Confiber ®

Construction Fibres

The company

Confiber® use the latest equipment and technology in the production and distribution of quality fibres for the construction industry.

With years of experience in innovation and fibre development, Confiber® has access to and draws from many areas of expertise including concrete technology and design, production, quality engineering, logistics and health & safety. Confiber® is a global supplier of fibres to the construction industry and other related industries.

Approval and certification

Confiber® products are patent protected in most industrialised countries, providing reassurance of a technically superior performance over similar, yet coarser fibres supplied by our competitors. Our patent prevents the replication of polyolefin fibres between 5-39 microns diameter for use in cementitious materials. It is this fineness that determines a fibres performance in concrete.

All of our products are either BBA approved, which certifies the performance of the fibre within concrete, or have full independent test data to support all technical claims.

Our manufacturing plants are BS EN ISO 9001:2000 approved. The products are manufactured to exacting standards on the technologically advanced production lines, which allow constant monitoring of quality.

Technical benefits of Confiber fibres

Special surfactant coatings enable excellent dispersion of individual filaments, allowing the formation of a homogenous three-dimensional matrix within the concrete mix. The inclusion of Confiber® construction fibres provides significant technical benefits in both the plastic and hardened state of concrete.

Reduced plastic shrinkage • Reduced plastic settlement • Reduced bleed Improved impact resistance • Improved abrasion resistance • Improved freeze / thaw resistance • Reduced water and chemical permeability • Reduced explosive spalling in fire Improved durability

Applications

Due to the considerable advantages Confiber® construction fibres offer, they are used in many applications throughout the world. The fibres effective reduction of plastic shrinkage cracking and increased hardened state properties in cementitious mixes means that they can be considered as a cost effective replacement for crack control steel mesh, air entraining agents and some other chemical additives and toppings.

Internal / external industrial floors • Mortar / render / plaster • Refractory products Sea defence • Tunneling • Patterned imprinted concrete • Extruded concrete • Roads and runways • DIY market • Screeds • Pre-cast concrete • Fire resistant areas Sprayed concrete • Agricultural areas • Piling • Bridges • Concrete repair

Product range

Confiber® has a wide range of specialist fibres for use in the majority of construction applications. Each fibre type has been developed and manufactured to provide optimum performance for each individual construction need. Alternatively, we have the flexibility to produce synthetic fibres to our customers' own design.

Patented monofilament fibre • Synthetic industrial fibre • Fibrillated fibre • Blended (steel / polypropylene) fibre • Steel fibre • Polyester fibre • Cellulose fibre

Technicaly superior fibres

	Patented 18 micron fibre	Competitors 32 micron fibre
Number of fibres / Kg	360 million	110 million
Number of fibres / lb	164 million	50 million
Surface area of fibres / Kg	245 sq. metres	137 sq. metres
Surface area of fibres / lb	133 sq. yards	74 sq. yards

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Office: Heide 13 8521 DE Sint Nicolaasga NL **T** +31 (0) 513 43 45 94 **F** +31 (0) 513 43 46 15 **E** fbg@betongroep.nl **W** www.betongroep.nl

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External Concrete

External concrete will be subjected to the worst that nature has to offer, but also to varying degrees of harsh treatment from users. Whether its commercial, industrial or residential hardstandings, external concrete will, over its design life, encounter destructive forces, which more often than not lead to its early and costly deterioration.

Potential Problems

Critically, external concrete must be able to resist the negative effects prevalent in many climatic conditions during placement, many of which lead to plastic shrinkage cracking and in turn leads to a less durable concrete with a lesser life span.

In its hardened state, concrete will also need to withstand impact and abrasion forces, and damage caused by cycles of freezing and thawing, if it is to complete its full design life cycle.

How Confiber® Patented Fibres Can Solve the Problems

With over 360 million individual fibres per Kg, our patented range of polypropylene fibres are designed to significantly improve the ability of the concrete to withstand the damage caused by the problems outlined above.

Our patented polypropylene fibres are a proven and effective replacement for air entraining agents. Any potential air-entraining problems are removed and the fibres will give the concrete the required freeze thaw protection.

Confiber® fibres improve the early tensile strain capacity of the concrete after placing. It reduces crack frequency and size, enabling the concrete to retain more intrinsic strength.

