

**CHEMICALS
FOR MAINTENANCE
AND REINFORCEMENT
OF INFRASTRUCTURES**
TECHNOLOGIES AND SOLUTIONS
FOR LARGE-SCALE WORKS



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ABOUT US

FIP Chemicals

FIP chemicals, an Italian company, plays an important role in the production and sale of special building materials used for both new constructions and maintenance works on reinforced concrete and masonry structures.

The production of resin-based materials began in 1970 within FIP Industriale which in 2008 created FIP chemicals as a company exclusively dedicated to the production of special materials for construction. The company's portfolio was subsequently expanded to include a complete range of cement and lime based products. FIP chemicals, today owned by Licata SpA, was born and developed within a Group made up of societies and companies with proven experience in the construction and maintenance sector. Its market standing has allowed the company to acquire extensive experience in all stages of the building process, thus setting itself apart among producers of special building materials.

FIP chemicals products are designed, formulated and developed in compliance with both specific standards and the expectations of **Clients, Planners, Corporations, specialised Installers and Directors of Works**. They were successful in combining the needs of cost-effectiveness and durability of the interventions with the design requirements, simplifying and making easier as much as possible the execution problems.

FIP chemicals provides a range of services to assist:



making sure product performance meets planning and development needs in real working and operating conditions. Provides:



TECNOLOGIA

FIP chemicals products offer reliable solutions for the following problems:

- Restoration, repair or reinforcement of reinforced concrete and prestressed concrete;
- Structural adhesives and embedding;
- Precision anchoring for machinery, prefabricated elements, safety barriers and manufactured goods;
- Waterproofing of structures with cement and synthetic resin-based materials;
- Protection of concrete structures;
- Preservation and reinforcement of masonry constructions;
- Reinforcement of concrete or masonry structures with FRP (**Fibre Reinforced Polymer**) composite materials consisting of carbon or glass filaments immersed in a matrix of epoxy resins.

All products have been used successfully for several years to build or preserve:

INFRASTRUCTURES

- Roads
- Railways
- Water systems
- Ports
- Airports
- Energy production

CIVIL CONSTRUCTIONS

- Schools
- Hospitals
- Services

INDUSTRIAL CONSTRUCTIONS

- Various types of industry
- Industrial sheds
- Warehouses

Three families of **BetonFIP**, **ResinFIP**, FiberFIP products have been created, each of which is divided into several lines intended to supply a wide range of solutions.

BetonFIP Cement-based or lime-based products are divided into four specific lines:

- Repair - restoration and reinforcement of concrete or reinforced concrete structures;
- Ancoraggio (anchor cement);
- WP cement waterproofing;
- Lime - preservation and reinforcement of masonry structures.

ResinFIP Resin-based products, are divided into five lines specifications:

- Coat - protection of concrete and reinforced concrete structures;
- Bond - anchorage and structural adhesives;
- Mortars - synthetic mortars;
- Seal - sealing of expansion, contraction and construction joints;
- WP - waterproofing based on synthetic resins.

FiberFIP Composite FRP materials (Fibre Reinforced Polymer) composed of carbon or glass fibre yarns submerged in a polymer matrix. These are broken down into 2 specific lines:

- Adesivi (Adhesives);
- Tessuti (Fabrics).

TYPES OF STRUCTURES

PRODUCT FAMILIES

ISO CERTIFICATION AND CE MARKING

All products requiring a CE marking to be used have obtained said marking. The requirements and performance characteristics indicated in the separate technical data sheets allow a professional evaluation of the product's compatibility with specific needs. The performance characteristics are certified by official laboratories.

Certificazioni

- ISO 9001
- ISO 14001
- ISO 18001

Marcatura CE

- Per tutti i prodotti soggetti alla marcatura CE

Marcatura ETAG

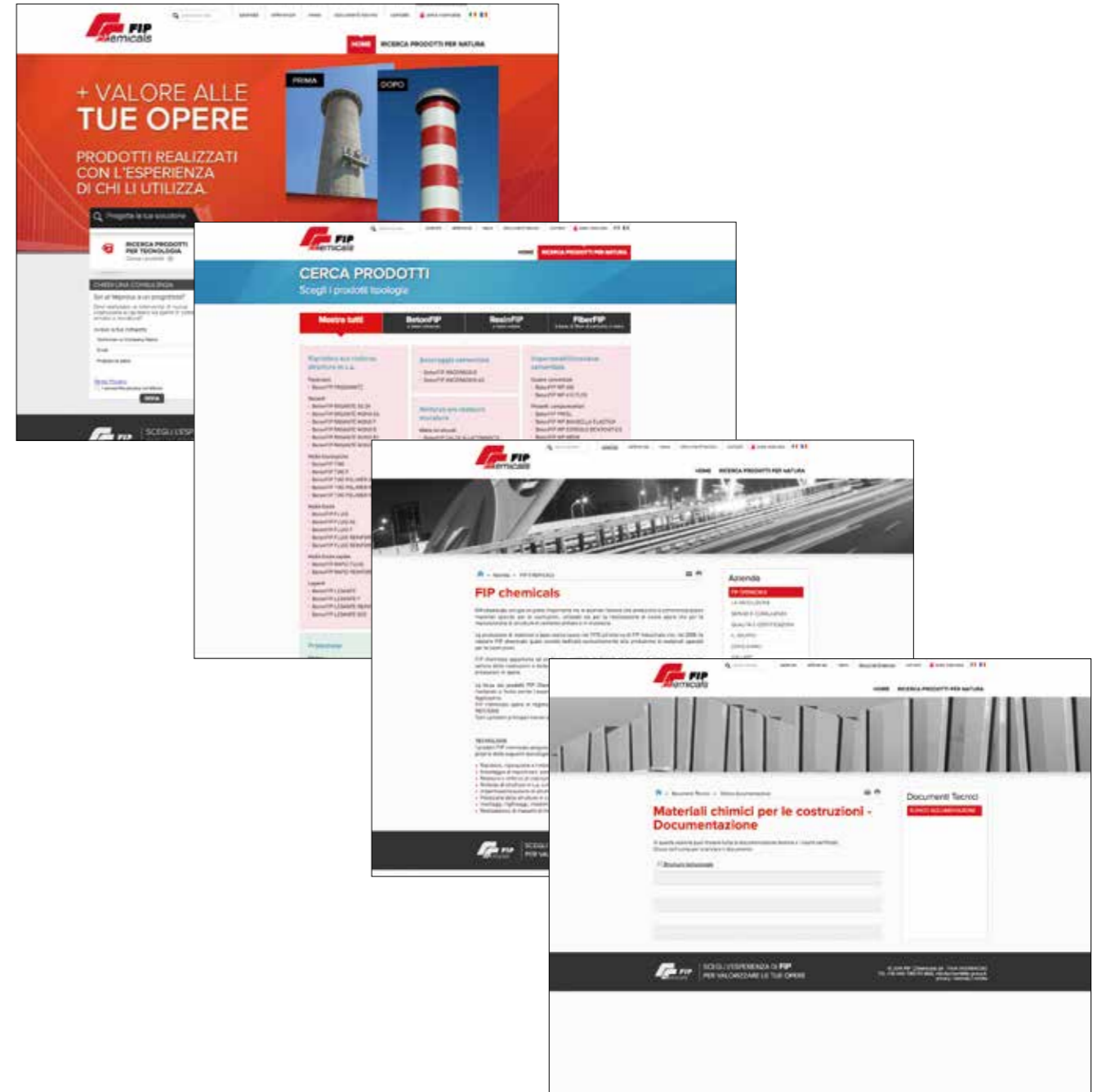
- Per ancoranti chimici per i fissaggi strutturali

AVCP 2+

Sistema di controllo della produzione obbligatorio per i materiali strutturali



Search for the desired product and system on our FIP chemicals website. From the website it is possible to download technical data sheets, catalogues, items specifications and other useful information.



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BetonFIP

A brand that proposes cement or lime based products able to guarantee all the advantages of hydraulic binders while eliminating the negative aspects, thanks to their accurate formulation and in-depth knowledge of building procedures.

It is broken down into four specific technologies:

BetonFIP REPAIR

BetonFIP ANCORAGGIO

BetonFIP WP

BetonFIP MURATURE

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Beton REPAIR

RESTORATION, REPAIR AND REINFORCEMENT OF STRUCTURES IN REINFORCED CONCRETE

Durability has become an essential concept in repair and/or reinforcement works on structures in reinforced concrete.

In the past, the problems at the base of repair works carried out on degraded structures were too often dealt with using a simplistic approach, leading to resounding failures. In fact, it often became necessary to repair the repairs.

Today the UNI EN 1504 standard is available to all specialists, consisting of a guideline for the maintenance of reinforced concrete structures. Part 3 of that standard is the reference for obtaining the CE marking of the products used to reconstruct the section or to increase it. It is worth noting that the requirements and performance characteristics necessary to obtain the CE marking may not necessarily be sufficient when selecting the most efficient product for specific needs.

OBJECTIVES OF INTERVENTION

The main objectives to be achieved in a repair or reinforcement intervention are:

- Identify and eliminate the cause of degradation;
- Define the affected areas and thickness;
- Form a monolith with the existing structure;
- Guarantee compatibility between materials;
- Make sure the durability of the repair material used is superior to that of the original concrete;
- Prevent the formation of cracks that may become new preferential paths for infiltration by aggressive agents.

PHASES OF REPAIR PROCESS

Having defined the main objectives, it is possible to identify **the phases of the entire recovery process** that can be summarised as follows:

- Execution of studies to determine the cause of degradation and define the areas and thickness of concrete to be removed, thus guaranteeing the non-recurrence of the degradation process in the future;
- Selection of operating techniques;
- Selection of performance characteristics of materials;
- Definition of operating phases;
- Preliminary checks prior to the start of works, during works and when works are completed;

- Technical standard that incorporates all previous points;
- Cost analysis consistent with the requested materials and operating techniques;
- Price list.

Degradation phenomena in concrete and reinforced concrete structures are common and of a varied nature. They are manifested on the cement paste and in some cases even on the aggregates. Undoubtedly, however, the most frequent cause of deterioration of the reinforced concrete structures is the corrosion of the reinforcements. Corrosion, when particular exposure conditions etc. occur, is triggered by the carbonation of concrete and/or the penetration of chlorides. Recognition of the phenomenon is simple because it initially manifests itself with **cracking**. If the corrosion process is not stopped, the damage progressively worsens. Initially the concrete cover will be expelled, and if there is still no intervention, delamination may occur on relatively thick portions of the concrete. The tests that need to be performed are relatively simple and covered by regulations, making it possible to evaluate which areas require intervention and the thickness of concrete that needs to be removed.

DEGRADATION PHENOMENA AND RECOGNITION

A correct definition of the areas and the thickness on which to intervene allows on the one hand to block the deterioration phenomena and ensure that they do not recur in the future, on the other hand to draw up an accurate tender report with a realistic quantification of costs.

AFFECTED AREAS AND SECTIONS

Once the cause of the degradation and its extent has been identified (areas and thickness), it is simple to define the most appropriate intervention techniques that also vary according to the vertical - horizontal element that needs to be repaired.

OPERATING TECHNIQUES

The **intervention techniques** can be summarised as follows:

- **Passivation of reinforcement bars:** action designed to block the oxidation process;
- **Skim coating:** used to eliminate defects on exposed concrete surfaces, such as segregation, pitting, lack of concrete cover or to reconstruct millimetric portions of original sections due to very superficial degradation;
- **Spraying or manual undercoating:** allows you to restore vertically or overhead using thixotropic mortars with thickness ranging from 10 to 50 mm;
- **Casting:** allows repairs to the extrados of horizontal structures with mortars (thickness 10-50 mm), small aggregate concrete (thickness 50-100 mm), large aggregate concrete (thickness > 100 mm);
- **Casting inside the formwork:** it is used to restore vertical or overhead structures with cement (thickness 50-100 mm) and with concrete (thickness > 100 mm).

