use an appropriate alkali resistant primer. U.L. Primer requirements for contour applications where primers are recommended, Pyrocrete 241 must meet minimum U.L. bond strength criteria. Contact the Carboline Regional Fireproofing Division for other approved primers.
Topcoats	Generally not required. In severely corrosive atmospheres, consult Carboline Technical Service for selection of the coating most suitable for the operating environment (Refer also to Carboguard / Pyrocrete 1340).
Dry Film Thickness	Recommended thickness depends on desired rating and assembly to be fireproofed. Refer to separate design details data or Carboline Regional Fireproofing Division.
Theoretical Coverage	3.37 square metres at 10mm thickness, per 22.7 kg (50 lb) bag.
Mix Ratio	22.7 kg Pyrocrete 241 Powder to 17±3 litres potable water.
Dry Temp. Resistance	Not recommended for use as refractory cement or where operating temperatures exceed 93°C.

Physical Data (Typical values)

Colour	Non-uniform	Speckled grey
Density (average)	ASTM E 605 ⁽¹⁾	881 kg per cubic metre (55 lbs per cubic foot)
Durometer Hardness Shore DO	ASTM D 2240	83 ³
Compressive Strength	ASTM E 761	7.6 MPa (1111 psi)
Coefficient of Thermal Expansion (Linear)		8.0 x 10 ⁻⁶ cm/cm °C (4.5 x 10 ⁻⁶ inch/inch °F)
Bond Strength (Unprimed Steel)	ASTM E 736	1054 kPa (22026 psf)
Bond Impact	ASTM E 760	Pass (no cracking at 20 ft/lb)
Impact Resistance	ASTM D 2794	Indents at 27.1 N-m (20 foot pounds)
Deflection	ASTM E 759	Pass
Average Flexural Strength	ASTM D 790	3.46 MPa (502 psi)
Flame Spread	ASTM E 74	0
Smoke Development	ASTM E 74	0
Maximum Strain	ASTM D 790	0.015 inch/inch
Corrosion	ASTM E 937	0.00 gm/mm ²
Insulation "K" Factor	ASTM C 177	0.1254 W m ⁻¹ K ⁻¹ (0.87 BTU in/ hr ft ² °F at 75°F)
Specific Heat		1,507 J g ⁻¹ °C ⁻¹ (0.36 BTU/lb °F)
Shrinkage		< 0.5%
Coverage per 22.7 kg (50lb) bag ⁽²⁾		3.37 m ² at 10mm thick (14.3 Bd.Ft.)
Shelf Life		2 years
(1)	Air dry at ambient conditions until constant weight. Do not force dry. Use ASTM E 605 Positive Bead Displacement modified to use 1mm ceramic beads.	
(2)	Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.	
(3)	Material shall reach a hardness of Shore DO 64 prior to handling and topcoating.	
Test reports and additional data available upon written request. Physical property data was derived using 17 litres (4½ gallons) of water per 22.7 kg (50 lb.) bag. To achieve the above stated coverage, refer to the Pyrocrete 241 application instructions.		

For type approvals and testing information refer overleaf.

Pyrocrete® 241

Approvals

UL (Underwriters Laboratories Inc.)

Pyrocrete 241 has been tested by Underwriters Laboratories, Inc. and is classified for exterior or interior use. It is listed under the following designs:

ASTM E119 (U.L. 263, NFPA 251)

Columns	X732, X733, X735, X736, X743, X744, Y707, Y708
Roof Assembly	P734, P735, P736, P737, P738, P739, P926, P927, P928, P929, G706, G707, G708, J713, J714, J715, J716
Beams	N715, N716, N717, N718, N771, N772, N773, N774, N775, S706, S713, S731, S732, S733
Floor Ceiling Assembly	D744, D767, D768, D769, D770, D771, D772, D773, D774, D775, D776, D777, D927, D928
Walls	U704

UL 1709

Rapid temperature rise which simulates a hydrocarbon fire exposure

Columns	XR701, XR702
---------	--------------

LPG Vessels

Factory Mutual Global Group / Factory Mutual Research - Fire Protective Coating for Steel Process Structures.

Test Report #0E0A9

Fire Protective Coating for LP Gas Storage Vessels. Hydrocarbon Fire Protection

Approval:- Pyrocrete 241 applied at 10mm over 1.3 kg / m² galvanized steel lath.

