

FICHAS TÉCNICAS DE LAS FIBRAS DE VIDRIO AR

Tomado de la empresa **SUMIGLAS S.A**



Anti-CRAK® fibers for concrete reinforcement





Since their development and launch in 1970, Alkali Resistant glass fibers have been used in more than 120 countries for the reinforcement of cement and concrete products. They are best known for their use in factory-produced GRC elements (Glass fiber Reinforced Concrete), but the range of Anti-CRAK® fibers has been developed to target the use of AR glass fibers in the general ready-mix concrete and precast industries (e.g. flooring, thin-walled elements).

Our state of the art facilities allow us to provide technical support in the use of our products and design dedicated solutions for specific applications.

Owens Corning's global platform ensures support and delivery of consistent solutions in all regions.



Furnace & glass science



Innovative chemistry



Fiber solutions



Global platform



Why glass fiber?

With its total affinity to cementitious composites, high tensile strength and modulus of elasticity, glass fibers are an ideal reinforcement for concrete, already efficient at very early stages of the cracking process. Moreover, glass fiber density is similar to concrete, which allows a quick dispersion for very short mixing times, with minimum clumping risk and exceptionally low influence on workability.

Raw Material	Density	Elastic Modulus (GPa)	Tensile Strength (MPa)
Concrete	2.4	30 – 40	3 – 4
Cem-FIL® glass	2.7	72	1700
Steel	7.8	210	500 – 1100
Polypropylene	0.9	1.5 – 9.5	100 – 500

Anti-CRAK® fibers as concrete reinforcement

There is an Anti-CRAK® solution for every type of cracking. From the micro to the macrofiber range, Anti-CRAK® fibers control cracking processes that can take place during the entire life-span of concrete. From cracks due to volume changes in fresh (settlement and plastic shrinkage) and hardened states (thermal and drying shrinkage), to post-crack load-bearing capacity contribution.

	Plastic shrinkage	Secondary reinforcements		Primary reinforcements
	Plastic shrinkage cracking	Thermal and Shrinkage cracking		Structural Performance
	Micro fibers		Macro fiber	
Fiber Type	Low addition rate		High addition rate	
	HD 12 HP 58/12	HP 58/12	HP 67/36	
Addition rate	0.3 - 0.6 kg/m³ 0.5 - 1.0 lb/cu.yd	0.9 - 1.5 kg/m³ 1.5 - 2.5 lb/cu.yd	1.5 - 5 kg/m³ 2.5 - 8.5 lb/cu.yd	5 - 15 kg/m³ 8.5 - 25.5 lb/cu.yd
Benefit	Anti-cracking	Anti-cracking mesh replacement	Light mesh and rebar replacement	Heavy mesh and rebar replacement
Evaluation method	ASTM C1579 (Plastic shrinkage)	ASTM C1579 (Plastic shrinkage) ASTM C78 (Flexural Strength) ICC ES Acceptance Criteria 32	ASTM C1581 (Drying shrinkage) ASTM C78 (Flexural Strength)	ASTM C1609 EN 14651 (Post-cracking residual strength)
Primary applications	Concrete flatwork Flooring		Residential floors Light commercial floors	Commercial and industrial floors / pavements Composite metal deck Thin walled precast

Applications

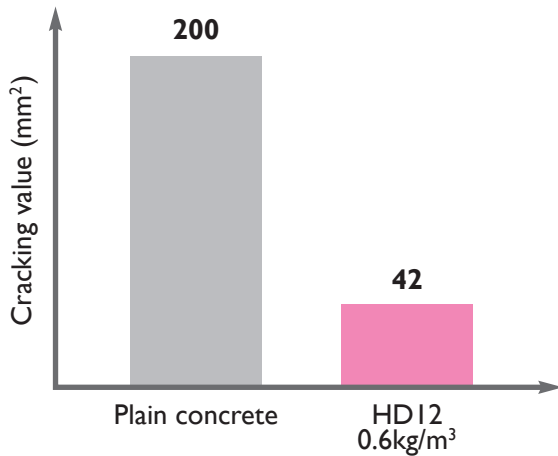


Technical performance of Anti-CRAK® fibers

PLASTIC SHRINKAGE CRACKING

Product: Anti-CRAK® HD 12mm @ 0.6kg/m³

Solution to control plastic shrinkage cracking in combination with standard curing practices, in flooring applications under severe environmental conditions.

