

WATERPROOFING DESIGN

Solutions for waterproofing pools



VOLTECO
WATERPROOF TECHNOLOGY

Contents

1. Pools	4
2. Types of pools	6
3. Technical issues	7
<i>Structure</i>	
4. New construction	10
5. Renovation	12
6. Finishing	14
7. Product Focus	18
7. Installation details	24
8. Water containment	25
12. Certifications & Warranties	26
13. Volteco services	27

Waterproofing Design



Pools

> **3.200** Public swimming pools in Italy

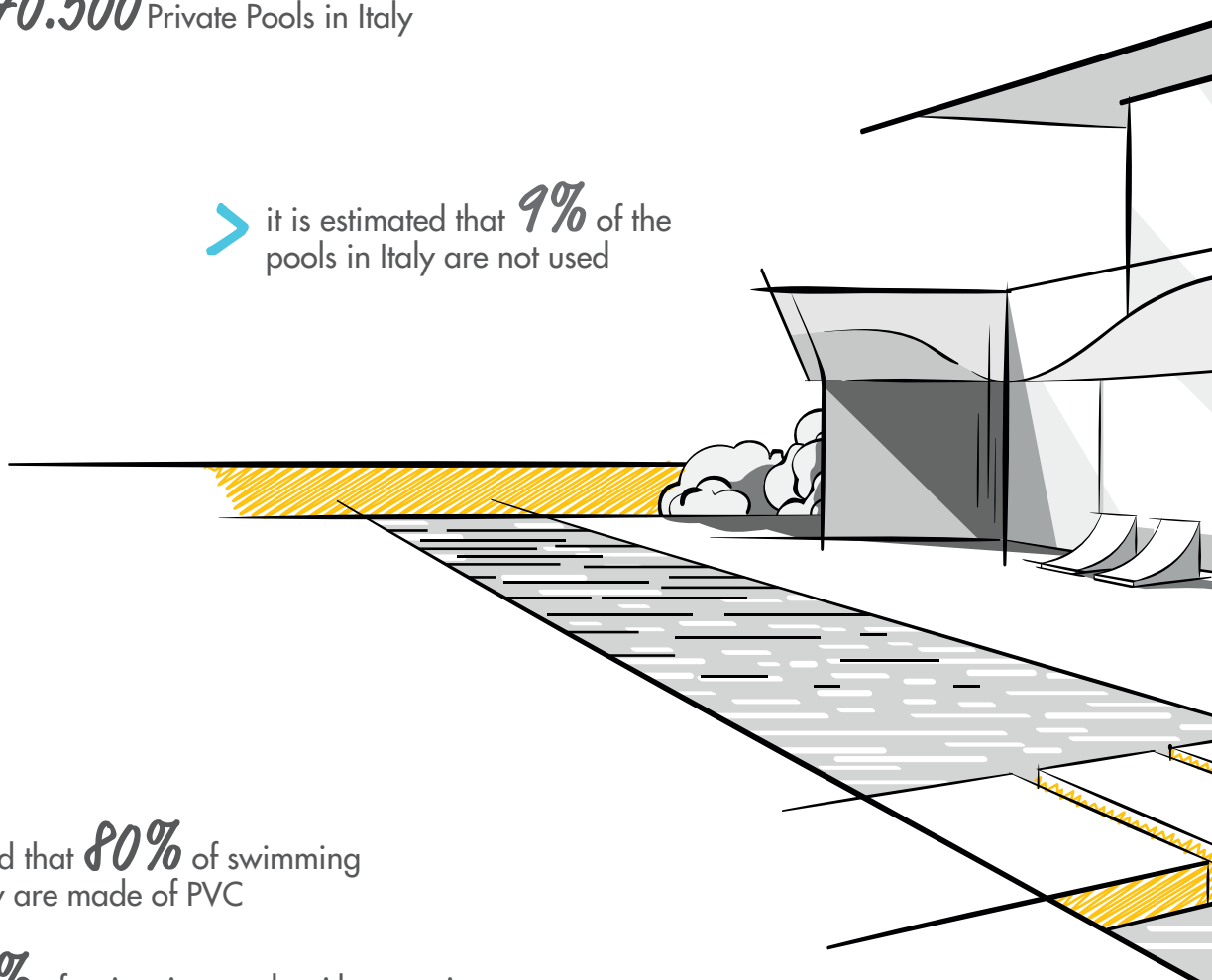
