

MERINO ARMOUR ENERGY SAVING SYSTEM

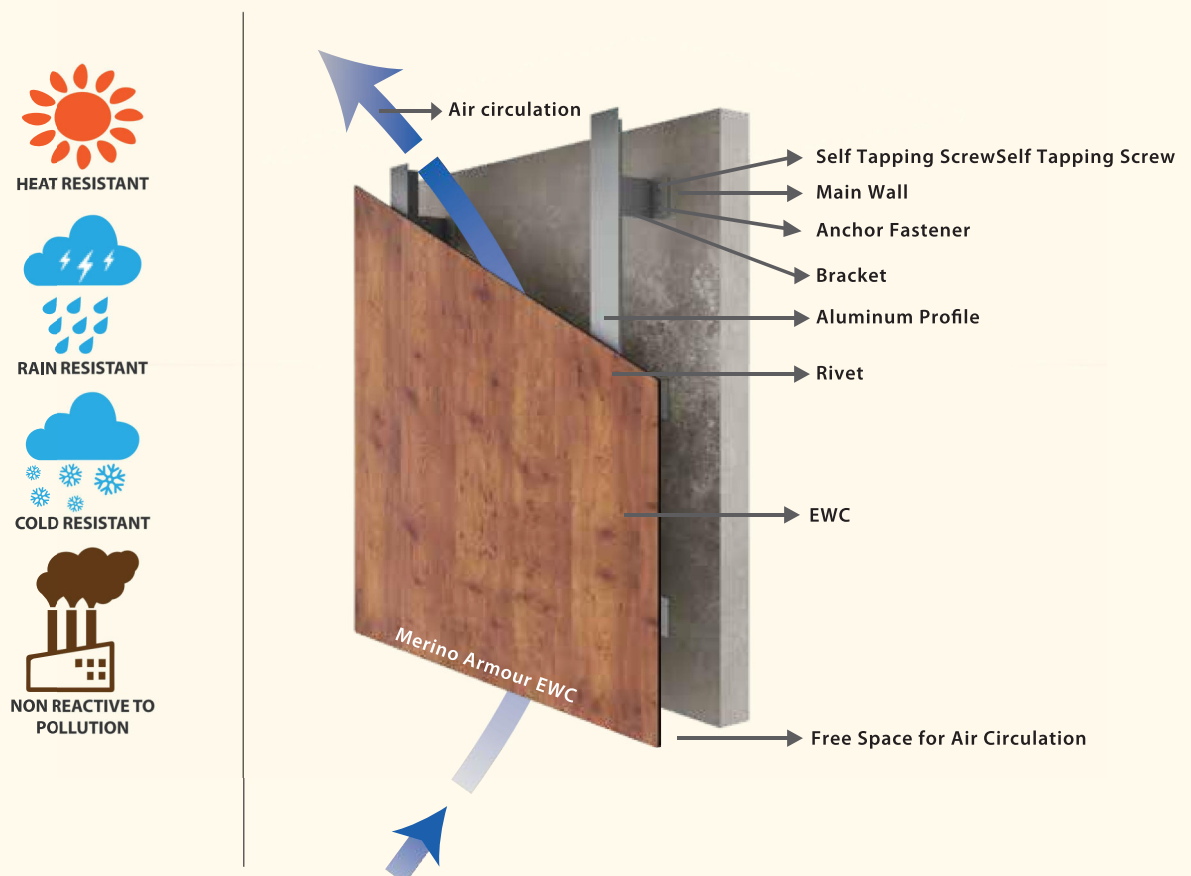
The extensive range of External Wall Claddings blends strength and beauty to perfection. The Armour epitomizes a weather resistant envelope to enhance the lifespan of your building as it can endure all weather fluctuations like intense heat, heavy showers, chilly winters that India experiences. The main advantage of Armour ventilated facade systems is energy saving. The correct design and implementation of the systems reduce energy losses and increases the comfort of the living environment.

Ventilated Façade: Natural ventilation and vapour permeability are also very important for the inner microclimate. The gap between the wall and Armour EWC allows air to circulate and protects the building from overheating during the summer and cooling down during the winter.

