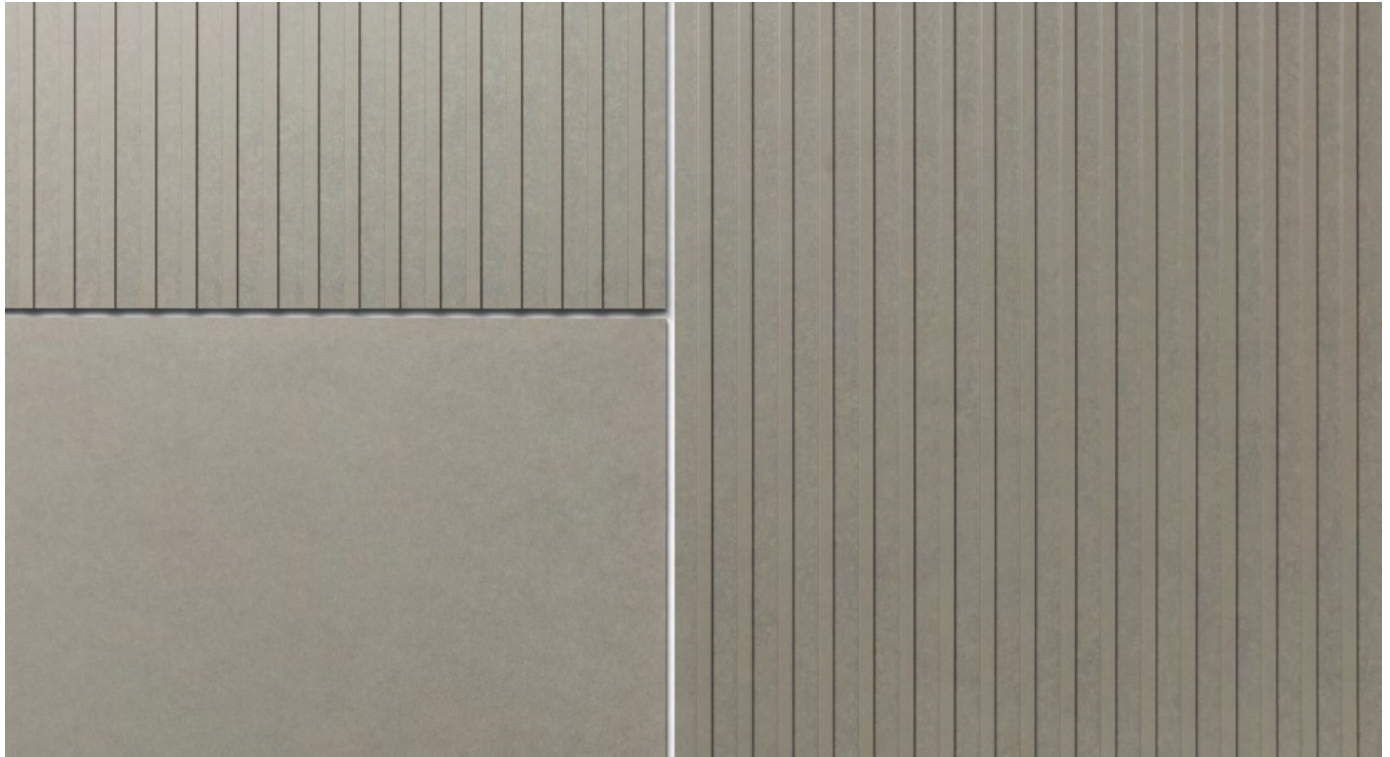


DIM Design & Installation Manual

Largo Gravier



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Remarks

This DIM (Design + Installation Manual) provides technical information regarding design and installation. Refer to area manager and local distributor for further information such as:

- Terms of delivery
- Pricing
- Products and colors
- Lead time, etc.

More general information available on swisspearl.com

CH- 8867 Niederurnen
+41 55 617 11 60
info@swisspearl.com

Validity of DIM

Please consult your local distributor and/or the Technical Advisor prior to the commencement of shop drawings or installation for the most current DIM guide. The current DIM can always be found at swisspearl.com. All previous DIM guides should be disregarded and are no longer valid

Product warranty

Warranty conditions are available on request from your local Swisspearl office or dealer.

Maritime conditions

Maritime conditions call the use for stainless steel rivets. Those may be used on steel or anodized aluminum subframe. Maritime conditions are considered up to 0.6 miles from the sea. Material specification for subframe, fasteners and accessories to cater for maritime conditions according to local standards.

Advantages of fiber cement products

- Maximum protection against weather
- Excellent longevity
- Easy installation in any climate
- Almost no maintenance required
- Proven details
- No cracks, paint or sealant problems
- High sustainability
- Noncombustible

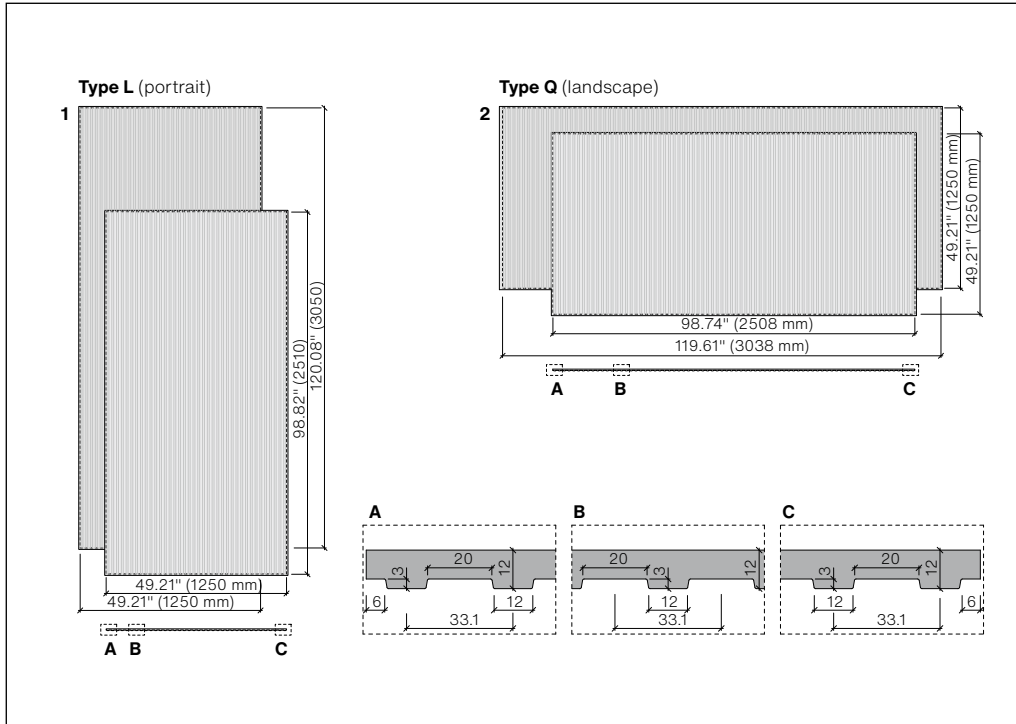
Project specific ordering

Subtle visual differences may occur between product batches. Therefore we recommend ordering by job or specific elevation if ordering in phases.

Disclaimer

The information and recommendations contained in this Design & Installation Manual ("DIM") are offered as a service to architects, contractors, installers, and other persons involved with our products and are not intended to relieve them from their own responsibility. The information and recommendations provided herein are believed by Swisspearl Group to be accurate at the time of preparation of this DIM, or obtained from sources believed to be generally reliable. Swisspearl Group makes no warranty concerning the accuracy of the content of this DIM and shall not be liable for claims relating to any use regardless of whether it is claimed that the information or recommendations are inaccurate, incomplete, or otherwise misleading. The information and recommendations herein are intended to be used with the judgment and experience of professional personnel competent to evaluate the significance and limitations of the material contained. SWISSPEARL GROUP EXPRESSLY DISCLAIMS ANY GUARANTEES AND WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, FOR ANYTHING DESCRIBED OR ILLUSTRATED HEREIN, AND ASSUMES NO RESPONSIBILITY OR LIABILITY FOR DAMAGES OF ANY KIND, INCLUDING - WITHOUT LIMITATION - BODILY HARM, INJURY OR DAMAGE TO PROPERTY INCURRED FROM (1) THIS DIM, (2) THE USE OF THE INSTRUCTIONS IN THIS DIM, OR (3) THE INSTALLATION OR USE OF THE MATERIALS DESCRIBED HEREIN.

Overview panel sizes



Gravid 9/12 mm thick panels – max. net panel sizes

Product data

- Density > 1.8g/cm³
- Modulus of elasticity ca. 15'000 MPa
- Characteristic value for bending strength (average) ca. 22.4 MPa
- Thermal expansion coefficient 0.01 mm / m / °K
- Fire Classification: EN 13501-1 (A2-s1,d0) ASTM E136, ASTM E84
- Frost resistance and durability under EN 12467
- Thermal range - 40°F to 176°F

Overview of colors and panels available see: «Swisspearl Range Brochure Facade».

Variants of structure

Further design router variants on request.

- 1** Portrait Panel Type L
- 2** Landscape Panel Type Q

The type must be specified when ordering whole panels. (cut to size on site).

Overview

Swisspearl Largo Gravial		Nobilis Carat	
Thickness	mm	9/12	
Weight	ca. lb/ft ²	4.91	
Format Untrimmed panels	max. net panel sizes		
	Landscape (Type Q)	Portrait (Type L)	
120.87" × 50" (3070 × 1270 mm)	119.61" × 49.21" (3038×1250 mm)	49.21" × 120.08" (1250 × 3050 mm)	■
99.61" × 50" (2530 × 1270 mm)	98.74" × 49.21" (2508×1250 mm)	49.21" × 98.82" (1250 × 2510 mm)	■

Additional panels without engraving

Supplementary panels from the standard Carat and Nobilis range are available.

Application

Swisspearl Largo panels can be attached to vertical timber or metal profiles. Suitable for new facades or existing cladding renovations.

Installation orientation

As standard, Swisspearl Gravial types Q and L are installed with vertical grooves. Both types can also be installed on the facade with horizontal grooves. This is possible because the edge of the groove has a slight angle.

Untrimmed full size panels

Untrimmed panels will only be provided to approved fabricators. Untrimmed Swisspearl Largo panels must be trimmed 10 mm 3/8" trimmed Gravial facade panels are delivered.

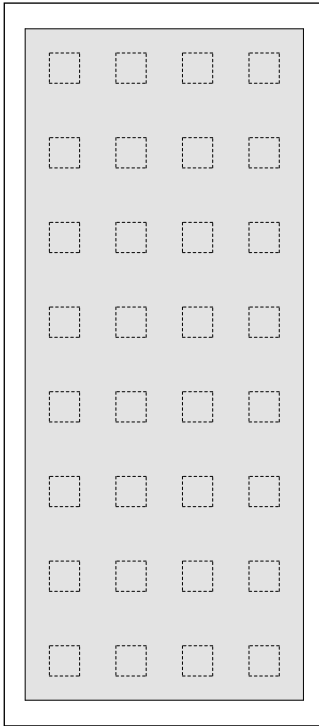
Signage, light fittings, etc.

Provide structural attachment points behind the panel as required. Leave generally min. (1/4") free gap between panel edge and installation – so as not to constrain panel movement.

Sealed cut edges

All panel edges cut on site or at fabricator workshops must be sealed by LUKO sealer, provided by Swisspearl.

Adhesive application



Adhesive technology

Specially ordered ARSB panels are signified by printed squares on the backside of the panel. Please consult with your adhesive manufacturer prior to installation.

General requirements

Glue manufacturer's instructions for use must be strictly followed regarding all aspects, including:

- Cleanliness of panels and support profiles
- Panel and air temperature
- Air moisture content
- Etc.

Support profiles

- For exterior application the panels may be glued to aluminum supports only.
- Subframing to be approved by glue manufacturer prior to starting the installation.

Panel ordering

Panels ordered for adhesive application are called ARSB and are available upon request at time of order. Standard Swisspearl panels cannot be used for adhesive application.

Warranty

Panel manufacturer provides functional warranty for the panels only. Warranty for the attachment of the panels to be obtained by adhesive manufacturer. Warranty for the panels cannot exceed that of the adhesive.

Character

Large format Largo Graviál fiber cement facade panels, with a concealed system, consists of a high quality design, which represents the pure principle of a ventilated facade without any visible attachments.

System description

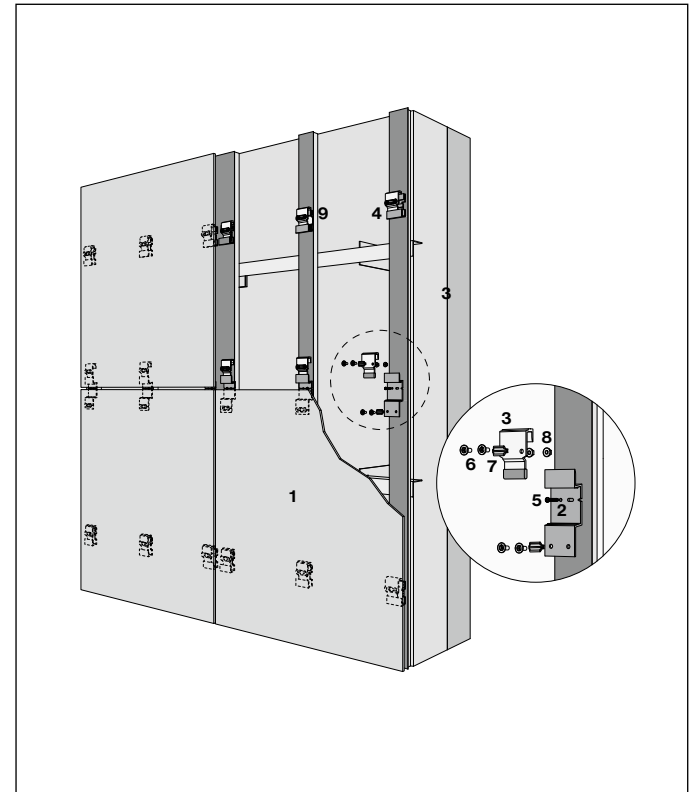
The Sigma 8 Pro system consists of 3/8" and 1/2" (9/12 mm) thick Largo Graviál panels with a maximum size of 120.08" × 49.21" (3050 × 1250 mm). Panels are equipped with undercut anchors on the rear side and attachment cleats fastened to vertical subframe profiles made of timber battens or metal profiles in aluminum or galvanized steel.