Products must be selected in consideration of the required performance characteristics in order to satisfy the design and durability objectives of the specific project. There are **requirements** and **performance** demanded for all products that are used for a restoration intervention such as:

- Strong adhesion to substrate;
- No shrinking or expansion;
- Long-lasting resistance against aggressive atmospheric agents.

SELECTING THE PERFORMANCE CHARACTERISTICS OF MATERIALS



Others on the other hand are specific to individual operating techniques, for example:

- Higher or lower mechanical resistance;
- Ductility;
- Hardening time;
- Use at low temperatures etc.

The materials most commonly used are expansive **cement-based air curing products** that guarantee a monolithic result with the substrate, mitigating long-term shrinkage typical of all cement-based mixes. Alternatively, **polymer modified cementitious** materials are used, which guarantee strong adhesion to the substrate thanks to the quality and percentage of polymer used. One category of products enjoying increasing popularity is that of **fast-setting liquid cement** products, characterised by their ability to develop mechanical resistance in very short curing times, even at low temperatures (up to -5°C), thus quickly restoring the structure's operating conditions.

APPLICATION MEASURES

All stages of the process must be scrupulously carried out in order to guarantee long-lasting solutions that significantly increase the useful life of the structure.

The entire development process can be summarised as follows:

- Techniques to remove the concrete and prepare the substrate by way of sandblasting, scarifying or hydro-demolition;
- Use or otherwise of reinforcing mesh or riveting;
- Treatment of any cracks;
- Cleaning and saturation of substrate prior to application;
- Use of cement-based, polymer modified or resin-based products;
- Compliance with mixing procedures and application methods;
- Correct surface finishes;
- Curing.

The development stages too often underestimated are the preparation of the substrate, the finish (especially the trowelling of the thixotropic materials) and the curing of surfaces exposed to air.

PREPARATION OF SUBSTRATE

The preparation of the substrate is often underestimated. This operation varies depending on the type of action that needs to be taken and the thickness of concrete that needs to be removed.

For interventions requiring the application of just a few millimetres of product (**Skim coating**) the substrate must be sandblasted or hydro-sandblasted. If on the other hand it is necessary to remove sections of degraded concrete with **thickness ≥ 10 mm** the substrate must be macroscopically rough. In these cases **mortars, cement or expansive concrete is used**. If it is necessary to apply centimetres of thickness without removing the degraded concrete, the substrate must first be subjected to intense sandblasting. The polymer modified cementitious materials can then be applied.

PRODUCTS

The BetonFIP line of products offers Clients, Planners, Corporations and Installers a broad range of products specifically designed to guarantee long-lasting solutions characterised by the simplicity, speed and reliability of the development stages.

The summary table indicates the specific technique to be used, the application method and recommended category of material for different levels of degradation.

SURFACE DEGRADATION



TECHNIQUE	PREPARATION OF SUBSTRATE	THICKNESS	DESCRIPTION OF PRODUCT	PRODUCT NAME
Manual or mechanical skim coating	Sandblasting Hydro-sandblasting	1-3 mm	Cement-based mortar, premixed, thixotropic, polymer modified, single-component, in grey colour, small particle size, resistant to aggressive atmospheric agents, designed to skim coat slightly degraded structures in reinforced concrete.	BetonFIP RASANTE MONO R3
		1-5 mm	Cement-based mortar, premixed, thixotropic, polymer modified, single-component, in white or grey colour, small particle size, resistant to aggressive atmospheric agents, designed to skim coat slightly degraded structures in reinforced concrete.	BetonFIP RASANTE MONO R1
		1-5 mm	Cement mortar, premixed, thixotropic, modified polymer, single-component, in grey colour , resistant to aggressive environmental agents. Designed to skim coat concrete plasters and reinforced concrete structures , slightly degraded.	BetonFIP RASANTE MONO F
		4-20 mm	Cement mortar, premixed, thixotropic, modified polymer, single-component, medium grain size, in grey colour , resistant to the aggressive agents of the environment. Designed to skim coat reinforced concrete structures slightly degraded.	BetonFIP RASANTE MONO AS
			Cement-based mortar, ready-mixed, thixotropic, polymer modified, two-component, medium particle size, grey coloured, resistant to aggressive atmospheric agents. Designed to skim coat slightly degraded structures in reinforced concrete.	BetonFIP RASANTE AS 2K
		4-18 mm	Cement mortar, premixed, thixotropic, modified polymer, single-component, medium grain size, in white colour , water-repellent, resistant to aggressive environmental agents, particularly suitable for interventions on the internal arch of tunnels .	BetonFIP RASANTE MONO G

Warnings
The above information is of a general nature only.
It is therefore essential to consult the technical data sheet of the preselected product.

MEDIUM DEGRADATION OF VERTICAL STRUCTURE



TECHNIQUE	PREPARATION OF SUBSTRATE	THICKNESS	DESCRIPTION OF PRODUCT	PRODUCT NAME
Application with spraying machines or manual	Hydro-demolition Milling Mechanical hammers	10-50 mm	Cement-based mortar, ready-mixed, thixotropic, class R4, expansive in air with use of CL liquid component, resistant to aggressive atmospheric agents. Designed to restore, repair, reinforce degraded structures in reinforced concrete. Requires the application of an arc-welded mesh in cases where thickness is greater than 30 mm.	BetonFIP TIXO
			Cement-based mortar, ready-mixed, thixotropic, class R4, contains inorganic fibres, expansive in air with use of CL liquid component, resistant to aggressive atmospheric agents. Designed to restore, repair, reinforce degraded structures in reinforced concrete. Does not require the application of an arc-welded mesh.	BetonFIP TIXO F
			Cement-based mortar, ready-mixed, thixotropic, class R4, polymer modified, two-component, resistant to aggressive atmospheric agents. Designed to restore, repair, reinforce degraded structures in reinforced concrete.	BetonFIP TIXO POLIMER 2K
			Cement-based mortar, ready-mixed, thixotropic, class R4, polymer modified, single-component, resistant to aggressive atmospheric agents. Designed to restore, repair, reinforce degraded structures in reinforced concrete.	BetonFIP TIXO POLIMER MONO R4

Warnings
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MEDIUM DEGRADATION



TECHNIQUE	PREPARATION OF SUBSTRATE	THICKNESS	DESCRIPTION OF PRODUCT	PRODUCT NAME
Repair and reinforcement by way of casting, either using a pump or manually	Hydro-demolition Milling Mechanical hammers	10-50 mm	Cement-based mortar, ready-mixed, fluid, class R4, expansive in air with use of CL liquid component, resistant to aggressive atmospheric agents. Designed to restore, repair, reinforce degraded structures in reinforced concrete. Requires the application of an arc-welded mesh in cases where thickness is greater than 30 mm.	BetonFIP FLUID
			Cement-based mortar, ready-mixed, fluid, class R4, contains inorganic fibres, expansive in air with use of CL liquid component, resistant to aggressive atmospheric agents. Designed to restore, repair, reinforce degraded structures in reinforced concrete. Does not require the application of an arc-welded mesh.	BetonFIP FLUID F
			Cement-based mortar, ready-mixed, fluid, class R4, high ductility and flexural resistance, steel fibre reinforced, expansive in air with use of CL liquid component, resistant to aggressive atmospheric agents. Designed to restore, repair, reinforce structures in reinforced concrete. Does not require the application of an arc-welded mesh.	BetonFIP FLUID REINFORCED
			Cement mortar, premixed, fluid, class R4, with hardening behaviour, high ductility and flexural strength, fibre-reinforced with rigid steel fibres, high tensile strength, expansive in air with the use of the CL liquid component, ductile, resistant to aggressive environmental agents. Designed to restore, repair, reinforce structures in reinforced concrete. Does not require the application of an arc-welded mesh.	BetonFIP FLUID REINFORCED ETD

Warnings
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It is therefore essential to consult the technical data sheet of the preselected product.

DEEP DEGRADATION



Due to the deep thickness of castings, the latter must always be reinforced.

TECHNIQUE	PREPARATION OF SUBSTRATE	THICKNESS	DESCRIPTION OF PRODUCT	PRODUCT NAME
Application by casting also inside the formwork, carried out by means of pumps or manually	Hydro-demolition Milling Mechanical hammers	60-100 mm	Cement-based small aggregate concrete, ready-mixed, fluid, class R4, expansive in air with use of CL liquid component, resistant to aggressive atmospheric agents. Designed to restore, repair, reinforce degraded structures in reinforced concrete. Requires the application of an arc-welded mesh.	BetonFIP FLUID AS
			Cement-based small aggregate concrete, ready-mixed, fluid, class R4, high ductility, high flexural resistance, steel fibre reinforced, expansive in air with use of CL liquid component, resistant to aggressive atmospheric agents, designed to restore, repair, reinforce structures in reinforced concrete. Does not require the application of an arc-welded mesh.	BetonFIP FLUID REINFORCED AS
			Cement-based small aggregate concrete obtained by supplementing BetonFIP FLUID mortar with 35% inert material measuring 5/10 mm, free of impurities and perfectly washed.	BetonFIP FLUID + Gravel
			Cement-based small aggregate concrete obtained by supplementing BetonFIP FLUID F mortar with 35% inert material measuring 5/10 mm, free of impurities and perfectly washed.	BetonFIP FLUID F + gravel
			Cement-based small aggregate concrete, ductile with high flexural resistance, obtained by supplementing BetonFIP FLUID REINFORCED mortar with 35% inert material measuring 5/10 mm, free of impurities and perfectly washed.	BetonFIP FLUID REINFORCED + grit

Warnings
The above information is of a general nature only.
It is therefore essential to consult the technical data sheet of the preselected product.

VERY DEEP DEGRADATION



Due to the deep thickness of castings, the latter must always be reinforced.

TECHNIQUE	PREPARATION OF SUBSTRATE	THICKNESS	DESCRIPTION OF PRODUCT	PRODUCT NAME
Application by casting also inside the formwork, carried out by means of pumps or manually	Hydro-demolition Milling Mechanical hammers	≥ 100 mm	Expansive cement-based concrete obtained by supplementing BetonFIP FLUID AS small aggregate concrete with about 35% inert material measuring minimum 10 mm, with maximum grit size dependent on casting thickness. The inert material must be free of impurities and perfectly washed.	BetonFIP FLUID AS + grit
			Expansive cement-based concrete, ductile, high tensile strength obtained by supplementing BetonFIP FLUID REINFORCED AS small aggregate concrete with about 35% inert material measuring minimum 10 mm, with maximum grit size dependent on casting thickness. The inert material must be free of impurities and perfectly washed.	BetonFIP FLUID REINFORCED AS + grit
			Shrinkage compensating concrete with fluid or super-fluid consistency obtained using a special expansive binder to which sand, grit and gravel is added with a perfect particle size distribution. This inert material must be completely free of impurities and perfectly washed. Designed to repair or reinforce structures in reinforced concrete.	BetonFIP LEGANTE
			Compensated shrinkage concrete, of fluid or super-fluid consistency, obtained using as a binder a special expanding binder containing synthetic fibres to which sand, fine gravel and gravel are added following a perfect grain size curve. This inert material must be completely free of impurities and perfectly washed. Designed to repair or reinforce structures in reinforced concrete.	BetonFIP LEGANTE F
			Shrinkage compensating concrete with fluid consistency, ductile, obtained using a special expansive binder containing steel fibres, to which sand, grit and gravel is added with a perfect particle size distribution. This inert material must be completely free of impurities and perfectly washed. Designed to repair or reinforce structures in reinforced concrete.	BetonFIP LEGANTE REINFORCED
			Shrinkage compensating concrete, self-compacting, obtained using a special super-fluid expansive binder to which sand, grit and gravel is added with a perfect particle size distribution. This inert material must be completely free of impurities and perfectly washed. Designed to repair or reinforce structures in reinforced concrete.	BetonFIP LEGANTE SCC

Warnings
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It is therefore essential to consult the technical data sheet of the preselected product.

