Ventilated Facades
Design and Installation Manual

Vers. 0/2020

LAPITEC

NOTE

The scope of this manual is to provide general indications on the criteria for use of **Lapitec®** as façade cladding installed on a structure, with and without ventilation.

The information contained herein is the result of experience acquired by Lapitec SpA and the technical knowledge available at the time of publication. Users are therefore invited to refer to the most up-to-date version, which is always available for download at www.lapitec.com in the download area.

The assessment of fitness for use for a specific project and verification of compliance with the regulations in force in the country and context where the project will be developed, remain the responsibility of the authorised professional.

In regards to the above, Lapitec S.p.A. shall not be held liable for any damage that may result during the application of the information and suggestions contained in this technical manual, insofar as considered merely information and suggestions, which must always be verified beforehand by the user.

Moreover, Lapitec S.p.A. reserves the right to make technical changes of any type without any prior warning and without direct communication to any parties.

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1. LAPITEC®

1.1/ CHARACTERISTICS

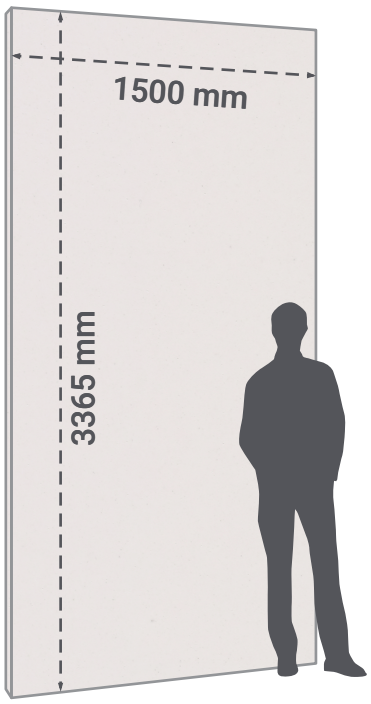
Lapitec® is a sintered stone, an innovative material produced in large slabs using an exclusively patented technology, which can be used for both indoor and outdoor applications.

Lapitec® sintered stone is resistant to wear, weather, UV exposure, heat, frost and absorption.

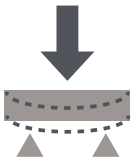
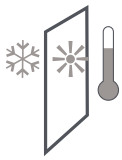
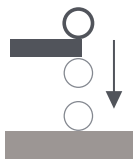
The different surface finishes of **Lapitec®** make it perfect for use on both floors and walls.

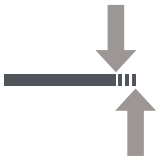
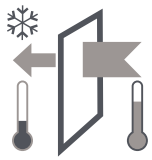
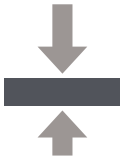
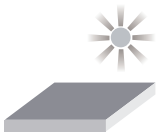
Lapitec® is compatible with a broad range of adhesives and binders, thus allowing it to be installed on various types of supports; it can be used without limits in different environments, including those that are particularly harsh (humidity, salinity, presence of aggressive pollutants...).

Standard dimensions



1.2/ TECHNICAL DATA SHEET

TECHNICAL SPECIFICATIONS		STANDARD	VALUE
	Standard dimensions	EN 14617-16	3365x1500 (12-20 mm) 3365x1460 (30 mm)
	Thicknesses	EN 14617-16	12 – 20 – 30 mm
	Density	EN 14617-1	2,4 kg/dm^3
	Water absorption	EN 14617-1	0.02%
	Flexural strength (R_{tf}) after 25 freeze-thaw cycles (R_{Mf}) after 20 thermal shock cycles (R_{sf})	EN 14617-2	55 N/mm^2 54.1 N/mm^2 54.3 N/mm^2
	Deep abrasion resistance	EN 14617-4	140 mm^3
	Frost resistance	EN 14617-5	Resistant
	Coefficient of thermal shock resistance (after 20 cycles)	EN 14617-6	0.9%
	Impact resistance	EN 14617-9	1.97 Joule (thickness 12 mm) 3.3 Joule (thickness 20 mm)
	Acid and alkali resistance	EN 14617-10	C4 - Resistant
	Coefficient of linear thermal expansion	EN 14617-11	5.8 x 10^{-6} °C^{-1}

TECHNICAL SPECIFICATIONS		STANDARD	VALUE
	Dimensional stability	EN 14617-12	A
	Fire reaction	EN 13501-1	A1
	Thermal conductivity	EN ISO 10456	1,3 W /m · °K
	Specific heat capacity	EN ISO 10456	840 J/kgK
	Aqueous vapour diffusion resistance	EN ISO 10456	no value (dry) ∞ (wet)
	Non-slip properties	DIN 51130	R10 (Vesuvio, Lithos, Dune) R13 (Fossil, Arena)
	Compressive strength	ASTM C170	439 N/mm^2 (dry) 483 N/mm^2 (wet)
	Colour resistance to light	DIN 51094	No variation
	Water absorption - capillary	EN 1925	0,006 g/m^{2}s0,5

Lapitec® is a fireproof material, classified A1. When exposed to fire it does not ignite, does not release fumes and does not spread flames.

Violent thermal fluctuations such as direct exposure to a flame may cause the material to break.

2. DESIGN

2.1/ INTRODUCTION

Sintered stone is a highly versatile material with very few application constraints in a broad range of situations.

Façades can be created using a variety of formats, layouts, finishes, thicknesses and fixing criteria. The possible combinations can be adapted to both engineering and architectural requirements. The solutions adopted must comply with local regulations.

Lapitec® façades can be created without restrictions on the distance from the substrate, however ventilation is one of the most efficient criteria in order to take full advantage of the great qualities offered by the façade system.

The physical and mechanical properties of **Lapitec®** highlight many of the typical characteristics of a ventilated façade; the many benefits include:

- increased performance of insulating materials,
- reduced exposure to sunlight and heat dispersion
- prevention of condensation phenomena and water retention
- increased sound insulation.

The inalterability of **Lapitec®** also extends the lifespan of the façade, significantly reducing the effects of time on the cladding; Lapitec is in fact resistant against polluting agents and dirt, thus reducing maintenance costs.

2.2/ LAYOUT AND SELECTION OF A SYSTEM

Lapitec® slabs can be used in all sizes obtainable from the standard size of 1500x3365 mm. There are no limitations except those dictated by the performance characteristics of the available solutions. To assess the performance of the various systems, see the tables in the dedicated chapter.

When designing a façade, the size, shape and layout of the **Lapitec®** slabs will significantly increase or decrease the resistance levels of the façade itself.

It is important that fitness for use be evaluated by an authorised professional able to determine, on a case by case basis, whether the proposed solution satisfies local requirements and applicable laws.

2.3/ CHARACTERISTICS OF UNDERSTRUCTURES

Lapitec® can be installed on aluminium or steel metal structures; various solutions are available on the market.

Generally speaking these structures have two types of components: brackets for anchoring to the substrate and vertical (mullions) and/or horizontal (tracks) profiles to fix the cladding in place.

The brackets have a two-fold function, they allow the understructure to be anchored to the substrate and guarantee spacing based on the presence or otherwise of insulation and/or an air chamber. Brackets are available on the market in a range of depths from approx. 40 mm to over 350 mm. Contact a steel mill for greater thicknesses.

The vertical and horizontal profiles have different shapes and sizes. The most common have T, L and C-shaped sections; their function is to guarantee suitable support for the fixing grid of the cladding. In the case of ventilated façades, profiles must also guarantee ventilation. To this end, it is recommended not to reduce the space between the slab and substrate to less than 4 cm.

Structures available on the market are generally tested by their respective manufacturers; use of a structure different to those normally available on the market is allowed only if suitability is verified before installation begins.

Regardless of the type of structure used, Lapitec SpA recommends the following aspects be complied with:

2.3.1/ Resistance

Structures must have a size and layout that considers the loads they will need to bear (wind, accidental impact, weights, thermal fluctuations, earthquakes...), thus guaranteeing safe use and compliance with local legislative requirements.

Below is a description of the allowed deformations, without prejudice to an accurate study of any interferences between the anchoring system and supported cladding, which indicates a further reduction:

- for the mullions, the maximum allowed sag is equal to 1/200 of the vertical span between two consecutive anchors (wind);
- for cross-bars, the maximum allowed sag is equal to 1/300 of the net span for vertical inflections (weight) and 1/100 of the same span for inflections in the horizontal plane (wind).

2.3.2/ Elasticity with respect to the substrate

Buildings are subject to deformation, bending or movements that may affect the cladding, causing damage.

Settling, thermal fluctuations, deformations due to wind loads, are just some of the causes of these stresses; the structures on which the slabs will be installed must be designed to neutralise or significantly reduce the consequences of these actions. There are compatible structures already available on the market, recommended by Lapitec SpA as preferable to DIY solutions.

2.3.3/ Inalterability

In certain locations, environmental conditions may compromise the structures, causing oxidation or corrosion phenomena. One classic example are buildings located along the coast; the façades are significantly exposed to salt spray from the sea; support structures should preferably be made of anodised aluminium or stainless steel.

Lapitec® can be installed in harsh environments without the need to adopt any particular measures.

2.3.4/ Coplanarity

The structures must guarantee the perfect coplanarity of the surface of the mullions on which the **Lapitec®** slabs will be installed. Structures available on the market allow the vertical and horizontal adjustment of any misalignments or off-plumb substrates. Failure to comply with this measure may jeopardise the correct positioning of the slabs.

To this end, during the design stage, when calculating the dimensions of the façade pack consider an additional clearance of at least 20 mm.

2.4/ SELECTING THE SIZE AND THICKNESS

Lapitec® slabs offer elevated mechanical resistance, allowing them to be used on façades in all sizes and thicknesses.

Their resistance depends on the different possible combinations of size, thickness, anchoring system (number and layout) and shape of the slabs themselves.

The designer may prefer one aspect over another at different times in order to satisfy engineering, architectural or economic needs.

Values are provided below, for example purposes, in relation to allowable wind loads for the different combinations of size and anchoring systems (number and layout).

Lapitec® slabs can be used in all sizes effectively obtainable from the maximum size 1500x3365 mm. Lapitec SpA recommends using modules compatible with the standard measurements.

An ideal design will make use of modules in multiples of 750 mm.

The aim of the sizes proposed herein is to optimise the use of the slab.

SUGGESTED MODULES

3000x1500
1500x1500
750x1500
750x750
500x500

Making the most of the dimensions compatible with **Lapitec®** sizes not only helps avoid waste, but also ensures optimal use of the fixing grids allowed for installation, thus offering considerable economic savings on both the material and installation time.

If the presence of people and/or means in the vicinity of the cladding may compromise the integrity of the slabs (accidental impact), Lapitec SpA recommends increasing the thickness of the slabs or reducing the span between anchors.

For façade claddings, the minimum thickness of 12 mm is sufficient to guarantee almost all wind load requirements. To increase the performance characteristics of the cladding without necessarily increasing the thickness, simply consider increasing the number of anchors or reducing the size of the slab itself.

During the design stage, also pay attention to the choice of finish, which shall affect maintenance and cleaning during use. The different finishes will facilitate or otherwise cleaning operations. Generally speaking, smoother surfaces are preferable in cases requiring regular cleaning and the impossibility to use equipment (e.g. pressure cleaners, industrial cleaners...).

2.5/ CRITERIA FOR INSTALLATION DESIGN

Lapitec® can be designed with any composition layout (in-line gaps, staggered gaps, alternated gaps...).

The design, in order to guarantee the durability and visual appeal of the cladding must consider the layout of the gaps and joints (structural).

Avoid positioning a slab over an expansion joint or anchoring it to two distinct profiles, which may develop counteracting forces as they expand. Failure to comply with this requirement will almost certainly cause the slabs to break.

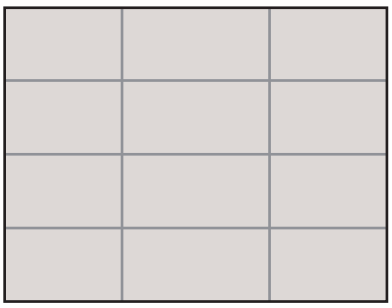
The slabs are calibrated and produced in compliance with design tolerances expressed in the technical data sheets, however the alignment of slabs may highlight even the slightest dimensional difference and/or unevenness of the substrate.

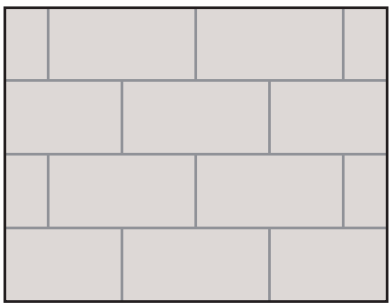
The choice between a vertical or horizontal layout of the slabs shall be at the discretion of the designer. The support structure will be adapted to the architectural design.

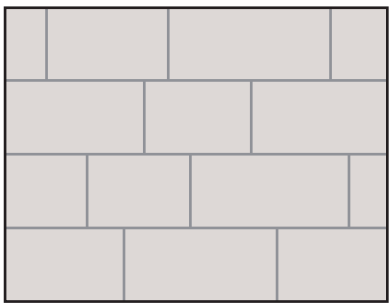
2.5.1/ Gaps

Lapitec® slabs must always be installed with 10 mm gaps, and in any case never less than 8 mm. The only situations in which slabs may be installed with a smaller gap is in indoor spaces, when small sizes are used and after having checked with the Lapitec SpA technical department.

The slabs can be positioned in such a way that they are lined up, alternated or staggered. In locations with high pollution levels, Lapitec SpA recommends a layout with in-line gaps; unless the façade is properly maintained, dust deposits further to expansion may lead to unsightly streaks of dirt on the slabs.







2.5.2/ Joints

Ventilated façade cladding is not watertight; regardless of whether the joints are closed or open, water can always pass through to the inside of the cladding.

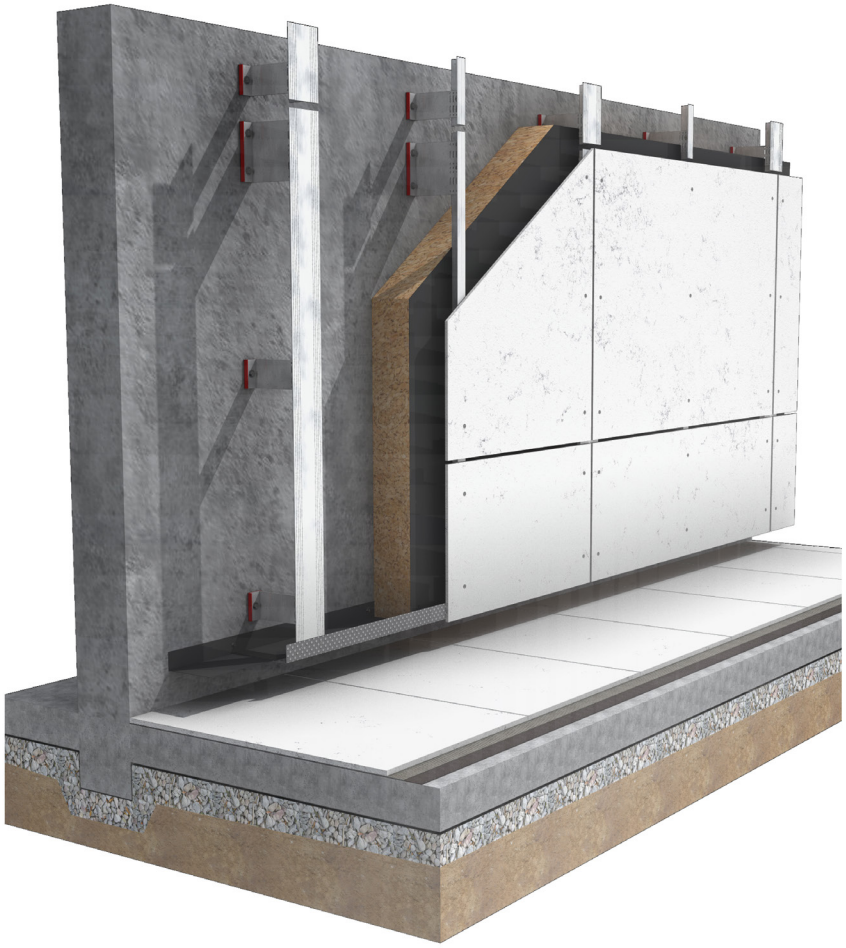
In any case, water in a ventilated façade does not pose a problem, since due to run-off and continuous ventilation, the rear side of the system (insulation/substrate) is always maintained dry.

The design must not interfere with verticality through the interposition of elements that may interrupt the air flow, or even worse, create retention phenomena.

Should such interruptions prove necessary, flashing must be used to facilitate the evacuation of run-off water.

2.5.3/ Edges, corners, windows and doors and noteworthy points

Refer to the specific drawings of each anchoring system attached to this manual and on the Lapitec SpA website for the design and installation of edges, corners and all noteworthy points in general.



2.6/ SAFETY OF USE

2.6.1/ Loads

When developing façade cladding, ventilated or otherwise, it is essential have an engineering study performed by authorised technicians, which takes into account local laws, the context, loads and stresses to which the cladding will be subjected.

The correct choice of size, the calculation of the number and layout of anchors is the responsibility of the designer and must guarantee adequate resistance.

Lapitec SpA has conducted a considerable number of tests with the aim of identifying the physical characteristics of its product and facilitating designers in their decisions, also testing the breaking behaviour of the different anchoring systems and how they respond to ageing.

The following values are provided in this manual to assist engineering calculations:

LAPITEC® MODULE OF ELASTICITY

E = 60 GPa

FLEXURAL STRENGTH

Average flexural strength σm = 55 MPa

Characteristic flexural strength σk = 42 MPa

Wind resistance

For the various anchoring systems, the dedicated chapters include recalculated wind load charts for the different sizes, for example purposes, quoting the reference standard at the bottom of each.

2.6.2/ Mesh and matting

The mechanical resistance and reaction to impact of **Lapitec®** can be modified through the use of reinforcement materials glued to the back side of the slabs.

The most commonly used material is matting, due to its mechanical resistance, and mesh to hold the slab together in the case of impact. This process is available on request. For applications requiring use of this system, please contact the Lapitec SpA technical department for an assessment of your requirements.

Such safety systems are only compatible with mechanical anchoring systems. Use with structural adhesives is prohibited.

Anti-collapse mesh is not very thick, however at times it may limit the use of rivets. Therefore, it is advisable to check the compatibility of the fastening depth of the selected rivet with the total thickness of the selected slab, the space occupied by the mesh and the profiles of the structure used.

2.7/ INTRODUCTION TO FAÇADE SYSTEMS WITH LAPITEC®

Lapitec® is installed using a broad range of fixings designed to guarantee the performance of the material in its intended uses. Lapitec SpA has worked with several of the industry's leading companies, jointly identifying the most suitable systems for the various applications.

Not all solutions are applicable in every context; the designer and installer must verify fitness for use in compliance with codes and regulations, in each situation.

Lapitec® slabs can be installed on façades using different types of fixings.

Generally speaking, these can be grouped into three families: visible mechanical systems, concealed mechanical systems and structural adhesives.

Visible systems use rivets; concealed systems use expanding inserts and adhesives use silicone or polyurethane structural adhesives.

An anchoring system implies the set of fixings and all components and/or tools used for installation. Failure to use one of the components or tools may jeopardise the final result.

Following is a list of the systems identified by Lapitec in collaboration with various leading companies in the fixing sector.

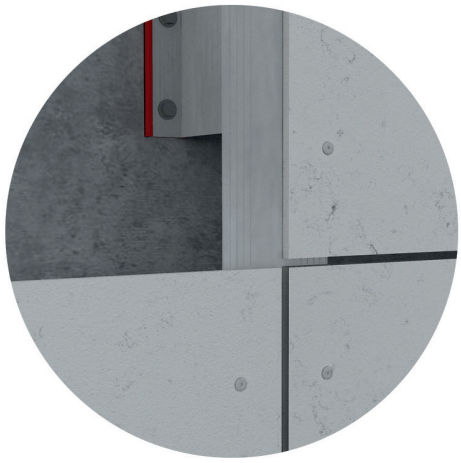
LAPITEC V in collaboration with SFS INTEC Srl

System compatible with Lux, Satin, Lithos, Vesuvio finishes.

- SFS WEBSITE www.sfsintec.biz

The SFS fixing kit involves the use of:

- Rivet AP16-5x21-S (max depth 16) AP14-5x23 (max depth 18)
- Centring device 146x20x9.0 for holes Ø 9.0-9.9 with bit 5.1x100
- Nose piece for riveter AP PG 17/29 K16 (GESIPA riveter)



LAPITEC H1 in collaboration with KEIL BEFESTIGUNGSTECHNIK GmbH

System compatible with all finishes.

- KEIL WEBSITE keil-fixing.de

The Keil concealed fixing kit involves the use of:

- Keil insert KH AA 7.00 - M6x11.5
- Stainless steel screw with depth based on thickness of clip used
- Clip with hex hole to house insert

LAPITEC H2 in collaboration with FISCHER ITALIA Srl

System compatible with Dune, Arena, Fossil, Vesuvio, finishes.

- FISCHER WEBSITE www.fischeritalia.it

The Fischer concealed fixing kit involves the use of:

- Fischer insert FZP-II 11x8 M 6/T/12 PA
- Tightening tool FISCHER SGT/SGA
- Clip with circular hole to house insert
- Stainless steel nut to tighten clip

LAPITEC B in collaboration with DOW CORNING, SIKA ITALIA SpA

System compatible with all finishes.

