ONDUCLAIR® THERMO

Factory assembled insulating rooflights

INSTALLATION GUIDE

Light transmission
Thermal insulation
Broad product range

Onduline®

www.onduline.com

ONDUCLAIR® THERMO

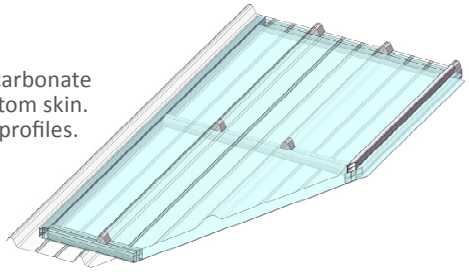
ONDUCLAIR® THERMO is an insulating translucent panel adaptable to composite panels and offering a wide product range to let you find the system that exactly fits your needs:
- ONDUCLAIR® THERMO **PC** factory assembled insulating rooflights featuring a polycarbonate top skin.
- ONDUCLAIR® THERMO **PLR** factory assembled insulating rooflights featuring a polyester top skin.
- ONDUCLAIR® THERMO PC **T** and PLR **T** Thermal comfort option for increased insulation properties.
- ONDUCLAIR® THERMO PC **R** and PLR **R** Reinforced option for increased resistance to loads and simplified installation, whether in case of a new construction or renovation.
- ONDUCLAIR® THERMO PC **TR** and PLR **TR** a unique association of our Thermal comfort and Reinforced options, combining insulation and mechanical performances so as ease of installation.

Summary

➤ DESCRIPTION

BASIC MATERIALS

ONDUCLAIR® THERMO panels are composed of sheets connected together by extruded structured polycarbonate profiles, factory assembled with high performance adhesives and reinforced by riveting.



ONDUCLAIR® THERMO panels are available in two finishes:

- **ONDUCLAIR® THERMO PC**: factory assembled insulating rooflights featuring a polycarbonate top skin (1 mm thick in compliance with EN-1013) and a multiwall polycarbonate bottom skin. Top and bottom skins are connected together by extruded structured polycarbonate profiles.
- **ONDUCLAIR® THERMO PLR**: factory assembled insulating rooflights featuring a polyester top skin (1.2 or 1.6 mm thick in compliance with EN-1013) and a multiwall polycarbonate bottom skin. Top and bottom skins are connected together by extruded structured polycarbonate profiles.

Two options (that can be combined depending on the thickness of the panel) are available:

- **ONDUCLAIR® THERMO PC T and PLR T**: Thermal comfort option for increased insulation properties.
- **ONDUCLAIR® THERMO PC R and PLR R**: Reinforced option for increased resistance to loads and simplified installation, whether in case of a new construction or renovation.
- **ONDUCLAIR® THERMO PC TR and PLR TR**: a unique association of our Thermal comfort and Reinforced options, combining insulation and mechanical performances so as ease of installation.

DESTINATION

ONDUCLAIR® THERMO panels are designed for daylighting composite panel applications (they can be all or part of a roof or wall). They can be used with all types of low or medium humidity buildings located at an altitude of less than 900 m, under usage conditions defined by the present Installation Guide.
Over 900 m, take into account the local conditions of implementation of the construction.

➤ RANGE, CHARACTERISTICS AND COMPATIBILITIES

GAMME

Below tables describe the features and characteristics of **ONDUCLAIR® THERMO** panels including the offered options.

ONDUCLAIR® THERMO PC	Description	Thickness*	Light Transmission**	Colour	Length***	Fire rating
ONDUCLAIR® THERMO PC	Panels composed of a **polycarbonate** top skin and a **4 mm multiwall polycarbonate** bottom skin connected together with **extruded structured polycarbonate profiles.**	30, 40, 50, 60, 80, 100, 120 and 140 mm	Crystal - From 30mm to 80mm: 75% From 100mm to 140mm: 60%	Top skin: Crystal or opal 66% Bottom skin: Clear	From 1 m to 6,50 m (casing without end lap/cut back)	Top and bottom skins: B-s1,d0
Option						
ONDUCLAIR® THERMO PC T Thermal comfort option	Panels composed of a **polycarbonate** top skin and **16 mm multiwall polycarbonate** bottom skin, connected together with **extruded structured polycarbonate profiles.**	40, 50, 60, 80, 100, 120 and 140mm	Crystal - From 40mm to 80mm: 40% From 100mm to 140mm: 35%			
ONDUCLAIR® THERMO PC R Reinforced option	Panels composed of a **polycarbonate** top skin and a **4 mm multiwall polycarbonate** bottom skin, connected together with **extruded structured polycarbonate profiles and longitudinal polycarbonate reinforcements located under each rib.**	30, 40, 50, 60 and 80mm	Crystal - 75%			
ONDUCLAIR® THERMO PC TR Thermal comfort & Reinforced options	Panels composed of a **polycarbonate** top skin and a **16 mm multiwall polycarbonate** bottom skin, connected together with **extruded structured polycarbonate profiles and longitudinal polycarbonate reinforcements located under each rib.**	40, 50 and 60mm	Crystal - From 40mm to 60mm: 40%			

* Other thicknesses upon request
** Note: Overall light transmission when new. A slight variation (attenuation) of light transmission may appear over time.
*** **ONDUCLAIR® THERMO** panels can be connected together in order to increase the daylighting area: side laps (longitudinal overlaps) are possible thanks to the external corrugation of the panel and downslope laps (transversal overlaps) thanks to the cut back (the total length of daylighting surface must then be divided in several **ONDUCLAIR® THERMO** panels with a maximum casing length of 6,5m, ensuring that junctions between the panels are made over a support).

ONDUCLAIR® THERMO PLR	Description	Thickness*	Light Transmission**	Colour	Length***	Fire rating
ONDUCLAIR® THERMO PLR	Panels composed of a **polyester** top skin and a **4 mm multiwall polycarbonate** bottom skin connected together with extruded **structured polycarbonate profiles.**	30, 40, 50, 60, 80, 100, 120 and 140mm	Colourless - From 30 to 80mm: 65% From 100mm to 140mm: 50%	Top skin: colourless Bottom skin: crystal	From 1 m to 6,50 m (casing without end lap/cut back)	Top skin: E non dripping. Bottom skin: B-s1,d0
Option						
ONDUCLAIR® THERMO PLR T Thermal comfort option	Panels composed of a **polyester** top skin and **16 mm multiwall polycarbonate** bottom skin, connected together with **extruded structured polycarbonate profiles.**	40, 50, 60, 80, 100, 120 and 140mm	Colourless - From 40 to 80mm: 35% From 100mm to 140mm: 30%			
ONDUCLAIR® THERMO PLR R Reinforced option	Panels composed of a **polyester** top skin and a **4 mm multiwall polycarbonate** bottom skin, connected together with **extruded structured polycarbonate profiles and longitudinal polycarbonate reinforcements located under each rib.**	30, 40, 50, 60 and 80mm	Colourless - 65%			
ONDUCLAIR® THERMO PLR TR Thermal comfort & Reinforced options	Panels composed of a **polyester** top skin and a **16 mm multiwall polycarbonate** bottom skin, connected together with **extruded structured polycarbonate profiles and longitudinal polycarbonate reinforcements located under each rib.**	40, 50 and 60mm	Colourless - From 40 to 60mm: 35%			

* Other thicknesses upon request
** Note: Overall light transmission when new. A slight variation (attenuation) of light transmission may appear over time.
*** **ONDUCLAIR® THERMO** panels can be connected together in order to increase the daylighting area: side laps (longitudinal overlaps) are possible thanks to the external corrugation of the panel and downslope laps (transversal overlaps) thanks to the cut back (the total length of daylighting surface must then be divided in several **ONDUCLAIR® THERMO** panels with a maximum casing length of 6,5m, ensuring that junctions between the panels are made over a support).