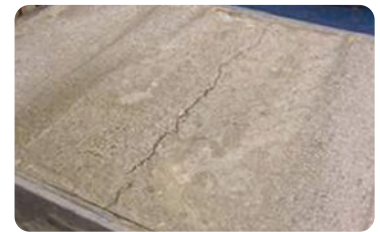


78%
Crack
reduction

Obtained on concrete class C25
(4000 PSI) – workability S2
Coarse aggregate 20mm (3/4 in.)



ASTM C1579-06

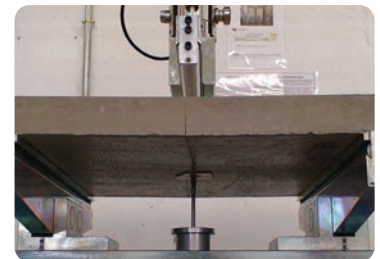
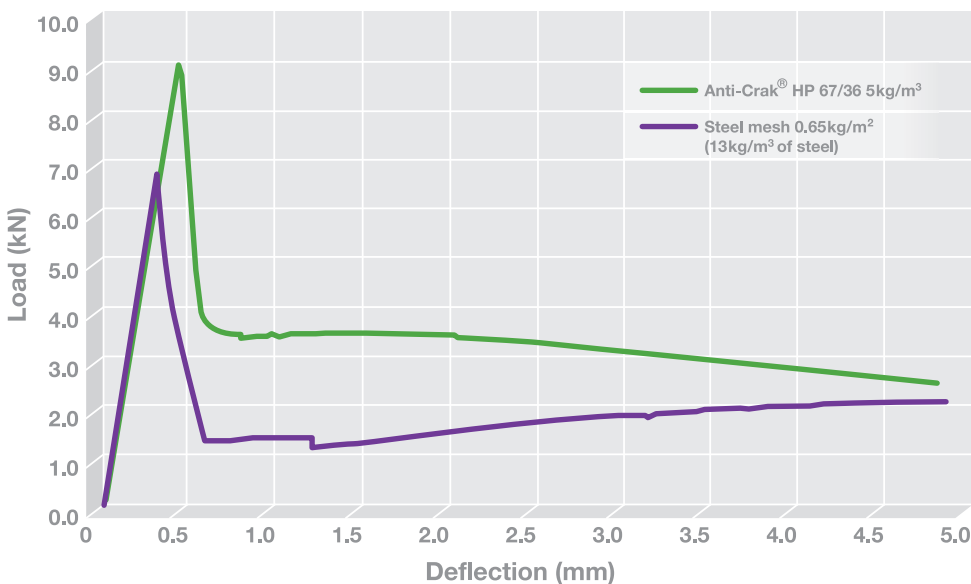


Typical crack pattern
for plain concrete

SECONDARY REINFORCEMENT:

Thermal and shrinkage cracking prevention

Product: Anti-CRAK® HP 67/36 @ 5kg/m³



3 point flexural test on
600 x 600 x 50mm slab

Alternative solution to anti-cracking mesh in order to control thermal and drying shrinkage cracking in residential and light commercial floors.



PRIMARY REINFORCEMENT:

Steel mesh and rebar replacement

Product: Anti-CRAK® HP 67/36 @ 5-15kg/m³

At different levels of fiber addition Anti-CRAK® HP 67/36 provides a higher peak strength than plain concrete, due to the total bond between fiber and matrix, which allows the contribution of the fiber action even before the peak load, at the very beginning of the microcracking process. Subsequently, Anti-CRAK® HP 67/36 provides residual strength over a large range of crack openings.