- DOW CORNIG WEBSITE consumer.dow.com

The Dow Corning® fixing system involves the use of single component silicone adhesive:

- Cleaner Dow Corning® (Type: R 40 Universal Cleaner)
- Dow Corning® Primer P
- Dow Corning® 896 PanelFix for Bonding

- SIKA ITALIA WEBSITE ita.sika.com

The Sika® fixing system involves the use of two solutions:

With SikaTack® Panel a single component thixotropic polyurethane adhesive

- Cleaner
- Primer SikaTack® Panel
- SikaTack® Panel
- SikaTack® Fixing Tape

With SikaTack® Panel-50 a single component silicone adhesive

- Cleaner
- Primer SikaTack® Panel
- SikaTack® Panel-50
- SikaTack® Fixing Tape

The fixing systems are compatible with both aluminium and steel structures; use of a wooden structure to support Lapitec is not contemplated (for clarifications contact the Lapitec SpA technical department).

2.8/ LAPITEC V

The Lapitec V system involves visible fixing with rivets.

The system is compatible with Lux, Satin, Lithos, Vesuvio finishes.

On aluminium structures, aluminium rivets are used; on galvanised steel structures, stainless steel rivets are used to prevent any galvanic corrosion phenomena in the presence of humidity.

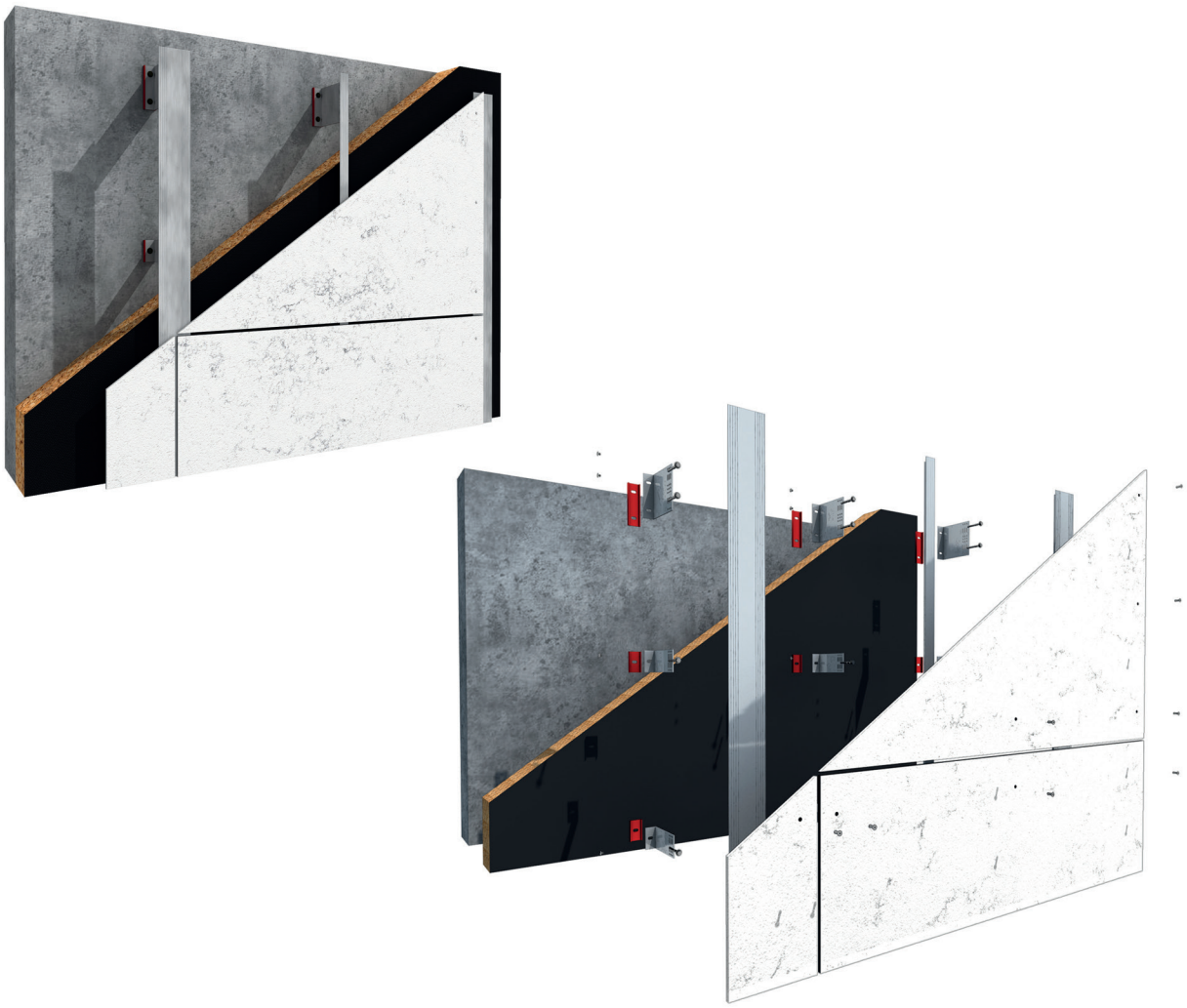
LAPITEC V (in collaboration with SFS INTEC)

Rivet AP16 5x21 for mounting on aluminium structures (clamping of thicknesses up to 16mm)
Rivet AP14 5x23 for mounting on aluminium structures (clamping of thicknesses up to 18mm)
Rivet SSO 5x22 for mounting on steel structures

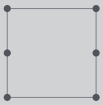
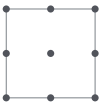
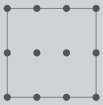
For the technical specifications of fixings, see the table in the dedicated section.

Lapitec SpA recommends the use of these rivets. Should an alternative be selected, the user must ensure that the product specifications are identical to those expressed herein.

Upon request, rivets thermolacquered in the same colour as the Lapitec slabs can be supplied.



For example purposes, the following table contains a recalculation of the design wind loads for four different sizes, considering various fixing grids. The design wind values indicated take into account the material's characteristic strength reduction coefficients and the design load amplification coefficients, as per the methods prescribed by Eurocodes for Limit State verifications.

Size	Step / Anchors	Layout	Design Pressure (kN/m^2) 12 mm
3000x1500	1000/12		1,02
3000x1500	750/15		1,35
3000x1500	500/21		2,09
1500x1500	1500/6		1,65
1500x1500	750/9		1,27
1500x1500	500/12		2,10
1500x750	1500/4		2,06
1500x750	750/6		3,00
1500x750	500/8		4,97
750x750	750/4		6,71

Wind load amplification coefficient (Eurocode): 1.50

Characteristic strength reduction coefficient (UNI 11018): 1.60

General requirements

Use of the rivets must comply with certain fundamental principles:

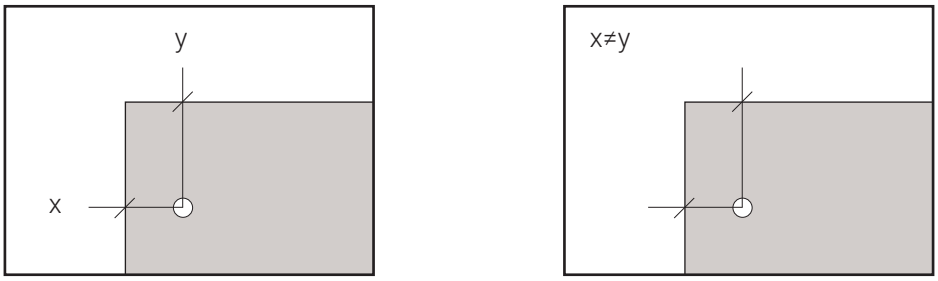
- compliance with the minimum and maximum distance from the edge
- development of fixed point and sliding point holes
- alignment of the hole on the structure with the hole on the slab
- use of a nose piece on the riveter to prevent stress during tightening

Disclaimer

Use of screws to anchor Lapitec panels is not allowed. The impossibility to check tightening makes it impossible to guarantee the result. Although there are no contraindications in terms of performance (fixing grids comparable to rivet systems), given it is not possible to eliminate the risk of breakage during assembly, Lapitec SpA does not contemplate screw fastening among the allowed systems.

2.8.1/ Minimum and maximum distance from the edge

The distance of the holes from the edge of the slab must be at most 250 mm and at least 50 mm from the vertical edge (X) and 50 mm from the horizontal edge (Y)



The number of holes on each slab will be determined based on an assessment of the required load and stress resistance.

2.8.2/ Fixed point and sliding point holes

To prevent rotational or translational movement of the slabs on the structure, on each Lapitec slab, regardless of the installed size, two of the holes must be fixed point and the remaining holes must be sliding point.

Fixed point holes are those with a diameter compatible with that of the rivet used (e.g. for a 5 mm rivet, a 5.5 mm hole).

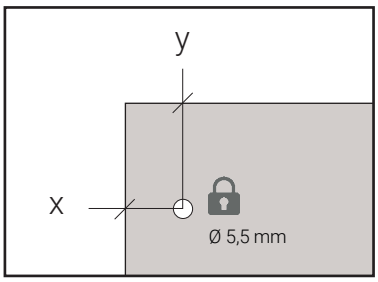
Sliding point holes are those whose diameter is at least 4 mm larger than the shaft of the rivet used (e.g. for a 5 mm rivet, a 9 mm hole).

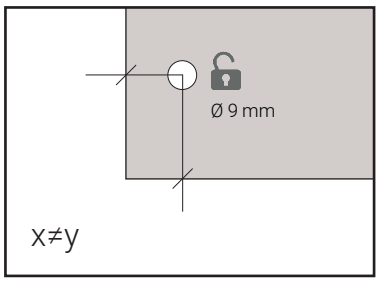
Sometimes, in order to achieve the same result without using holes with different diameters, sliding point holes can be used with aluminium bushes, which guarantee fixed points by filling the excess space.

Fixed point holes will support the weight of the slab, keeping it in place, and together with the sliding point holes provide resistance to wind. The layout of the fixed point holes and sliding point holes must be determined during the design stage and respected during installation.

It is preferable to arrange the holes in the central part of the slab as opposed to other solutions.

Fixed point holes on a single slab cannot work on the same metal profile and must be positioned at the same horizontal height. Finally, the fixed points of two adjoining slabs must not be on the same mullion (in the case of narrow slabs that do not allow compliance with this provision, contact the Lapitec SpA technical department).





Through-holes relative to rivet fixing systems must be developed with the following diameters: Ø 5.5 mm for fixed points and Ø 9 for sliding points.

2.8.3/ Centring the hole on the structure

During installation, the slabs must be laid in position and the understructure must be pre-drilled before fixing the rivets.

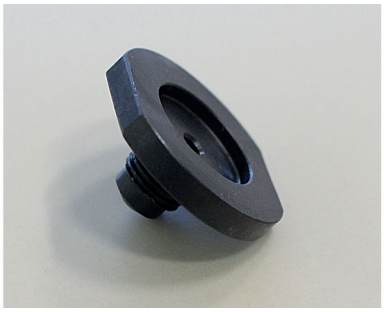
The hole on the understructure must be perfectly centred with respect to the hole on the slab. Use of a centring device is recommended.

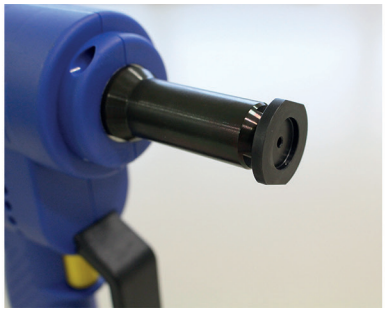
Before inserting the rivet, any drilling residue must be eliminated.

2.8.4/ Preventing stress

The slabs must be able to move freely. Rivets must not be excessively tightened or they will inhibit movement of the slab on the structures, or worse still, cause breakage during installation.

To this end, a mechanical riveter with nose piece must be used for tightening.





Use of a nose piece is mandatory.

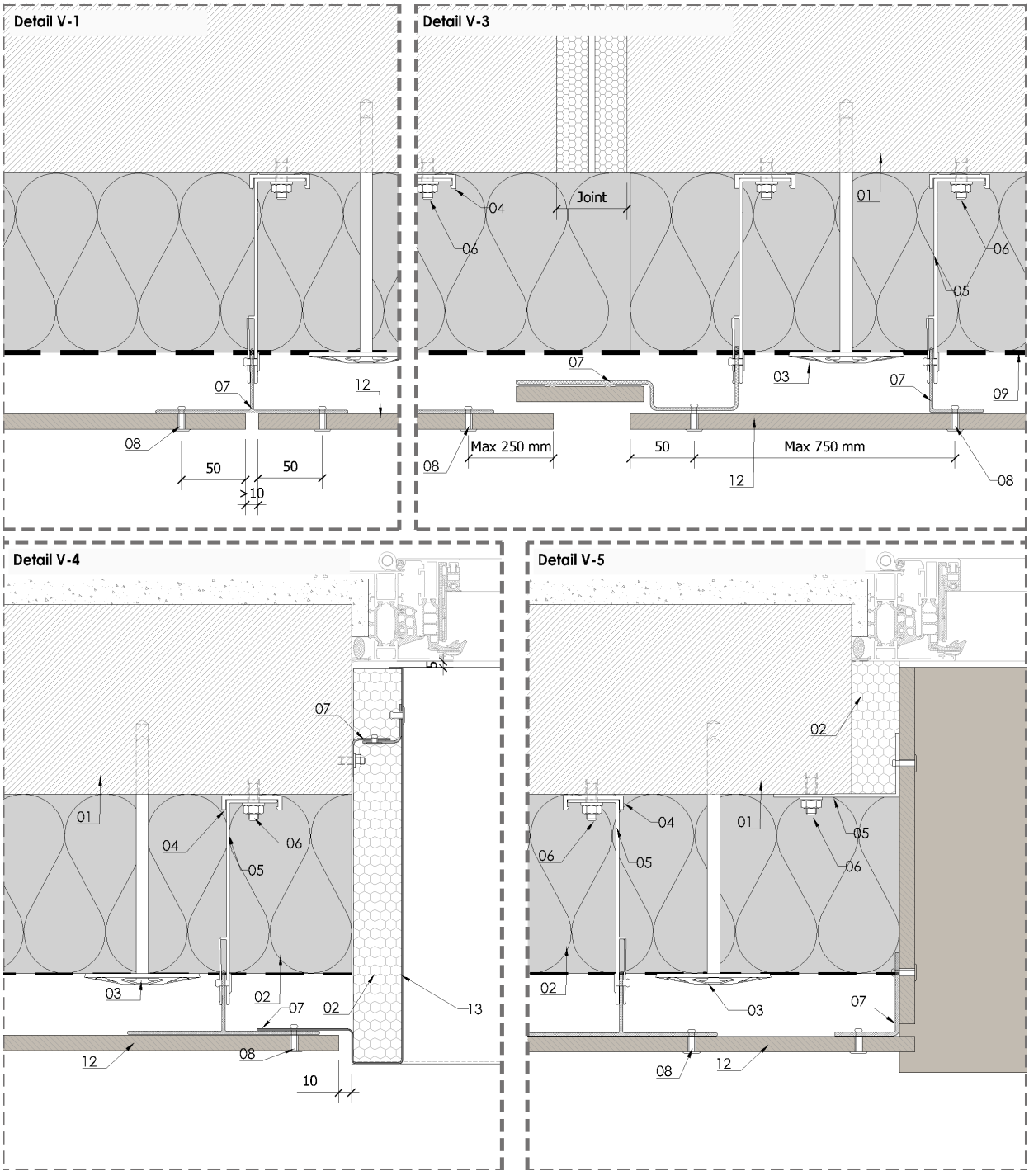
All anchors must be inserted perpendicular to the surface of the slab.

2.8.5/ Screw fastening disclaimer

Use of screws to anchor Lapitec panels is not allowed. The impossibility to check tightening makes it impossible to guarantee the result. Although there are no contraindications in terms of performance (fixing grids comparable to rivet systems), given it is not possible to eliminate the risk of breakage during assembly, Lapitec SpA does not contemplate screw fastening among the allowed systems.

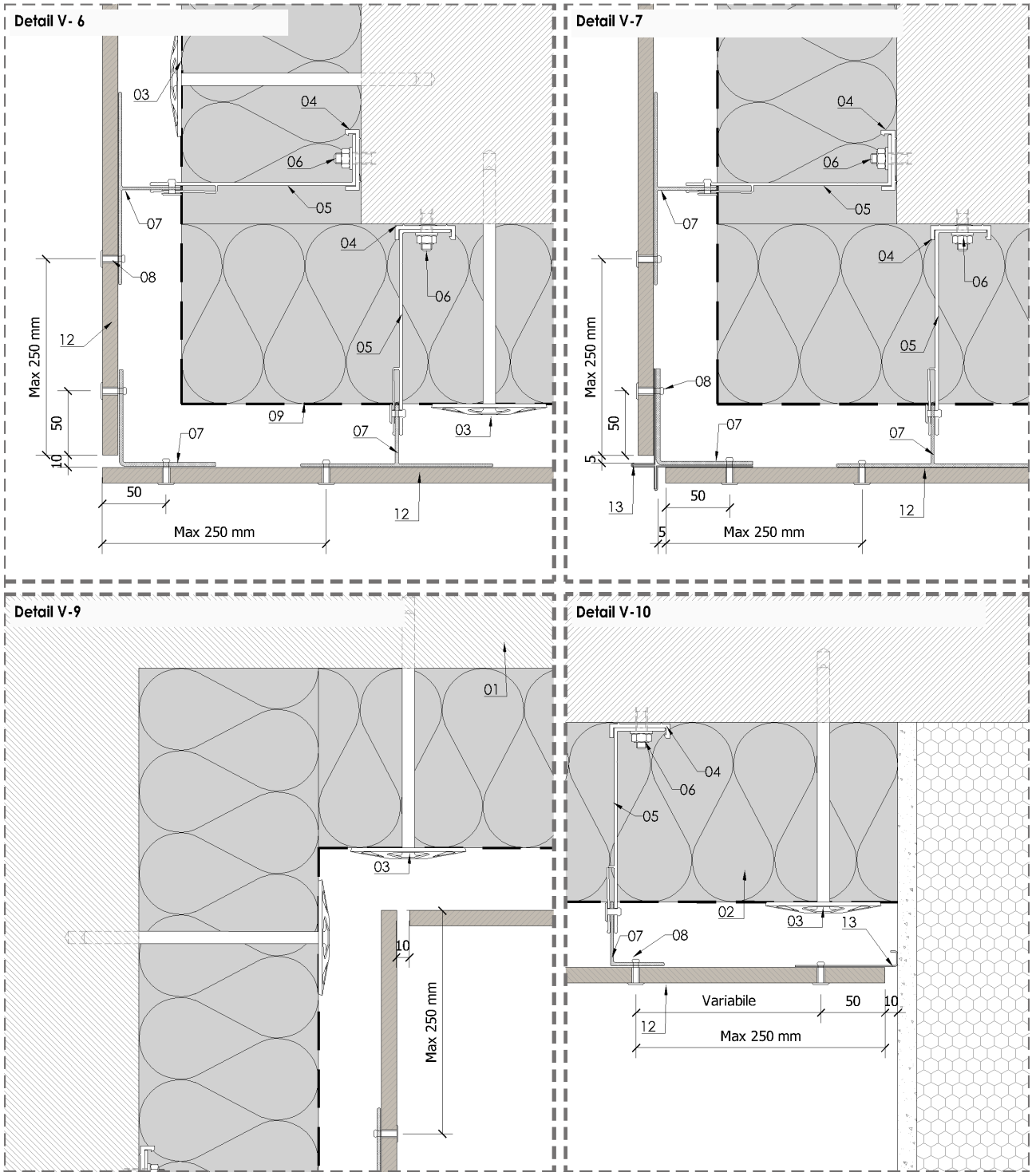
2.8.6/ Project details LAPITEC V

Following are various extracts of details of projects available on the website www.lapitec.it in dwg, BIM and pdf.



LIST OF MATERIALS:

01 Substrate (e.g. Cement wall...)
02 Insulation (e.g. Mineral wool...).
03 Anchor for insulation layer.
04 Isolator.
05 Brackets (e.g. Aluminium, stainless steel...).
06 Bracket anchors.
07 Aluminium profile.
08 Stainless steel anchors.
09 Vapour barrier.
10 Aluminium guide.
11 Aluminium clip.
12 Lapitec slab, 12 mm thick.
13 Sheet metal closing.



