LIGHTCEM TECHNOLOGY

Advanced
Concrete

LIGHTCEM - IN THE BEGINNING

Concrete has certainly been around for a long time, in fact archeologists tell us that the ancient Egyptians may have used a form of it in the construction of the pyramids.

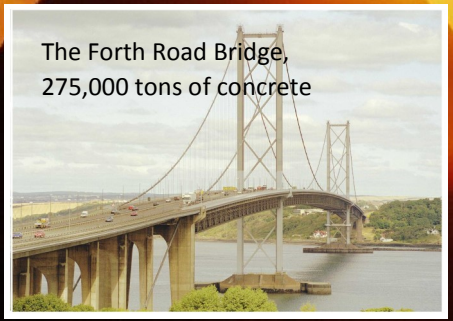
In more recent times concrete has proved itself to be an essential part of building technology, with an almost endless catalogue of uses as diverse as sky scrapers, tunnels, bridges and roads. The list of applications are so wide ranging and comprehensive that there can hardly be a construction project anywhere on Earth that does not feature concrete somewhere in its list of materials.

However, despite all its many uses during the past 5000 years, the biggest leap forward in concrete technology has been during the last three decades.

As builders and engineers have gradually pushed back the boundaries of design and construction, new demands have been made on the materials they specify.

Where concrete once was thought of as a simple mixture of sand, stone, cement and water, today this is no longer true.

Modern concrete compounds may now have well over a dozen or more ingredients, carefully balanced to create a brand new material, to meet the Engineers specific requirements.



LIGHTCEM - A NEW GENERATION

At Lightcem Technology these advances in concrete technology have led to the development of a remarkable range of products. A new generation of concrete compounds, as far removed from sand and gravel as Concord is from the Pyramids.

LITECRETE

The perfect material where weight is the primary focus. Light enough to float, yet strong enough to support a building.

SPRAYFAST

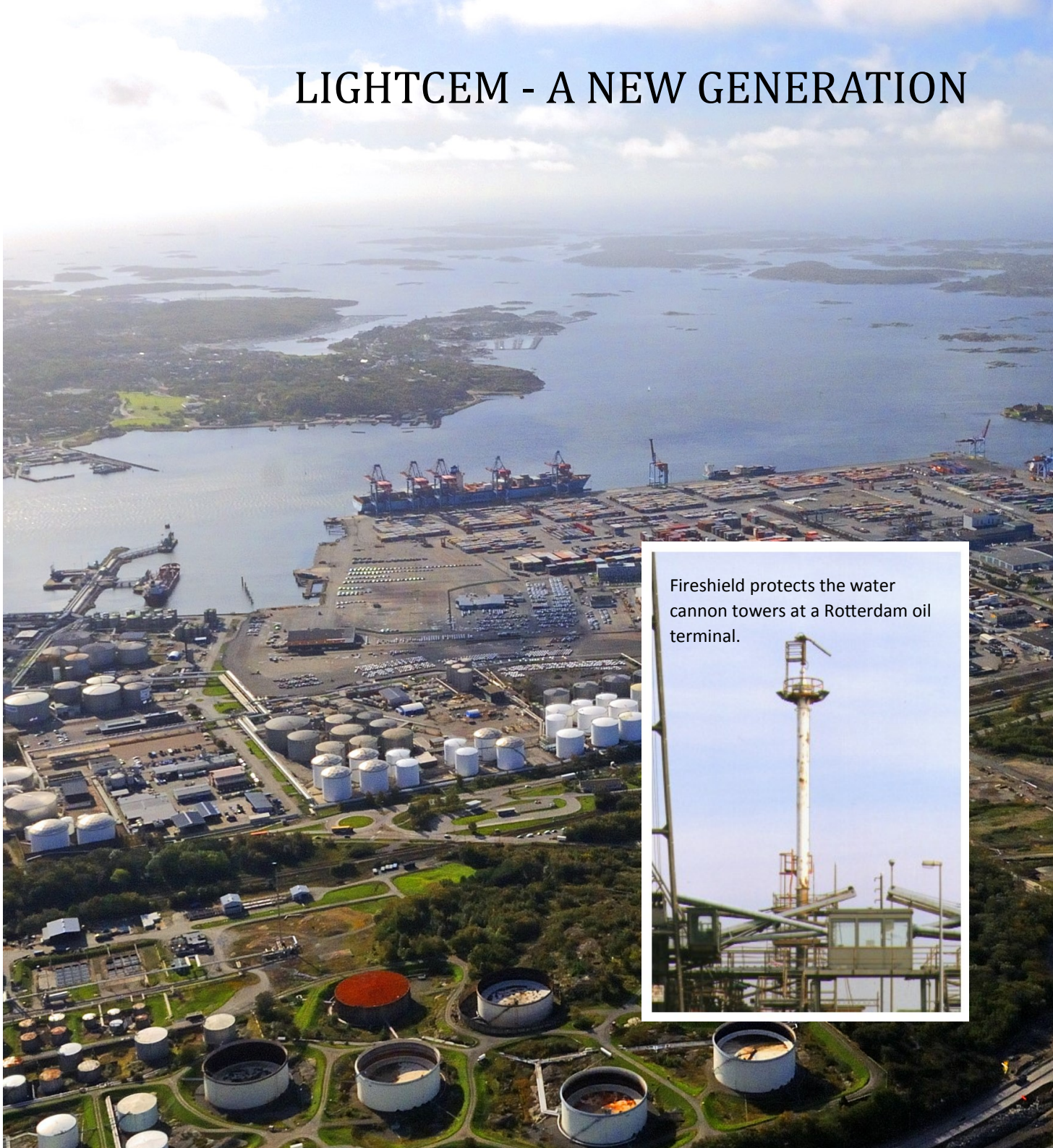
A sprayable concrete that will bond to virtually anything, including glass. Can be sprayed to a thickness of 150mm in ONE application. Ideally suited for tunnel linings, external renderings and protection of steel work.