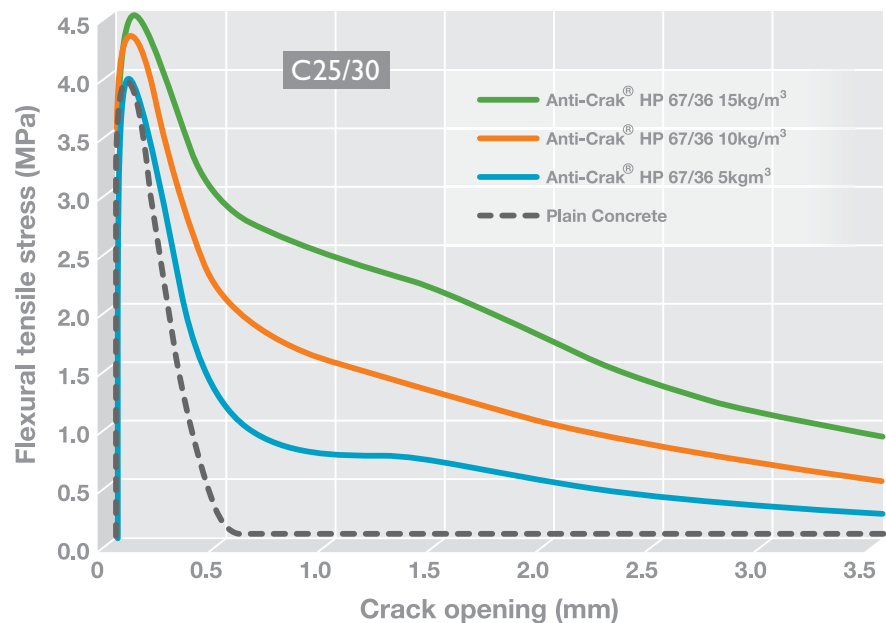
EN 14651 Flexural Test



First
Structural
macro glass fiber
with CE mark



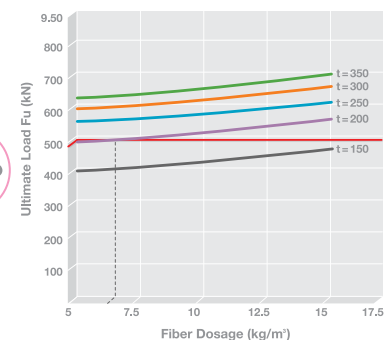
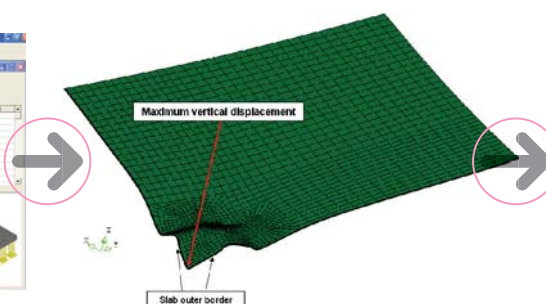
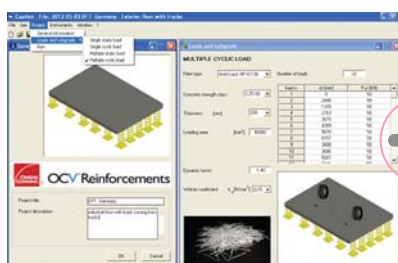
Macro glass fibers pulled out of the matrix at the fracture plane



Slab-on-ground design

All over the world, OC offers local support to glass fiber reinforced concrete projects. From fiber selection, mix design, and general FRC practical guidance, to modern structural design by non-linear fracture mechanics following the new fib Model Code 2010. In this way, fiber contribution is maximized, providing safer and cost-efficient designs.

Our design software collects all necessary project details, and processes them through a finite element analysis plus non-linear fracture mechanics data base. The output includes the fiber content versus ultimate load relationship for different slab thicknesses, and the corresponding project requirements.



Application Range

The high flexural performance of Anti-CRAK® HP 67/36 makes this fiber an ideal solution to replace conventional steel reinforcement in a wide range of applications.



Commercial floor – Audi dealership, France.
5 kg/m³ Anti-CRAK® HP 67/36 + 0.6 kg/m³ Anti-CRAK® HD12, C 20/25.



Industrial floor – OC Puma plant, Mexico.
10 kg/m³ Anti-CRAK® HP 67/36 + 0.6 kg/m³ Anti-CRAK® HD12, C 25/30



Airport pavement – Aeródromo T-35, AVIALSA, Spain.
5 kg/m³ Anti-CRAK® HP 67/36, C 30/37.