The drilling of the undercut holes requires high precision and must be carried out at the factory in Niederurnen, Switzerland. All attachment cleats are installed on site.

Panels are cut to size and packed onto pallets at the factory according to dimensions provided by the customer. The sophisticated system concept of the panel clip allows Sigma 8 Pro to be mounted on standard spacer screw, wood-metal, metal and thermal bridge optimized substructures.

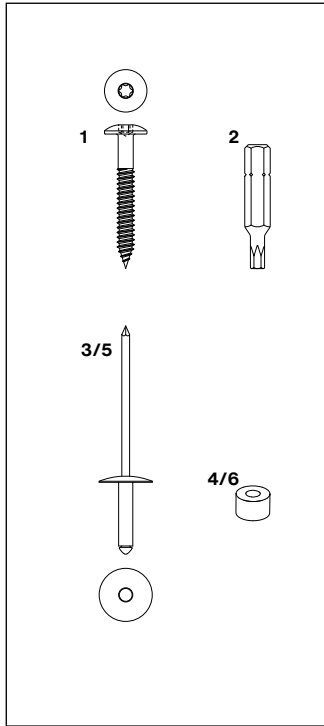
- 1 Swisspearl Largo Graviál panel 9/12 mm
- 2 Omega cleat S8Pro
- 3 Panel clip S8Pro
- 4 U-Cleat S8Pro
- 5 Screw SR2 Inox, 4,8×30 mm, black powder coated
- 6 Threaded anchor S8Pro
- 7 Spacer S8P
- 8 Hexagon nut with flange and locking teeth
- 9 Migration protection-K S8, Stainless steel bright

System Sigma 8 Pro



More details about the system, see Design and Installation Manual Sigma 8 Pro.

Fasteners



To timber battens

1. Screw, inox, saucer head
 Ø 12 mm, T20 drive, blank or powder coated (Red Horse)
 4.8×30 mm
 4.8×38 mm
 4.8×44 mm
 4.8×60 mm

Screws, inox, saucer head
 Ø12 mm, T20 drive, blank or powder coated
 4.5×30 mm SCR-W 4.5×30 mm A2
 4.5×36 mm SCR-W 4.5×36 mm A2
 4.5×41 mm SCR-W 4.5×41 mm A2
 4.9×38 mm SCR-W 4.5×38 mm A2 DC
 4.8×40 mm SCR-W 4.5×40 mm A4

2. Torx bit T 20 W

To aluminum profiles

3. Swisspearl aluminum rivet
 head Ø 15 mm, blank or powder coated (SFS and MBE)
 - 4.0×18-K15, 8-13 mm grip range
 - 4.0×24-K15, 13-18 mm grip range
 - 4.0×30-K15, 18-23 mm grip range
 Rivets, head Ø14 mm, RIV-A EPDM washer
 4.0×20 mm, 10-14 mm grip range (Red Horse)

4. Fixed point sleeve aluminum type 8

To steel profiles

5. Swisspearl stainless steel rivet for Planea and Zenor panels, head Ø 15 mm, blank or powder coated (MBE)
 - 4.0×16-K15, 10-12 mm grip range
 - 4.0×18-K15, 12-14 mm grip range
 - 4.0×20-K15, 14-16 mm grip range
 - 4.0×22-K15, 16-18 mm grip range

Swisspearl stainless steel rivet all Swisspearl panels except Planea and Zenor panels head Ø 15 mm, blank or powder coated (SFS)

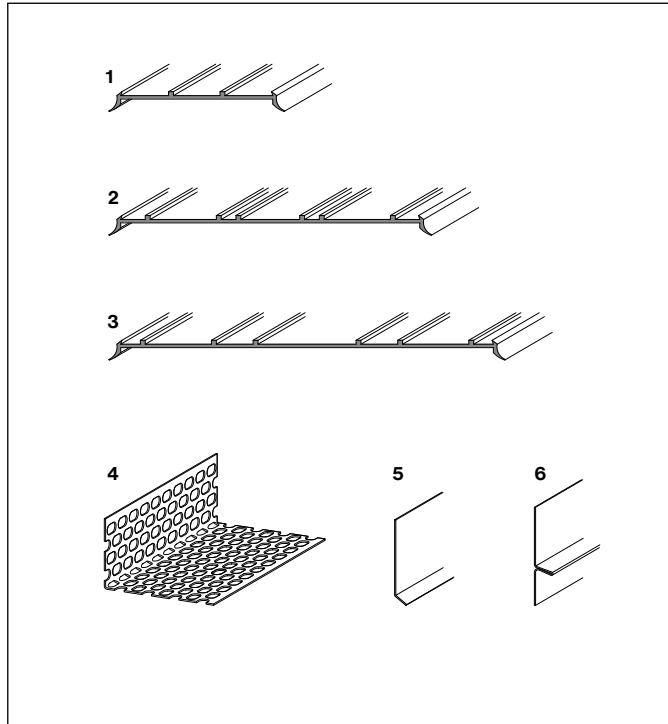
- 4.0×18-K15, 9-14 mm grip range
 - 4.0×23-K15, 14-19 mm grip range
- Rivets, head Ø14 mm, RIV-S EPDM washer
 4.8×20 mm, 9-13 mm grip range (Red Horse)

6. Fixed point sleeve aluminum type 8

Maritime conditions

Maritime conditions call the use for stainless steel rivets. Those may be used on steel or anodized aluminum subframe. Maritime conditions are considered within a distance of 0.6 miles from the sea. Material specification for subframe, fasteners and accessories to cater for maritime conditions according to local standards. Ensure that the performance of the support system and accessories used, complies with country-specific standards, approvals and regulations.

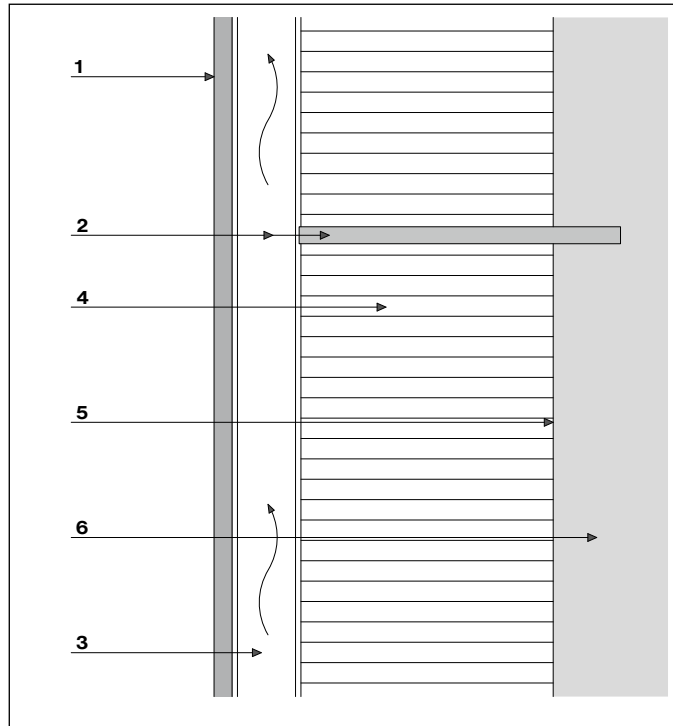
Joint material



1. EPDM band, black, 60 mm wide for intermediate supports with side lips, in 50 m rolls;
Local alternative version 50 mm
2. EPDM band, black, 100 & 120 mm wide for butt joints with side lips, 50 m rolls;
Local alternative version 100 mm
3. EPDM band, black, 150 mm wide for inner and outer corners with side lips, in 25 m rolls
4. Ventilation profile, raw aluminum or standard colors, 50 × 30 mm, 70 × 30 mm, 100 × 40 mm. 2500 mm long, 0.6 mm thick
5. L-flashing, stainless steel, powder coated, 0.5 mm thick 2510 / 3050 mm long
6. Horizontal joint flashing, aluminum, powder coated black, 0.5 mm thick 2510 / 3050 mm long

Profiles are just for illustration purposes. Differences in the local profile portfolio will occur.

Terminology



Vertical section

Rear-ventilated cladding

The design principle involves the screening (deflection) of rainwater to prevent it from entering the system. As the panel joints are not sealed, minimal amounts of water may access the air cavity behind the panel. The cavity is naturally ventilated by vent gaps at the bottom and top, so any moisture will evaporate naturally by thermal action.

Cladding (1)

Panels with open or closed joints, in one plane or lapped.

Subframing (2)

To support the cladding dead and wind load generally vertical panel supports in timber or metal.

Min. requirement is 3/4" vertical airflow.

Ventilation cavity (3)

Cavity behind panel with ventilation gaps at bottom and top.

Thermal insulation layer (4)

To increase the thermal insulation capacity of the exterior wall.

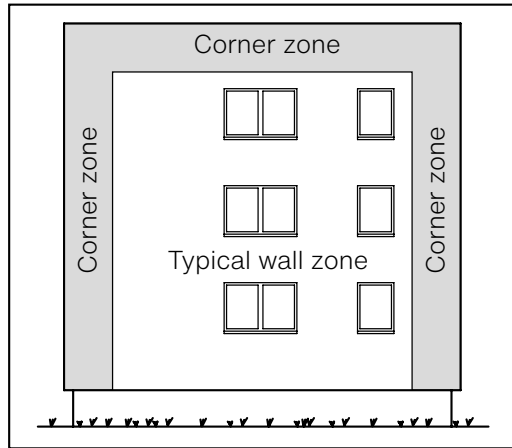
Substrate (5)

Face of exterior wall, such as plaster, concrete, exterior sheathing, wind proofing layer, etc.

Exterior wall (6)

Brick, concrete, wood and steel studs.

Corner zone



Wind load zones
 As per scheme there are two wind load zones: The corner zones generally are subject to increased negative wind load (suction) due to turbulence at the edges of the building. The applicable wind load values must be determined in the cladding specification.

Min. manufacturer cavity depth:

Mandatory for issuance of the warranty letter.

Cladding height	min. cavity
< 20'	3/4"
20' - 99'	1"
> 99'	1 3/4"

Application

Swisspearl cladding panels can be attached to vertical supports made of timber, aluminum or steel.

Wind load

Always consider local standards when determining windloads and related panel fastener distances. This is especially important for tall buildings, for buildings with special shapes and for high wind exposure areas.

Ventilation cavity

Building tolerances must be allowed for. The cavity may not be reduced by horizontal profiles or any stray objects such as loose insulation and other materials.

Building expansion joints

The building's structural expansion joints should be considered when designing subframe systems. Structural expansion joints must be applied to subframe and cladding as provided to the building structure.

Ventilation cavity

Minimum (min.) airflow at the backside of the panels should be 100% free of obstructions with no less than 9.45 in² per linear foot of vertical airflow (min. 3/4" system depth) behind panels. Min. airflow at base and top of walls is required to have at least 60% unobstructed ventilation if using ventilated profiles.

Ventilation cavity with perforated horizontal subframe components

Min. ventilation gap to be 1 1/2". Horizontal profiles should allow min. 75% airflow. In advance please contact your Technical Service for approval.

Ventilation Cavity and Panel Support

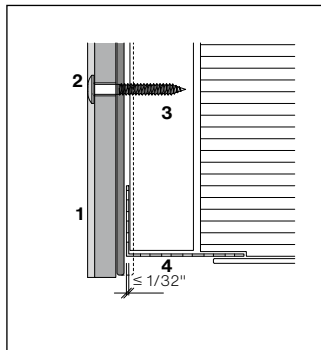
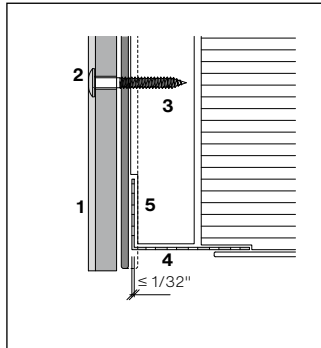
Panels must be supported on an even surface. If perforated angles are installed between the panel and the vertical batten profile, the closure piece must not exceed 1/32".

Perforated profiles must provide at least 60% ventilation. Mineral wool behind panels must be covered with a UV-resistant wrap to prevent clogging and blocked airflow or drainage. Where falling insulation may occur, ventilation grilles must not be used.

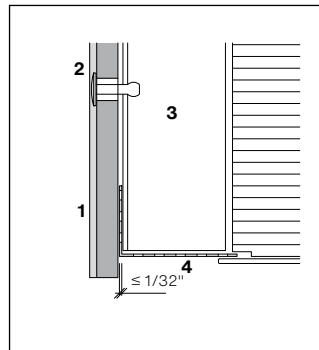
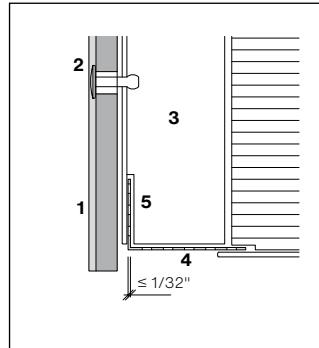
Aluminum mesh may be used. It provides high ventilation, is thin, and easy to install.

- 1 Swisspearl Largo Gravial 9/12 mm
- 2 Fastener
- 3 Panel support
- 4 Perforated angle
- 5 Recess

Timber battens



Metal profile



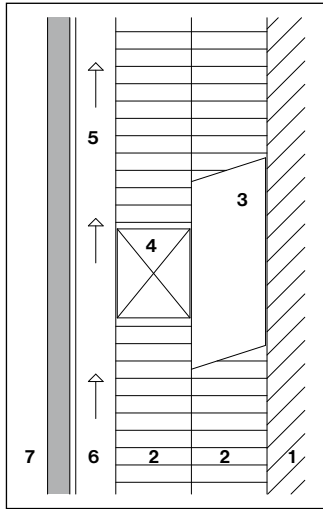
Material compatibility

Untreated aluminum material such as Window sills, frames, etc. is not compatible with cement and must be protected against dust from drilling panels, etc. Aluminum components are to be used in anodized or powder-coated or Kynar Coated for exterior applications with protective films.