FIRESHIELD

Can withstand repeated subjection to temperatures in excess of 1350°C. Combines well with SPRAYFAST making it the perfect material for bonding to steel sheeting or framework.

WHITECOAT / TOPCOAT

Used when you need a strong and washable surface. A water repellent as well as it prevents intrusion of salt, oil, dust, etc.



Fireshield protects the water cannon towers at a Rotterdam oil terminal.

LIGHTCEM - THE EARLY DAYS

The "MARIANA" Floating Fish Farm, Barcelona

The foundations for LIGHTCEM were first put into place almost 40 years ago in the Norwegian city of Bergen.

It was there that father and son team, Einar and Stein Knutsen, began applying their engineering skills to a number of problems unique to the offshore construction industry.

In conjunction with several Scandinavian research institutes, including "Det Norske Veritas", they proceeded to develop a complete new family of concrete compounds that would float, remain water resistant, resist temperatures in excess of 1350°C, insulate from cold and much more.

These properties enabled the fledglings company to pursue a wide range of contracts that would include projects as diverse as a floating fish farm, for use in the Mediterranean, a docking harbor for ferryboats and a program of structural repairs to a Norwegian football and athletic stadium.

Now, with almost four decades of progressive development behind it, the company maintains its place at the forefront of concrete technology and is ideally placed to meet the challenges of today's market.

Brann Stadium, Norway

The development of LIGHTCEMS range of products has allowed designers and engineers to approach technical difficulties in a way that would once have been impossible.

When a Dutch company used LITECRETE in the construction of concrete holding tanks, they achieved a weight reduction of more than 100 tons. They were therefore able to simplify the piling schedule and cut down on the time allowed.

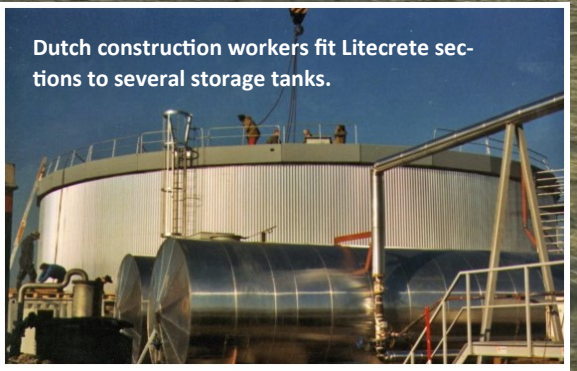
As a result they are now Licensed Distributors, with exclusive rights to manufacture and distribute Lightcem products throughout the Netherlands.