CHARACTERISTICS

General characteristics:

	ONDUCLAIR® THERMO PC	ONDUCLAIR® THERMO PLR
Expansion Coef. T° 20° (m/m°C)	6.5×10^{-5}	2.5×10^{-5}
Service Temperature	-40°C to +110°C	

Thermal insulation characteristics:

Thickness	Option	U-Value W/m².K	S winter	S summer
30	THERMO	2,59	0,79	0,8
	THERMO R	2,56	0,75	0,77
40	THERMO	2,56	0,77	0,79
	THERMO T	1,1	0,8	0,81
	THERMO R	2,47	0,74	0,76
	THERMO TR	1,09	0,77	0,77
50	THERMO	2,54	0,77	0,79
	THERMO T	1,09	0,79	0,79
	THERMO R	2,44	0,74	0,76
	THERMO TR	1,06	0,76	0,76
60	THERMO	2,54	0,77	0,79
	THERMO T	1,08	0,79	0,79
	THERMO R	2,45	0,74	0,76
	THERMO TR	1,05	0,76	0,76
80	THERMO	2,48	0,77	0,78
	THERMO T	1,06	0,79	0,79
	THERMO R	2,37	0,74	0,76
100	THERMO	1,52	0,83	0,85
	THERMO T	0,85	0,87	0,87
120	THERMO	1,5	0,83	0,85
	THERMO T	0,84	0,87	0,87
140	THERMO	1,49	0,83	0,85
	THERMO T	0,83	0,85	0,86

Calculations in compliance with French Standard RT-2005 based on an average profile and a panel length of 6,00 linear meters with 5 intermediate supports. U and S values are average values wich are reliable at +/- 0,1 whatever the case. A more precise calculation can be realized upon request to our Technical Department.

Dimensional characteristics*:

Width tolerance	+/- 0,8 %
Thickness tolerance	+/- 2 mm
Length tolerance	+/- 10 mm

* As per coefficient of expansion T° at 20°C.

Chemical characteristics:

Regarding the resistance to chemicals of the **ONDUCLAIR® THERMO** panels top skins, refer to the chemical resistance of **ONDUCLAIR® PC** (for **ONDUCLAIR® THERMO PC** panels) or ONDUCLAIR® PLR (for **ONDUCLAIR® THERMO PLR** panels).
Regarding the resistance to chemicals of the bottom skin (made in multiwall polycarbonate) of all **ONDUCLAIR® THERMO** panels, refer to the chemical resistance of **ONDUCLAIR® PC** (See the table below for **ONDUCLAIR® PC** and the appendix for **ONDUCLAIR® PLR**).

ONDUCLAIR® PC - Resistance to chemicals	
CHEMICAL CLASS	**EFFECTS**
Acids (Mineral)	No effect under most conditions of concentration and temperature.
Alcohols	Generally compatible.
Alkalis	Acceptable at low concentration and temperature. Higher concentrations and temperatures result in etching and attack as evidenced by decomposition.
Aliphatic Hydrocarbons	Generally compatible.
Amines	Surface crystallisation and chemical attack.
Aromatic Hydrocarbons	Solvents and severe stress-cracking agents.
Detergents and Cleaners	Mild soap solutions are compatible. Strongly alkaline ammonia materials should be avoided.
Esters	Cause severe crystallisation. Partial solvents.
Fruit Juices and Soft Drinks	Compatible at low stress levels. Some concentrates not recommended.
Gasoline	Not compatible at elevated temperatures and stress levels.
Greases and Oils	Pure petroleum types generally compatible. Many additives used with them are not, thus materials containing additives should be tested.
Halogenated Hydrocarbons	Solvents and severe stress-cracking agents.
Ketones	Cause severe crystallisation and stress cracking. Solvents.
Silicone Oils and Greases	Generally compatible up to 80°C.

Characteristics are provided in good faith, according to internal tests.
For other substances or different conditions, samples can be provided upon request for testing.

COMPATIBILITIES WITH COMPOSITE PANELS

As part of our development strategy of technical quality systems, each creation of a new **ONDUCLAIR® THERMO** reference goes through a compatibility study referring to the Technical Approval of the composite panel manufacturer and is confirmed by testing with samples and prototypes.

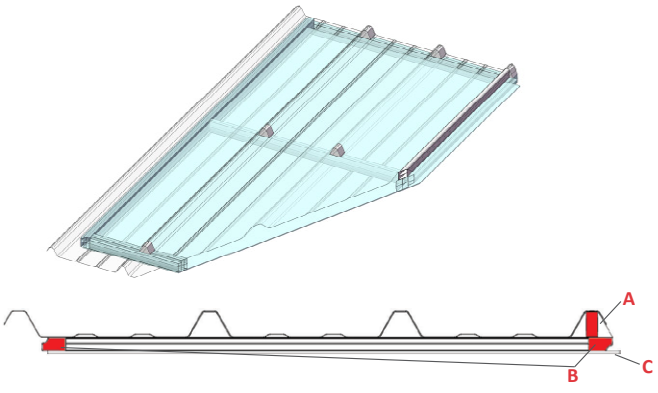
We have a list of compatibility between ONDUCLAIR® THERMO references and some specific composite panels references, however, given the increasing number of references and various denominations existing on the market (misleading), we strongly recommend our customers to contact our Technical Department to ensure the compatibility of their panel with our solution.

It is the customer's responsibility to ensure that his composite panel is fully identical to the specifications provided by the Technical Approval which has been considered by Onduclair to validate the compatibility of the system (reference of the Technical Approval available upon request).

In case of doubt or specific request (not existing reference), Onduclair reserves the right to suspend the execution of the order so as to obtain accurate drawings or samples to be provided at the customer's costs and responsibility, to validate or not the order. If changes must be made on **ONDUCLAIR® THERMO** panels to ensure their compatibility, development methods and conditions will be defined case by case with the customer.

GRAPHIC DESCRIPTION

ONDUCLAIR® THERMO cross-section

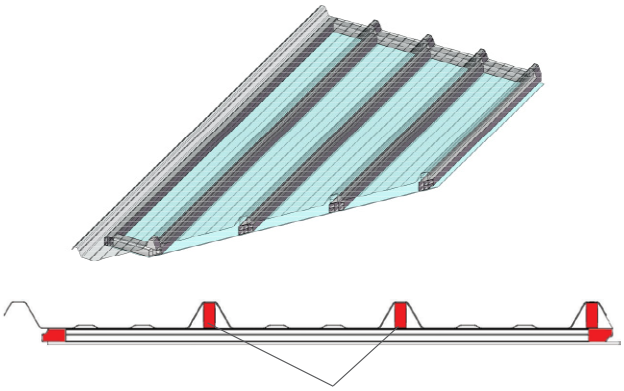


A: Longitudinal polycarbonate reinforcement located under the rooflight underlap.

B: Structured polycarbonate profiles. **ONDUCLAIR® THERMO** casings are completely made of polycarbonate.

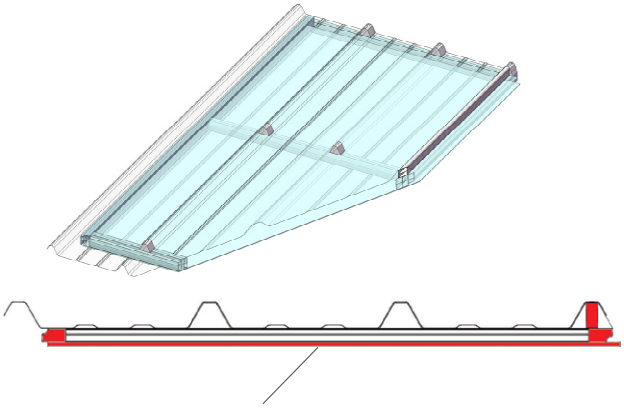
C: 4mm multiwall polycarbonate bottom skin.

ONDUCLAIR® THERMO R cross-section Option Reinforced



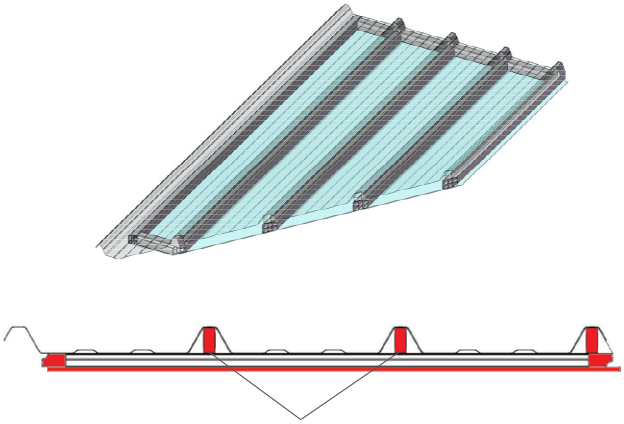
The Reinforced option (R) features longitudinal polycarbonate reinforcements located under each rib.

ONDUCLAIR® THERMO T cross-section
Option Thermal Comfort



The Thermal Comfort option (T) features a 16mm multiwall polycarbonate bottom skin.

ONDUCLAIR® THERMO TR cross-section
Options Thermal Comfort & Reinforced



The Thermal Comfort and Reinforced options (TR) feature a unique combination of longitudinal polycarbonate reinforcements located under each rib and a 16mm multiwall polycarbonate bottom skin.

