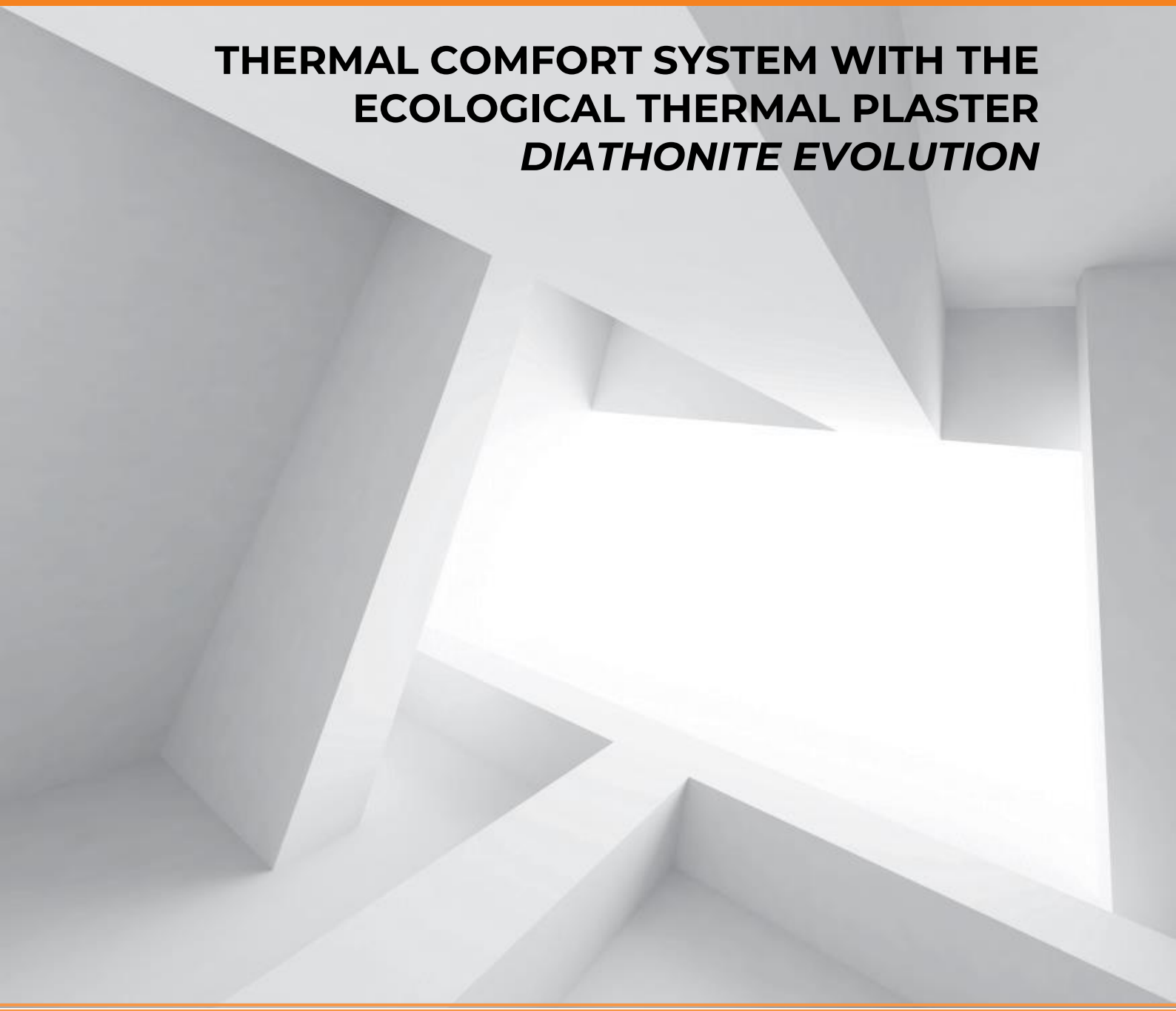
Technical Handbook for External Application of Thermal Plaster



THERMAL COMFORT SYSTEM WITH THE ECOLOGICAL THERMAL PLASTER *DIATHONITE EVOLUTION*

DIASEN®
GREEN BUILDING FUTURE

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1. WHO WE ARE

Diasen was founded in the year 2000 and is specialised in the production of ecological materials and natural paints for sustainable comfort, able to satisfy the multi-faceted needs of thermal, acoustic and hygrometric wellness in homes and buildings.

Diasen solutions are characterised by the use of inorganic and natural raw materials from cork bark. The company is very active and committed to the implementation of policies inspired by the principles of circular economy and sustainability lived both in environmental and social terms. Diasen has been a B Corp® company since 2017 and a Benefit Corporation since September 2020.

2. INTRODUCTION

This document has been prepared on the basis of our best technical and applicative knowledge, with the aim of providing operating instructions for the installation of **Diathonite Evolution** (**Figure 1**), lightweight thermal insulation plasters based on cork and other natural raw materials.

It is understood that all the information given is of a general nature and must be contextualised to the specific intervention, according to what is foreseen in the project and what is prescribed by the Works Management. Like other external insulation systems, preparing the substrate prior to applying Diasen external thermal plaster is extremely important.

Figure 1: Diathonite Evolution and external finishes applied to St Catherine's College Cambridge

If the substrate is not prepared to receive the system as intended, then this can have severe implications on the performance and aesthetics of the system i.e. if the wall is not straight or plumb then the overall finish will not be straight or plumb as the system will follow the contour of the existing substrate, though plaster layers can be built up to attain a plumb finish. It is always recommended that the following is undertaken prior to the application of Diasen external thermal plaster system:

- Check for rising/ground source damp and the causes
- Check for existing movement joints and make provision to reflect this in the new installation
- Check for efflorescence (lime bloom) or if similar problems have been treated and remedied that the masonry has dried out sufficiently
- Test the walls for any defects
- Carry out a line and level survey to determine if a dubbing out or levelling coat is required which will assist in informing volume of material required
- Remove moss, lichen, mould, and treat with an anti-fungicidal wash if required
- Identify any unusual detailing issues
- Determine if any architectural features need preserving or re replicating in order to be repositioned and placed within / on the new Diasen system
- Evaluate access to the property, heights of the building and security of tenants
- It is the responsibility of the designer/client to contact the local planning department to evaluate if planning permission is required. This is of particular importance if the property is situated in a conservation area or area of outstanding natural beauty or if the property is listed etc.
- Discuss finishes, colours and textures with the client
- Ensure the eaves and roof zone should have adequate insulation to avoid cold bridging at these junctions
- Evaluate the need for repositioning of or temporary removal and / or extension of services such as overhead electricity, TV, telephone and broadband connections / equipment, gas or oil pipe work, electricity or gas meters, lights, rainwater goods etc.

Once the building survey / pre installation survey has been completed, drawings and specifications for each elevation that is to receive an Diasen system should be prepared and instigated prior to the project starting. The drawings and specification should include some or all of the following:

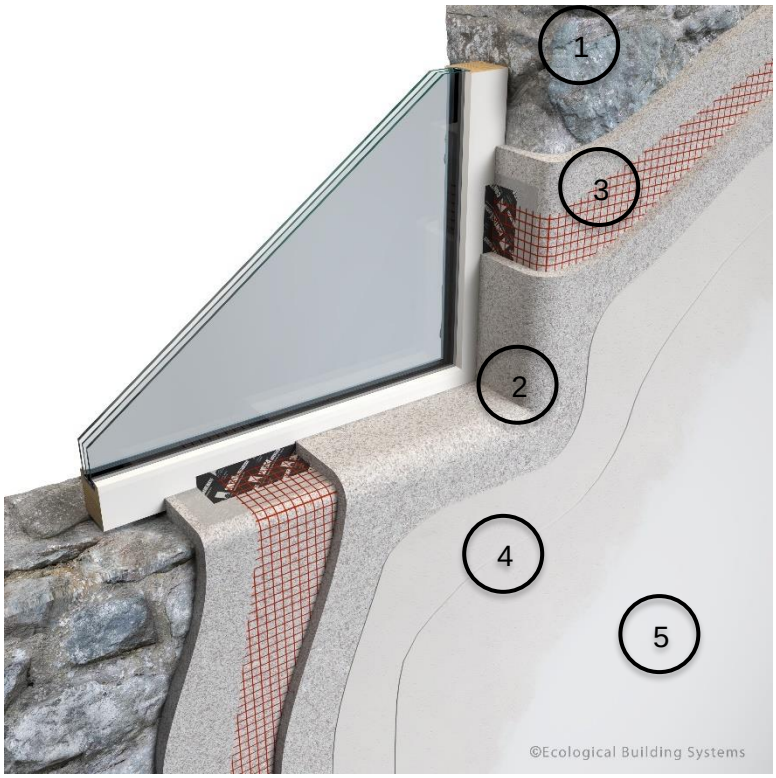
- Clear detailing at base of wall and means by which drainage occurs
- Detailing around doors, windows, eaves, projecting balconies, coping details and special details such as abutments, extensions (robust standard solution / typical design details available from Diasen)
- Areas where additional weather tight tapes and seals are needed
- Location of movement joints, if needed.
- Location and positioning of beads and trims
- Flashing details
- Window and door sill details
- Architectural features i.e. quoins, external cornicing, stringers, keystones, window headers, window sills, window architraves, corbels, arches, flat bands, raised or recessed bands, ashlar cuts and columns etc.
- Coping details and special details such as abutments, extensions
- Attachments such as gates and fences, clothes lines and satellite dishes.

The systems should be continuous, as breaks can create cold bridging and junctions are potential weak zones for moisture ingress. The system designer should engage with the installation contractor and attend site, where possible, to undertake a project inspection on the installed system.

3. THERMAL INSULATION PROCESS: COMPONENTS

Diasen Diathonite cork lime thermal plasters are specifically formulated for internal and external use on masonry buildings. The following section (**Figure 2**) outlines core components within the system.

Ancillary items such as primers and finishes are expanded upon within specific data sheets and further sections of this document.