The same has been true in Sweden, Norway, Belgium, Luxembourg and England, where former users of LIGHTCEMS products have become licensed distributors, with the exclusive rights to manufacture and distribute the products in their respective countries.

Those Distributors are the very lifeblood of the company and as such, LIGHTCEM is aware that along with a range of the finest products there must be a continuous program of Research and Development and full technical support service.

Lightcem WHITECOAT surface in Brattås tunnel, Norway

LIGHTCEM - THE WAY FORWARD



Dutch construction workers fit Litecrete sections to several storage tanks.

CASE STUDY

C/NO. 050685

LOCATION Bergen, Norway

CONTRACTED BY Almo Nord AS

LICENSE HOLDER SK Norway

LIGHTCEM SPRAYFAST

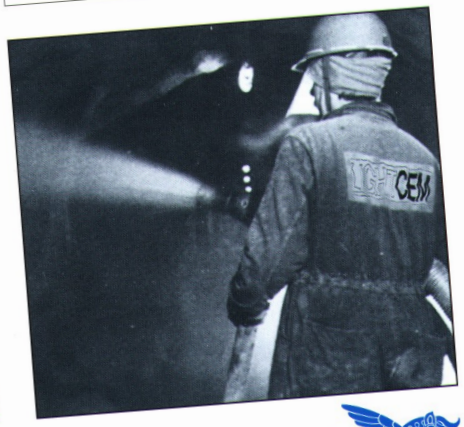
TYPE OF CONSTRUCTION: Road Tunnels

PROBLEM

In the early years of the 1980's, following a freak accident inside a road tunnel, the Norwegian legislative body for road safety embarked on an extensive research program to establish the safety (or otherwise) of the lining material used inside a large number of road tunnels.
The results showed that a fire inside the tunnel could result in the release of flammable gases with devastating consequences for anyone caught in the tunnel. With typical Scandinavian efficiency the relevant agencies set to work to solve the problem.
Their final specification involved spraying the existing lining with a protective layer of concrete. Using traditional concrete a coating of 120mm would be needed and this would be sprayed on to the lining material, but in order to prevent the sprayed concrete from slumping away from the original tunnel lining the contractors would need to install a layer of steel-mesh reinforcing throughout the entire tunnel and then spray the concrete in four separate applications of approximately 30mm each.

SOLUTION

Because of its exceptional bonding characteristics Lightcems SPRAYFAST was sprayed directly to the original tunnel lining without the need for reinforcing mesh and in ONE application.
The savings were incredible:
Savings in time: Instead of closing down the tunnel on FIVE separate occasions to fix reinforcing and then apply four separate layers, with SPRAYFAST the tunnel was shut just once.
Savings in materials: By combining the properties of Lightcems FIRESHIELD to Lightcem SPRAYFAST the protection required was achieved with less than half the thickness that would have been necessary with traditional concrete.
The result was a cost effective safety program, that saved time, saved money and kept the traffic moving.



LIGHTCEM®

LIGHTCEM SPRAYFAST

Supplying the product to the point of usage is one of the key factors that makes concrete spraying such an important option for todays builders. Not just to the vicinity involved, but right where the worker want it; on walls or ceilings, on columns or beams, inside or out.

Unfortunately, while the idea may be good, quite often the product is not. Often it proves difficult to maintain a consistent spray pattern resulting in higher finishing costs. At other times the bonding may be so poor that little more than 20 to 30mm of coverage can be achieved, so that additional applications are required if a greater thickness is specified.

These were the very problems that Lightcems SPRAYFAST was designed to eliminate.

The easy-flow, high-bonding characteristics of SPRAYFAST made it the number one choice when coating was required inside several Norwegian tunnels.

Sprayfast is FAST to use and ideal for both wet and dry spraying. It also sticks fast in a way no other concrete will. For example: It was successfully sprayed onto a vertical steel plating to a thickness of 200mm in one application, and in another situation a 50mm coating of SPRAYFAST was even sprayed onto the underside of overhanging glass panels.

APPLICATIONS:

INTERNAL AND EXTERNAL COATINGS.

High water resistant qualities, makes SPRAYFAST an ideal coating material

EMERGENCY REPAIRS:

SPRAYFAST can be sprayed directly onto plastic sheeting.

SHOTCRETING/PUMPING

Perfectly formulated for concrete repairs on tunnel linings. SPRAYFASTs high flow characteristics make it ideal for long distance pumping applications, while maintaining good workability.