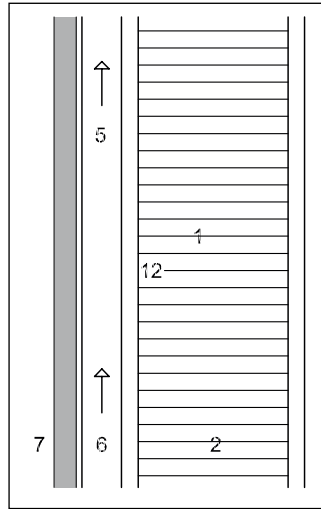
Sealant material

To keep the cladding low-maintenance, it is recommended to avoid the use of sealants. Where the use of sealant is unavoidable, Polyurethane, Acrylic or Hybrid Polymer products would be most suitable. Before applying any sealant to fiber cement material the compatibility must be checked as certain materials leave permanent staining on panel surface.

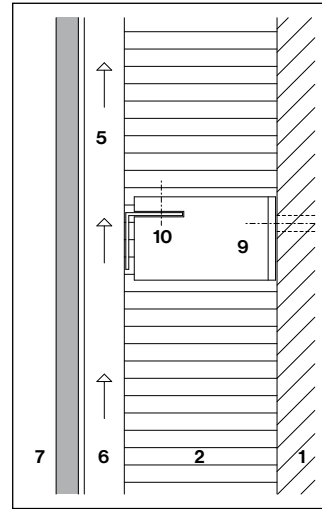
Subframe types



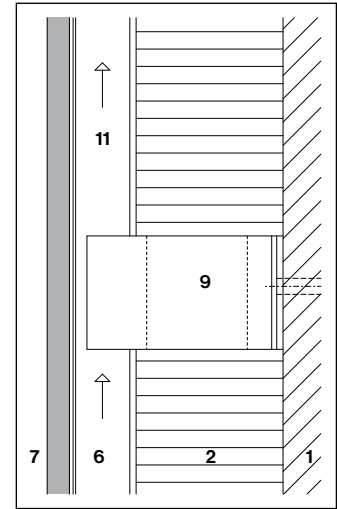
Timber / timber



Timber / Windstopper on a light wall system



Metal / timber verticals

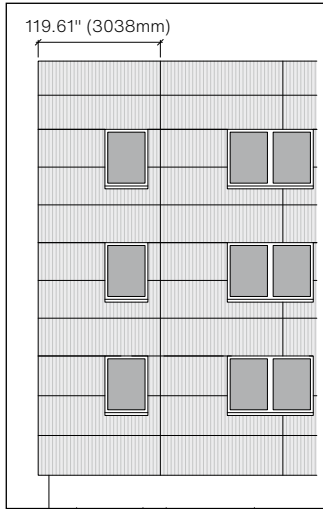


Metal

- 1 Substrate
- 2 Thermal insulation
- 3 Vertical batten
- 4 Horizontal batten
- 5 Panel support
- 6 Vent cavity
- 7 Swisspearl Largo panel

- 8 Spacer screw
- 9 Bracket
- 10 Horizontal batten
- 11 Vertical batten
- 12 Swisspearl Windstopper

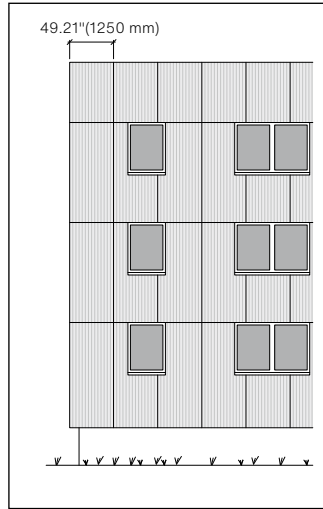
Reference lines



Portrait installation

Reference lines

The planning of vertical joints can be done with a maximum panel usable dimension. Aesthetically the building corners or certain reference lines can be divided. The lintels should be considered as horizontal reference lines.

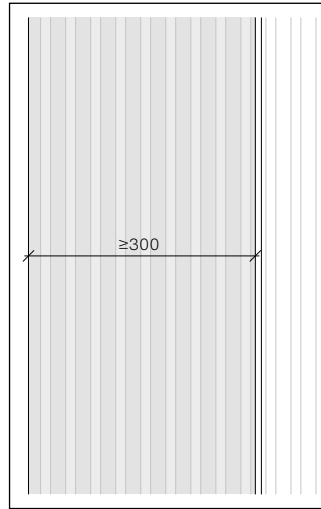


Landscape installation

Panel width

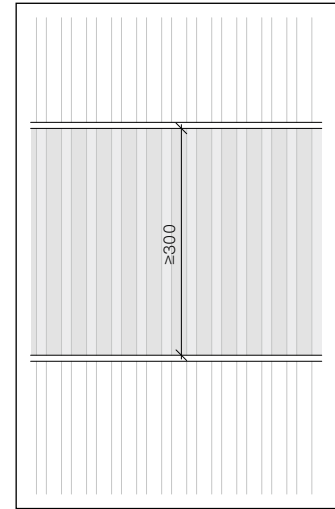
The min. panel width for portrait Gravail panels is $\geq 11.81''$ (300mm). In case of continuous vertical stripes, control that the Gravail lines are even. The height of the landscape Gravail panel is $\geq 11.81''$ (300mm).

Min. panel width



Min. width portrait

Should you consider a smaller width, please get in touch with your Swisspearl Technical Advisor.

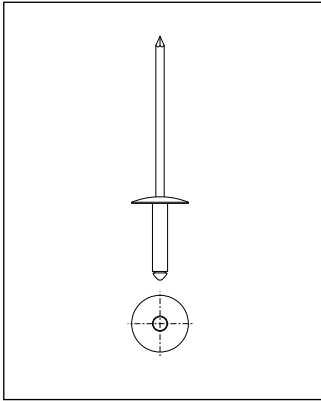


Min. width landscape

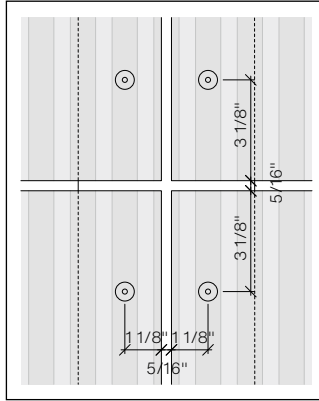
Fastener distances

For fastener distances on Gravail panels $\geq 11.81''$ (300mm), see Largo large size format documentation.

Swisspearl rivet



Swisspearl rivet Ø 15 mm 4.0×18-K15



Panel edge distances

Holes in panel for rivets

Diameter 9.5 mm

Standard edge distances

Horizontally 1 1/8"

Vertically 3 1/8"

Minimum edge distances

Horizontally 1 1/8"

Vertically 2 3/8"

Maximum edge distance

Horizontally and vertically 4"

Panel joints

Typical panel joint is 5/16", this allows panel scraps to be used as spacers. Wider joints will make any inaccuracies in the installation less noticeable.

Fixed, sliding points

Each panel must be fastened by 2 fixed points in the panel's center to support the panels dead load. All other rivets are sliding points.

Drill holes Ø 4.1 mm to metal profiles

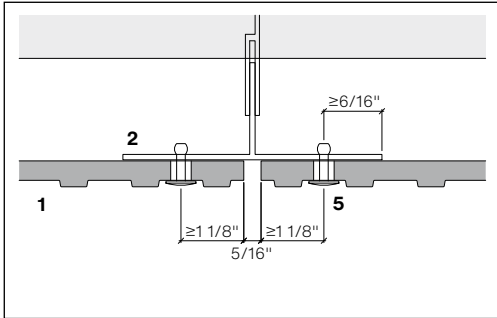
Use centering drill gauge so the holes will be concentric to the Ø 9.5 mm hole in the panel. Use drill bit type A for aluminum profiles and type S for steel.

Sub-frame engineering

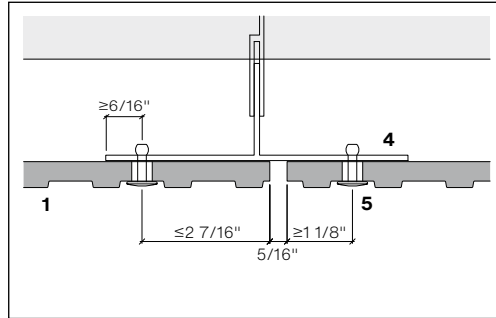
Engineer / contractor is responsible for the design and installation of all subframe parts including all pertaining fasteners.

The sliding point connection is **NOT** meant to accommodate building drift or seismic movement.

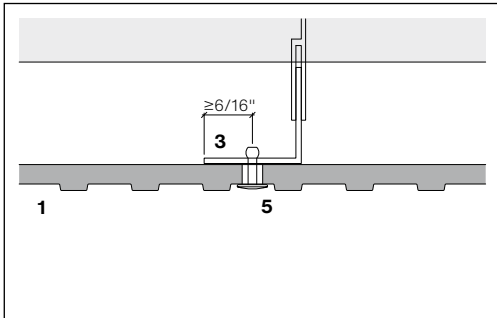
Sub frame examples



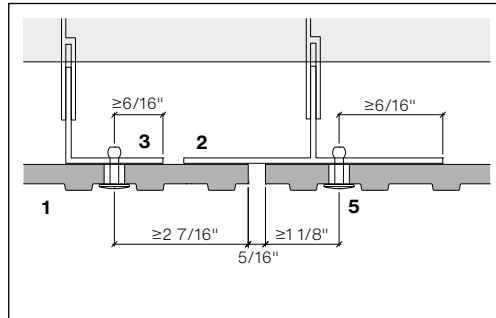
T-Profile 120 mm
Continuous Graviol grid



T-Profile 140 mm
Individual Graviol grid



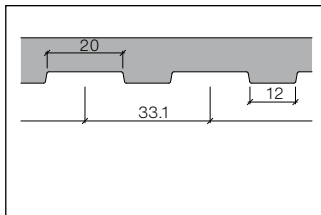
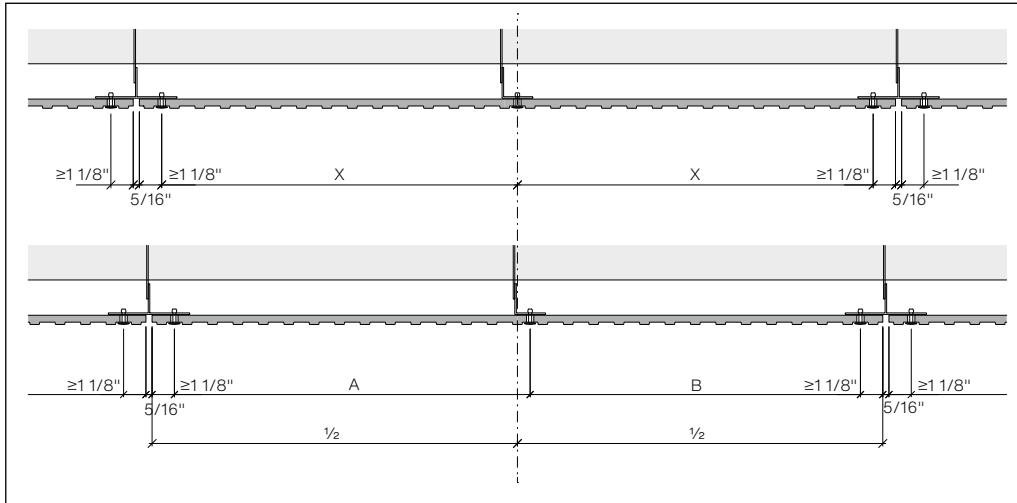
Intermediate support L-profile 45 mm
Continuous Graviol grid



T-profile 120 mm and L-profile 45 mm
Individual Graviol grid

- 1 Swisspearl Largo Graviol 9/12 mm
- 2 Vertical profile T-profile 120 mm
- 3 Intermediate profile, L-profile 45 mm
- 4 Vertical profile, T-profile 140 mm
- 5 Rivets 4.0 × 18-K15

Panel Planning



Detail engraving Gravial grid

Installation planning

The arrangement of the subframe will always depend on the grid of the engraving.

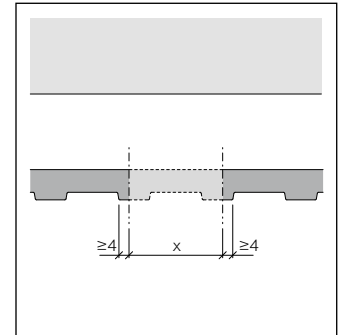
Calculation example:

Panel width minus lateral edge distance due to raster engraving = number of millings

Even = X

Uneven = A; B

Jobsite fabrication



Onsite Gravial fabrication

Gravial cutting

When Gravial panels are cut on site, please note that minimum edge distance of 4 mm remains.

All cut edges must be treated with LUKO sealant afterwards.

Aluminum profiles

Aluminum thickness should be a min. of 2 mm. Profiles should not exceed 10' and profile breaks should coincide with panel joints.

Aluminum rivet

4.0×18-K15 rivet, head Ø 15 mm, powder coated or blank, grip range 8-13 mm.

Staggered Horizontal Joints

The profiles must be installed separately at vertical panel joints. These must be adjusted independently of each other to the respective panel height in order to enable stress-free panel installation.

Black panel joints

Panel joints read as shadow lines. It is recommended to blacken the metal where visible, with paint or PVC paint tape.

Steel profiles

Steel panel supports to be min. 18 gauge to obtain nominal pull out value. Profiles should not be longer than 20'.

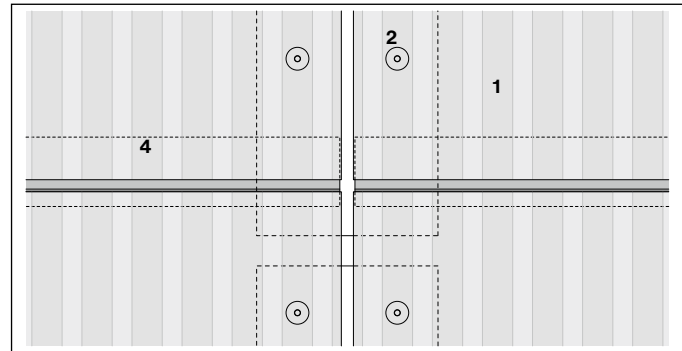
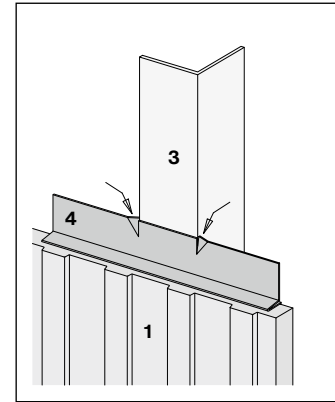
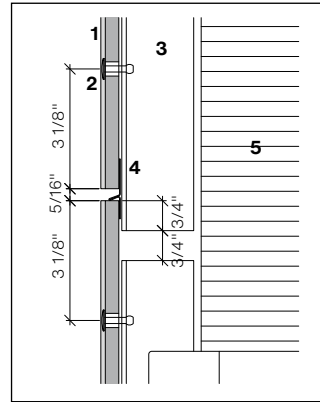
Stainless steel rivet

4.0×18-K15 rivet, head Ø 15 mm, powder coated or blank, grip range 9-14 mm.

