ONDUCLAIR® PROTECT

Opaque single-skin roofing and cladding system in Glassfibre Reinforced Polyester

INSTALLATION GUIDE

Chemical protection

Fire rating

Thermal stability

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Onduline®

ONDUCLAIR® PROTECT

ONDUCLAIR® PROTECT sheets are made of specific polyester resin reinforced with fibreglass (GRP sheets - thermosetting resin).

ONDUCLAIR® PROTECT sheets are designed for roofing and cladding (flat or curved) for any type of buildings. They are specifically adapted to industrial applications as they resist to chemicals, to extreme temperature swings and to corrosive atmospheres.

Summary

DESCRIPTION

BASIC MATERIALS

ONDUCLAIR® PROTECT sheets, made of specific synthetic resins reinforced with fibre glass and gelcoated on both sides, are offered in two finishes:

- ONDUCLAIR® PROTECT C&FR (Chemical & Fire Resistant): opaque composite sheets with exceptionnal resistance to chemicals and first class fire rating. Unique thickness of 1,45 mm.

- ONDUCLAIR® PROTECT CR (Chemical Resistant): opaque or translucent composite sheets with exceptionnal resistance to chemicals and standard fire rating. Two thicknesses available: 1,3 and 1,7 mm.

APPLICATION

ONDUCLAIR® PROTECT sheets are designed for roofing and cladding (flat or curved). They can be used for all types of low or medium hygrometry 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.

ONDUCLAIR® PROTECT sheets are particularly adapted to corrosive atmospheres (internal or external).

CHARACTERISTICS

Appearance characteristics: ONDUCLAIR® PROTECT sheets come with the following features:

Standard colours	
Light Ivory (RAL 1015)	Pure White (RAL 9010)
Grey Blue (RAL 5008)	Basalt Grey (RAL 7012)
Reseda Green (RAL 6011)	Light Grey (RAL 7035)
Red Brown (RAL 8012)	Anthracite Grey (RAL 7016)
Off-White	Petrol Blue
Light Grey	

Other colours upon request

Light colour variations may appear from one production to another, this is why it is advised no to divide orders which are dedicated to a specific project. Moreover, opacity may be different depending on the thickness and cannot be guaranteed for some colours or thicknesses.

Dimensional characteristics
(According to EN-1013 standard)

Cover width tolerance	+/- 0,8 %
Corrugation height tolerance	+/- 2 mm
Average thickness tolerance	+/- 10 %
Length tolerance	< 2.50 m - 0 + 20 mm > 2.50 m - 0 to + 0,8%

General characteristics

	ONDUCLAIR® PROTECT CR	ONDUCLAIR® PROTECT C&FR
Density	1,64 g /cm³	1,58 g /cm³
Projected m² density: - average thickness 1,3 mm - average thickness 1,7 mm - average thickness 1,45 mm	 1,91 Kg 2,62 Kg	 1,91 Kg
Water absorption	<0,6mg/cm²	
Water vapour permeability	1,5 x 10^{-5} mg/(m.h.Pa)	
Modulus of elasticity in flexion	78 000 daN/cm²	70 000 daN/cm²
Linear expansion coef. at ambient T°	2,8 x 10^{-5} m/m°C	
Thermal conductivity coef.	0,16 W/m.K	
Fire classification	Euroclass E	Euroclass B-s3,d0
Resistance to hail (thick. ≥ 1,3 mm)	75 m/sec	
Service temperature	-30°C to +120°C	
Marking/Traceability	Ink-printing	

Chemical characteristics

ONDUCLAIR® PROTECT sheets have very good resistance properties to chemical attacks, especially with most of acids.
Refer to the table in annex 1.

IMPLEMENTATION - GENERAL

PRINCIPLE

ONDUCLAIR® PROTECT sheets will be installed in accordance with the local standards in force as well as good practice.
On roofs, the sheets will always be installed with the ribs running down the slope of the roof. The parts whose base is located within 2 m of a floor must be protected by a device to avoid their possible deterioration.

ACCIDENT PREVENTION

The implementation of **ONDUCLAIR® PROTECT** sheets requires compliance with the local Health and Safety regulations for access to lightweight material roofs in force.
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® PROTECT** sheets cannot on their own act as a parapet wall. Protective devices must be installed according to the standards in force.

U.V. AND CHEMICAL PROTECTION

ONDUCLAIR® PROTECT sheets have a double sided protection to chemicals and UV.

FIRE SAFETY

ONDUCLAIR® PROTECT sheets are used in different categories of premises while complying with potential implementation and sizing rules established by the regulations in force. It is the user's responsibility to ensure that the fire classification of the product is complying with the classification requested for the building.

IMPACT RESISTANCE IN SPORT FACILITIES

ONDUCLAIR® PROTECT sheets have a great resistance to impacts outdoors as well as indoors without protective net (thicknesses ≥ 1,3mm).
However, in specific cases, the use of a protective net may be necessary in order to avoid the degradation of the material due to intensive shocks.
In order to avoid incipient cracking at the location of the fixings due to the frequency and intensity of the shocks from balls, the installation of a stretched protective net between the posts is recommended. This precaution is essential if tennis is practiced.

STORAGE

Storage of packages of **ONDUCLAIR® PROTECT** sheets 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.

PRECONDITIONS REQUIRED FOR INSTALLATION

General conditions

Minimum slopes are directly given by the metal or wood load-bearing framework. They are prescribed in the paragraph «Roofing implementation» (page 7). 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® PROTECT sheets do not contribute to the general stability of buildings and 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 of the supports

For open or hollow steel profiles:
- minimum width: 40 mm
- minimum thickness: 1,5 mm

For wooden purlins or ribbon strips:
- minimum width: 60 mm
- minimum anchorage height: 50 mm.

Spans and working loads

Please refer to the technical data sheets available upon request to our Technical Service (example in appendix).
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 allowed spans are limited following the French DTU 40-35: maximum span 1500mm and destruction safety margin greater than or equal to 3.
- The calculated spans have to be adapted to the norms and rules in force at the location of the building.

Tools

Drilling

Drilling at the location of the fixings is made with a centre drill or with a self-drilling screw. **ONDUCLAIR® PROTECT** must be drilled on the top of the corrugation, rib or trough (stitching) and always at a minimum distance of 50 mm from the sheet edge. A deburring and dust removal must be performed to remove the shavings that could impede the proper application of the bonded washer.

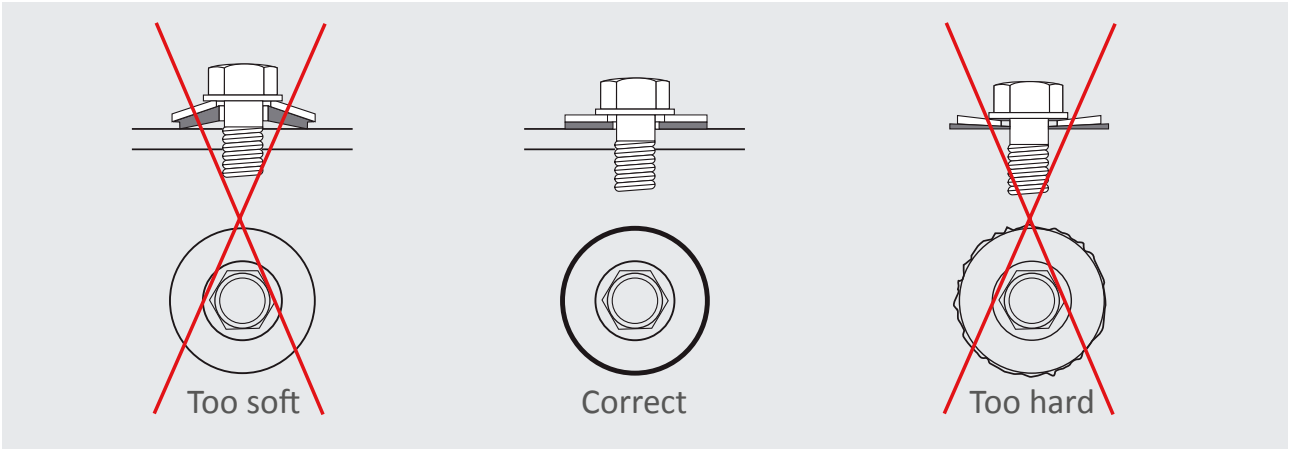
Sawing

ONDUCLAIR® PROTECT sheets can be cut with a separating disc or a fine tooth saw (5 teeth/cm).