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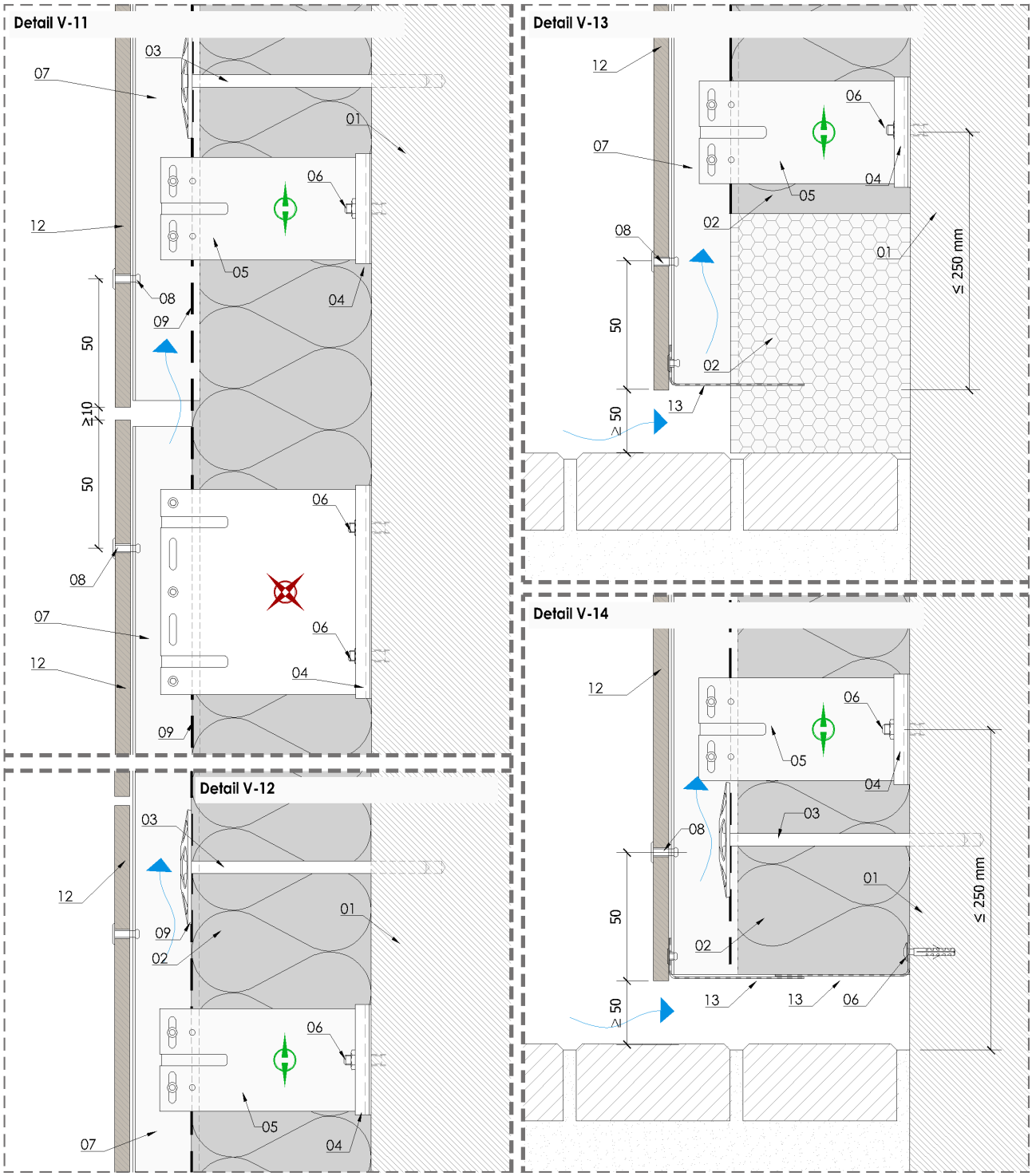
13 Sheet metal closing.



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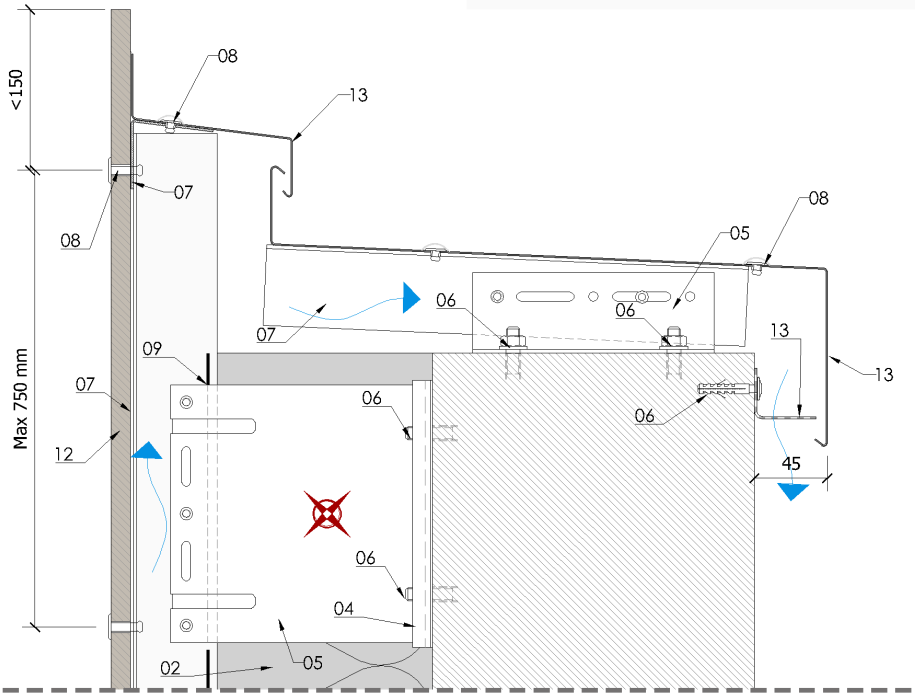
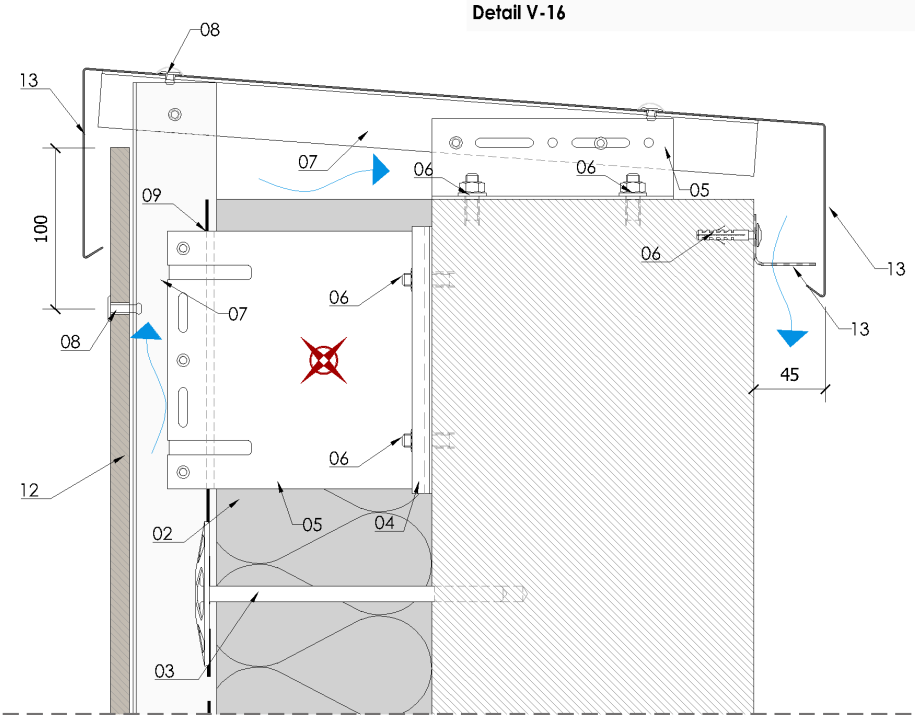
Detail V-15



Detail V-16



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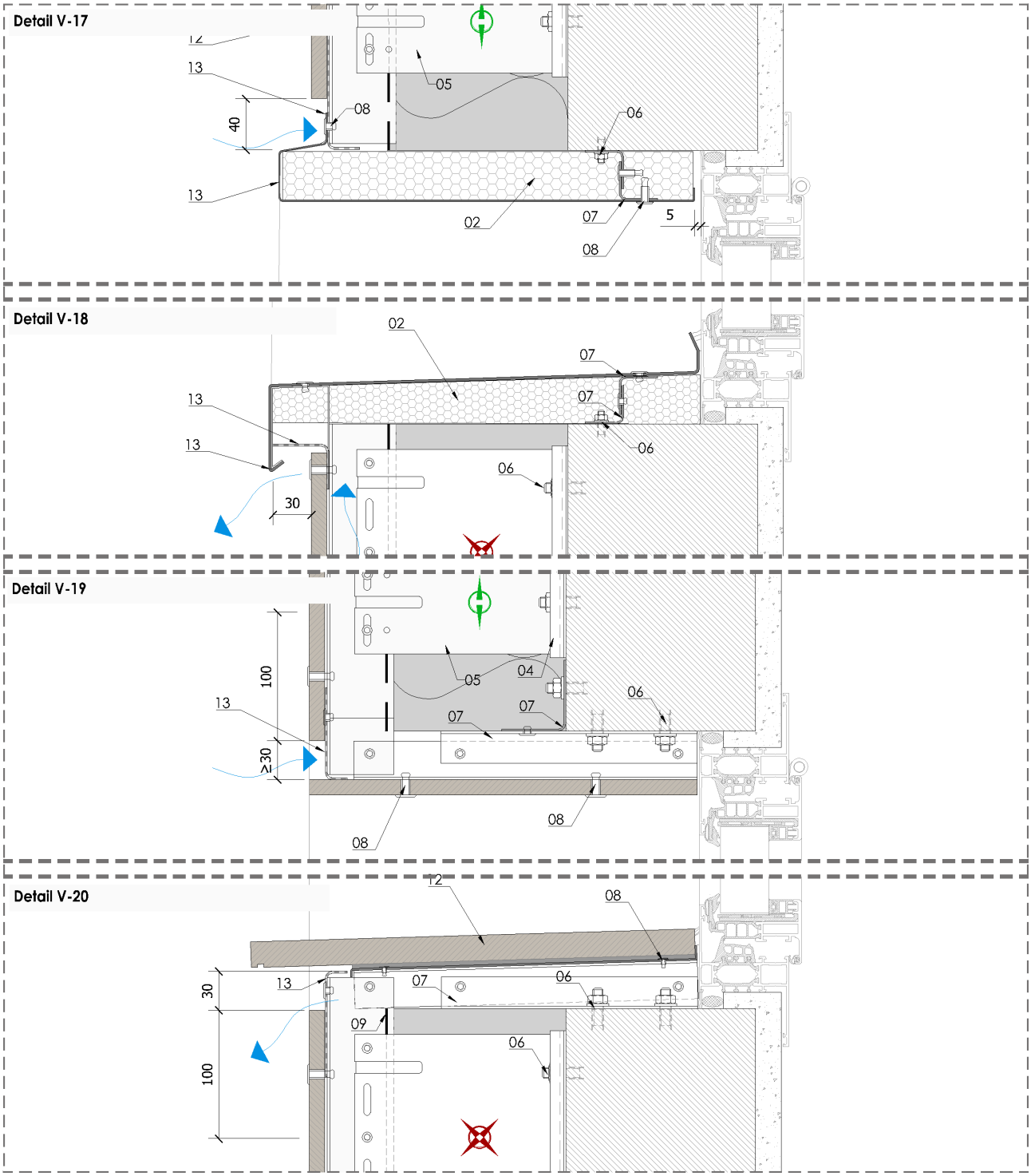

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2.9/ LAPITEC H

The Lapitec H system is a concealed anchoring system with expanding inserts. These inserts are placed in blind holes with a truncated cone section developed on the rear face of the slab. The inserts allow for the hidden fixing of elements (clips) for the anchoring of slabs to horizontal tracks fixed to the understructure.

The insert expands by means of screws in the H1 system and using a tool in the H2 system.

The inserts are made of stainless steel and are compatible with aluminium and galvanised steel structures.

Two solutions have been developed for the system:

LAPITEC H1 (in collaboration with KEIL BEFESTIGUNGSTECHNIK GmbH)

KEIL KH AA 7.0 M6x11.5

The H1 system is compatible with all finishes.

- Stainless steel screw with depth based on thickness of clip used
- Clip with hex hole to house insert

LAPITEC H2 (in collaboration with FISCHER ITALIA Srl)

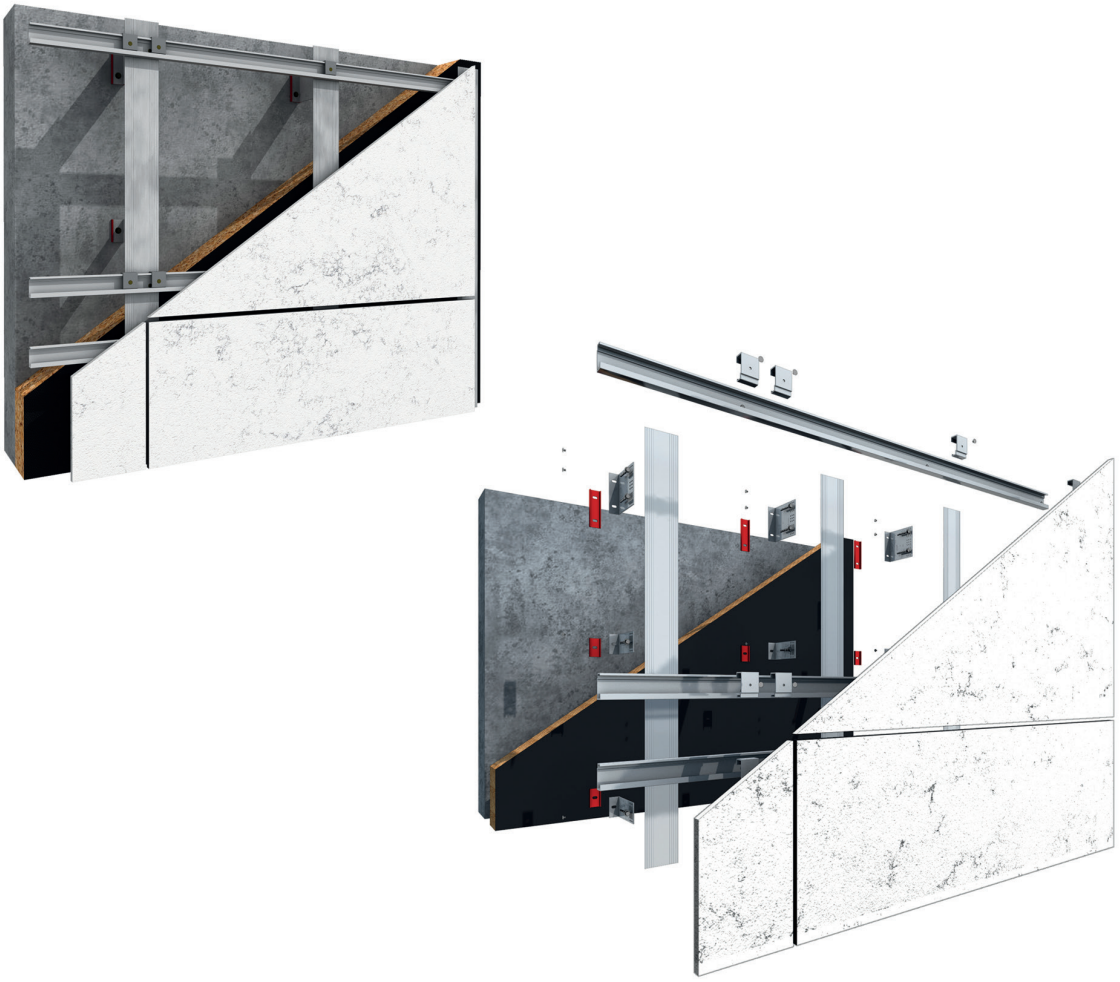
FZP-II 11x8 M6 6/T/12 PA

The H2 system is compatible with Dune, Arena, Fossil, Vesuvio finishes.

- Tightening tool FISCHER SGT/SGA
- Clip with circular hole to house insert
- Stainless steel nut to tighten clip

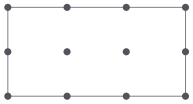
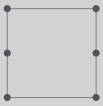
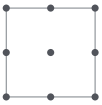
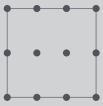
For the technical specifications of fixings, see the table in the dedicated section.

Lapitec SpA recommends the use of these inserts. Should an alternative be selected, the user must ensure that the product specifications are identical to those expressed herein.



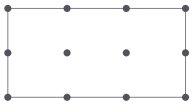
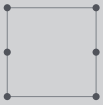
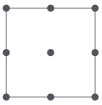
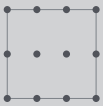
For example purposes, the following table contains a recalculation of the design wind loads for four different sizes, considering various fixing grids. The design wind values indicated take into account the material's characteristic strength reduction coefficients and the design load amplification coefficients, as per the methods prescribed by Eurocodes for Limit State verifications.

KEIL KH AA 7.0 M6x11.5

Size	Step / Anchors	Layout	Design Pressure (kN/m^2) 12 mm
3000x1500	1000/12		0,98
3000x1500	750/15		1,29
3000x1500	500/21		2,00
1500x1500	1500/6		1,59
1500x1500	750/9		1,22
1500x1500	500/12		2,01
1500x750	1500/4		1,78
1500x750	750/6		2,87
1500x750	500/8		4,76
750x750	750/4		6,42

Wind load amplification coefficient (Eurocode): 1.50
Characteristic strength reduction coefficient (UNI 11018): 1.60

FZP-II 11x8 M 6/T/12 PA

Size	Step / Anchors	Layout	Design Pressure (kN/m^2) 12 mm
3000x1500	1000/12		0,97
3000x1500	750/15		1,28
3000x1500	500/21		1,99
1500x1500	1500/6		1,58
1500x1500	750/9		1,21
1500x1500	500/12		1,99
1500x750	1500/4		1,71
1500x750	750/6		2,85
1500x750	500/8		4,73
750x750	750/4		6,38

Wind load amplification coefficient (Eurocode): 1.50
Characteristic strength reduction coefficient (UNI 11018): 1.60

General requirements

Use of insert systems must comply with certain fundamental principles:
- compliance with the tolerances relative to the geometry of the blind hole
- compliance with the minimum and maximum distance from the edge
- compliance of the tightening system with the manufacturer's instructions
- choice of clips compatible with the type of insert
- coplanarity of the substrate

2.9.1/ Geometry of blind holes

When using inserts, the tolerances imposed by the geometry of holes with a truncated cone section must be respected. The depth, entry and expansion diameter and angles of the sides of the hole, must all correspond with the instructions provided by the manufacturers.

The manufacturers provide specific tools for the measuring of tolerances, Lapitec SpA recommends purchasing and using these.

Given the hardness of the material, to avoid excessive wear of the Keil/Fischer slitting tool for blind holes, Lapitec Spa suggests making a pre-hole using the hole saw.

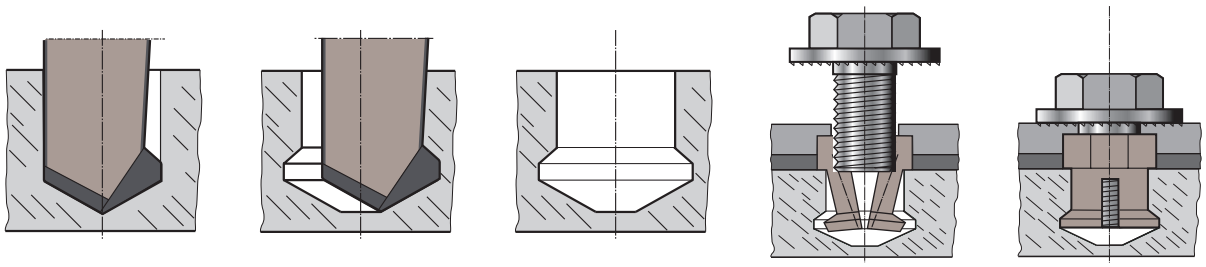
KEIL drilling sequence

Holes drilled for Keil concealed inserts must be created using the appropriate tool in order to comply with the required dimensions.

Following is the Keil drilling sequence:

- PRE-HOLE using the hole saw
- HOLE using the slitting tool
- TOLERANCE CHECK
- HOUSING FOR KEIL INSERT KH AA 7.0 M6x11.5

Once the operator has finished pre-drilling and drilling operations, they will need to use the dedicated tools to measure the geometry of the hole and check that it complies with the allowed tolerances.



FISCHER drilling sequence

Holes drilled for Fischer concealed inserts must be created using the appropriate tool in order to comply with the required dimensions.

Following is the Fischer drilling sequence:

- PRE-HOLE using the hole saw
- HOLE using the slitting tool
- TOLERANCE CHECK
- HOUSING FOR FISCHER INSERT FZP-II 11X8 M 6/T/12 PA

Once the operator has finished pre-drilling and drilling operations, they will need to use the dedicated tools to measure the geometry of the hole and check that it complies with the allowed tolerances.

Tolerance checking tools

DPL Go/no go

HVL Click/no click

ICG Comparator

Fischer inserts must always be placed and expanded using a suitable adaptor for the SGA-M6 screw gun.

Attention: the holes must always comply with the minimum and maximum distance from the edge indicated for each system.

Generally speaking, the slabs are delivered to the job site with the holes already drilled. Should on-site drilling be necessary, it is advisable to use the specific equipment supplied by Keil and Fischer.

Important note: regardless of the thickness used, the depth of the blind hole will always guarantee at least 5 mm between the visible surface of the slab and the hole on the back.

Disclaimer

If Lux, Satin or Lithos finishes are used, only the Keil system is allowed.