Subframe engineering

Engineer / contractor is responsible for the design and installation of all subframe parts including all pertaining fasteners.

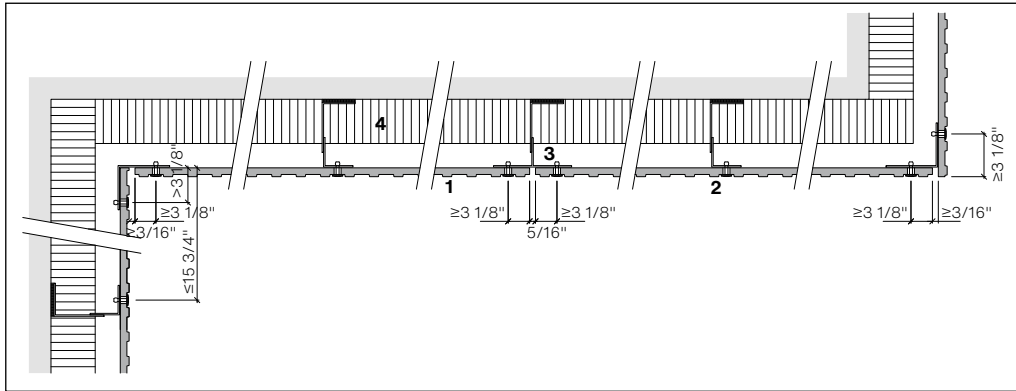
Horizontal joint



- 1 Swisspearl Largo Gravail 9/12 mm
- 2 Rivet
- 3 Panel support profile
- 4 Joint flashing (optional); length = panel width - 1/16"
- 5 Thermal insulation

Any breaks to panel support profiles must be located at panel joints as shown. Flashing cut at one vertical as shown to prevent lateral dislocation of flashing.

Horizontal section



Panel may be cantilevered
max. 15 3/4".

- 1 Swisspearl Largo Gravial 9/12 mm
- 2 Rivet
- 3 Aluminum profile
- 4 Thermal insulation

Rivet installation

Use rivet gun GESIPA ACCUBIRD or similar. Do not use pneumatic equipment. Use centering drill gauge with drill bit $\varnothing 4.1$ mm to obtain concentric hole [A/3].

Fixed point for Aluminum Subframe

Fixed point for Aluminum, Type 8, $\varnothing 9.4$ mm [B/4]

- Rivet head $\varnothing 15$ mm
4.0 x 18-K15, blank or powder coated, grip range 8-13 mm

Fixed point for Steel Subframe

Fixed point steel A2, Type 8, $\varnothing 9.4$ mm [B/4]

- SS Rivet, head $\varnothing 15$ mm,
4.0 x 18-K15, blank or powder coated, grip range 9-14 mm

Each panel must be fastened by 2 fixed fastening points in the panel center, installed first. All the others are sliding points.

Sliding points for Aluminum Subframe

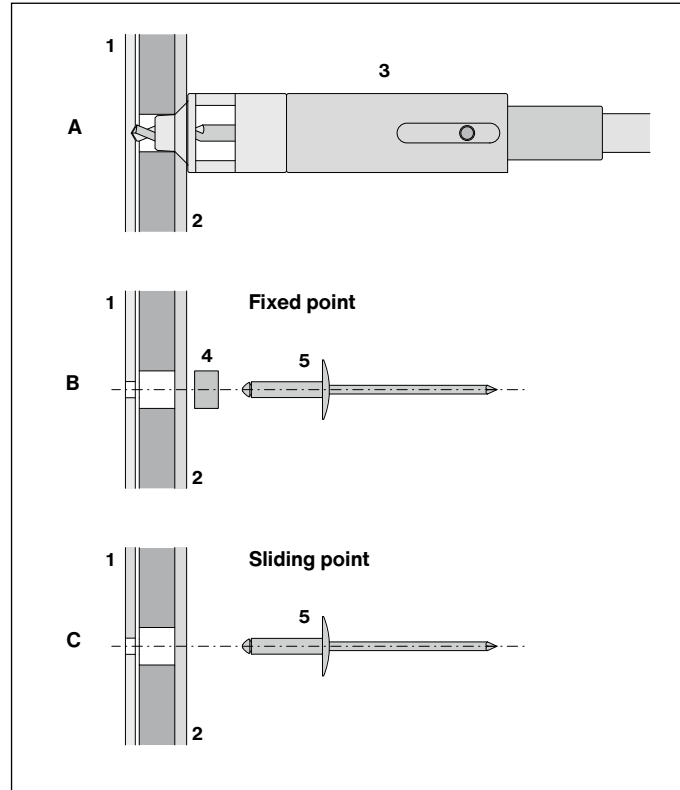
Use centering drill gauge with drill bit $\varnothing 4.1$ mm to obtain concentric hole [C/5]

- Aluminum Rivet, head $\varnothing 15$ mm
4.0 x 18-K15, blank or powder coated, grip range 8-13 mm. Sliding points for aluminum subframe use centering drill gauge with drill bit $\varnothing 4.1$ mm to obtain concentric hole [C/5]

Sliding points for Steel Subframe

- Sliding points for steel Subframe. Use centering drill gauge with drill bit $\varnothing 4.1$ mm to obtain concentric hole [C/5]
- SS Rivet, head $\varnothing 15$ mm,
4.0 x 18-K15, blank or powder coated, grip range 9-14 mm

- 1 Support profile
- 2 Swisspearl Largo Graviál 9/12 mm
- 3 Centering drill gauge
- 4 Fixed point sleeve, type 8
- 5 Rivet 4.0 x 18 - K15



Metal sub frame – Gravidal 9/12 mm facade panels – rivet distances

Characteristic value of wind suction (according to European standards)		Design value of wind suction (including a chosen safety coefficient of 1.5)		Recommendation for maximal spacing d (spacing between rivets / screws)			
kN/m ²	psf	kN/m ²	psf	Vertical panel (portrait)		Horizontal panel (landscape)	
				horizontally in	vertically in	horizontally in	vertically in
-0.7	-13.9	-1.0	-20.9	23 5/8"	28 9/16"	28 9/16"	20 7/8"
-1.0	-20.9	-1.5	-31.3	23 5/8"	23 1/4"	26 9/16"	20 7/8"
-1.3	-26.5	-1.9	-39.7	23 5/8"	19 5/16"	20 7/16"	20 7/8"
-1.8	-37.6	-2.7	-56.4	15 3/4"	19 5/16"	16 15/16"	14 9/16"
-2.3	-48.7	-3.5	-73.1	15 3/4"	16 1/2"	15 3/4"	14 9/16"
-2.7	-55.7	-4.0	-83.5	15 3/4"	13"	14 9/16"	14 9/16"
-3.3	-69.6	-5.0	-104.4	11 13/16"	14 9/16"	14 9/16"	11"
-4.0	-83.5	-6.0	-125.3	11 13/16"	13"	13"	8 5/8"

Above table is a guideline for 2 or more fasteners in vertical and horizontal direction. The spacings originate from 49.21" × 120.08" (1250 × 3050 mm) full size panels with equal distances between rivets. Data may be interpolated.

Metal sub frame – Gravial 9/12 mm facade panels – rivet distances

Engineering responsibility
 The spacings in above table are provided as indication. For the actual cladding design a locally licensed engineer shall assume responsibility for calculation and verification.

Panel data

- Modulus of elasticity
 MOE ca. 15,000 MPa
- Characteristic value of bending strength (average: lengthwise / crosswise) or MOR (average) 22.4 MPa
- Density > 1.8g/cm³

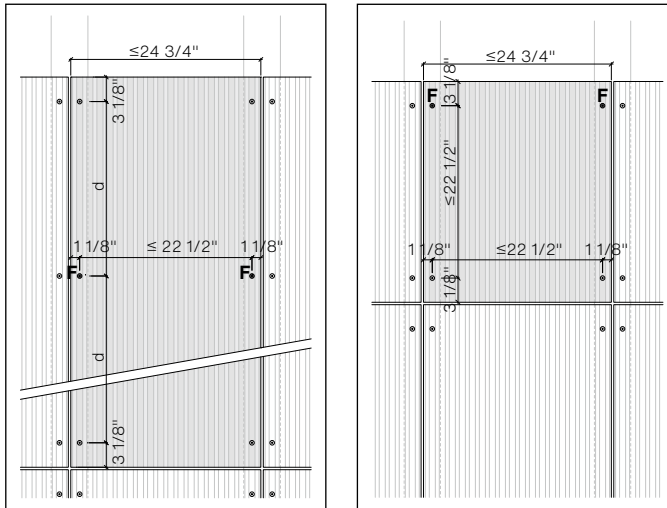
Characteristic values

Resistance of aluminum and steel rivets 4.0 × 18 K15

Position	Distance between fasteners (spacing)
	23 5/8"
Middle	2100 N
Edge	1350 N
Corner	1050 N

The data was evaluated according to ETAG 034 using 9/12 mm Gravial panel, and includes no safety factor. Diameter of panel hole must be 9.5 mm, and rivet head must be 15 mm. Min. thickness for steel profiles to be 1.27 mm, and 2 mm for aluminum. Edge distances 1 1/8" horizontally, 3 1/8" vertically. The data may be interpolated.

Single span no intermediate support



Single span

Fixed point $\varnothing 9.5 \text{ mm [F]}$

Sliding point $\varnothing 9.5 \text{ mm}$

Soffit panels

Fastener distances for soffit panels and suspended ceilings not to exceed $19 \frac{11}{16}''$.

- Fixed point $\varnothing 9.5 \text{ mm [F]}$
- Sliding point $\varnothing 9.5 \text{ mm}$

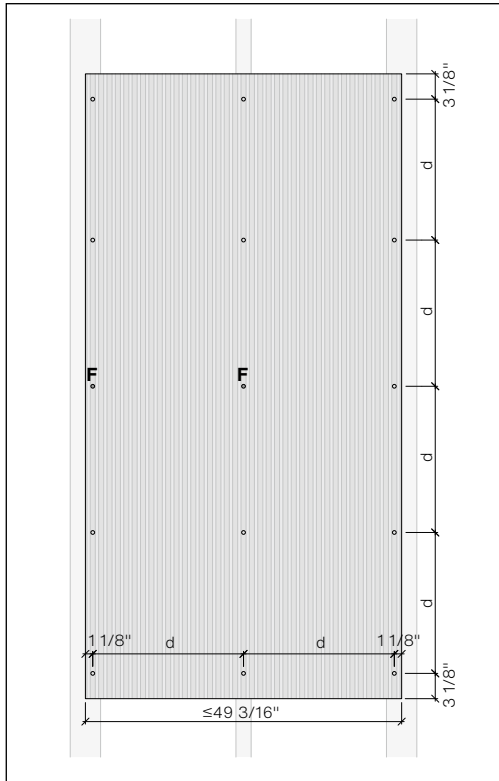
Max. distance between fasteners for single span panels 570 mm, unless smaller distances are required by high wind load as per table of fastener distances.

Ensuring horizontal panel expansion: For facades with multiple single-field panels installed side by side, the vertical aluminum substructure must be structurally separated in the horizontal direction every $9' 10 \frac{1}{8}''$.

Consult with technical advisor.

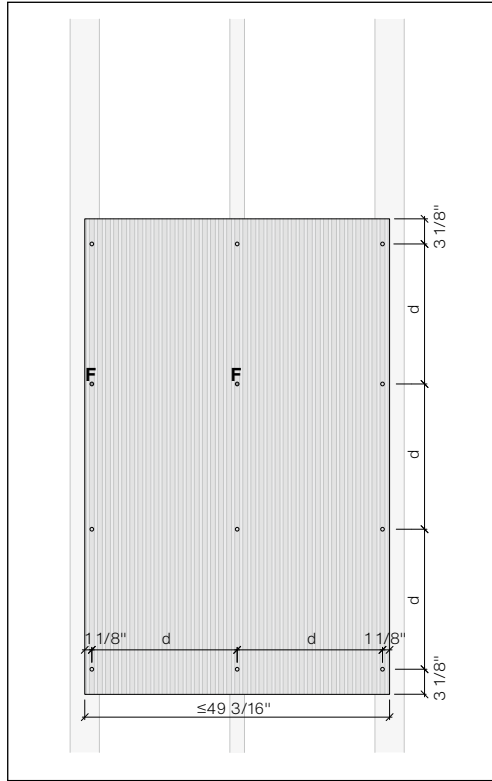
Sample rivet layouts, final layout to be determined by a local structural engineer.

Swisspearl Largo vertical panel (portrait)



Fixed points [F] center and left.

Swisspearl Largo vertical panel (portrait)



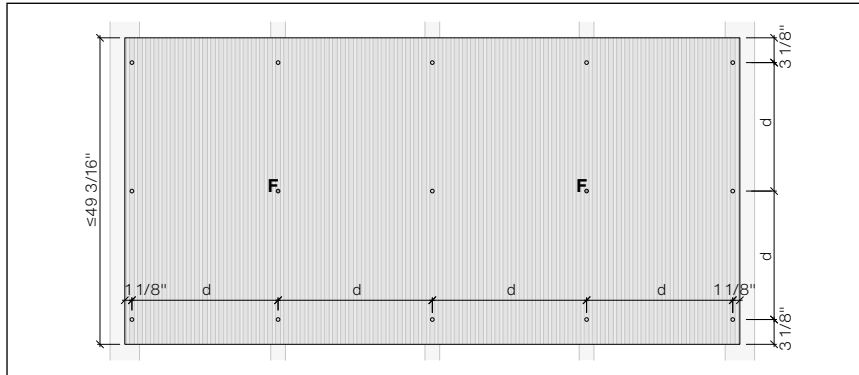
If no rivet at half height go with [F] to row above.

