

AG-TUF® Installation Guide

Indoor Corrugated PVC Liner Panel

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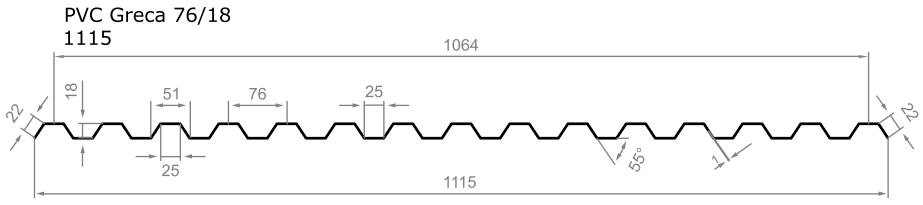
WARNING

Do not use sealing or bonding materials that are not approved specifically by Palram. Expanded polyurethane is not recommended for use in AG-TUF Installation. Extensive use of this material will render the sheets fragile at the area of contact through mechanical bond effect.

When in doubt, consult your Palram Distributor.

Profile Dimensions

Distance Between Corrugations	Rib Depth	Panel Width	Number of Corrugations	Coverage	Overlap	Overlap
[mm]	[mm]	[mm]		[mm]	[Corrugations]	[%]
76	18	1115	15	1064	1	6.8



Distance Between Supports (ceiling purlins & wall girts)

Panel Thickness	Theoretical Weight	Ceiling Supports Distance	Wall Supports Distance
[mm]	[g / m2]	[mm]	[mm]
1.2	2000	1200	1200

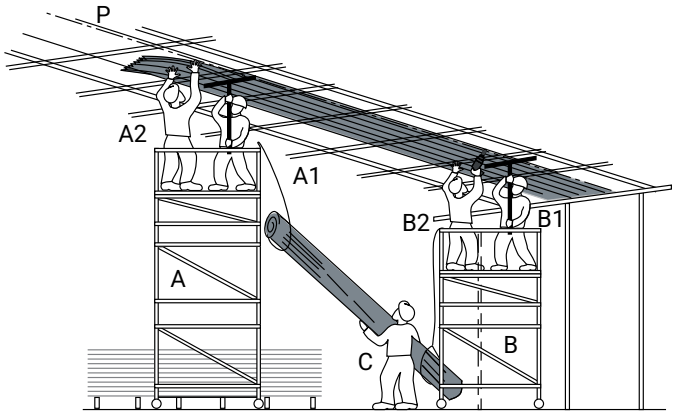
* Installations with purlin spacing greater than 1,200mm may result in increased deflection (sagging).

- The dimensions depicted in the table above do not supersede any requirements of local construction codes. Before installation, check local building codes for relevant specifications and recommendations. Follow local codes at all times. The support distances depicted are based on the typical structural properties with sheet deflection by dead load and thermal expansion factors taken into consideration, according to customary construction practice for internal lining materials.
- The maximum recommended panel length is up to 7 m. Longer panels could be supplied on special demand.
- Instead of longer panels, consider lapping panels to achieve desired length.