1) Masonry Wall

2) Diathonite Evolution

3) POLITES 140 Reinforcing Mesh

4) Argatherm Finishing Plaster

5) Primer & Breathable Exterior Paint

Figure 2: Core system components of the Diasen Diathonite External Insulation System

3.1. SPRAYABLE CORK-BASED THERMAL INSULATION: *DIATHONITE EVOLUTION*

The company's flagship products have been designed, perfected and formulated to provide thermal insulation in both summer and winter, contributing to hygrometric comfort indoors. Valuable features include high breathability, lightness and high porosity, the combination of which prevents mould and condensation by absorbing and releasing excess moisture. Several references are related to this highly-performing product, as shown in **Figure 3**, **Figure 4** and **Figure 5**. Diathonite Evolution contains the following breathable components:

- Cork
- Hydrated lime
- NHL 3.5
- Diatomaceous earth
- Clay

In combination with the other products composing the application process, it creates a stable and long-lasting system, making **Diathonite Evolution** ideal for historical restoration; in fact, since the product can be applied on already existing masonry, it preserves it in time.

Moreover, the products have a *double CE marking* (EN 998-1, EN 998-2), have been tested for *reaction to fire* (class A1), are ecological. **Diathonite Evolution** is recyclable as an inert material at the end of their life, are natural compounds and suitable where environmentally friendly materials are required. Diasen components including Evolution, the Argatherm smoothening plaster and finishing paints have independently verified EPD®s. They contribute to *LEED®* and have been tested for the major international standards as for the VOC content, being promoted as *low VOC emitting products*.

More information regarding technical data and final performances of these lightweight thermal insulation plasters can be found in the **Table 1** reported below.

Table 1: Technical data and final performance relative to the lightweight thermal insulation plaster made from cork and natural raw material, namely Diathonite Evolution. For more information, please refer to the product TDS.

DIATHONITE EVOLUTION		
Technical data		
Features		***Unit***
Yield	3.70 (±10%) for 10mm of thickness	kg/m²
	1.92 (±10%) per inch of thickness	lb/ft²
Aspect	powder	-
Colour	light grey	-
Density	360 ± 20	kg/m³
	22.5 ± 1.25	lb/ft³
Grain size	0 – 3	mm
	0 - 0.12	in
Water to add to the mixture	0.60 – 0.80 L/kg 11 - 14 L for each 18 kg bag	L/kg
	0.072 – 0.096 gal U.S. per paper bag (39.68 lb)	gal (US) / lb
Minimum thickness for application	20	mm
	0.8	inches
Maximum thickness for each layer	40	mm
	1.6	inches
Maximum thickness for each layer for ceiling applications	2 x 15mm layer with Polites 140 Mesh at midpoint	mm
Application temperature	+5 / +30	°C
	+41 / +95	°F
Workability time *(UNI EN 1015-9 – method B)*	40	min
Drying time (T=23 °C; U.R. 50%)	10 - 15	days
Storage	12	months
Packaging	18 kg paper bag	kg
	39.68 lb paper bag	lb

Final performances				
Final performances		**Unit**	**Regulation**	**Results**
Thermal conductivity (λ)	0.045	W/mK	UNI EN 1745	category T1
Thermal resistance (R) for 10 mm / 0.4 in thickness	0.222	m2 K/W	UNI 10355	-
Specific heat capacity (c)	1000	J/kgK	UNI EN 1745 UNI EN 10456	-
	0.239	kcal/kg °C	-	-
Thermal diffusivity (a)	0.125 x 10^{-6}	m^2/s	UNI TS 11300-1	-
Vapour permeability coefficient (μ)	4	-	UNI EN ISO 12572	highly breathable
Water absorption by capillarity	0.40	kg/m^2 $min^{0,5}$	UNI EN 1015-18	category W1
Water penetration depth (after 90 minutes)	40	mm	UNI EN 1015-18	-
	1.57	in		
Compressive strength	2.95	N/mm^2	EN 998-1	category CS II
	427.9	lbf/in^2 (psi)	EN 998-2	M 2.5
Flexural strength	1.5	N/mm^2	UNI EN 1015-11	-
	217.6	lbf/in^2 (psi)		
Dried Plaster porosity	71.64 %	-	ISO 15901-1	-
Reaction to fire	class A1	-	UNI EN 13501-1	-

Figure 3: nZEB residential complex designed by architects Joan Fortuny and Alventosa Morell Arquitectes and representing the perfect combination of comfort and sustainability in the city of Inca, Mallorca. Credits [a]

For further information, visit Diasen or Diasen's national partner (e.g. Ecological Building Systems in Ireland and the UK) website where technical data sheet ('ST'), declaration of performances ('DOP') and material safety data sheet ('MSDS') can be found.

[a] **Architects**: Joan Fortuny; Alventosa Morell Arquitectes;
Photograph: José Hevia

Figure 4: Cumbrian coastal renovation with Diasen Diathonite Evolution and Diasen finishes

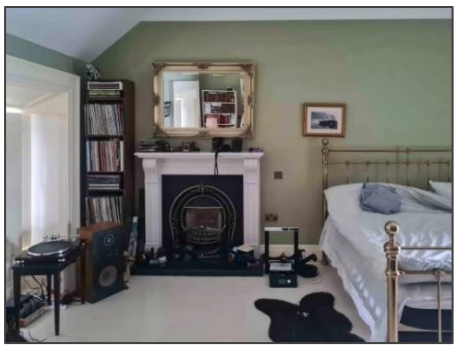


Figure 5: Deep retrofit of a c. 1750's townhouse, Carlow, Ireland. Originally functioning as an 'Inn', this historic building was used later by Daniel O'Connell in the elections of the 1840s.

3.2. DIATHONITE REGULARIZATION (RINZAFFO)

Pre-mixed Plaster based on natural hydraulic lime and mineral aggregates, characterized by excellent dehumidifying properties and anti-saline barrier function.

These product's features are essential in the treatment of humidity related problems; the high breathability guarantees an excellent water vapour permeability, allowing the masonry to breath and blocking the diffusion of saline crystals. *Diathonite Regularization (Rinzaffo)* is also useful to uniform the absorption of the existing substrate, to regularize the substrate and to provide a better adhesion surface to the plaster. The Plaster is designed for load-bearing and curtain walls in brick, tuff, stone and mixed internal and external masonry before the application of dehumidifying plaster. The product is also ideal for applications in "*green*" building and restoration operations, where it is necessary to guarantee the breathability of the wall and the use of natural materials.

Technical data		**Final performances**	
Yield	12 ± 15% kg/m² *per 10mm thickness*	**Compressive strength**	4,30 N/mm²
Density	1230 ± 10% kg/m³	**Water vapour permeability (*μ*)**	< 8,0
Mixing water	4 - 5 L *of water for each* 25 kg bag	**Capillary water absorption**	0,35 kg/m² $h^{0,5}$
Consistency of the mixture	Sprayable	**Fire resistance (Euroclass)**	A1
Application temperature	+5 / +30 °C	**Salt resistance**	Exceeded
Drying time (T=23 °C; U.R. 50%)	1 day	**Apparent density of fresh Plaster**	1360 kg/m³

3.3. AQUABOND

Ready-to-use adhesion primer with granular aggregates for creating a strong bonding bridge on the types of substrates commonly found in the building industry, ensuring optimal adhesion of plasters, smoothing compounds and tile adhesives. The product is suitable for outdoor and indoor applications.

Aquabond is ideal on various types of substrates such as cement or lime-based plaster, smoothing plaster, smooth concrete surfaces, precast concrete panels, cork or plasterboard panels, stone, wood, metal, glass or unglazed tile substrates.

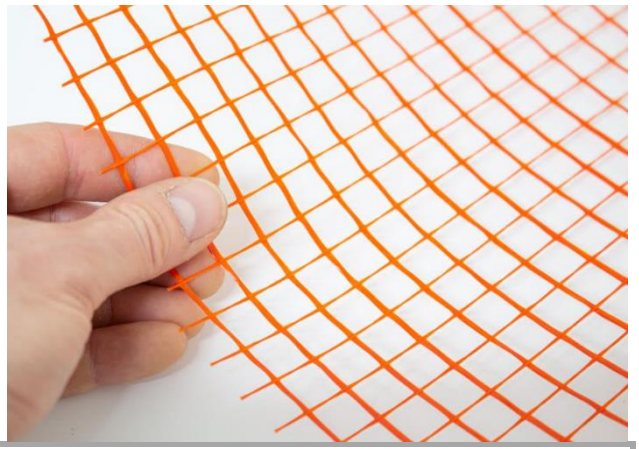
Technical data		**Final performance**	
Yield	0,20 – 0,25 kg/m² *according to the absorption degree of support*	**Weathering test** [b]	1000 hours (>5 years)
Dilution	If necessary, add 5% water	**Adhesion of *Aquabond* + *Diathonite Evolution* system on cork panel**	85,5 N/mm²
Application temperature	+5 / +35 °C	**Adhesion on cementitious substrates**	> 4 N/mm²
Drying time (T=23 °C; U.R. 50%)	30 minutes		

[b] ***Resistance to accelerated ageing processs***

3.4. POLITES 140

Polites 140 is a glass fibre mesh used to reinforce deteriorated or painted plasters applied indoors and outdoors, as well as to prevent the formation of cracks on inconsistent substrates and micro-cracks caused by possible settlement of underlying substrates.

It gives the system an adequate capacity to resist impact, as well as to counteract stresses due to temperature changes and shrinkage risks. Polites 140 is specifically designed for use with Diathonite plasters only.



Technical data		Final performances		
Yield	1,10 m^2/m^2 *Including 100-150 mm overlapping*	**Stitch dimension *(UNI 9311/2)***	11 x 11 mm	
	11.84 ft^2/ft^2 *Including 3.94 – 5.90 inches of overlapping*		0.43 x 0.43 in	
Composition	fiberglass	**Fabric weight *(UNI 9311/4)***	120 ± 5% g/m^2	
Application temperature	+5 / +35 °C		0.025 ± 5% lb/ft^2	
	+41 / +95 °F	**Average fabric thickness *(UNI 9311/3)***	0,60 ± 5% mm	
Drying time (T=23 °C; U.R. 50%)	does not require drying		0.024 ± 5% in	
		Tensile breaking load *(N/5 cm)*	Warp	Weft
Aspect	mesh		> 1466 ± 5%	> 1318 ± 5%
Colour	orange	**Construction *(n° of wires)***	Warp	Weft
Packaging	1 x 50 m roll		185 ± 5%	10 ± 5%
	3.28 x 164.04 ft roll	**Loss by calcination**	16%	

3.5. BKK ECO

BKK ECO is a colourless water-based siloxane coating, suitable for the protection of absorbent walls made of bricks, stone, cement, etc. from rainwater infiltration. Ideal for historic buildings or buildings of particular architectural value. It does not alter the colour of the masonry, it protects against frost, blocks the penetration of humidity, allows the water currently present in the masonry to evaporate, and makes deep impregnations possible even on slightly damp materials. Product suitable as a preventive treatment against carbonation of fair-faced concrete, as it is ideal for mineral-based building materials.