- Fixed point Ø9.5 mm [F]
- Sliding point Ø9.5 mm

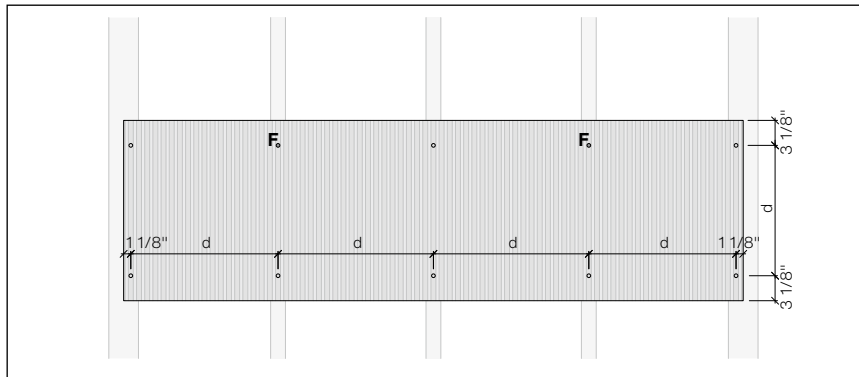
Design I Metal supports

Sample rivet layouts, final layout to be determined by a local structural engineer.

Swisspearl Largo horizontal panel for odd number of rivets



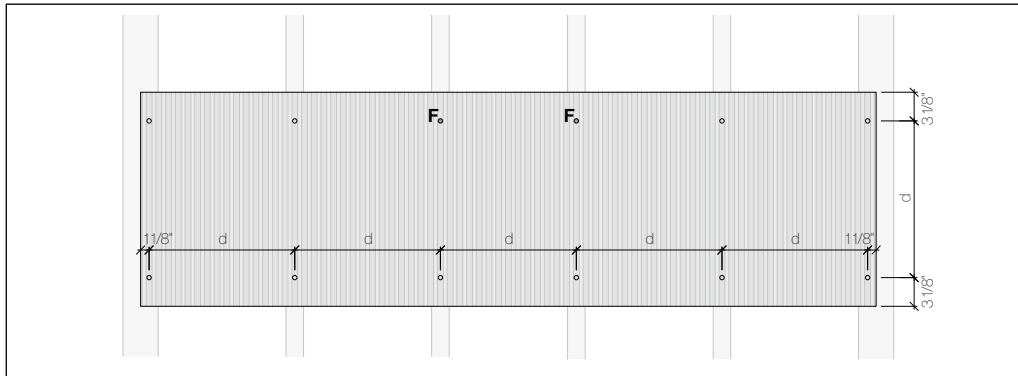
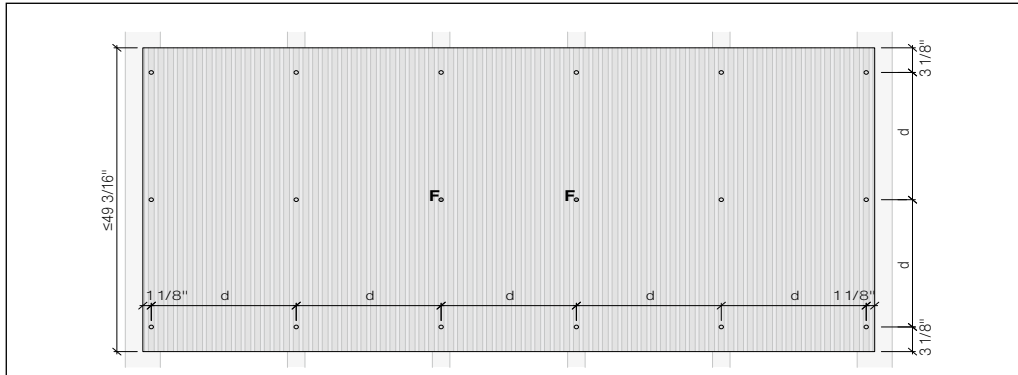
Between fixed points, the max. distance can be 1 sliding point



- Fixed point Ø9.5 mm [F]
- Sliding point Ø9.5 mm

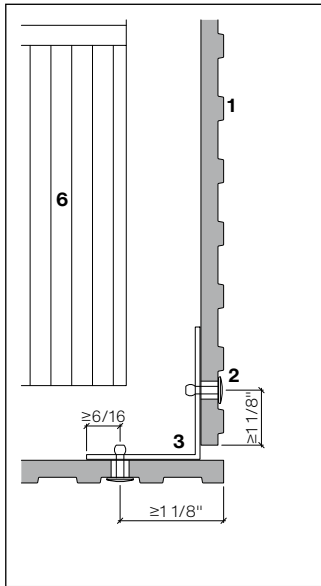
Sample rivet layouts, final layout to be determined by a local structural engineer.

Swisspearl Largo horizontal panel (landscape) for even number of rivets

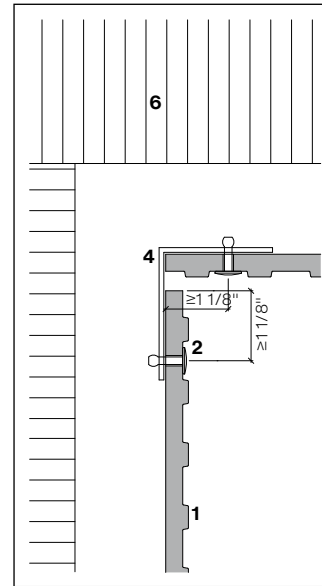
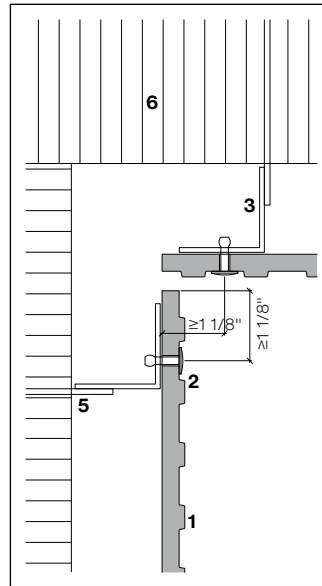


- Fixed point Ø9.5 mm [F]
- Sliding point Ø9.5 mm

Example outer corner



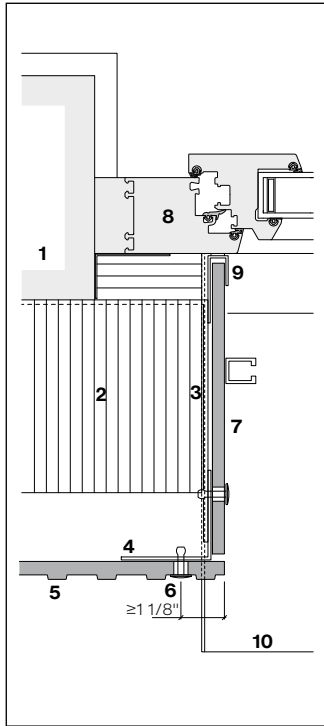
Example inner corner



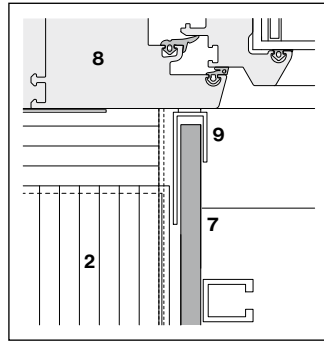
- 1 Swisspearl Largo Gravia 9/12 mm
- 2 Rivet 4.0 × 18-K15
- 3 Min. angle 2 1/4" × 2 1/4"
- 4 Min. angle 2 3/4" × 2 1/4"
- 5 Bracket
- 6 Thermal insulation

Corner angle not attached back to building as shown can be cantilevered up to 16".

Example window jamb



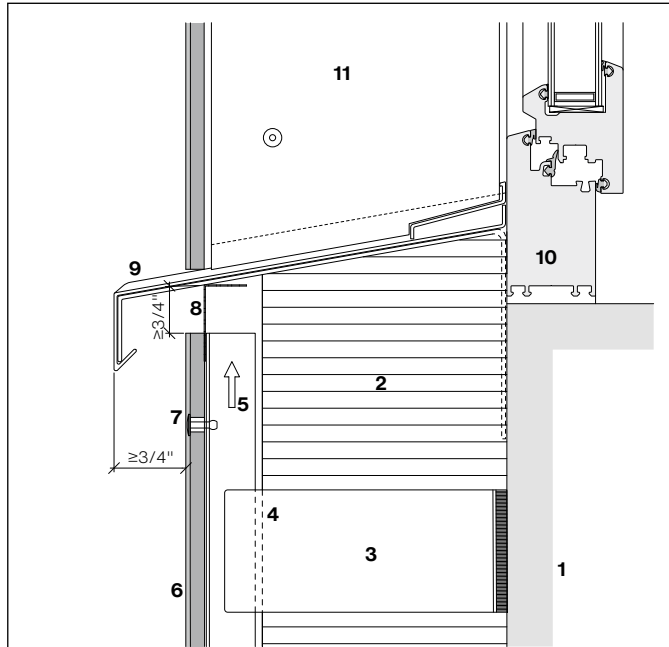
Jamb with 8 mm panel



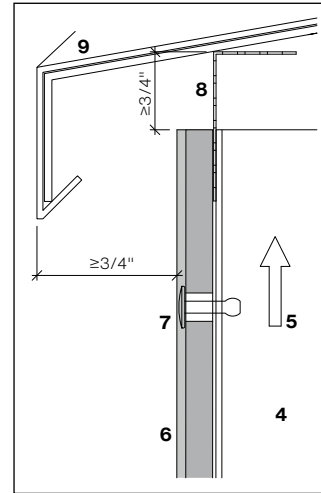
Window jamb with metal frame

- 1 Exterior wall
- 2 Thermal insulation
- 3 Horizontal support
- 4 Vertical support
- 5 Swisspearl Largo Gravidal 9/12 mm
- 6 Rivet 4.5 × 18 K15
- 7 Swisspearl Largo jamb board 8 mm
- 8 Window frame
- 9 U or F-profile with sealant
- 10 Window sill

Example window sill



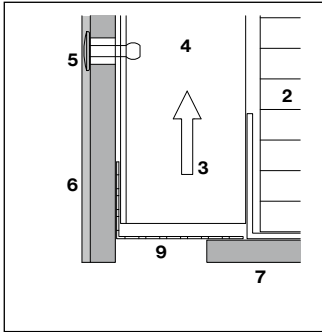
Window sill made of metal



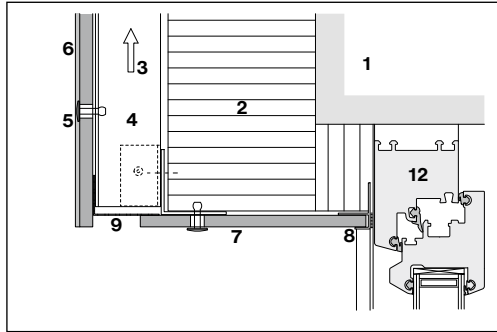
Sill detail

- 1 Exterior wall
- 2 Thermal insulation
- 3 Bracket
- 4 Vertical support
- 5 Ventilation cavity
- 6 Swisspearl Largo Gravidal 9/12 mm
- 7 Rivet 4.0 x 18-K15
- 8 Perforated angle
- 9 Window sill
- 10 Window frame

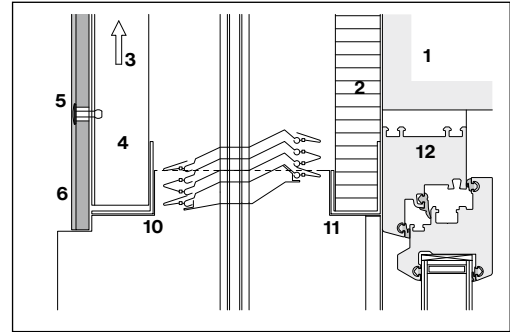
Example window head



Perforated angle



Metal framing around whole window

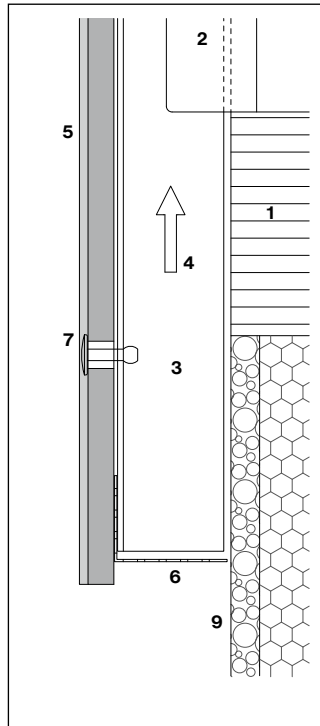
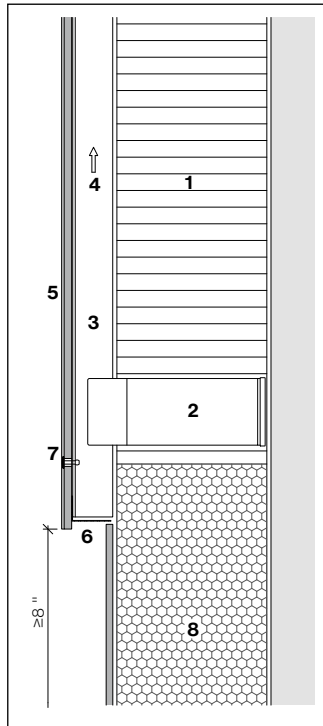


Head detail sun shutter

- 1 Exterior wall
- 2 Thermal insulation
- 3 Ventilation cavity
- 4 Vertical support
- 5 Rivet 4.0 × 18-K15
- 6 Swisspearl Largo Gravidal 9/12 mm
- 7 Swisspearl Largo 8 mm

- 8 U or F-profile
- 9 Perforated angle
- 10 Reinforcing profile
- 11 Angle profile insulation
- 12 Window frame

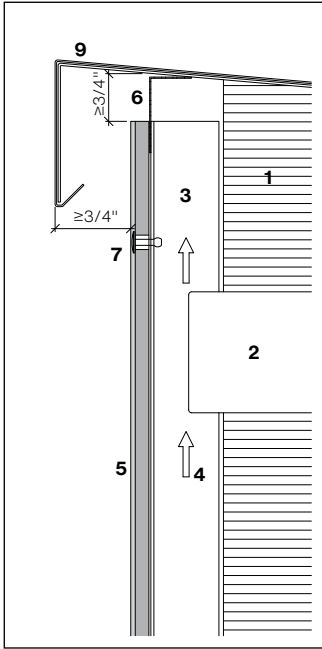
Example bottom detail



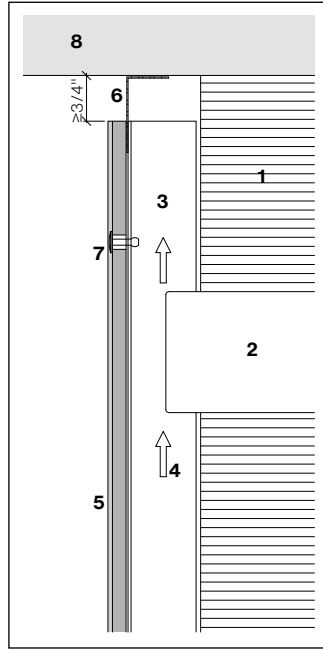
- 1 Thermal insulation
- 2 Bracket
- 3 Vertical support
- 4 Ventilated cavity
- 5 Swisspearl Largo Gravier 9/12 mm
- 6 Perforated angle
- 7 Rivet 4.0 × 18-K15
- 8 Thermal insulation
- 9 Thermal insulation water resistant

In order to avoid damage, it is advised to keep a min. distance of 8" from bottom of the panel to the ground.