> **70.500** Private Pools in Italy

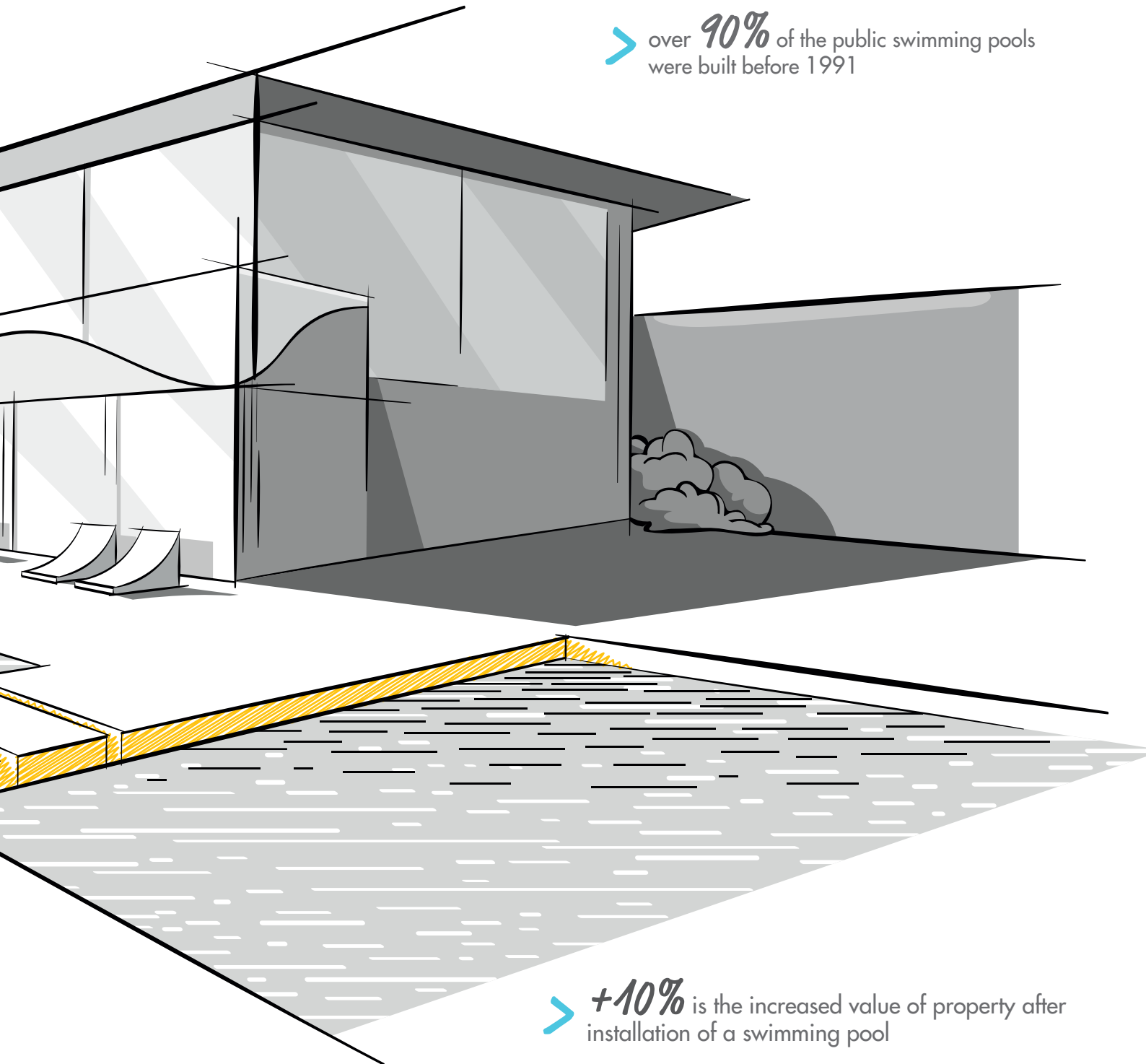
> it is estimated that **9%** of the pools in Italy are not used

> It is estimated that **80%** of swimming pools in Italy are made of PVC

> **15%** of swimming pools with ceramic or natural stone lining

> **5%** of swimming pools coated with paint





> over **90%** of the public swimming pools were built before 1991

> **+10%** is the increased value of property after installation of a swimming pool