Performance Result: 120 FRR Hydrocarbon Fire Protection

Test Report #3024079

Fire Protective Coating for LP Gas Storage Vessels and Process Structures – Fire Endurance & Hose Stream Test and Protection Re-Test

Result: PASS

Cryogenic Immersion & Fire Test

Test Method:

South Hook LNG Terminal Company Ltd. (UK) - Specification for Cryogenic Protection and Passive Fire Protection of Structural Members.

Protection of steel columns when exposed to cryogenic liquid followed by a hydrocarbon fire

Test Report #09073

28.6mm Pyrocrete 241 applied over 1.3 kg / m² galvanized steel lath.

Limiting Temperature Endpoints:

400°C	Offshore standard	106 minutes
538°C	UL 1709 standard	134 minutes
550°C	European standard	137 minutes

Bulkhead Ratings

Tested by Fire Insurers' Research and Testing Organization (FIRTO) London, England for standard and hydrocarbon exposure.

Approved by the following agencies:

Lloyds Register of Shipping

Jet Fire Test	SAS F070237
3 Bar Over-blast	Pass

Building Code Reviews (Architectural Protection)

NYC MEA 172-80-M (Columns), 174-80-M (Beams),
173-80-M (Columns W14x233)

San Francisco 164 C57.7A
Los Angeles RR24763

Packaging, Handling & Storage

Shipping Weight (Approximate)

Bag weight is 22.7 kg (50 lb.)
Truckload = 880 palletized bags 40 to pallet, plastic wrapped.

Storage - General

Material should be kept dry, covered, and off the ground.

Storage Temperature & Humidity

Store under cover
-29°C to 66°C
0 to 90% relative humidity

Shelf Life

24 months minimum

***Shelf Life: (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.**

Manufactured / supplied by:-
Altex Coatings Ltd, 91-111 Oropi Road,
Tauranga 3112
New Zealand
Phone: +64 7 5411221
Resene Paints Australia Ltd.
7 Production Avenue
Queensland 4214
Australia
Phone: +61 7 55949522



350 Hanley Industrial Court, St. Louis, MO 63144-1599
314/644-1000 314/644-4617 (fax) www.carboline.com

An **RPM** Company

Substrates & Surface Preparation

General	Before applying Pyrocrete 241, the substrate coating must be free of all oil, grease, condensation, or other contamination.
Steel	Steel preparation before priming should be done in accordance with the recommended primer's Product Data Sheet.
Carbon Steel	Carbozinc® 11 Carbozinc® 11 WB Carbozinc® 858 Carbozinc® 859 EZ2 Carboguard® 635 Rustbond® Penetrating Sealer
Galvanized Steel	Normally not required, but may be required under corrosive conditions. Use Carboline Rustbond® Penetrating Sealer or Carboguard® 504 Epoxy Primer.
Non-Ferrous Metals	Aluminium, copper, etc. shall be primed with one coat of Carboline Rustbond® Penetrating Sealer
Concrete	The primer recommended is Carboguard® 1340 or Pyrocote® 1340.

Lathing & Attachments (Where required)

1.85 kg/m² galvanized metal lath may be pre-bent and tie-wired into place for appropriate design. Optionally, beam furring clips or electrically welded, pneumatic or self-tapping screws or studs, may be used.

A. Contour Design: 1.85 galvanized metal lath wrapped around the flange edges toward the web approximately 3.8 cm (1½"). Contour columns allow the use of chicken wire with beam furring clips as an alternate to the 1.85 metal lath. Please refer to design details. For contour applications on structural members with web span greater than 410 mm (16") or flange widths greater than 310 mm (12") refer to the U.L. Fire Resistance Directory under "Coating Materials" section.

B. Boxed Design: 1.85 galvanized metal lath wrapped around member spanning the web, overlapped 2.5 cm (1") and tie-wired on the flange face on centre. For large webbed members, additional support for lath may be needed for ease of installation. Optional use of plastic-nose corner beads may be used for better thickness control and aesthetics.

C. Tower Skirts and Flat Surfaces: Require that 1.85 galvanized metal lath be anchored on 310-610 mm (12" to 24") centres depending upon requirements. The lath should overlap and be tie-wired. On tower skirts only, PVC coated mesh can be used in lieu of 1.85 galvanized lath. Mesh shall be 50mm x 50mm, 0.8mm (2" x 2", 20 gauge) wire coated with PVC as furnished by Carboline.