The fibres significantly reduce the bleeding of the concrete by means of more efficient hydration control thus also reducing the development of intrinsic stresses.

Concrete is considered a brittle material, however the inclusion of Confiber® polypropylene fibres will improve its ductility.

The improved impact resistance of fibre enhanced concrete can be accredited to the high amount of energy absorbed in debonding, stretching and pulling out of the fibres after the cement matrix has cracked.

The fibre-entrained concrete will also give greater protection from joint edge deterioration in industrial hardstandings.

The ability of polypropylene fibres to control the bleed water migration in a concrete mix reduces the possibility of segregation of the fine cement and sand particles. Polypropylene fibres should not be used as an alternative to primary or structural reinforcement.

This will give more efficient hydration of cement and combined with the improved bonding of the cement matrix achieves a more durable concrete surface.

Features and Benefits

- Alternative to Crack Control Mesh.
- Improved Resistance to Freezing and Thawing.
- Improved Resistance to Plastic Shrinkage and Plastic Settlement Cracks.
- Improved Impact Resistance.
- Improved Abrasion Resistance
- Reduced Permeability.
- Reduced Construction Time.
- Reduced Labour Costs.
- Fibres Will Not Rust or Corrode.
- Provides a 3-Dimensional Secondary Reinforcement System.

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Confiber ®

Extruded Concrete

Many contractors have come to realise the advantages of using our patented range of polypropylene fibres in extruded concrete.
The addition of these fibres is now an accepted practice when it comes to completing high quality contracts with this traditionally difficult process.

Potential Problems

Fine plastic shrinkage cracks that occur in the surface of the concrete will result in greater penetration by water, petrol, chemical or de-icing salts. This significantly reduces the life span of the extruded sections.

The particularly low water cement ratio mixes used in extruded concrete can be subject to surface tearing when the extruder operates on corners and bends. This results in early and costly deterioration.

Often, the machines used are so efficient at compacting the concrete, the entrained air used to provide freeze thaw protection is removed. Thus leaving the concrete without the required protection.

How Confiber® Patented Fibres Can Solve the Problems

Our patented polypropylene fibres are a proven and effective replacement for air entraining agents. Any potential air-entraining problems are removed and the fibres will give the concrete the required freeze thaw protection.

A further benefit of using fibres is improved cohesion of the concrete mix, which when coupled to improvements in early age tensile strength give better surface finishes and less surface tears, especially when cornering.

The addition of the polypropylene fibres to the concrete will increase the early tensile strain capacity at the plastic stage. It reduces the crack frequency and size enabling the concrete to retain more intrinsic strength. Polypropylene fibres should not be used as an alternative to primary or structural reinforcement.

This reduction in cracking will also improve resistance to water and petro-chemical penetration whilst improving resistance to abrasion and impact.

Features and Benefits

- Improved Resistance to Plastic Shrinkage and Plastic Settlement Cracks.
- Improved Impact Resistance.
- Improved Abrasion Resistance.
- Improved Resistance to Freezing and Thawing.
- Improved Cohesion of the Mix During Placement.
- Improved Resistance to Water, Petrol and De-icing Salts.
- Reduced Surface Tears.
- Reduced Permeability.
- Reduced Labour Costs.
- Fibres Will Not Rust or Corrode.
- Provides a 3-Dimensional Secondary Reinforcement System.

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Internal Floor Slabs

Most industrial floor slabs will, over their design life, be subjected to external forces, which, even before the concrete has hardened, can lead to a reduction in the quality of the concrete surface and its future performance.

Potential Problems

Climatic conditions such as: excessive temperatures or cross winds can lead to the formation of plastic shrinkage cracks. These cracks occur when excessive bleed water is allowed to evaporate from the concrete surface due to inadequate curing.

Plastic shrinkage cracks often penetrate the entire depth of the slab. Impact and abrasion damage to concrete will be a daily occurrence with the likes of forklift trucks continuously wearing surfaces and impacting on joints.

How Confiber® Patented Fibres Can Solve the Problems

Concrete is considered a brittle material, however concrete containing Confiber® polypropylene fibres will have significantly improved ductility.

With a higher fibre count per Kg, Confiber® patented fibres offer technically superior performance over its competitors.

Where high tolerance flatness is required the use of fibre enhanced concrete will control bleed water on the surface, prevent ponding and inhibit the formation of plastic settlement cracks. This will allow contractors to meet the tight specification required.