RAPID INTERVENTIONS EVEN AT LOW TEMPERATURES (-10°C)



TECHNIQUE	PREPARATION OF SUBSTRATE	THICKNESS	DESCRIPTION OF PRODUCT	PRODUCT NAME
Repair or reinforcement by way of manual casting	Hydro-demolition Milling Mechanical hammers	10-150 mm	Ready-mixed cement-based mortar, fluid, fast-setting with rapid development of mechanical resistance even at low temperatures, up to -5°C, resistant to aggressive atmospheric agents. Designed to restore, repair, reinforce degraded structures in reinforced concrete.	BetonFIP RAPID FLUID
			Ready-mixed cement-based mortar, fluid, steel fibre reinforced, fast-setting with rapid development of mechanical resistance even at low temperatures, up to -5°C, resistant to aggressive atmospheric agents. Designed to restore, repair, reinforce degraded structures in reinforced concrete.	BetonFIP RAPID REINFORCED

Warnings
The above information is of a general nature only.
It is therefore essential to consult the technical data sheet of the preselected product.



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BetonFIP ANCORAGGIO

ANCHOR CEMENT

The effectiveness and durability of a precision anchor is ensured by a correct design.

Knowing the possible mechanisms of crisis of an anchoring agent, the effective stresses in play, the nature and condition of the substrate is necessary in order to define:

- The type of element that will be used to develop the anchor (threaded bars, improved adhesion bars, tie rods, etc.);
- The positioning, spacing, dimensions (length, section) of the anchor pocket or hole;
- The requirements and performance characteristics that must be guaranteed by the anchoring agent.

FIELDS OF APPLICATION

The line of cement-based products **BetonFIP ANCORAGGIO** is used in the commissioning of all types of machinery in industrial lines such as overhead cranes or similar, for the assembly of prefabricated concrete elements, for the anchoring of metal structures to concrete foundations, or of metal and concrete products, of protective or sound barriers and vertical signage.

The **BetonFIP ANCORAGGIO** products must be applied on wet substrates or even saturated with water. This prerogative gives them an advantage from the point of view of application compared to resin-based materials that, on the other hand, often require dry substrates. The **very high fluidity** allows a quick and reliable filling of the volume between the base plate of the machinery or the prefabricated element and the foundation, or the anchor pocket. Their **expansive properties** ensure maximum adhesion over time, thus preventing shrinkage phenomena. In order to develop **fast-setting anchors** even at low temperatures, **BetonFIP RAPID FLUID** was created, a product whose mechanical performance characteristics are developed in rapid time. It is not recommended for machine anchorage, which generally needs to allow for a broader window of workability.

The compressive membranes can be injected at low pressure using a special expansive binder that allows the development of extremely fluid grouts, set apart by their extremely low W/C ratio, which perfectly adhere to the steel wire ropes even in the long term, given they are completely free of shrinkage. These grouts are also used to anchor reinforcement bars in vertical and slanting holes in cases where the annular space is reduced.



The main requirements distinguishing a product used for anchorage are:

- **High fluidity**, allowing fast, simple and reliable casting operations, significantly improving the flow of the mixture and maximising filling and compacting capacity;
- **Strong adhesion**, allowing correct stress transfer. Strong adhesion is guaranteed over time thanks to the expansive characteristics of the product, which eliminate long-term shrinkage typical of normal cement-based mixes;
- **Excellent mechanical performance**, allowing resistance to high static and dynamic stress and cyclic loads;
- **High resistance to freeze-thaw cycles**, an essential requirement for the durability of any outdoor anchoring agent;
- **Excellent waterproofing**, guarantees the durability of the anchorage;
- **Excellent resistance to lubricating oils**, allows use in industrial environments.

The reference standard for CE marking is UNI EN 1504 part 6

The reliability and durability of any anchoring agent is highly dependent on the accuracy of its application.

To ensure **maximum adhesion to the concrete substrate** it is necessary to:

- Slightly roughen the substrate, even if just to remove the top layer of surface cement;
- Clean the substrate to eliminate any oils, grease, debris, dust.

PREPARATION OF SUBSTRATE

Check that the base plate, if present, of the element being anchored is perfectly clean and fitted with air ventilation holes.

Saturate the concrete substrate just before applying the anchoring mortar. It is implied that any free water must be removed with compressed air before casting.

Secure and seal any formwork in order that it withstands the pressure of the pour and to stop the grout from leaking. Create a 150 mm high head on the side where the pour will be made, guaranteeing a distance of 150 mm from the base of the element being anchored.

Application will occur by way of casting preferably from one side only, but in any case never on opposite sides, to prevent the formation of trapped air bubbles. Casting must be continuous without any interruptions to guarantee the best possible flow of the mixture.

During the application phase, check that there are no vibrations generated, for example by machines operating in the vicinity of the anchorage. For anchorages characterised by large dimensions, place chains in the space underneath the plate, which if moved during casting will encourage the flow of the material.

APPLICATION



The summary table associates the type of element being anchored with the technique applied, the application method and the recommended category of material.

FIELDS OF APPLICATION	MODALITY OF APPLICATION	THICKNESS	DESCRIPTION OF PRODUCT	PRODUCT NAME
<p>Precision anchors for:</p> <ul style="list-style-type: none"> all types of machines, including: turbines, pumps, compressors, lathes, milling machines, rolling mills, engine units, machines used in paper mills or the processing of stone materials, mills, etc.; prefabricated elements in steel and reinforced concrete; gantry cranes, tracks, cranes, etc.; guardrail columns, soundproof panels and similar; wind turbines. 	Casting by way of pumps or manually	10-50 mm	Cement-based mortar, ready-mixed, fluid, expansive , resistant to aggressive atmospheric agents. Designed to develop anchorages, including precision anchorages.	BetonFIP ANCORAGGIO
		50-100 mm	Cement-based small aggregate concrete, ready-mixed, fluid, expansive , resistant to aggressive atmospheric agents. Designed to develop anchorages, including precision and very thick anchorages.	BetonFIP ANCORAGGIO AS
<p>Fast-setting anchorage, even at low temperature of:</p> <ul style="list-style-type: none"> metal elements to structures in reinforced concrete; prefabricated elements in reinforced concrete; urban furnishing elements, vertical signs, manhole covers etc. 	Manual casting	10-150 mm	Ready-mixed cement-based mortar, fluid, FAST-SETTING with rapid development of mechanical resistance even at low temperatures, up to -5°C , resistant to aggressive atmospheric agents. Designed to develop fast-setting fastenings and anchorages even at low temperatures.	BetonFIP RAPID FLUID
<p>Anchorage of:</p> <ul style="list-style-type: none"> reinforcement bars; threaded bars; steel wire ropes. 	Casting by way of pumps or manually	5-20 mm	Expansive grout, super-fluid obtained using a special expansive binder. Designed to develop fastenings and anchorages with a highly reduced thickness.	BetonFIP LEGANTE

Warnings

The above information is of a general nature only. It is therefore essential to consult the technical data sheet of the preselected product.



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CEMENT-BASED WATERPROOFING SYSTEMS

BetonFIP WP

Structural waterproofing is a very important technology that influences the performance of the construction and its useful life, in the case of both new constructions and repair works.

It should be pointed out that a simply superficial approach to the technology is the cause of **defects that emerge in a very short time** and manifest themselves in the form of **infiltrations, leaks, actual water infiltration, humidity, condensation**.

Presently, materials that allow a **continuous waterproof coating to be made on site** are increasingly used, which do not present the problems of overlapping and joints typical of prefabricated membranes. These coatings have even become indispensable for waterproofing **structures with complex geometry and/or which have numerous pass-through bodies**. Among the waterproof coatings made on site, those **cement-based are being widely used**. Synthetic-based coatings are mostly applied in the field of special waterproofing.

The choice of the coating that offers the most suitable performance package is made considering the **type of structure, contact with specific liquids**, whether such contact occurs with stagnant liquids or not and whether it generates a **positive or negative thrust** on the coating.

SELECTING THE PERFORMANCE CHARACTERISTICS OF MATERIALS

The main requirements provided by the coatings of the **BetonFIP WP** cement-based line can be subdivided in general or specialised requirements, depending on the utilisation. The main **general requirements** are:

- Good resistance to direct and indirect hydrostatic pressure;
- Strong adhesion to substrate;
- Good aqueous vapour permeability;
- Excellent resistance to freeze-thaw cycles;
- Excellent resistance to aggressive atmospheric agents.

The **specialised requirements** depending on the use are:

- Good crack bridging ability;
- Good resistance to abrasion;
- Chemical resistance to particularly aggressive liquids.



The reference standard is **UNI EN 1504 part 2**, which is specific to protective systems and which is normally used for the CE marking on cement-based waterproof coatings.

REFERENCE STANDARD

The cement coatings of the **BetonFIP WP** line sprayed on site, are frequently used for the waterproofing of the following structures:

FIELDS OF APPLICATION

- Foundations and underground venues;
- Retaining structures;
- Exposed concrete surfaces of hydraulic structures, which are not in contact with aggressive liquids;
- Irrigation ducts
- Lift shafts;
- Undertile waterproofing for small terraces and balconies;
- Fountains, flower boxes and similar.

To ensure successful waterproofing, it is important to provide a series of **complementary products** allowing the hydraulic sealing of couplings, expansion joints, cracking phenomena, connected concrete components, obstacles, and which block any potential water ingress. All application phases must also be executed with maximum precision.

Particular care must be afforded to the preparation of surfaces to be waterproofed. They must be mechanically firm, free of dust, oil, grease, grout residue and any other element that may promote detachment.

The substrate must be slightly roughened by way of sandblasting, hydro-sandblasting or pressure washing at a pressure greater than 500 bar. Any water infiltration must be blocked using the quick binding **BetonFIP WATER BLOCK** cement. Any cracks must be welded or sealed using the products of the **ResinFIP BOND** line, and/or the use of **BetonFIP WP BANDELLA ELASTICA**.

PREPARATION OF SUBSTRATE

The hydraulic sealing of the casting and joints must be achieved through an adequate use of the hydro-expansive profiles and sealants of the **ResinFIP WP** line **and the elastic bands of the ResinFIP WP**.

Shortly before the application of **ResinFIP WP 610 FLEX** or **ResinFIP WP 600** it is indispensable to clean and humidify the concrete substrate to remove dust and eventual sand remaining from the previous substrate roughening operations, and to prevent that very absorbent substrates absorb the liquid component B from the mixture, limiting its adherence.

ResinFIP WP 610 FLEX or **ResinFIP WP 600** must always be applied in two layers if applied manually.

APPLICATION

The following summary table associates the type of structure being waterproofed with the application method and recommended category of material.