➤ IMPLEMENTATION - GENERAL

PRINCIPLE

ONDUCLAIR® THERMO panels will be installed in accordance with the local standards in force as well as good practice. The panels will always be installed with the ribs (corrugations) running down the slope of the roof. The illuminating parts whose base is located within 2 m of a floor must be protected by a device to avoid their possible deterioration. For reasons of expansion, removal and handling, the length of the **ONDUCLAIR® THERMO** panels will never be smaller than 1 m and greater than 6.50 m casing length, excluding cut back length.

Any modification of the ONDUCLAIR® THERMO panels (cutting, modification of the casing, un-sticking and sticking, painting...) is strictly forbidden, will void all warranty and exclude our Company's liability.

PREVENTION OF ACCIDENTS DURING IMPLEMENTATION AND MAINTENANCE

The implementation of **ONDUCLAIR® THERMO** panels requires compliance with the Health and Safety regulations for access to lightweight material roofs. In particular, devices for the distribution of loads over the purlins must be systematically used for installation or for maintenance in order not to use the panels directly for support. In the case of the installation of accessible cladding or roofing, **ONDUCLAIR® THERMO** panels cannot of themselves act as a parapet wall. Protective devices must be installed according to the standards in force.

FIRE SAFETY

ONDUCLAIR® THERMO panels can be used in different categories of premises while complying with potential implementation and sizing rules established by the regulations in force.

STORAGE

Storage of packages must be done in a ventilated shelter (covered store, light coloured cover). Packages must be slightly inclined horizontally to promote their drying and they must be separated from the ground using cushioning, thus providing sufficient space to allow good ventilation while avoiding any permanent deformation of the sheets.

NEVER FORGET THESE SAFETY RULES:

- NEVER STACK TWO PALLETS ON ROOFING.
- SECURE THE STACKS IN THE EVENT OF VIOLENT WIND.

MARKING OF THE TOP SHEET

- **ONDUCLAIR® THERMO PLR**: ink marking.
- **ONDUCLAIR® THERMO PC**: ink marking.

INCOMPATIBILITY OF POLYCARBONATE WITH PVC

Polycarbonate is not compatible with PVC. This is why, when ONDUCLAIR® THERMO panels are connected with composite panels covered with Plastisol (or any other PVC-based paint), the overlaps must be protected with a sealing band (Alu-butyl type or equivalent) in order to avoid contact between polycarbonate and PVC leading to a chemical deterioration.
The use of sealing washers containing PVC (and any other element containing PVC and in contact with ONDUCLAIR® THERMO panels) is prohibited.

PRECONDITIONS REQUIRED FOR INSTALLATION

General conditions

Minimum slopes are directly given by the metal or wood load-bearing framework. Installation on concrete or masonry framing is done on a secondary metal frame (insert) as defined by the standards in force as well as by the Professional Implementation Rules. **ONDUCLAIR® THERMO** panels do not contribute to the general stability of buildings. **ONDUCLAIR® THERMO** panels cannot perform the function of the bracing or anti-misalignment of purlins.

Special support conditions

Support surfaces

The installation can only take place if the support surfaces are flat, parallel, continuous and without projections, on the same plane as the roofing or cladding. **The use of extension brackets on the purlins may be necessary.**

Minimum dimensions

The minimum support width is:
- 40 mm, for open or hollow steel profiles,
- 60 mm, for wooden purlins or ribbon strips.

Spans and working loads

The maximum admissible spans (m) and loads (daN/m2) have been determined taking account of the following criteria:
- deflection less than or equal to 1/100th of the span,
- destruction safety margin greater than or equal to 3.

Please refer to the technical data sheets available upon request to our Technical Service.
Technical data sheets resume:

- Product denomination
- Profile Plan
- Material information
- Sheet information
- Admissible spans and loads on two or three supports for pressure and depression.
- The calculated spans have to be adapted to the norms and regulation in force at the location of the building.

Tools

Drilling

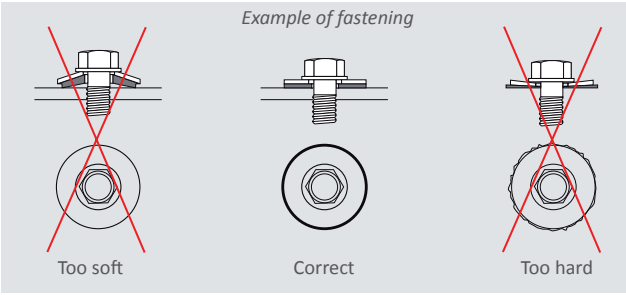
Mandatory pre-drilling.
Because of the coefficient of expansion of the material, drill the fastener holes to a diameter 4mm larger than the fastener diameter. A deburring must be performed to remove the shavings that could impede the proper application of the bonded washer.

Screwing

Self-tapping, thread-cutting screws, coach screws etc., must be installed with the appropriate tools equipped with a torque limiter and depth stop. Tightening must be sufficient to ensure the water tightness of the fixing system, but must in no case be excessive to avoid blocking the free expansion of the panels. For the fastening of the panels, the use of gun-nailing, riveting or coach screw tamping is prohibited.

SPECIAL CONNECTION PARTS

The ridge caps, edge protectors, roofing penetrations, etc., will be carried out using shaped parts in compliance with the local rules in force.



FIXING ACCESSORIES

PVC washers are prohibited.

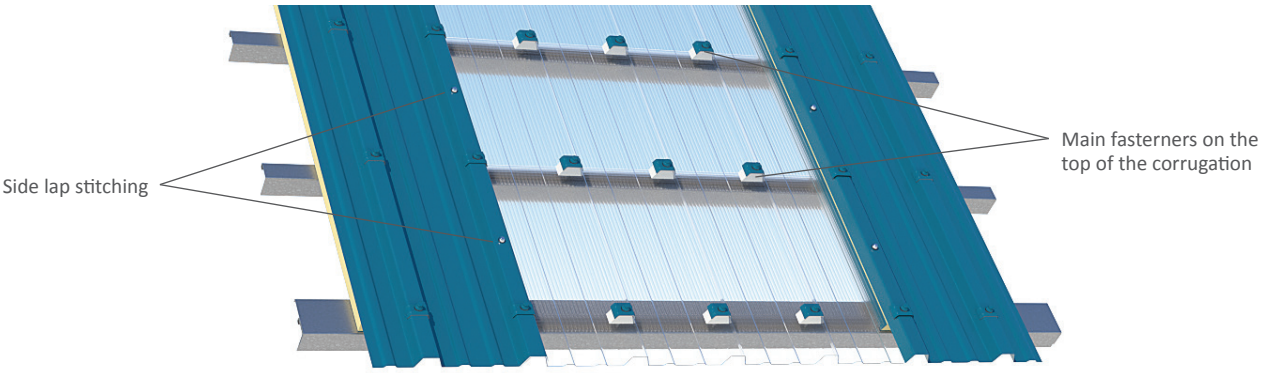
It is essential to place the fasteners properly, on the locations which are strictly dedicated to fixing.

General

The fasteners and accessories employed as roofing or cladding elements must meet minimum characteristics of mechanical strength, leak tightness and durability, in accordance with the requirements of the local rules in force and Professional Rules.

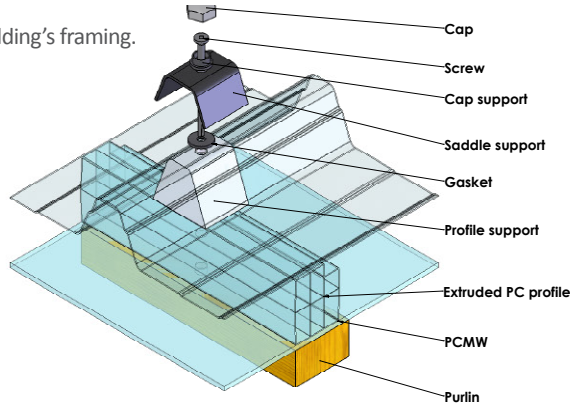
These minimum requirements concern:
- Types, shapes and dimensions
- Materials and means of protection against corrosion.

The main fasteners are always located at the top of each rib and each purlin or strip and have to go through the transversal reinforcements of the panels that must be located over the purlin or strip (excepted in the case of the Reinforced version, replacing the transversal reinforcements by longitudinal reinforcements located under each rib, so as in the case of the fastening at the eaves). The side lap stitchings are made at the peak of the longitudinal rib overlap (side lap) with a maximum spacing of 500 mm. (see p.6 «Side lap stitching accessories»).



Types of fixings

The type of fasteners must conform to the profiles of the panel and to the building's framing.
To be defined according to the manufacturer's requirements.