Polypropylene fibres will improve the early tensile strain capacity of the concrete shortly after placing. The fibres will reduce crack size and frequency enabling the matrix to retain more intrinsic strength.

The improved impact resistance of fibre entrained concrete can be accredited to the high amount of energy absorbed in debonding, stretching and pulling out of the fibres after the cement matrix has cracked.

The ability of polypropylene fibres to control the bleed water migration in a concrete mix reduces the possibility of segregation of the fine cement and sand particles.

This will give more efficient hydration of cement and combined with the improved bonding of the cement matrix achieve a more durable concrete surface.

Our patented range of polypropylene fibres are designed to significantly improve the ability of concrete to withstand the damage caused by the above mechanisms. Polypropylene fibres should not be used as an alternative to primary or structural reinforcement.

It is this ability, which ensures that the concrete will remain intact and fulfil client requirements.

Features and Benefits

- Alternative to Crack Control Mesh.
- Fibres Will Not Rust or Corrode.
- Improved Abrasion Resistance.
- Improved Impact Resistance.
- Improved Resistance to Plastic Shrinkage and Plastic Settlement Cracks.
- Provides a 3-Dimensional Secondary Reinforcement System.
- Reduced Bleeding.
- Reduced Construction Time.
- Reduced Labour Costs.
- Reduced Permeability.

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Confiber ®

Marine Concrete

Marine concrete is subject to some of the harshest conditions on the planet, usually in the most critical of applications; where life span and structural reliability are optimum factors.

Potential Problems

Marine concrete is subject not only to chemical attack from seawater but also from continual impact from waves and the abrasive action of wave born sand and shingle with the ebb and flow of the tide.

This impact and abrasion can be very severe leading to spalling of the concrete and corrosion of the structural steel. Eventually this will result in structural failure.

How Confiber® Patented Fibres Can Solve the Problems

Marine concrete enhanced with Confiber® construction fibres can provide improvements in abrasion and impact resistance of 40% and 400% respectively.

The use of fibres will also reduce concrete permeability, as fibres reduce bleeding and hence segregation in a concrete mix.

The significant improvement in the reduction of plastic shrinkage cracking, provides a more durable concrete, which in turn reduces the susceptibility of chloride attack. In marine concrete this is one of the main causes of deterioration.

Confiber® polypropylene fibres are a proven and effective replacement for air entraining agents. Any potential air-entraining problems are removed and the fibres will give the concrete the required freeze thaw protection. Polypropylene fibres should not be used as an alternative to primary or structural reinforcement.

Features and Benefits

- Alternative to Crack Control Mesh.
- Fibres Will Not Rust or Corrode.
- Improved Abrasion Resistance
- Improved Impact Resistance.
- Improved Resistance to Freezing and Thawing.
- Improved Resistance to Plastic Shrinkage and Plastic Settlement Cracks.
- Provides a 3-Dimensional Secondary Reinforcement System.
- Reduced Construction Time.
- Reduced Labour Costs.
- Reduced Permeability.

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Plasters & Renders

Many plaster and rendering contractors now realise the advantages of using Confiber® specifically designed range of polypropylene fibres. The addition of polypropylene fibres provides an effective way of completing high standard projects more economically.

Potential Problems

The migration of calcium hydroxide, a by-product of cement hydration causes efflorescence or lime bloom. Calcium carbonate crystals formed on the surface between the calcium hydroxide and carbon dioxide leave unsightly staining on the finished product.

Plastic shrinkage cracking occurs on surfaces where the rate of evaporation exceeds the rate of bleed. Such a situation is the cause of stresses in the cementitious material, which lead to hairline cracks, often penetrating the full depth.

When renders and plasters are applied to a backing material, on occasions there maybe problems with the cementitious material bonding. This lack of adhesion can lead to hollowness, which in turn leads to cracks and any impact will bring about delamination of the material.

How Confiber® Patented Fibres Can Solve the Problems

Polypropylene fibres when added to plaster and render offer a three - dimensional reinforcing system, which will help prevent plastic shrinkage cracks from occurring.

The addition of the polypropylene fibre to the plaster or render will increase the early tensile strain capacity of the mix at the plastic stage, therefore preventing the plastic shrinkage cracking.