Technical data		Final performances	
Yield	Bricks: 0,30 - 0,40 L/m^2	**Weathering Test [b]**	1680 hours (10 years)
	Stones: 0,40 - 0,70 L/m^2		
Dilution	Do not dilute	**Water vapour permeability (μ)**	$\mu = 7$
Application temperature	+5 / +30 °C	**Average initial water absorption rate $c_{wi,s}$**	untreated bricks 0,73 $kg/m^2\ min^{-1}$

Waiting time between the 1st and 2nd layer (T=23°C; U.R. 50%)	1 hour		bricks impregnated with *BKK eco* 0,00 kg/m^2 min^{-1}
Drying time (T=23 °C; U.R. 50%)	4 hours	**Average cold-water absorption W_s**	untreated bricks 18,7 ± 0,2 %
			bricks impregnated with *BKK eco* 4,9 ± 0,3 %

3.6. ARGATHERM (FINISHING COAT SMOOTHER) AND PAINTS

To complete the application process in which **Diathonite Evolution** cork-based thermal plasters are the main character, one or more smoothing products are required (such as *Argatherm*, which will be further discussed in chapter **7. APPLICATION OF ARGATHERM** on **page 20**) and a moisture open paint of choice, depending on the type of use and finish required by the project. All the paints recommended by the Diasen Technical Office are listed in the in chapter **8. FINISHING APPLICATION PROCESS** (page **27**). Specifically, chapter **9.1** reports information on paints to be used in **outdoor applications** (page **27**).

4. VERIFICATION AND PREPPING OF THE SUBSTRATE

As with any external thermal insulation system, it is essential to take account of the local climate, time of year of application and coordination of follow-on trades to ensure a robust and reliable application is attained. It is crucial that an installer plans the working sequence in line with site requirements, resource, system specification, and weather conditions. In the Irish and British climates, the ideal time of year to apply external insulation systems including finishes are generally between April to late August/September at the latest. In the event that an external insulation system is applied over the colder and wetter periods of the year, this may lead to numerous risks including but not limited to: increased drying times, costs, wetter insulation, thermal bridging, freeze thaw damage, staining and increased algae risk. The substrate must be completely hardened and of sufficient strength. To ensure optimum adhesion is attained, existing paints should be removed to ensure a reliable adhesion of the product. Moreover, the surface must be thoroughly clean, dry, well consolidated, free of crumbling and loose parts. Before applying the product, it is recommended to protect any elements that are not to be coated. 7*

In order to address the presence of salts, it is imperative to include a thorough examination process. Upon identification, determine the type and extent of salt contamination (e.g., efflorescence, sub-florescence). Consequently, ensure the affected area is dry before removing any loose debris or surface contaminants using a soft-bristle brush or vacuum cleaner. For efflorescence on masonry surfaces, use a mild detergent solution (1 part detergent to 10 parts water) applied with a soft brush, then rinse the surface thoroughly with clean water to remove detergent residue. Allow the surface to dry completely before utilising a poultice or poultice paper saturated with a salt-removing solution (e.g., ammonium citrate) for stubborn salt deposits. Apply the poultice to the affected area according to manufacturer instructions and leave it in place until dry. Carefully remove the dried poultice, taking care not to damage the substrate. Eventually rinse the treated area with clean water to remove any remaining salt residues or poultice remnants and allow the surface to dry thoroughly. Once the process is completed, conduct a final inspection to ensure all salt deposits have been effectively removed: address any remaining issues or areas of concern as necessary. When the surface is suitable for coating, apply an anti-saline product such as *Diathonite Regularisation* (Rinzaffo) or *Diathonite Deumix*+ according to manufacturer instructions to prevent future salt migration and ensure long-term protection of the substrate.

4.1. ANY ADDITIONAL PRELIMINARY INTERVENTIONS

Check for the presence of any deterioration, such as deteriorated, damaged, detached or tending to detach portions of masonry; masonry gaps, deteriorated or crumbling Plaster joints. In these cases, proceed with specific re-building interventions before the reinforced plastering, in order to re-establish masonry continuity and guarantee good stability (e.g. crack stitching, joint re-straining, injections with binding mixtures; partial or integral reconstructions, etc.).

4.2. *Brick* SUBSTRATE

In the case of brick substrates, it is not necessary to apply a primer; in fact, the application can be carried out directly on the substrate. An adhesion trial is recommended to be carried out. If needed, use Diasen *Aquabond* primer: in this case, no moisten is required. Depending on the conditions of the substrate, if it looks too dry then mist the surface lightly with water before applying Diathonite plasters, ensuring the wall is not saturated.

4.3. *Concrete* SUBSTRATE

In the presence of deteriorated and crumbling concrete, provide for restoration with suitable cement Plaster. For the treatment of reinforcement rods, apply suitable anticorrosive products. In the case of smooth concrete, the application of *Aquabond* primer is recommended (see technical data sheet); if the substrate is rough, on the other hand, there is no need for primer, and the application may be carried out directly on the substrate. An adhesion trial is recommended to be carried out. If needed use Diasen *Aquabond* primer.

4.4. *Cellular concrete* SUBSTRATE

Diathonite Evolution can be applied directly on cellular concrete panels, without priming the surface first. It is mandatory to wet the substrate.

4.5. *Masonry* STONE SUBSTRATE

If the substrate is in masonry, it is important to clean the surface with a high-pressure cleaner or to proceed with brushing. It is essential to check the condition of the masonry, repairing damaged or loose bricks and stones if present. Apply *Diathonite Regularization (Rinzaffo)* anti-salt rendering (see technical data sheet) in case there are many salts in the masonry. On substrates to be regularised, it is recommended to use a lime-based filling Plaster to maintain breathability. An adhesion trial is recommended to be carried out. If needed use Diasen *Aquabond* primer: in this case, no moisten is required. Depending on the conditions of the substrate, if it looks too dry then mist the surface with water before applying the second layer. In any case, do not saturate the wall.

4.6. *Panels* SUBSTRATE

Diathonite Evolution can also be applied on untreated cork or woodwool boards, without the need to use a primer. Given the great variety of panels available on the market, it is advisable to perform an adhesion test to verify the suitability of the application; in case the support does not have the necessary adhesion, it is recommended to use the *Aquabond* primer (see technical data sheet). For a workmanlike finish, make sure that the panels are well adhered to each other. It is always mandatory to reinforce the plaster used with *Polites 140* when applied over panels.

4.7. *Wood* SUBSTRATE

Proceed with the direct application of the plaster on untreated wood substrates; however, in the presence of smooth or treated wood, prime the surface with *Aquabond* (see technical data sheet). For substrates not listed in the technical data sheet contact Diasen technical office. It is always mandatory to reinforce the plaster used with *Polites 140* when applied over panels.

5. MIXING FOR THE HAND APPLICATION

Diathonite Evolution is supplied in 18 kg paper bags. As it is a pre-mixed plaster, it needs water to be used. The amount of water specified below is indicative, and strictly depends on the degree of absorption of the substrate and environmental conditions; it is advisable to add the correct amount of water to obtain the correct adhesion.

If mixed with a drill mixer, add **11 - 14 l** of clean water for each bag of **Diathonite Evolution** (**18 kg** ≅ 40 lb) to the dry plaster (**Figure 7**).

Figure 7: Image of drill mixer mixing Diathonite Evolution thermal plaster

Figure 6: Image of a mixer for preparing the Diathonite Evolution

Do not mix for more than **3-4 minutes**. The amount of water may vary depending on weather conditions and the level of suction of the existing wall.

No foreign ingredients or additives should ever be added.

6. APPLICATION OF THE PLASTER

Before applying **Diathonite Evolution** it is essential to wet yet not saturate the substrate, especially in summer and on masonry exposed to the sun, but only if the substrate has not already been primed: in this case, do not wet the substrate. **Figure 8** shows an application method of the product. In order to plaster a wall evenly, the plaster must be applied in vertical areas that are well defined and of equal thickness. To do this, timber battens or gauges can be embedded in plaster vertically to the wall (see **Figure 9**), aluminium profiles or plaster references, i.e. bands made with the same mixture and left to dry. These bands for plastering a wall are, in practice, guides that allow the plaster layer to be applied with the required thickness, straight edge float. A real application example of reference points is shown in **Figure 10**, where a wooden batten embedded within plaster on the wall and used as a guide line during the application of **Diathonite Evolution** plaster by spraying with a plastering machine is clearly visible.

Figure 8: the cork-based premixed lightweight plaster for thermal insulation Diathonite Evolution applied with spray plastering machine

The bands must be installed from the ceiling to the ground, so that the thicknesses required by the project are always kept in mind, and they can be 1-1.3 metres apart. If wooden battens or aluminium profiles are used, these must be removed immediately after the last layer of plaster has been applied and filled in with **Diathonite products**.

Figure 9: Aluminium battens or gauges embedded within plaster on the wall used as reference points when laying plaster

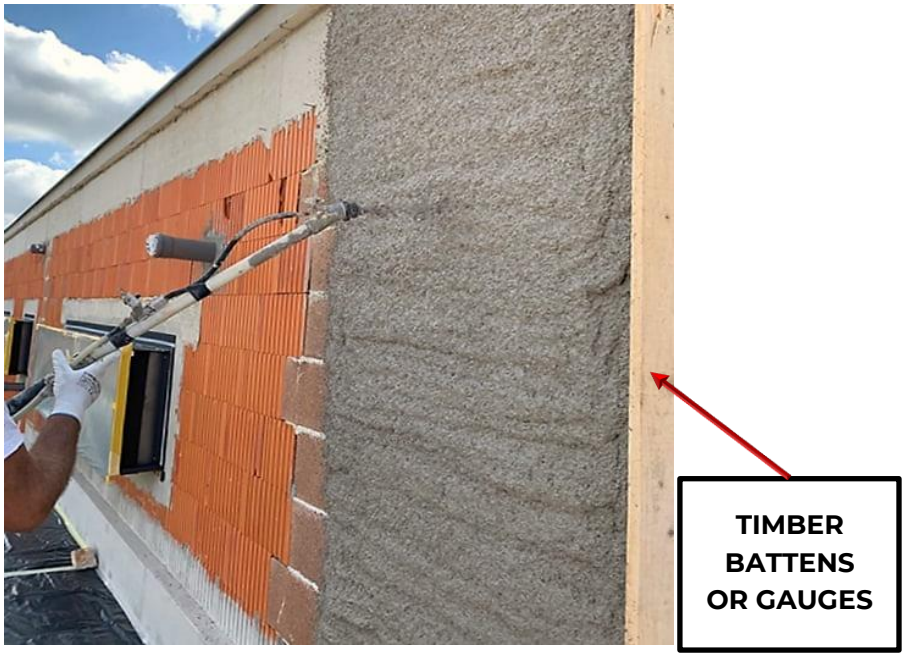


Figure 10: Practical example of wooden battens embedded within plaster vertically on a wall, used as reference points during the application of Diathonite Evolution plaster with plastering machine

Another important element when deciding to design or renovate a building, be it domestic, industrial or commercial, is the corner bead (also known as corner guard) in pvc, stainless or galvanised steel, or aluminium. External corner profiles are designed to protect the junction between two vertical walls; the presence of sharp edges between claddings could expose the surroundings to considerable risks and allows the two walls to be joined by smoothing the external corner.

