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Validity

Users of any Agrément certificate should check its status: all currently valid certificates are listed on the website. In addition, check whether the certificate is [Active](#) or [Inactive](#).

The certificate holder is in possession of a confirmation certificate attesting to his status.

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Oxyfibre Cryplon Fibres

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Description and use

Oxyfibre Cryplon fibres are uncrimped, extruded, oxyfluorinated, fibrillated, multi-layered polypropylene fibres available in lengths of 14 mm, 25 mm and 36 mm and supplied in 1 kg or 9 kg bags or per customer requirements.

The introduction of Oxyfibre Cryplon Fibres to a cement-bound matrix modifies the plastic and hardened properties of concrete. When used in accordance with the guidelines, the fibres reduce the probability of plastic shrinkage-cracking, thereby increasing the occurrence of drying shrinkage-cracking at planned locations. The addition of Oxyfibre Cryplon Fibres will also increase the toughness and the impact resistance of concrete.

Oxyfibre Cryplon Fibres are used to enhance the cracking resistance and the impact resistance of concrete, cement mortars, plasters and screeds.

They are typically used:

- In industrial, commercial and residential slabs and pavements, etc
- In thin-section pre-cast concrete components such as wall panels
- as an alternative to steel mesh to control cracking.

Oxyfibre Cryplon Fibres can be used in a wide range of mix proportions and can be added without any other modification of the concrete mix

Oxyfibre Cryplon Fibres are not capable of resisting structural tensile stresses and must **not** be used as a substitute for conventional steel reinforcement.

This certificate and Agrément South Africa's assessment apply only to Oxyfibre Cryplon Fibres that are manufactured and used as described and illustrated in this certificate, and where the terms and conditions of certification are complied with.

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PREAMBLE

This certificate is issued by Agrément South Africa in terms of the powers granted to it by the Minister of Public Works. This certificate:

- has been granted after a technical appraisal of the performance of Oxyfibre Cryplon Fibres for the [uses](#) covered by the certificate
- is independent of any patent rights that may or may not subsist in the subject of the certificate
- does not relieve the certificate holder from the obligation to obtain the prior approval of the building authority concerned for the use of the subject.

Agrément South Africa considers that the quality and performance of Oxyfibre Cryplon Fibres will be satisfactory provided that the requirements stipulated in this certificate are adhered to. However, Agrément South Africa does not on behalf of itself, or the State, or any of its employees or agents, guarantee such quality or performance.

Responsibility for the proper application of the quality assurance system and the compliance of Oxyfibre Cryplon Fibres with this certificate resides with the certificate holder.

No action for damages, or any other claim whatsoever, lies against Agrément South Africa, its members, the State or any of its employees should the said components and materials fail to comply with the standard set out in this certificate.

Building authorities or users who are in any doubt about any detail or variation, should contact [Agrément South Africa](#).

The validity of this certificate is reviewed every three years. The certificate shall remain valid as long as Agrément South Africa is satisfied that:

- the certificate holder complies with the general and specific conditions of certification and the technical requirements stipulated in the certificate
- the performance-in-use of the subject is acceptable
- any changes in building legislation, regulations, relevant standards or Agrément performance criteria have not invalidated the technical assessment which formed the basis of certification.

Agrément South Africa reserves the right to withdraw the certificate at any time, should reasonable cause exist.

Notices affecting the validity of this certificate will be published in the *Government Gazette*.

PART 1: CONDITIONS OF CERTIFICATION

The certificate covers only Oxyfibre Cryplon Fibres that:

- are manufactured by Oxyfibre (Pty) Ltd at their factory at Pelindaba
- are applied as described in this certificate
- are used in accordance with the technical description(see [Part 3](#)) and the certificate holder's detailed application specifications and quality assurance manual
- comply with the Conditions of Certification.

Any change to the production process, material, formulation or to the method of application could result in various aspects of the performance of this product no longer complying with Agrément criteria.

Any change not authorised by Agrément South Africa in writing prior to its implementation will invalidate this certificate and the certificate can then not be used to demonstrate compliance with the National Building Regulations.

Republic of South Africa. *National Building Regulations*, Government Notice R. 2378, *Government Gazette* No 12780, Pretoria, South Africa, 12 October 1990.