STEEL COATINGS

Combine with Lightcem FIRESHIELD and you have the ideal spray covering for columns and beams

LIGHTCEM LITECRETE

The wide variety of contracts that have benefited from the special qualities of LITECRETE, testify to the versatility of this product.

In almost any construction project there are opportunities for LITECRETE to make savings. Savings in materials, in reinforcing, in labor, in expenditure and of course, savings in weight.

Consider, for example, the MARIANA, a Spanish fish farm constructed in Barcelona, and towed out in the Mediterranean to serve as home to thousands of Bream and Bass. Made from reinforced LITECRETE the Mariana is light enough to float and yet so strong and stable that it Is able to withstand waves of up to 7 meters height.

In London, England, the restoration of Edwardian and Victorian buildings have been made much simpler, and more economical by the introduction of LITECRETE as a backing material to molded stonework. The buildings gets a much needed facelift and are strengthened to increase their lifespan, without adding a serious loading to the original structure.

APPLICATIONS:

FLOATING CONSTRUCTIONS

For example; wharves, jetties and fish farms, emergency housing, Floating hospitals and workshops.

LIGHTWEIGHT CONSTRUCTION

For example: Pre-fabricated, portable buildings. Lightweight roofing elements for tunnel linings. Flooring sections, wall panels and roof decking.

MOLDING

For example: Molds for metal foundries. Molded ornamentation and enrichment. Backing for pre-cast natural stone components.

CASE STUDY

C/NO. 200985

LOCATION Barcelona

CONTRACTED BY Barca Import S.A.

LICENSE HOLDER SK Norway

LIGHTCEM LITECRETE

TYPE OF CONSTRUCTION: Floating Fish Farm

PROBLEM

Fish farming has been part of mans food supply chain for hundreds of years, but the developments that took it from the medieval stew pond to a major industry really got underway in the 1970's. By the 1980's literally hundreds of lochs, lakes and inlets had become home to a variety of farms and tank nets. However only a few species lent themselves to such a farming style; many others require more open waters and a freer environment.
Current designs proved to be unsuitable, for what was required was a farm that could be moored miles from shelter and exposed to all the elements.
A new type of farm was called for, one that was strong enough to withstand the continuous onslaught of the open sea, yet light enough to float.

SOLUTION

Using the latest off-shore technology a design was submitted utilising reinforced LITECRETE.
The resultant weight reduction, of almost 45% allowed the engineers to produce a more compact design, with smaller buoyancy chambers and a simplified reinforcing schedule.
Thus a successfully completed Floating Fish Farm is now moored safely out in the middle of the Mediterranean Sea.
A farm designed to withstand waves of seven metres in height and a farm that costs 40% less than any design using conventional technology.

LIGHTCEM®

CASE STUDY

C/NO. 070493

LOCATION Rotterdam.

CONTRACTED BY Intergron V.O.F.

LICENSE HOLDER NG Benelux

LIGHTCEM FIRESHIELD

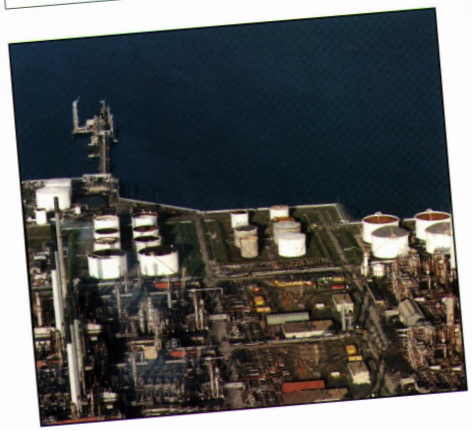
TYPE OF CONSTRUCTION:
Water Cannon Towers

PROBLEM

Almost all fires have the potential for danger, but there can be few that threaten to be as devastating as a fire in an oil refinery.
It is hard to imagine the catastrophic cost, both in monetary terms, and more seriously in the number of lives lost, when a petro-chemical fire gets out of control.
These were the very factors that prompted Dutch Safety Engineers at the Texaco Terminal in Rotterdam Harbour, to turn their attention to one vital weapon in their fire fighting arsenal: Remote Controlled Water Cannons.
Strategically placed Water Cannons, set on top of steel towers could be targeted to fight a fire, without risking the lives of Fire Fighting crews.
But now the engineers were faced with a new problem: How could they protect the Water Cannons from the ravages of fire.