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 sheets. The use of gun-nailing and riveting is prohibited.

Example of fastening



Refer to the installation instructions at the end of the Installation Guide.

Penetrations

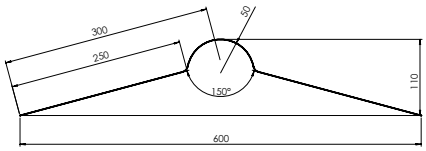
Any penetration (tubes, chimney vent, lifeline supports etc.) through **ONDUCLAIR® PROTECT** sheets is prohibited.
Cross-section stringers may be compulsory.

SPECIAL CONNECTION PARTS

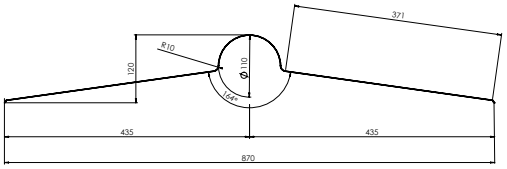
The ridge caps, edge protectors, roofing penetrations, etc., will be carried out using shaped parts in compliance with the local rules in force and will have to be adapted to the corrosivity of the environment.
These accessories will be installed in compliance with local rules and in a way that will avoid any wind pressure that could tear the sheets off.
Gutters cannot be fastened to **ONDUCLAIR® PROTECT** sheets.

Onduclair offers 3 types of polyester ridges:

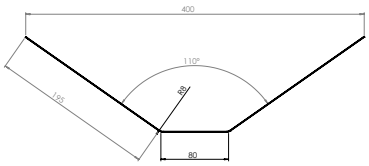
Roll-top ridge 300 (standard length of 3m)



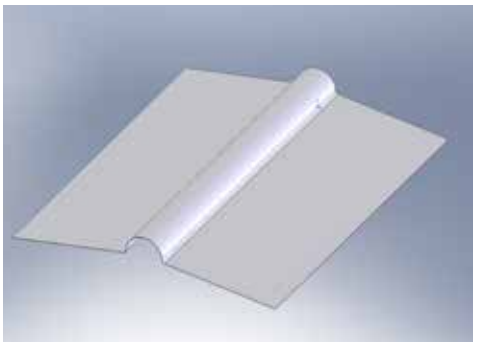
Roll-top ridge 400 (standard length of 3m)



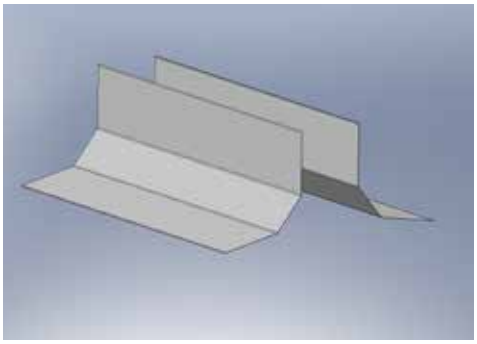
Ventilated ridge (standard length of 3m)



Roll-top ridge



Ventilated ridge



Consult us for availabilities and minimum order quantities that may be required to launch a production.

FIXING ACCESSORIES

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,
- Mechanical resistance.

The main fasteners are always located at the top of each corrugation or rib and at each purlin or strip.

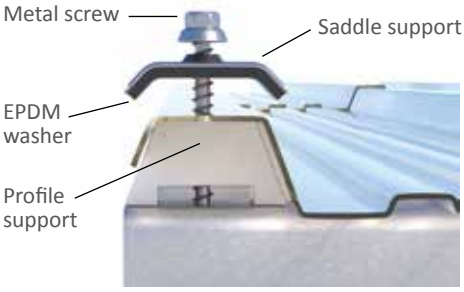
The side lap stitchings are made at the top of the longitudinal corrugation or rib overlap (side lap):
- at mid-span for types G.O. (177/51), P.O. (76/18) and GRECA,
- with a maximum spacing of 500 mm for ribbed technical profiles (ie. Nervesco 1000).

Types of fixings

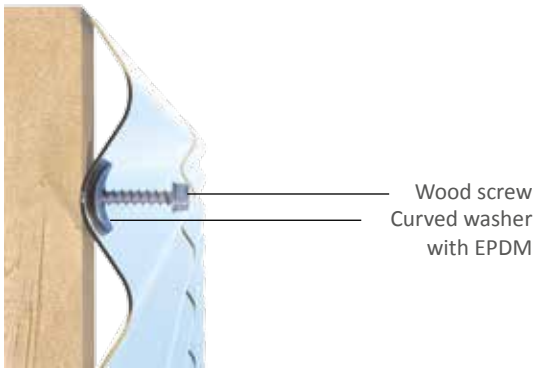
Main fixings

To be defined according to the manufacturer's requirements.

Example of fastening with a metal screw on a steel purlin (in roofing)



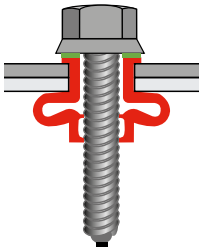
Example of fastening with a wood screw on a wooden support (wall cladding)



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.

Example: expanding rubber grommet fastener, diam. 9/25 mm, with screw diam. 5 mm.



Sealing

Sealing (waterproofing) accessories to use for connecting **ONDUCLAIR® PROTECT** sheets together must comply with local specifications in force. For example type polyisobuthylene (butyl) preformed bands.
The installation of sealant must be done on clean and dry surfaces.

ROOFING IMPLEMENTATION

INSTALLATION DIRECTION

The installation is carried out with the ribs (or corrugations) running down the slope of the roof (longitudinal and transversal overlaps).

Horizontal laying direction

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

Vertical laying direction

From the bottom up. The downslope lap (cut back) of the top sheet covers the lower sheet already installed.

Install the sheets from the eaves to the ridge, starting from the opposite direction of prevailing winds.

FIXING SPECIFICATION

Main fasteners

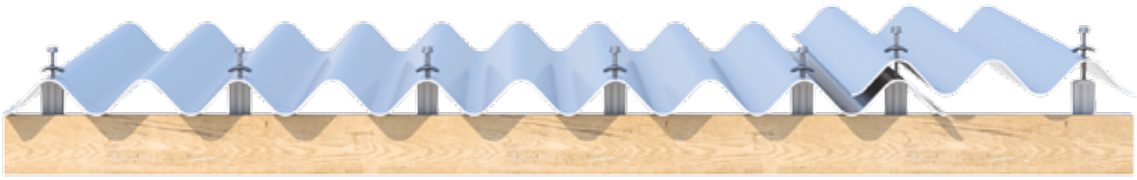
In roofing: the fixings must include following accessories (waterproofing and loads distribution):

- Sealing washers.