General conditions

All bags used to package Oxyfibre Cryplon Fibres must be clearly marked with Agrément South Africa's identification logo illustrated below.



Mixing instructions must be attached to each bag.

Validity

The validity of this certificate is subject to the continued participation of the certificate holder in Agrément South Africa's post-certification quality assurance scheme.

Reappraisal

- must be requested by the certificate holder before making changes to the product
- will be required by Agrément South Africa if there are changes to the National Building Regulations or to Agrément criteria.

This certificate may be withdrawn if the certificate holder fails to comply with the above requirements.

On behalf of the Board of Agrément South Africa



Chairman
2 October 2000

PART 2: ASSESSMENT

Scope of assessment

This assessment is based on:

- known behaviour of materials used in the system and tests conducted
- documentation provided by the applicant
- discussion with consultants who have experience with the product in various applications
- inspection of the manufacturing process
- assessment of the certificate holder's quality assurance system
- British Board of Agrément certificate no 92/2830: *Fibrin 23*

Assessment

In the opinion of Agrément South Africa, Oxyfibre Cryplon Fibres is suitable for the [uses](#) specified (page 1).

Agrément South Africa's detailed comments on the various aspects of performance of Oxyfibre Cryplon Fibres are set out in Table 1 below. Each aspect of performance was assessed by experts in that field.

Where applicable, the performance of the Oxyfibre Cryplon Fibres relates to the National Building Regulations as set out in Table 1. Any regulation not specifically referred to is considered to be outside the scope of this certificate and must be applied by the local authority in the normal manner.

Table: Assessment

Aspects of performance	Opinion of Agrément South Africa	Explanatory notes
Materials	Satisfactory.	The materials used in Oxyfibre Cryplon Fibres are deemed to satisfy the requirements of Regulation A13(1)(a).
Wettability	Satisfactory. Oxyfibre Cryplon Fibres are more hydrophilic (water attracting) than normal polypropylene fibres.	The interfacial bonding between polypropylene fibre and a cementitious matrix is generally accepted as being poor due to the hydrophobic nature of normal polypropylene. The contact angle of water with samples of normal polypropylene fibres and Oxyfibre Cryplon Fibres was determined using the micro-Wilhelmy technique. The Oxyfibre Cryplon Fibres are more hydrophilic than normal polypropylene fibres.
Initial set	Satisfactory. The addition of Oxyfibre Cryplon Fibres reduces the setting time.	The initial setting times of plain cement pastes and pastes made with the addition of Oxyfibre Cryplon Fibres were determined using the Vicat needle. The tests showed that the addition of normal polypropylene fibres tended to reduce setting time, with the Oxyfibre Cryplon Fibres having a greater effect than normal polypropylene fibres.
Compressive strength	Satisfactory. The addition of Oxyfibre Cryplon Fibres increases the compressive strength.	The compressive strength of plain concrete and concrete mixes containing different percentages of Oxyfibre Cryplon Fibres was determined using the test method set out in SANS 5863. The addition of Oxyfibre Cryplon Fibres to plain concrete mixes resulted in an increase of compressive strength.

SANS 5863 Concrete tests – Compressive strength of hardened concrete.

Table: Assessment (continued)