Mechanical machining parameters for KEIL/FISCHER drilling

Given the hardness of the material, to avoid excessive wear of the Keil/Fischer slitting tool for blind holes, Lapitec Spa suggests making a pre-hole using the hole saw.

Pre-drilling

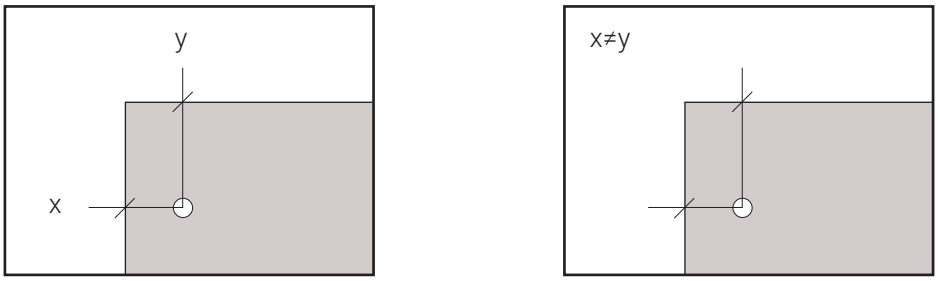
Type	Spindle revolutions g/min	Feed rate mm/min
KEIL Ø 7	6000	15-20
FISCHER Ø 11	6000	15-20

Drilling

Type	Spindle revolutions g/min	Feed rate mm/min
KEIL Ø 7	6000	25-30
FISCHER Ø 10	6000	25-30

2.9.2/ Minimum and maximum distance from the edge

The distance of the holes from the edge of the slab must be at most 250 mm and at least 50 mm.



The number of holes on each slab will be determined based on an assessment of the required load and stress resistance.

2.9.3/ Correct tightening

The performance of an expansion-based system is heavily dependent on the correct tightening of the screw (H1 System) or the insert itself (H2 System). Incomplete tightening will significantly reduce, or in the worst case scenario completely nullify the extraction resistance and shear characteristics of the anchor inside the hole. Excessive tightening may lead to breakage of the material (ripping or spalling).

Attention: for the H1 system, the choice of screw (depth) must consider the type of clip and guarantee full expansion of the insert when tightening is complete.

2.9.4/ Attachment clips

The use of inserts entails a series of mandatory requirements when selecting the clips for attachment to the structure. Various manufacturers produce clips compatible with KEIL and FISCHER inserts; the installer must verify their fitness for use before purchasing them. If the wrong clips are selected, tightening and insert expansion may be compromised with serious consequences (see previous section).

All anchors must be inserted perpendicular to the surface of the slab.

The number of attachment clips will be determined based on the number of anchors required based on the designer's calculations; their layout must ensure perfect horizontal alignment between clips positioned at the same height.

Two types of clips are used behind each slab: adjustable and fixed. Adjustable clips are different from fixed clips insofar as they have a small metric hex head screw.

Adjustable clips support the weight of the slabs, and together with the fixed clips, help provide resistance to wind.

Adjustable clips will generally be placed in the top part of the slab, allowing adjustment of the slope and alignment between slabs at the same height.

To prevent the Lapitec slabs from shifting along the horizontal tracks over time, one of the upper clips of each slab will be blocked, securing a pair of screws to the sides.

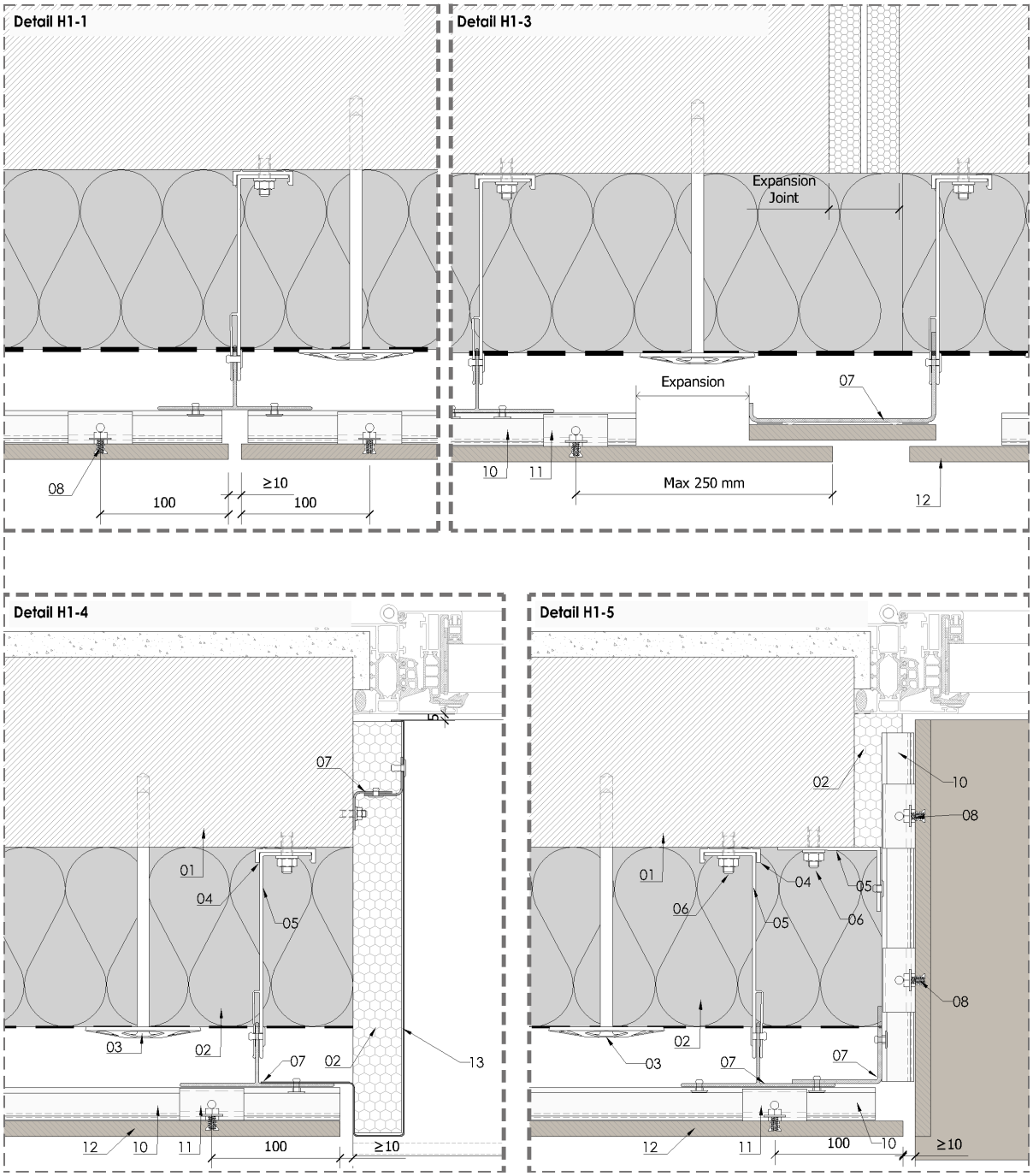
2.9.5/ Coplanarity

The structures must guarantee the perfect coplanarity of the surface of the mullions/tracks on which the **Lapitec®** slabs will be installed. Structures available on the market allow the vertical and horizontal adjustment of any misalignments or off-plumb substrates. Failure to comply with this measure may jeopardise the correct positioning of the slabs.

To this end, during the design stage, when calculating the dimensions of the façade pack consider an additional clearance of at least 20 mm.

2.9.6/ Project details LAPITEC H1

Following are various extracts of details of projects available on the website www.lapitec.it in dwg, BIM and pdf.



LIST OF MATERIALS:

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02 Insulation (e.g. Mineral wool...).
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04 Isolator.
05 Brackets (e.g. Aluminium, stainless steel...).
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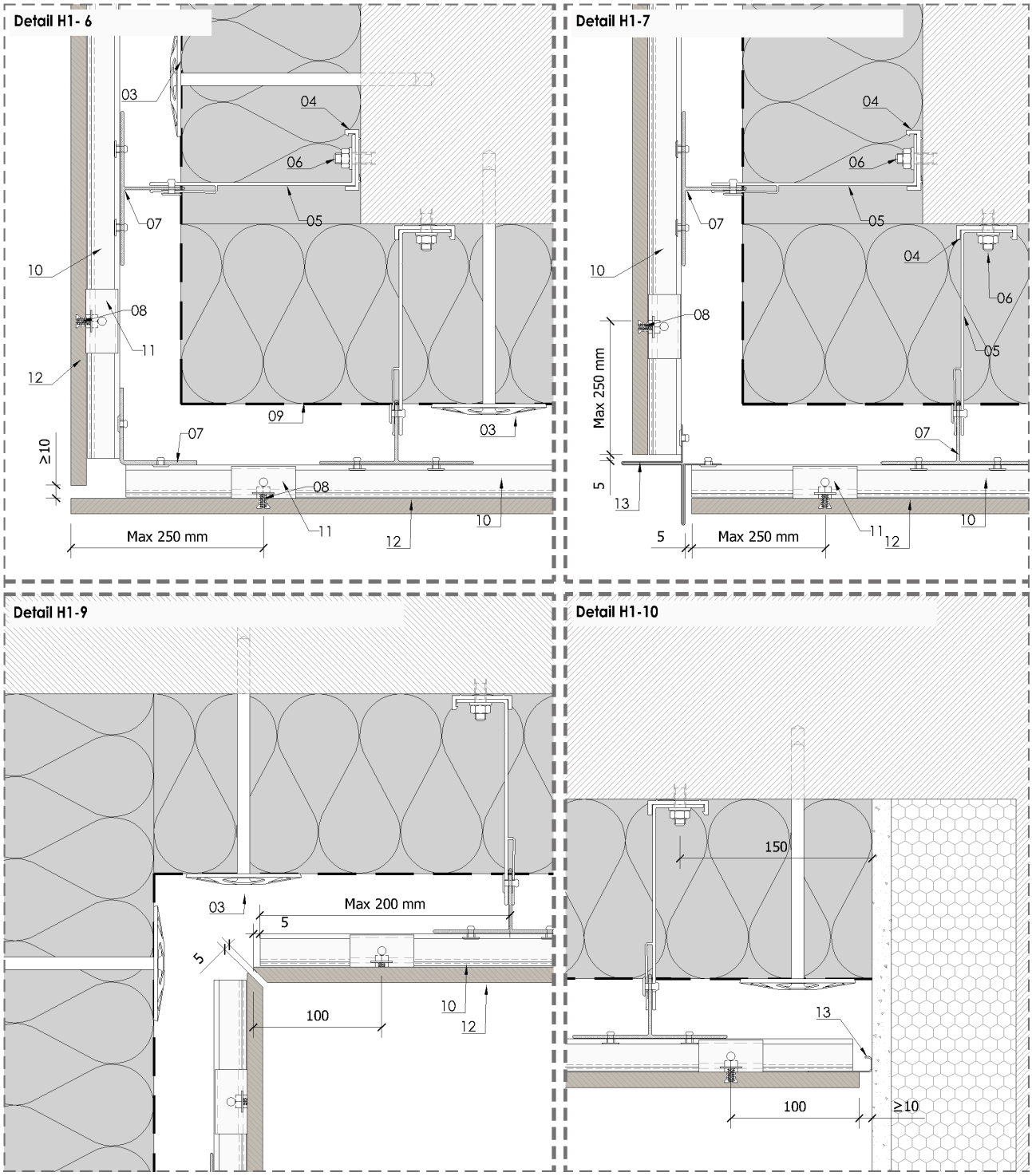
07 Aluminium profile.
08 Keil KH AA 7.0.
09 Vapour barrier.
10 C-shaped horizontal track.
11 Aluminium clip.
12 Lapitec slab, 12 mm thick.
13 Sheet metal closing.



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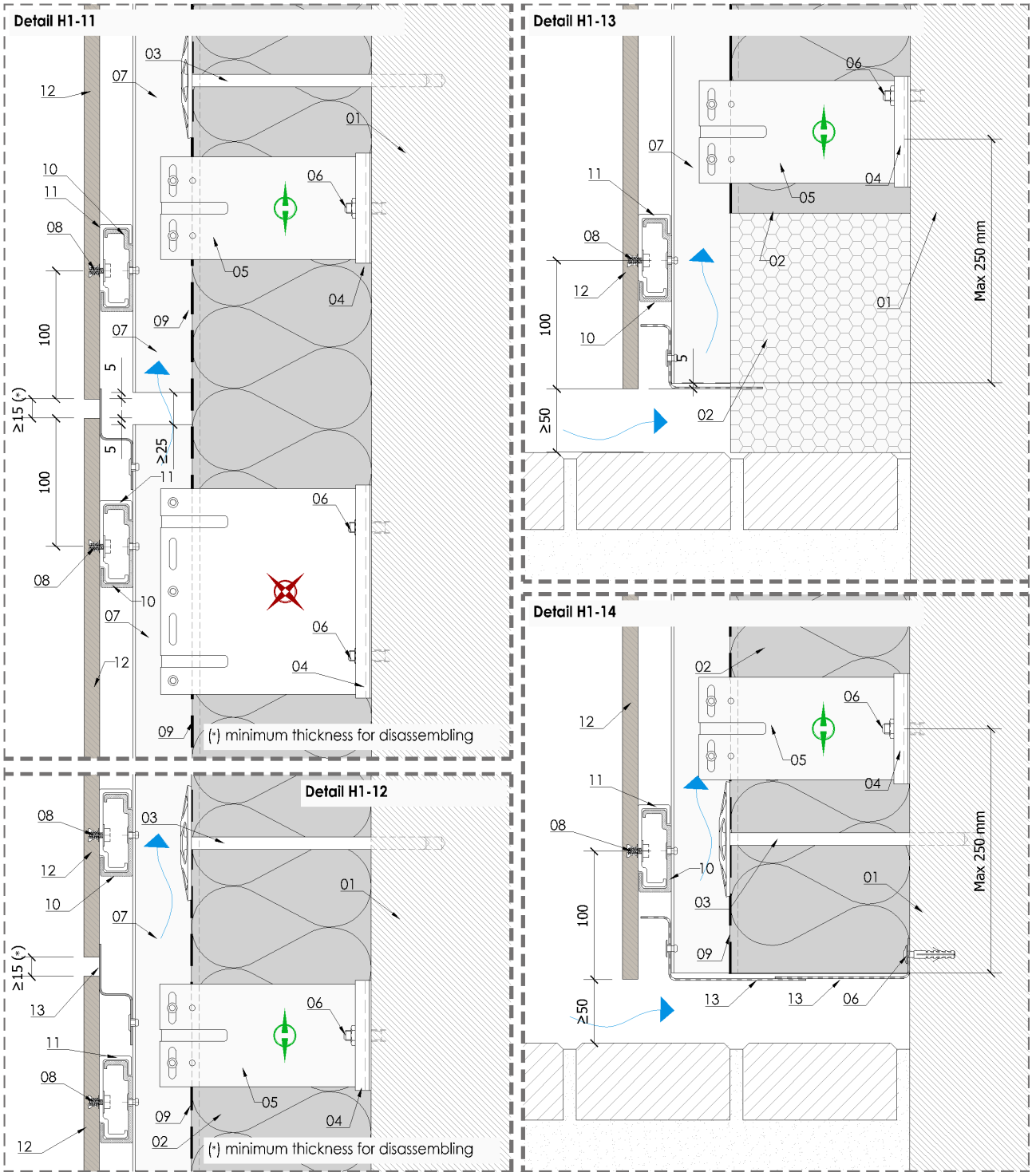

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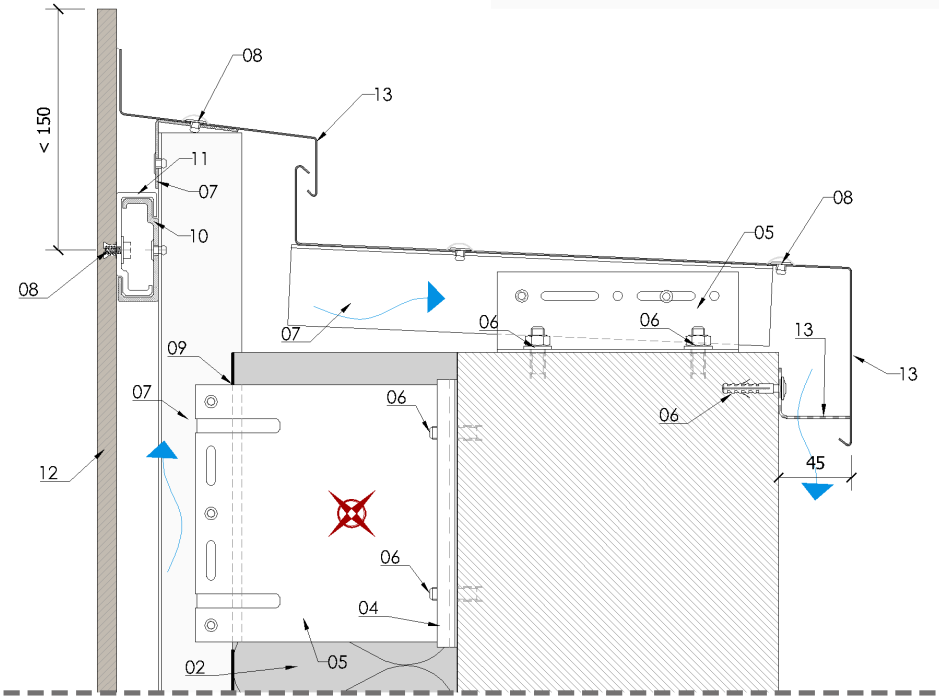
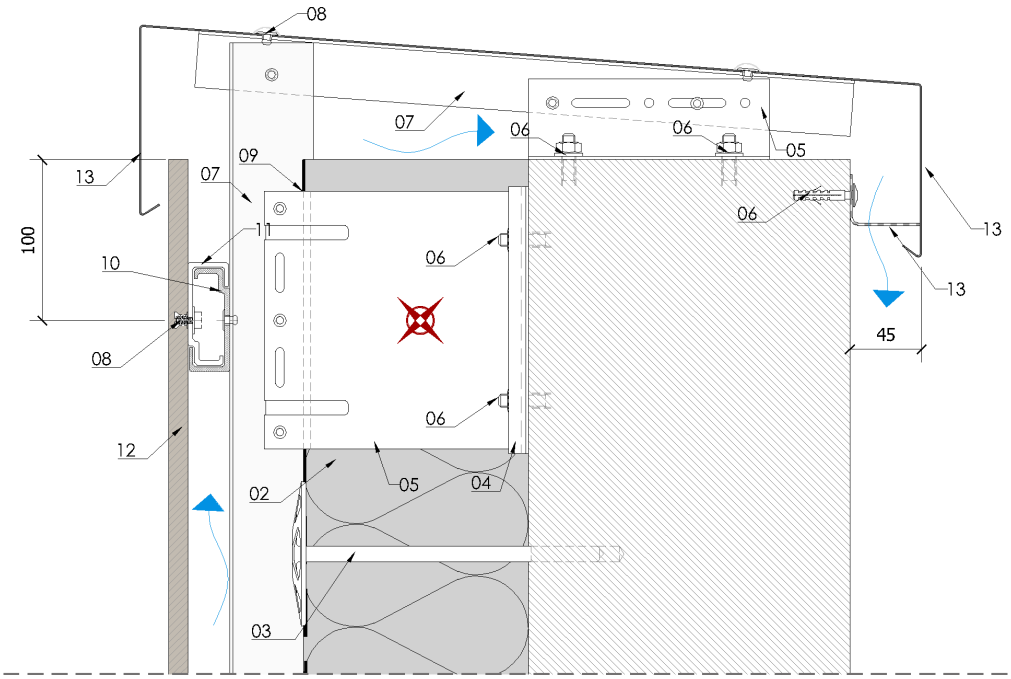
Detail H1-15



