Recovery and restoration for a more durable concrete

Volumetric reconstruction
Reinforcement bars treatment
Surface protection

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SYSTEM CERTIFICATION ISO 9001 SGS

Concrete recovery and restoration

Concrete is undoubtedly a material widely used in construction, thanks to its cheapness, ease and speed of installation, however, the topic that has always been discussed is the durability of reinforced concrete products. The concrete is subject to aggressive action deriving from the environment, which often generates degradation on the structure, in particular with the corrosion of the reinforcement bars. The electrochemical phenomenon comes from carbon dioxide and chlorides, respectively with widespread and localized disruptive effects (pitting corrosion). Degradation can also affect the cementitious matrix due to physical-chemical actions such as physical-chemical actions such as freeze-thaw cycles, shrinkage, thermal phenomena, acid attack, alkali-silica reactions and sulfates.

Main causes of degradation on reinforced concrete structures

Exposure classes: EN 206 and UNI 11104 standards

Carbonation corrosion (XC)
The action of CO2 produces a change in the alkaline environment within the cement matrix, bringing the pH to a neutral value. The depassivated reinforcement bars are vulnerable to the effect of oxygen and humidity, with the initiation of corrosive phenomena.

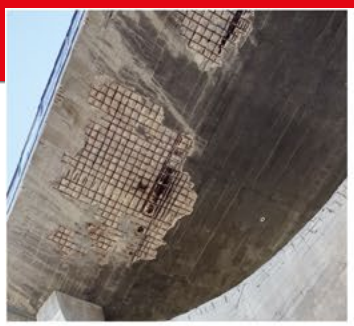
Chloride corrosion (XD and XS)
They can be present in industrial process water (XD), in marine aerosol or in sea water (XS). They penetrate into the concrete causing corrosion of the rods and swellings

Freeze-thaw action and anti-freeze salt action (XF)
The phase change of water from liquid to solid due to the effect of frost, with an increase in volume, causes a disruptive effect within the capillary pores of the concrete with the appearance of widespread cracks.

Chemical attack (XA
Aggressive substances contained in water and soils in contact with concrete structures that affect the cementitious paste.

Mode of intervention, degradation by carbonation. Main phases:

STEP 1: Evaluation of the state of deterioration of the existing concrete existing concrete, survey of corrosion phenomena of the reinforcement of reinforcement, definition of the depth of carbonation.



STEP 2: Preparation of the surfaces according to the evaluations indicated above with removal of the surface layer of carbonated and incoherent concrete, to obtain a surface wrinkled able to facilitate the adhesion of the layer of mortar for repair. Surface demolition can be carried out by means of hydro demolition and / or hydro sandblasting until you discover the reinforcing bars along their entire perimeter. Subsequent cleaning of the surface of the oxidized reinforcing bars by dry brushing and / or sandblasting for the purpose to bring the armor to white metal (Sa 2.5 - EN ISO 8501).

STEP 3: Application of two-component protective passivator **FERROSAN** on reinforcing bars. In the preparation phase of the product, add the powder to the liquid, without adding water, mixing thoroughly with a mechanical stirrer for approx. 3 min in order to obtain a fluid and free of grout lumps. Spread the product with a brush in two coats within ca. 30 min. from cleaning the reinforcement iron. Wait for about 60 min. between one coat and the other and no more than 24 hours

STEP 4: Injection of resins for the consolidation and sealing of the cracks with the following procedure:
-Sealing of cracks (up to about 3 mm) with epoxy putty **RESIN 90**;
-Injection of injectors every 50 cm approx;
-Injection with fluid epoxy resin **RESIN INJECT SF** starting from the lowest point and up to complete saturation.

STEP 5: Reconstruction of sections and damaged parts with one-component or two-component cementitious mortars **CONCRETE ROCK V** or **CONCRETE ROCK V2**. In the case of reinforced concrete elements, it is possible to use **CONCRETE ROCK H** pourable mortars, also additivated with aggregates or with **CONCRETE ROCK HPFRC** metal fiber reinforced mortars.

STEP 6: Anti-carbonation protection of concrete by smoothing with **RASEDIL AS** two-component polymeric smoothing compound and **RESINCOLOR** methacrylate paint or **RESINLAST S** highly elastic polyurethane paint.

GROUTING

CONCRETE ROCK HF is an expansive cement mortar with high mechanical strength, high adhesion to concrete and steel, waterproof and durable even in aggressive environments.
CONCRETE ROCK HF is applicable for grouting by pouring for centimeter thicknesses between plate and foundation.
CONCRETE ROCK HF complies with the requirements and acceptance limits for expansive mortars for anchoring according to EN 1504-6.