SOLUTION

What was required was a fire resistant coating that would protect the steel towers from fire. A fire that could become so intense it could twist and buckle the Water Cannon towers, and render them useless.
Numerous options were considered but the specification demanded that the material used should offer the highest standards of fire resistance, should form an almost permanent bond with the steel work and should not shale, split or blister under the searing heat it would become exposed to.
Test after test at the Dutch Fire Research Institute proved beyond doubt that Lightcem FIRESHIELD was the only material designed to meet the stringent demands imposed upon it. A material that would be easy to install, competitive in price and most importantly, effective as front-line protection against the deadliest of fires.



LIGHTCEM®

LIGHTCEMS FIRESHIELD (1150 and 1350)

Only those who have been exposed to the dangers of a fire can really appreciate the terror and panic that can overcome a person, especially in a situation where the fire is out of control. The resultant devastation may well be counted in hundreds of thousands of pounds, not to mention the loss of life that may occur. Authorities are therefore mindful of the need to restrict the use of flammable products and wherever possible replace these with materials that are fire resistant and afford protection for the occupants.

FIRESHIELD could be viewed as such a product, except that it has a unique property that sets it apart from the rest.

Today most products afford protection because they burn slowly, thereby allowing extra time for evacuation of the building. However these products still burn and have to be replaced at a later date.

30mm FIRESHIELD protection will resist direct assault by fire, up to 1350°C, and what's more it will not burn. It will remain intact, offering the same degree of protection should another incident occur at a later date.

FIRESHIELD affords unique fire protection, without the danger of toxins and contaminates. It can be made into sheets, molded to virtually any shape, and its high bonding properties allow it to be sprayed onto almost any material, including glass.

APPLICATIONS:

COMMERCIAL APPLICATIONS

Isolating fire risk areas ex. Kitchens/Boiler rooms. Constructing fire breaks.

STEEL COATINGS

Combine with Lightcem SPRAYFAST to protect steel framework, columns and beams

DOMESTIC APPLICATIONS

Hotels and residential homes, firebreaks between floors Isolating corridors and escape routes.

MARINE APPLICATION

Fire proof coverings to floors, walls, decks and bulkheads.

LIGHTCEMS WHITECOAT AND TOPCOAT

The European Union has recently declared that tunnels must have a certain level of brightness. This can be solved by the installation of more lighting or making the tunnel linings brighter.

On this basis we have developed WHITECOAT. Lightcems WHITECOAT is a color ingrained, cement based product that can be sprayed directly onto the tunnel walls. This will significantly brighten the tunnel, giving a safe optical effect for the motorists using it.

WHITECOAT and TOPCOAT are similar products except for its color. Both can be used where you need a strong and washable surface. They are designed to have a carbonation retarding effect and they can withstand frost/defrost fluctuations.

FOR THE ENGINEER

Lightcems advanced concrete technology has been used to good effect in applications as diverse as a Floating Fish Farm in the Mediterranean to Tunnel Linings in Scandinavia.

The versatile nature of the products has prompted a wide range of test programs, which have been undertaken in a number of accredited laboratories throughout Europe. Relevant test programs are listed below and full details are available for download at www.lightcem.co.uk

Aug. 1985: Test program by Norwegian Fire Research Laboratory to determine the dire resistance of FIRESHIELD 1150 and FIRESHIELD 1350

Sept. 1988: Test program by NOTEBY Laboratories on SPRAYFAST when applied to road tunnel walls.

Sept. 1991: Test program by Det Norsk Veritas to confirm underwater pumping of FIRESHIELD 1150 to provide protection to steel plating constantly immersed in sea water.

Jan. 1992: Test program by VERITEC to confirm bonding strength of SPRAYFAST to tunnel lining material

Aug. 1992: Test program by FAVERDALE Laboratories to confirm fire resistant qualities of Lightcems FIRESHIELD

June. 1995: Test program by SINTEF to confirm; a) Fire resistance of FIRESHIELD 1150. b) Lack of spalling when LITECRETE used to protect reinforced concrete beams.

Dec. 1995: Test program by B.B.A. to confirm fire resistant qualities of FIRESHIELD and Pump/Spray qualities of SPRAYFAST.