Example coping detail



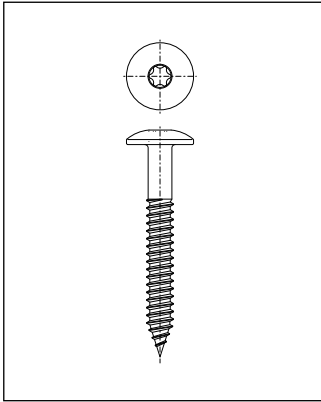
Coping detail



Details under slab

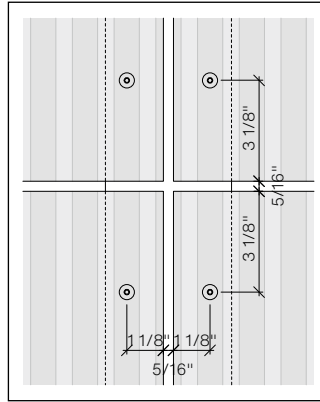
- 1 Thermal insulation
- 2 Bracket
- 3 Vertical support
- 4 Ventilated cavity
- 5 Swisspearl Largo Gravial 9/12 mm
- 6 Perforated angle
- 7 Rivet 4.0 × 18-K15
- 8 Soffit
- 9 Coping

Swisspearl screw



Swisspearl screw, stainless steel, saucer head \varnothing 12 mm, T20 drive, 4.8 x 38 mm.

Distances to panel edge



Panel hole

Diameter 5.5 mm

Standard edge distances

Horizontally 1 1/8"

Vertically 3 1/8"

Minimum edge distances

Horizontally 1 1/8"

Vertically 2 3/8"

Maximum edge distance

Horizontally and vertically max. 4"

Panel joints

Typical panel joint is 5/16", this allows panel scraps to be used as spacers. Wider joints will make any inaccuracies in the installation less noticeable.

Installation

The screws must be installed with depth stop at 90 degrees set to the panel. The screw head must rest flush to the panel.

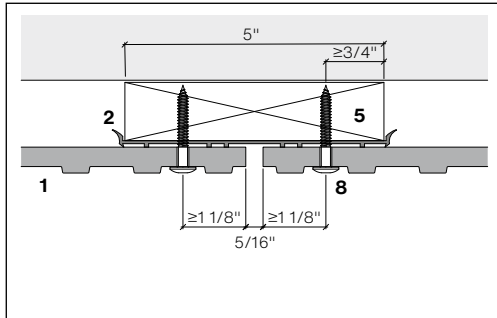
Sub-frame engineering

Engineer / contractor is responsible for the design and installation of all sub framing parts including all pertaining fasteners.

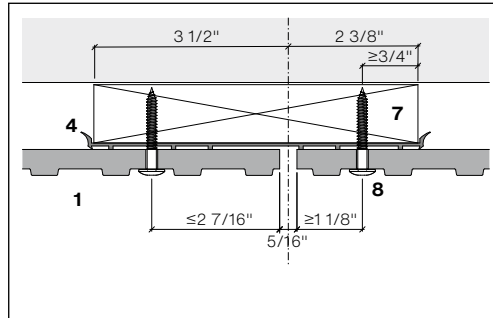
Timber battens

Straight grown pine, dry (max. 20% moisture content). Grade No. 2.

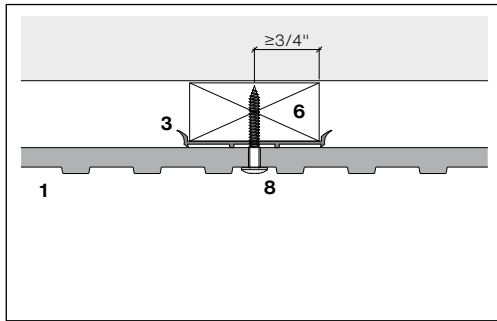
Fastening on timber battens



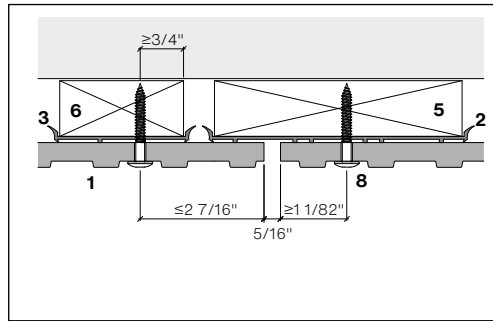
Timber Battens 120 mm
Continuous Graviol grid



Timber battens 150 mm
Individual Graviol grid



Timber Battens 60 mm
Continuous Graviol grid



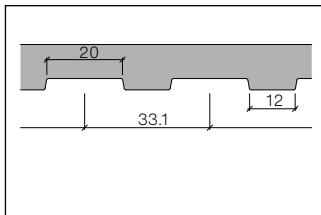
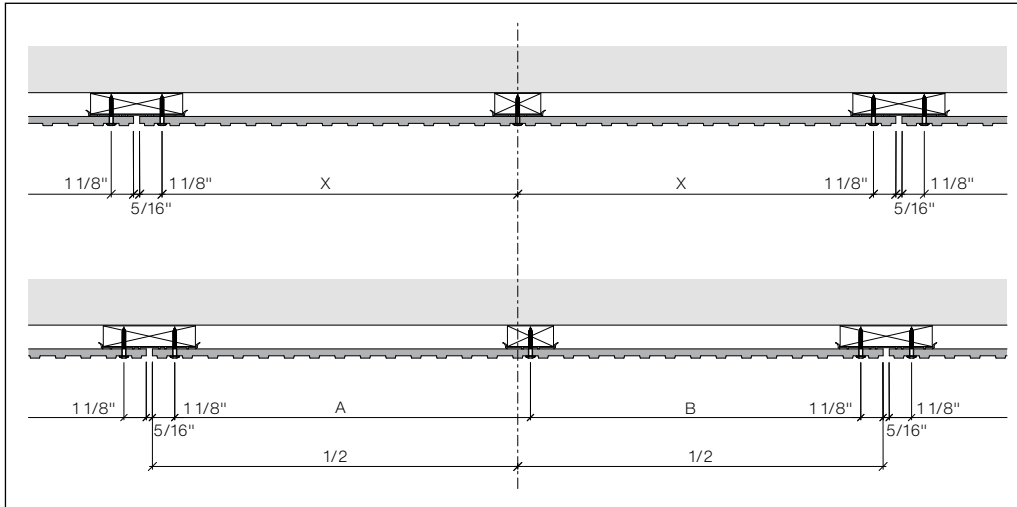
Timber battens 120 mm and 60 mm
Individual Graviol grid

- 1 Swisspearl Largo Graviol 9/12 mm
- 2 EPDM band 120 mm
- 3 EPDM band 60 mm
- 4 EPDM band 150 mm
- 5 Battens 3/4" x 5"
- 6 Battens 3/4" x 2 1/2"
- 7 Battens 3/4" x 150 mm
- 8 Screw T20 4.8 x 38 mm

Joint formation

For individual vertical joints, the vertical joint battens (120 mm / 150 mm) must be offset by 30 mm from the layout axis.

Panel planning



Detail engraving Gravial grid

Installation planning

The arrangement of the sub-frame will always depend on the grid of the engraving.

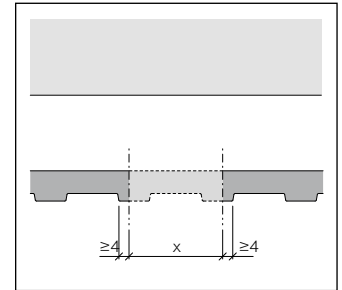
Calculation example:

Panel width minus lateral edge distance due to raster engraving = number of millings

Even = X

Uneven = A; B

Jobsite fabrication



Onsite Gravial fabrication

Gravial cutting

When Gravial panels are cut on site, please note that minimum edge distance of 4 mm remains.

All cut edges must be afterwards treated with Luko sealant.

Timber battens

Installation over timber battens is allowed provided the design meets local engineered codes and standards.

Timber quality

Battens must be thickness-gauged to 1 face:

- Thickness min. 3/4"
- Always use planed surface timber
- Solidity class II (FK II/C24)
- Recommended only using kiln-dried lumber
- Moisture content max. 20%
- Timber must be of equal or higher quality

Min. vertical battens

At panel joints:
 2 pieces 3/4" x 2 1/2 " or
 1 piece 3/4" x 5"
 Intermediate supports:
 3/4" x 2 1/2"

Engineering

Battens including their attachment to be engineered per local standards.

Battens screw

Screw Ø min. 6 mm
 Head Ø min. 12 mm
 For battens wider than 2 1/2" use two screws per point of attachment. Rear ventilation, thermal insulation, moisture proofing, wind proofing layers. All local standards are applicable and must be complied with.

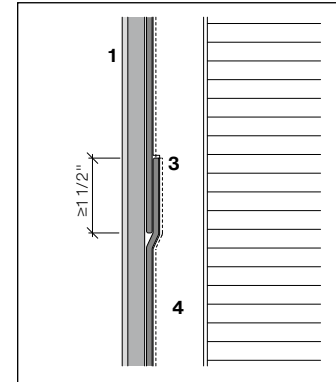
Joint flashing

Horizontal joint flashing and L-flashing should be fabricated 1/16" shorter than the panel width so that they are not visible at vertical joints. Where required, flashing pieces shall be butt-jointed over battens; do

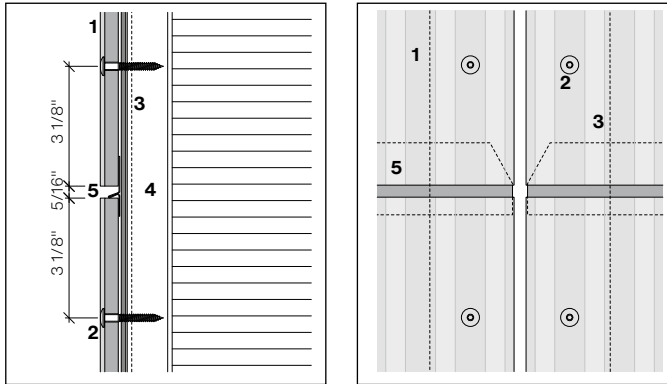
L-flashings and horizontal joint flashing are not 100% waterproof! Therefore all timber battens must be fully covered by EPDM bands to protect them against moisture and to prevent rotting and the growth of fungi and mold.

EPDM strips

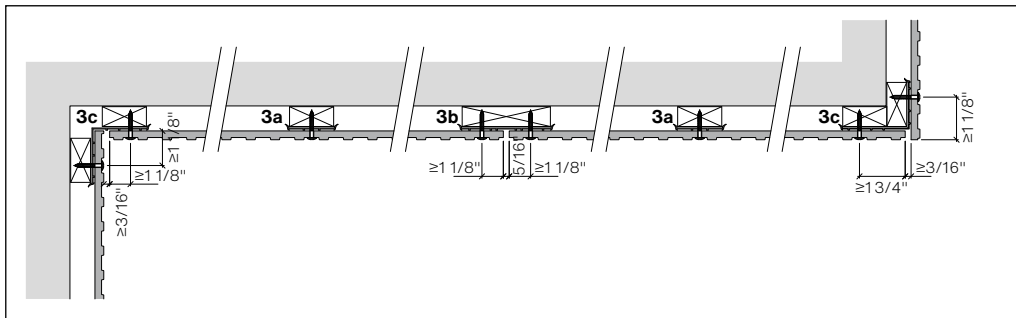
All timber battens must be fully covered by EPDM backing strips stapled to the battens. Stapled at the edges of the bands. EPDM strips to be in one single piece top to bottom or overlapped as per diagram.