Aspects of performance	Opinion of Agrément South Africa	Explanatory notes
Flexural toughness	Satisfactory. The addition of Oxyfibre Cryplon Fibres increases the flexural toughness.	The flexural toughness of concretes made with additions of polypropylene fibres and Oxyfibre Cryplon Fibres was determined using ASTM C78 and ASTM C1018. The concrete mixes with Oxyfibre Cryplon Fibres showed significant increases in strain capacity before the yield point was reached relative to the concrete mixes with normal polypropylene. ASTM C78-02 Standard test method for flexural strength of concrete (using simple beam with third-point loading). ASTM C1018-97 Standard test method for flexural toughness and first-crack strength of fiber-reinforced concrete (using beam with third-point loading).
Interfacial shear bond strength	Satisfactory. The addition of Oxyfibre Cryplon Fibres increases the interfacial shear bond strength.	The interfacial shear bond strength of concrete made with additions of normal polypropylene and Oxyfibre Cryplon Fibres was determined. The mix with Oxyfibre Cryplon Fibres gave a significantly higher value of shear bond strength than the mix with normal polypropylene fibres.
Impact resistance	Satisfactory. The addition of Oxyfibre Cryplon Fibres increases the impact resistance.	The impact strengths of plain concrete and concrete with the addition of Oxyfibre Cryplon Fibres were determined using ACI 544. The concrete with Oxyfibre Cryplon Fibres showed significantly increased strength even at a low dosage.
Restrained plastic shrinkage cracking	Satisfactory. The addition of Oxyfibre Cryplon Fibres reduces the restrained plastic shrinkage cracking.	The cracking of plain concrete, concrete containing Oxyfibre Cryplon Fibres, concrete containing steel mesh and concrete containing normal polypropylene fibres was determined. The concrete mixes with Oxyfibre Cryplon Fibres displayed the least plastic shrinkage cracking.
Gas (oxygen) permeability	Satisfactory. The addition of Oxyfibre Cryplon Fibres does not change the gas permeability of concrete.	The gas (oxygen) permeability of plain concrete and concrete containing Oxyfibre Cryplon Fibres was determined. The results showed that there is no significant change in the oxygen permeability with the addition of the fibres.

Table: Assessment (continued)

Aspects of performance	Opinion of Agrément South Africa	Explanatory Notes
Interfacial adhesion	Satisfactory. Oxyfibre Cryplon Fibres have stronger interfacial adhesion than normal polypropylene fibres.	Specimens of plain concrete containing additions of normal polypropylene fibres and Oxyfibre Cryplon Fibres were examined in a scanning electron microscope. The normal polypropylene fibres appeared smooth with few cement hydration products adhering to them. The Oxyfibre Cryplon Fibres showed numbers of adhering cement hydration products, indicating stronger interfacial adhesion.
Fire performance	Satisfactory. The structural integrity of concrete with Oxyfibre Cryplon Fibres will be the same as concrete without fibres.	Fire will destroy fibres close to the surface, resulting in an increase in the porosity of the concrete. Test results showed that the structural integrity of concrete with Oxyfibre Cryplon Fibres would be the same as concrete without fibres.
Chemical resistance	Satisfactory. Oxyfibre Cryplon Fibres are resistant to chemical attack by most inorganic compounds.	Concrete mixes reinforced with Oxyfibre Cryplon Fibres were subjected to exposure to sulphuric acid and ammonium sulphate solutions in unbrushed mass-loss tests. In the case of compressive strength, the inclusion of Oxyfibre Cryplon Fibres improved the performance of concretes when exposed to either H ₂ SO ₄ OR (NH ₄) ₂ SO ₄ . In flexural strength tests concrete reinforced with Oxyfibre Cryplon Fibres exposed to (NH ₄) ₂ SO ₄ performed better than the control mix.
Abrasion resistance	Satisfactory. Oxyfibre Cryplon Fibres improved the abrasion resistance.	Abrasion tests were conducted on concrete with normal polypropylene and with Oxyfibre Cryplon Fibres using SABS Test Method CKS 208. The results indicated a marginal increase in abrasion resistance when the concrete contained Oxyfibre Cryplon Fibres.
Durability	Satisfactory. The addition of Oxyfibre Cryplon Fibres increases durability.	Based on the results of tests carried out, it is assessed that the durability of concrete containing Oxyfibre Cryplon Fibres manufactured and applied as specified in this certificate, will in many respects be superior to conventional concrete.

Table: Assessment (continued)

<p>Quality management</p>	<p>Satisfactory. The certificate holder's quality system complies with Agrément South Africa's requirements. Properly applied, it will ensure that acceptable standards are maintained in the manufacture and application of Oxyfibre Cryplon Fibres.</p>	<p>Agrément South Africa's requirements are based on SANS 9001:2000.</p> <div style="border: 1px solid green; padding: 5px;"> <p>SANS 9001:2000 <i>Quality management systems - Requirements</i></p> </div>
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PART 3: TECHNICAL DESCRIPTION

General description

Oxyfibre Cryplon Fibres are uncrimped, extruded, oxyfluorinated, fibrillated, multi-layered polypropylene fibres manufactured in tape form, chopped into fibres 14 mm, 25 mm and 36 mm long. The oxyfluorination process makes the normal hydrophobic (water repellent) polypropylene surface hydrophilic (water attracting), thereby improving the interfacial shear bond strength with cement matrices.