FIELDS OF APPLICATION	MODALITY OF APPLICATION	DESCRIPTION OF PRODUCT	PRODUCT NAME
Development of continuous rigid coating on hydraulic and retaining structures.	Application by way of spraying machines or manually.	Cement coating, premixed, thixotropic, single-component, rigid , with osmotic action, highabrasion resistance. Designed for waterproofing of structures in reinforced concrete and masonry.	BetonFIP WP 600
Development of continuous flexible coating on hydraulic structures and different types of infrastructure, where a good crack bridging ability is required.	Application by way of spraying machines or manually.	Cement-based coating, ready-mixed, thixotropic, polymer modified, two-component, flexible for waterproofing and protection of structures and surfaces in reinforced concrete and masonry.	BetonFIP WP 610 FLEX
System to intercept and convey water infiltrations in tunnels . Composed of: • BetonFIP PM SL synthetic membrane; • BetonFIP RASANTE MONO G hydrophobised cement-based skim coat.	Application of synthetic membrane according to instructions in technical data sheet. Application of skim coat by way of spraying machines or manually.	Synthetic multi-layer membrane in non-reinforced TPO BetonFIP PM SL for underground works, and therefore coated with BetonFIP RASANTE MONO G mortar.	BetonFIP PM SL BetonFIP RASANTE MONO G
• Tunnel waterproofing system Composed of: • MC MONTAN SHOT SEAL polymer membrane with IMB Technology	Application via dry spraying machines.	Polymer coating thixotropic premix, single-component, waterproofing for structures and surfaces in reinforced concrete.	MC MONTAN SHOT SEAL
Stops concentrated and even pressurised water ingress.	Application by way of manual pressure.	Cement-based mortar, ready-mixed, ultra-quick hardening to stop water ingress, even pressurised.	BetonFIP WP WATER BLOCK
Connecting element to develop continuity in fittings between walls and between wall bottoms.	Apply the strip by exerting slight pressure onto the "bottom" layer of the waterproof coating, to be used when still fresh. Cover the strip with another layer of the waterproof coating.	Special waterproofing strip made from thermoplastic elastomer , resistant to wear, covered with a non-woven polypropylene fabric on both sides .	BetonFIP WP BANDELLA ELASTICA
Reinforcement of waterproofing, flexible BetonFIP WP 610 FLEX cement-based coating.	Must be completely incorporated into the thickness of the waterproofing mortar or skim coat used.	Thin alkali-resistant fibreglass mesh for the reinforcement of cement coating, waterproofing, flexible BetonFIP WP 610 FLEX .	BetonFIP WP MESH
Development of a hydro-expansive barrier with perfect water seal during the construction of concrete works that must be waterproofed.	Position the band at the centre of the concrete connection, inserting a nail approximately every 25 cm.	Hydro-expansive band in rubber and sodium bentonite for the hydraulic sealing of connected concrete components.	BetonFIP WP CORDOLO BENTONITICO

Warnings

The above information is of a general nature only.
It is therefore essential to consult the technical data sheet of the preselected product.



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BetonFIP MURATURE

RESTORATION AND REINFORCEMENT OF MASONRY

The repair and restoration of masonry constructions is an articulated and particularly complex process. It is essential to set predefined objectives, taking into account that each masonry construction must be individually assessed and treated separately.

GENERAL APPROACH

It is essential to combine diversified skills such as art history, architecture, mechanical behaviour, chemistry, the technology of ancient and modern materials. Only through a multidisciplinary approach is it possible to guarantee the preservation of architectural history, static efficiency, the compatibility of materials.

The **BetonFIP CALCE** line proposes specific products for the restoration and reinforcement of masonry, compatible with the technique of the original materials.

DESIGN AND DEVELOPMENT

A process that allows elaborate planning and efficient solutions can be summarised as follows:

- Historical study that investigates the different phases of design and development, including any subsequent restorations;
- Geometric survey;
- Assessment of static instability;
- Assessment of extent of degradation of materials;
- Types of action;
- Selection of performance characteristics of materials.

Masonry constructions lose their original efficacy due to the following phenomena:

1. degradation of materials;
2. static instability

1. DEGRADATION PHENOMENA

The degradation is generated by **chemical, physical and mechanical phenomena** that are triggered between the original materials, between these and the materials used in previous restorations and due to the interaction of the materials with the environment.



A decisive role in the mechanisms that determine the **degradation** is played by the presence of water or humidity and the movement of these within the masonry. Degradation may affect stone or brick materials, binders, mortars, renders and decorations.

The main **chemical causes** that can cause degradation are:

- Formation of ettringite (which can cause the delamination of renders) or thaumasite (which determines the "softening" of mortars), caused by the reaction of the sulphate with the other composites in the masonry;
- Formation of salts not originally present in the masonry, their transportation by way of rising damp and their subsequent crystallisation with the possible formation of efflorescence on the surface;
- Action of acidic water, which generates the dissolution of carbonates (for example, the deterioration of carbonate stones);
- Corrosion of iron inserts.

The main **physical causes** that can generate degradation are:

- The crystallisation of soluble salts in the masonry between the masonry and render, with consequent progressive detachment of the render;
- Freeze-thaw cycles linked to porosity and the presence of water or damp, which determine the degradation of mortars and stone elements;
- Wind action (abrasion and erosion);
- Variations in volume generated by wet-dry cycles;
- Thermal expansion.

The main **damages** found on masonry structures, following the degradation of the materials and the related intervention techniques are: **Moisture on the walls due to capillary ascent** (dehumidifying plaster); **Crystallization of salts and formation of efflorescences** (dehumidifying plaster); **Degradation and/or detachment of the plaster** (remaking), **Erosion of stone or brick segments** (impregnation or replacement); **erosion of the mortar** between segments (reshaping).

DAMAGE OPERATING TECHNIQUES

The **failure** is generated when the initial static balance is lost and manifests itself with a more or less evident fissure. Failures can affect **foundations, vertical structures** (walls, columns and pillars) and **horizontal structures** (floors, vaults, trusses, domes).

INSTABILITY PHENOMENA

It is always desirable that the **reinforcement interventions** be integrated with the **overall construction restoration project**.

The main stages of a reinforcement can be summarized as follows:

- Identification of the causes of the instability in single structures and as a whole;
- Identification of the characteristics of the land;
- Schematic diagram of the forces in play;
- Assessment of local and collective load-bearing capacities;
- Definition of types of action and their entity;
- Evaluation of improved safety levels after the intervention.

PHASES OF REINFORCEMENT PROCESS



OBJECTIVES AND TECHNIQUES REINFORCEMENT PROCESS

Reinforcement works are generally intended to:

- Intervene on the foundations (expansion, underpinning);
- Reintegrate a part of the elements constituting the masonry (indenting, grouting);
- Improve mechanical characteristics (mass or reinforcement injections, impregnation, autofrettage, adhesive application of fabrics or metal sheets, or the insertion of threaded bars made with glass or carbon fibre yarns, insertion of metal elements);
- Repair lesions (grouting and injection);
- Increase resistance to rotation (spurs, counterforts);
- Increase the resistance section (reinforced plate);
- Increase the monolithic behaviour of various elements constituting the structure (tie rods, reinforced injections);
- Eliminate rising damp and infiltrations (dehumidifying renders).

SELECTING THE PERFORMANCE CHARACTERISTICS OF MATERIALS

The necessary requirements and performance characteristics of the materials used are shown in association with the necessary type of action. Nonetheless, it is possible to highlight the requirements that are strictly necessary:

- Water impermeability;
- Limited capillarity;
- High porosity;
- Good vapour permeability;
- Low salt content;
- Diversified mechanical performance characteristics (resistance and elastic modulus) depending on the type of action, but suitable for masonry;
- Adhesion;
- Setting and hardening times compatible with working methods;
- Compatibility with original materials or those used in previous restoration projects;
- Safety of material used so as not to trigger degradation mechanisms in the masonry;
- Resistance to freeze-thaw cycles.

REFERENCE STANDARDS

An important reference standard is UNI EN 998 part 1 and part 2.

The summary table below associates the aim of the restoration with the technique applied, the application method and the recommended category of material.

FIELDS OF APPLICATION	MODALITY OF APPLICATION	THICKNESS	DESCRIPTION OF PRODUCT	PRODUCT NAME
CONSERVATION INTERVENTIONS				
Consolidating binding layer on masonry highly degraded due to rising damp.	Application by way of rendering machines or manually.	Thickness from 5 to 10 mm	Ready-mixed mortar, thixotropic, natural hydraulic lime based (NHL 3.5), to develop consolidating and salt-resistant renders.	BetonFIP CALCE RINZAFFO
Plastering of existing or new masonry located both indoors and outdoors. Also on stone, brick, tuff or mixed masonry. Compatible with historical masonry.	Application by way of rendering machines or manually.	Thickness from 5 to 15 mm per layer. Total thickness maximum 30 mm	Ready-mixed mortar, thixotropic, natural hydraulic lime based, light hazelnut colour, to develop renders on new or historical masonry.	BetonFIP CALCE INTONACO
For skim coating with smooth finish, indoors and outdoors, on: <ul style="list-style-type: none"> • traditional plasters or made with BetonFIP CALCE INTONACO; • reinforcements made with BetonFIP lime-based mortars. 	Manual application	Thickness from 2 to 5 mm.	Ready-mixed mortar, thixotropic, transpiring, natural hydraulic lime based, light hazelnut colour, for smooth finishes of ready-mix or traditional renders.	BetonFIP CALCE RASATURA
For the indoor and outdoor skim coating of: <ul style="list-style-type: none"> • Traditional renders or those developed with BetonFIP CALCE INTONACO; • reinforcements made with BetonFIP lime-based mortars. 	Manual application	Average thickness 1 mm.	Ready-mixed mortar, thixotropic, transpiring with very small particle size, natural hydraulic lime based, ivory coloured, for smooth finishes of ready-mix or traditional renders.	BetonFIP CALCE RASATURA FINE
To develop dehumidifying renders in indoor and outdoor environments specifically for repairs to masonry affected by rising damp phenomena.	Application by way of rendering machines or manually.	Thickness from 20 to 30 mm	Ready-mixed mortar, thixotropic, grey, macroporous.	BetonFIP DEUMIDIFICANTE
For the indoor or outdoor skim coating of dehumidifying plasters.	Manual application	Maximum thickness 2-3 mm	Ready-mixed top coat, thixotropic, white.	BetonFIP FINITURA DEUMIDIFICANTE

Warnings

The above information is of a general nature only. It is therefore essential to consult the technical data sheet of the preselected product.



FIELDS OF APPLICATION	MODALITY OF APPLICATION	THICKNESS	DESCRIPTION OF PRODUCT	PRODUCT NAME
REINFORCEMENT WORKS				
Used in indoor and outdoor environments to: <ul style="list-style-type: none"> • develop new masonry; • develop grouting for joints; • reinforce wall faces using the indenting technique. 	Manual application	—	Masonry mortar , ready-mixed, thixotropic, based on natural hydraulic lime , of hazelnut colour. Characterised by high vapour permeability, does not release salts, does not provoke efflorescence, good dimensional stability. Class M8.	BetonFIP CALCE ALLETTAMENTO
Used to reinforce masonry through the development of: <ul style="list-style-type: none"> • reinforced slabs; • reinforced vaults; • indenting technique; • joint grouting. 	Application by way of rendering machines or manually.	Thickness from 10 to 50 mm	Masonry mortar , ready-mixed, natural hydraulic lime based , for masonry, high resistance (class M15), transpiring, hazelnut colour, does not release water-soluble salts and does not generate efflorescence.	BetonFIP CALCE STRUTTURALE
Used to make very low thickness reinforcements using as reinforcement glass or carbon filament nets of the FiberFIP line .	Application by way of rendering machines or manually.	Thickness from 3 to 6 mm	Masonry mortar , ready-mixed, natural hydraulic lime based , high resistance (class M15), transpiring, does not release water-soluble salts and does not generate efflorescence, hazelnut colour.	BetonFIP TIXO MUR M15
Used to make low to medium thickness reinforcements using as reinforcement traditional steel bars, carbon bars or glass or carbon filament nets of the FiberFIP line .	Application by way of rendering machines or manually.	Thickness from 5 to 25 mm	Cement-based mortar, thixotropic, ready-mixed, polymer modified , single-component , high resistance (class M25), containing polyacrylonitrile fibre.	BetonFIP TIXO MUR M25
Used to reinforce all types of masonry structures by way of low pressure injections, even reinforced .	Mechanical application by way of low pressure injection machines.	—	Ready-mixed grout, natural hydraulic lime based , structural, high mechanical performance for a natural lime (class M15) and compatible with the mechanical performance characteristics of masonry .	BetonFIP CALCE INIEZIONE S

Warnings

The above information is of a general nature only.