Detail H1-16



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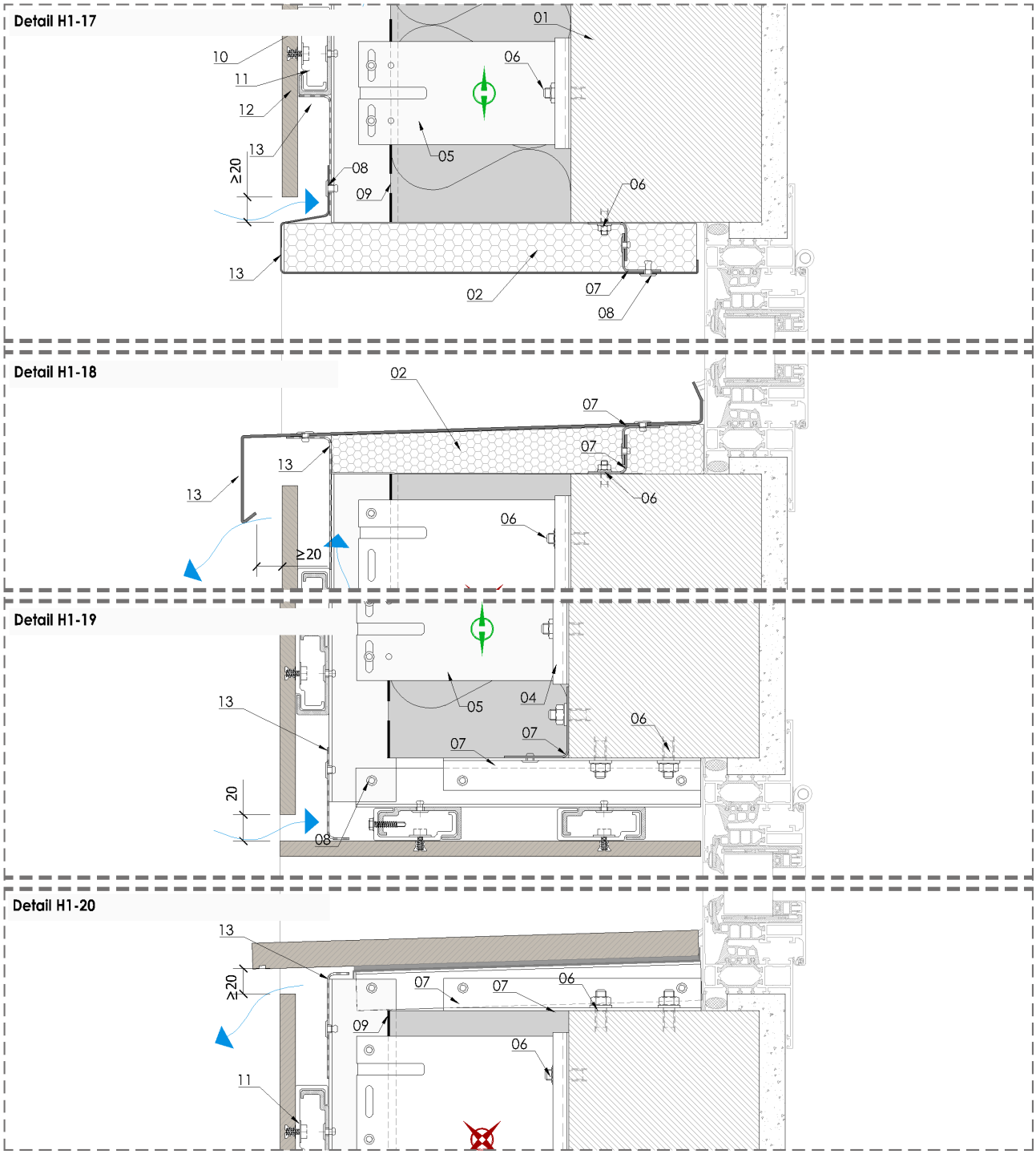

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2.9.7/ Project details LAPITEC H2

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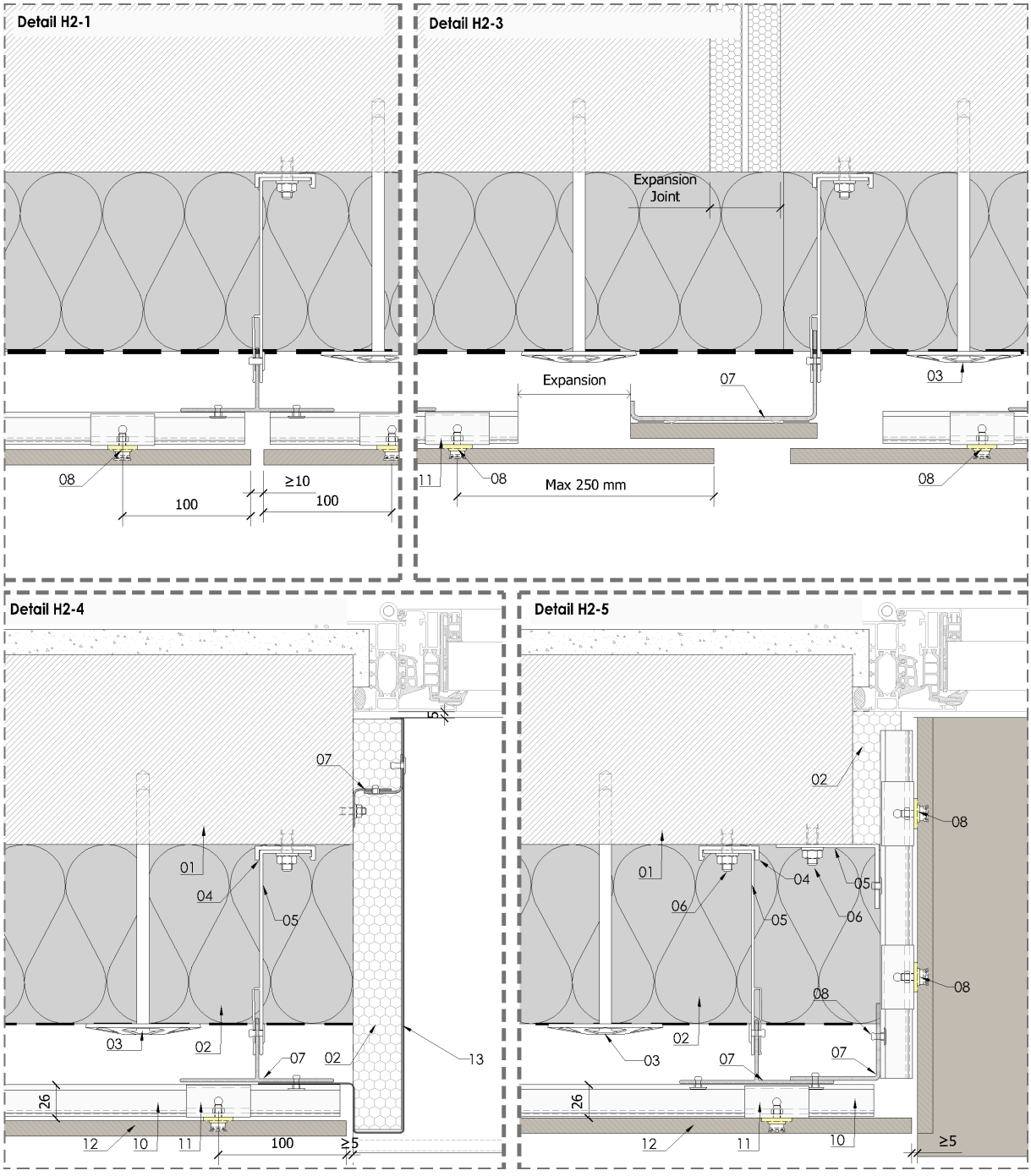

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04 Isolator.
05 Brackets (e.g. Aluminium, stainless steel...).
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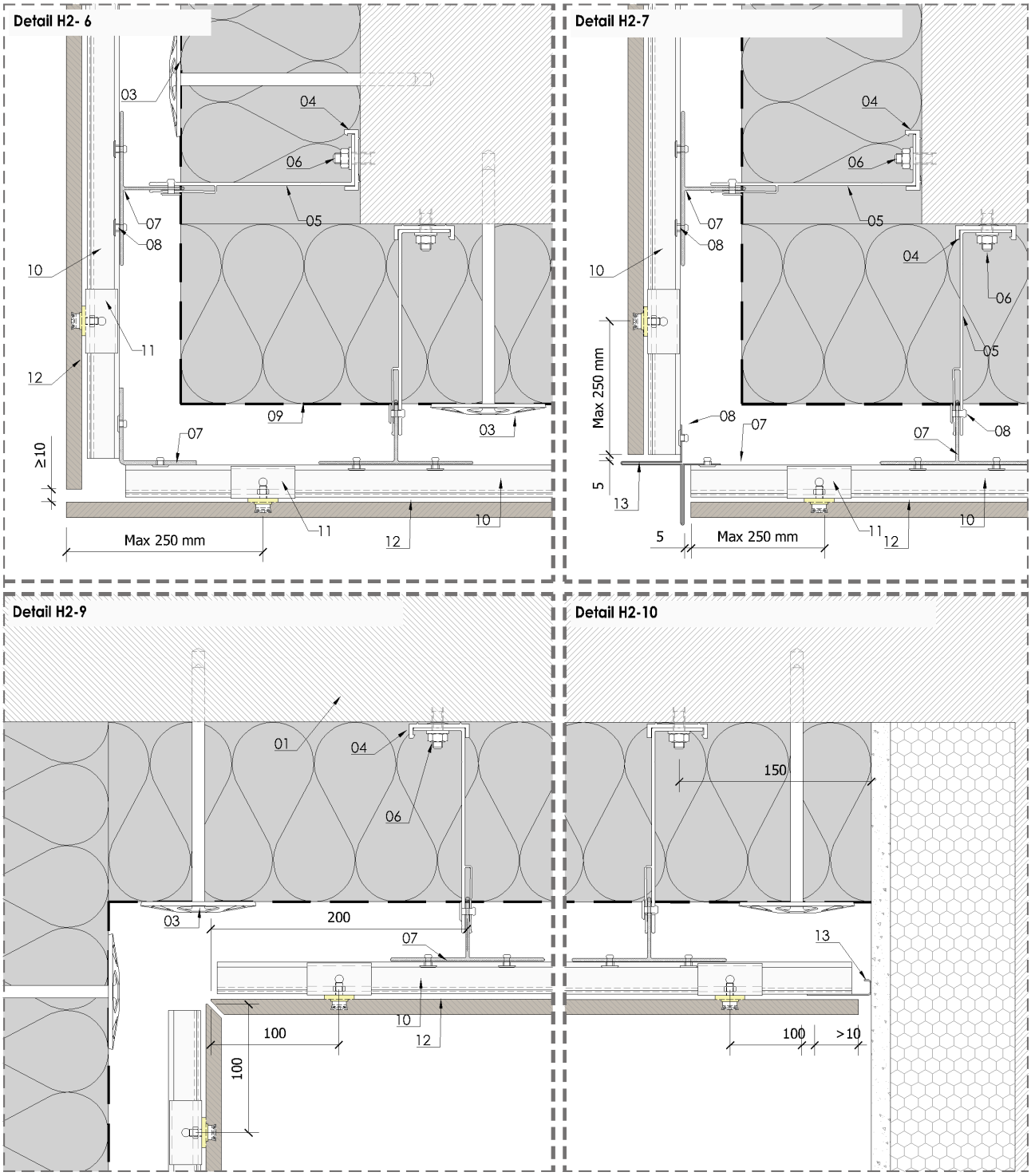
08 Fischer FZP-II 11x8 M6/T/12 PA.
09 Vapour barrier.
10 C-shaped horizontal profile.
11 Aluminium clip.
12 Lapitec slab, 12 mm thick.
13 Sheet metal closing.



LIST OF MATERIALS:

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04 Isolator.
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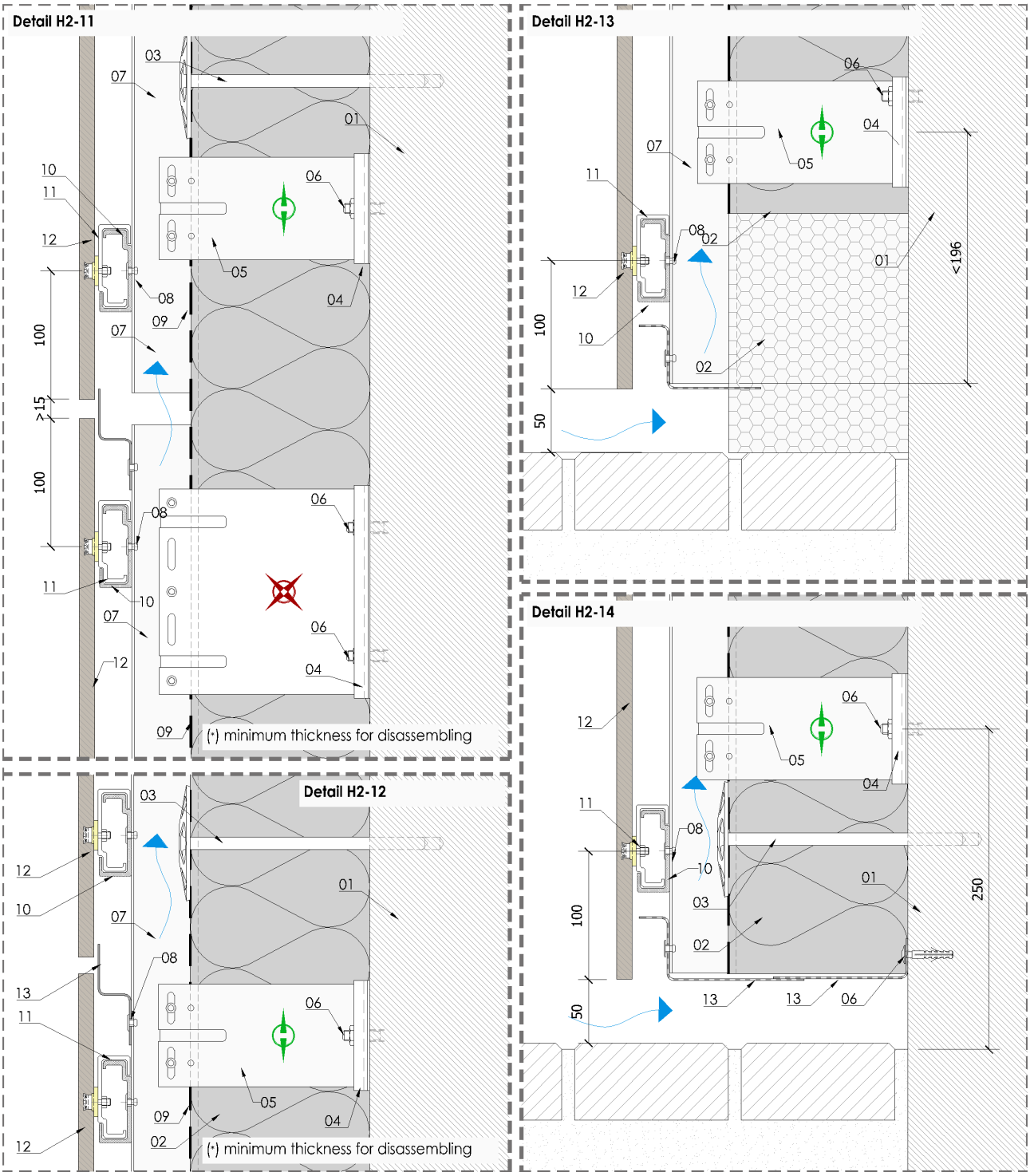
06 Bracket anchors.
07 Aluminium profile.
08 Fischer FZP-II 11x8 M6/T/12 PA.
09 Vapour barrier.
10 C-shaped horizontal profile.
11 Aluminium clip.
12 Lapitec slab, 12 mm thick.
13 Sheet metal closing.



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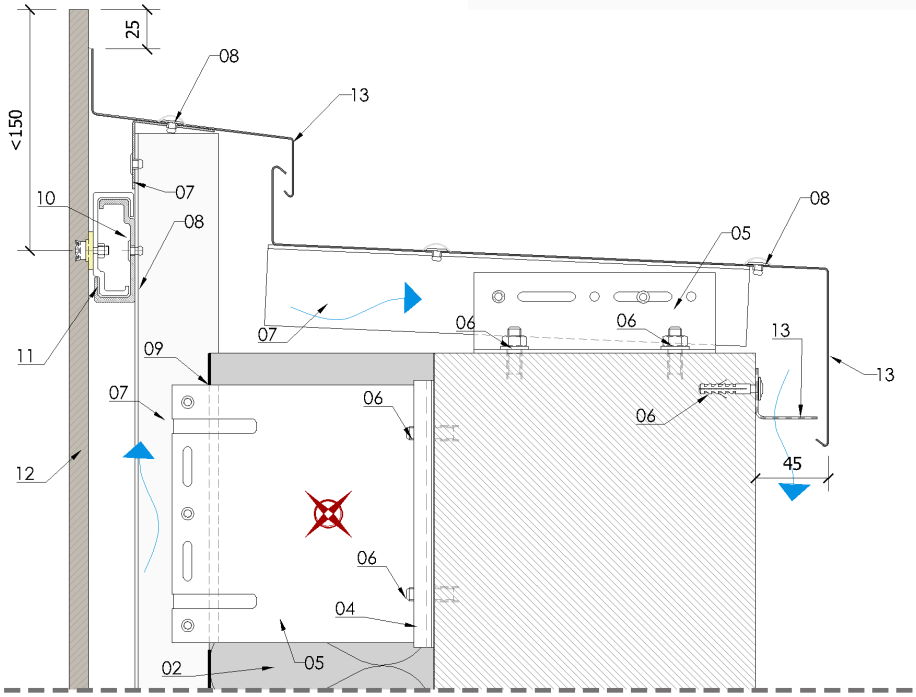
Detail H2-15



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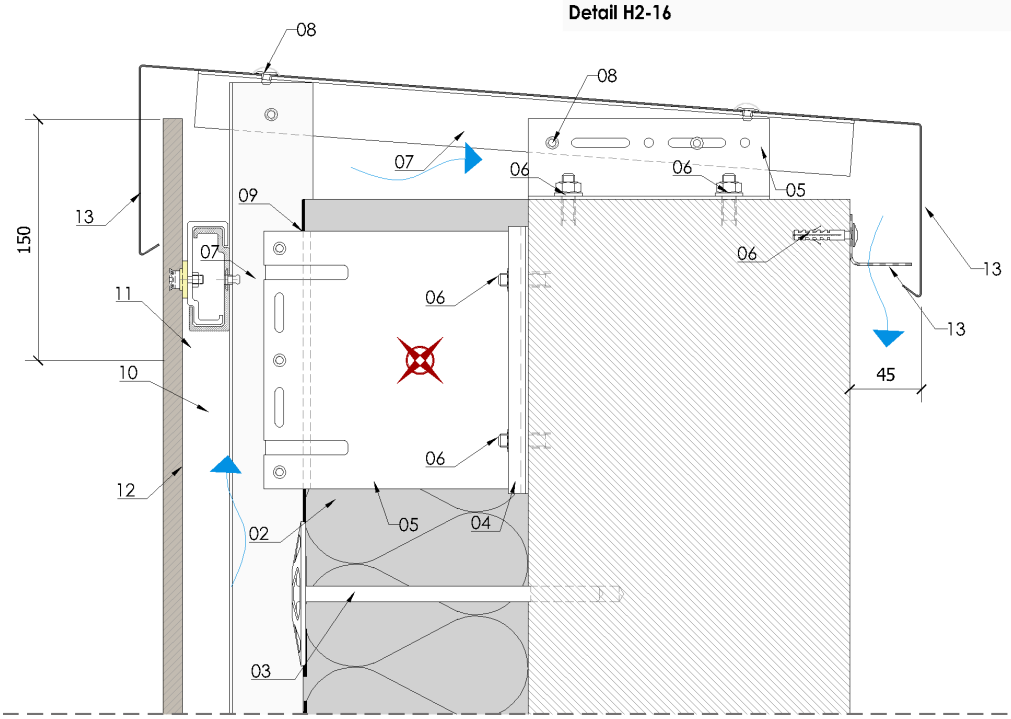

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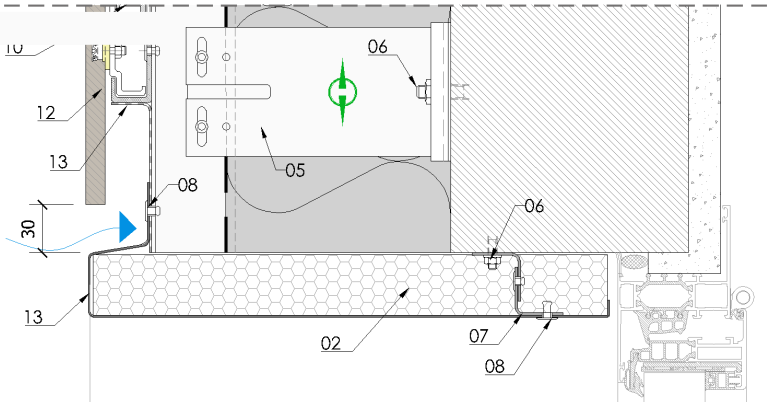
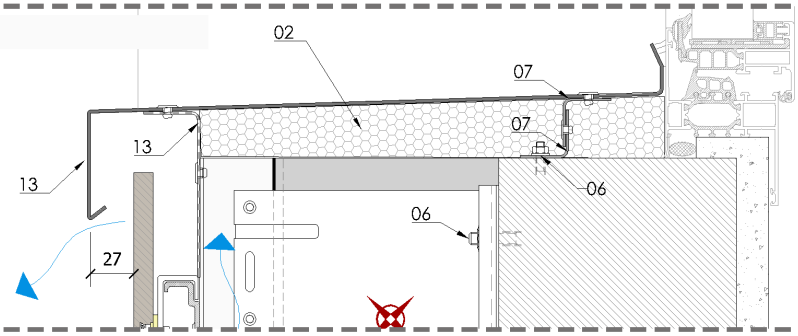


Detail H2-18



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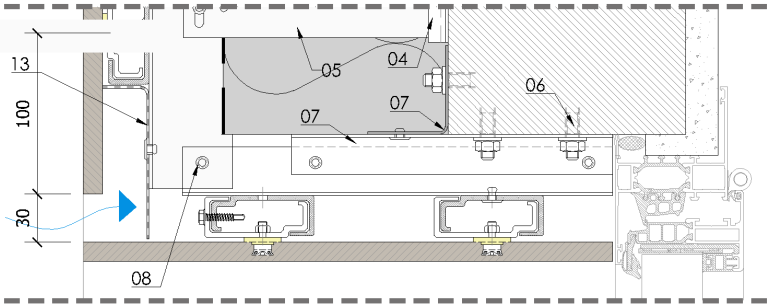

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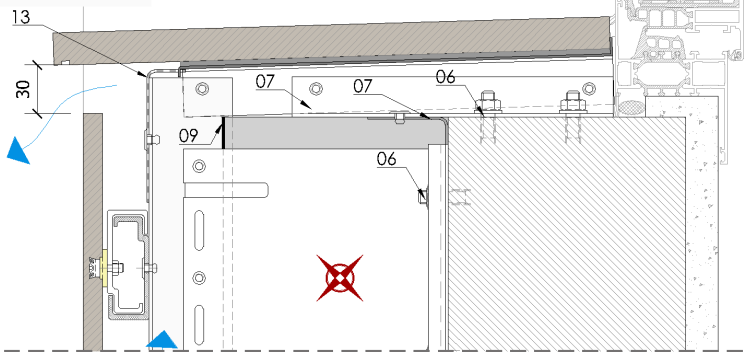

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2.10/ LAPITEC B

The Lapitec B system is installed using an invisible fixing system with structural bonding kit. The bonding systems are defined as kits as they involve the use of multiple components (cleaners, primers, double-sided tapes and adhesives). The adhesives, which can be polyurethane or silicone based, are applied in beads to the metal structures after several stages of substrate preparation.