Technical Specifications SPRAYFAST

SPRAYFAST	LC-10	LC-25	LC-35
General	Single Pack, add water on site		
Finish	As-sprayed or floated (as normal concrete)		
Color	Light grey (can be colored)		
Compressive Strength	8-10 N/mm²	22-25 N/mm²	35-40 N/mm²
Tensile Split	1,1 N/mm²	2,4 N/mm²	3,4 N/mm²
Specific Gravity (wet)	900-1000	1300-1400	1600-1700
Specific Gravity (dry)	700-800	1100-1200	1350-1450
E-modulus	4,0-6,0 Gpa	10,0-12,0 Gpa	15,0-17,0 Gpa
Average Bond strengths	1,0 N/mm²	1,3 N/mm²	2,0 N/mm²
Water Penetration (DIN 1048)	4 mm	3 mm	5 mm
Thermal Conductivity λ	0,25 W/m□	0,41 W/m□	-
Maximum Particle Diameter	4mm		
Carbonation Depth	3mm	3mm	4mm
pH - value (when wet)	12 - 12,5		
Flash Point	None		
Standard bag (may vary)	25 kg (On request: 1000 kg in big bag)		
amount of water / standard bag	8,0 liters	6,5 liters	5,0 liters
Yield (for bag size above)	33 liters	23 liters	17 liters
Minimum practical thickness	Unreinforced: 10mm Reinforced: 15mm		
Subsequent Coats	50% strength - 1 day after initial set 75% Strength - 3 days after initial set 98% strength - 28 days after initial set		
Shelf Life	12 months if stored as instructed		
Storage	Store bags unopened in dry environment off the ground		
Attention: It is important to note that the whole bag must be mixed in one process.			

Technical Specifications LITECRETE

LITECRETE	LC-10	LC-25	LC-35
General	Single pack, add water on site		
Finish	Tamped or floated (as normal concrete)		
Color	Light grey (can be colored)		
Compressive Strength	8-10 N/mm²	22-25 N/mm²	35-40 N/mm²
Tensile Split	1,1 N/mm²	2,4 N/mm²	3,4 N/mm²
Specific Gravity (wet)	900-1000	1300-1400	1600-1700
Specific Gravity (Dry)	700-800	1050-1150	1300-1400
E-modulus	4,0-6,0 Gpa	10,0-12,0 Gpa	15,0-17,0 Gpa
Average bond strengths	1,0 N/mm²	1,3N/mm²	2,0 N/mm²
Water penetration (DIN 1048)	4 mm	3 mm	5 mm
Thermal Conductivity λ	0,25 W/m□	0,41 W/m□	-
Maximum Particle Diameter	4mm		
Carbonation Depth	3mm	3mm	4mm
pH - value (when wet)	12 - 12,5		
Flash Point	None		
Standard bag (may vary)	25 kg (On request: 1000 kg in big bag)		
amount of water / standard bag	9,0 liters	7,5 liters	6,0 liters
Yield (for bag size above)	33 liters	23 liters	17 liters
Minimum practical thickness	Unreinforced: 10mm Reinforced: 15mm		
Subsequent Coats	50% strength - 1 day after initial set 75% strength - 3 days after initial set 98% strength - 28 days after initial set		
Shelf Life	12 months if stored as instructed		
Storage	Store bags unopened in dry environment off the ground.		
Attention: It is important to note that the whole bag must be mixed in one process.			

Technical Specifications

FIRESHIELD 1150

FIRESHIELD 1150	
General	Single pack, add water on site
Finish	Sprayed
Color	Grey (can be colored)
Compressive Strength	3-5 N/mm²(Mpa)
Specific Gravity (wet) (Kg/dm³)	650-800
Specific Gravity (dry) (Kg/dm³)	500-650
E-modulus	1,5-2,6 GPa
Average Bond strengths	1 - 2 N/mm²
Maximum Particle Diameter	2mm
Carbonation Depth	3mm
pH - value (wet)	12-12,5
Flash Point	None
Standard bag (may vary)	25 kg (may vary)
Amount of water / standard bag	12 - 14 liters
Yield (for bag size above)	Ca. 60 liters
Maximum thickness	100mm
Minimum thickness	10mm
Thermal Conductivity λ	0,13 W/mK
Air content	15 - 20 %
Subsequent Coats	50% strength: 1 days after initial set
	75% strength: 3 day after initial set
	98% strength: 28 days after initial set
Fire Testing	BS 476 Del.4,6&7 (1997)
	BS 476 Del. 21 (1998)
	SINTEF 010-0204
	NS-EN 1363-1:1999
	NS-EN 1364-1
	IMO Res. A.754(18)
Packing	25 kg bags + big bag
Shelf Life	Store bags unopened in dry environ-ment off the ground
Storage	12 months if stored as instructed