Farm floor – France.
7 kg/m³ Anti-CRAK® HP 67/36, C 30/37



Roundabout – Road K 1060/1013, Germany.
10 kg/m³ Anti-CRAK® HP 67/36, C 30/37



Railway base – Zurich Diameter Line, Switzerland.
8 kg/m³ Anti-CRAK® HP 67/36, C 25/30



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Anti-Crak® HD*

Hilos cortados AR para el control y prevención de la fisuración del hormigón®

* Las fibras Anti-Crak® HP forman parte de la gama de productos Cem-FIL®

DESCRIPCIÓN DEL PRODUCTO

Anti-Crak® HD (alta dispersión) es un hilo cortado de vidrio AR diseñado para ser incorporado al hormigón y cualquier otro mortero hidráulico.



APLICACIÓN DEL PRODUCTO

Los hilos cortados Anti-Crak® HD se utilizan generalmente a un bajo nivel de dosificación para prevenir la fisuración y mejorar las prestaciones del hormigón, suelos, enlucidos y otras mezclas de morteros especiales.

Se incorpora fácilmente a la matriz generando una gran cantidad de fibras de refuerzo bien distribuidas a partir de poca cantidad de producto.

Las fibras Anti-Crak® HD se pueden añadir al hormigón húmedo en una planta de mezclado o directamente en el camión hormigonera.

Las fibras Anti-Crak® HD no sobresalen en la superficie y no requieren ningún proceso adicional de acabado. El refuerzo se incorpora en la masa de hormigón y es invisible en la superficie acabada.

VENTAJAS Y BENEFICIOS

- Alta dispersión: 220 millones de filamentos por kg (100 millones por libra)
- Excelente trabajabilidad
- Invisible en la superficie terminada
- No se corroe
- Control y prevención de la fisuración en el hormigón fresco
- Mejora global de la durabilidad y las propiedades mecánicas del hormigón
- Efectivo a dosis muy bajas
- Mezcla homogénea
- Seguro y fácil de manejar



CARACTERÍSTICAS (valores nominales)

- Longitud de la fibra: 3; 6; 9; 12; 18 mm - 1/8" - 1/4" - 3/8" - 1/2" - 3/4" pulgadas
- Diámetro del filamento: 14 (µm), 0,000546 (pulg.)
- Pérdida al fuego %: 0,55% (ISO 1980: 1980)
- Humedad: 0,3% máx. (ISO 3344: 1977)
- Material: Vidrio resistente a los álcalis*
- Peso específico: 2,68 g/cm³
- Punto de ablandamiento: 860°C - 1580°F
- Conductividad eléctrica: Muy baja
- Resistencia química: Muy alta
- Módulo de elasticidad: 72GPa • 10 x 10⁶ psi
- Resistencia a la tracción: 1.700 MPa • 250 x 10³ psi

* Nuestras fibras están fabricadas con un alto contenido en circonio que cumple con las normas ASTM C1666/C 1666M-07, EN 15422 y las recomendaciones del PCI y de la GRCA.

Anti-Crak® HD*

Hilos cortados AR® para el control y prevención de la fisuración del hormigón

* Las fibras Anti-Crak® HD forman parte de la gama de productos Cem-FIL®

CÓMO UTILIZARLO - DOSIFICACIÓN

Las fibras se pueden introducir en una planta de mezclado o directamente en el camión hormigonera.

La dosis recomendada es 600 g/m³ (1 lb/cu.yd) de hormigón para el control de la fisuración por retracción plástica.

EMBALAJE y ALMACENAMIENTO

Los hilos cortados Anti-Crak® HD están empaquetados en bolsas de papel individuales (dispersables en agua) o en bolsas de plástico.

Los hilos cortados Anti-Crak® HD deben almacenarse alejados del calor y de la humedad, y en su embalaje original.

Las mejores condiciones son:

- Temperatura: 15°C – 35°C.
- Humedad: 35% – 65%.