The choice of the shape of a corner profile has a mostly aesthetic value. Depending on the final application, one can opt for corner profiles with a thin, limited surface in the case of modern, minimalist living areas; for commercial contexts and large spaces where it is the finish of the profile that emphasises the details, the application of a corner profile with a rounded section is more appropriate. The corner profiles can be positioned together with the reference bands, but must in any case be inserted before the last layer of plaster is applied. In any case, to secure the corners, in applications on more than one floor in elevation, foresee the use of pvc, stainless or galvanised steel, aluminium beads, that will be fixed with **Diathonite plaster** to avoid thermal bridges.

6.1. APPLICATION BY HAND

In the case of application by hand (**Figure 11**) it is essential to wet yet not saturate the substrate before applying each layer, but only if the substrate has not already been primed. Then proceed with the *creation of reference points or bands* to obtain the required thicknesses, as detailed in the previous section (**APPLICATION OF THE PLASTER**). If bands are made with aluminium or wooden battens, these must be removed immediately after the application of the last layer. If necessary, apply angle profiles by placing them together with the reference bands; in any case, the angle profiles must be put in place before the last layer of plaster is applied. It is always advisable to secure the corners, especially in applications on several floors in elevation: therefore, foresee the use of aluminium corner protectors, which will be fixed with **Diathonite plaster** to avoid thermal bridges.

Figure 11: The cork-based premixed lightweight plaster for thermal insulation Diathonite Evolution, applied by hand with trowel/ trowel

With a trowel, apply a first layer of **Diathonite plaster**, taking care to create a thickness that can reach a maximum of 40 mm per layer. If the required thickness – typical application 20 mm – is not reached with the first coat, proceed with the application of subsequent coats, always taking care to maintain a thickness ≤ 40 mm for each coat applied. Please, note that the minimum thickness per each layer is 20 mm. It is important to proceed with each coat, only when the preceding layer is firm to the touch and visually lighter; this generally occurs after about 12/24 hours.

A plaster reinforcing mesh, Diasen Polites 140 is required for applications of 60 mm or more. Diasen proposes its own solution to prevent the formation of cracks on in consistent substrates, cracks caused by possible settling of underlying substrates, and to improve the adhesion of plasters on different types of materials: Polites 140 is a fiberglass mesh used to reinforce Diathonite when installed over internal and external, deteriorated, or painted plasters. The mesh gives the system an adequate capacity to resist impact, as well as to counteract stresses due to temperature changes and shrinkage incidents, preventing the formation of cracks or fissures in the façade. *Polites 140* must be applied when the plaster layer is still fresh, gently pressing it about halfway through the total thickness. It must be used regardless of thickness for applications on panels, wood, plasterboard or on substrates subject to movement. At beams and columns, the mesh must protrude on both sides of the concrete element by at least 100-150 mm at the joints, as shown in **Figure 12**.

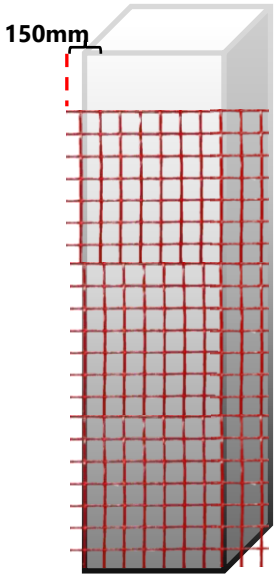


Figure 12: Reinforcement mesh on abutment. The mesh should protrude on both sides of the concrete element by at least 100-150 mm at the joints.

Polites 140 mesh must not show any curling or bubbles and must always be used where there are micro-cracks or in particularly stressed areas. On particularly unstable substrates, it is advisable to fix the plaster mesh with dowels or nails. The mesh width of *Polites 140* perfectly matches the grain size of Diathonite plasters, such as **Diathonite Evolution.** When applying or levelling, do not compress the selected **Diathonite plaster** to preserve the porosity of the product. Use a straight edge float with horizontal and vertical passes until a regular surface is obtained.

6.2. APPLICATION WITH PLASTERING MACHINE

Diathonite Evolution can be applied with plastering machines (**Figure 16** and **Figure 17**). The setting may vary depending on the machine chosen. It is possible to use a three-phase plastering machines (similar to PFT G4), equipped with a rotor stator D6-3, a semi-closed (see **Figure 14**) or fully closed (see **Figure 15**) mixing shaft, a conical spraying gun with a diameter of 35/25 mm, and a 14- or 16-mm nozzle (see **Figure 13**). MTEC machines can be used too - these are similar machines with PFT, requiring slightly different settings (please see Appendix for Machine and Settings in the TDS of the products).

Figure 13: plastering machine type PFT G4, equipped with a D6-3 stator and "conical" material pipe

Make reference points or bands to obtain the required thicknesses. Then proceed with the creation of reference points or bands to obtain the required thicknesses, as detailed in the previous chapter (**6. APPLICATION OF THE PLASTER**).

If bands are made from aluminium or wooden battens, these must be removed immediately after the last layer has been applied. If necessary, apply angle profiles by placing them together with the reference bands; in any case, the angle profiles must be put in place before the last layer of plaster is applied. It is always advisable to secure the corners, especially in applications on several floors in elevation: therefore, foresee the use of aluminium corner protectors, which will be fixed with **Diathonite Evolution** to avoid thermal bridges. In case of application with plastering machine, it is essential to wet yet not saturate the substrate before applying each layer, but only if the substrate has not already been primed. It is recommended to wet the plastering hose for a few minutes before thermal plaster is added into the hopper to reduce friction within the hose. Proceed by pouring the content of the bags of **Diathonite Evolution** inside the hopper; adjust the flowmeter of the machine to **300 - 400 l/h**, then adjust it until the optimal consistency for adhesion is reached (foamy and not shiny aspect). The amount of water may vary depending on weather conditions, as well as the level of water in the pump.

Figure 14: Close up of a semi-closed shaft

Once the flow has been set, start applying the product by spraying from the bottom upwards in the first layer, taking care to create a thickness of up to 40 mm. If with the first layer the design thickness is not reached, proceed with the application of subsequent layers always taking care to maintain the thickness ≤ 40 mm for each coat applied. It is recommended to apply **Diathonite Evolution** without interruption in the process. If it is necessary to interrupt the work for long periods or frequently, immerse the nozzle in clean water to avoid the formation of a plug of material in the gun.

For applications involving a total thickness of more than or equal to 60 mm, the use of a plaster reinforcing mesh such as *Polites 140* is recommended. For more information, see the previous paragraph (**6.1 APPLICATION BY HAND**).

Once the mesh has been laid and drowned in the plaster, proceed with applying the product. It is recommended not to compress the product in order to preserve the porosity, using a straight edge with horizontal and vertical passes until obtaining a regular surface.

Figure 15: Close up of a fully-closed shaft

Figure 16: Application of Diathonite Evolution premixed plaster on brick and stone substrates by plastering machine

Figure 17: Application of Diathonite Evolution premixed plaster on brick and stone substrates by plastering machine

7. APPLICATION OF ARGATHERM FINISHING PLASTER

Without applying any primer, especially in summer and on masonry exposed to the sun, wet the substrate with **Diathonite Evolution** before applying a first coat of *Argatherm* thermal finishing coat (see product data sheet). Before applying Argatherm, it is recommended to cover thresholds, window frames and any element that does not need to be covered. Load the contents of the sacks into the hopper, adding approx. 26 - 28% clean water (approx. 6.5 - 7 litres per 25 kg sack of *Argatherm*), mix with a drill mixer or automatic mixer until the product is homogeneous, lump-free and well hydrated. Adjust the flowmeter of the machine to **170 - 220 l/h**, then adjust it until the optimal consistency for adhesion is reached (foamy and not shiny aspect). We also recommend letting the mixture rest for 5 minutes and mixing again before applying the finishing coat. The finishing coat can be applied either by hand, with a stainless-steel trowel with rounded edges, or with a plastering machine. In the case of application by hand, the first layer has the function of filling the porosity of the base. If applied by plastering machine, proceed after adjusting the flow meter of the machine, the setting of which may vary depending on the model chosen. Three-phase machines with the classic orange D6-3 or single-phase machines with a standard stator (e.g. Viola D5-2.5) can be used. For smoothers' thicknesses of 2 - 3 mm, the capacities of these stators may be excessive. In the case of three-phase machines, the D4 ½ stator can be used. If the substrate has a non-homogeneous surface, subject to movement or characterised by joints or critical points, with the aim of preventing the occurrence of:

a. diffused cracks with "*spider's web*" development caused by heterogeneity and/or discontinuity and/or different thermal expansion of the substrate, by plastic or hydraulic shrinkage of the Plaster, by differences in applied thickness; or
b. micro-cracks due to movement of the substrate;

and at the same time improve the strength of the system, we recommend the use of *Polites 80* reinforcement mesh (as described in the relevant product data sheet), with a sandwich system (*Argatherm ~ 2mm + Polites 80 + Argatherm~2mm*).