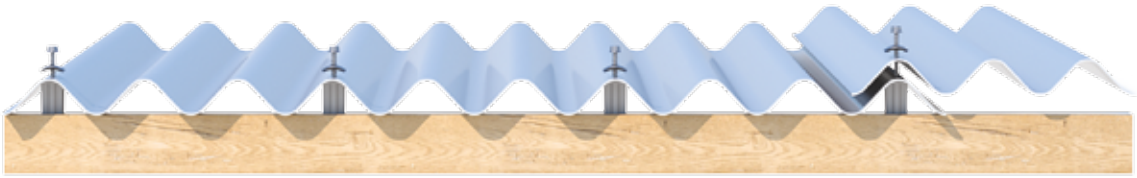
- Saddle supports or curved washers adapted to the profile, in galvanized steel, prelacquered, in aluminum or stainless steel, depending on the site corrosivity.

Examples

Onduline95 profile



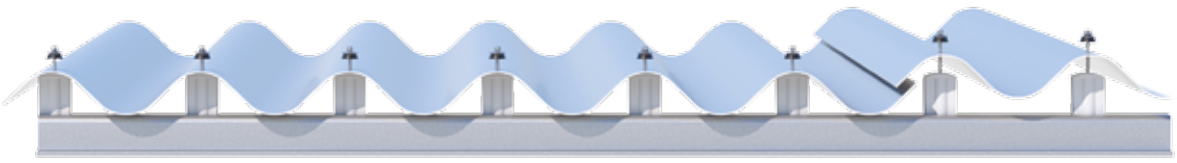
One fastener each two corrugations at the top and the bottom of the sheet plus one fastener at sidelap.



One fastener each three corrugations at each intermediate support (purlin) plus one fastener at sidelap.

GO (177/51) profiles

- At the eaves

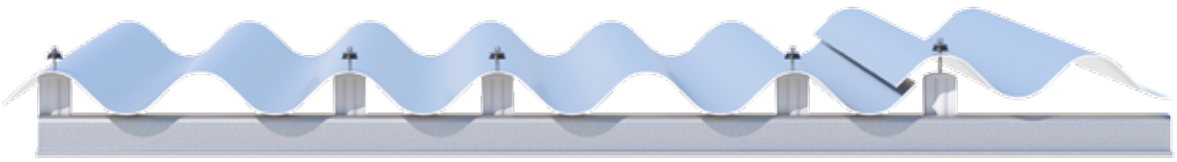


The fasteners must be installed on each corrugation top at the eaves (this is valid for both profiles: GO110 - 177/51 and GO92 - 177/51 with 6,5 and 5,5 corrugations).

- In the slope of the roof, at intermediate supports (the location of the fixings will depend on the width of the profile so as on the sidelap).

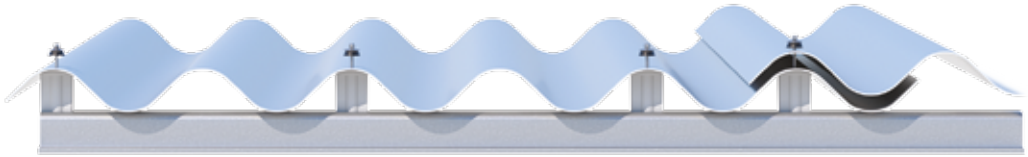
GO110 profile (177/51 with 6,5 corrugations)

- GO110 profile installed with a half-corrugation sidelap (normal site):



Fasteners are located on the top of the 1st, 3rd, 4th and 6th corrugations.

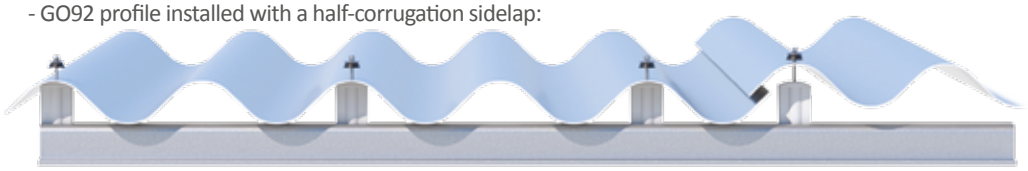
- GO110 profile installed with a corrugation and a half sidelap (exposed site):



Fasteners are located on the top of the 1st, 3rd and 5th corrugations.

GO92 profile (177/51 with 5,5 corrugations)

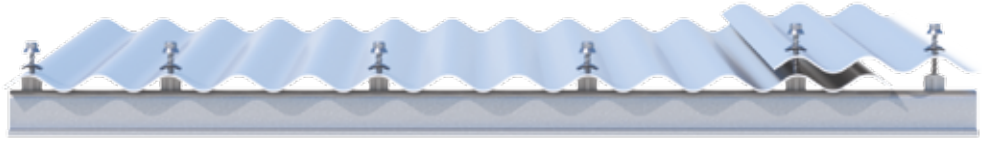
- GO92 profile installed with a half-corrugation sidelap:



Fasteners are located on the top of the 1st, 3rd and 5th corrugations.

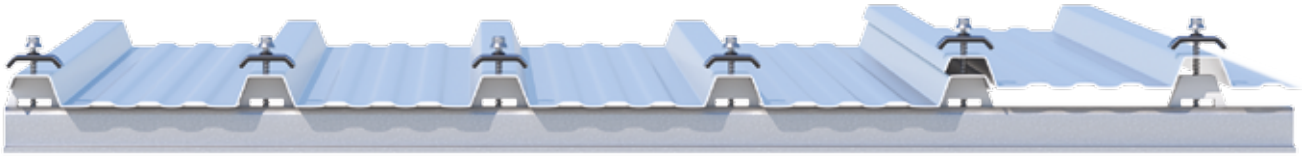
PO112 profile (76/18)

- PO112 profile installed with two corrugations sidelap:



Fasteners are located on the top of the 1st, 3rd, 6th, 9th and 12th corrugations.

Ribbed technical profiles in roofing installation



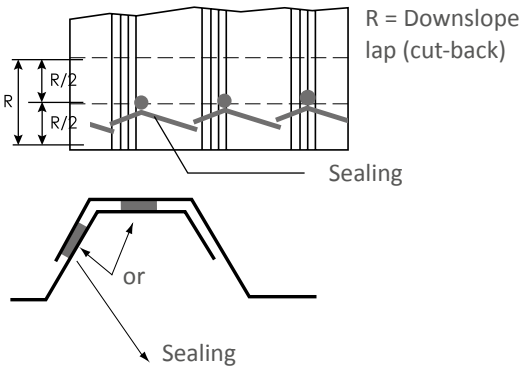
Main fasteners are always located on the top of each rib (corrugation) and on each support (purlin).

Side lap stitching

The side lap stitchings are made at the top of the longitudinal corrugation or rib overlap (side lap):
- at mid-span for types G.O. (177/51), P.O. (76/18) and GRECA,
- with a maximum spacing of 500 mm for ribbed technical profiles (ie. Nervesco1000), cleverly distributed between the main fixings.

SEALING

Transversal (sealing at end laps) and longitudinal (sealing at side laps) sealing is mandatory for slopes less than or equal to 25% for all the profiles (even when installation direction respects the prevailing wind).
Transversal (sealing at end laps) sealing is made over the support at around 30 mm under the fastener's line and must be installed discontinuously, in a herringbone installation (zigzags), in order to allow potential condensation evacuation, particularly in case of insulated roofing.
Longitudinal (sealing at side laps) sealing is compulsory for profiles G.O. (177/51), P.O. (76/18) and GRECA. For the ribbed technical profiles, transversal sealing is made depending on the zone, slope and site (refer to local snow and wind standard).



LONGITUDINAL OVERLAP

The longitudinal overlap (side-lap) is always made in the opposite direction of the prevailing wind.
- Profile G.O. (177/51): normal or protected site = half corrugation, exposed site = one and half corrugation.
- Profile P.O. (76/18): two corrugations in all situations.
- Profile GRECA: two ribs in all situations.
- Ribbed technical profiles: one rib.

TRANSVERSAL OVERLAP

The transversal overlap (downslope lap) is made over the support. Its minimum length is depending on the profile, the slope and the climatic zone.