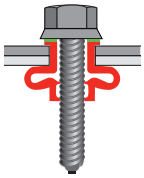


Side lap stitching accessories

Side lap stitching is vital at the longitudinal overlaps, regardless of the region, the site and the slope.
Specification: at the top of the rib with a maximum spacing of 500 mm.

- ONDUCLAIR® THERMO over **ONDUCLAIR® THERMO** and composite over **ONDUCLAIR® THERMO**: expanding rubber stitching fastener (grommet).

Example:
Expanding rubber grommet fastener
B 9/25 mm, with screw diam. 5 mm
(moulded polyamide head).



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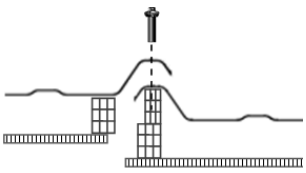
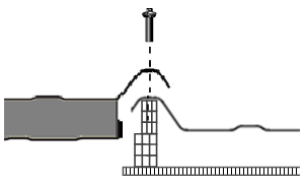
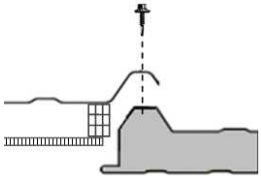


ONDUCLAIR® THERMO over **ONDUCLAIR® THERMO**



Composite panel over **ONDUCLAIR® THERMO**

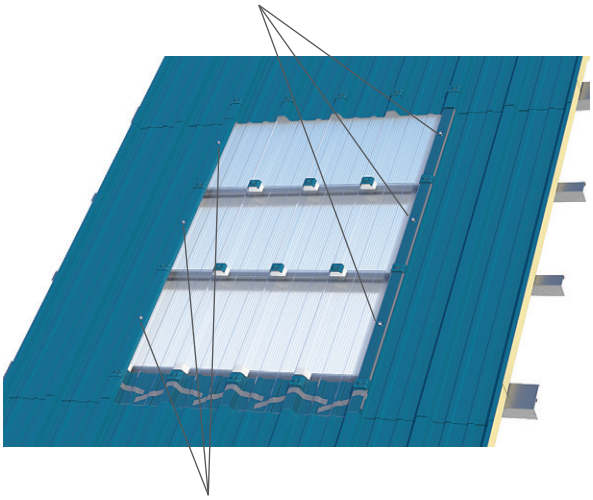
- ONDUCLAIR® THERMO over composite panel: standard sidestitch fastener.



ONDUCLAIR® THERMO over composite panel

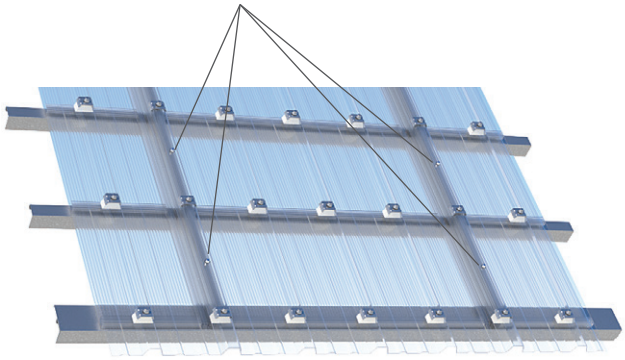
INSTALLATION EXAMPLE

Slide lap: **ONDUCLAIR® THERMO** over composite
Standard sidesitch fastener



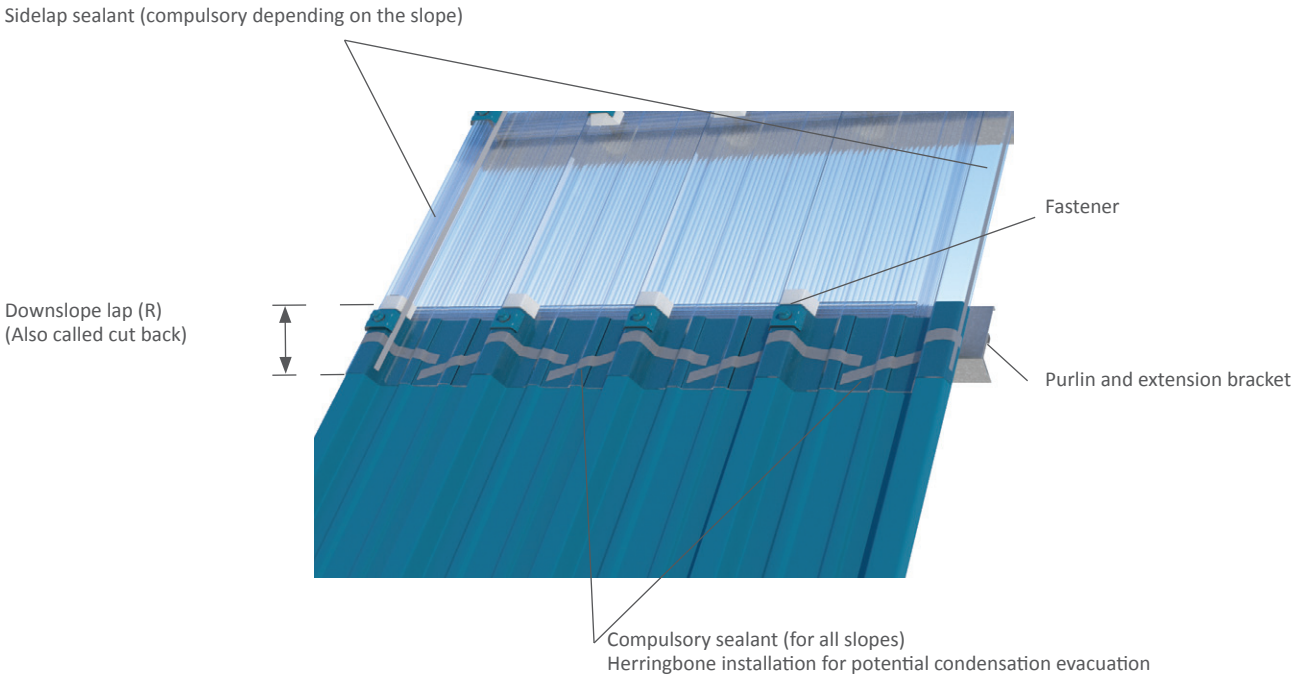
Slide lap: composite panel over **ONDUCLAIR® THERMO**
Grommet (expanding rubber fastener)

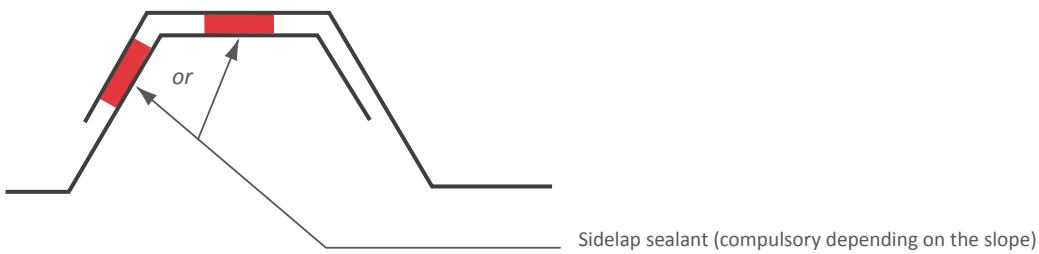
Slide lap: **ONDUCLAIR® THERMO** over **ONDUCLAIR® THERMO**
Grommet (expanding rubber fastener)



Sealing

Sealing accessories to use for connecting the **ONDUCLAIR® THERMO** panels together must meet the specifications of standard NF P30-305 (or the local standard in force), for example, 10 X 3 clear butyl (polyisobuthylene) preformed bands and be compatible with polycarbonate. The installation of sealant must be done on clean and dry surfaces at the locations shown in the sketch below.





➤ ROOFING IMPLEMENTATION

INSTALLATION DIRECTION

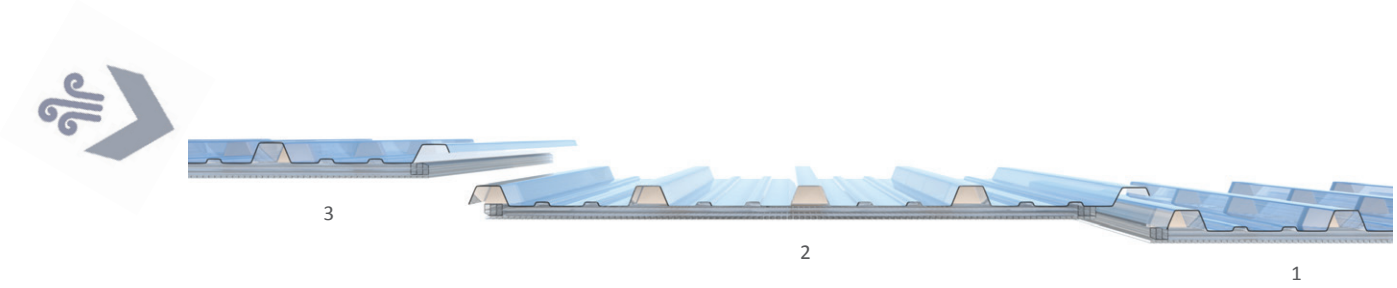
The minimum slope for the installation is 7%.
The installation is carried out with the ribs running down the slope of the roof.