Technical data			
Yield	3,6 ± 10% kg/m² per 3 *mm* thickness	**Aspect**	premixed powder
	1.86 ± 10% lb/ft² per 3 inches of thickness	**Colour**	White
Application temperature	+5 / +30 °C	**Density**	1050 ± 10%
	+41/+95 °F	**Grain size**	0 – 0,6 mm
Resting time of the mixture	5 minutes		0 – 0,03 in
Waiting time between 1st and 2nd layer (T = 23°C / 73.4 °F; R.H. 50%)	12/24 hours	**Final performances[c]**	
Drying time (T = 23°C / 73.4 °F; R.H. 50%)	5 – 7 days	**Thermal conductivity (λ)**	0.128 W/mK
Minimum thickness	2,0 mm	**Vapour permeability coefficient (μ)**	μ ≤ 15
	0.08 in	**Coefficient capillarity water absorption (C_m)**	-
Maximum thickness per layer	1,5 mm	**Apparent mass density of fresh Plaster**	1270 ± 10% kg/m³
	0.06 in	**Apparent mass density of hardened Plaster**	1150 ± 10% kg/m³
Maximum total thickness	10,0 mm	**Average compressive strength at 28 days**	≥ 15 N/mm²
	0.4 in	**Fire reaction**	Class A1

Figure 18 shows a perfect example of Argatherm applied on top of Diathonite Evolution.

Figure 18: Smooth Argatherm finish over Diathonite Evolution (project: Clane Retrofit, Co. Kildare)

[c] For further information, refer to the technical data sheet of the product that can be found here on the Diasen website.

When the first layer of *Argatherm* is still wet, proceed with drowning the mesh. Once the layer underneath feels firm to the touch, generally between 12 and 24 hours at 23°C and 50% relative humidity, first wet the finishing coat; then proceed with the second and last coat, taking care to cross the layers, until an approximate thickness of 2 mm is reached for each layer. The product dries out in approximatively 5 – 7 days. The product can then be sanded with grit size 100 sand paper.

If a textured finish is desired, *Argatherm* can be spray-applied and left unsmoothed to achieve a "dash effect" (**Figure 19**).

Figure 19: Argatherm with "dash effect" over Diathonite Evolution (images provided by Eco-Renovation UK)

8. CRITICAL JUNCTION: TREATMENT

Treating critical areas in construction is of paramount importance for several reasons. First and foremost, these areas often play a pivotal role in ensuring the structural integrity and safety of a building. Neglecting critical areas can lead to structural weaknesses, compromising the overall stability and safety of the structure, potentially resulting in catastrophic failures. Moreover, addressing critical areas ensures that buildings meet stringent building codes and standards, which are in place to safeguard occupants and the public. Additionally, proper attention to these areas can significantly enhance a building's durability and longevity, reducing the need for costly repairs and maintenance down the road. In essence, prioritizing the treatment of critical areas is a fundamental aspect of responsible construction practices that safeguard both human lives and long-term investments. DIASEN proposes the *WATstop* solution, a product designed for positive and negative thrust (counterthrust) waterproofing, both indoors and outdoors. *WATstop* is formulated with a characteristic epoxy resin (part A), a hardener (part B) and special cement (part C). As it is a three-component product, mixing must be done in steps. Open the epoxy Plaster (part A) and pour it completely into the larger bucket. Then open the cement (part C) and pour it slowly into the bucket; mix to homogenise the two components.

Open the catalyst bucket (part B), pour it completely into the bucket already containing the A+C mixture and mix the three components (A+B+C) of *WATstop* thoroughly until a homogeneous, lump-free mixture is obtained. A professional mixer is recommended for mixing.

Depending on the type of application, clean water is then added to the mix (**Figure 20** and **Figure 21**) according to the following guidelines:

- Trowel application: 10 - 20% by weight;
- Short-hair roller or brush application: 30 - 40% by weight.

Depending on the degree of water absorption of the substrate and environmental conditions, it is advisable to dose the correct amount of water to obtain the correct consistency (maximum 40%). Adding a higher percentage of water could, in fact, compromise the effectiveness of the product. In addition, WATstop gives rise to an exothermic reaction: for this reason, it is requested not to close the container at the end of mixing. Never add foreign products to the mixture.

Figure 20: Steps in the preparation of the tricomponent mixture - WATstop

Watstop is an epoxy-based material that will only remain workable for two hours once mixed. Therefore, we recommend you only mix up as much as you need for each coat being applied. WATstop should be applied in a minimum of two coats with a trowel or short-hair roller, until the yield indicated in the technical data sheet is reached, allowing the product to penetrate well into the substrate and ensuring total coverage of the surface. Wait a maximum of 24 hours between one layer and the next. Any subsequent coats (finishing coats, renders, paints, etc.) must be applied within and no later than 48 hours. At a temperature of 23°C and 50% relative humidity, the product dries in approximately 24 hours.

Any subsequent coats (finishing coats, renders, adhesives, paints, Diathonite etc.) must be applied within and no later than 48 hours (otherwise may not be able to bond to the Watstop). If the subsequent coat is not applied within 48 hours, an additional thin layer of Watstop (0.3kg per m²) should be applied as primer (Diasen Aquabond cannot be used over Watstop as a primer). Then within 24-48 hours, the next plaster or paint layer can be applied. It is critical to highlight Watstop sets quickly and once it is mixed it cannot be used the next day.

Figure 21: Add clean water to the mix to dilute the mixture until the optimum consistency is reached according to the type of application envisaged by the project.

8.1. *Flat surfaces*: flashing (weatherproofing)

In the case of flat surfaces, such as roofs, terraces or balconies, it is important to insert a coping, an element that protects buildings from water infiltration, in the corner of the roof-wall to which **Diathonite Evolution** are applied (**Figure 22**).

The application of the flashing on the edge of the roof, in fact, is used to ensure that rainwater never comes into in contact with the "bare" surface of the plaster, which could absorb water and humidity; the tannin, present in the lightened thermal plaster, reacting with water gives rise to superficial staining, actually affecting the colour of the façade.

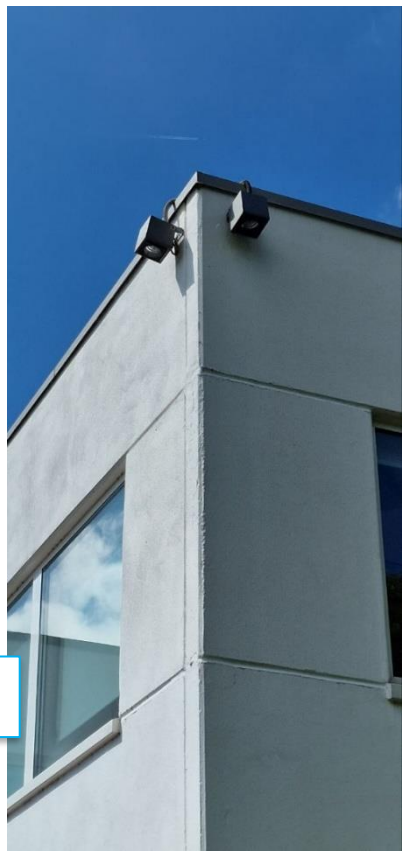
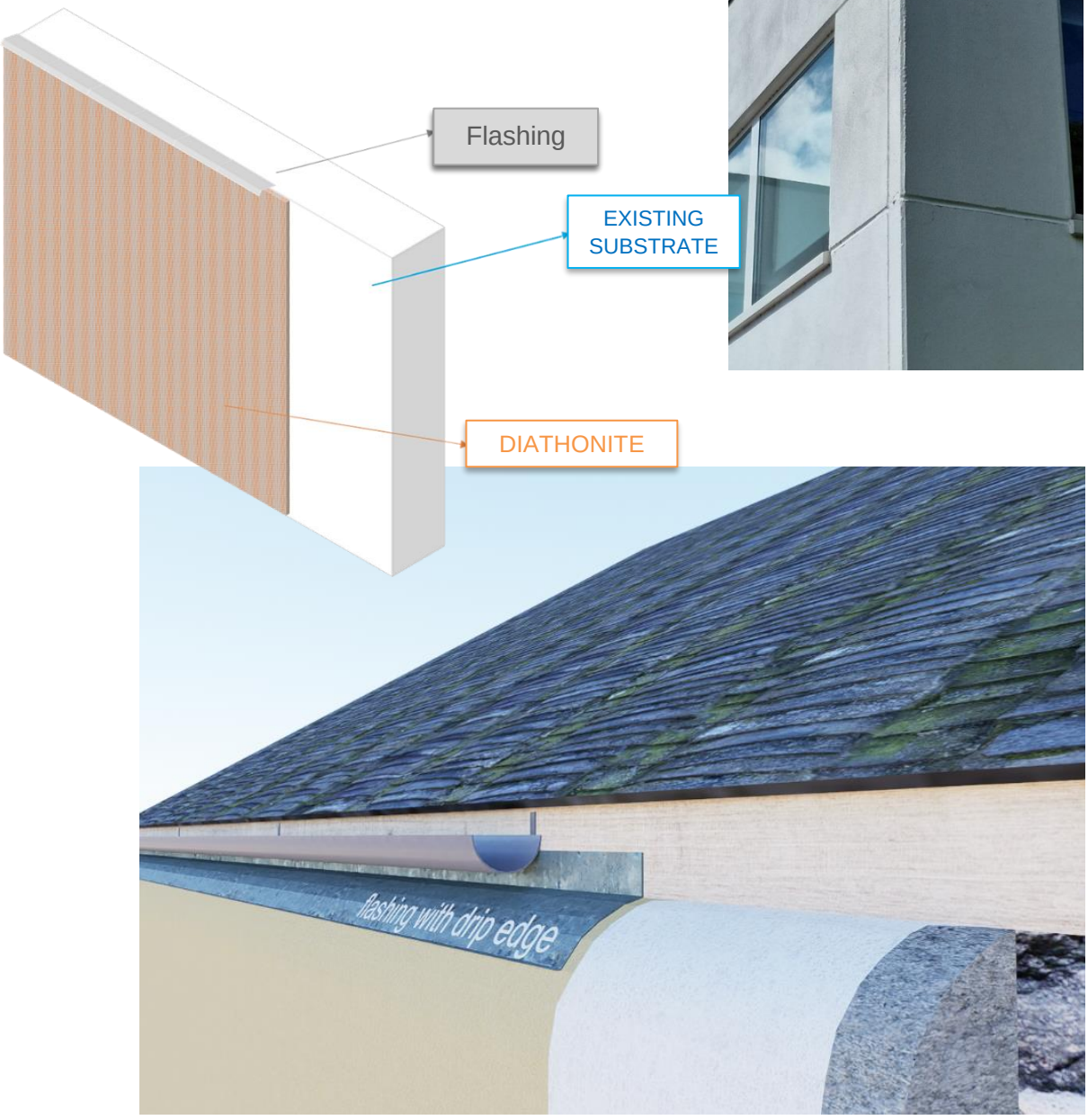


Figure 22: insertion of a flashing on the corner of the roof-wall to which Diathonite Evolution is applied.