When ram set or welding is prohibited; a pneumatic fastener may be used.

On very large areas, control joints are made by scoring halfway through the thickness of Pyrocrete 241. This is achieved by using the trowel blade edge or an appropriate scoring tool. A preferred option would be the use of plastic nosed corner beads. Spacing should be on 3 metre (10') centres, both horizontally and vertically. Please refer to design details.

Application Equipment

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results. General Guidelines:

- Mixer**
- Use a heavy-duty mortar mixer with rubber tipped blades that will scrape the sides and bottom of the mixer. A 22.7 kg. (50 lb) bag of Pyrocrete 241 typically requires a mixer volume of 0.23 m³ (8 ft³) minimum.
 - Continuous feed mixer option. Contact Carboline technical service for recommendation. Densities may vary when using this type of mixing equipment.

Pumps

Manf.	Model	Type	Size
Essick	FM9, FM5E	Rotor Stator	2L4
Putzmeister	S5EV	Rotor Stator	2L6
Hy-Flex	HZ-30E	Rotor Stator	2L6
Sunspray	EZ88	Rotor Stator	Super 2L6
Strong Mfg	Spraymate 60	Rotor Stator	2L6
Airtech	Swinger	Piston	N/A
Hy-Flex	H320E	Piston	N/A
Mayco	PF3	Dual Piston	N/A
Thomsen	PTV 700	Dual Piston	N/A

Trowels Standard plasterers' hawk and trowel may be used. A rubber float may also aid in finishing.

Compressor Be certain that the air supply is a minimum 22 cfm at 100 psi (6.9 Kpa) and higher when distances longer than 22 metres (75') are required.

Material Line Minimum 25mm (1") I.D. hose with 300 psi minimum bursting pressure. For lengths over 15 metres (50") use 38mm to 75mm (1½" to 3") I.D. hose. Do not reduce hose diameter by more than 7mm (¼") per 7.5 metres (25') unless a tapered conical reducer equipped with swivel fitting is used. A 3 metre (10') length of 18mm (¾") I.D. hose may be added at the gun for use as a whip.

Air Line Use 12.5mm (½") I.D. line, with a minimum bursting pressure of 100 psi (6.9 Kpa)

Spray Guns

Manf.	Model	Fluid Tip	Air Cap
Binks	7E2	47 or 49	3/8" or ½"
Graco	204000	167331	160658
SpeeFlo	701	9mm	9mm
Plasterers	NA	9mm	N/A
Air Tech	Internal Mix	3/8" to ½"	N/A

Pyrocrete® 241 – Application Instructions

Mixing & Thinning

Mixing Add 17 ± 3 litres (4½ ± ¾ US gallons) of clean, potable water to a mortar mixer with rubber tipped blades. With mixer running slowly, add powder and mix for 5 minutes minimum (10 minutes maximum) until a homogeneous mortar-like consistency is achieved. Total water must not exceed 20 litres (5¼ US gallons) per 22.7 kg (50 lb) bag. In cool weather, warm water may be used to enhance application. In hot weather, cool/cold water may be used.

Pot Life 2 hours at 21°C (70°F) and less at higher temperatures. Pot life ends when the material thickens and becomes unusable.

Density Wet density measurements are critical to obtaining correct dry densities. Mixer wet density should be 1.18 - 1.28 g/cm³ (74-80 lbs/ft³). To check wet densities:-
1. Zero the scale with an empty cup (of known volume** in cm³) on it or note the cup weight (Tare).
2. Fill the paper cup with mixed material and immediately screed the excess until even with the rim of the container and weigh it on the gram scale
3. Divide the weight (in grams) by a conversion factor based on the size of the container. (Conversion factor is calculated by taking the full value of the cup volume in cm³). The result will yield density in gram / cm³. Target range 1.18 - 1.28 g/cm³.
Formula:
(Weight of Mix ÷ Cup Volume) = gram / cm³.
**If the full-to-brim volume of the cup is not known then tare the cup as above, fill it full to the brim with clean water and weigh the full cup. The weight of the water = the volume of the cup in cm³.