> every **10** years a swimming pool needs maintenance and adaptations

Ref. Volteco Research Centre
Data referred to italian market

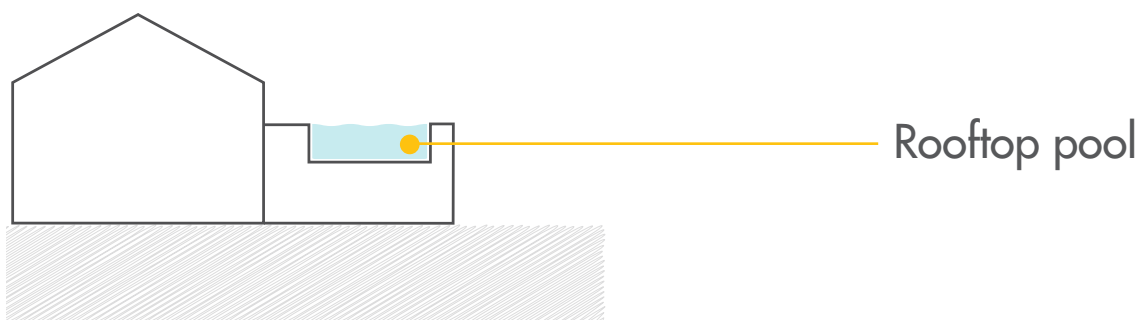
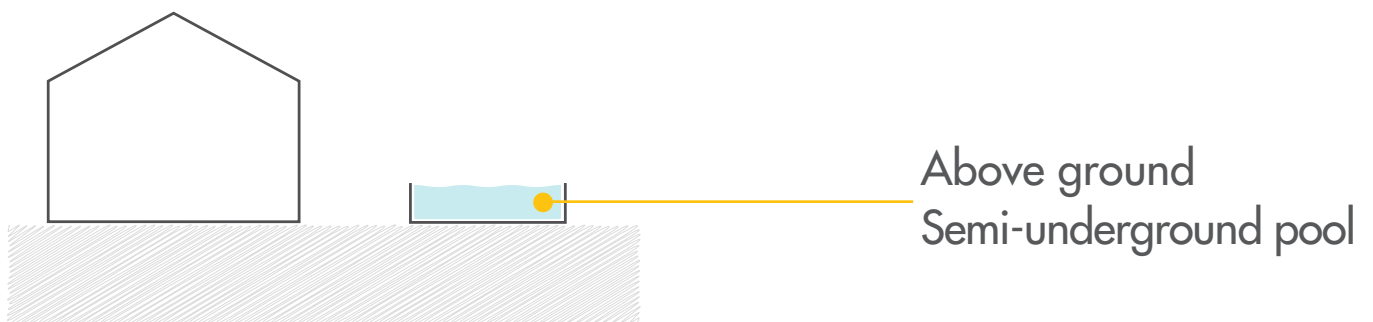
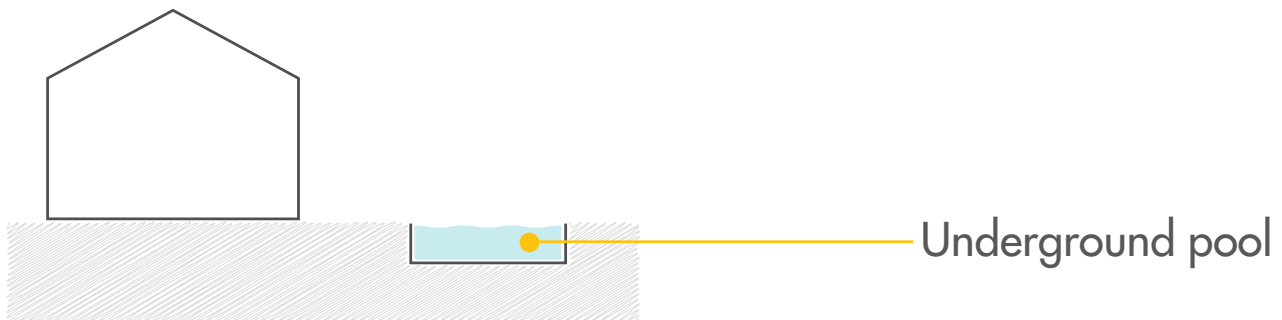
Types of pools

When it comes to the construction of a swimming **pool**, there are many aspects to consider.