PROFILE TYPE	Slope %	Transversal overlap (mm) Zone 1 Normal protected sites	Transversal overlap (mm) Zone 2 Normal protected sites	Transversal overlap (mm) Zone 1 & 2 - Exposed sites Zone 3 - All sites
G.O. (177/51) (sealing)	9 to 31	200	200	200
	> 31	140	140	140
P.O. (76/18) (sealing)	25 to 29	130	140	140
	30 to 39	110	130	130
	40 to 49	100	120	130
	> 49	100	110	120
GRECA (sealing)	15 to 19	200	200	-
	20 to 30	200	200	200
	>30	150	150	150
RIBBED TECHNICAL PROFILES	7 to 35	200	200	200
	>35	150	150	150

The table below defines the need for sealing (example: France)

SLOPE (%)	Minimum transversal overlap (mm)	Zone 1 Normal protected sites	Zone 2 Normal protected sites	Zone 1 & 2 - Exposed sites Zone 3 - All sites
7≤P<20	200	Yes	Yes	Yes
20≤P<25	200	Yes	Yes	Yes
25≤P<35	200			Yes
P>35	150			

Exposed situation

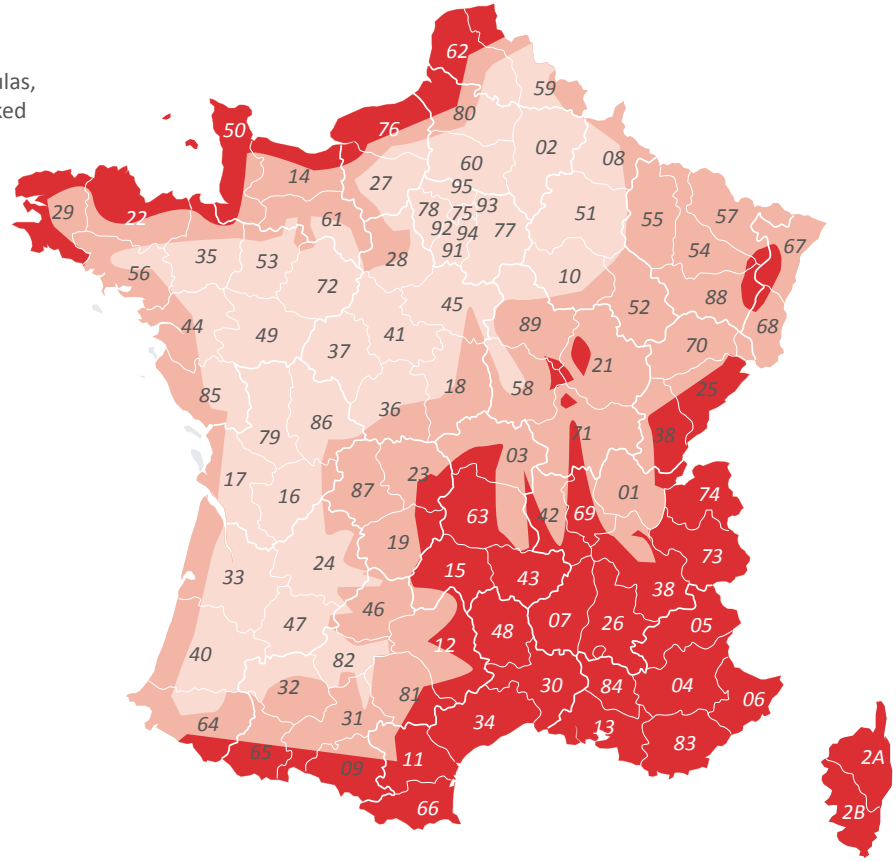
• *Close to the sea:*
The shoreline to a depth of about 5 km, the tops of cliffs, islands or narrow peninsulas, estuaries and bays that are deeply embanked and deeply cut into the land.

• *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 (DTU-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).



Zone 3
Zone 2
Zone 1

Eurocodes:

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

The information contained in this Installation Guide cannot substitute for prevailing standards.
Illustrative map.

CLADDING IMPLEMENTATION

INSTALLATION DIRECTION

The installation is carried out with longitudinal and transversal overlaps.

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

Vertical laying direction
From the bottom up. The downslope lap (cut back) of the top sheet covers the lower sheet already installed.

FIXING SPECIFICATION

Main fasteners

In wall cladding: the fixings must include following accessories (waterproofing and loads distribution):
- Sealing washers.
- Saddle supports or curved washers adapted to the profile and to the type of installation, in galvanized steel, prelacquered, in aluminum or stainless steel, depending on the site corrosivity.

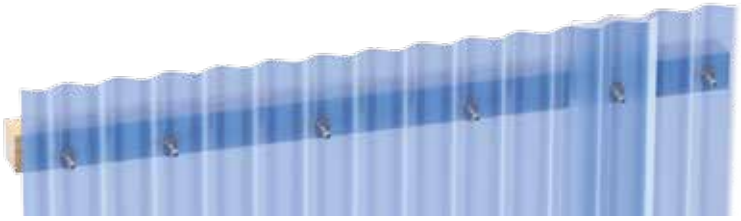
Before installing the sheets in cladding, it is advisable to realise a prior marking of the fixing points with usual building tools (plumb line, laser, gauge...). In some cases, a mixted installation with profile supports located at each sheet side lap (longitudinal overlap) is advised.
If the use of an anchored to the wall scaffolding is necessary, **ONDUCLAIR® PROTECT** sheets which are located at the anchoring points will have to be installed later with the use of a gondola, once the scaffolding is removed. Surrounding **ONDUCLAIR® PROTECT** sheets will be temporarily fixed so as to avoid any wind pressure that could tear them off.

Side lap stitching

The side lap stitchings are made at the top of the longitudinal corrugation or rib overlap (side lap):
- at mid-span for types G.O. (177/51), P.O. (76/18) and GRECA,
- with a maximum spacing of 500 mm for ribbed technical profiles (ie. Nervesco1000), cleverly distributed between the main fixings.

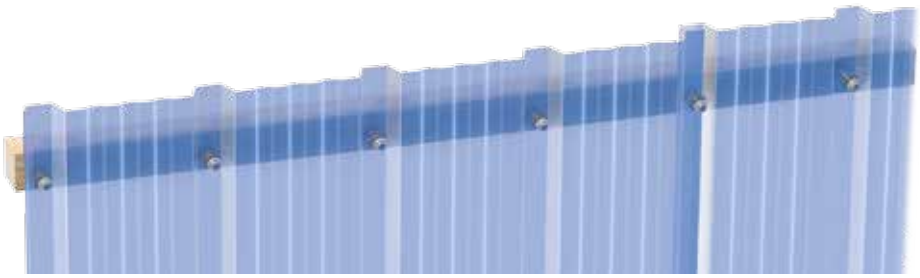
Examples

Profil PO112 (76/18): cladding installation with a two corrugations sidelap



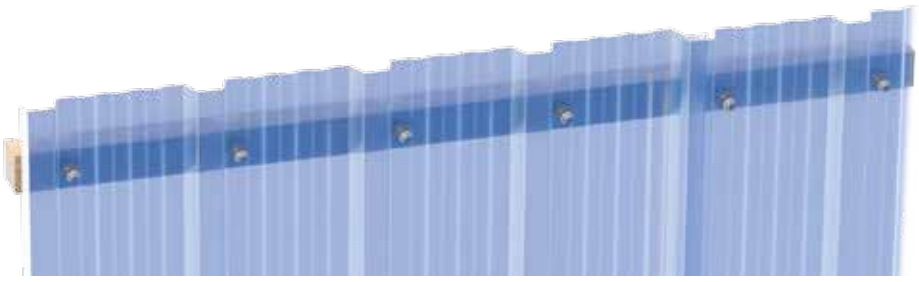
Fasteners are located in the 1st, 3rd, 6th, 9th and 12th corrugations troughs.