Confiber® patented fibres will also substantially reduce the chance of permeability problems compared to non-fibrous material.

The addition of fibres to render and plaster will help improve the bond to the backing material.

This improvement is directly related to the ability of the fibre to reduce bleed, which in turn leads to more water being available at the interface for better hydration of the cement.

The fibre increases the ductility of an otherwise brittle material and helps redistribute impact loads leading to reduced surface damage. Polypropylene fibres should not be used as an alternative to primary or structural reinforcement.

Features and Benefits

- Improved Abrasion Resistance.
- Improved Impact Resistance.
- Improved Resistance to Freezing and Thawing.
- Improved Resistance to Plastic Shrinkage Cracks.
- Increased Bonding.
- Provides a 3-Dimensional Secondary Reinforcement System.
- Reduced Construction Time.
- Reduced Delamination.
- Reduced Efflorescence & Lime Bloom.
- Reduced Labour Costs.
- Reduced Permeability.

Applications

- Rendering for Walls, Bricks and Concrete.
- Water Tanks.
- Pools.
- Cellars.
- Basements.
- Ponds.
- Internal Plastering.

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Screed

Screed is a mixture of sand and cement that is laid over a concrete base to provide a surface, close to the specified level. It requires a high standard of flatness suitable to receive a flooring material, such as carpet, plastic sheeting or tiles and never left exposed to act as a wearing surface.

Potential Problems

Some screeds contain mesh solely to control plastic shrinkage cracking. Also the function of steel mesh is to slow down the propagation of the shrinkage cracks from the screed surface and to hold together any cracks that appear. This only applies if the mesh has been placed correctly in the screed, i.e. in the top section. Crack control steel mesh only works when the screed has actually cracked.

Excessive water within the screed can lead to bleeding. This inturn leads to the curling of the screeds surface.

Crack control steel mesh can also move towards the top section of the screed and can cause the surface to delaminate.

Realistically a bonded screed should not be thicker than 40mm because even with a correctly prepared base it is unlikely to bond to the backing material.

This lack of adhesion can lead to hollowness in the screed, which in turn leads to cracks, which if left un-repaired will often break when the screed is subjected to load.

One requirement is that the screed should be tested for in-situ crushing resistance or impact resistance. Should the screed fail to meet these requirements it may lead to either its removal or costly remedial work.

How Confiber® Patented Fibres Can Solve the Problems

The use of polypropylene fibres in screeds is now widely accepted within the Construction Industry. The inclusion of polypropylene fibres offers a three - dimensional system, which helps to prevent plastic shrinkage cracks from occurring.

The addition of fibres into the matrix increases the tensile strain capacity at the plastic stage, whereas crack control reinforcement merely holds the cracks together once the screed has failed. Polypropylene fibres should not be used as an alternative to primary or structural reinforcement.

Fibre enhanced screed helps to improve the bond between the screed and the area below. This is directly related to the ability of the fibre to reduce bleed which in turn leads to more water available at the interface for better hydration of the cement. There is also the reduced risk of curling as the rate of bleed is controlled throughout the matrix, ensuring proper hydration takes place.

The fibre also increases the ductility of an otherwise brittle material and helps redistribute any impact and leads to less surface damage.

Features and Benefits

- Alternative to Crack Control Mesh.
- Cost Effective.
- Fibres will not Rust or Corrode.
- Improved Pumping Characteristics.
- Increased Bond.
- Increased Impact Resistance.
- Provides a 3-Dimensional Secondary Reinforcement System.
- Reduced Construction Time.
- Reduced Curling.
- Reduced Risk of Delamination.
- Reduction in Bleeding (Generally Unbonded Screeds).
- Reduction of Plastic Shrinkage Cracking.

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Shotcrete

Sprayed concrete or shotcreting is a name given to high performance concrete or mortar, which is sprayed pneumatically through a hose onto a backing surface. For nearly a century, sprayed concrete has been an acceptable way of placing cementitious material in a variety of applications.

It is the force of this spraying action that leads to the compaction of the concrete, which then allows formation of layers to the required thickness.

Potential Problems

Because of the high velocity of the impacting jet, not all the sprayed concrete projected on a surface remains in position; with some material rebounding. It has been quoted that rebound can waste 40% or more of all sprayed concrete applied in a project.[1] Rebound material consists of the coarsest particles in the mix, so that the shotcrete in-situ is richer than would be expected from the mix proportions batched. This may lead to slightly increased shrinkage.