The introduction of Oxyfibre Cryplon Fibres to a cement-bound matrix is intended to modify the plastic and hardened properties of concrete. The fibres, when used in accordance with the guidelines, reduce the probability of plastic shrinkage-cracking and thereby increase the probability of drying shrinkage-cracking occurring at planned locations. The addition of Oxyfibre Cryplon Fibres will also increase the toughness and the impact resistance of concrete.

Oxyfibre Cryplon Fibres can be used in a whole range of mix proportions and can be added without any other modification of the mix proportions.

Oxyfibre Cryplon Fibres are not capable of resisting structural tensile stresses and must **not** be used as a substitute for conventional steel reinforcement.

Oxyfibre Cryplon Fibres are packaged in 1 kg, 9 kg bags or as per customer requirements.

Manufacture

General

The polypropylene tape is manufactured in a continuous process by extruding polypropylene pellets. The material is heated, extruded, slit into tapes, stretched and then wound onto spools. The operational checks include checking heating and cooling temperatures, extruder pressure, speeds and draw ratios.

The fibre spools are placed in the in-line oxyfluorinating reactors. The reactors are closed tightly, and the fluorine and oxygen gas mixture is introduced into the reactors at a regular rate. After a set period, the fibre tapes are continuously drawn from the reactors and fed into the cutting wheel to be chopped to the required length. The chopped oxyfluorinated fibres are then blown through a conveying pipe into plastic or paper bags which are placed on an electronic scale for weighing. The fibre length of fibre samples taken from the bag is checked with a vernier calliper a few minutes after starting the cutting machine as well as at the end of the cutting process.

Typical material properties

Material:	Surface oxyfluorinated homopolymer
Specific gravity	0,91
Melting point	160 °C
Ignition point	590 °C
Fibre thickness	0,096 mm

Concrete mixes with Oxyfibre Cryplon Fibres

Selection of fibre length

The fibre length should exceed the coarse aggregate size in any fibrous concrete mix, as follows:

- 14 mm fibre is suitable for cement mortar, plaster and screed
- 25 mm fibre is suitable for general concrete mixes containing 16 mm or 19 mm stone
- 36 mm fibre is used especially for shotcrete.

Guidelines for method of use (the mix should be tested on site)

Purpose	Oxyfibre Cryplon Fibres (kg/m ³)
Plastic-shrinkage control	1,0 to 1,8 (ie 0,11 to 0,20 % by volume or 0,045 to 0,082 % by mass)
Increased toughness and impact resistance	2,0 to 4,5 (ie 0,22 to 0,5 % by volume or 0,091 to 0,21 % by mass)

Mixing procedure

Cementitious mixes containing Oxyfibre Cryplon Fibres are suitable for mixing in a revolving drum, tilting drum or revolving paddle pan mixer. Fibre-reinforced concrete can be transported by pumping as well as all other means of transport.

Mixing times

For standard mixers, the minimum mixing time should be 3 minutes. In the case of truck mixers, the minimum mixing time should be 5 minutes.

Oxyfibre Cryplon Fibres can be used in a wide range of concrete mix proportions. The user can add Oxyfibre Cryplon Fibres without any other modification of the mix proportions.

The stresses inherent in the normal mixing process will cause the bundles of interconnected fibres to separate, allowing the distribution of the fibres throughout the matrix.

Specification for use

The mix proportions of concrete incorporating Oxyfibre Cryplon Fibres must be designed by a competent person or agency.

Normal good curing procedures for conventional concrete must be strictly adhered to for concrete mixes containing Oxyfibre Cryplon Fibres.

The base material of Oxyfibre Cryplon Fibres is polypropylene and it must not be used when steam curing is carried out at a temperature in excess of 140 °C.

Storage

The packaged material can be stored for an indefinite period and must be protected from getting damp or wet. Packaging must be kept intact to prevent the ingress of deleterious material, by storing it in a sheltered area until the product is used.