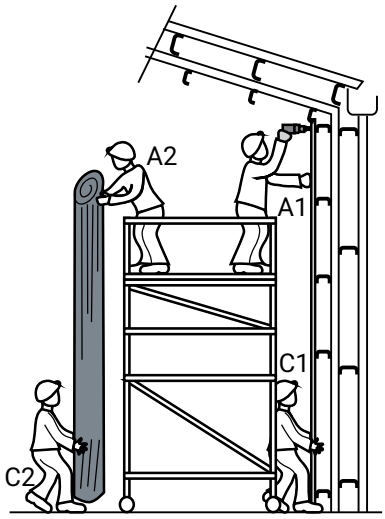
Positioning the Panels

- The panels may be installed on ceilings with the corrugations parallel or perpendicular to the direction of the main supporting structure, providing the purlins are prepared as depicted, perpendicular to the corrugations.
- When the ceiling is sloped, Palram recommends installing panels with the corrugation in the direction of the slope.
- Never try to adapt the AG-TUF panel to a wider or narrower dimension by stretching & forcing the corrugations in or out during installation. Such an action distorts the panel, inducing undue internal stresses leading to crazing and eventual failure.
- To minimize the possibility of warp and deformation, Palram recommends installing the panels after they have been acclimated. The panels should be stored inside the interior space in which they have to be installed until their temperature is equalized to the ambient temperature inside the structure. This way there will be no warp through drastic changes of thermal expansion/contraction.
- When installing AG-TUF panels vertically on walls or horizontally sloped on ceilings, start installation at the bottom and work up toward the wall eave or ceiling top. Be sure to maintain the correct fastening sequence. Commence at bottom edge, at right or left side & proceed to the left (or right) and up. It is possible to start in the middle and work both ways toward the ends. Never fasten both edges first and then work towards the middle; this will result in undue slack and wavy appearance.
- Recommended method and installation steps of AG-TUF on ceilings:
  1. An installation crew of 5 or 6, two teams (A & B) on mobile scaffoldings, 2 workers on each, with a ground team C to prepare and hand out the lining panel for installation. The panel will be lifted by ropes either at with clamps holding the edge, or rolled into a tube.
  2. A plumb line P will be put up, to mark the precise starting position and direction.
  3. B1 of team B will hold one end of the panel against the 1ST bottom purlin, while B2 along with team A aligns the panel along the plumb-line and holds it taut, in place.
  4. With the panel aligned and taut, B2 will fasten the panel's edge to the purlin. Next, with team A stationary, holding the liner edge against the last purlin, the ground crew will push team B's tower under the subsequent purlin, the fastening process repeated and so on.
  5. The liner should always be kept flush and taut during positioning and fastening. A slack panel during installation will result in deformation and wavy appearance.
  6. It is also possible to begin installation in the middle of a panel and proceed to both sides. Never commence installation from both ends towards the middle. It may result in imprecise execution and undue slack.
  7. When more than one-length panel is required for ridge to eave, or eave to floor cladding, follow instructions in paragraph D Overlap part 1.
  8. Horizontal installation on walls should work out virtually the same (with necessary adjustments).
  9. Vertical wall cladding can be done with team A1-A2 on a tower and ground crew C1-C2. Installation can be begin from the bottom up or vice versa. Working from the top down is more logical and easier. However, when more than one panel is required, always begin with the bottom array and proceed upward.
- Use only approved scaffoldings, lifting devices and equipment, for safe and efficient work.
- For safety sake, do not leave partly installed panels unattended until all the required fasteners have been placed and properly tightened.