Horizontal laying direction

Opposite direction of the prevailing wind. The panel to be installed covers, along the adjacent longitudinal edge, the panel installed previously.

Vertical laying direction

From the bottom up. The downslope lap (R) of the top panel covers the lower panel already installed.



DOWNSLOPE LAP BASED ON SLOPE

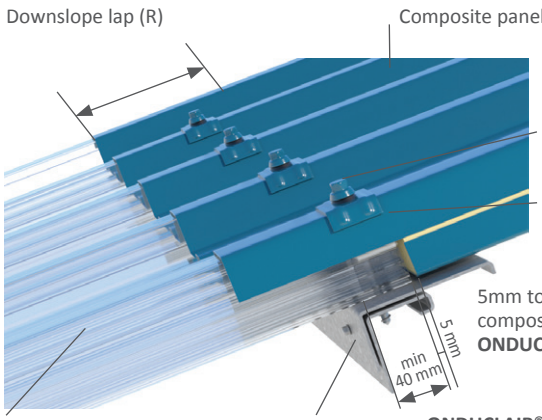
The downslope lap (cut back) will depend on the slope of the roof as well as on the climatic zone where the construction is located (see page 13).

Downslope lap

Transversal overlap (end lap or cut back) occurs over a support.
The minimum value of the end lap is a function of the slope (P) under the following conditions:
7% ≤ P < 35 %: 200 mm
P > 35 %: 150 mm

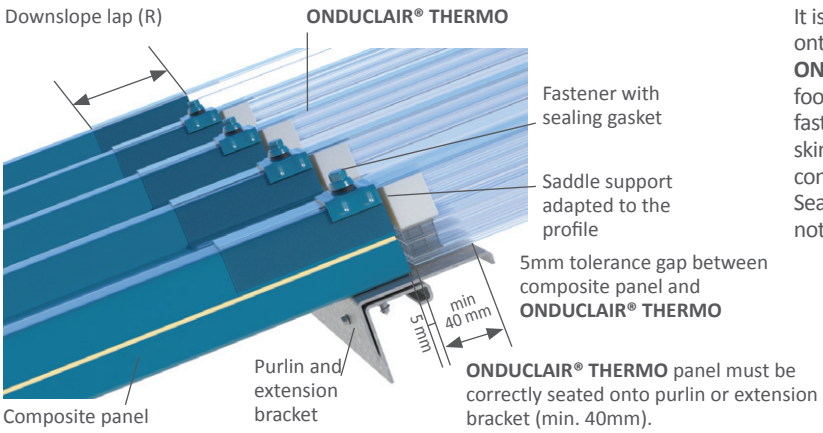
It is essential that **ONDUCLAIR® THERMO** panels have a secure footing onto the purlin (or extension bracket) at their ends, as specified in the details below.
In order to increase the daylighting area, it is possible to join **ONDUCLAIR® THERMO** panels together thanks to the possible side and end laps.
If the requested daylighting length (in the direction of the roof slope) is over 6,5 m, it should be divided in several **ONDUCLAIR® THERMO** panels with a length smaller than 6,5 m (and longer than 1 m) ensuring that the junction between the panels will be made over a support.

Composite panel over ONDUCLAIR® THERMO



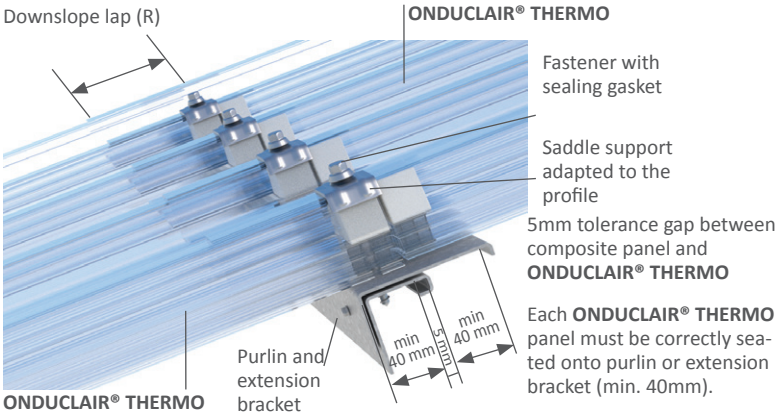
It is essential that both panels are correctly seated onto the purlin (or extension bracket).
ONDUCLAIR® THERMO panel must have a secure footing onto the purlin of min. 40 mm. Main fasteners must pass through the profile supports in underlapping **ONDUCLAIR® THERMO** panel.
Sealants which are not shown on the picture must not be forgotten (refer to «Sealants» part).

ONDUCLAIR® THERMO over composite panel



It is essential that both panels are correctly seated onto the purlin (or extension bracket).
ONDUCLAIR® THERMO panel must have a secure footing onto the purlin of min. 40 mm. Main fasteners must pass through the overlapping top skin of the **ONDUCLAIR® THERMO** panel into the composite panel.
Sealants which are not shown on the picture must not be forgotten (refer to «Sealants» part).

ONDUCLAIR® THERMO over ONDUCLAIR® THERMO



It is essential that both **ONDUCLAIR® THERMO** panels are correctly seated onto the purlin (or extension bracket), with a minimum secure footing onto the purlin of min. 40 mm at each end. Main fasteners must pass through the overlapping top skin of the **ONDUCLAIR® THERMO** panel and through the profile supports in underlapping **ONDUCLAIR® THERMO** panel.
Sealants which are not shown on the picture must not be forgotten (refer to «Sealants» part).

SEALING

- For watertightness: Transversal sealing (sealing at end laps) is compulsory whatever the slope. It must be installed in herringbone (zigzags) in order to allow the evacuation of potential condensation (see table P.13).
Longitudinal sealing (sealing at side laps) is strongly recommended in case of low slope, corrugation height smaller or equal to 35mm and in case of installation in exposed site (see table P.13).

- For airtightness: In case of continuous installation (**ONDUCLAIR® THERMO** panels combined together), the use of a sealant, cleverly positionned between the boxes, may be necessary in order to avoid thermal bridges. This sealants must be PVC-free.

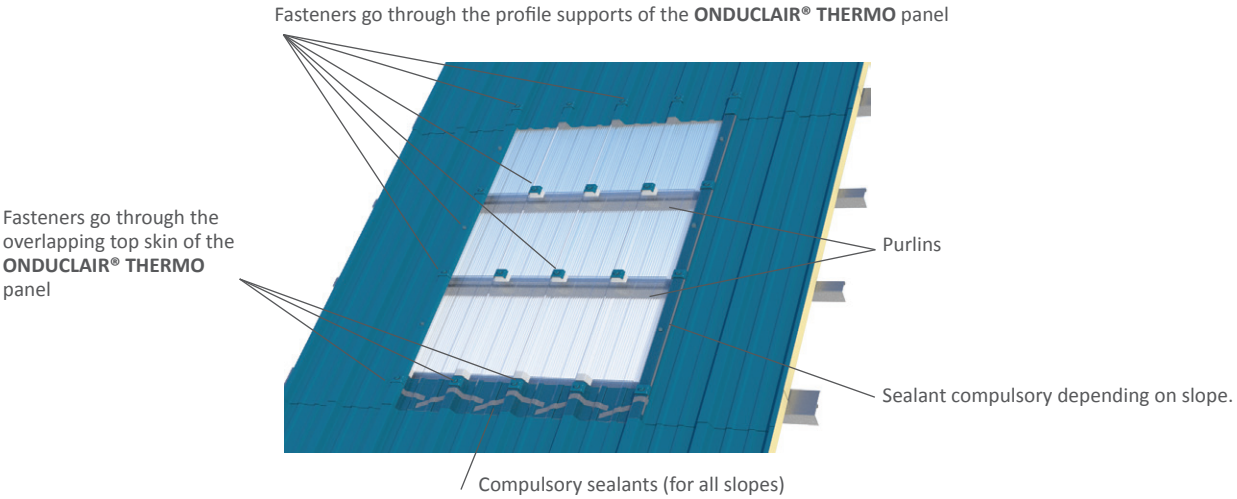
FIXING SPECIFICATION

Main fixings

The main fasteners are always located at the top of each rib and over each purlin.