Ribbed technical profiles in cladding installation (corrugation crowns facing the wall)

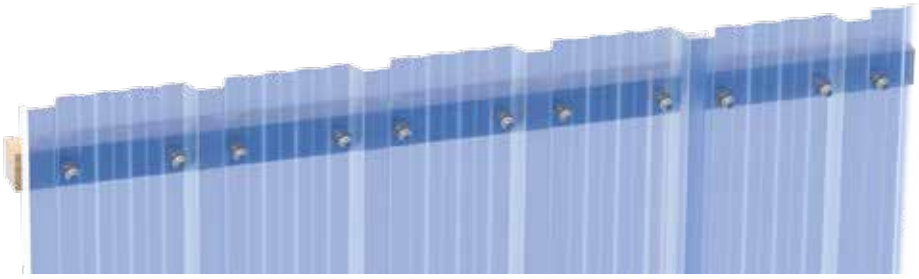


Installation in the rib (or corrugation) trough (one fastener per trough).

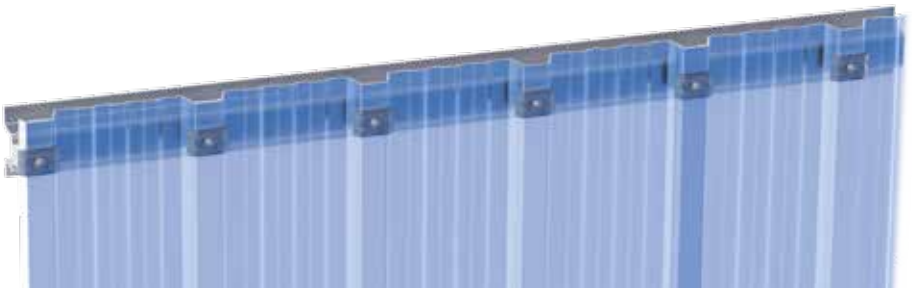
Ribbed technical profiles in cladding installation (profiles also suitable for roofing)



Installation in the profile trough (normal site: one fastener per trough).



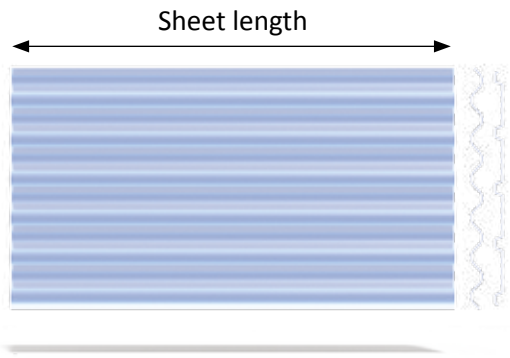
Installation in the profile trough (exposed site: two fasteners per trough).



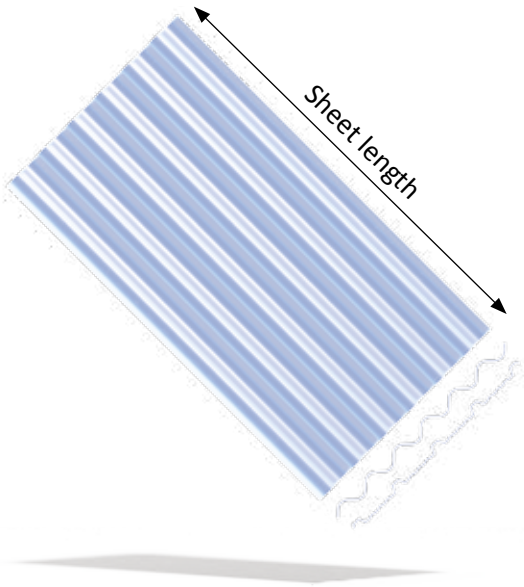
Fixing on the top of the rib (corrugation)