Another problem of spraying concrete is plastic shrinkage cracking. This is due to the extremely low water / cement ratio of the concrete. The low water content of a typical sprayed concrete mix means that there is insufficient bleed water to help the hydration process and plastic shrinkage cracking may occur. Sprayed concrete exhibits increased durability comparable with ordinary concrete. The only reservation concerns the resistance to freezing and thawing, especially in salt water.

Air entrained sprayed concrete is possible using the wet process, but achieving an adequately low bubble spacing factor presents some difficulties.[2]

How Confiber® Patented Fibres Can Solve the Problems

The inclusion of patented polypropylene fibres significantly increases the cohesive nature of the sprayed concrete through mechanically binding the cementitious material together. This mechanism; therefore, greatly reduces rebound waste that occurs through the shotcreting process.

Polypropylene fibres also enhance the early age tensile strength of concrete, which inhibits the formation of plastic shrinkage cracking. Polypropylene fibres should not be used as an alternative to primary or structural reinforcement.

Fibre enhanced concrete has been proven to resist cycles of freezing and thawing. This leads to a more durable concrete surface reducing the chances of water and chemical penetration.

Features and Benefits

- Improved Resistance to Plastic Shrinkage Cracks.
- Improved Bond.
- Improved Impact Resistance.
- Improved Abrasion Resistance.
- Improved Freeze / Thaw Resistance.
- Reduced Rebound.
- Reduced Permeability.
- Reduced Wastage.
- Reduced Construction Time.
- Reduced Labour Costs.
- Fibres Will Not Rust or Corrode.
- Provides a 3-Dimensional Secondary Reinforcement System.

References

1. 'Silica fume in sprayed concrete' – Rob Lewis. Concrete April 2002
2. 'Properties of Concrete' – A.M. Neville

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Tunnels

Over the last decade Confiber® patented polypropylene fibres have been used in many tunnels, primarily to enhance the fire rating of the concrete structure.

This product has been proven many times at such test facilities as: TNO, Holland and the BRE, England.

The fibres have been used in applications such as sprayed linings, precast segments and pumped concrete behind slip formed shuttering.

Potential Problems

Following several recent tunnel fires in Europe, design engineers have had their minds firmly focused on how to prevent the explosive spalling of concrete in tunnels.

The phenomenon occurs when concrete is exposed to high temperatures such as those experienced during a hydrocarbon fire. The high quality dense concrete that is associated with tunnelling projects means that in the event of a fire, moisture escaping from the heat source, cannot escape quickly enough. Any voids that are present within the concrete soon become saturated.

As the heat overtakes the moist front, the moisture starts to vapourise and increases pressure within the concrete voids. The result of such excessive pressure is explosive spalling.

This spalling occurs rapidly and has affected emergency personnel and passengers in transit from either entering the area in an attempt to bring the fire under control, or hindering others from fleeing the effected area. This has lead to fatalities or serious injury.

Often tunnels cast in-situ can suffer from plastic shrinkage cracking, which on occasions penetrates through the full thickness of the concrete. This plastic cracking will reduce the permeability of the tunnel lining.

How Confiber® Patented Fibres Can Solve the Problems

Patented monofilament fibres are added to the concrete mix for the purpose of increasing permeability during heating, thus reducing pore pressures and the risk of spalling. The fibres will start to melt when the heat generated is approximately 160°C.
When the temperature reaches 360°C, the fibres will disintegrate to provide millions of capillaries in the concrete for the moisture to escape. Therefore there is no build up of pressure and hence no explosive spalling.

Furthermore, polypropylene fibres offer a three - dimensional system, which helps to prevent plastic shrinkage cracks from occurring. The fibres increase the tensile strain capacity of the mix at the plastic stage whilst crack control reinforcement would merely hold the cracks together once the concrete has failed.

Polypropylene fibres should not be used as an alternative to primary or structural reinforcement.

Features and Benefits

- Reduced Explosive Spalling.
- Reduced Construction Time.
- Reduced Labour Costs.
- Reduced Permeability.
- Fibres Will Not Rust or Corrode.
- Improved Resistance to Plastic Shrinkage Cracks.
- Provides a 3-Dimensional Secondary Reinforcement System.

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