The fasteners must go through the profile supports of the **ONDUCLAIR® THERMO** panels (or through the polycarbonate reinforcements located under the rib), excepted at the eaves, at the end lap between two **ONDUCLAIR® THERMO** panels and at the end lap when the **ONDUCLAIR® THERMO** panel is over the composite panel. It is absolutely forbidden to do any other fixing (or penetration) at a location which is not dedicated to this purpose.

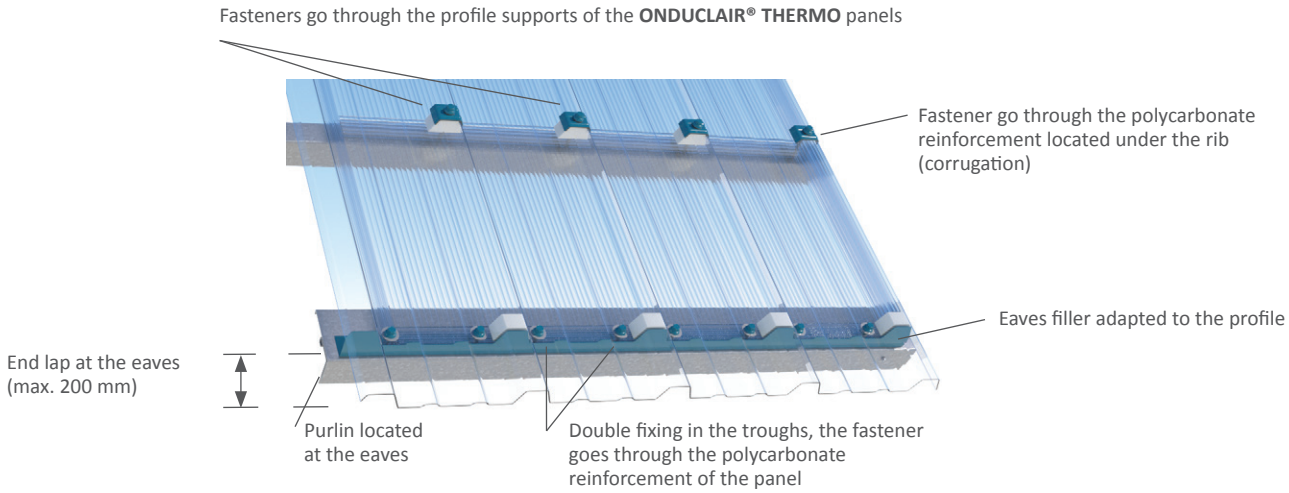
As well, excepting the panels featuring the Reinforced version, each transversal reinforcement of the **ONDUCLAIR® THERMO** panels must correctly seat on a purlin and be properly fastened.



Fastening at the eaves

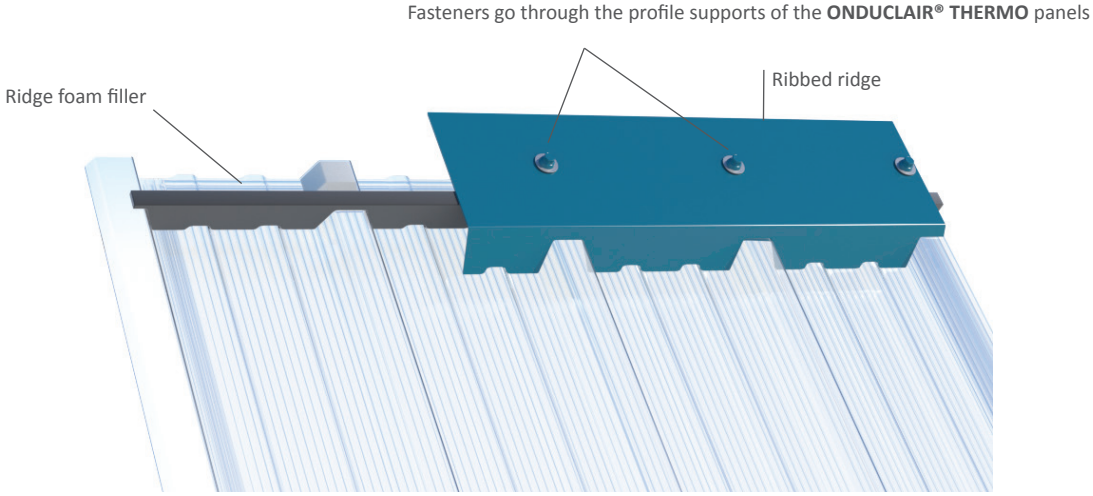
When **ONDUCLAIR® THERMO** panel is located at the eaves, the fasteners which are installed over the eaves purlin must be located in the troughs. 2 fasteners per trough must be installed as in the drawing below.

An eaves filler adapted to the profile and panel thickness must be installed in order to protect the lower edge of the **ONDUCLAIR® THERMO** panel. No external element (ie. gutters) can be fixed to and maintained by **ONDUCLAIR® THERMO** panels.



Fastening at the ridge

When **ONDUCLAIR® THERMO** panel is located at the ridge, the fasteners which are installed over the ridge purlin must go through the profile supports of the panel.
It is reminded that it is strictly prohibited to fasten any ridge element (fillers, ridge...) out of the profile supports which are dedicated for this.
Stitching or riveting ridge elements to the top skin of the **ONDUCLAIR® THERMO** panels is prohibited.
A ridge foam filler should be installed.



➤ 1200 JOULES IMPLEMENTATION

ONDUCLAIR® THERMO panels with Reinforced option successfully passed the large soft body impact test «1200 Joules» (in compliance with the XP P38-505 June 1998 standard method and with the INRS ND-1990-159-95 recommendations).
In order to be qualified as 1200 Joules, **ONDUCLAIR® THERMO** panels with Reinforced option have to be installed in accordance with the 1200 Joules certificate provided by the Apave (Notified Body) and available upon request to our Technical Department.

➤ CLADDING IMPLEMENTATION

SPECIAL USAGE CONDITIONS

Low end exterior protection
The illuminating parts whose base is located within 2 m of the floor must be protected by a device to avoid their possible deterioration.

Height of illuminating parts
The height of each illuminating band may not exceed the maximum length which is allowed by the local standards in force.

IMPLEMENTATION

ONDUCLAIR® THERMO panels are used in both vertical as well as inclined cladding. The installation is carried out with the ribs running down the slope of the roof, in the opposite direction of the prevailing wind.

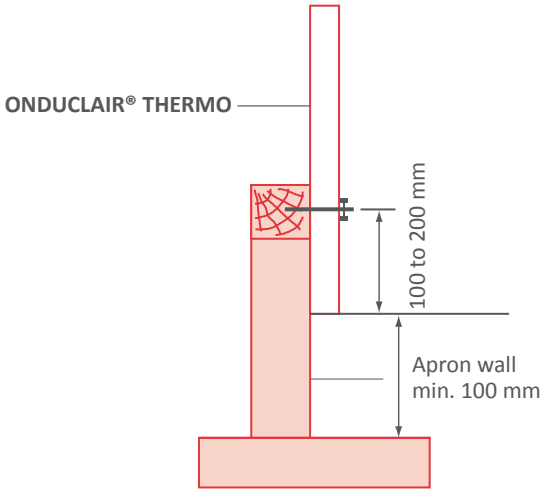
Downslope laps
The transversal overlaps (end laps) minimum length is 100 mm.

SPECIAL SPECIFICATIONS

Foot of cladding
Panels must not rest on the ground. Precautions will be taken to allow the evacuation of runoff and prevent its penetration inside the building. End laps at the extremities will be 200 mm maximum and 100 mm minimum in overlapping the apron wall (see sketch).

Miscellaneous connections
The V-cut and external angles, the acroterion apexes, the high and low head flashings are executed in parts shaped in accordance with local standards in force.

Expansion
The ends of the sheets must never be constrained. Leave a gap of 10 mm with sealing devices in connections with the high and low parts, with an allowance for thermal expansion.



➤ MAINTENANCE

Normal maintenance involves the periodic removal of leaves, grass, mosses and other deposits or foreign objects. Cleaning of the work done in **ONDUCLAIR® THERMO** panels can be done with cold water under low pressure. It is necessary to ensure the proper state of the building ventilation. If antifoam product or cleaning product is used, it must be chemically compatible with the **ONDUCLAIR® THERMO** panels. Do not use abrasives.