Given the wide variety of flashings available and the fixing methods (hooking, screws, sealants, glues, etc.), it is advisable to refer to the solutions proposed by the project: regardless of where the flashing is installed, however, it is a good idea to seal the upper part, the part fixed to the wall, with transparent outdoor silicone to ensure a better seal. DIASEN recommends the application of a drip flashing, which is characterized by a final curvature that allows rainwater running down the flashing away from the wall minimum overhang. For optimum protection, an adequate overhang should be included.

8.2. *Surfaces in contact with the ground*

Junctions for surfaces in contact with the ground are a critical element to assess when specifying and applying external plaster or finishes including insulating plasters. It is essential to examine external ground levels, runoff patterns, the water table, the existence of a functioning damp-proof course if present, and if external drainage such as a French drain are present. Diasen thermal plasters are not suitable for use externally below ground level. **Figure 23** presents the effective installation of a French drain and maintenance of water goods to protect the wall and external finish from penetrating damp. In the case of substrates in contact with the ground, it is recommended to waterproof and protect the points most subject to hygrometric stress.

Figure 23: Robust detailing at ground level with adequate drainage and maintenance of water goods. Project Reference: Rubric Building, Trinity College Dublin, Ireland

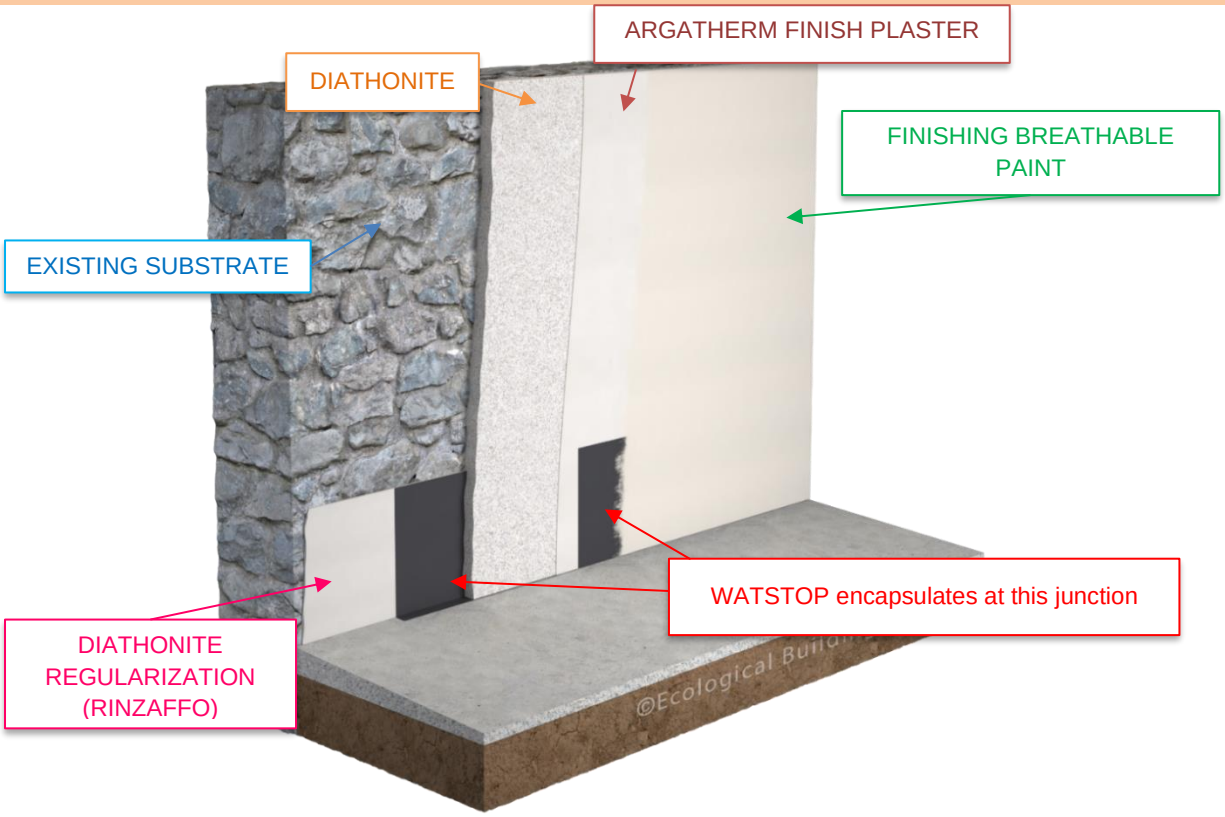


Figure 24: Application of WATstop between the wall and hard external flooring to prevent water ingress. Robust detailing at ground level with adequate drainage and maintenance of water goods.

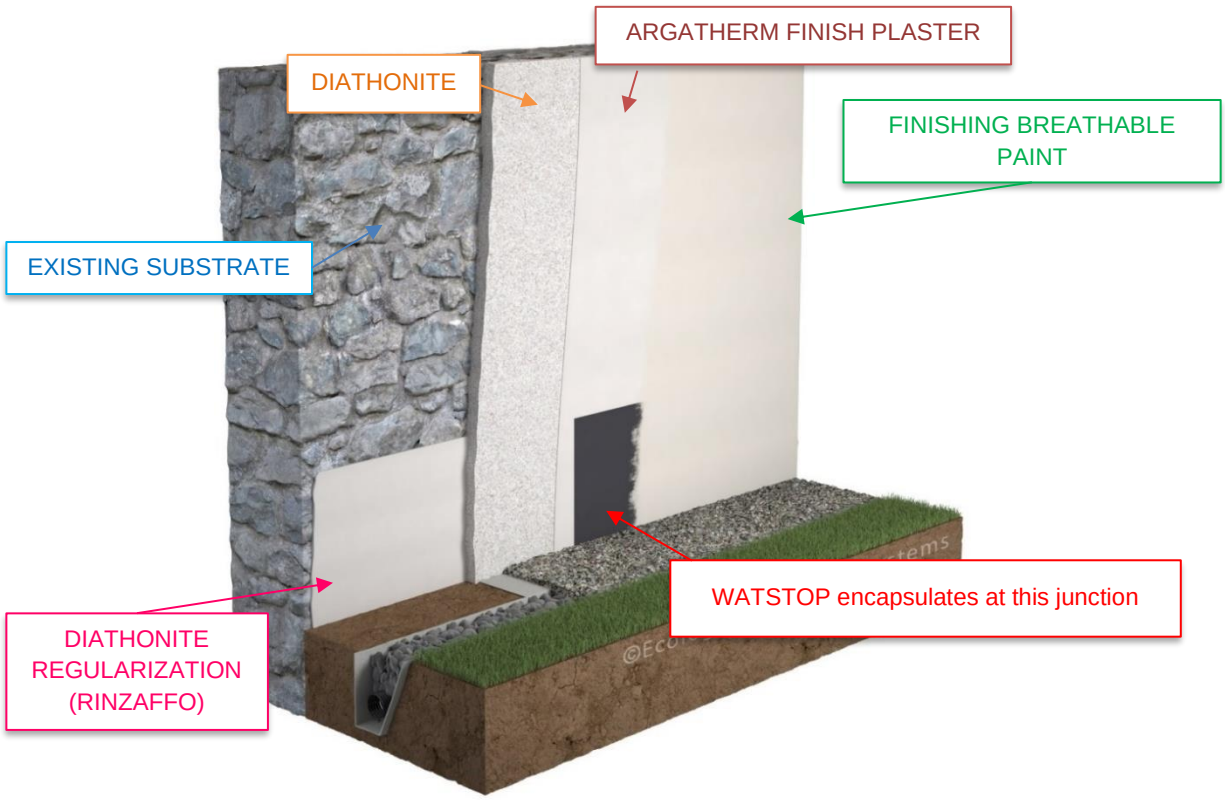


Figure 25: Application of WATstop between the wall and the external drain to prevent water ingress.

DIASEN proposes as a solution the application of a specific waterproofing agent to deal with water infiltration risks: *WATstop*. Localised waterproofing must be carried out, specifically, in the corner between the substrate, on which the **Diathonite Evolution** process will then be applied, and the flooring from which infiltration problems could arise. As can be seen from **Figure 24** and **Figure 25**, *WATstop* is applied according to the methods previously specified. More specifically, it has been applied for approximately 300-400 mm on the vertical flat surface (of the substrate), and for approximately 100-200 mm on the horizontal flat surface (flooring). If the situation shows the need for a deeper intervention, it is recommended to apply *WATstop* possibly also underground. After having applied **Diathonite Evolution** according to the methods described above, proceed with the application of the Argatherm process (finishing coat), *WATstop* (waterproofing) and finish of your choice (DIASEN paints are recommended). In this way, the cork-based thermal plaster is "encapsulated" and preserved from infiltration as it is protected at every point.

9. HOW TO FINISH OFF THE APPLICATION PROCESS

When the applied finishing coat is still wet, finish it off with a sponge or plastic trowel, depending on the type of finish to be obtained. Depending on the type of application different solutions can be used to finish the finishing coat and conclude the application process. In any case, before applying the chosen finish, proceed with the water-based *D20* primer, a water-based acrylic resin primer: this product is designed to improve the adhesion of finishes by penetrating the substrate and ensuring the adhesion of subsequently applied layers. *D20* is applied with a short-nap roller, airless sprayer, or brush in a single layer, yet respecting the yield of 0,15 l/m^2.

9.1. OUTDOORS PROCESS APPLICATIONS: FINISHES

As with any external thermal insulation system, it is essential to take account of the local climate, time of year of application and coordination of follow-on trades to ensure a robust and reliable application is attained. In the Irish and British climates, the ideal time of year to apply external insulation systems including finishes are generally between April to late August/September at the latest. In the event that an external insulation system is applied over the colder and wetter periods of the year, this may lead to numerous risks including but not limited to: increased drying times, costs, wetter insulation, thermal bridging, freeze thaw damage, staining and increased algae risk.

When applying the process outside buildings, it is recommended to protect *Argatherm* for 48 hours from rain, frost and excessive evaporation with breathable and water-repellent finishes (*Plasterpaint Coloured, Decork Mediterraneo*). In situations of high temperatures, beating sun or strong winds, it is necessary to wet the finishing coat 2/3 times a day for the first 2/3 days after application. During winter, it's crucial to provide adequate protection for exposed Diathonite or smoother surfaces to ensure its durability and performance, and it therefore is recommended to cover the material with plastic sheets.