Application Procedures

Pyrocrete 241 may be applied by spray and/or trowel. Film build will depend on application method, weather conditions and equipment used. For application overhead, a scratch coat of up to 13mm (½”) is recommended to key into the lath. Allow to set for approximately 1 to 2 hours at 21°C (70°F) before applying the subsequent coats. It is recommended that the total required thickness be applied within a 24 hour period. If this is not possible, the preceding coats should be left as sprayed or scored after the initial 24 hour period, Pyrocrete 241 should then be dampened with water before application of additional coats.

- Maximum time to achieve the full thickness is 3 days at 21°C (70°F) and 50% relative humidity. This would be less at higher temperatures and humidities.
- All additional coats are applied monolithically to the entire perimeter of the member.
- At no time shall Pyrocrete 241 be applied at a thickness less than 6mm (¼”) or “skim” coated or feathered.

Application Conditions

Condition	Surface or Ambient Temperature		Relative Humidity	
	Minimum	Maximum	Minimum	Maximum
Normal Interior or Exterior	4°C	38°C	0%	95%

Finishing

If a smooth finish is required, this may be done by trowel, roller or brush, typically within 1 to 2 hours after final application of Pyrocrete 241.

Protection of Adjacent Surfaces

Finished surfaces shall be protected from damage and overspray. Encapsulation of aluminium electrical conduits is not recommended.

Curing

Fresh Pyrocrete 241 must be protected from rain or running water for 24 hours at 21°C (70°F). In low humidity, high temperature, direct sun or wind, the Pyrocrete surface should be kept damp for at least 12 hours by applying a water mist or wrapping in plastic sheets to reduce rapid water loss.

Caution: Do not start work if ambient temperatures are expected to drop below 2°C (35°F) for 24 hours after application; or take measures to protect the curing coating from excessively low temperatures.

Topcoating

Seal Coat – In corrosive environments, use an appropriate topcoat. If topcoating is required, apply Carboguard 1340 as a seal coat. Carboguard 1340 may be applied after 24 hours of final application of Pyrocrete 241. Consult the Carboguard 1340 Product Data Sheet for minimum and maximum cure times.

Top Coat – Surface hardness should be a minimum Shore D 40 as measured with a Durometer prior to application of the topcoat. Normally, this minimum dry time is 10 days at 21°C (70°F) and 40 days at 4°C (40°F), for thickness of 2.5 cm (1”) or less.

Caulking – For exterior installations a compatible caulk should be applied at all termination joints between Pyrocrete 241 and the substrate. Contact Carboline Technical Service for full information.

Cleanup & Safety

Cleanup

Pump, mixer and hose should be cleaned with clean, potable water at least once every 4 hours at 70°F (21°C), and more often at higher temperatures. Sponges should be run through the hoses to remove residual material. Wet Pyrocrete 241 overspray must be cleaned up with soapy or clean, potable water. Cured overspray may require chipping and/or scraping to remove.

Safety

- 1 - Do not breathe dust. Pyrocrete 241 is caustic and will irritate mucous membranes. Use OSHA approved dust mask while mixing.
- 2 - For eye contact, flush with copious amount of water in accordance with OSHA instructions. Goggles or safety glasses are recommended.
- 3 - Wash skin with clean water to prevent irritation.

Packaging, Handling & Storage

Refer to Pyrocrete® 241 Product Data Sheet and MSDS.

Manufactured / supplied by:-
Altex Coatings Ltd, 91-111 Oropi Road,
Tauranga 3112
New Zealand
Phone: +64 7 5411221
Resene Paints Australia Ltd.
T/A Altex Coatings
7 Production Avenue
Queensland 4214
Australia
Phone: +61 7 55949522



350 Hanley Industrial Court, St. Louis, MO 63144-1599
314/644-1000 314/644-4617 (fax) www.carboline.com

An **RPM** Company

Issued Sept. 2015 – updating Aug. 2010

Manufactured and / or distributed in Australia & New Zealand by Altex Coatings under license to Carboline Company. To the best of our knowledge the technical data contained herein is true and accurate on the date of publication and is subject to change without prior notice. User must contact Altex Coatings to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. We guarantee our products to conform to Carboline quality control. We assume no responsibility for coverage, performance or injuries resulting from use. Liability, if any, is limited to replacement of products. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY ALTEX COATINGS OR CARBOLINE, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Carboline® and Carboguard® are registered trademarks of Carboline Company.