The system is compatible with all finishes.

The system has been developed in two similar solutions:

LAPITEC B (in collaboration with DOW CORNING)

- Cleaner Dow Corning® (Type: R 40 Universal Cleaner)
- Dow Corning® Primer P
- Dow Corning® 896 PanelFix for Bonding

LAPITEC B (in collaboration with SIKA)

- Cleaner
- Primer SikaTack® Panel
- SikaTack® Panel
- SikaTack® Fixing Tape

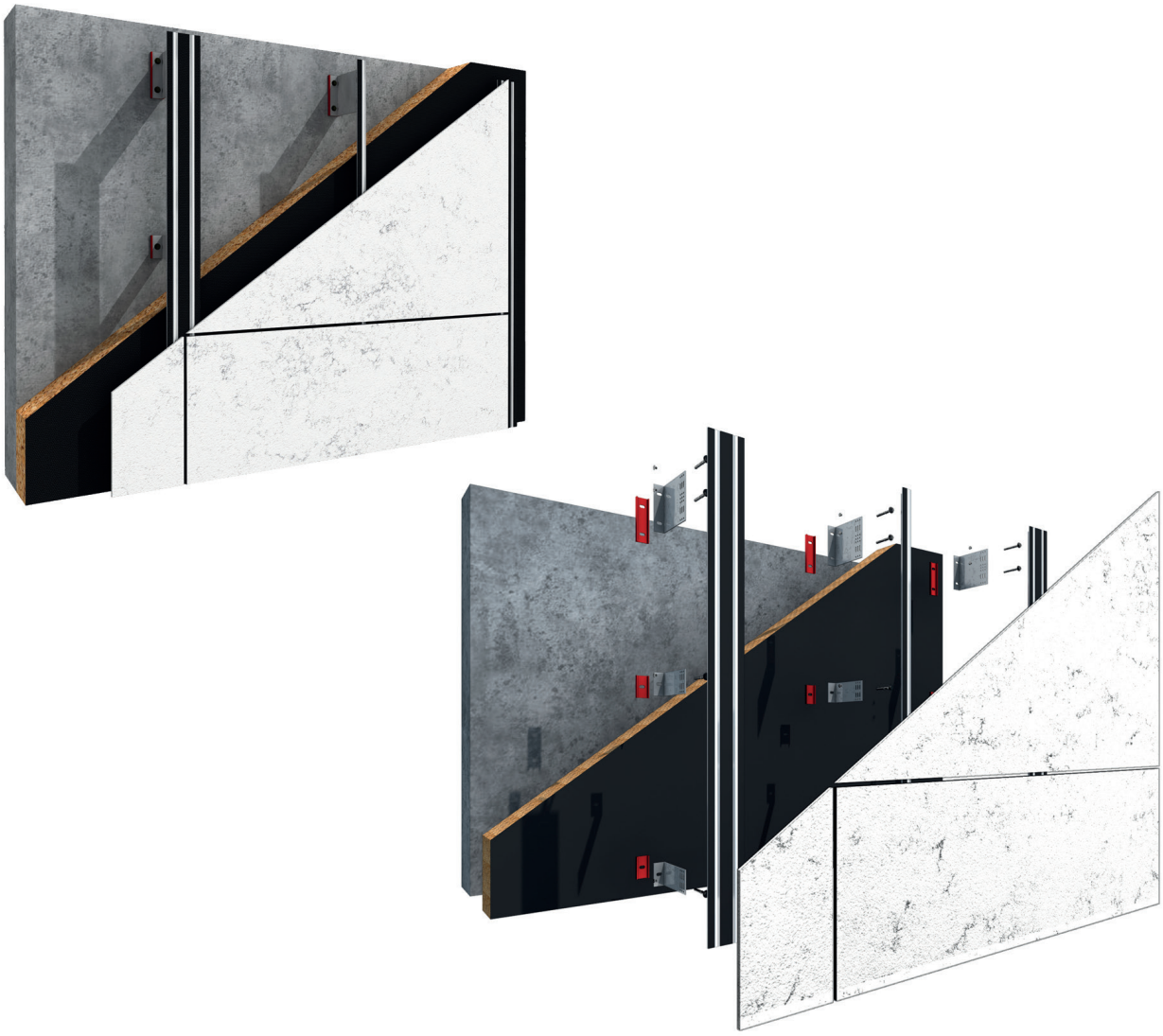
Adhesive systems must be developed in close collaboration with the adhesive manufacturers, and in full compliance with their instructions. Lapitec SpA recommends obtaining the most up-to-date information and checking the compatibility of the system beforehand.

For the technical specifications of the adhesives and their use, see the table in the dedicated section of the Claddings Manual.

General requirements

Use of adhesive systems must comply with certain fundamental principles:

- verification of compatibility with substrate
- verification of weather conditions (temperature and relative humidity)
- coplanarity of the substrate
- assembly sequences and drying times
- hold for heavy elements



2.10.1/ Verification of compatibility

Before applying the adhesive, the compatibility of the adhesive with the type of structure used for the façade must be checked. The type of primer, vertical or horizontal layout and slab size all impact the performance characteristics of the system.

The adhesive must always be selected based on the adhesive manufacturer's opinion.

2.10.2/Verification of weather conditions

When using adhesive systems, the weather conditions for the given location must always be taken into account. The adhesive must be applied in respect of temperature and relative humidity specifications, which vary from adhesive to adhesive and may change significantly from one product to another. In general, the adhesive can be applied in environments with temperatures between + 5°C e + 35°C and relative humidity no higher than 70%. The substrates on the other hand must be +3°C with respect to the dew point.

Important note: These conditions must be respected during installation and for the entire drying time of the adhesive itself.

Temperature and humidity significantly affect the duration of the various stages of adhesive cycles.

2.10.3/Coplanarity

The performance of the adhesive is strictly linked to the amount used; the number and size of beads are dosed according to the manufacturer's instructions; in any case, the layout of the structure also plays a critical role in correct installation. Substrates that are not perfectly coplanar may jeopardise the adhesion of the slab, the function of the double-sided tape or the correct binding of the adhesive.

2.10.4/Assembly sequence (and drying times)

The assembly sequences always require use of a cleaner, a primer and the application of the structural adhesive, with or without the use of double-sided tape to keep the slab in position.

Regardless of the sequences, it is important to respect the drying times of the products used between the different stages, strictly following the times indicated by the manufacturers. Cleaners require drying times to be respected; primers, in addition to the drying time, also have a time span after which adhesion is no longer guaranteed. The same applies to double-sided tape and both polyurethane or silicone adhesives.

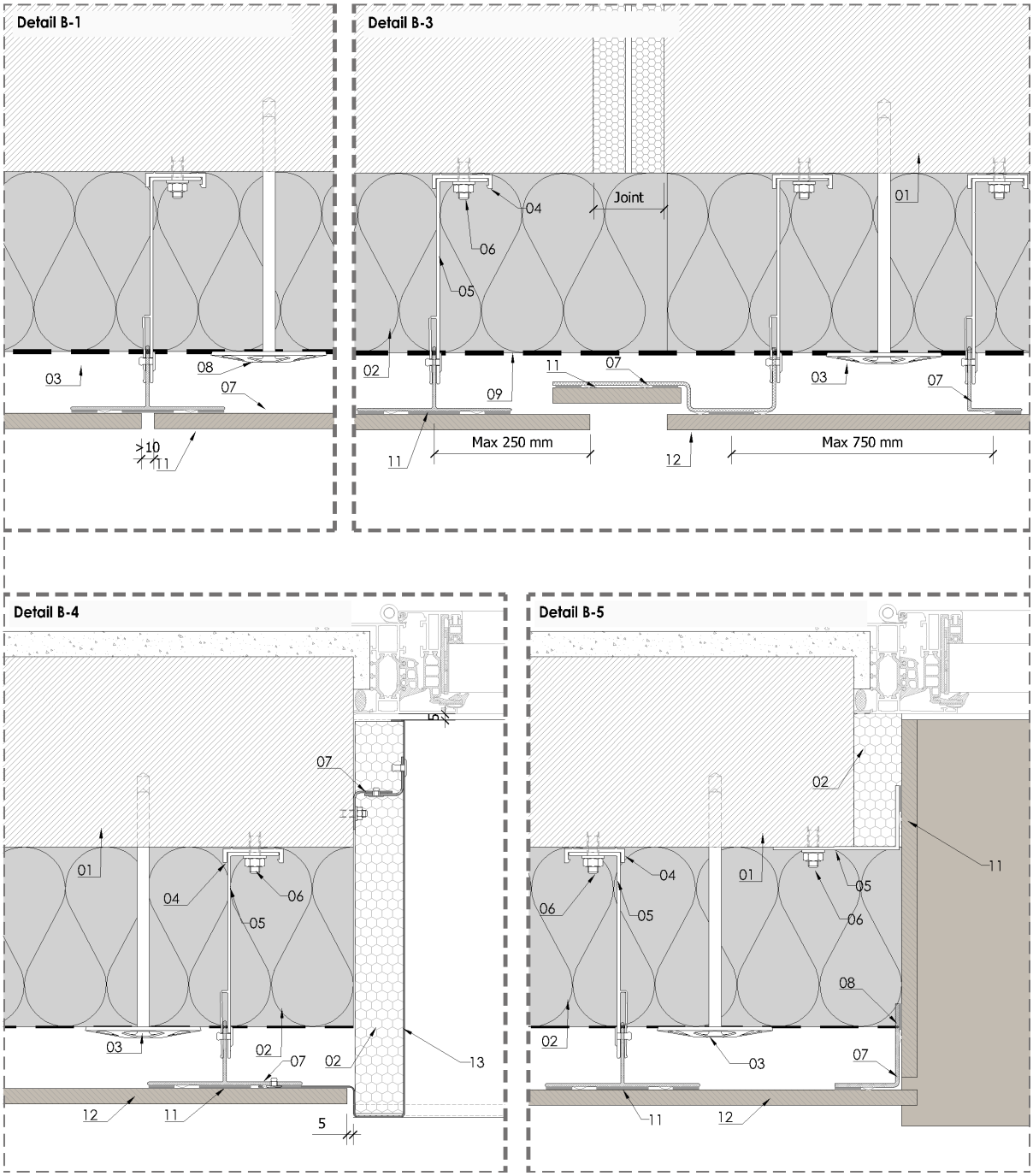
It is worth remembering that drying and setting times are determined above all by weather conditions (temperature and relative humidity) and therefore may vary significantly from case to case. Lapitec SpA always recommends evaluating the criteria for use with the manufacturer.

2.10.5/Hold for heavy elements

Should heavy elements by used for installation, Lapitec SpA recommends using temporary supports so as to facilitate the functionality of the adhesives used, thus avoiding shear force.

2.10.6/Project details LAPITEC B

Following are various extracts of details of projects available on the website www.lapitec.it in dwg, BIM and pdf.



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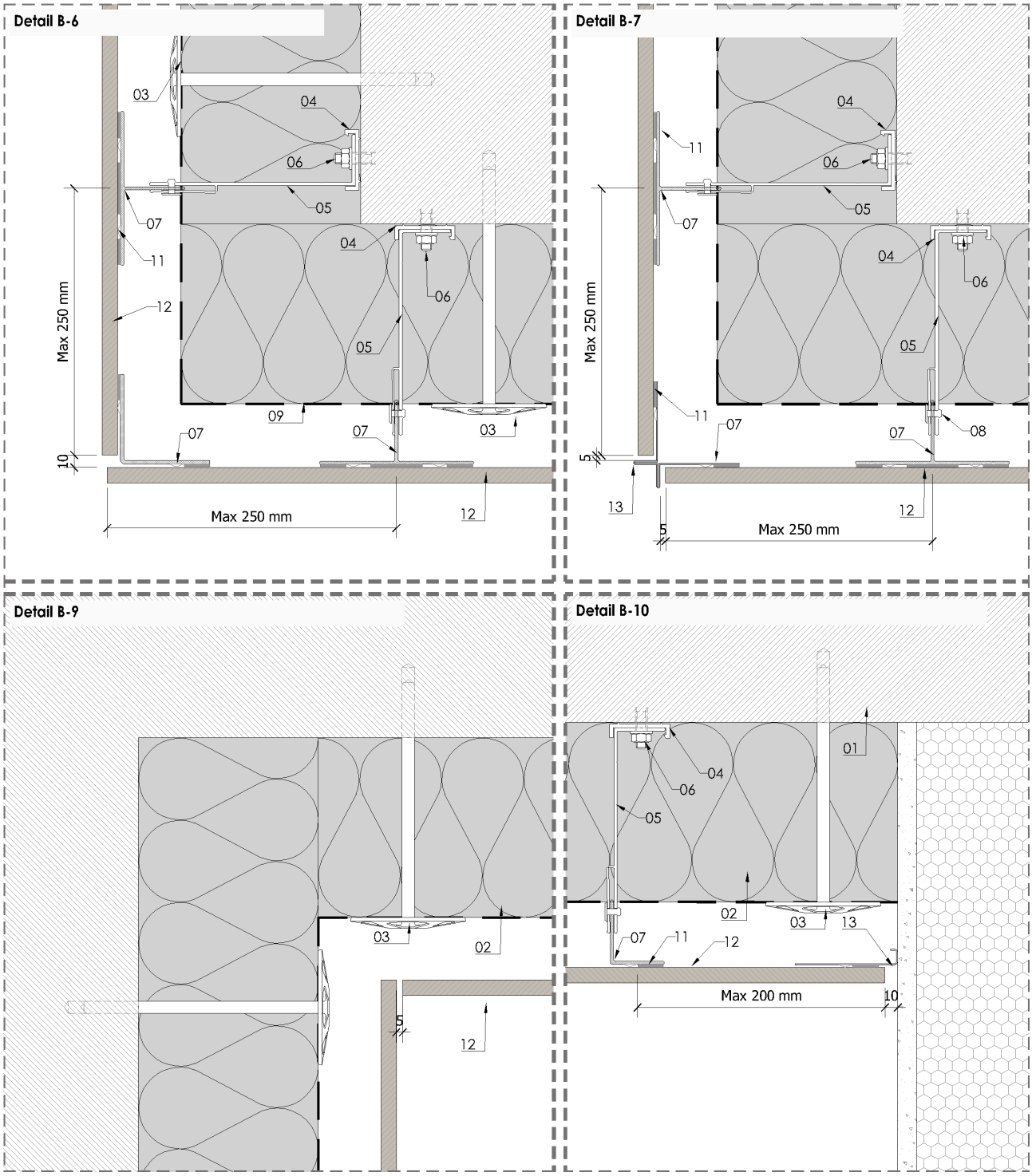
09 Vapour barrier.
10 Aluminium guide.
11 Structural adhesive.
12 Lapitec slab, 12 mm thick.
13 Sheet metal closing.



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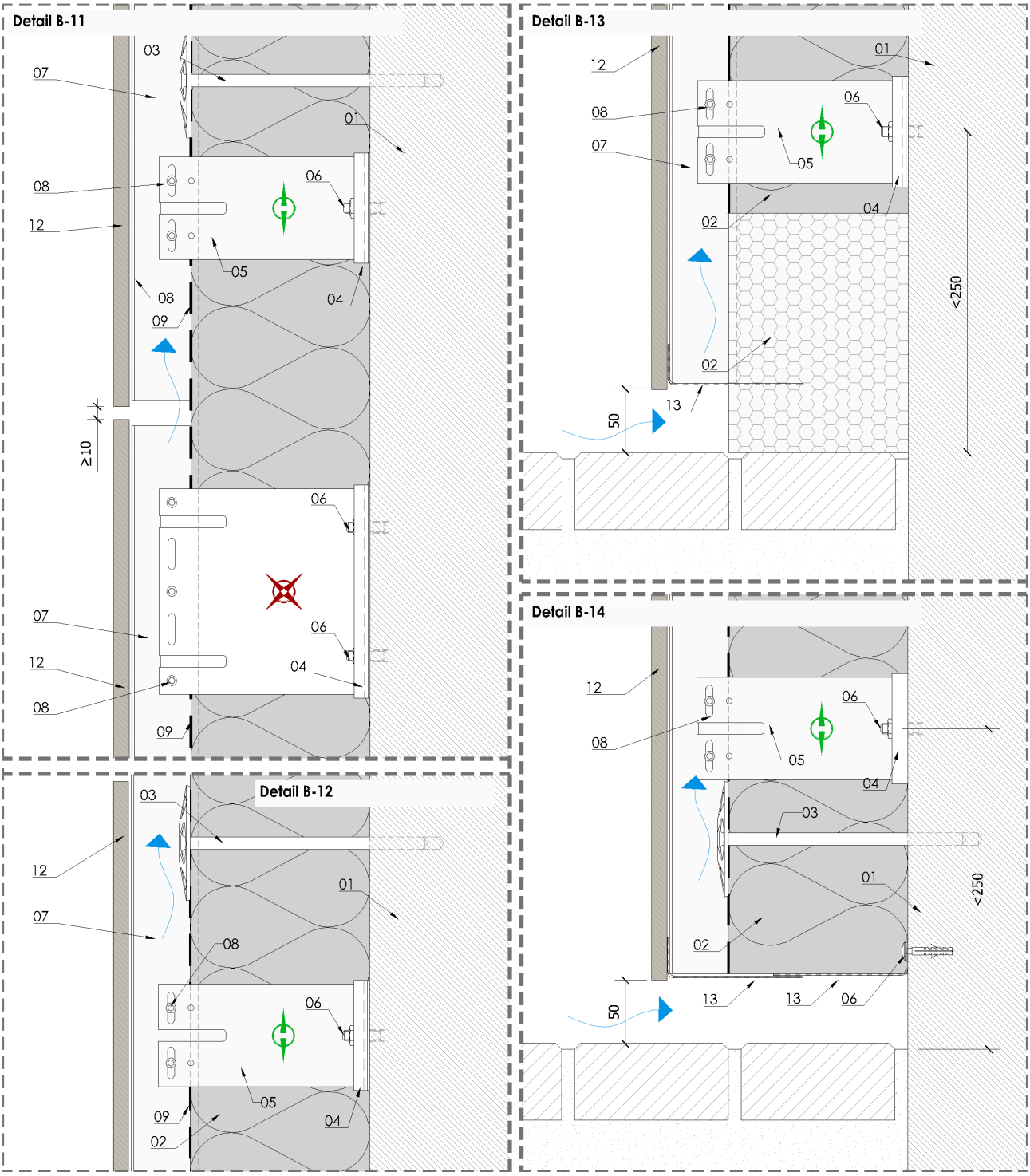