These sheets serve a dual purpose: they act as a shading mechanism to shield the material from direct sunlight, which can be harsh during winter, and they also serve as a rain barrier, protecting the Diathonite or the smoother from moisture and water damage. It's important to maintain the scaffolding in place while applying the plastic covering, as they ensure that the entire surface is effectively shielded from the elements. If the cycle applied includes both Diathonite and the smoother, protected with a layer of *D20*, this product acts as an additional barrier against moisture, helping to seal and protect the underlying Diathonite and plaster.

Therefore, there is no need for using the plastic sheets. This comprehensive approach ensures that the Diathonite system remains intact and functional throughout the winter months, even in challenging weather conditions.

9.1.1. Finishing with *Plasterpaint Coloured*

To create a protective-coloured finish that is smooth, water repellent and breathable, the ideal product is *Plasterpaint Coloured*, a solution based on potassium silicate, limestone sandstone and natural pigments (**Figure 26**). The product is in fact ideal for finishing thermal-acoustic plaster coats, such as those made of Diathonite, as it prevents the absorption of meteoric water by the masonry. This liquid-coloured coating is versatile and can also be used to decorate facades and walls, to coat old paints and dry, compact absorbent and cohesive mineral coatings, and to be applied on old and new plasters.

Figure 26: Application of the product Plasterpaint Coloured as a finish on the exterior walls of the new residential complex built in the well-known resort town of Quarteira, on the prestigious coast of the Portuguese Algarve

Plasterpaint Coloured is presented as a liquid in the desired colour. It is recommended to dilute the mixture with 10-20% water and to mix the mixture with a drill mixer before applying. The water indicated on the package is indicative and may vary depending on weather conditions; also remember that it is possible to obtain a product with a more or less fluid consistency depending on the application to be made. it is recommended, as always, never to add foreign components to the mixture. Before proceeding with the application of the paint, it is essential to apply *Color Primer* as reported in the TDS.

Once the *Color Primer* has completed drying, apply a first coat of *Plasterpaint Coloured* with a brush or short-hair roller. If the product is not perfectly dry, carefully check its suitability for subsequent coating. The product dries in about 3 hours, so it is recommended to wait until this time has elapsed before applying a second layer of *Plasterpaint Coloured*, until the substrate is completely covered. In the case of application on particularly absorbent substrates, a third coat may be necessary. For a better result and a more homogeneous coating, we recommend crossing the layers. At a temperature of 23°C and relative humidity of 50%, the product dries completely in 3 hours.

9.1.2. Finishing with *Decork Mediterraneo*

If the project requires a coloured decorative that is breathable, thermal, resistant to fire and atmospheric agents, *Decork Mediterraneo* is the optimal solution (**Figure 27** and **Figure 28**). This ecological product can be applied on walls and floors, either outdoors and indoors on a variety of substrates, among which are old and new facades, and thermal plasters. Infinite aesthetic effects can be created by using *Decork Mediterraneo*, ranging from the creation of smooth, dotted, bush-

hammered, modern or antiqued finishes. *Decork Mediterraneo*, the grain size of which varies between 0 - 300 µm, is formulated with cork and clay, water-based resins and high-tech waxes designed to increase the product's mechanical properties and water repellence.

Technical data		Final performances[d]		
Yield	0.3 – 0.50 in 2 coats **for brush applications** per *0.6 mm* thickness	**Elasticity**		195%
	0.06 – 0.10 in 2 coats **for brush applications** per *0.024 inch* thickness	**Crack Bridging Ability**		1.5 mm
	0.5 – 0.7 in 2 coats **for trowel applications** per *0.5 mm* thickness			0.059 in
	0.10 – 0.14 in 2 coats **for trowel applications** per *0.019 inch* thickness	**Weathering Test****		1680 hours (10 years**)
Dilution	If necessary, max 5% of water by trowel	**Thermal conductivity (λ)**		0.057 W/m K
	If necessary, max 10% of water by spray	**Adhesion to self-levelling concrete screed *(direct traction)***		0.98 – 1.12 N/mm²
Aspect	paste			142.2 – 162.4 lbf/in²
Colour	See colour chart	**Adhesion with D20 to tuff**	*Adhesion pull off test*	1.0 N/mm²
Packaging	10 kg			145 lbf/in²
Grain size	0 – 300 µm	**Adhesion to WATstop**		2.0 N/mm²
				290 lbf/in²
Application temperature	+5 / +35 °C	**Bend test *(cylindrical mandrel)***		2.00 mm
	+41/+95 °F			0.079 in
Waiting time between 1st and 2nd coat (T=23°C/ 73.4°F; R.H. 50%)	8 – 10 hours	**Theoretical specific heat**		1.8 KJ/kg K
Drying time (T=23°C / 73.4°F; R.H. 50%)	10 hours	**Water vapour permeability**		µ = 7
		Permeability to CO_2		Class C1
		Permeability to water		Class W2
		Transmission of water vapour		Class V3
		Gloss		Class G3
		Grain size		Class S1
		Thickness		Class E5
		Crack Bridging		Class A5

** 1680 hours of accelerated ageing corresponds to approximately 10 years. This correspondence is purely indicative and may vary considerably depending on the climatic conditions of the place where the product is used.

Decork Mediterraneo prevents the absorption of rainwater by the masonry and prolongs the life of the plaster. *Decork Mediterraneo* is produced, packaged and sold as a paste in the desired colour.

Mix the mixture with a high-speed, helical-tipped stirrer for at least 2 to 3 minutes until a homogeneous, lump-free and uniformly coloured paste is obtained.

[d] For further information, refer to the technical data sheet of the product that can be found here on the Diasen website.

Figure 27: Application of the product Decork Mediterraneo as a decorative on the exterior walls of a villa in Sicily

Figure 28: Application of the product Decork Mediterraneo as a decorative on the exterior walls of a villa in Sicily

Although the product is ready to use and should generally not be diluted, if the weather conditions are extremely hot, add:

- Between 0 % - 5 % water for trowel applications (0 L - 0.5 L per 10 kg / 22.04 lb packaging) of neutral product.
- 0 % for trowel applications of toner;
- Between 10% - 20% water for brush applications (1 L - 2 L per 10 kg / 22.04 lb packaging) of neutral product.
- Between 5% - 15% water for brush applications (0.5 L - 1.5 L per 10 kg / 22.04 lb packaging) of toner.

Decork Mediterraneo can be applied with a variety of tools, including trowel, brush, roller and airless to create surprising and unique aesthetic effects. The use of different tools can offer a wide range of creative possibilities and enable unique aesthetic effects. *Decork Mediterraneo* can be applied to walls and floors, depending on need and demand, in two coats.

Before applying, proceed with a primer, such as *Color Primer* or *Grip Primer*, and accordingly to what is reported in the TDS. Wait for the primer used to dry completely, then proceed applying a first abundant coat of *Decork Mediterraneo*, which can be used as a skimming coat to even out the surface. If the product is not perfectly dry, carefully check its suitability for subsequent coating. After the first coat has completely dried (approx. 10 hours at 23°C and 50% relative humidity), apply a second layer of product to finish to the desired effect. At a temperature of 23°C and 50% relative humidity, the product dries in approximately 10 hours. In general, please refer to an application video available at this link.

10. APPLICATION OF ARGACEM COLOURED

Applying *Argacem Coloured* directly onto *Diathonite Evolution*, previously treated with D20, offers a versatile and efficient solution for enhancing the aesthetic appeal of interior and exterior surfaces (see **Figure 29**). This application method not only ensures a vibrant and durable finish but also serves as a compelling alternative to the finishing system including *Argatherm* and one of our paints.

Argacem Coloured not only adds an attractive visual dimension but also maintains the remarkable thermal and acoustic insulation properties of Diathonite Evolution, making it a standout choice for achieving both beauty and performance in architectural designs.

Figure 29: Argacem Coloured applied on the external wall of a private residence in Valencia (Spain)

11. DIATHONITE EVOLUTION: DRYING TIMES

After the application of the last layer, **Diathonite Evolution** dries out at a rate of 2 mm per day at a temperature of 23 °C and 50% relative humidity. At temperatures and relative humidity percentages different from the standard ones reported, the product can require more or less time to dry completely. In fact, drying times are influenced by the relative humidity of the room and the temperature, and can vary significantly. If the plaster is applied in large thicknesses, the drying time will be considerably longer. It is important to protect the thermal plaster during curing from heavy rain, frost, wind and direct sunlight; moreover, in situations of high temperatures and beating sun, and also in cases of strong wind, it is essential and necessary to wet the plaster even 2/3 times a day for the first two or three days after application. For example, at temperatures above 28°C it is important to wet the plaster every 2 hours to avoid cracks.

As soon as **Diathonite Evolution** has completed the drying time, it is recommended to coat the plaster with the chosen finishing system. If applied indoors, it is recommended to ventilate the room as much as possible during application and drying of the product. If applied externally, in order to avoid prolonged exposure to the weather, it is essential, after applying the last coat of **Diathonite Evolution** and waiting for its curing (so not before 10-15 days), to coat the plaster with the chosen finishing coat, referring to the technical data sheet of the product. When the latter is completely cured (and not before 7 days), apply the chosen finishing according to the indications reported in the related technical data sheet.

12. ADDITIONAL SUGGESTIONS FOR THE BEST PRACTICE INSTALLATION OF THE PRODUCT

It is important not to apply the thermal plasters in case of environmental and substrate temperatures lower than +5°C and higher than +35°C. During the summer season, it is recommended to apply the product during the cooler hours of the day, out of the sun. In general, do not apply when there is imminent danger of rain or frost, in conditions of heavy fog or when relative humidity exceeds 70%.

In exposed sites or at periods of the year when weather conditions may be more extreme, it is important to take sufficient steps to protect the façade with a scaffold and tarpaulin (see **Figure 30** below).

If it is deemed necessary, and only after contacting the Diasen technical office, it is possible to proceed with the application, by hand or by spray, of a first coat of **Diathonite Evolution** as a rendering. **Diathonite** plaster can be applied on ceilings; however, it must be applied with plastering machines for optimum adhesion. On rare occasions, where machine application is not feasible (e.g. in very confined spaces) hand application is possible. Please refer to Diasen's hand application guidance. In all cases it must also be reinforced with Polites 140. It is important to highlight that, for ceiling application, maximum ceiling thickness is 40 mm, whilst per layer the max. thickness shall be 20 mm. For indoor applications, it is ***essential*** that the surface of the external façade does not absorb water: therefore, all junctions shall be protected, the pointing must be good. If the wall is in contact with the ground or can in any way be affected by moisture or water, it is mandatory to treat the surface with *BKK Eco*.