It is therefore essential to consult the technical data sheet of the preselected product.



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ResinFIP

A brand that proposes resin-based formulas with different chemical compositions. The broad range of products has been designed and selected to guarantee performance and characteristics compatible with application needs in a broad range of fields.

It is broken down into five specific technologies:

ResinFIP COAT

ResinFIP BOND

ResinFIP MALTA

ResinFIP SEAL

ResinFIP WP

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PROTECTION OF STRUCTURES IN CONCRETE

ResinFIP COAT

Structures in reinforced concrete have proven not to be as durable as expected. This is often due to the progressively reduced capacity of the cement-based matrix to passivate the reinforcement due to carbonation phenomena manifested in the concrete. Reinforcements that are no longer passivated may corrode over varying periods of time depending on the operating environment, the penetration of chlorides, water and oxygen.

Clearly, depassivation occurs if the concrete carbonation process also starts to affect the concrete cover on the reinforcement steel. Therefore, the likelihood of corrosion increases on par with the reduction of the concrete cover.

The degradation of concrete structures may also be caused by contact with or the penetration of sulphates or other particularly aggressive chemical substances.

To increase the useful life of structures, it has become increasingly common to use protective film-forming systems, the main function of which is to create a shield against penetration and contact with aggressive agents. Depending on their specific composition, protective systems can also satisfy a number of other functions, such as: increase resistance to wear, improve visual and architectural appeal, improve visibility in tunnels, prevent the development of micro-organisms in structures in contact with water, guarantee maximum safety for the containment of foodstuffs, etc.

PRODUCTS

Protecting structures against the action of aggressive agents is an operation that must be properly planned and not dealt with superficially. The protective systems, concerning the degree of aggression of the operation environment and/or the specific use, are chosen according to the chemical composition that can generally be **polyurethane, acrylic, methacrylic, epoxy or mixed**. Additionally, within the same chemical

nature, **rigid** or more or less elastic formulations **are also available**, the latter are used in case the capacity to form bridges on cracked or less reliable surfaces is required.

A further difference occurs between **single-component** or **two-component formulations**.

Finally, formulations are available **in aqueous dispersion, in solvent or without solvent**, which either require or not the preventive application of a specific primer (adhesion promoter) that constitutes a system with the protective layer itself.

It is clear that the choice of the most suitable protection for a specific situation must be made according to the requirements that are fundamental in each case.

In addition to indicating the chemical nature of the formula, the planner must specify the requirements and performance characteristics that need to be guaranteed.

Often, choosing the most suitable protective system is the result of a pondered compromise between performance characteristics deemed necessary, but which are sometimes contradictory.

Part 2 of the UNI EN 1504 standard is the reference for the awarding of the CE marking for protection systems. It is worth noting that the requirements and performance characteristics necessary to obtain the CE marking may not necessarily be sufficient when selecting the most efficient product for specific needs.

The main requirements characterising a protective system are:

- Adhesion to the concrete;
- Water impermeability;
- CO₂ impermeability;
- Chloride ion impermeability;
- Aqueous vapour permeability;
- Chemical resistance to aggressive substances;
- Resistance to freeze-thaw cycles;
- UV resistance;
- Crack bridging ability;
- Abrasion resistance;
- Permanent contact with water;
- Chemical resistance to contact with aggressive substances.

The efficacy of the protection is highly dependent on certain aspects of its application. Some of these depend on the composition while others are of general importance, among which it is worth noting:

- The surfaces to be coated must be cohesive, if there are degraded areas it is necessary to restore them using the products of the **BetonFIP** line;
- The surfaces to be coated must be prepared by means of sandblasting and/or pressure washing;
- The humidity of the substrate at the time of application of the protective system must be compatible with the specific formula;

SELECTING THE PERFORMANCE CHARACTERISTICS OF MATERIALS

REFERENCE STANDARD

APPLICATION TIPS



- It is essential to apply a primer first when this is part of the system, together with the actual protective coat, in order to guarantee the performance characteristics of the system. The primer must always be applied when indicated by the specific protective system;
- Application must guarantee the dry film thickness indicated in the design, it is important not to make the mistake of confusing dry film and wet film;
- Maximum reliability on site is achieved by applying the protective layer in two crossed coats.

The ResinFIP COAT line offers Customers, Planners, Corporations and Installers a broad range of products specifically designed to guarantee long-lasting solutions characterised by the simplicity, speed and reliability of the application stages.

The following summary table should be used to assist the choice of protective system.

DESCRIPTION OF PRODUCT	PRODUCT NAME	FIELDS OF APPLICATION	THICKNESS
ACRYLIC FILM-FORMING COATING SYSTEMS			
Protective film-forming system, elastic, single-component, based on elastic acrylic resin in aqueous emulsion, for the protection of reinforced concrete structures not in permanent contact with water.	ResinFIP COAT AC 350 EL	Suitable for moderately aggressive environments. It provides: high ability to act as a bridge on cracked surfaces, maximum water vapour permeability, maximum resistance to ultraviolet rays, maximum resistance to CO ₂ , good "barrier" effect.	200 - 400 µm of dry film
Film-forming, rigid, single-component protective system based on acrylic resin in aqueous emulsion, for the protection of reinforced concrete structures not in permanent contact with water.	ResinFIP COAT AC 351	Suitable for moderately aggressive environments. Provides: maximum aqueous vapour permeability, maximum resistance to UV rays, maximum resistance to CO ₂ , good "barrier" effect.	100 - 200 µm of dry film
Film-forming, rigid, single-component protective system based on acrylic resin in aqueous emulsion, with a high content of titanium dioxide, for the protection of reinforced concrete structures not in permanent contact with water.	ResinFIP COAT AC 351 HT	Specific as a substrate in the protection cycles of tunnels, underpasses, and for all situations in which it is necessary to have a coating that best reflects natural or artificial light.	100 - 200 µm of dry film
METACRYLIC FILM-FORMING COATING SYSTEMS			
Film-forming, rigid, single-component protective system based on methacrylic resin in solvent, for the protection of reinforced concrete and metal structures.	ResinFIP COAT MC 360	Suitable for relatively aggressive environments. Provides: excellent aqueous vapour permeability, good resistance to UV rays, maximum resistance to CO ₂ , excellent "barrier" effect.	80 - 150 µm of dry film
POLYURETHANE FILM-FORMING COATING SYSTEMS			
Protective film-forming system, elastic, two-component, polyurethane resin based in solvent, for the protection of structures in reinforced concrete.	ResinFIP COAT PU 370 EL	Suitable for relatively aggressive environments. Provides: high ability to act as a bridge on cracked surfaces, excellent permeability to water vapour, maximum resistance to ultraviolet rays, maximum resistance to CO ₂ , excellent "barrier" effect.	200 - 400 µm of dry film

DESCRIPTION OF PRODUCT	PRODUCT NAME	FIELDS OF APPLICATION	THICKNESS
EPOXY FILM-FORMING COATING SYSTEMS			
Protective film-forming system, two-component, rigid, based on solvent-free epoxy resin, with high electrical resistance, for the protection of reinforced concrete structures, even in contact with aggressive liquids.	ResinFIP COAT E 381	Suitable for highly aggressive environments. Structures subject to industrial atmospheres, marine structures, structures in contact with highly aggressive liquids, for example sewage pipes, purifiers, industrial water collection tanks. Provides: maximum barrier effect, excellent resistance to aggressive liquids, maximum resistance to CO ₂ , low aqueous vapour permeability and low resistance to UV rays.	200 - 600 µm of dry film
MIXED FILM-FORMING COATING SYSTEMS			
Protective film-forming system, rigid, two-component, epoxy-acrylic resin based in aqueous emulsion, for the protection of structures in reinforced concrete, in particular tunnels and underpasses.	ResinFIP COAT E-AC 386	Provides high resistance to vehicle exhaust gases, improves visibility in tunnels and underpasses, ensures the reduced accumulation of dirt and subsequent ease and less frequent cleaning of supports.	200 - 400 µm of dry film
Protective film-forming system, elastic, two-component, epoxy-polyurethane resin based without solvent, for the protection of exposed structures in reinforced concrete, also in highly aggressive environments.	ResinFIP COAT E-PU 380 EL	Suitable for highly aggressive environments. Structures subject to industrial atmospheres, marine structures, structures in contact with highly aggressive liquids, for example sewage pipes, purifiers, industrial water collection tanks. It provides: good ability to act as a bridge on cracked surfaces, maximum barrier effect, excellent resistance to aggressive liquids, maximum resistance to CO ₂ , discrete permeability to water vapour and discrete resistance to UV rays.	200 - 400 µm of dry film
White epoxy-siloxane two-component protective coating without solvent specifically for road tunnels, significantly improves visibility and consequently safety.	ResinFIP COAT ES 385	Specifically for maximum protection of tunnels. Significantly improves visibility in tunnels, guarantees excellent resistance to vehicle exhaust gases, ensures the reduced accumulation of dirt and subsequent ease and less frequent cleaning of supports.	75 - 125 µm of dry film
IMPREGNATING PROTECTIVE SYSTEMS			
Waterproofing treatment, single-component, alkylamino trialkoxysilane based in aqueous emulsion, used to impregnate various types of absorbent mineral materials.	ResinFIP SILAN A	To impregnate absorbent mineral materials with high and medium porosity.	
Waterproofing treatment, single-component, alkylamino alkoxy silane based in aqueous emulsion in solvent, used to impregnate various types of absorbent mineral materials.	ResinFIP SILAN S	Against the aggression of atmospheric agents, to impregnate mineral materials with low and medium porosity that need to remain visible. Must be applied in open and well-ventilated environments.	
Impregnating agent, two-component, epoxy based in aqueous emulsion, for the surface hydrophobisation and consolidation of cementitious structures.	ResinFIP TOPCOAT E	Suitable for the impregnation of cementitious surfaces in indoor or outdoor environments to obtain a strong anti-dust effect, good resistance to abrasion, consolidation of the cortical layers of the support. Can also be used to connect concrete components.	
Impregnating agent, single-component, metacrylic in solvent, for the surface hydrophobisation and consolidation of cementitious structures.	ResinFIP TOPCOAT MC	To impregnate cementitious surfaces in indoor or outdoor environments. For the surface treatment of rigid cementitious flooring in: industrial sheds, warehouses, parking lots, footpaths, large landings.	

Warnings

The above information is of a general nature only.

It is therefore essential to consult the technical data sheet of the preselected product.

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GLUEING AND STRUCTURAL ANCHORS

ResinFIP BOND

The bonding or anchoring of different types of construction elements is a particularly delicate operation and must take into account several parameters in order to guarantee durability over time.

The correct choice of materials to be used must take into account the nature of the materials that must be bonded, stresses, geometries, the operating environment and application conditions.

In the specific case of threaded bar or adhesion anchorage, based on the stresses in play it is important to define the diameter of the bar, the diameter of the hole, the length of the anchorage, the influence of the distance from the edges of the element being anchored, the influence of spacing in the case of multiple anchorage, the nature of the support, its resistance and its condition (integral, cracked, humid, wet).

Synthetic structural adhesives are normally formulated with epoxy or vinyl ester polymers.

FIELDS OF APPLICATION

They are used for:

- Adhesion of prefabricated elements in reinforced concrete or prestressed concrete;
- Adhesion of plates and metal elements to the concrete;
- Improved adhesion bar anchorage;
- Threaded bar anchorage.

REFERENCE STANDARDS

Currently, there is no specific harmonising standard that regulates the characterisation of materials and which provides planning guidelines. This standard is nonetheless in the process of approval.