The first point is certainly the choice of **type**. In fact, it is clearly different to design an **underground** pool compared to a **rooftop** one.

In the first case, a complete **geotechnical approach** must be carried out, while in the second case, all aspects of exposure to **meteorological** and climatic **events** must be considered with the relative greater possibilities of **movement** of the building.

In the presence of **underground pools**, **internal and/or external waterproofing** must be provided, resistant to hydrostatic pressure; in the case of a **rooftop pool**, on the other hand, the biggest problem will be the management of **movement joints** because this structure has a greater degree of movement than the previous one.



HYDROSTATIC PRESSURE

When you have to proceed with the construction of a swimming pool, it is essential to choose a waterproofing system resistant to hydrostatic pressure. The two types of hydrostatic pressure have the following characteristics:



Negative hydrostatic pressure

The waterproofing undergoes a detachment attempt due to water buoyancy. The condition of negative hydrostatic pressure, in fact, occurs when **the liquid exerts pressure at the coating's adhesion interface**, thus exerting pressure to detach the coating from the substrate.



Positive hydrostatic pressure

The waterproofing is pushed by the water towards the structure. The condition of positive hydrostatic pressure occurs when **the liquid exerts pressure directly on the coating**, which is then compressed onto the substrate.



Example of waterproofing **inside** the structure



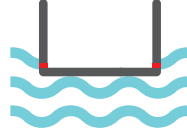
Example of waterproofing **outside** the structure

Technical issues

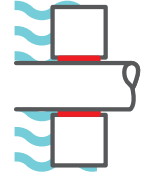
The main critical points, as for all the artefacts subject to hydraulic pressure in the swimming pool area, are:



Cracks



Construction joints



Penetrations



Structural injuries



Expansion joints

RECURRING ISSUES

- **Groundwater infiltration**

To pay attention to the **water table**, both constant and temporary, is the first point to be taken into account when building a underground pool. Even existing polls can be subject to sudden oscillations of **groundwater**. The most suitable **type of waterproofing** can be decided after making these assessments and in line with the context where it is inserted.

- **Non-waterproofed technical details**

Penetrations, rebars, level stakes, pipelines, water pumping accessories, lighting fixtures are the preferential routes for the **passage of water**.

- **Infiltration in utility rooms**

Infiltrations in the technical rooms, the heart of the pool, are often caused by incorrect treatment of the **concrete casting**, by a lack of waterproofing, by any **cracks** due to physiological structural settlements. For this reason, it is important to also consider the waterproofing of these areas that play a **fundamental role** in the correct functionality of the pool.

- **Aesthetic damage**

In environments such as swimming pools and wellness centers, a lot of attention is paid to the **aesthetic part**. It is therefore necessary to identify **solutions** in line with the required aesthetic **expectations** and at the same time functional and performance.



Pools are very often **customised** with shapes, cladding, perimeter edge, internal staircase, diving board, handrail. These are all critical points to take into account when **designing waterproofing**. In addition, the pool is an environment where the **water** constantly needs to be **filtered** and **purified** to maintain the **right parameters** for safe and comfortable bathing.

It is therefore also important to pay attention to the system chosen to manage **water recirculation** in order to design the most appropriate waterproofing.

- **Skimmers**

Characterized by the **water level** below the external surface of about 5/10/15 cm depending on the model chosen, the skimmer solution is characterized by the presence of "openings" through which the pool water is **sucked in** by the pump, passed through the **filtration and disinfection** system present and introduced back into the pool through the nozzles located on the walls.

- **Overflow swimming pools**

The **water level** is continuous with respect to the **outer edge**, the pool water "overflows" inside a **channel** (sometimes creating a real waterfall) through which it is brought to the **compensation tank**, then to the filtration and disinfection system present and introduced back into the pool through nozzles usually placed on the **floor**.



It's a waterproof life.

NEW CONSTRUCTION

Waterproofing cycle

1 AMPHIBIA 3000 GRIP

Waterproof membrane

2 WT CONSTRUCTION

Reinforced hydro-expansive profile

3 AKTI-VO 201

Hydro-expanding mastic

4 FINISHING

See page 15

Watertight waterproofing

Advantages:

- Absolute impermeability with no side seepage of water
- Immediate mechanical protection, self-repairing also in case of accidental perforations
- High resistance to hydraulic load
- High flexibility and capacity to bridge cracks



It's a waterproof life.