Horizontal panel joint

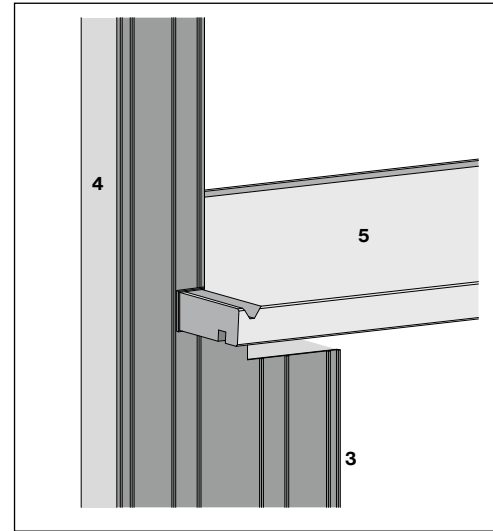
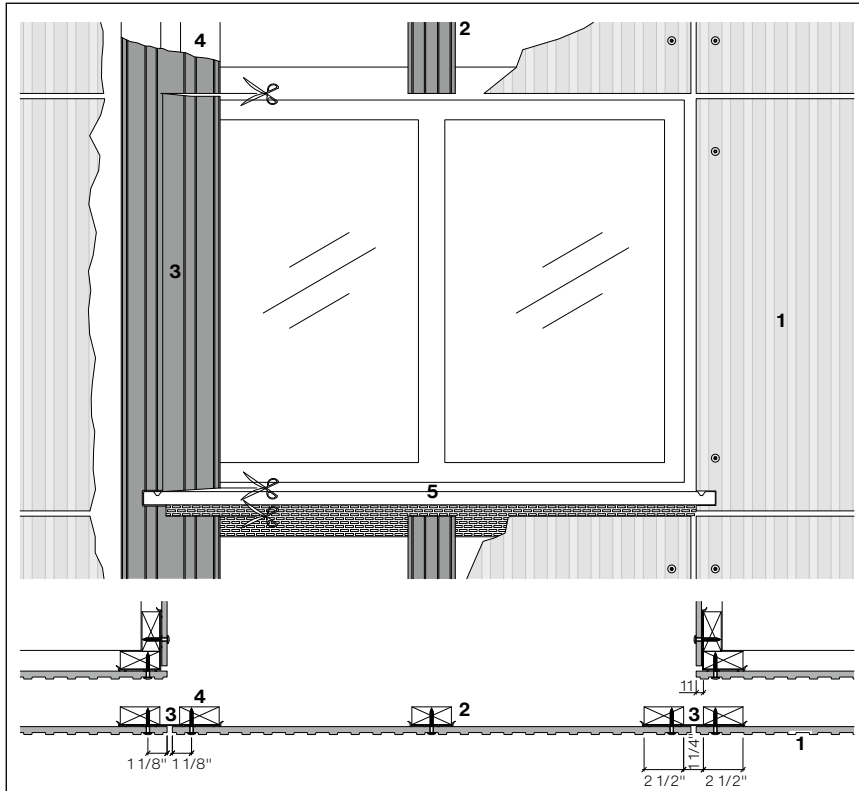


Horizontal section through vertical battens



- 1 Swisspearl Largo Gravia 9/12 mm
- 2 Screw
- 3a EPDM band 60 mm
- 3b EPDM band 120 mm
- 3c EPDM band 150 mm
- 4 Batten 3/4" x 2 1/2", 3/4" x 5"
- 5 Joint flashing

Vertical joint at window



- 1 Swisspearl Largo Gravail 9/12 mm
- 2 EPDM band 60 mm
- 3 EPDM band 150 mm
- 4 Batten 3/4" x 2 1/2"
- 5 Swisspearl window sill

Timber battens – Graviat 9/12 mm facade panels – screw distances

Characteristic value of wind suction (according to European standards)		Design value of wind suction (including a chosen safety coefficient of 1.5)		Recommendation for maximal spacing d (spacing between rivets / screws)			
kN/m ²	psf	kN/m ²	psf	Vertical panel (portrait)		Horizontal panel (landscape)	
				horizontally in	vertically in	horizontally in	vertically in
-0.7	-13.9	-1.0	-20.9	23 5/8"	28 9/16"	28 9/16"	20 7/8"
-1.0	-20.9	-1.5	-31.3	23 5/8"	23 1/4"	26 9/16"	20 7/8"
-1.3	-26.5	-1.9	-39.7	23 5/8"	19 5/16"	20 7/16"	20 7/8"
-1.8	-37.6	-2.7	-56.4	15 3/4"	19 5/16"	16 15/16"	14 9/16"
-2.3	-48.7	-3.5	-73.1	15 3/4"	16 1/2"	15 3/4"	14 9/16"
-2.7	-55.7	-4.0	-83.5	15 3/4"	13"	14 9/16"	14 9/16"
-3.3	-69.6	-5.0	-104.4	11 13/16"	14 9/16"	14 9/16"	11"
-4.0	-83.5	-6.0	-125.3	11 13/16"	13"	13"	8 5/8"

Above table is a guide line for 2 or more fasteners in vertical and horizontal direction. The spacings originate from 49.21" × 120.08" (1250 × 3050 mm) full size panels with equal distances between screws. Data may be interpolated.

Engineering responsibility

The spacings in above table are provided as indication. For the actual cladding design a locally licensed engineer shall assume responsibility for calculation and verification.

Panel data

- Modulus of elasticity
MOE ca. 15,000 MPa
- Characteristic value of bending strength (average: lengthwise / crosswise) or MOR (average) 22.4 MPa
- Density > 1.8g/cm³

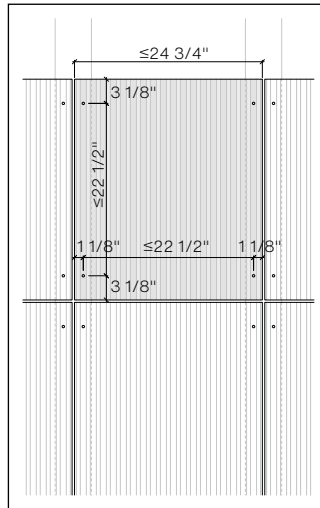
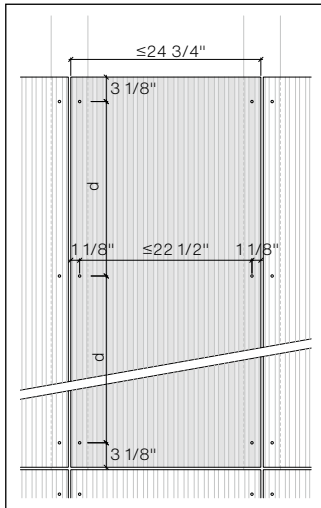
Characteristic values

Resistance of screws 4.8 × 38 Ø 12 mm

Position	Distance between fasteners (spacing)
	23 5/8"
Middle	2350 N
Edge	1300 N
Corner	900 N

The data was evaluated according to ETAG 034 using 9/12 mm Gravial panel, and includes no safety factor. Diameter of panel hole must be 5.5 mm, and screw head must be 12 mm. Minimum screw engagement in timber to be 1 1/16". Edge distances 1 1/8" horizontally, 3 1/8" vertically. The data may be interpolated.

Single span panel (no intermediate support)



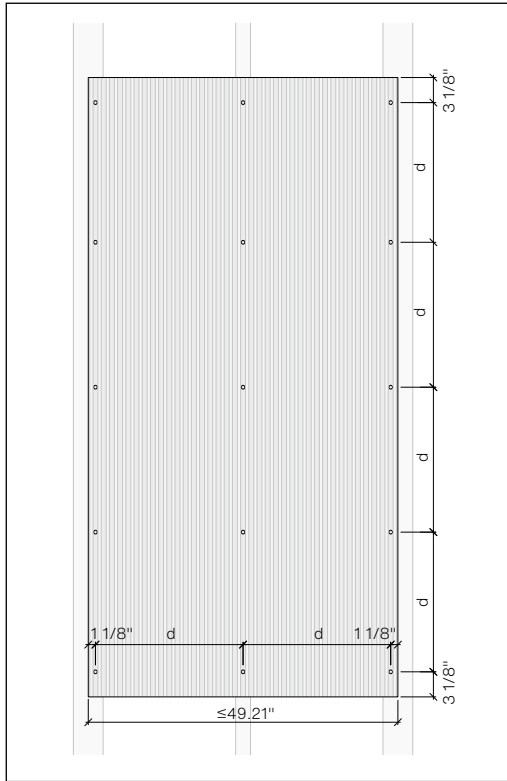
Soffit panels

Fastener distances for soffit panels and suspended ceilings not to exceed $19 \frac{11}{16}''$.

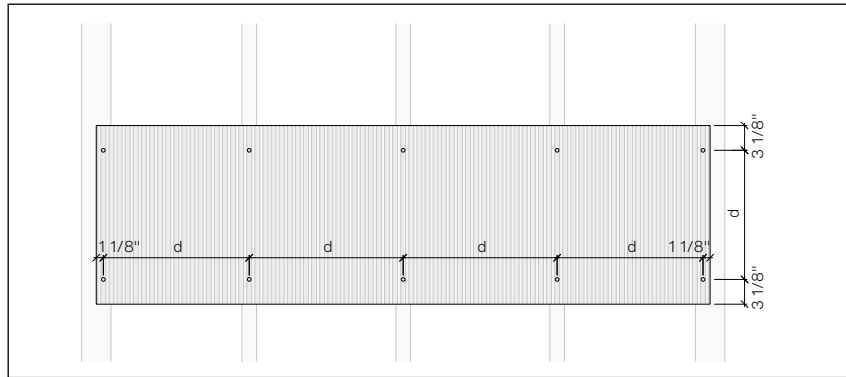
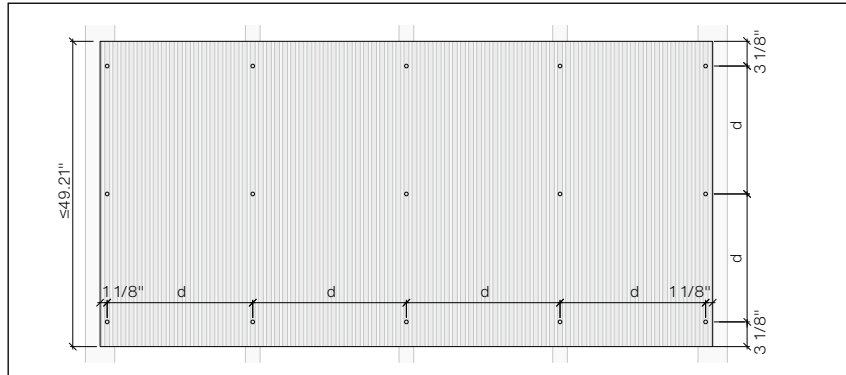
Max. distance between fasteners for single span panels $22 \frac{1}{2}''$, unless smaller distances are required by high wind load as per table of fastener distances.

Sample screw layouts, final layout to be determined by a local structural engineer.

Swisspearl Largo vertical panel (portrait)

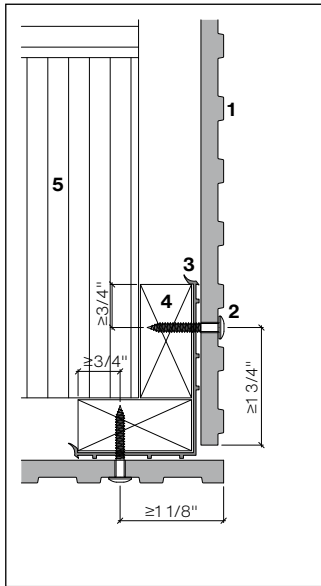


Swisspearl Largo horizontal panel (landscape)

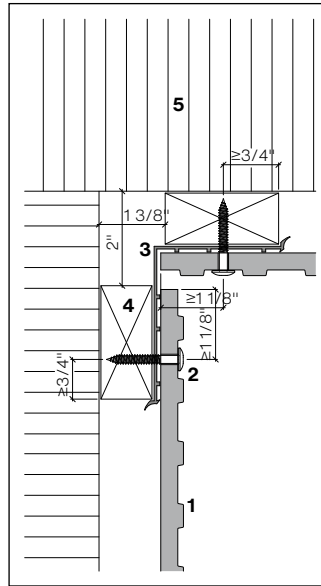


Drill holes \varnothing 5.5 mm

Swisspearl Largo example outer corner



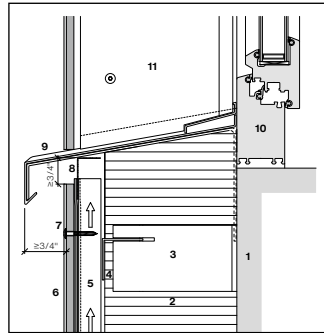
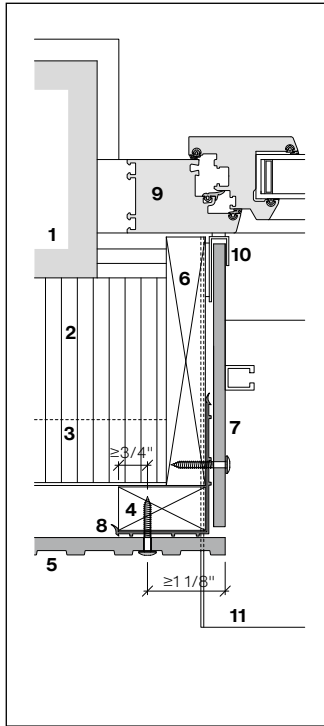
Swisspearl Largo example inner corner



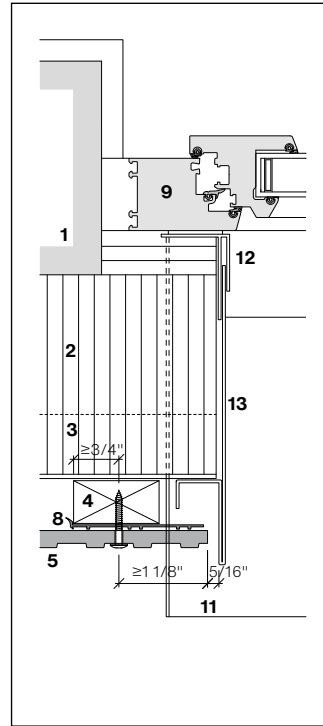
- 1 Swisspearl Largo Gravia 9/12 mm
- 2 Swisspearl Screw 4.8 × 38 mm
- 3 EPDM band 150 mm
- 4 Batten 3/4" × 2 1/2"
- 5 Thermal insulation

Batten configuration to building corner as shown above with the use of 150 mm EPDM.