Ceiling installation



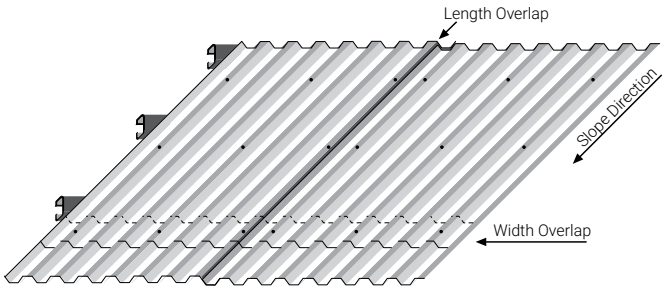
Wall installation



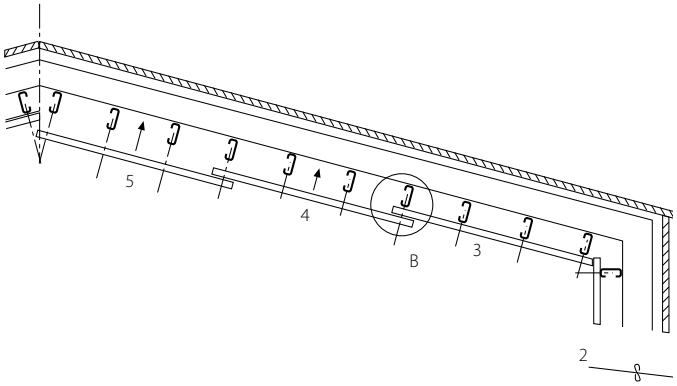
Overlap

- **End-Lap** (at panel's short edges):
  Minimal recommended overlap - 100 mm. Minimum distance of 50 mm from each panel edge to the centre line of the support (line of fasteners).
  Maximum overlap 200mm. Always install the lower panels array first, and lap with the upper panels, so the drip down the slope or wall does not penetrate into the ceiling or wall cavity and wet the insulation.
- **Side-Lap:** One corrugation.
- **Panel's Edge Overhang:** The panel's edge should not extend more than 100 mm from the centre line of edge support on both sides. Minimal extension - 50 mm.
- **Overlap Seals**: In wash areas or extremely wet conditions, Palram recommends installation of butyl-rubber sealing strip along the whole length of side lap or end lap corrugations.

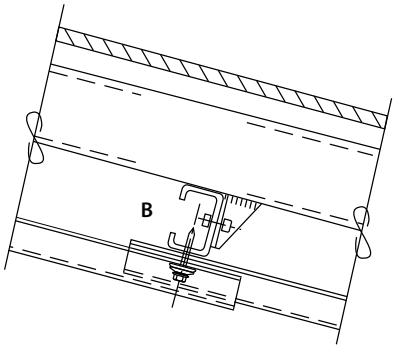
Ceiling installation & fasteners positions



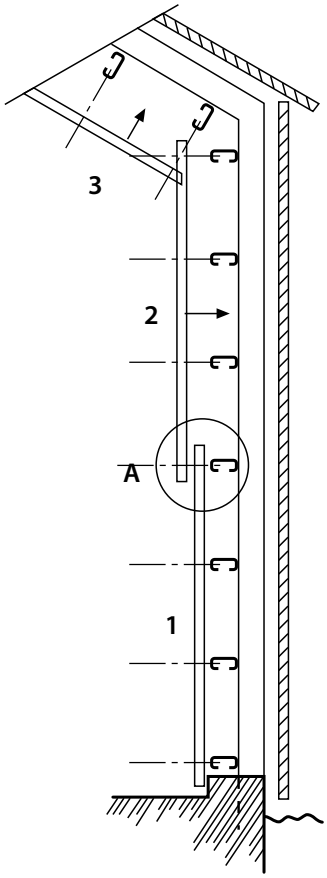
Ceiling array installation sequence 3-4-5



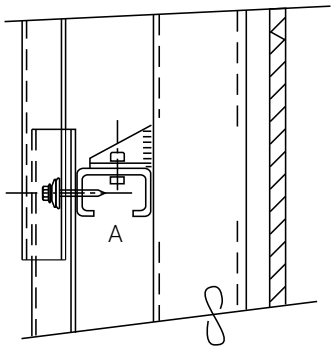
Detail B



Wall array installation sequence 1-2-3

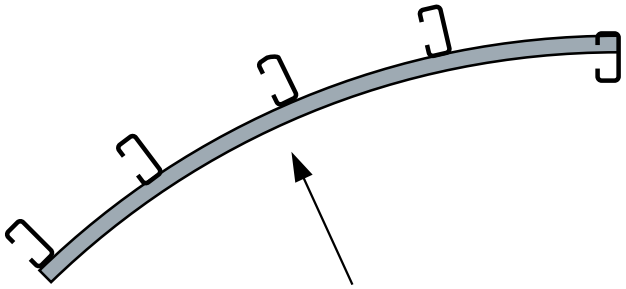


Detail A



Arching Radius

When lining a curved ceiling, it is possible to set the panels against a curved (concave) structure so they will arch within their range of elasticity, without inducing undue stress. The minimal radius recommended for such an arch is 4.00 m.



Wall and Ceiling Fastener Location

- A fastener should be installed every third corrugation valley, screwed into the centre line of each support.

Position of ceiling/wall fasteners
in regular installation without insulation



- At sheet edges and overlaps a fastener should be used in every 2nd corrugation valley.