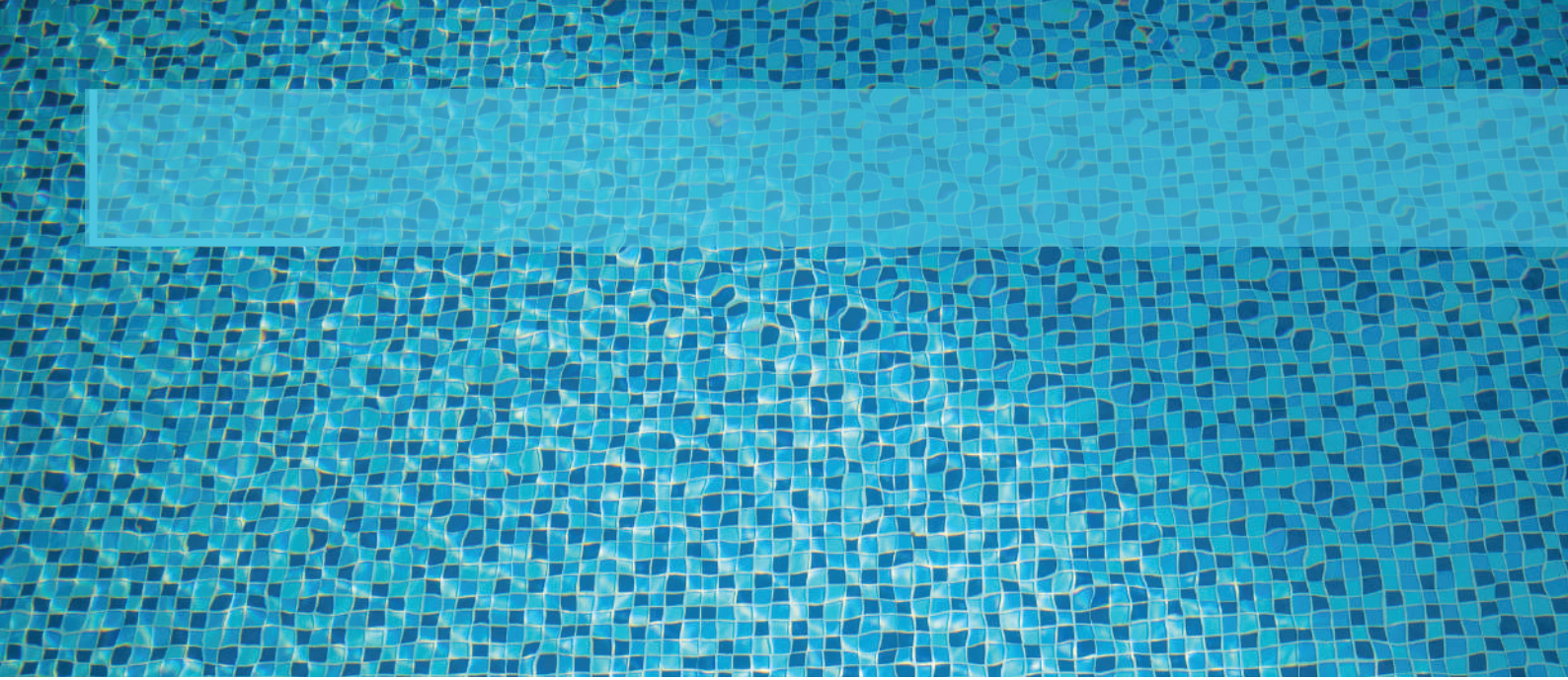
Waterproofing cycle

- 1** AKTI-VO 201 / I-PLUG
Hydro-expanding mastic / Ultra-quick waterproof mortar
- 2** BI MORTAR LEVELLING SEAL
Waterproofing horizontal interior surfaces
- 3** BI MORTAR PLASTER SEAL + RETE REVOMAT
Waterproofing vertical interior surfaces
- 4** BI FLEX SYSTEM
Sealing joints and cracks
- 5** FINISHING
See page 15

Thick waterproofing

Advantages:

- Excellent resistance to negative pressure
- Excellent adhesion
- Also applicable on uneven surfaces
- Regularises and waterproofs in one solution



TROWEL FINISHING



BLUE



SAND



It's a waterproof life.