The standards currently adopted for the CE marking of materials, or the reference guidelines, are:

- **European standard UNI EN 1504 part 4:** which specifies the requirements and performance characteristics (including durability) of products and systems used for the structural adhesion of reinforcement materials to an existing concrete structure.
- **European Standard UNI EN 1504 part 6:** which specifies the requirements and performance (including durability) of the anchoring products of steel reinforcements used as structural reinforcement, in order to ensure the continuity of reinforced concrete structures.



- **European guideline ETAG 001** for obtaining the European technical approval for metal anchors in concrete, which can also be used in the case of seismic loads, whose **part 5** is specific for chemical anchors. It also provides a method for anchor design.

The ResinFIP BOND line consists of **thixotropic or fluid products (in paste or cartridge)**. Each specific formula must guarantee continuous performance even in the long term in order to guarantee the safety of the structure and its end users.

The main requirements characterising an adhesive can be summarised as follows:

- Adhesion to steel by way of direct traction;
- Adhesion to concrete by way of direct traction;
- Shear adhesion on inclined surface;
- Compressive strength;
- Flex-traction resistance;
- Shear resistance;
- Pull-out resistance;
- Modulus of elasticity;
- Modulus of flexural elasticity;
- Durability, measured in terms of adhesion after thermal and humidity cycles;
- Hardened/fresh concrete adhesion (connection of concrete components);
- Hardened/hardened concrete adhesion (bonding);
- Dielectric strength.

Some experimental indications are provided for formulations in cartridges, which may be useful to the designer when designing the grouting.

Correct use of the materials will depend on knowledge of the specific characteristics of each formula, including:

- Application temperature;
- A:B mix ratio (in weight);
- Pot life;
- Specific gravity (A+B);
- Viscosity.

Some application methods are of fundamental importance for the durability and reliability of the intervention such as:

- Correct preparation of surfaces to be mechanically bonded by way of sandblasting, bush hammering or manually with a steel brush;
- Removal of any detaching elements from surfaces in reinforced concrete, such as dust, release agents, laitance, oil or grease;
- Sandblasting of steel surfaces at a sandblasting level of SA 2 ½;
- Application of the adhesive onto metal surfaces before rust is formed;
- Drilling of anchorage holes, checking their perpendicularity;
- Blowing the holes using a blower pump (or compressed air), cleaning of the lateral surfaces of the hole using a pipe-cleaner, blowing the hole again until no more dust and/or other residual material is seen emerging;
- Filling the hole with resin for 2/3;
- Using a bar, having cut the end being inserted into the hole at an angle of 45°;
- Insertion of the bar with a rotary movement to release any air bubbles.



PRODUCTS

SELECTING THE PERFORMANCE CHARACTERISTICS OF MATERIALS

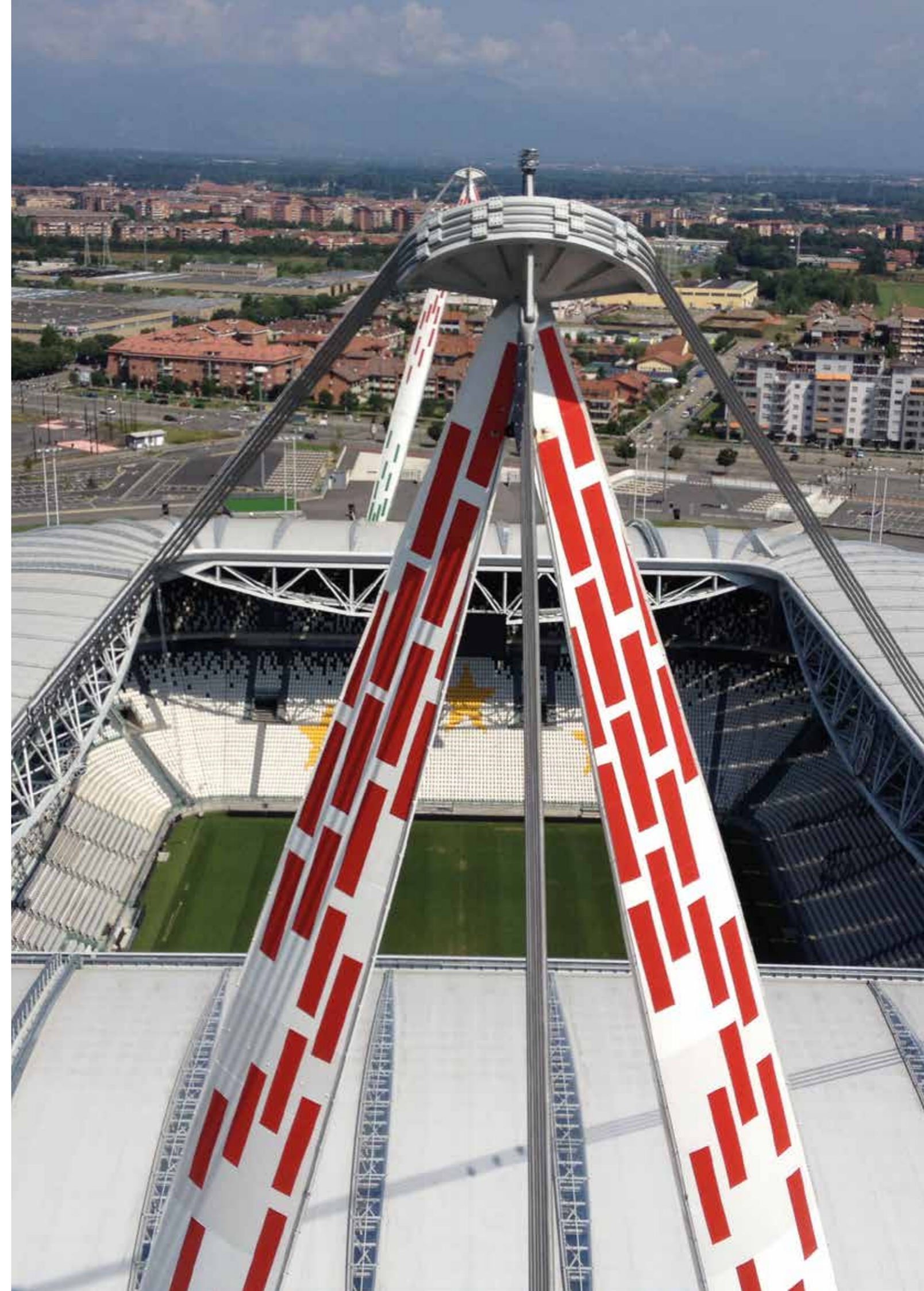
APPLICATION TIPS

The following table may assist in identifying the specific fields of application, performance characteristics and application methods.

FIELD OF APPLICATION	MODALITY OF APPLICATION	DESCRIPTION OF PRODUCT	PRODUCT NAME
To develop structural adhesion and anchorage between concrete-concrete, steel-steel, concrete-steel and in any case between the most diverse range of construction materials. Characterised by excellent rheology, which allows application also by way of extrusion with a pressure pump.	Manual application or mechanical application using a pressure pump for resins	Thixotropic structural adhesive, epoxy, two-component, solvent-free, used to develop adhesion, anchorage and rigid sealing between similar and different-natured materials.	ResinFIP EPOBOND T 160
To carry out the glueing and structural fixings in concrete - concrete, steel - steel, concrete - steel, and in any case between the most different materials of construction. Manual application only.	Manual application with smooth or toothed steel spatula	Structural adhesive, thixotropic, epoxy, two-component, solvent-free, for bonding between similar and different-natured materials and to restore superficial imperfections.	ResinFIP EPOBOND T 170
Used to develop high-performing structural anchorages, high dielectric strength, also for seismic stresses on: <ul style="list-style-type: none"> improved adhesion bars; threaded bars; safety barriers. 	Extrude with dedicated gun	Adhesive, structural, thixotropic, epoxy, in cartridge, two-component, for high-performance anchorages, adhesion and bonding also in seismic zones.	ResinFIP EPOBOND C 100
To develop an anchorage in the presence of stresses induced by medium-high loads for: <ul style="list-style-type: none"> improved adhesion bars; threaded bars; safety bars, guardrails, railings; connectors and tie rods; gates, handrails, hinges, antennas; urban furniture elements. 	Extrude with dedicated gun	Structural adhesive, thixotropic, vinyl ester resin based, in cartridge, two-component, specifically for anchorages, adhesion and bonding subject to medium-high loads.	ResinFIP VEbond C 120
To develop structural anchorages with very high performance and high dielectric strength for: <ul style="list-style-type: none"> improved adhesion bars; threaded bars; safety barriers. To develop structural anchorages between similar and different-natured materials such as concrete, steel, stone elements, brick, wood. To connect concrete components.	Casting	Structural adhesive, fluid, epoxy, two-component, solvent-free, used to develop adhesion and anchorages between similar and different-natured materials, and to connect cementitious components.	ResinFIP EPOBOND F 130
Mainly for: low or high pressure injections on cracked structures in reinforced concrete or masonry. Also for the anchorage of reinforcement bars, tie rods, connectors or metal profiles in different-natured substrates such as concrete, steel, wood, etc.	Application by way of injection using injection machines, or by casting	Structural adhesive, super-fluid, epoxy, two-component, solvent-free, used to renovate and strengthen, by injection, cracked structures in reinforced concrete or masonry.	ResinFIP EPOBOND F 140

Warnings

The above information is of a general nature only. It is therefore essential to consult the technical data sheet of the preselected product.



_02.03

ResinFIP MALTA

MULTIPURPOSE MORTAR RESIN-BASED

The ResinFIP **MALTA** line provides formulations in epoxy, epoxy-polyurethane or epoxy-cement base.

They are used for:

- Connection screeds between road expansion joints and adjoining paving;
- Regular and deep fillings, resistant to highly intense and frequent mechanical stresses;
- Impermeable coating of structures in reinforced concrete;
- Anchoring of machinery, gantry cranes, steel plates;
- Minor repairs to concrete elements.

SELECTING THE PERFORMANCE CHARACTERISTICS OF MATERIALS

The FiberFIP **MALTA** line provides products that, depending on the specific formulation, can provide different performance levels in accordance with the following requirements:

- Adhesion;
- Mechanical resistance;
- Chemical resistance;
- Resistance to freeze-thaw cycles;
- Impact resistance;
- Abrasion resistance;
- Hydrostatic pressure resistance;
- Dielectric strength.

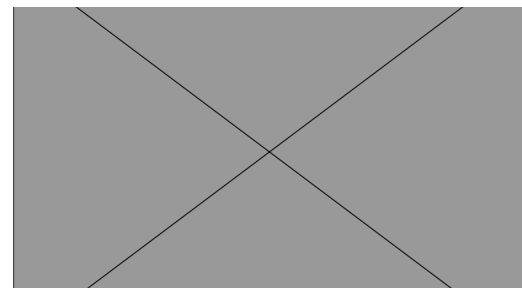
The following table may assist in identifying the specific fields of application, performance characteristics and application methods.

FIELD OF APPLICATION	MODALITY OF APPLICATION	DESCRIPTION OF PRODUCT	PRODUCT NAME
Primer used to promote the adhesion of synthetic mortars of the ResinFIP MALTE line.	Manual application	Quick epoxy primer, two-component, solvent-free, suitable for promoting the adhesion of synthetic mortars of the ResinFIP MALTE line.	ResinFIP PRIMER 383
For: • waterproofing of structures in reinforced concrete and prestressed concrete; • repair of localised degradation affecting a minimal thickness.	Mechanical application by way of spraying machines or manually.	Epoxy-cement based mortar, three-component, thixotropic, resistant to aggressive agents, very low capillary porosity, can be used as an impermeable coating on structures in reinforced concrete.	ResinFIP MALTA EC 430
For the installation of road expansion joints.	Manual application	Synthetic epoxy-polyurethane mortar, three-component, elastic for high thickness fillings and strong mechanical stresses.	ResinFIP MALTA E 440
For: • repairs to supports; • development of surface on which equipment used to support the sliding tubes and beams of scaffolding will be positioned; • load distribution under tracks; • repairs to industrial flooring.	Manual application	Epoxy mortar, quick, dielectric, for the construction of screeds and horizontal sealing on concrete products.	ResinFIP MALTA ER 420
For filling and sealing of gaps in correspondence with lock nuts in road joints.	Manual application	Fast-hardening, resilient, epoxy-polyurethane resin-based two-component mortar modified with bitumen and rubber granules, for the filling and sealing of the slots of road joints.	ResinFIP MALTA EGR 455

Warnings

The above information is of a general nature only.