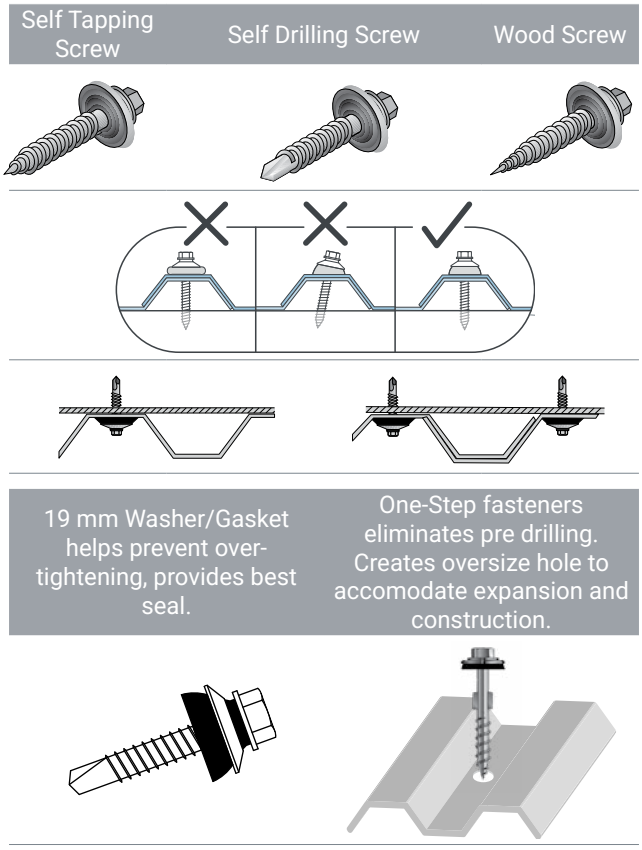
Position of ceiling/wall fastener
at sheet edge and overlap



- A pre-drilled hole, 4 mm larger in diameter than the intended fastener, is recommended at every fastener location. A special self-drilling / wood screw, equipped with additional protrusions at top of screw stem, preparing a larger entry hole during insertion, can also be used.
- The fasteners should be tightened by an electric screwdriver equipped with adjustable clutch, taking care not to overtighten.
- At the side-lap, two valley fasteners should be installed at both sides of the overlapping corrugations.

Fasteners, Washers and Gaskets

- For optimal long-term maintenance-free service, Palram recommends the use of corrosion resistant #12-14 x 1" fastening screw, with 19 mm washer specified by Palram with profiled EPDM rubber gasket, to fasten the panel to the supports. In wash areas, extremely wet areas, or in highly corrosive environments like pig or cattle confinement, stainless steel fasteners are recommended.
- The screw can be hex-head or pan-head Phillips, self-drilling, self-tapping or wood screw, according to the type of the supports and the method of fastener installation. Each fastener will be fitted with 19 mm washer specified by Palram.
- The screws should be tightened moderately, without deforming the washer, squashing the gasket and distorting the panel. Careful attention should be given to assure perpendicular insertion of the fasteners.
- Excess tightening and oblique insertion will possibly distort the panel, induce undue internal stresses, leading to fracture and cracks, eventually ending in failure.
- Never use an impact wrench/driver for fastening AG-TUF. Tighten by hand or by an adjustable torque power screwdriver.

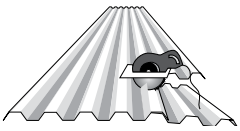


Handling and Storage:

- AG-TUF panels should be transported and stored horizontally on a flat, sturdy pallet whose dimensions are equal to or larger than the panels themselves. The panels should be secured and fastened to the pallet. It is possible to store panels of smaller dimensions on top of larger panels of the same type. (Never store long panels on top of smaller ones!)
- In case it is necessary to store the pallet outdoors, cover it with a white opaque polyethylene sheet, cardboard, or other suitable materials that do not absorb or conduct heat. The total area of the pallet should be covered.
- To minimize the possibility of warp and deformation, Palram recommends installing the panels after they have been acclimated. The panels should be stored inside the interior space in which they have to be installed until their temperature is equalized to the ambient temperature inside the structure. This way there will be no warp through drastic changes of thermal expansion/contraction.