Positionning of the sheets : general installation principles

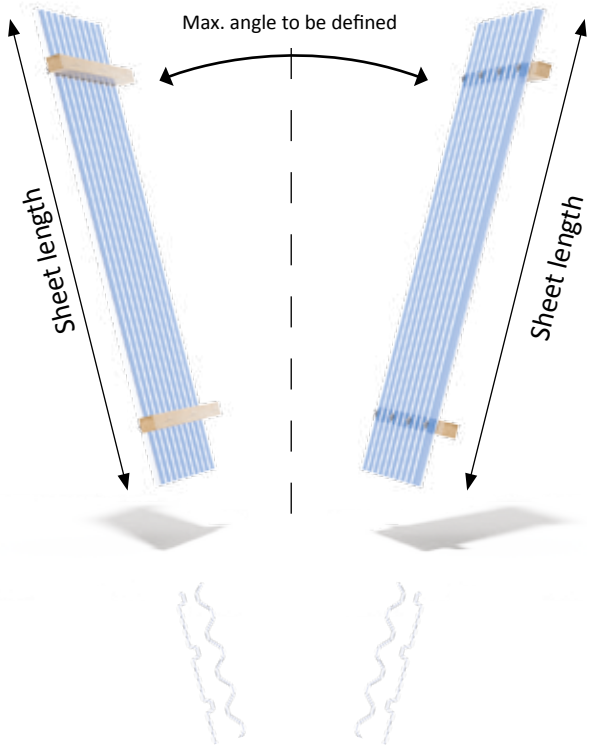
Horizontal installation



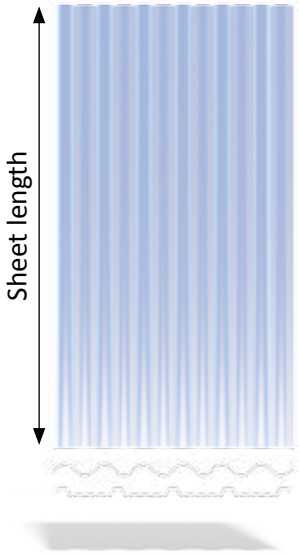
Oblique installation



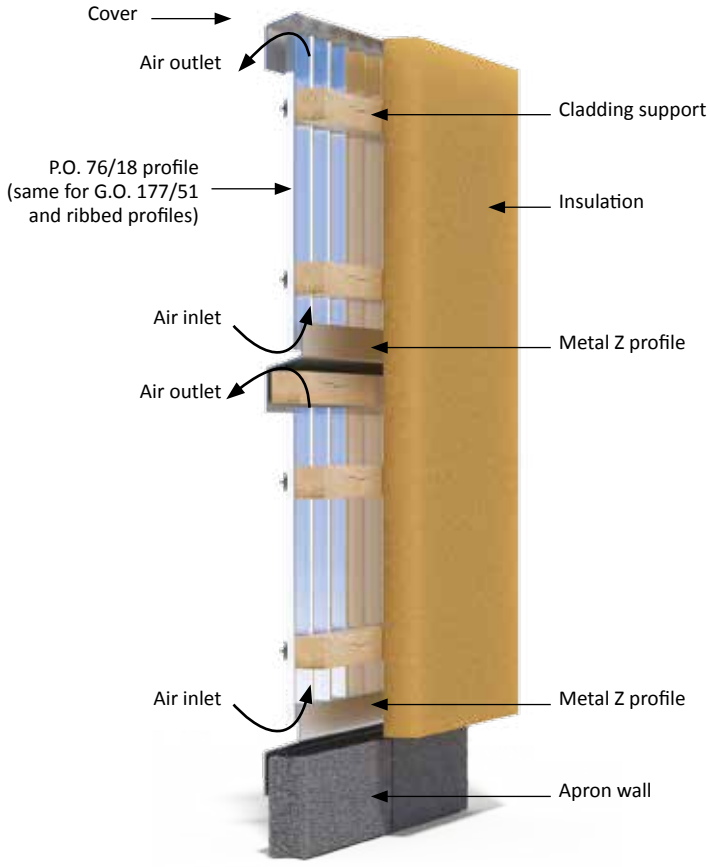
Sloping installation



Vertical installation

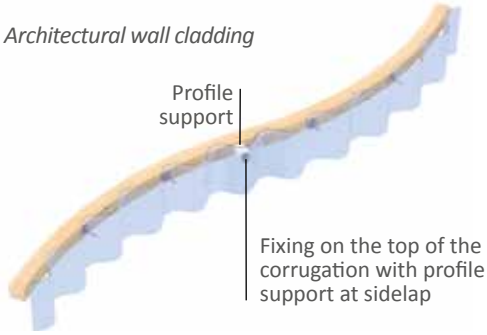


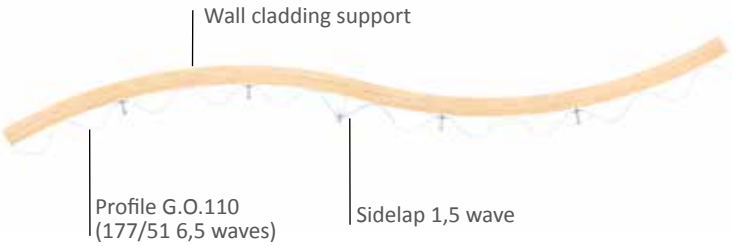
Ventilation: installation as insulation protection



LENGTHWISE FOLDING OR BENDING

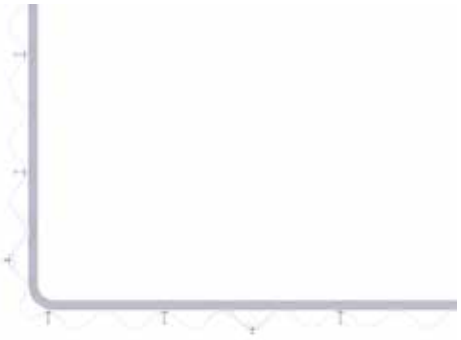
Architectural wall cladding





Lengthwise folding or bending

External angle
Profile G.O. 110 (177/51 6,5 waves)



Internal angle
Profile G.O. 110 (177/51 6,5 waves)

SPECIAL USAGE CONDITIONS

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

Length of lightning parts
The surface and localisation of illuminating parts on the wall will be limited by local standards and legislation in force.

TRANSVERSAL OVERLAP

The minimum transversal overlap will be:
- 140 mm for G.O. (177/51) profiles
- 100 mm for P.O. (76/18), GRECA (75 x 18) and ribbed technical profiles

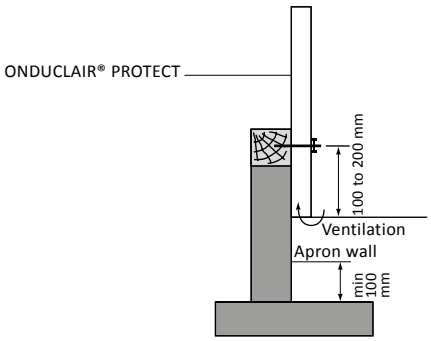
The transversal overlap must take into account the direction of prevailing wind.

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 and adapted to the site corrosivity.
These accessories will be installed in compliance with local rules and in a way that will avoid any wind pressure that could tear the sheets off.

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.



CURVED INSTALLATIONS IN ROOFING

ONDUCLAIR® PROTECT sheets, which are supplied flat, can be used for the realization of continuous or discontinuous curved roofs. They can either be used on new constructions (single-skin or insulated), or on existing constructions.

APPLICATION LIMIT

Minimum curving radius :
- 18 m minimum for the ribbed technical profiles and profiles type GO 177/51
- 12 m minimum for profiles type PO 76/18

IMPLEMENTATION

ONDUCLAIR® PROTECT sheets are installed the corrugations (or ribs) parallel to the development of the vault.

Support surfaces
The surfaces that will support the **ONDUCLAIR® PROTECT** sheets must form a constant radius along the development of the vault, so that the **ONDUCLAIR® PROTECT** sheets rest on a flat surface at any point. Installation is carried out with profile supports such as for flat roof slopes.
The installation is made with the use of profile supports as for a flat roof slope.

Transversal overlap
In any case, the transversal overlap between the sheets will be minimum 300 mm, uniformly distributed on each side of the main fixings.
Any crack that could lead to damages due to unusual constraints must be avoided.
Transversal overlap at the ridge is forbidden in order to avoid any infiltration problems.

VENTILATION

General ventilation rules for constructions established by the regulations in force have to be respected.
ONDUCLAIR® PROTECT sheets being single-skin sheets, temporary condensation may appear depending on the climatic and hygrometric conditions.

- Continuous linear ventilation devices are essential at the eaves and the ridge, the top and the bottom of the cladding.
- The bottom layer of the sheets will be ventilated so that the in situ temperature does not exceed 110° C.
- In any case, the minimum section of each ventilation opening (air inlet and outlet) will be equal to 1/500th of the horizontally projected surface of the roof slope, with a minimum of 380 cm²/ml, or in compliance with the local standards in force.

MAINTENANCE

Normal maintenance involves the periodic removal of leaves, grass, mosses and other deposits or foreign objects. Cleaning of the work done in **ONDUCLAIR® PROTECT** sheets 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® PROTECT** sheets. Do not use abrasives.

GUARANTEE

ONDUCLAIR® PROTECT sheets are covered by a 10 year third party insurance.
The information contained in this Installation Guide is provided in good faith and cannot substitute for prevailing standards.

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Onduline®

➤ APPENDIX

Chemical characteristics:

ONDUCLAIR® PROTECT C&FR and PROTECT CR - 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		30
2-Chloro-2-methylpropane		NR
2-methoxyethanol		AT
3-methyl-1-butanol		
Acetic acid A.S	10%	60
	50%	AT
	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%	AT
	10%	AT
	25%	
Ammonium carbonate A.S		50
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		40
Benzoic acid A.S		40
Benzoyl chloride		
Benzoyl peroxide	50%	AT
Benzyl alcohol		NR
Benzyl benzoate		NR
Benzyl chloride		
Benzyl octyle adipate		40
Bleach (javel water)		NR
Bleaching lye (10 % Cl actif)		AT
Boric acid A.S		80
Brine		40
Bromine		NR
Butan-1-ol		50
Butanediol		AT
Butyric acid	50%	AT
Butyl acetate		AT
Butyl acrylate		
Butyrolactone		NR
Butyraldehyde		NR
Calcium chloride	100%	80
Calcium hydroxide	saturated	
Calcium sulphate A.S		
Camphor oil		
Caprolactam A.S	40-80 %	NR
Carbon dioxide	100%	
Carbon disulphide		NR
Carbon tetrachloride liquid	pur	AT
Carbon tetrachloride vapor		
Chloric gas humid		60
Chloric gas dry		
Chlorine dioxide		
Chloro-2-ethanol	100%	NR
Chloroacetic acid	85%	NR