➤ TECHNICAL ASSISTANCE

Onduclair, a division of Onduline Group, has a Technical Service that can, at the request of the user, provide assistance in the study of a project. It is stipulated that the realization of works with **ONDUCLAIR® THERMO** panels must be done by companies that specialize in roofing-cladding work.

➤ SEALING AND DOWNSLOPE LAP

The table below defines the need for side lap sealing depending on the zone, the slope and the site (end lap sealing being compulsory whatever the site or the slope). It also defines the recommended minimum end lap lengths (downslope lap or cut back).
(Example: France)

SLOPE (%)	Minimum downslope lap length (cut back) (mm)	Zone 1 Normal protected sites	Zone 2 Normal protected sites	Zone 1 & 2 - Exposed sites Zone 3 - All sites
7≤P<20	200	Sealing compulsory	Sealing compulsory	Sealing compulsory
20≤P<25	200	Sealing compulsory	Sealing compulsory	Sealing compulsory
25≤P<35	200			Sealing compulsory
P>35	150			

➤ CLIMATIC ZONES

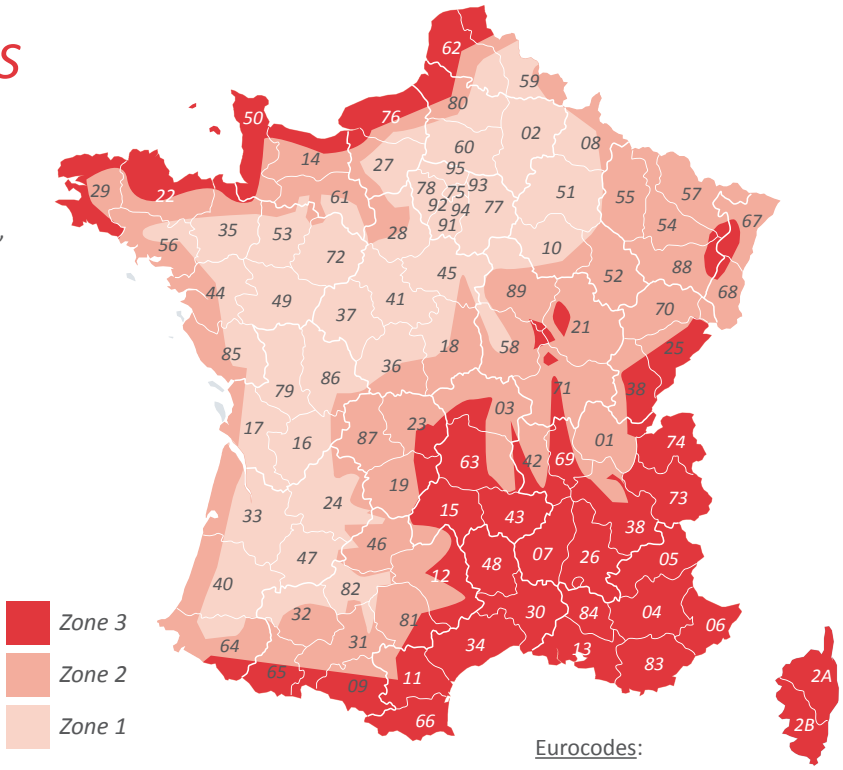
Exposed situation.
• *Close to the sea:*
The shoreline to a depth of about 5 km, the tops of cliffs, islands or narrow peninsulas, estuaries and bays that are deeply embanked and deeply cut into the land.

• *Within the country:*
Narrow valleys where the wind rushes, isolated and high mountains and some passes.

Snow and wind.
Refer to the local rules in force.

Following standards give means of calculating wind and snow loads.

France (NV65)
Austria (B4013)
Denmark (DS410.2)
Germany (DIN 1055)
The Netherlands (NEN 3850)
Norway (NS1-1991-1-4)
Czech Republic (CSN EN 1991-1-3, 1-4).

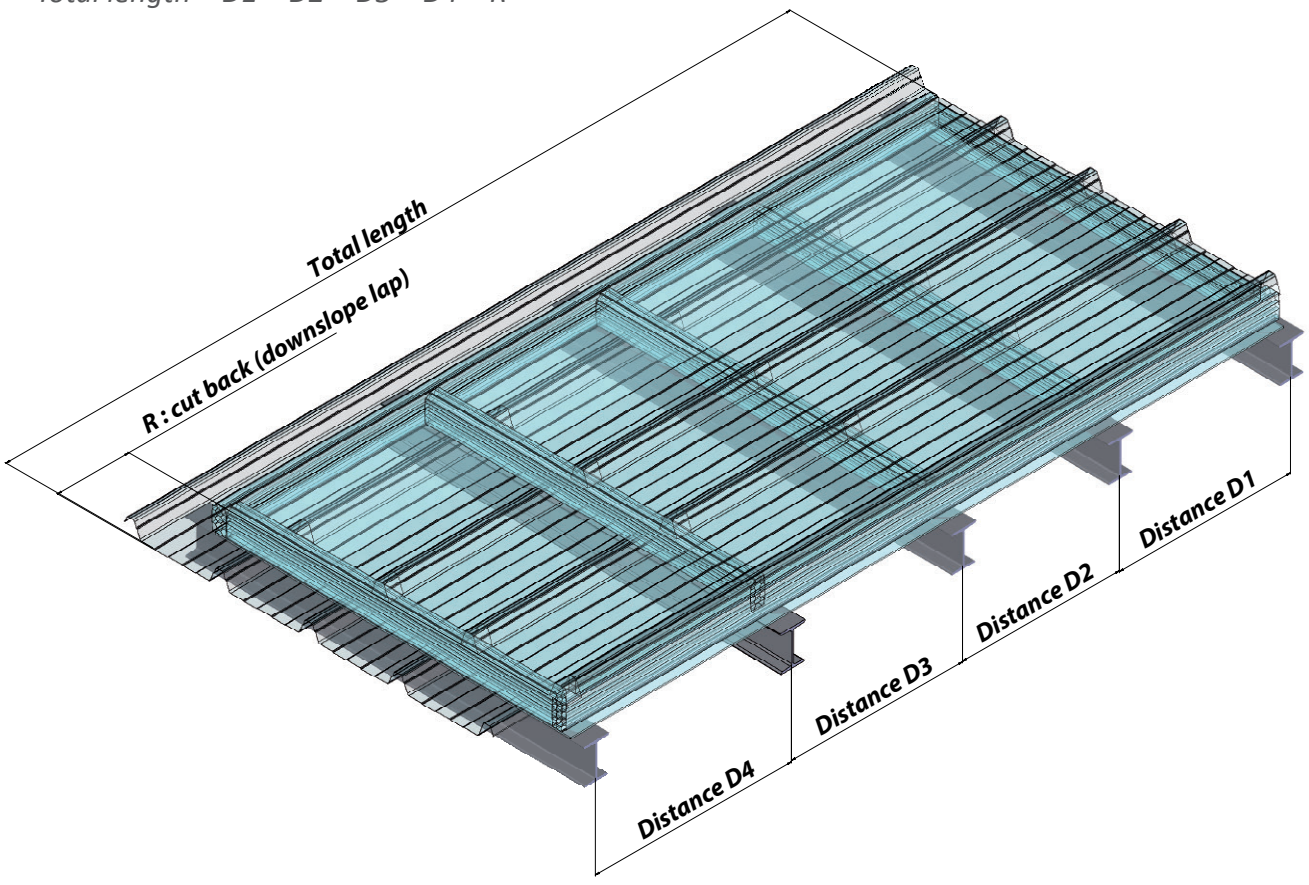


Eurocodes:
Snow: EN 1991-1-3
Wind: EN 1991-1-4.

The information contained in this Installation Guide is provided in good faith and cannot substitute for prevailing standards.