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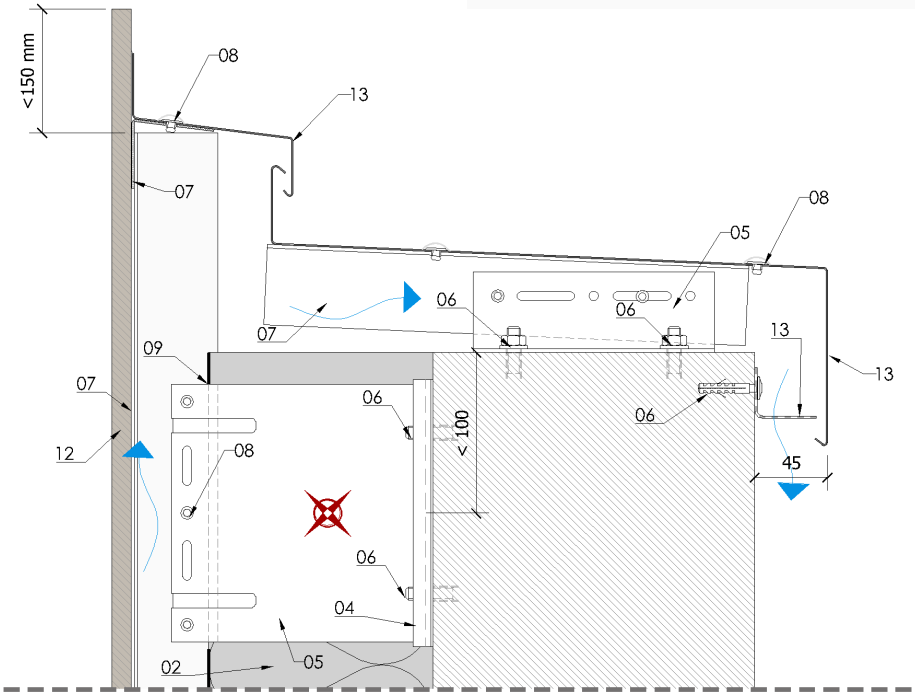
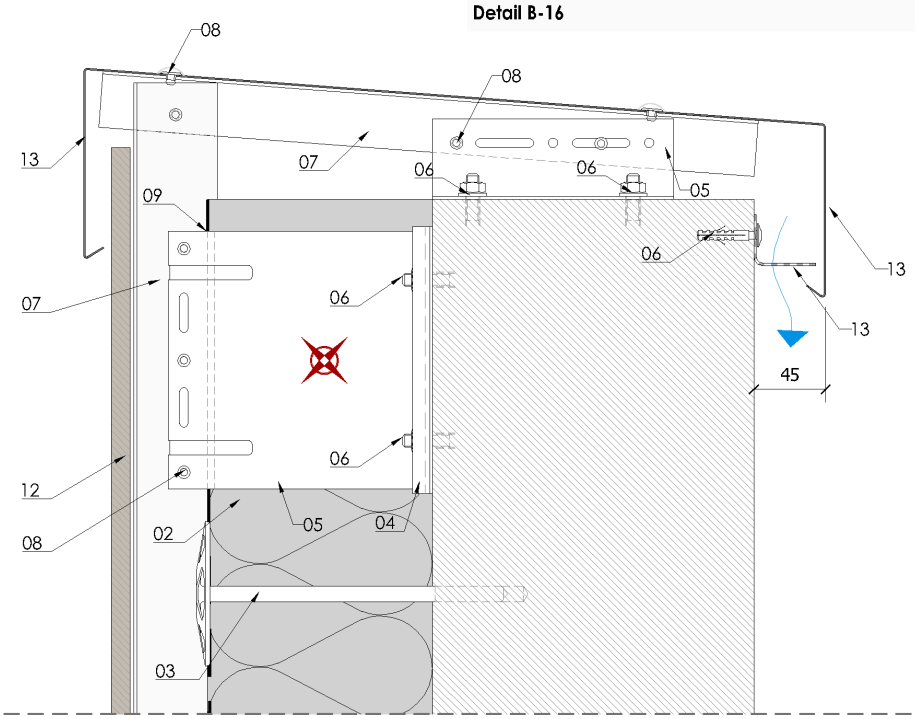
Detail B-15



Detail B-16



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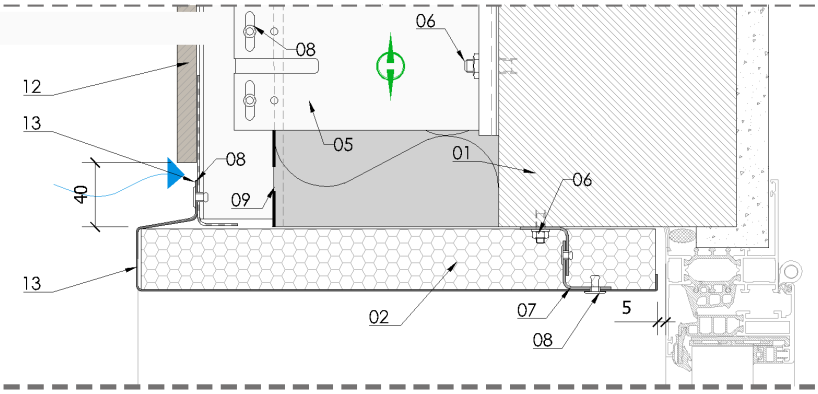

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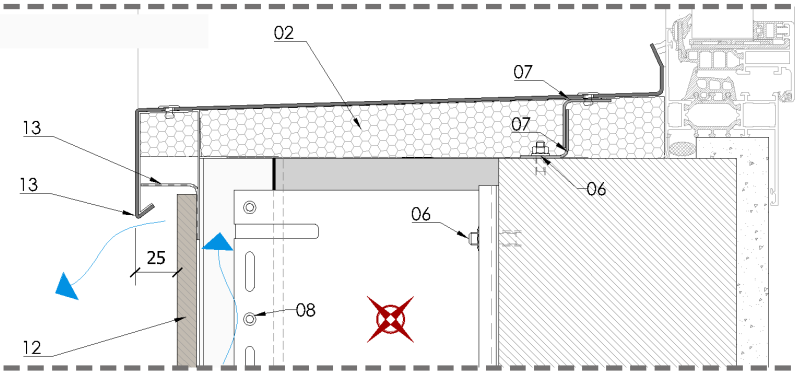
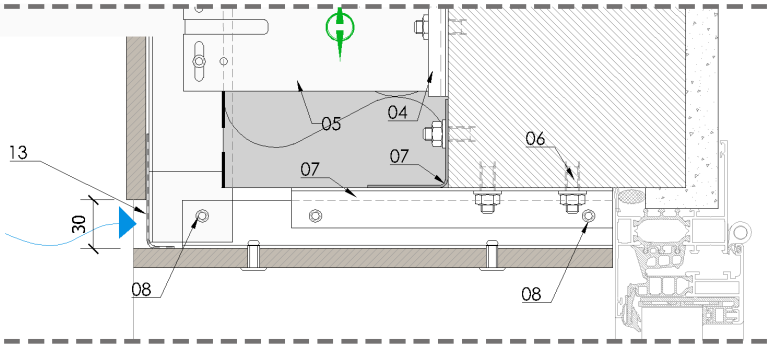


Detail B-19



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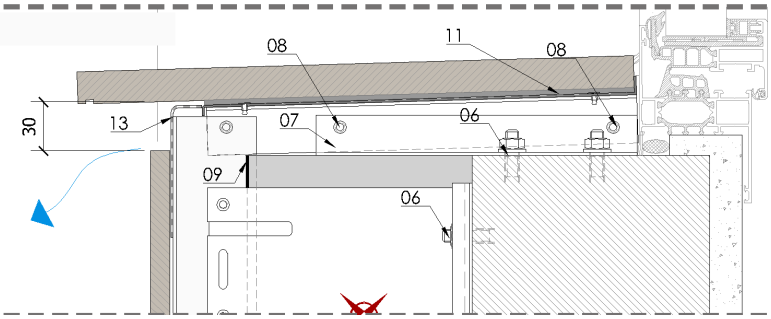


3. INSTALLATION

3.1/ INTRODUCTION

The installation of façade cladding requires a highly specialised workforce and must be based on a design produced by authorised professionals.

Lapitec SpA advises installers to follow the instructions provided in this manual and all other indications that may come to light during the design and engineering of the façade.

Failure to comply with the instructions or working design may jeopardise the final result with potentially serious consequences.

3.2/ PRELIMINARY CHECKS

During the preliminary stage, construction management and/or the installer must check the substrates to which the façade structures will be bound (curtain walls, metal structures, slabs, ...)

The substrates, regardless of their nature, must be sufficiently resistant to allow the anchoring of the understructures without any instability phenomena.

the installer must carefully check for the presence of any elements that may interfere with the layout of the understructure on both the horizontal and vertical plane (string courses, building systems, joints, downpipes, ...).

When fixing the brackets to the substrate, the anchors used must guarantee a suitable level of resistance to the working loads. The identification, choice of anchors to be used and verification of their resistance is the responsibility of the façade designer.

The installer must also plan for handling procedures. Lapitec is often used in large sizes. Lifting and positioning before anchoring can prove to be complicated procedures if underestimated. In preparation for material handling, it is good practice to check for possible interferences with scaffolding or temporary structures during slab hoisting and subsequent handling on the installation level.

3.3/ INSTALLATION STEPS

3.3.1/ Survey and check of the design against the installation environment

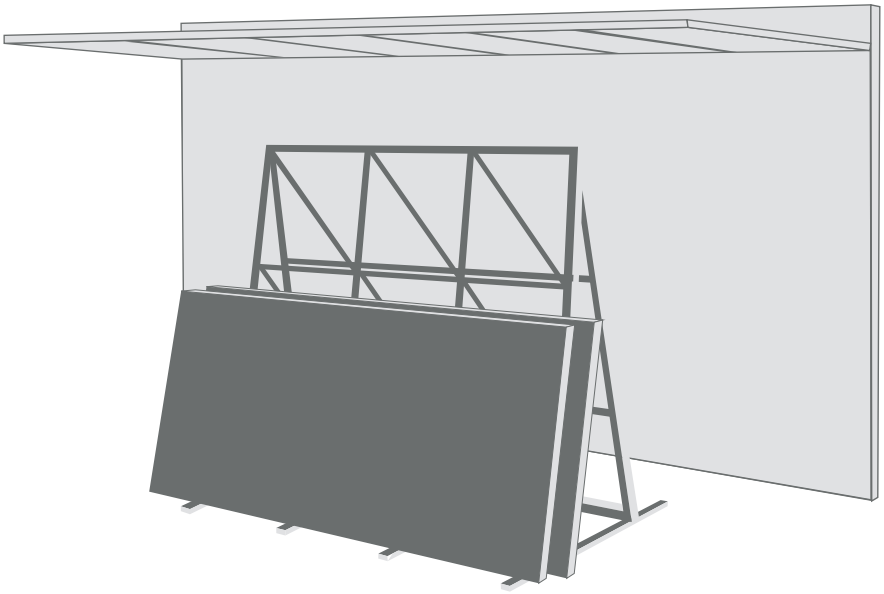
The initial installation stage must include a survey that highlights any deviations between the working design and the building. Should any discrepancies emerge, these must be reported to construction management in order that the project can be checked and adapted to the actual situation.

Similarly to the first on-site survey, during the installation stage, the installer must report any problems that may arise, which may alter the original working design.

3.3.2/ Storage and inspection of material

Once the material arrives in the workplace for installation, the installer must check the integrity of the material and store it in a suitable location. The material must be protected against possible damage throughout the entire period between its delivery and installation. The material must be stored in compliance with the instructions provided by the various manufacturers of the materials. In regards to **Lapitec®**, see the dedicated chapter.

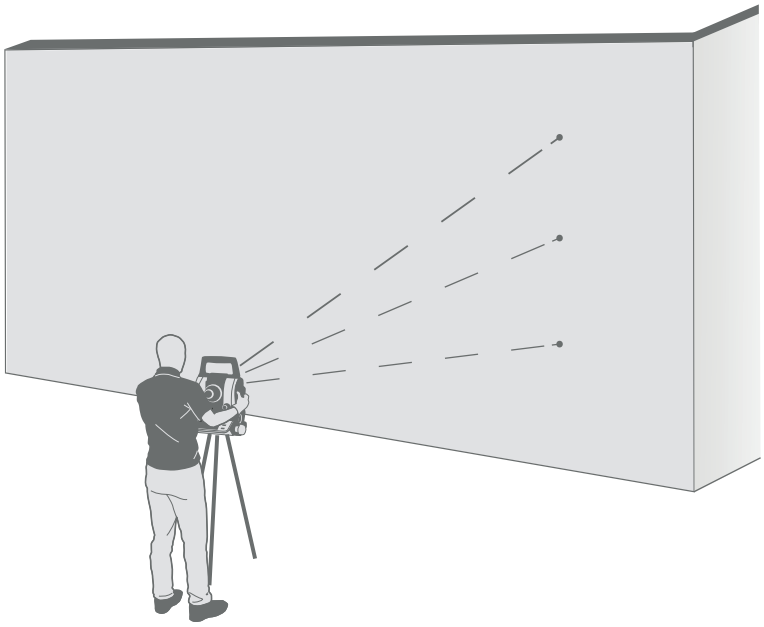
The installer and construction management must identify a suitable temporary storage location. The assembly stages may require long periods of time, and numerous setbacks.

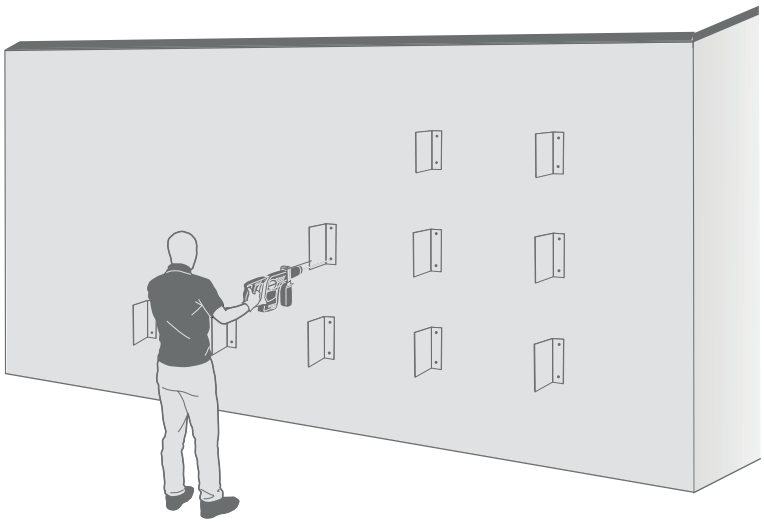


3.3.3/ Positioning

The first and most important stage of installing the façade is positioning. The exact identification of the start/stop measurements and anchoring points of the support structure will ensure the correct positioning of all elements, thus avoiding the need for costly rectifications during installation in terms of time and economic resources.

Lapitec SpA recommends paying special attention to this stage of the installation, as experience shows that the more care is invested, the smoother the progress of the job.





3.3.4/ Assembling the structure

The structure will be assembled by arranging the elements in the following order:

Structures with single and double layers

- anchoring of brackets to the support structure
- installation of any insulation
- fixing of the insulation layer using suitable dowelling
- inspection and sealing of all free spaces left in the insulation layout to avoid thermal bridges
- placement of vertical mullions on the brackets, verification of coplanarity with respect to the plane and between the brackets
- anchoring of mullions using screws or rivets

Double layer structures (follows)

- placement of horizontal tracks and fixing screws or rivets on the vertical mullions

NOTES

- Some substrates do not guarantee resistance to wind and water, therefore construction management will sometimes consider the installation of a breathable windproof tarpaulin. This tarpaulin must be developed before assembling the vertical mullions.
- Processing residue may be generated during drilling operations. Lapitec SpA recommends removing such residue as it may compromise the correct tightening or coplanarity of the structure itself.

Attention: During installation, the installer must constantly check that the structures have been installed in such a way that coplanarity between the elements is maintained. Any deformation of the plane may compromise the assembly of the slabs, as positioning the panels would be impossible. Lapitec® is a rigid material that cannot be bent or forced while it is being installed on the structure.

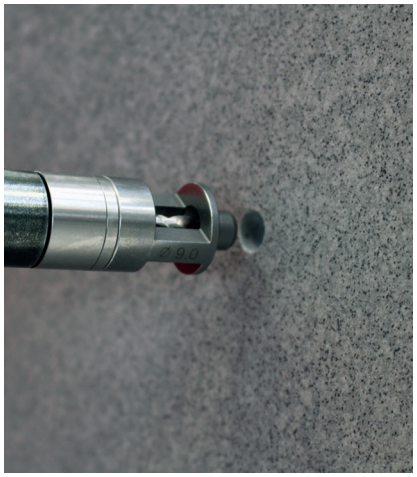
3.3.5/ Installation of Lapitec®

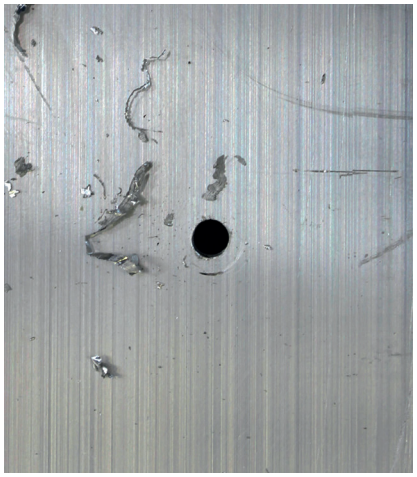
Lapitec® must be anchored to the structures in compliance with the instructions provided for each of the systems used. The installer must strictly abide by the provided instructions.

3.3.5.1/ Installation with rivets

The **Lapitec®** slab must be placed in the position in which it will be permanently fixed. Next, holes must be drilled in the vertical mullions using the dedicated centring tool, making sure they are perfectly aligned with those in the slab. After drilling, the installer must remove any metal residue that may inhibit the passage of the rivet or interfere with its tightening.

Using a mechanical riveter fitted with a nose piece, the slab must then be anchored, making sure to tighten the rivets in the fixed point holes first.



3.3.5.2/ Installation with concealed insert

The **Lapitec®** slab must be prepared at the foot of the structure, inserting the relative expanding insert in the blind holes.

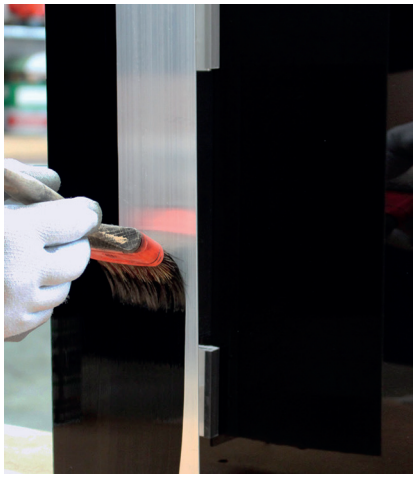
Next, the installer must position the clips used to anchor the slab, making sure they are perfectly aligned with each other and fixing them using screws (Keil) or nuts (Fischer).

The slab, prepared as such, will then be brought into position and hooked to the horizontal tracks. Positioning must be carried out with care, making sure not to cause any twisting phenomena or strain on any of the clips. This is especially important when dealing with large slabs positioned horizontally.

The installer must then correct any misalignments in the gaps, adjusting the metric screws fixed to the upper clips.

3.3.5.3/ Installation with adhesives

The installation sequence for an adhesive system involves initial cleaning with specific cleaners; next, the primers are applied and the double-sided tape is positioned. Shortly before installing the slab, the adhesive must be spread in accordance with the manufacturer's instructions. The panels will then be positioned and fixed in place.



3.3.6/ Installation sequences

The installation sequence for façade panels depends on the type of fixings used and the specific worksite needs.

In general, each system allows for both bottom-up or top-down installation. In any case, certain guidelines must be followed: for concealed mechanical systems, top-down installation is only allowed if the horizontal gaps maintain a minimum distance of 15 mm between the lower and upper slabs.

This is because the clips, in order to be placed on the tracks, must have a vertical clearance of about 10 mm.

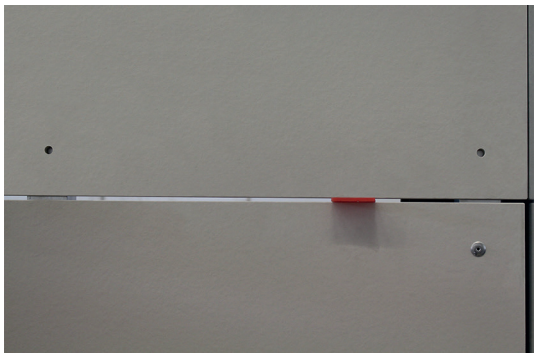
The most comfortable approach to installation remains the top-down method, as it facilitates and prevents falling objects or substances from ruining any slabs that have already been installed.

3.3.7/ Slab alignment

To guarantee the correct execution of the gaps, spacers must be used equal to the size of the gaps themselves.

During the installation of large panels, their weight may make it difficult to work. To help with positioning, **Lapitec**® SpA recommends the use of lifting equipment, or metal profiles temporarily attached to the façade structure itself, which may be used as a support surface for the slab being fixed in place.

These types of tracks, in addition to assisting with installation, can also help with horizontal alignment. These elements can only be used in top-down installations. In bottom-up installations, “spacers” will need to be placed between the lower and upper slab.



3.3.8/ Cleaning and protection of Lapitec®

Cladding is normally applied during the final stages of a worksite. In any case, this doesn’t eliminate the risk of the cladding being ruined or spoiled by accidental events.

Some of the most common causes are: painting, door and window installations, the dismantling of scaffolding.

As soon as the cladding is assembled, the installer must take care to clean any processing residue (especially if adhesives were used) and protect the slabs against possible damage after installation and before the façade becomes functional.

4. MANUAL PROCESSING

4.1/ INTRODUCTION

Lapitec® is a sintered stone supplied to the worksite ready for installation (cut, drilled and processed).

A good design and accurate site survey will allow all processes to be carried out at the company premises, avoiding the need for inconvenient and critical adjustments in the worksite.

Should processing be necessary in the worksite, it is recommended to strictly follow all instructions provided in this manual, using the tools supplied and/or recommended by Lapitec SpA.

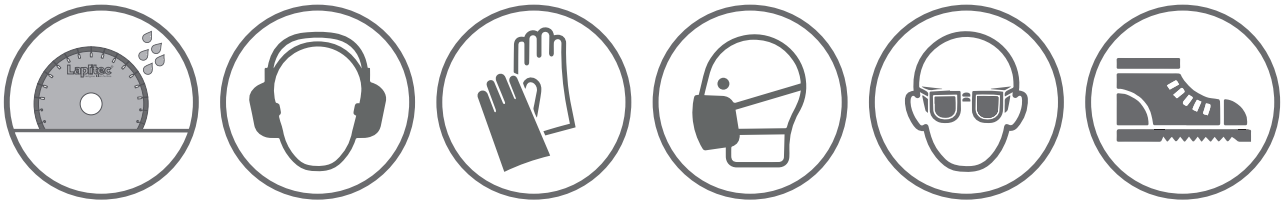
If it becomes necessary to perform any type of process, it is good practice to carry out preliminary tests for both cutting and drilling in order to acquire familiarity and avoid unfortunate inconveniences.