CERAMIC FINISHING cycle

- 1** PLASTIVO
Flexible waterproofing
- 2** CERAMIC FINISH

MINERAL FINISHING cycle

- 1** BI MORTAR CONCRETE SEAL
Cement-based waterproofing compound with crystallisation
- 2** BI MORTAR RASO SEAL
Waterproof, flexible and pigmentable finish

TROWEL FINISHING

MARBLING EFFECT

MARBLING EFFECT

PAINT FINISHING cycle

- 1** BI MORTAR CONCRETE SEAL / PLASTIVO
Cement-based waterproofing compound with crystallisation / Flexible waterproofing
- 2** PROFIX 80
Waterproof anchoring bottom
- 3** CRYSTAL POOL
Satin-effect paint

BLUE

SAND

WHITE

WHITE

BI MORTAR PLASTER SEAL

Fibre-reinforced waterproofing mortar for thick layer applications (vertical surfaces)

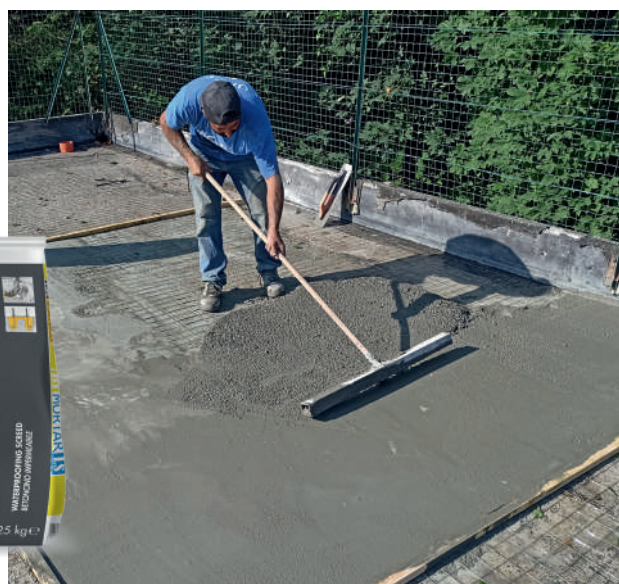
Fibre-reinforced coating plaster with waterproofing suitable for regularising both mixed and reinforced concrete masonry.



BI MORTAR LEVELLING SEAL

Waterproof pourable concrete (horizontal surfaces)

Pourable and waterproof concrete for levelling and waterproofing, even in cases of negative hydraulic pressure, horizontal structures.



BI MORTAR CONCRETE SEAL

Crystalline waterproofing

A crystalline cross-linking cement-based waterproofing product. This creates a continuous coating that prevents the penetration of water even with negative pressure.

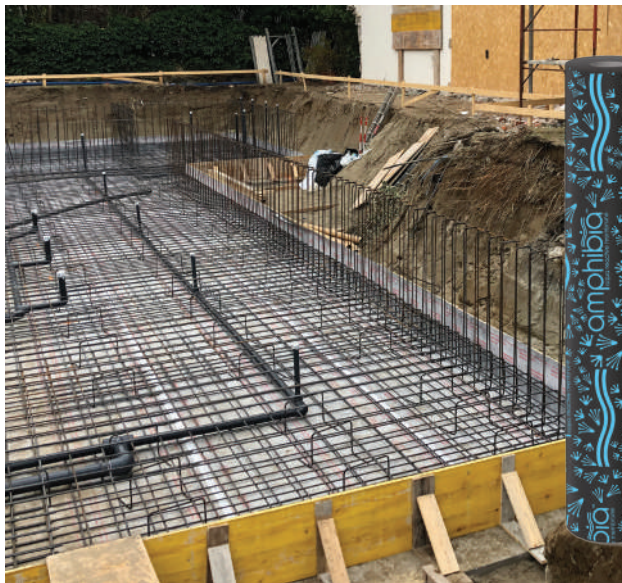




BI MORTAR RASO SEAL

Skim coat with waterproofing and finishing function

White, flexible and decorative waterproofing coating. It is pigmentable according to your preferred shade.



AMPHIBIA 3000 GRIP

Hydro-reactive multilayer waterproof membrane

Self-fastening, self-repairing and self-sealing hydro-reactive multilayer waterproof membrane.



WT CONSTRUCTION

Hydro-expansive waterstop

Hydro-expansive profile, which seals casting joints in reinforced concrete structures, even in the presence of strong water pressure.