Even in case of exposed walls it is essential to apply a transparent water-repellent and breathable siloxane paint, such as *BKK ECO*. For application methods and other relevant information, please refer to the technical data sheet of the mentioned product. It is recommended to waterproof and protect the points most subject to hygrometric stress, such as at the base of the wall near the ground or at the junctions between the flat roof slab and the external walls. In fact, the presence of moisture can cause the growth of fungal colonies and/or the presence of condensation on the internal surface of the building envelope. If there is any doubt about the consistency of the substrate, and considering the wide variety of substrates that are available, it is advisable to carry out an adhesion test on a small area. The test area must allow to verify any chemical, mechanical and physical incompatibility between **Diathonite Evolution** and the substrate.

Figure 30: Robust weather protection of façade with scaffold, hessian and weathertight tarpaulin outside. Project – Peach House, Aras an Uachtarain, Dublin, Ireland

12.1. *Weather tight detailing at Window and Doors*

When dealing with the exposed wall surfaces where the glazing elements meet the structure, it's essential to start by priming them. A suitable option for this is **pro Clima** **Tescon Sprimer** primer, applied by spraying.

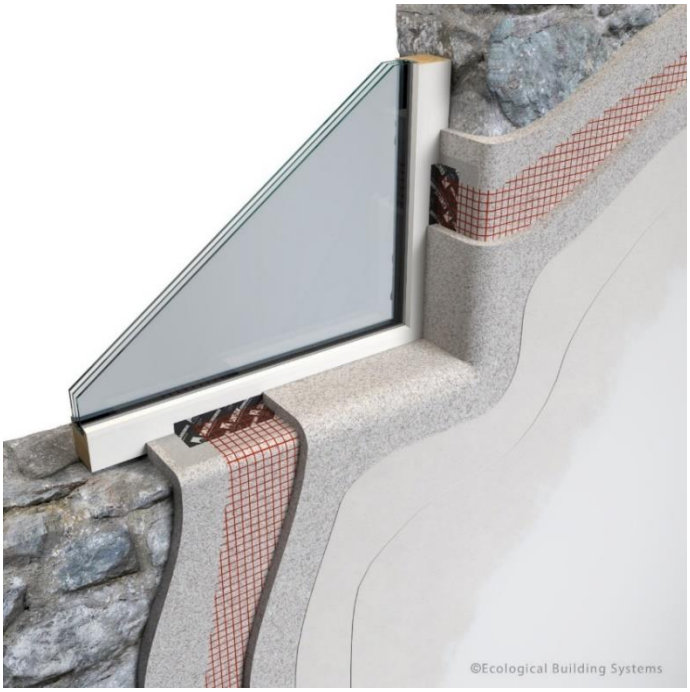
Following the priming, it's advisable to tape the reveals and window head junction before applying thermal render, such as **pro clima** **Contega Solido EXO**, which offers a reliable solution for ensuring the integrity and performance of exposed wall surfaces in construction projects. Its immediate waterproofing, durability, flexibility, and compatibility with other construction materials make it a valuable choice for builders and contractors. Sills and flashings should be installed so that they provide sufficient overhang to shed water away from the face of the finished system. Best practice is to allow for a minimum of 40mm overhang to the throat or drip.

12.2. *Application*

Ensure the frame of the door/window is clean and free from dust and grease.

Remove the backing from the 20mm tape section and adhere to the door/window frame surface if any arise. Before taping onto concrete surfaces, the area should be primed in advance. Before spraying the **pro Clima** **Tescon Sprimer** ensure the structure is dry, and that the product is well shaken before use. Apply an even layer from a distance of approximately 200mm onto the concrete surface. Working with manageable 1m long sections taping may begin immediately to the primed surface.

To ensure a secure and airtight seal, begin by removing the backing strips from the tape and firmly adhere it to the designated areas. Once in place, use the recommended application tool, such as the **pro clima** **Pressfix tool** provided by the supplier, to press the entire surface of the tape firmly. This step is crucial for achieving a permanent, strong bond.



This detail is particularly recommended for external applications of thermal plaster. It serves to prevent rainwater ingress at vulnerable positions over time, safeguarding the integrity of the structure and maintaining the effectiveness of the thermal insulation. When executed correctly, the tape should be completely concealed behind the thermal plaster finishes upon completion. This ensures a seamless and aesthetically pleasing result, with no visible tape compromising the appearance of the finished surface.

13. VENTILATED FAÇADE SYSTEMS

Diathonite Evolution has also been studied for applications in ventilated façade systems, technological solutions that offer many advantages in terms of energy saving, acoustic insulation, protection of the structure, but also architectural value. The role of the façade in a building is in fact **to relate to the context** and to **regulate the exchange of heat, air and light between inside and outside**. A ***ventilated façade*** is an external cladding system that bases its operation on the movement of air that is triggered inside the air cavity: it is a natural convective motion, which depends on the temperature difference created between the inside and outside of the cavity (see **Figure 31**).

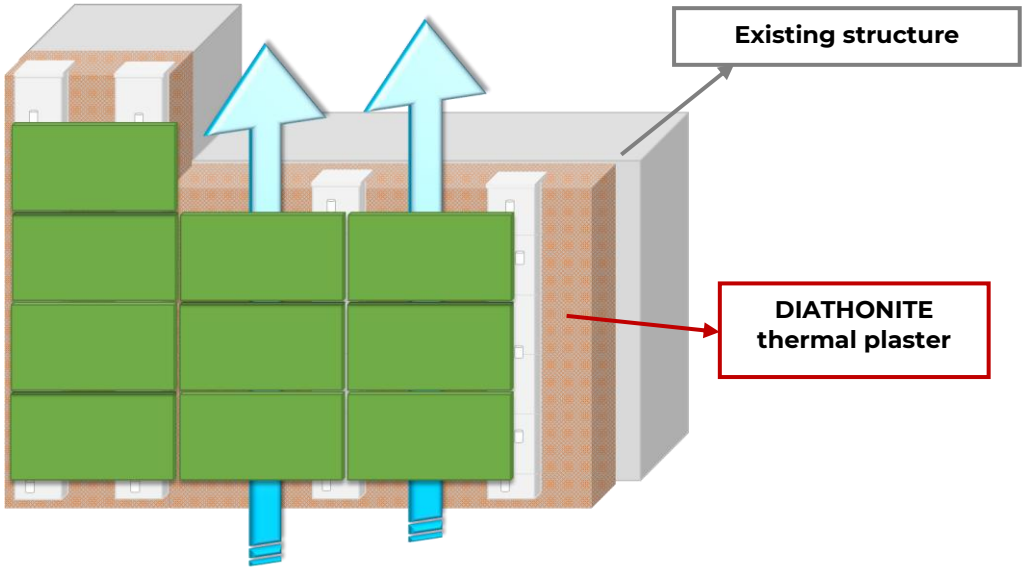


Figure 31: Functioning of ventilated façades. Exploiting the natural convective motion, in summer the rise in air temperature in the cavity caused by solar radiation on the cladding causes the so-called 'chimney effect' (air upwards); in winter, on the other hand, the cavity keeps the internal temperature of the wall in equilibrium.

Ventilated façades are installed dry, and involve a cavity between the perimeter wall of the building and the external cladding. The outer cladding layer does not adhere to the curtain wall but is spaced from it to form a cavity. In this way, natural air circulation is achieved in the cavity space, due to the convective motion produced by the presence of openings arranged at the base and top of the façade. During the winter period there is little solar radiation and the cavity between the substrate and plaster keeps the internal temperature of the wall in balance (reducing humidity and surface condensation). In summer, the rise in air temperature in the cavity caused by solar radiation on the cladding causes the so-called ***'chimney effect'***, which transports warm air upwards and removes heat, effectively reducing the temperature on the inside wall. A ***ventilated wall*** consists of a continuous insulation layer that is laid on the walls. After the substrate has been prepared, proceed with the installation and fixing to the wall of the elements that make up the substructure of the *ventilated façade* according to the project specifications.

Therefore, after having prepared the existing structure on which the thermal plaster **Diathonite Evolution** will be applied, proceed with the installation and wall fixing of the elements that make up the substructure of the ventilated façade according to the project specifications.

Depending on the type of **Existing structure,** assess the possible need to apply a water-based primer such as *Aquabond*. Then proceed with the application of the plaster following the application specifications in the previous two chapters (**6.1 APPLICATION BY HAND** and **6.2 APPLICATION WITH PLASTERING MACHINE**), until the design thickness is reached. Once the last layer of the thermal plaster has completely dried, apply on the whole wall the colourless water-based siloxane water repellent, *BKK Eco*. The application of this thermal plaster of the Diathonite line as a technological solution takes part in the increase of energy saving (A1, non-combustible), contributing also to the acoustic insulation and to the protection of walls from atmospheric agents and thermal shocks. It is recommended to pay particular attention to the points where **Diathonite Evolution** are more subject to hygrometric stresses, such as the base of the wall close to the ground or the joints between the flat roof slab and the external walls. At these points, the use of suitable flashings and/or localized waterproofing is recommended (**7. APPLICATION OF ARGATHERM**). Finish by installing the superstructure and all other elements required to complete the ventilated façade according to the project specifications.

14. SAFETY INFORMATION

All the components of the **Diathonite Evolution** application process are provided with Safety Data Sheets drawn up in compliance with European standards and obtained through **Chemeter**[e] software**.** As far as the *Polites 140* mesh is concerned, on the contrary, in compliance with the current European regulations (Reg. 1907/2006/CE - REACH) the preparation of the Safety Data Sheet is not required. During handling and use, however, it is recommended to wear protective gloves and goggles and to comply with the normal safety regulations in the workplace.

15. NOTES

The same outstanding characteristics outlined in the document for Diathonite Evolution also apply to Diathonite Thermactive.037 and Diathonite Deumix[+].

[e] **Chemeter** is an innovative software aimed at the chemical industry and designed to be different from other software already on the market. The software generates the MSDS through the use of an automatic calculation, adapted to the country in which it is being marketed and complying with the specific regulations of the sector in which it is working.

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