On request, the company can provide manufacturing scraps to use for this scope.

To perform manual processes, it is recommended to abide by health and safety legislation in force.

Each worker must have the PPE (Personal Protective Equipment) specific to the required processes.

Following are our recommendations.

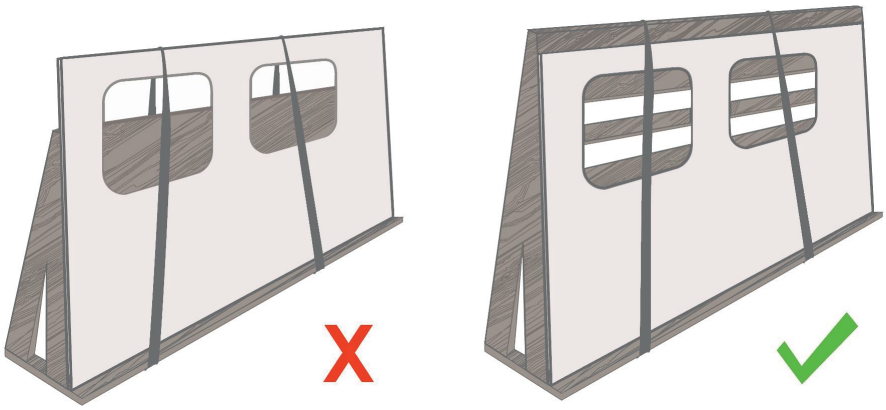


4.2/ WORKPLACES

The slabs are packaged either on A-frames and/or in crates. Individually, they must be transported with care and stacked on their side, regardless of their size, making sure to insert materials between the different pieces, and between the slabs and the support, to prevent any potential breakages (e.g. wooden shims). The slabs must be suitably supported so as to avoid any flexion and must be housed in spaces that are not subject to any accidental impact (passageways or manoeuvring areas).

If they must be deposited outdoors, they must always be protected against the rain by a sheet, thus preventing any stagnation on the slabs. If the slabs are wet during packaging, the packaging must be completely removed and the slabs must be arranged in such a way as to perfectly dry.

During any manual processing, the slabs must be properly supported. The support must be sufficiently rigid, perfectly flat and in good condition. A wooden support is preferable to a metal one in order to prevent scratches due to rubbing on the Lapitec surfaces.



4.3/ MANUAL CUTTING

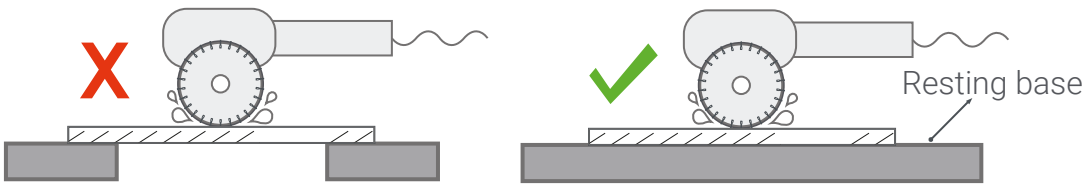
The instructions provided in this paragraph refer to manual cutting only; for benchtop processes (saw, waterjet or CNC), refer to the specific chapters.

In order to proceed, it is necessary to use the cutting tools supplied and recommended by Lapitec SpA, or alternatively, tools whose full compatibility with the indicated type has been checked, always with plenty of running water for cooling and to reduce dust. Lapitec SpA does not recommend dry cutting.

Processing must always start from the finished surface and proceed toward the unfinished one.

Once cutting is complete, it is recommended to lightly sand (with a sandpaper pad, 60/120 grit) the top and lower edge of the newly cut side. This technique will prevent inconvenient chipping and prevent the risk of cuts (the hardness of **Lapitec®** leaves the edges quite sharp).

Supplier	Tool	Grinder rotation
Lapitec®	Saw blade for manual cutting	13.000

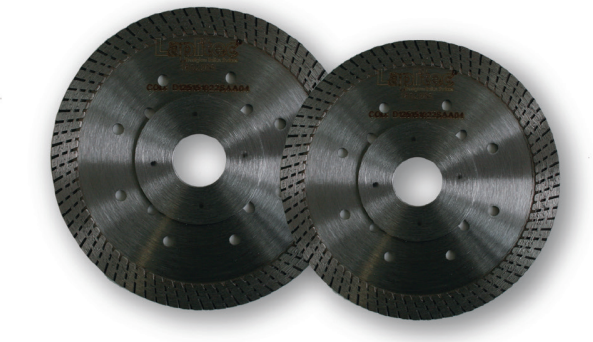


4.3.1/ Tools - blades for on-site cutting

To process the material on-site, Lapitec SpA supplies and suggests specific tools, all tested and guaranteed. The approved tools are available at Lapitec SpA, which declares their suitability for use.

Continuous rim diamond blades for manual tools (angle grinders, flex...)
Ø 115 mm attachment Ø 22 (*) RPM from 11,000 to 13,000
Ø 125 mm attachment Ø 22 (*) RPM from 11,000 to 13,000
Ø 230 mm attachment Ø 22 (*) RPM from 9,000 to 11,000
(*) adaptor also available for Ø 20

Lapitec® saw blade for manual cutting
Diameters 115-125-150-230 mm



The sequences are subject to possible variations due to the continuous effort to improve processing products. It is recommended to contact the supplier or the LapitecACADEMY service for all clarifications.

4.4/ MANUAL DRILLING

If cut-outs need to be made (for piping, wiring, air vents...) Lapitec can be drilled using the tools listed below and the indicated methods.

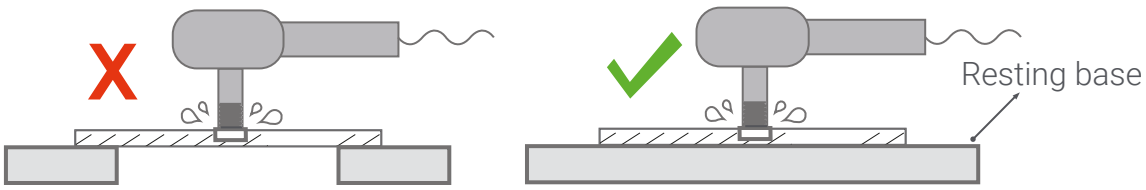
The part to be drilled must be suitably supported, as in the case of cutting; during drilling operations, all types of percussions must be avoided so as to prevent breakages.

To proceed with drilling, water must be used for cooling and to reduce dust.

Lapitec SpA does not recommend dry cutting.

Processing must always start from the finished surface and proceed toward the unfinished one.

Attention: square or rectangular section drilling (e.g. electrical installations) must provide for a rounded edge with 5 mm radius on the four corners. For more specific instructions see the specific Processing Manual.



4.4.1/ Tools - bits and hole saws for on-site drilling

To process the material on-site, Lapitec SpA supplies and suggests specific tools, all tested and guaranteed. The approved tools are available at Lapitec SpA, which declares their suitability for use.

Diamond hole saw for drilling with manual tools (drills...)

Holes Ø 06 mm attachment HEX RPM 1,800 - 2,000 (for drill)
Holes Ø 08 mm attachment HEX RPM 1,800 - 2,000 (for drill)
Holes Ø 10 mm attachment HEX RPM 1,800 - 2,000 (for drill)
Holes Ø 12 mm attachment HEX RPM 1,800 - 2,000 (for drill)
Holes Ø 14 mm attachment HEX RPM 1,800 - 2,000 (for drill)
Holes Ø 06 mm attachment M14 RPM 1,800 - 2,000 (for flex)
Holes Ø 08 mm attachment M14 RPM 1,800 - 2,000 (for flex)
Holes Ø 10 mm attachment M14 RPM 1,800 - 2,000 (for flex)
Holes Ø 12 mm attachment M14 RPM 1,800 - 2,000 (for flex)
Holes Ø 14 mm attachment M14 RPM 1,800 - 2,000 (for flex)
Holes Ø 15 mm attachment M14 RPM 3,000-11,000 (for flex)
Holes Ø 20 mm attachment M14 RPM 3,000-11,000 (for flex)
Holes Ø 25 mm attachment M14 RPM 3,000-11,000 (for flex)
Holes Ø 30 mm attachment M14 RPM 3,000-11,000 (for flex)
Holes Ø 32 mm attachment M14 RPM 3,000-11,000 (for flex)
Holes Ø 35 mm attachment M14 RPM 3,000-11,000 (for flex)
Holes Ø 40 mm attachment M14 RPM 3,000-11,000 (for flex)
Holes Ø 50 mm attachment M14 RPM 3,000-11,000 (for flex)

Factory core drill bits
Ø 35 mm M14 1,500-2,500

4.5/ FINISHES

4.5.1/ Finish for top and edge - LUX

Supplier	Tool	Sequence adopted
Sanwa - Kenma (Alpha Tools)	Dia Ceramica - Ex Ceramica Series	150R - 300R - 500R - 1000R - 2000R - 3000R
Weha	Es Wet Use - Ex Series - Hybrid Flash	1 - 2 - 3 - 4 - 5 - 6 - 7 50 - 100 - 200 - 400 - 800 - 1500 - 3000 H1 - H2 - H3
Italdiamant	Ds Series	50 - 100 - 200 - 400 - 800 - 1500 - 3000

4.5.2/ Finish for top and edge - SATIN

Supplier	Tool	Sequence adopted
Sanwa - Kenma (Alpha Tools)	Dia Ceramica - TF Ceramica Series	150R - 300R - 500R*
Weha	Es Series - Hybrid Flash	50ES - 100ES - 200ES - 400ES - 800ES* H1 - H2
Italdiamant	Ds Series	50 - 100 - 200 - 400 - 800*

*Optional

See the technical manual of the tool manufacturer to determine the best working parameters.

4.6/ ASSEMBLY USING ADHESIVES

This paragraph deals with processes for bonding **Lapitec®** slabs to each other, in order to develop elements such as edges, steps and suspended corners.

Lapitec SpA has performed bonding tests on numerous products, not only for their technical performance, but also for the compatibility of their tone with the colours of **Lapitec®** slabs.

A number of Tenax branded products are proposed below, custom made for **Lapitec®** slabs and our colour range, inclusive of their technical specifications.

4.6.1/ Good practices for use of adhesives

Before applying the adhesive, check that the surface to be glued is clean, properly dried and free of any type of treatment. If it is necessary to glue on a treated surface, it must be sanded with coarse sandpaper (60-80) so as to remove the treatments and create a rough surface that guarantees certain and long-lasting adhesion.

For greater certainty on overhanging (45°) bondings, it is good practice to place a square or "L" profile measuring approximately 30 x 30 mm on the non-visible rear side of the material, along the entire gluing length of the lintel.

When it is not possible to use **Lapitec®** to support the finished piece, choose a material with the same expansion coefficient as **Lapitec®** (e.g. Granite).

Disclaimer

When selecting the adhesive, the intended function and use of the workpiece must be considered in order to identify the most suitable product.

4.6.2/ STRONGBOND Cartridge

Adhesive paste to glue **Lapitec®** suitable for both indoor and outdoor applications, also with persistent exposure to UV rays. The Strongbond cartridge is characterised by its excellent adhesion in very short times (1 hour, 1 hour and 15 minutes), allowing the cutting and polishing of glued pieces.

4.6.3/ STRONGBOND A+B

New generation two-component adhesive with zero yellowing in the sun for **Lapitec®** bonding, suitable for indoor and outdoor applications and in the case of persistent exposure to UV rays. Paste product without solvents and with medium reactivity. Good hardness. The adhesive hardens even at 0°C. The appearance of the hardened film is still shiny and dry even in conditions with a poor humidity rate and temperature. Its use is suggested for white materials where it must be guaranteed that the resin will not yellow in the sun. Thanks to its properties, it does not leave streaks and its colour does not alter.

4.6.4/ FROZENBOND A+B

Extra-strong two-component epoxy adhesive in a very soft, spreadable thixotropic paste for vertical application, ideal for indoor and outdoor use, particularly suited to colder climates. Recommended for outdoor use. Characterised by high adhesion strength on multi-materials and weatherproof properties. Can be applied even on damp surfaces. Also suitable to bond different types of materials: **Lapitec®**-stone, **Lapitec®**-glass, **Lapitec®**-cement, **Lapitec®**-composite honeycomb panels, **Lapitec®**-wooden or laminate panels.

4.6.5/ FIREBOND

Adhesive paste to bond **Lapitec®**, suitable for indoor applications, offering particularly high resistance to heat and fast processing. Very fast, soft, with excellent workability. The Firebond product is characterised by excellent adhesion in very short times, 60-90 minutes, thus allowing the rapid processing of bonded pieces even at low temperature.

4.6.6/ RAINBOW

The systems described above can all be coloured with universal Rainbow pigments in a range of colours aligned with **Lapitec®** colours. The coloured paste features a soft, coloured and consistent appearance and mixes very well with all pastes, thus allowing easy colouration.

4.7/ BIO-CARE

Bio-Care is a technology that offers Lapitec antibacterial and self-cleaning properties during the production process. The functions of Bio-Care can be reactivated at any time by applying the Bio-Care kit. This treatment must be applied on the visible parts each time the material is processed (drilling, surface processing and cutting) in order to maintain the qualities attributable to **Lapitec®**.

How to apply

Make sure the surface is clean, dry and free of dust. Spread the Bio-Care One product evenly using a solvent-resistant cloth. When the product assumes a more viscous consistency (due to the evaporation of most of the solvent after about 2 minutes), remove the excess Bio-Care One with a clean cloth, taking care to remove any stains or shadows.

Attention: any shadows or stains left on the surface will become permanent once the treatment has completely hardened.

Treatment	Quantity gr/m²	Workpiece can be handled after
Bio-Care One	5-6	40 minutes

The surface can be handled 40 minutes after application; the treatment will have completely set and tests can be carried out after 7 days. The treatment can be manually applied on smaller surfaces. On slabs, the treatment must be applied using dedicated machinery. Given the minimal amount of product, it is recommended to apply **Lapitec®** Bio-Care One on several workpieces to be treated in a sequence.

Warning: do not turn upside down, store in a cool, dry place far from sources of heat.

4.8/ REPAIR KIT

The repair kit is composed of a 395nm UV torch, a coloured **Lapitec®** filler, 2 trowels, 1 diamond sheet 400 grit (usable on all finishes except Lux).

Instructions for use

Using the supplied trowel, thoroughly mix the filler until all the internal components are completely blended, then apply it in small quantities (drops) on the parts to be repaired.

Turn on the UV lamp and hold it over the repair to activate the solidification process (approx. 15-20 seconds). Manually check the compactness of the filler. Repeat the procedure until all chips have been filled.

Then protect the non-repaired section of the **Lapitec®** top with some masking tape to prevent the sandpaper from damaging the surface. Use the supplied diamond sandpaper to sand off any excess filler. Then apply Bio-Care only on the repaired part to prolong the aesthetic effect of the repair over time.

Disclaimer

Failure to properly mix the filler may cause a difference in colour with respect to the **Lapitec®**.

The characteristics of the UV Lamp must be the same as those indicated by Lapitec, otherwise the filler may not completely react. For the Lux finish, use polishing paper for granite with grit up to 3000.

Poor chamfering on the edge of the workpiece may be the cause of chipping. For more information see the **Lapitec®** Technical Manual.

Duration of filler: 3 months in closed jar.

Hazard identification

Classification of substance or mixture: the product is classified as hazardous pursuant to the provisions set out in Regulation (EC) 1272/2008 (CLP) (and subsequent amendments), the product therefore requires a safety data sheet compliant with the provisions of Regulation (EC) 1907/2006 and subsequent amendments. Any additional information regarding risks to health and safety and/or the environment are reported in sect. 11 and 12 of this data sheet.

Watch the video tutorial

5. CLEANING, CARE AND MAINTENANCE

5.1/ ROUTINE CLEANING

Daily care forms the basis of correct maintenance of **Lapitec®** claddings. The material features excellent stain resistance, however prolonged or recurring use, especially in public places, may result in the deposit of particularly hard to remove grime. A good strategy to facilitate the removal of stains is not to wait for them to dry.

For routine care, **Lapitec®** coverings can be cleaned with a microfibre cloth and hot water, to which neutral detergents can be added (e.g. Vetril, Glassex or FilaBrio). These detergents must always be used in accordance with the indications of their manufacturers, especially in relation to their dilution ratios.

On **Lapitec®** surfaces it is not necessary to use scourer sponges, waxes, fatty soaps, impregnating agents and/or other protective treatments; rather, these products will leave an oily/shiny film on the surface that will compromise the final appearance of **Lapitec®**.

5.2/ REGENERATIVE CLEANING

In case of particularly stubborn stains or if routine cleaning is ineffective, more targeted cleaning will be required. Stains must be removed using products specific to the type of stain, taking care not to compromise the integrity of the surface.

Lapitec SpA has collaborated with Fila Industria Chemica SpA, a company specialised in surface cleaning, in order to identify the most suitable and efficient products for the proper cleaning of **Lapitec®** coverings.

Below is a table identifying the types of stains that may occur on the finishes and the products recommended by Fila Solution for their removal. Technical data sheets available on the website www.filasolution.com. The choice of detergent must be made based on the products reported in this table, or otherwise making sure that any other product has identical characteristics to those expressed herein.

Before proceeding, Lapitec SpA recommends contacting the provider of the cleaning products to obtain the most up-to-date documentation, always following the provided instructions.

After cleaning, the surfaces must be washed with plenty of warm water in order to remove all traces of the detergent used and dried with a cloth.

In the case of special needs, Lapitec SpA customer care can be contacted by writing to customercare@lapitec.com

Type of dirt	Type of detergent
Oil and grease	FILA PS/87 - FILAFASEZERO
Beer	FILA PS/87 - FILAFASEZERO
Chewing Gum	FILA PS/87 - FILAFASEZERO
Vinyl glue	FILA PS/87 - FILAFASEZERO
Tyre marks and rubber shoe marks	FILA PS/87 - FILAFASEZERO
Silicone	FILA ZERO SIL
Ink	FILA PS/87 - FILA SR/95
Nicotine	FILA PS/87 - FILA SR/95
Urine and vomit	FILA PS/87 - FILA SR/95
Marker pen	FILA PS/87 - FILA SR/95
Hair dye	FILA PS/87 - FILA SR/95
Coffee	FILA PS/87 - FILA SR/95
Wine	FILA PS/87 - FILA SR/95
Blood	FILA PS/87 - FILA SR/95
Coca Cola	FILA PS/87 - FILA SR/95
Suction cup marks	A PS/87 - FILA CR10
Rust	FILA NO RUST
Metal/aluminium marks	FILA PHZERO
Cement-Potassium Nitrate (after laying)	FILA DETERDEK
Limescale	FILA DETERDEK
Pencil	FILA DETERDEK
Engobe	FILA DETERDEK

Type of dirt	Type of detergent
Epoxy grout (after laying)	FILA CR10
Enamel pain/wall paint	FILA NOPAINT STAR
Graffiti	FILA NOPAINT STAR
Dirty gap	FUGANET
Bitumen	FILASOLV
Candle wax	FILASOLV
Routine maintenance	FILACLEANER
Restoring wax finish	FILA SOLV - FILA ZERO SIL

Notes

Stains such as ink, paint, wax, oil/grease can also be removed using solvents such as a nitro thinner or turpentine. Before applying the product on the entire surface of the finish, it is recommended to test its efficacy on a small portion first.

Do not use hydrochloric acid or caustic soda concentrates and products containing hydrofluoric acid and its derivatives.

Warnings

If the material is not cleaned after installation, or in the case of poor cleaning, Lapitec SpA denies all liability in regards to the efficacy of cleaning and maintenance operations.

6. AFTER SALES

6.1/ LapitecLAB - Research centre

LapitecLAB is the Research and Development division dedicated to the study and experimentation of **Lapitec®** accessories and applications. The constant drive for innovation and the continuous development of new solutions allows us to meet the market's most specific needs.

Every single experience acquired working on international projects, in a range of different uses, is utilised to perfect the products and accessories sold by Lapitec S.p.A. Through a direct exchange with its customers, LapitecLAB continuously studies new solutions to offer an increasingly complete and efficient service for a diverse range of needs.

6.2/ LapitecACADEMY - Development centre

LapitecACADEMY is the division responsible for training and supporting professionals that work with **Lapitec®** through in-house company training courses and direct assistance. Thanks to the Academy Community service, all news and technical developments are rapidly diffused to the entire network of collaborators.

By attending the training course held by LapitecACADEMY, professionals can obtain an Approved Fabricator certificate and learn a series of helpful tips and **Lapitec®** machining techniques.

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7. CREDITS

We thank the following professionals for the photographic references:
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- GFI Architecture+Design
- Architetto Giorgio Parise
- The Marble & Granite Centre Ltd
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- Bautec
- Antonello Finiture
- Architect Francesco Pascali (Francesco Pascali Architetto)

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