It is therefore essential to consult the technical data sheet of the preselected product.



_02.04

ResinFIP SEAL

EXPANSION, CONTRACTION AND CONSTRUCTION JOINT SEALING

Joints must always be developed to eliminate the risk of movements impeded by construction elements generating internal tension, which, if greater than the tensile strength, would lead to uncontrollable cracking phenomena.

If joints are properly designed, movements will occur in the identified points and the structure's functionality will not be damaged.

Joints are discontinuities developed specifically to:

- Allow movement due to thermal fluctuations;
- Allow movements by single structural elements due to stresses or differential adjusting;
- Localise cracking phenomena in predefined areas due to the contraction of structural elements in concrete caused by shrinkage phenomena.

Joints must always be sealed to prevent the penetration or leakage of solids, liquids or gas. The efficacy of sealing plays an important role in determining the durability and functionality of the entire construction, whether a building or infrastructure.

SELECTING THE PERFORMANCE CHARACTERISTICS OF MATERIALS

To identify the requirements that must be guaranteed by a sealant depending on specific use, it is important to remember that it must absorb the structure's contraction and expansion movements over time and ensure long-lasting durability in operation.

The **performance** that a sealant must guarantee is also closely linked to the type of joint, follows a simple classification of the joints of the reinforced concrete structures:

Expansion joints: these joints are responsible for allowing movements by adjacent structural elements generated by thermal expansion/contraction phenomena, or the application of differential stresses. Their function is to isolate structural elements with different behaviour. For this reason, they are also called **isolation joints**;

- **Contraction joints:** these joints allow you to adjust and control the location of cracks due to unavoidable contraction phenomena typical of some large and relatively thin concrete structural elements, such as concrete pavements. Contraction joints make it possible to subdivide a large structural element into smaller elements;
- **Construction joints:** these joints are formed as a result of the execution/construction methods or as a result of the positioning of prefabricated components.

Sealing materials can deform up to a certain percentage with respect to their initial size: this measure is defined in the "**ability to move**".

For the sealing material to follow the movements, it must be essentially necessary to correctly calculate the ratio between the depth and width of the joint

The **basic** requirements that must be demanded from a sealant are:

- Adhesion to support, adhesion to opposing faces of the joint, allowing the joint itself to function;
- Elasticity, an essential requirement to absorb the movements of the structure being sealed, without losing adhesion and without cracking;
- Impermeability;
- Resistance to ageing (does not become fragile when exposed to low temperatures, does not soften when exposed to high temperatures) to guarantee durability;
- Resistance to UV rays;
- Chemical resistance in cases of contact with specific aggressive substances.

The **ResinFIP SEAL** line offers elastic sealants, based on polysulfuric, polyurethane, epoxy-polyurethane and acrylic base.

Our products are designed to develop seals for:

- **Expansion and construction joints in civil and industrial buildings and infrastructures;**
- **Prefabricated concrete elements;**
- **Connection joints between horizontal and vertical elements;**
- **Contraction joints in concrete industrial flooring;**
- **Joints in hydraulic structures.**

PRODUCTS

FIELDS OF USE



PREPARATION OF SUPPORT Particular care must be afforded when preparing the surfaces of the joint. They must be mechanically firm, free of dust, oil, grease, grout residue and/or any other element that may promote detachment. If there are deteriorated concrete structures, all the degraded concrete must be removed and the original geometry of the joint restored with products from the BetonFIP line. In the case of metal surfaces, oxide scales, rust, coatings, grease etc. must be removed.

APPLICATION

To ensure aesthetic quality, it is recommended to apply some tape on the upper edges of the joint so as not to stain the structure. When applied by way of casting, start from the bottom part of the joint and continue until the surface, making sure to avoid air bubbles.

APPLICATION TIPS

Adhesion on more than two sides of the joint will prevent the sealant from properly accompanying movement. The sealant must be adhere only on the edges of the joint to be able to work correctly, therefore it is essential the correct positioning of a **compressible profile** to be used on **the bottom of the joint**. The backing material, which should be sufficiently sized, must be positioned at a depth approximately half the length of the joint.

The following table associates the fields of application with the application method and recommended category of material.

FIELD OF APPLICATION	MODALITY OF APPLICATION	DESCRIPTION OF PRODUCT	PRODUCT NAME
PRIMER			
Suitable to promote the adherence of polyurethane sealants of the <i>ResinFIP SEAL</i> line.	Manual application	Epoxy primer, two-component, indicated to promote the adhesion of polyurethane sealants of the <i>ResinFIP SEAL</i> line.	ResinFIP SEAL PRIMER 500
BACKING MATERIAL			
For the confinement of the backing material, prior to the application of the sealant.	Manual application	Polyurethane extruded product, designed to confine the backing material prior to the application of the sealant.	ResinFIP FONDO GIUNTO
POLYSULPHIDE SEALANTS			
For sealing joints in horizontal applications.	Manual application	Elastic sealant, polysulphide based, glueable, two-component, for horizontal applications in black or grey.	ResinFIP SEAL THS 520
For sealing joints in vertical applications.	Manual application	Elastic sealant, polysulphide based, thixotropic, two-component, for vertical applications in black or grey.	ResinFIP SEAL THT 530
POLYURETHANE SEALANTS			
For the sealing of floor joints.	Manual application	Elastic sealant, polyurethane, glueable, two-component, in black, for horizontal floor joints.	ResinFIP SEAL PU 550
To develop elastic expansion and construction joints in civil and industrial buildings and infrastructures, prefabricated concrete elements, connection joints between horizontal and vertical elements, contraction joints in concrete industrial flooring, hydraulic structures.	Application with extruder	Elastic sealant, polyurethane, thixotropic, single-component with medium-low elastic modulus.	ResinFIP SEAL PU 570
For: <ul style="list-style-type: none"> • construction joints; • connections between structural elements, for example prefabricated elements; • holes or pockets for the insertion of profiles and piping. 	Application with extruder	Polyurethane sealant, hydro-expansive, thixotropic, in cartridge to prevent infiltrations of liquids in connections or joints in structures containing or in contact with liquids.	ResinFIP SEAL PU CARTRIDGE

Warnings
The above information is of a general nature only.
It is therefore essential to consult the technical data sheet of the preselected product.

_02.05

ResinFIP WP

WATERPROOFING WITH SYNTHETIC SYSTEMS

The ResinFIP **WP line** offers a range of continuous membranes/coatings to be applied on site, which are used for the waterproofing and protection of many different structures.

The technology of the **ResinFIP WP** membranes/coatings is mainly based on the requirements of **adhesion** and **continuity of the waterproofing**. Any discontinuity of the coating would cause a localised leak, preventing the spread of infiltrations below the waterproofing layer. This behaviour thus circumscribes the damage, simplifying identification and therefore repair works.

The waterproofing of a structure must be scrupulously planned. There is no one single solution applicable to all situations. Each waterproofing operation has its own characteristics, which strongly depend on:

- Type of structure;
- Type of substrate;
- Operating conditions;
- Hydraulic counter thrust;
- Condensation under the waterproofing;
- Geometric complexity of the surface being waterproofed;
- Application conditions and time frames.

SELECTING THE PERFORMANCE CHARACTERISTICS OF MATERIALS

The products that make up the **ResinFIP WP** systems are renowned by their chemical composition, requirements and performance characteristics.

The person responsible for coordinating the waterproofing project can identify the most suitable system in relation to the specific circumstances by consulting the list below and selecting the necessary requirements, along with their level of priority:

- High impermeability, even in harsh exposure conditions and in permanent contact with water or industrial fluids;
- Strong adhesion to substrate, guaranteeing durability regardless of the type of substrate and the effects of atmospheric agents, high temperatures, mechanical wear and movements of the substrate;
- Instant polymerisation, whereby the structures are immediately waterproofed;



- High resistance to freeze-thaw cycles, guaranteeing long-lasting durability even in environments subject to frequent thermal cycles;
- High thixotropy, the systems can be applied indifferently on horizontal or vertical surfaces, also in the presence of complicated elements such as storm drains, roof drains, air and water vents, skylights, flues, handrails, etc., without the need for dismantling;
- Absence of joints, systems are applied manually or sprayed on in a liquid form and react by forming an impermeable barrier free of joints, welds, without any overlapping, thus resolving the weaknesses of traditional waterproofing in preformed sheets;
- High elasticity, a requirement allowing adaptation to movements by the substrate without tearing;
- High crack bridging ability, or rather a protective system's capacity to guarantee a continuous surface even when applied on top of cracks in the existing substrate at the time of application;
- High mechanical resistance, resistant to impact, wear and laceration;
- Coloured finish, perfect for both visual appeal and to reflect solar radiation, in addition to improving safety thanks to the non-slip finish on treadable coatings.

For performance characteristics, see the individual product data sheets. It is also important to remember that for each sheath-coating **of the ResinFIP WP** line different primers (adhesion promoters) are available for specific types of substrates and surrounding conditions.

ResinFIP WP systems are marked according to **UNI EN 1504 part 2**, specific for the protection of concrete structures using coatings that act as a barrier to prevent the penetration of fluids.

The fields of use are:

- Industrial and civil roofs;
- Hydraulic structures;
- Bridge and railway decks;
- Holding basins and the treatment of waste water or industrial processing waste.

For each of these specialist sectors, **FIP chemicals** offers a dedicated system, designed to satisfy specific work conditions, combining the most suitable adhesion promoters with the type of support being waterproofed and the most suitable coating for the operating conditions of the structure.

It is essential to bear in mind that the success of a waterproofing depends strongly on all the implementation phases. The waterproofing of a structure is a highly articulated operation. For this reason **FIP chemicals srl** makes its own **TECHNICAL SERVICE** available to Customers, Planners and Corporations to guide them through all planning and development phases. It is also able to appoint a team of **accredited applicators** specialized in waterproofing interventions.



REFERENCE STANDARDS

FIELDS OF USE

The following summary table associates the fields of application with the application method and recommended category of material.
See separate Technical Data Sheets.