FIRESHIELD 1350

FIRESHIELD 1350	
General	Single pack, add water on site
Finish	Sprayed
Color	Light Grey
Compressive Strength	3-5 N/mm² (Mpa)
Specific Gravity (wet) (Kg/dm³)	800-1000
Specific Gravity (dry) (Kg/dm³)	700-900
E-modulus	1,5-2,6 GPa
Average Bond Strengths	1 - 2 N/mm²
Maximum Particle Diameter	4mm
number of coats	one or more
pH - value (wet)	12-12,5
Flash Point	None
Standard Bag (may vary)	20 kg (may vary)
Amount of water / standard bag	8,5 liters
Yield (for bag size above)	Ca. 32 liters
Maximum Thickness	70mm
Minimum Thickness	10mm
Thermal Conductivity λ	0,13 W/mK
Air content	15 - 20 %
Subsequent Coats	50% strength: 1 day after initial set
	75% strength: 3 days after initial set
	98% strength: 28 days after initial set
Fire Testing	TNO 97-CVB-R0710
	TNO-98-CVB-R0518
	TNO-98-CVB-R0560
	LPC-98-CC90360
	LPC-98-CC90360A
Packing	25 kg bags + big bag
Shelf Life	Store bags unopened in dry environ-ment off the ground
Storage	12 months if stored as instructed

WHITECOAT

WHITECOAT	
Color	White
Compressive Strength	20 Mpa
Specific Gravity	1,70 - 1,90 kg/dm³
Consumption	Ca. 1,4 kg/m² pr. mm.
Air content	4 - 8%
Packing	25 kg bags + big bag
Storage	Store bags unopened in dry environment off the ground
Shelf Life	12 months if stored as instructed

TOPCOAT

Topcoat	
Color	Grey
Compressive Strength	20 Mpa
Specific Gravity	1,70 - 1,90 kg/dm³
Consumption	Ca. 1,4 kg/m² pr. mm.
Air content	4 - 8%
Packing	25 kg bags + big bag
Storage	Store bags unopened in dry environment off the ground
Shelf Life	12 months if stored as instructed

LIGHTCEM - RESEARCH AND DEVELOPMENT

Compression testing of sample cube

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The extensive test program undertaken by Lightcems own technicians and, perhaps more importantly, a series of independent laboratories and government test centers, speak eloquently of the company's commitment to the quality of Fireshield. Sprayfast, Litecrete and White/Topcoat.

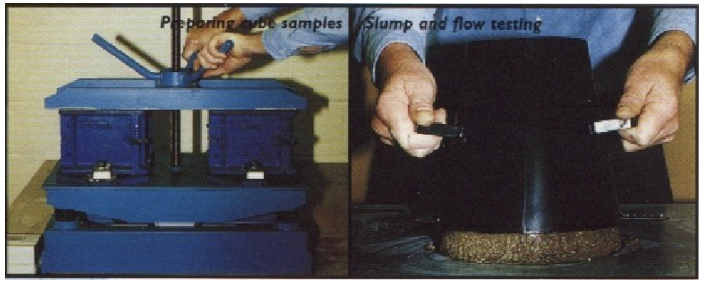
However, that is but a small part of Lightcems commitment.

Lightcem is committed to its Licensed Distributors and Agents. A commitment that is shown by the ongoing Research and Development program where the search is always on for new and improved products. These are immediately made available to the whole distribution network so that all can benefit.

Lightcem is committed to its customers, both old and new.

Today, with its network of licensed distributors and agent in many parts of the world, there is always someone available to offer advice, meet a potential user or simply discuss a project while it is still on the drawing board.

Similarly, the company's engineers and technicians are available for consultation and can be called upon to oversee installations or deal with problems on site.


Preparing cube samples

Slump and flow testing

Advanced
Concrete

LIGHTCEM TECHNOLOGY