➤ DIMENSION-TAKING INSTRUCTIONS

In the example:
Total length = D1 + D2 + D3 + D4 + R



APPENDIX

Chemical characteristics:

ONDUCLAIR® PLR - Resistance to chemicals		
Chemical Media The designation of each product conforms to modern chemical terminology	**Maximum concentration** Shows the maximum % by weight for use at the temperature quoted. An empty box means that the product can be used pure or with any concentration when the nature of the solute is indicated (ex: A.S stands for Aqueous Solution)	**Maximum temperature of use in degrees centigrade** **A.T.** = Ambient Temperature corresponds to a permanent temperature of use of 25° C **N.R.** = Use is Not Recommended **Empty box = The chemical resistance has not been determined for the substance mentioned**
1,2,3,4-tetrahydronaphtalene		AT
2-Chloro-2-methylpropane		NR
2-methoxyethanol		AT
3-methyl-1-butanol		NR
Acetic acid A.S	10%	AT
	50%	NR
	80%	NR
Acetic acid Vapour	25%	
Acetic Acid Glacial		NR
Acetic anhydride		NR
Acetone (A.S-Pur)		NR
Adipic Acid A.S		TA
Aluminium sulphate A.S	100%	
Ammonia A.S	5%	NR
	10%	NR
	25%	NR
Ammonium carbonate A.S		NR
Ammonium chloride A.S	100%	
Ammonium fluoride	100%	
Ammonium hydrogen carbonate		
Ammonium nitrate A.S	45%	
Ammonium nitrate	100%	
Ammonium peroxodisulfate	25-100 %	
Ammonium sulphate A.S	25%	
Ammonium sulphate	100%	
Amyl acetate		AT
Aniline		NR
Aniline sulphate		100
Anthracene oil	6%	
Baryum hydroxide	saturated	
Beer (5%alcohol maxi)		AT
Benzaldehyde		NR
Benzene		NR
Benzenesulfonic acid		AT
Benzoic acid A.S		AT
Benzoyl chloride		AT
Benzoyl peroxide	50%	AT
Benzyl alcohol		
Benzyl benzoate		NR
Benzyl chloride		NR
Benzyl octyle adipate		NR
Bleach (javel water)		NR
Bleaching lye (10 % Cl actif)		NR
Boric acid A.S		AT
Brine		
Bromine		NR
Butan-1-ol		AT
Butanediol		AT
Butyric acid	50%	AT
Butyl acetate		AT
Butyl acrylate		AT
Butyrolactone		NR
Butyraldehyde		NR
Calcium chloride	100%	AT
Calcium hydroxide	saturated	
Calcium sulphate A.S		
Camphor oil		AT
Caprolactam A.S	40-80 %	NR
Carbon dioxide	100%	
Carbon disulphide		NR
Carbon tetrachloride liquid	pur	AT
Carbon tetrachloride vapor		
Chloric gas humid		
Chloric gas dry		
Chlorine dioxide		
Chloro-2-ethanol	100%	NR
Chloroacetic acid	85%	NR

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Chlorobenzene		AT
Chloroform		NR
Chloropropionic acid		NR
Choline chloride		
Chromic acid A.S	10%	AT
	40%	NR
Chromosulfuric acid A.S		NR
Citric acid A.S		AT
Copper chloride	100%	
Copper nitrate	saturated	
Copper oxychloride	20%	
Copper sulphate A.S	100%	
Cresol A.S	1%	NR
Crotonaldehyde		NR
Cyclohexane		AT
Cyclohexanol		AT
Cyclohexanone		=< AT
Cyclohexylamine		=< AT
D.D.T	2.5 %	
Dextrin A.S		AT
Di-(2-ethylhexyl)phthalate		
Di-(2-ethylhexyl)adipate		NR
Dibutyl phosphate		AT
Di-ethyl-ether		NR
Di isobutylene		AT
Di isopropylamine		NR
Di-n-butylamine		
Dichloro-1,4 butane		NR
Dichloroethane		NR
Dichloroethylene		NR
Diesel oil		
Diethanolamine		NR
Diethylamine	50%	NR
Diethylene glycol		AT
Diethylphthalate		AT
Dimethylamine	100%	NR
Dimethylsulphate		NR
Dimethylphthalate		AT
Dioxanne		NR
Disodium tetraborate A.S	saturated	
Epoxy resin		AT
Essential oil		AT
Ethanol A.S	20%	AT
	50%	NR
Ethanol		NR
Ethanolamine A.S		NR
	35%	NR
Ethyl acetate		NR
Ethyl chloride		NR
Ethylamine	35%	NR
Ethylbenzene		AT
Ethylene chloride		NR
Ethylene diamine	70-90 %	NR
Ethylene glycol		AT
Ethylene glycol acetate		NR
Ethylhexanol		AT
Formaldehyde A.S	25%	AT
	35%	AT
Formamide		AT
Formic acid A.S	30%	AT
	50%	NR
Fruit juice		
Furfuryl alcohol		NR
Gasoline		
Glucose A.S	100%	NR
Glutaraldehyde		AT
Glycerol	75%	
Glycerol triacetate		AT
Glycol		AT
Grease		
Heptane		AT
Heptane vapor		
Hexane		AT
Hydrazinium hydroxide	20%	

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Hydrobromic acid A.S	10%	AT
	47%	NR
Hydrochloric acid		
Hydrofluoric acid A.S	10%	NR
(no glass on surface)		
(no thixotropic resin)	40%	NR
Hydrogen gas	100%	
Hydrogen peroxide	60%	NR
Iron chloride A.S	pur	
	25%	
Isoamyl acetate		AT
Isopropanol		AT
Isopropylamine	50%	NR
Kerosine		AT
Labarraque's solution		NR
Lactic acid A.S	10%	AT
	80%	NR
Latex dispersion (60 %)		NR
Lead acetate A.S		
Linseed oil		AT
Liquid soap		
Lubricating oil		
Machine oil		AT
Maleic acid A.S		NR
Margarin		AT
Melamine		AT
Mercaptoacetic acid	80%	NR
Mercury		AT
Methanol		NR
Methyl acrylate		NR
Methylene chloride		NR
Methylethylketone		NR
Methylisobutylketone		NR
Methylmethacrylate		NR
Milk		AT
Mineral oil		AT
Molasse		AT
N-butylamine	50%	NR
N-propylamine	50%	NR
Naphthalene		
Nitric acid	30%	NR
	30-50 %	NR
Nitric acid vapour	5%	
Octane		AT
Oil (extra light)		AT
Oil with methanol and aromatichydrocarbons.		NR
Oleic acid		40
Oleum		NR
Organic detergent (pH8-10-11)		
Oxalic acid A.S		40
Ozone		
Palmitic acid		40
Paraffin oil		40
Pentan-1-ol		
Perchlorethylene		AT
Perchlorethylene vapour	100%	
Perchloric acid A.S	20%	AT
Petroleum crude		AT
Phenol A.S	1%	NR
Phenolsulphonic acid A.S	70%	NR
Phosphoric acid A.S	100%	AT
Phthalate esters		AT
Phthalic acid		AT
Phthalic anhydride		
Picric acid A.S	10%	NR
Polyester resins		AT
Polyvinyl joiner's glue		AT
Potassium chloride A.S	100%	
Potassium cyanide		40
Potassium hexacyanoferrate	100%	
Potassium hydrogencarbonate	10-100 %	
Potassium hydroxide A.S	20%	NR
	40%	NR
Potassium nitrate	100%	

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Potassium permanganate A.S		NR
Potassium peroxodisulfate		NR
Potassium silicate		AT
Propane-1,2 diol		
Propionaldehyde		NR
Propionic acid		NR
Pyridine		NR
Rhodoviol	100%	
Salicylaldehyde		NR
Salicylic acid A.S		NR
Salt solutions		NR
Silicone (grease-oil)		40
Sodium carbonate A.S		NR
Sodium chloride		
Sodium hydroxide A.S	10%	NR
	40%	NR
Sodium hydroxide	conc.	NR
Sodium hypochlorite	12%	NR
Sodium nitrate		
Sodium peroxide A.S		NR
Sodium silicate		AT
Solid iodine (adhesive)		NR
Sorbitol A.S		NR
Starch A.S		NR
Stearic acid		40
Styrene		AT
Succinic acid A.S		NR
Sugar		AT
Sulphonate de vinyle		25
Sulphur dioxide	100%	
Sulfuric acid A.S	60%	NR
	60-70 %	NR
Sulfuric acid A.S vapour	80%	
Tartaric acid A.S		NR
Tetrachloroethylene		AT
Tetrahydrophthalic acid		
Tetrahydrofuran		NR
Thyonil chloride		NR
Toluene		AT
Toluenesulphonic acid	65%	NR
Tri-n-propylamine		
Tricresylphosphate		AT
Trichlorethylphosphate		AT
Trichlorethylene		NR
Trichloroacetic acid	85%	NR
Trichloroethane		NR
Triethylamine A.S	50%	
Trimethylamine A.S		
Turpentine oil		AT
Urea A.S		AT
Urine (fresh)		AT
Vegetable mould		AT
Vegetale oil		AT
Vinyl chloride		NR
Vinyl propionate		NR
Vinyl polyacetate		
Vinylidene chloride		NR
Water pure		AT
Water sea (salt water)		NR
Water swimming pool		NR
Wine		AT
Xylene		AT

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