FIELD OF APPLICATION	MODALITY OF APPLICATION	DESCRIPTION OF PRODUCT	PRODUCT NAME
PRIMER TO GUARANTEE HIGH RESISTANCE TO NEGATIVE HYDRAULIC PRESSURE			
The ideal promoter for application on wet substrates, creates a barrier to vapour.	Manual application	Epoxy-cement based primer, three-component, suitable for promoting adhesion of systems in the ResinFIP line in the presence of damp substrates and/or when it is necessary to create a vapour barrier or guarantee high resistance to negative hydraulic pressure.	ResinFIP PRIMER WP 700
Adhesion promoter for: <ul style="list-style-type: none"> ResinFP waterproofing membranes WP POLIUR, ResinFIP WP EB 710; connection of concrete components sharing the same membranes when the re-coating times have passed; spray-on application of membranes onto bituminous surfaces and plastic materials (excluding PE and HDPE). 	Manual application	Single-component polyurethane primer.	ResinFIP PRIMER WP 701
Universal adhesion promoter for the application of ResinFIP WP POLIUR elastomer sheaths on steel and galvanised metal. Also for applications on cement, vitrified surfaces (ceramic, glass) and plastic materials.	Application manual or mechanical via airless	Universal primer, anti-corrosion, epoxy resin based.	ResinFIP PRIMER WP 704
Adhesion promoter for the ResinFIP WP POLIUR 770, ResinFIP WP POLIUR WP 780 waterproofing membranes applied to concrete substrates.	Manual application	Two-component solvent-free epoxy primer.	ResinFIP PRIMER WP 771
Adhesion promoter on ResinFIP WP POLIUR 770, ResinFIP WP POLIUR WP 780 waterproofing membranes as a binding coat for bituminous road pavements.	Application manual or mechanical via airless	Polyurethane primer, single-component, hygrosetting for bituminous road surfaces.	ResinFIP PRIMER WP 772
SPRAY-ON POLYUREA ELASTOMER WATERPROOFING SYSTEMS			
Continuous spray-on membrane for the waterproofing and protection of concrete structures.	Mechanical application using specific equipment: bimixer sprayer hot, high-pressure	Elastic polyurea membrane, two-component, solvent-free, high resistance for the waterproofing and protection of concrete structures.	ResinFIP WP POLIUR 770
Continuous spray-on membrane for the waterproofing and protection of coverings characterised by complex geometries.	Mechanical application using specific equipment: bimixer sprayer hot, high-pressure	Elastic polyurethane membrane, two-component, solvent-free for the waterproofing of coverings.	ResinFIP WP POLIUR 780
To protect elastomer waterproofing membranes from UV rays.	Manual application or mechanical skim coating via airless	Protective film-forming system, elastic, polyurethane resin based, two-component, available in RAL colour.	ResinFIP WP POLIUR COAT

FIELD OF APPLICATION	MODALITY OF APPLICATION	DESCRIPTION OF PRODUCT	PRODUCT NAME
BITUMEN AND EPOXY-POLYURETHANE RESIN BASED COATING			
Suitable for the waterproofing of steel and concrete fabrications.	Manual application	Epoxy-polyurethane membrane supplemented with bitumen, two-component, suitable for the waterproofing of steel and concrete fabrications.	ResinFIP WP EB 710
BITUMINOUS RESIN BASED COATING			
Suitable for the waterproofing of retaining structures, foundation walls, etc. Easy to apply cold.	Application manual or mechanical via airless	Bituminous emulsion, single-component for general use.	ResinFIP WP BIT 730

Warnings
The above information is of a general nature only.
It is therefore essential to consult the technical data sheet of the preselected product.

*The above primers must be selected in accordance with the type of substrate being waterproofed.

_03

FiberFIP

Line for reinforcement with composite materials.
A brand that proposes composite products (FRP) composed of a polymer matrix and carbon or glass fibre yarns used for flexural, shear or confinement reinforcement in structures in reinforced concrete or masonry.

FiberFIP TECNOLOGIA

FiberFIP ADESIVI

FiberFIP TESSUTI

_03.01

FiberFIP TECNOLOGIA

CONSOLIDATION AND REINFORCEMENT OF STRUCTURES WITH COMPOSITE MATERIALS

FRP Fibre reinforced polymer materials are being increasingly used to reinforce structures in reinforced concrete or masonry.

They allow the flexural, shear and compression reinforcement of structures in reinforced concrete without modifying the weight, rigidity and dimensions of the elements on which they act, essential qualities for compliance with seismic requirements.

They are used to reinforce masonry structures, allowing the simple and reliable development of flexural and shear reinforcement in wall panels, column confinements, reinforced arches, vaults and nodes.

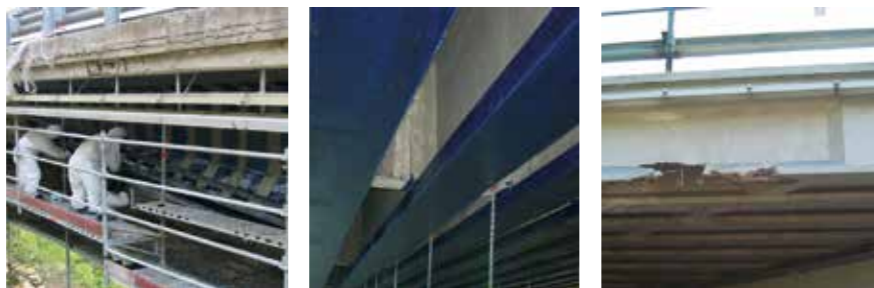
ADVANTAGES

The main advantages of fibre reinforced polymer materials are:

- Very high mechanical performance;
- Minimal thickness of intervention;
- Lightness;
- Fast and simple development;
- High reversibility of interventions.

The most common fields of application are:

- To increase resistance;
- To achieve seismic compliance or improvement;
- To reduce deformations during operation;
- As an integration to traditional reinforcement, either because it has suffered corrosive phenomena that has reduced its area of resistance, because the loads need to be increased, or because the set objectives were not sufficiently met during the design phase;
- To re-provide structural efficiency to elements that have suffered unforeseeable damage, such as in the case of impacted beams in overpasses.



_03.02

FiberFIP ADESIVI

ADHESIVES

Composite materials provide a structural contribution when, thanks to the adhesion between the support and composite material, they absorb part of the stresses to which the structure is subjected.

REFERENCE STANDARD

Adherence must be guaranteed by the application of specific adhesives, bearing the CE marking, to the interface between the substrate and the composite material. The reference standard is UNI EN 1504 part 4.

SELECTING THE PERFORMANCE CHARACTERISTICS OF MATERIALS

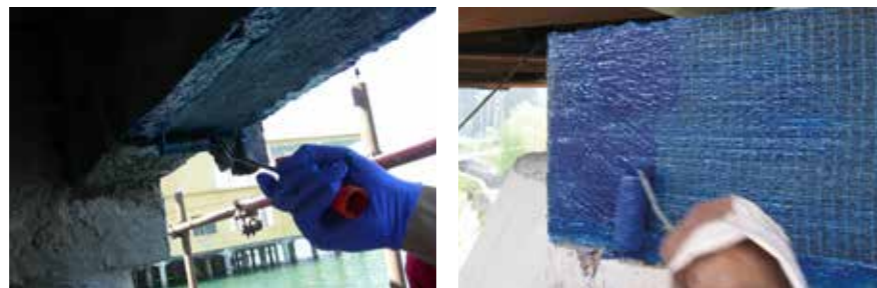
An adhesive suitable to develop reinforcements using composite materials must guarantee high performance in relation to the following main requirements:

- Vitreous transition temperature;
- Application temperature;
- Pot life;
- Adhesion to concrete;
- Adhesion to steel;
- Compressive strength;
- Flex-traction resistance;
- Resistance to thermal cycles and dry-wet cycles;
- Chemical resistance;
- Dielectric strength.

PREPARATION OF SUBSTRATE

In order to develop a durable reinforcement, particular attention must be paid to the preparation of the substrate, which must be:

- Integral and resistant;
- Rectilinear and flat, that is, free of bumps and dips, for example segregation or pitting;
- Free of sharp edges, which if present must be rounded;
- Perfectly clean and free of dust, grease or any other substance that may compromise adherence;
- Dry;
- Slightly roughened to facilitate adherence.



Generally speaking, before applying the adhesive, the substrate must be treated with a primer compatible with the adhesive that will be used.

Lastly, the adhesive must be applied in accordance with the following instructions:

- Suitable environmental and substrate temperature;
- Proper mixing ratio between component A and component B;
- Application process consistent with the pot life of the adhesive used.

APPLICATION TIPS

The summary table indicates the type of adhesive to use with the specific material for reinforcement works. See separate Technical Data Sheets.

DESCRIPTION OF PRODUCT	MODALITY OF APPLICATION	PRODUCT NAME
Epoxy primer used as an adhesion promoter for substrates in concrete and masonry.	Roll-on application	FiberFIP PRIMER 800
Epoxy adhesive and impregnating agent for the application of fabrics.	Manual application and impregnation of fabric with special rigid roller	FiberFIP ADESIVO 800

Warnings
The above information is of a general nature only.
It is therefore essential to consult the technical data sheet of the preselected product.



_03.03

FiberFIP FABRICS

FIBRE FABRICS OF CARBON OR GLASS

Fabrics are the most common form in which FRP materials are used in the structural reinforcement sector. They are woven with looms not unlike those used for normal textile products, using the selected fibre yarn.

The **FiberFIP** fabrics compose fibrous reinforcement systems that are impregnated on site. Such systems are composed of a phase consisting of carbon or glass fibres that are used to produce unidirectional fabrics by an industrial process, and a polymer phase consisting of a **FiberFIP PRIMER 800** and an adhesive **FiberFIP ADHESIVE 800** with which the reinforcement is glued to the substrate and the fabric is impregnated.

The **FiberFIP** fabrics obtained through an industrial weaving process have different characteristics depending on the nature of the filament (carbon or glass), the mechanical characteristics of the filament, or the tensile strength, the elastic modulus and the ultimate deformation.

The **FiberFIP** fabrics are **single-axis**, with the warp consisting of fibres arranged in parallel and held together by a weft of threads that does not perform a static function.

In order to obtain the requested reinforcement, it may be necessary to apply additional layers of fabric, which will subsequently be impregnated layer by layer. It is always recommended to protect the top layer with a protective system resistant to UV rays.

For correct application, it is recommended to consult the specific Preparation and Installation Manual and the Technical Data Sheets of each specific product.

The FiberFIP line offers the following fabrics:

FIELD OF APPLICATION	DESCRIPTION OF PRODUCT	WEIGHT	MODULUS OF ELASTICITY	RESISTANCE TO TRACTION	PRODUCT NAME
For flexural, shear or confinement reinforcement of structures following: <ul style="list-style-type: none"> increase in loads or modification to the intended use; variation to design specifications; degradation of reinforcements; seismic compliance; exceptional events such as: impact, fire, etc.; design errors; application errors. 	Unidirectional fabric in carbon fibre for the reinforcement of structures in reinforced concrete and masonry, of the FiberFIP (FRP) composite system.	300 g/m ²	≥ 250 GPa	≥ 3,000 MPa	FiberFIP CARBON T-UNI 230
	An unidirectional high modulus carbon fibre fabric for the reinforcing of reinforced concrete and masonry structures of the FiberFIP composite system (FRP).	300 g/m ²	≥ 390 GPa	≥ 2800 MPa	FiberFIP CARBON T-UNI 390
For reinforcement of masonry	An unidirectional fabric made of alkali-resistant fibreglass for the reinforcement of masonry structures of the FiberFIP composite system (FRP).	300 g/m ²	≥ 65,000 MPa	≥ 1,300 MPa	FiberFIP GLASS T-UNI 65
Monolithic reinforcement network for concrete and masonry in fibreglass and vinyl-ester resin.	Monolithic mesh composed of AR glass fibre (high chemical resistance) and vinyl-ester resin, with wire diameter of 8 or 10 mm, mesh of 150x150mm or 150x200mm.	Diameter 8 or 10 mm, mesh 150x150 mm or 150x200 mm	35 GPa	600 MPa	FiberFIP GLASS WIRE NET

Warnings

The above information is of a general nature only.

It is therefore essential to consult the technical data sheet of the preselected product.



Restauo strutture in muratura
RINFORZO STRUTTURE MURARIE **impermeabilizzazione**

Inghisaggio RIPARAZIONE STRUTTURE
IN CEMENTO ARMATO **INCOLLAGGIO**

Restauo
strutture in
muratura **SIGILLATURA** FISSAGGIO Inghisaggio

ANCORAGGIO **Riparazione**
strutture in c.a.

Rinforzo strutture murarie **impermeabilizzazione** fissaggio Sigillatura
RIPARAZIONE STRUTTURE MURARIE **ancoraggio**

PROTEZIONE AGGRESSIVI
DELL'AMBIENTE