Example window jamb



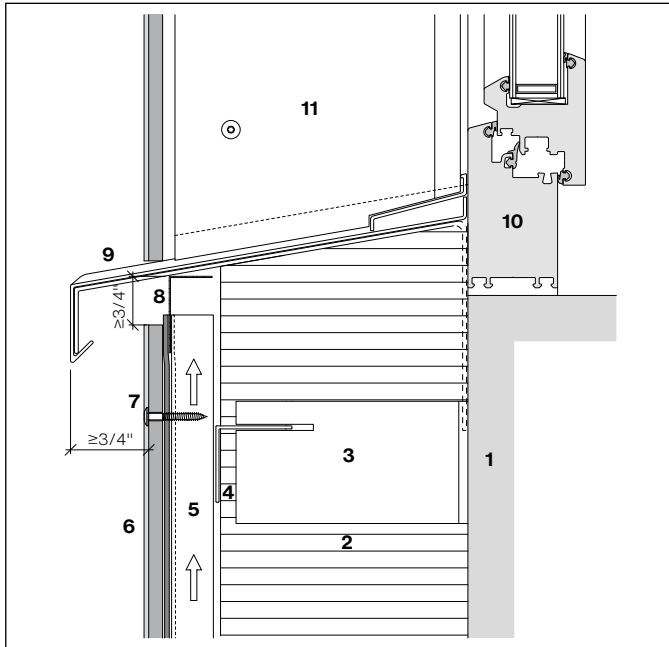
Window detail



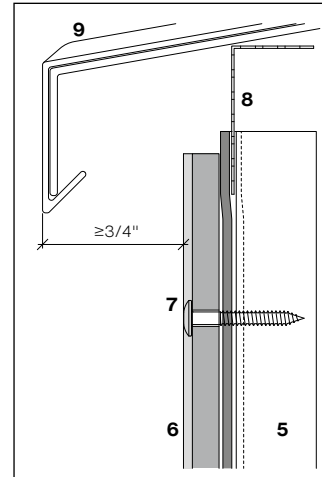
- 1 Exterior wall
- 2 Thermal insulation
- 3 Horizontal support
- 4 Vertical support
- 5 Swisspearl Largo Graviol 9/12 mm
- 6 Jamb board
- 7 Swisspearl Largo jamb board 8 mm
- 8 EPDM band 150 mm
- 9 Window frame
- 10 U or F-profile
- 11 Window sill
- 12 F-profile connection with seal
- 13 Plug frame

Jamb with 8 mm panels

Example window sill



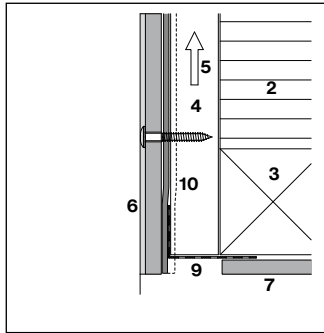
Window sill made of metal



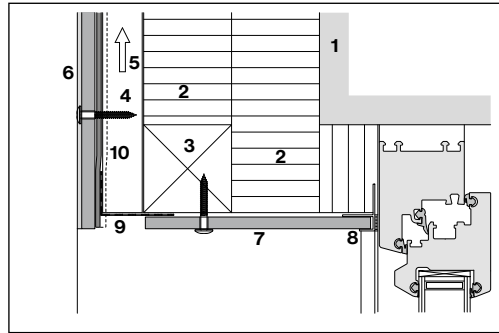
Sill detail

- 1 Exterior wall
- 2 Thermal insulation
- 3 Vertical support
- 4 Horizontal support
- 5 Vertical support
- 6 Swisspearl Largo Gravia 9/12 mm
- 7 Screw 4.8 × 38 mm
- 8 Perforated angle
- 9 Window sill
- 10 Window frame

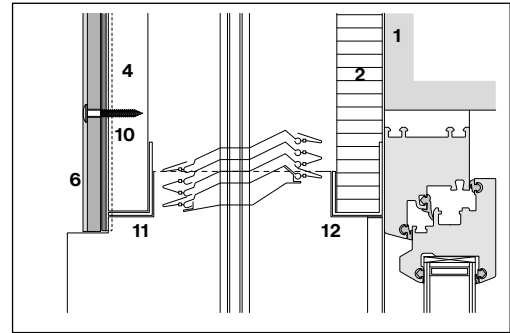
Example window head



Perforated angle



Metal framing around whole window

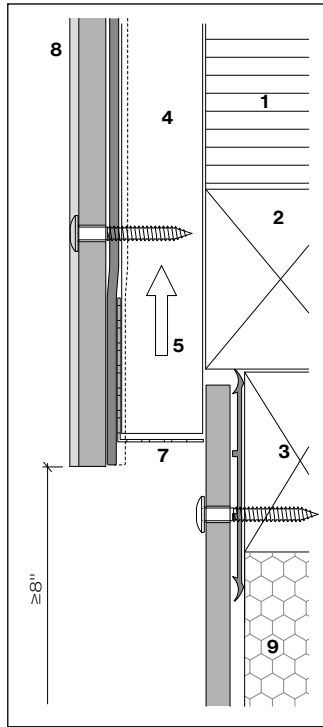


Head detail sun shutter

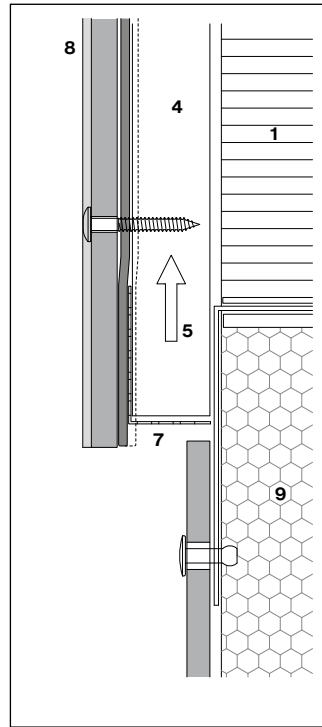
- 1 Exterior wall
- 2 Thermal insulation
- 3 Horizontal support
- 4 Vertical support
- 5 Ventilation cavity
- 6 Swisspearl Largo GraviaI 9/12 mm
- 7 Swisspearl Largo 8 mm

- 8 U or F-profile with sealant
- 9 Perforated angle
- 10 EPDM band
- 11 Angle profile
- 12 Angle profile insulation

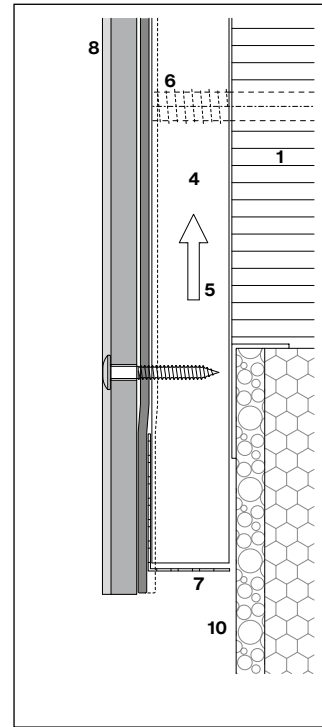
Example bottom detail



Timber / timber



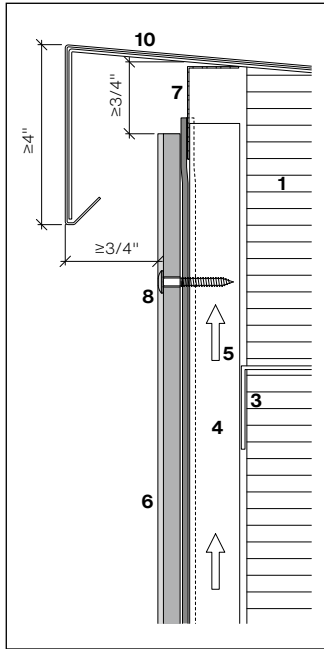
Timber / metal



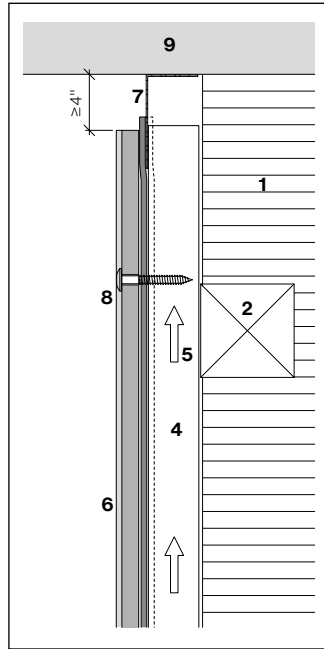
Timber verticals with spacer screw

- 1 Thermal insulation
- 2 Horizontal batten
- 3 Horizontal support
- 4 Vertical support
- 5 Ventilated cavity
- 6 Spacer screw
- 7 Perforated angle
- 8 Swisspearl Largo Gravail 9/12 mm
- 9 Thermal insulation water resistant
- 10 Thermal insulation

Example coping detail



Coping detail



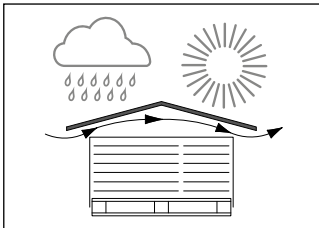
Detail under slab

- 1 Thermal insulation
- 2 Horizontal batten
- 3 Horizontal support
- 4 Vertical support
- 5 Ventilated cavity
- 6 Swisspearl Largo Gravia 9/12 mm
- 7 Perforated angle
- 8 Screw
- 9 Soffit
- 10 Coping

Onsite storage

Pallets must be stored under cover i.e. out of the rain and direct sunlight. Where this is not possible, store under tarp. Ingress of water into stacked panels will cause permanent staining to panel surface. Excess heat to stacked panels can cause damage to panel surface. Overseas pallets can be stacked 3 on top of each other.

Provisional roofing or tarp covers are to be used in a manner that allows cross ventilation as shown.



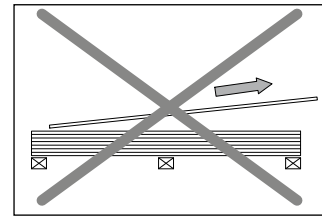
Fabricating panels at local fabricators or on site

Always work out of the weather. Cutting panels to size:

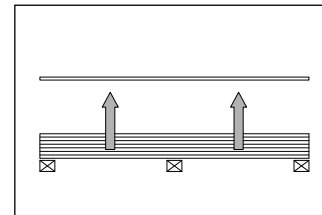
- Use industrial vertical panel saw for large quantities
- For small quantities use circular hand saw with straight edge and dust extraction
- Panel cut outs, etc. use jig saw
- Cutting blade supplied by factory or procured locally; considering cutting quality, performance, costs
- Dust from fabricating on site must be removed immediately
- Avoid tools which produce fine dust

Stacking panels on site

- Always stack the panel horizontally on pallet base
- Each stack should not be more than 20"
- Use foam protection layer between the panels (as supplied by factory)
- 3 stacks on top of each other



Do not pull panel across...



...but lift up vertically

Pallet sequence

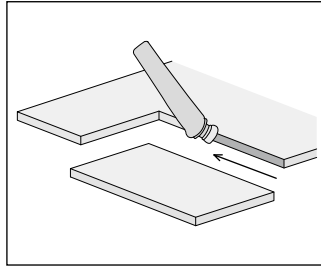
It is recommended to order the panels cut and pre-drill according to their sequence in order to save time while installing.

Panel fabrication on site

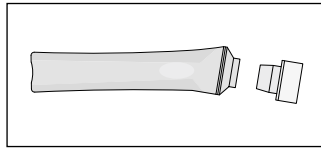
For long cuts use multifunction table with circular hand saw, guide rail and dust extractor. Saw blade supplied by panel manufacturer or at own choice.

Cut outs

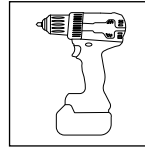
For smaller cut outs or odd shapes use pendular jig saw. For drilling use spiral drill bits on site storage $\varnothing 9.5$ / $\varnothing 5.5$ mm (metal / timber supports) with carbide metal tips supplied by panel manufacturer or procured locally.

Sealer to cut edges

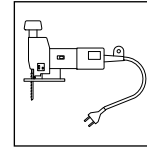
All cut edges must be sealed with impregnation liquid LUKO. Immediately wipe Luko off the face of the material.

LUKO hand applicator

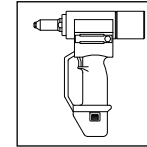
LUKO filled in hand applicators is frost proof to -8°C (18°F). LUKO supplied in 1 liter bottles is not frost proof but dries faster (for fabrication in workshop).

Tools

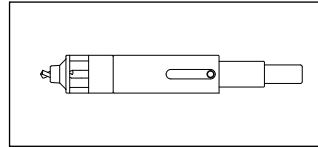
Drill



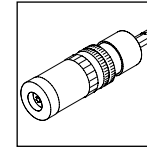
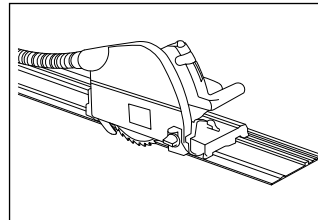
Jig saw



Rivet gun



Center drill gauge

Depth stop Gravial
(mandatory for
timber sub-frame)Circular hand saw with guide rail and
dust extraction

Swisspearl Gravial

Including those panels with a special Facade or Roof coating.

Cleaning procedures

Remove dust immediately after fabricating panels.

Dry dust

To be removed with a vacuum cleaner, or with a clean, dry and soft cloth or brush.

Wet dust

Results in staining the panel surface. It must be removed immediately, using plenty of water and a sponge or soft brush.

Cleaning of completed claddings

Non-calcium based stains:

- Use high pressure cold water at max. 1160 PSI (minimum distance from panel 10"). Use flat fan spray nozzle, dirt blasters are not allowed. Test on inconspicuous part of cladding prior to complete cleaning.
- If required use mild soap or dish- washing liquid. Do not use abrasive or solvent containing cleaning agents
- Do not use glass cleaning detergents!
- Never wash claddings in direct sunlight with alkaline or acid cleaners, as the detergent may cause irreversible stains

Calcium based stains:

- Apply a mist spray of a solution of 9.5% acetic acid and water
- Allow to react a few minutes but do not let dry out
- Use high pressure cold water to rinse cladding

Repeat steps 1 to 3 on difficult stains.

Cleaning during service life

Normally no cleaning will be needed since the rain will periodically wash away dust, environmental dirt, etc. However, if particular environmental conditions lead to a dirty surface, wash with garden hose or high pressure cold water.

The installation of Gravial panels is thought as vertical grids, in order to avoid dust sitting on the engravings. Should a horizontal grid be considered, technically possible, keep in mind that dust might sit and stain the panels.

Organic growth

Remove algae / fungi with a 5% solution of hydrogen peroxide (H₂O₂) to eliminate all spores.

Masking tape

For the use of masking tape on panels it should be noted that most common masking tapes are not resistant to UV rays. Such tapes leave behind residues, that cannot be removed without causing damage to panel surface. However the use of the following masking tapes is recommended:

- Masking tape 3M Blue 2090 for temporary application (1 - 2 weeks)
- Masking tape 3M Gold 244 for longer term application.



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