ONDUCLAIR® PROTECT C&FR and PROTECT CR - Resistance to chemicals		
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Chlorobenzene		
Chloroform		NR
Chloropropionic acid		NR
Choline chloride		
Chromic acid A.S	10%	60
	40%	NR
Chromosulfuric acid A.S		
Citric acid A.S		60
Copper chloride	100%	
Copper nitrate	saturated	
Copper oxychloride	20%	
Copper sulphate A.S	100%	
Cresol A.S	1%	AT
Crotonaldehyde		NR
Cyclohexane		40
Cyclohexanol		AT
Cyclohexanone		=< AT
Cyclohexylamine		=< AT
D.D.T	2.5 %	
Dextrin A.S		AT
Di-(2-ethylhexyl)phthalate		40
Di-(2-ethylhexyl)adipate		40
Dibutyl phosphate		40
Di-ethyl-ether		NR
Di isobutylene		AT
Di isopropylamine		AT
Di-n-butylamine		
Dichloro-1,4 butane		NR
Dichloroethane		NR
Dichloroethylene		NR
Diesel oil		AT
Diethanolamine		50
Diethylamine	50%	AT
Diethylene glycol		50
Diethylphthalate		40
Dimethylamine	100%	NR
Dimethylsulphate		NR
Dimethylphthalate		40
Dioxanne		NR
Disodium tetraborate A.S	saturated	80
Epoxy resin		AT
Essential oil		
Ethanol A.S	20%	AT
	50%	40
Ethanol		AT
Ethanolamine A.S		AT
	35%	NR
Ethyl acetate		NR
Ethyl chloride		NR
Ethylamine	35%	NR
Ethylbenzene		AT
Ethylene chloride		NR
Ethylene diamine	70-90 %	NR
Ethylene glycol		50
Ethylene glycol acetate		NR
Ethylhexanol		40
Formaldehyde A.S	25%	50
	35%	
Formamide		
Formic acid A.S	30%	AT
	50%	NR
Fruit juice		AT
Furfuryl alcohol		NR
Gasoline		AT
Glucose A.S	100%	80
Glutaraldehyde		
Glycerol	75%	80
Glycerol triacetate		AT
Glycol		60
Grease		
Heptane		60
Heptane vapor		
Hexane		60
Hydrazinium hydroxide	20%	

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

ONDUCLAIR® PROTECT C&FR and PROTECT CR - 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**
Potassium permanganate A.S		40
Potassium peroxodisulfate		NR
Potassium silicate		30
Propane-1,2 diol		
Propionaldehyde		NR
Propionic acid		NR
Pyridine		NR
Rhodoviol	100%	
Salicylaldehyde		NR
Salicylic acid A.S		40
Salt solutions		AT
Silicone (grease-oil)		80
Sodium carbonate A.S		50
Sodium chloride		
Sodium hydroxide A.S	10%	30
	40%	NR
Sodium hydroxide	conc.	NR
Sodium hypochlorite	12%	NR
Sodium nitrate		
Sodium peroxide A.S		AT
Sodium silicate		30
Solid iodine (adhesive)		AT
Sorbitol A.S		AT
Starch A.S		40
Stearic acid		80
Styrene		AT
Succinic acid A.S		40
Sugar		60
Sulphonate de vinyle		AT
Sulphur dioxide	100%	
Sulfuric acid A.S	60%	60
	60-70 %	NR
Sulfuric acid A.S vapour	80%	
Tartaric acid A.S		60
Tetrachloroethylene		30
Tetrahydrophthalic acid		
Tetrahydrofuran		NR
Thyonil chloride		NR
Toluene		AT
Toluenesulphonic acid	65%	50
Tri-n-propylamine		
Tricresylphosphate		40
Trichlorethylphosphate		
Trichlorethylene		NR
Trichloroacetic acid	85%	NR
Trichloroethane		NR
Triethylamine A.S	50%	
Trimethylamine A.S		
Turpentine oil		30
Urea A.S		30
Urine (fresh)		AT
Vegetable mould		
Vegetale oil		50
Vinyl chloride		NR
Vinyl propionate		NR
Vinyl polyacetate		
Vinylidene chloride		NR
Water pure		60
Water sea (salt water)		80
Water swimming pool		30
Wine		AT
Xylene		AT

ONDUCLAIR®

ONDUCLAIR® installation instructions for flat or curved supports

Foreword: The installation of ONDUCLAIR® sheets is always carried out from the eaves to the ridge or from the bottom up for wall cladding (except in case of curved installation).

1 - Determine the line of the greatest slope: this one has to be perpendicular to the purlins. Draw this line at the end of the roof, opposite to the prevailing winds.

2 - Fix the first profile support on the previously drawn line and on each purlin.

3 - 2 possibilities of fixing the profile supports:

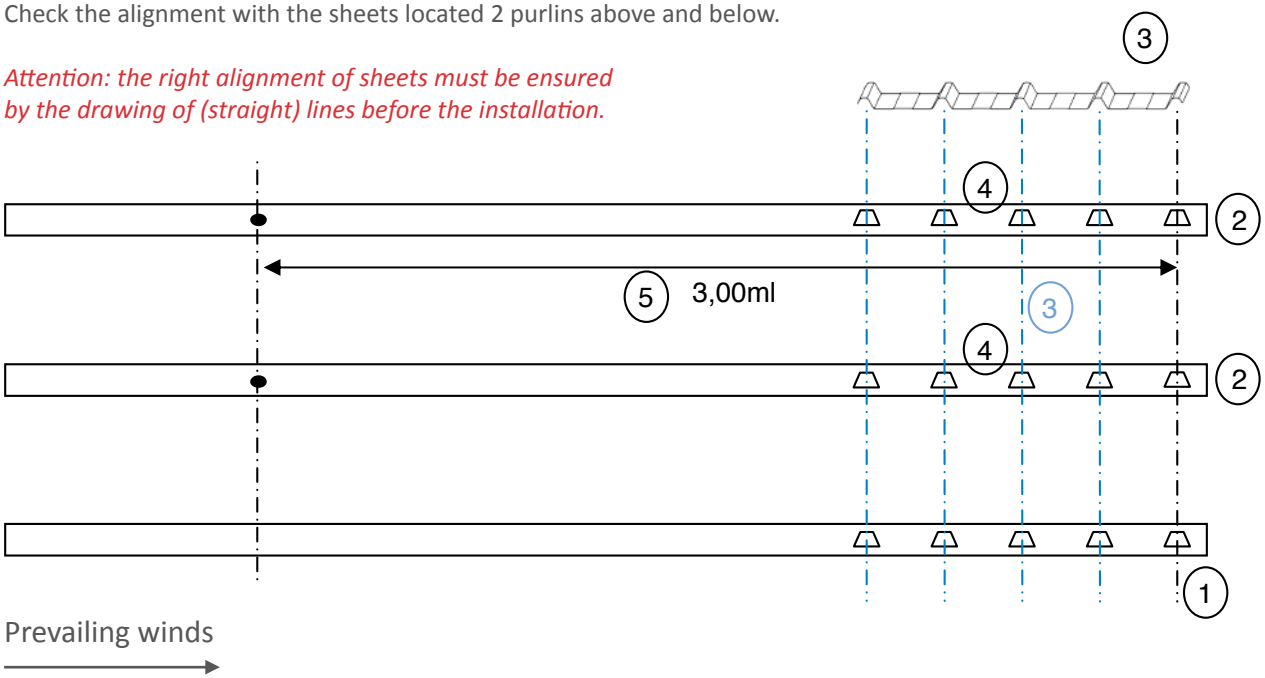
1	2
Use a gauge (template) corresponding to the installed profile (either a piece of metal sheet, or a wooden gauge) and place it on the first profile support already fastened on the purlin.	Use a measuring stick reporting the exact pitch of the profile on the highest purlin (the closest to the ridge) so as on the lowest one (at the eaves). Use a « cordex » (marking thread) in order to draw the lines in the right alignment of the pitches (refer to the sketch below).

4 - Fasten all the profile supports at each purlin using the gauge or the lines which were drawn with the measuring stick. Respect the curving radius for the sheets to be installed in curve.

5 - In order to check the right alignment, each 3 meters, draw a point on the structure (make a line) in order to rectify the possible gaps between the profile supports (some mm) which may appear despite the use of a gauge.