AKTI-VO 201

Synthetic rubber hydro-expansive mastic

Hydro-expansive mastic for the sealing and definitive waterproofing of penetrations and cracks in general. Allows you to intervene directly at the point of water ingress.



SPIDY 15

Quick-setting waterproof mortar

Pre-mixed quick-setting cement-based mortar for quick repair jobs on reinforced cement and cement-based surfaces in general.





BI FLEX SYSTEM

Elastic tape based on TPE polymers + epoxy adhesive

A combination of waterproof elements to treat joints and cracks. It consists of an elastomeric terpolymer-based elastic tape and a two-component epoxy adhesive



PLASTIVO 180/250

Two-component flexible waterproofing compound

Waterproof coating, modified polymer, two-component with high flexibility.
Versatility of use to waterproof surfaces subject to positive and negative hydrostatic pressure.

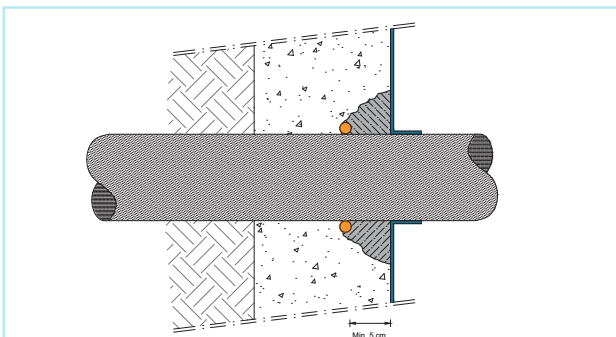


WATERPROOFING AND PLANT ENGINEERING: INTEGRATED SYSTEM REQUIREMENTS

The possibility of using **waterproofing systems with hydro-expanding sealants** is the natural and safe way to tackle problems concerning the integration of **penetrations** (1.1), such as light fixtures or air nozzles or drainage systems, while leisurely taking care of water tightness not just by the simple bonding of different materials but also working in contrast, to avoid, for example, suffering from the vibrations induced by the blowing of air into water even in motion.

When the system generates its own vibrations on a pipe inserted into a rigid housing structure, various types of problems normally arise.

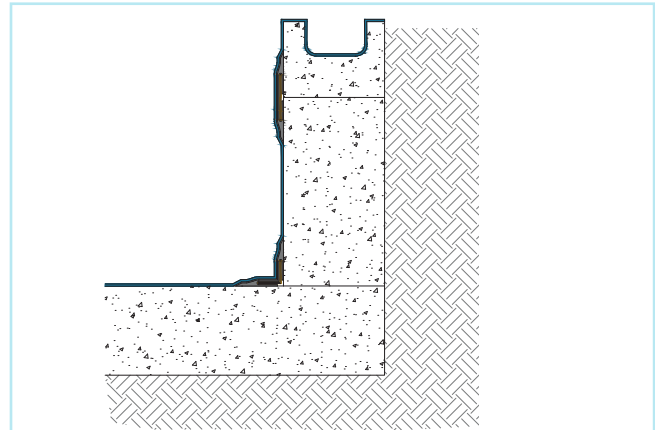
The ideal integration must consider **elastic sealants** capable of working in contrast between the system and the housing regardless of the materials and with continuity with respect to the waterproof membrane with which it must bond.



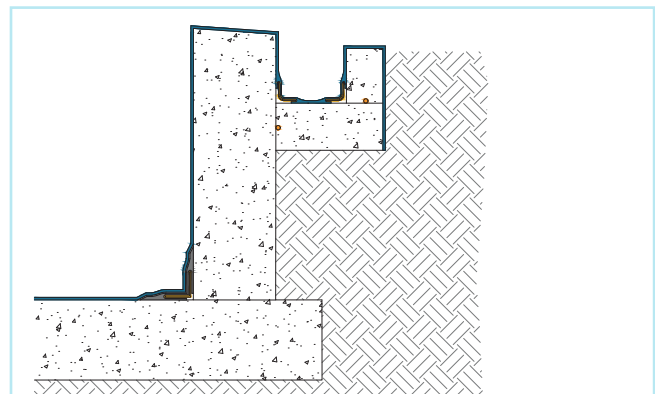
1.1 Sealing of penetrations

Expansion joints treated with specific joint cover tapes must be provided, perfectly integrated in the waterproofing allowing structures the necessary movement, even several centimetres, since not only monolithic elements are managed but also tanks of various depth and/or routes of various water head or weight.