Cutting

- It is possible to cut AG-TUF panels with a circular saw, using a blade intended for hardwood or a special one for plastics, rotating at a high speed. Advance the saw at a slow feed rate. Palram recommends cutting a few panels stacked together, for cleaner cuts and smaller risks of breaks and rough edges.
- It is possible to use an electric jig saw, a handsaw or sheet-metal shears for local or limited cropping, especially for curved lines or complex cuts.
- In any case, it is important to support the panels in the vicinity of the cut and clean away the dust and debris generated by cutting.



Chemical Resistance

(Compatibility to environmental chemicals, sealants and adhesives)

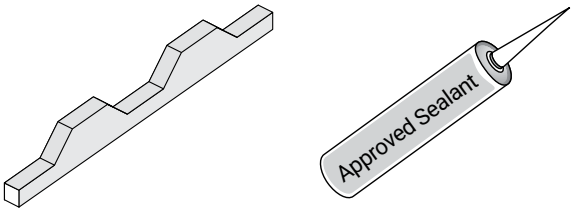
- AG-TUF panels are resistant to a wide variety of chemicals and display limited resistance to others. A third group of chemicals may attack and damage the panel. The degree of damage will depend on he severity of attack and the duration of exposure.
- In case of doubt consult the list of chemical resistance of PVC to various chemicals, depicted in Palram publications, to find out if there is any risk to the liner.
- Materials not on the list, which have not received the Manufacturer's explicit approval, may harm the panel and void all warranties and responsibility of the manufacturer for the performance of AG-TUF panels!
- Your local distributor can provide additional information and forward materials for evaluation of their compatibility with AG-TUF panels.

Sealing and Bonding

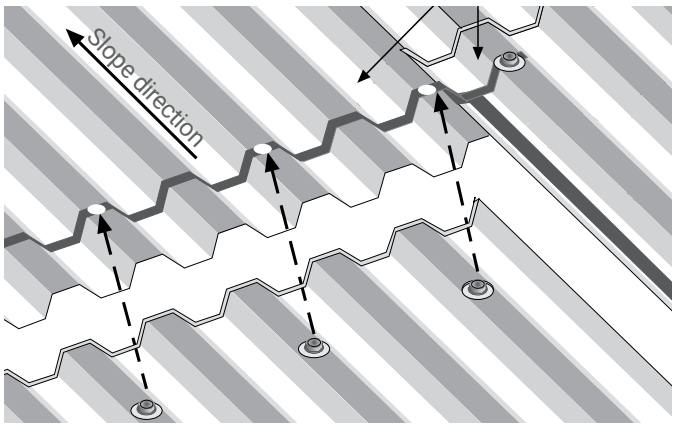
- Silicone sealants: Palram strongly recommends the use of tested and approved sealing, bonding and adhesives materials that may be required. For a list of sealants that have been tested and approved, download a list of Chemical resistance of Palram PVC products at: http://www.palram.com/AG-TUF
- Other silicone sealants and sealing, bonding or adhesives materials should be referred to Palram or its distributor for evaluation and approval before use.
- Obscure sealing or bonding materials should be referred to Palram or its distributor for evaluation and approval before use. Unapproved materials may chemically attack the AG-TUF, resulting in failure and voiding any and all warranties.
- Corrugated closure strips are used to stop entry of water, wind, insects or small animals through the openings above or below the edges of the installed sheets. The closure between the sheet and edge purlins or top trim is done by an AG-TUF profile contoured closure strips. The strips are held in place by the sheet fastening screws. They are made of cross- linked expanded polyethylene (XPE).
- In wash areas or extremely wet conditions butyl sealing tape should be used along the side & end-laps of AG-TUF sheets, to prevent moisture penetrating the wall or ceiling cavities.

Shaped foam polythylene (PE) sealing strip.

Silicone sealant



Butyl rubber sealing tape



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