Si el producto es almacenado a temperaturas inferiores, se recomienda acondicionarlo en el taller al menos 24 horas antes de su uso, para evitar su condensación.

ESTÁNDARES DE CALIDAD - CERTIFICACIÓN

- Las fibras Cem-FIL® se fabrican según un Sistema de Gestión de calidad aprobado para ISO 9001. Además, las prestaciones reales de las fibras Cem-FIL® están sujetas a evaluación y aprobación independientes en Alemania (Zulassung n.º Z-3.72.1731).
- Las fibras Cem-FIL® cumplen con los estándares de seguridad según la Directiva Europea 99/45/EC, 67/548/EEC y su última enmienda.

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FICHAS TÉCNICAS DE LAS FIBRAS DE VIDRIO TIPO E

Tomado de **JUSHI GROUP CORPORATION**



Assembled Roving 872 for Panels

Assembled Roving 872 is coated with a silane-based sizing and is compatible with unsaturated polyester and acrylic resins. 872 delivers extremely fast resin wet-out. Its good bonding properties with unsaturated polyester makes it ideal for use in panel applications where high transparency is vital.

SPECIFICATIONS

Type of Glass
E-Glass (E)

Type of Fiberglass
Assembled Roving (R)

Standard
Linear Mass Densities
2400
grams per metre (Tex)

Filament Diameter
12 microns

Most Common Sizes
ER12-2400-872
ER12-4800-872

FEATURES

- Consistent and uniform laydown
- Excellent choppability
- Excellent mechanical properties of the finished composite product
- Good dispersion
- Good resin refractive match

RESIN COMPATIBILITY

- Acrylic
- Unsaturated polyester

USES

- Panel applications where high transparency is vital

TECHNICAL PARAMETERS

Linear Density (%)
ISO 1889
± 5

Moisture Content (%)
ISO 3344
≤ 0.15

Size Content (%)
ISO 1887
0.60 ± 0.15

Stiffness (mm)
ISO 3375
115 ± 20

NOMENCLATURE

ER00-000-000

Filament
Diameter
(microns)

Sizing Code

Linear Mass Density
(grams per meter – tex)

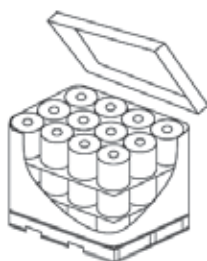
Assembled Roving 872 for Panels

PACKAGING

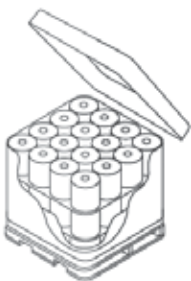
Doffs can be packed on pallets or in small cardboard boxes.



Doff



3-Layer Pallet
12 doffs per Layer



3-Layer Pallet
16 doffs per Layer

Doff:	270	310
Doff outside diameter	270 mm (10.6 in)	310 mm (12.2 in)
Doff inside diameter	100 mm (4 in)	100 mm (4 in)
Doff height	260 mm (10 in)	260 mm (10 in)
Doff weight	17 kg (37.4 lb)	23 kg (50.7 lb)

Pallet:				
Number of layers per pallet	3	4	3	4
Number of doffs per layer	16	16	12	12
Number of doffs per pallet	48	64	36	48
Net weight	816 (1797.3 lb)	1088 kg (2396.5 lb)	828 kg (1825.4lb)	1104 kg (2433.9 lb)
Length	1120 mm (44 in)	1120 mm (44 in)	1270 mm (50 in)	1270 mm (50 in)
Width	1120 mm (44 in)	1120 mm (44 in)	960 mm (36 in)	960 mm (36 in)
Height	940 mm (37 in)	1180 mm (46.5 in)	940 mm (37 in)	1180 mm (46.5 in)

STORAGE

Unless otherwise specified, fiberglass products should be stored in a dry, cool and moisture-proof area. Room temperature and humidity should always be maintained at 15°C – 35°C, 35% – 65% respectively.

Best used within 12 months after production date. Fiberglass products should remain in their original packaging until just prior to use.

To ensure safety and avoid damage to the product, the pallets should not be stacked more than two layers high. When the pallets are stacked in two layers, care should be taken to correctly and smoothly move the top pallet.