6 - Fasten the pre-drilled sheet on the profile supports starting with 1 fastener in the middle of the sheet before fastening all the other corrugations that have to be fixed.
Check the alignment with the sheets located 2 purlins above and below.

Attention: the right alignment of sheets must be ensured by the drawing of (straight) lines before the installation.



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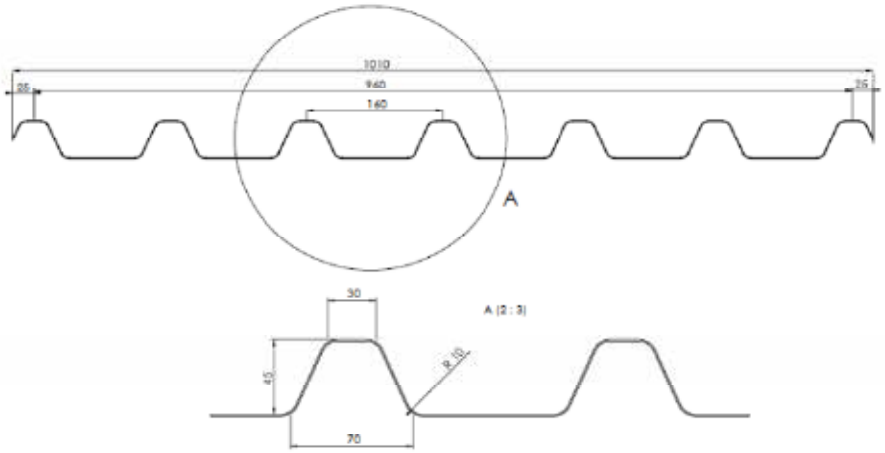
ONDUCLAIR® PROTECT CR

Fiche Technique *Technical Sheet*

Profil *Profile* : TS 1045

Dessin du profil
Profile drawing



Plan D 61 064

Information Matière *Material Information*

Module d'élasticité *Modulus of elasticity* (daN/cm²) :	**78 000**
Coéf. de dilatation *Linear expansion* (m/m.°C) :	**2,8 . E-5**
Plage de température *Service Temperature* :	**-30 à to +120°C**
Réaction au feu *Fire Performance* (Euroclass):	**E non gouttant/Non-dripping**
Conductivité thermique *Thermal conductivity* (W/m.°C) :	**0,16**
Norme de fabrication *Manufactured in compliance with norm* :	**EN 1013 CE**

Information Plaque *Sheet Information*

Tenue à la grêle *Resistance to hail* (m/sec) : 75 m/s

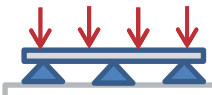
Test 1200 joules : Veuillez nous consulter *Please consult us*

Poids *Weight* (Kgs/ml) :

CR 10	CR 13	CR 17
1,797	**2,336**	**3,055**

Inertie du profil *Profile inertia* (cm^4) :

CR 10	CR 13	CR 17
42,7716	**55,6165**	**72,7599**



Portées et charges sur 3 appuis et plus *Load/Span data for 3 or more supports*

Epaisseur *Thickness*	Flèche *Deflection*		daN/m² 40	60	80	100	120	140	160	180	200
CR 10/10	1/50 mm	**Portée retenue**[1]	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**
		Portée calculée[2]	*2 768*	*2 419*	*2 197*	*2 040*	*1 920*	*1 823*	*1 744*	*1 677*	*1 619*
	1/100 mm	**Portée retenue**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 447**	**1 384**	**1 331**	**1 285**
		Portée calculée	*2 197*	*1 920*	*1 744*	*1 619*	*1 524*	*1 447*	*1 384*	*1 331*	*1 285*
CR 13/10	1/50 mm	**Portée retenue**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**
		Portée calculée	*3 022*	*2 640*	*2 398*	*2 226*	*2 095*	*1 990*	*1 904*	*1 830*	*1 767*
	1/100 mm	**Portée retenue**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 453**	**1 403**
		Portée calculée	*2 398*	*2 095*	*1 904*	*1 767*	*1 663*	*1 580*	*1 511*	*1 453*	*1 403*
CR 17/10	1/50 mm	**Portée retenue**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**
		Portée calculée	*3 305*	*2 887*	*2 623*	*2 435*	*2 291*	*2 177*	*2 082*	*2 002*	*1 933*
	1/100 mm	**Portée retenue**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**	**1 500**
		Portée calculée	*2 623*	*2 291*	*2 082*	*1 933*	*1 819*	*1 728*	*1 652*	*1 589*	*1 534*

La charge ascendante maximum admissible est limitée à nx36mKg/m². n étant le nombre de fixations par mètre linéaire d'appui.

For depression the maximum allowed load is limited to nx36mKg/m². n being the number of fixations per supported linear meter.

[1] *Allowed span*

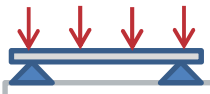
[2] *Calculated span*

Valeurs données à titre indicatif. Veuillez adapter les informations contenues dans cette fiche technique aux normes locales en vigueur. Notre Service Technique se tient à votre disposition pour tout renseignement. *Values are given for information only. Please adapt the information contained in this technical sheet to local norms in force. Our Technical Department remain at your disposal for any information.*

ONDUCLAIR® PROTECT CR

Fiche Technique *Technical Sheet*

Profil *Profile* : TS 1045



Portées et charges sur 2 appuis *Load/Span data for 2 supports*

Epaisseur *Thickness*	Flèche *Deflection*		daN/m² 40	60	80	100	120	140	160	180	200
CR 10/10	1/50 mm	**Portée retenue**[1]	1 500	1 500	1 500	1 500	1 500	1 500	1 500	1 489	1 438
		Portée calculée[2]	2 458	2 147	1 951	1 811	1 704	1 619	1 549	1 489	1 438
	1/100 mm	**Portée retenue**	1 500	1 500	1 500	1 438	1 353	1 285	1 229	1 182	1 141
		Portée calculée	1 951	1 704	1 549	1 438	1 353	1 285	1 229	1 182	1 141
CR 13/10	1/50 mm	**Portée retenue**	1 500	1 500	1 500	1 500	1 500	1 500	1 500	1 500	1 500
		Portée calculée	2 683	2 344	2 130	1 977	1 860	1 767	1 690	1 625	1 569
	1/100 mm	**Portée retenue**	1 500	1 500	1 500	1 500	1 477	1 403	1 342	1 290	1 245
		Portée calculée	2 130	1 860	1 690	1 569	1 477	1 403	1 342	1 290	1 245
CR 17/10	1/50 mm	**Portée retenue**	1 500	1 500	1 500	1 500	1 500	1 500	1 500	1 500	1 500
		Portée calculée	2 934	2 563	2 329	2 162	2 035	1 933	1 849	1 777	1 716
	1/100 mm	**Portée retenue**	1 500	1 500	1 500	1 500	1 500	1 500	1 467	1 411	1 362
		Portée calculée	2 329	2 035	1 849	1 716	1 615	1 534	1 467	1 411	1 362

La charge ascendante maximum admissible est limitée à nx36mKg/m². n étant le nombre de fixations par mètre linéaire d'appui.

For depression the maximum allowed load is limited to nx36mKg/m². n being the number of fixations per supported linear meter.

[1] *Allowed span*

[2] *Calculated span*

Portées retenues selon conditions de calcul suivant Annexe L (normative) DTU 40-35 (NF P34 205-1).
Autres pays que France, vérifier les charges admissibles en tenant compte des portées calculées données et des normes et règlementations en vigueur dans le pays d'implantation du bâtiment.

Allowed spans according to means of calculating following Annex L (normative) DTU 40-35 (NF P34 205-1).
For other countries than France, check the allowed loads taking into account the calculated spans so as the norms and regulations in force in the country where the construction is located.