Another issue to face is the presence of **drainage systems** inside the water storage system (pool or tank) or positioned at the surface. For the former (1.2) connection with waterproofing is made as mentioned above, while the latter (1.3) features all types of variables, differing one from another, namely:



1.2 Waterproofing of pre-cast channel



1.3 Waterproofing of channel cast in situ

- Assurance of waterproofing continuity between different materials (water, metal, ceramic, etc.);
- Direct exposure to different atmospheric agents (freezing-thawing cycles, UV rays, temperature excursions, etc.);
- Assurance of waterproofing continuity between different shapes;
- Assurance of material resistance (waterproofing or draining) to different types of liquids;
- Combination between drainage and waterproofing effectiveness with aesthetic requirements.

This way the design should focus on all those details that become essential for the **effectiveness of waterproofing**.

Certifications & Warranties

CERTIFICATIONS

PROCEDURES AND CHARACTERISTICS OF THE PRODUCTS TO BE USED FOR THE REPAIR, MAINTENANCE AND PROTECTION OF CONCRETE STRUCTURES - STANDARD EN 1504

This standard establishes how to proceed with the nominal life of structural works, intended as the number of years for which the structure will be used for its intended purpose, provided that routine maintenance is performed. Therefore the need to create an effective protection of the structures against the absorption of aggressive environmental agents is evident, also delaying the corrosion phenomena of the reinforcements (anti-carbonation effect). It is also essential to waterproof the structures from atmospheric phenomena, avoiding the stress caused by freezing/thawing cycles, creating an effective UV ray barrier and sealing all existing cracks.

The **Ministerial Decree 174/2004** regulates the materials and objects that can be used in fixed systems of collection, treatment, delivery and distribution of water intended for human consumption: it is in force since 2007 and has governed the materials in contact with water intended for human consumption.

LIQUID-APPLIED WATER IMPERMEABLE PRODUCTS FOR USE UNDER CERAMIC TILING BONDED WITH ADHESIVES - STANDARD EN 14891:2012

This standard establishes the criteria, test methods and requirements for conformity assessment, classification and designation of liquid-applied waterproofing products to be used under ceramic tiling bonded with adhesives.

- CM liquid-applied water impermeable cementitious products. To be compliant, the products must also have minimum adhesion strengths $> 0.5 \text{ N/mm}^2$ in all the required tests, they must have a crack-bridging ability $> 0.75 \text{ mm}^2$ and must be impermeable to a pressure of 150 KPa.
- P Products that have minimum adhesion strengths $> 0.5 \text{ N/mm}^2$ even after the contact test with water containing chlorine.

WARRANTIES

What does Durability mean for Volteco?

It means certifying the quality of its applied systems over the years or subjecting one's work to constant control through real, on-site, past and present achievements. Thanks to this check-up, our technicians evaluate different levels of in-depth analysis: on the one hand the history of the construction, the pre-intervention analysis, the state of affairs, the environmental and geophysical situation. On the other hand, the cataloging of the building's problems in relation to waterproofing and the presence of water, with the description of Volteco's solutions.



Targets



Quality



Durability



User guarantee

Volteco services at your disposal

> **Services for
the designer**

BIM
Building Information Modeling
CUSTOMIZE YOUR PROJECT

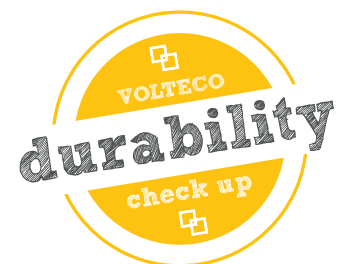
> **Support for
professionals
and installers**



> **Qualified installers**



> **More than 2.200 references:
www.volteco.com**





VOLTECO S.p.A.
Via delle Industrie, 47
31050 Ponzano Veneto (TV) Italy
tel. +39 0422 9663 - fax +39 0422 966401
volteco@volteco.it
www.volteco.com



COMPANY CERTIFIED MANAGEMENT SYSTEM QUALITY - ISO
9001 - ENVIRONMENT ISO 14001 - SAFETY ISO 45001

Information, images, texts contained in this brochure are property of Volteco spa; they are to be considered purely indicative and are subject to change at any time and without notice. The most updated version of this documentation is available on www.volteco.com.

PA-BF-GB-I-C-IL-EW-E-M-EN-EQ-FH-ET DT 04 00 03/2024 EN