LOW THICKNESS CONSOLIDATIONS

CONCRETE ROCK HPFRC is a cementitious mortar, premixed, pourable, with controlled shrinkage, with very high ductility, fiber-reinforced with rigid Armospritz metal fibers and Remat synthetic fibers, resistant to aggressive environmental agents. It allows to consolidate, restore and / or roughen reinforced concrete elements, through application by pouring for thicknesses from 2 to 5 cm without electro-welded mesh, which must resist dynamic and seismic seismic stress, impacts or particular hydraulic stresses, such as: freeway joints, extrados of slabs, pillars and hydraulic structures subject to cavitation or transport.

Products for concrete restoration according to EN 1504 CE

The technical documentation is available on the website www.gpintech.com at the link https://www.gpintech.com/prodotti/

PRODUCTS	DESCRIPTIONS
FERROSAN	Two-component product based on additives, resins and antioxidants suitable for the protection of reinforcing bars in the recovery cycles of concrete. Excellent resistance to chlorides, sulfates and the passage of CO2. Complies with standard EN 1504-7.
RESIN INJECT SF	Fluid epoxy resin for injections, low viscosity, two-component with high characteristics of penetration and wetting of the support. It complies with the EN 1504-5 standard.
RESIN 78	Two-component formulation based on water-compatible epoxy resins, free of solvents, thinners and plasticizers, particularly suitable for casting between new and old concrete. Complies with EN 1504-4 standard.
CONCRETE ROCK V	Premixed, single-component, fiber-reinforced cementitious mortar to obtain rheoplastic, thixotropic mixtures with compensated shrinkage. It is in class R4 according to the EN 1504-3 standard.
CONCRETE ROCK V2	Re-plastic, thixotropic, bicomponent, fiber-reinforced, cement-based mortar with compensated shrinkage and low elastic modulus for structural repairs. It is in class R4 according to EN 1504-3.
CONCRETE ROCK HPFRC	Cementitious mortar, premixed, pourable, with compensated shrinkage, with very high ductility, fiber-reinforced with metal fibers and synthetic fibers, resistant to aggressive environmental agents. It is in class R4 according to the EN 1504-3 standard.
CONCRETE ROCK H	Ready-mixed, ready-to-use, pourable cementitious mortar for obtaining re-plastic, non-segregating, fluid, bleeding-free, shrinkage-compensated mixes. In compliance with EN 1504-3 standard.
CONCRETE ROCK HF	Expansive cementitious mortar with high mechanical resistance and high adhesion to concrete and steel. It complies with the requirements and acceptance limits for expansive mortars for anchoring indicated by the standards: UNI 8993 and UNI 8994 for consistency classes for superfluid, fluid and plastic types; UNI8994, UNI 8996, UNI 8147 for the expansion both in plastic and hardened phase; UNI 8998 for the absence of bleeding. In compliance with EN 1504-3 and EN 1504-6 standards.
RASEDIL AS	Two-component, fiber-reinforced cementitious mortar for medium thickness smoothing with high adhesive power consisting of hydraulic binders, fine siliceous aggregates and special additives. Compliant with EN 1504-2 standard.
RESINCOLOR	Methacrylic paint with high content of solids in solvent, protective, breathable and colored with high covering power. In compliance with EN 1504-2 standard.
RESINLAST S	Two-component colored coating based on unmodified hydroxylated acrylic resins for the protection of concrete, cement mortar and iron. Applied as a topcoat over a primer such as RESILAST PRIMER C, it provides effective, long-lasting and aesthetically pleasing protection. Complies with the EN 1504-2 standard.

Case history: Former tobacco factory in Rovereto (TN)

Within the building sector of the former Tobacco Factory in Rovereto, the University of Trento has undertaken an adaptation plan for some buildings with functional readjustment of the same to spaces for scientific research.
The restoration of the pillars in reinforced concrete has provided for the demolition of the deteriorated concrete, cracked and inconsistent up to make visible the reinforcing bars; subsequent cleaning of the surfaces by dry brushing and brush application of epoxy formulated corrosion inhibitor **FERROSAN** and the improvement of adhesion between the old surface and the new restoration material.
Finally, the volumes of material removed were reconstructed with thixotropic fiber-reinforced two-component mortar with compensated shrinkage **CONCRETE ROCK V2**. In order to increase the shear strength and confinement of the pillars, it was made an intervention of structural consolidation, using **CFRP** (Carbon Fiber Reinforced Polymer) system with unidirectional carbon fiber fabrics **C-SHEET 240/300** applied with epoxy adhesives **RESIN PRIMER and RESIN 75**.

THIRTY YEARS EXPERIENCE IN INNOVATIVE CONSTRUCTION TECHNOLOGIES

G&P Intech is a technology partner and provider of prestigious international groups that supply special products and technologies to the anti-seismic, structural recovery of cultural heritage, new construction and infrastructure sectors.

G&P Intech offers technical consultancy and service engineering, supply of highly reliable and durable materials and technologies, technical assistance on construction sites to Public Boards, Construction Companies, General Contractors, Engineering Companies and Specialized Appliers.

G&P Intech is placed in the national and international territory with its own commercial agencies, technical consultants and specialized installers.

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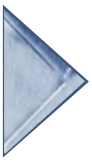

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