The ventilated façades allow the building to breathe and eliminate the condensation inside the building. The thermal insulation let the construction moisture evaporate, and in the building with higher humidity to be released outside.

Energy Saving: A natural insulation i.e. an air cavity gets created between the wall and the External Wall Cladding. This air gap facilitates continuous air ventilation that reduces heat or moisture effect on the base structured wall and this ventilation process contributes to reduced levels of energy losses and consumption, and also avoids corrosion of the exterior surfaces, thus it allowing retention of indoor temperature. The buildings are now better ventilated providing a more comfortable indoor environment and ensuring significant energy saving.

Flame Retardant: The most important advantages of Armour ventilated systems is, the Armour have Flame Retardant properties which allows it to withstand against the flame, according to the European regulations for fire safety. The combination between Flame Retardant Armour façade materials and specially designed systems by Façade Expert, additionally increases the safety advantages of the building.



Technical Specifications
Technical Data Sheet

PROPERTIES	TEST METHOD	ATTRIBUTES PROPERTY	UNIT	EWC	
				Standard Value	Actual Merino Armour EWC value
Thickness	EN 438 2-5	$6.0 \leq e < 8.0$	mm	Tol \pm 0.4	Tol \pm 0.4
Length & Width	EN 438 2-6	Panel	mm	+10-0	+10-0
Edge Straightness	EN 438 2-7	Panel	mm	≤ 1.5	< 1.5
Squareness	EN 438 2-8	Panel	mm/m	≤ 1.5	< 1.5
Flatness	EN 438 2-9	$6.0 \leq e < 8.0$	mm	≤ 5.0	< 5.0
Density	ISO 1183	Mass	g/cm ³	≥ 1.35	> 1.4
Wear Resistance	EN 438 2-10	Abrasion Resistance	Revolution	350	> 400 Rev.
Impact Resistance	EN 438 2-21	Dropped ball $e \geq 6$ mm	mm	1800 m (Large Diameter Ball) height-no crack height 10 mm Max.	1800 m (Large Diameter Ball) height-no crack height 10 mm Max.
Dry Heat Resistance	EN 438 2-16	Resistance to Dry Heat at 180°C	Appearance	Min. Level 4	Level 5
Resistance to Boiling Water	EN 438 2-12 $T \geq 5.0$ mm	Moisture Resistance	% Mass Increase	Max. 2% in weight	rW = 0.8%
			% Thickness Increase	Max. 2% in thickness	rT = 0.8%
			% Mass Increase	Level 4	Level 5
			% Thickness Increase		

Mechanical Properties

Exterior Grade Compact Laminate - Merino Armour EWC

PROPERTIES	TEST METHOD	ATTRIBUTES PROPERTY	UNIT	EWC	
				Standard Value	Actual Merino Armour EWC value
Modules of Elasticity	ISO 178	Strength	Mpa	≥ 9000	≥ 9000
Flexural Strength	ISO 178	Strength	Mpa	> 80	≥ 90
Tensile Strength	EN ISO 527-2	Strength	Mpa	≥ 60	≥ 70

Weather Resistance

Technical Data Sheet

PROPERTIES	TEST METHOD	ATTRIBUTES PROPERTY	UNIT	EWC	
				Standard Value	Actual Merino Armour EWC value
Light Fastness	EN 438 2-27	Contrast	Grey Scale	Min. Level 4	\geq Level 4
Artificial Weathering	EN 438 2-29 : 3000h	Contrast Appearance	Grey Scale	Min. Level 3	Min. Level 3
			Grey Scale	Min. Level 4	Min. Level 4
UV - Light	EN 438 2-28 : 1500h	Contrast Appearance	Grey Scale	No Requirement	For EGS only
			Grey Scale	No Requirement	For EDS C-3, A-4
Dimensional Stability	EN 438 2-17	Accumulated dimensional change	%	L: Max 0.3%	<Max 0.3% (L)
At elevated temperature				L: Max 0.6%	<Max 0.6% (W)
Resistance to climate shock	EN 438 2-19	Appearance	Rating	Min. Level 4	Level 5
		Flexural strength Index Ds	Index	Min 0.80	For EDS 0.92
		Flexural modulus Index Dm	Index	Min 0.80	For EDS 0.84

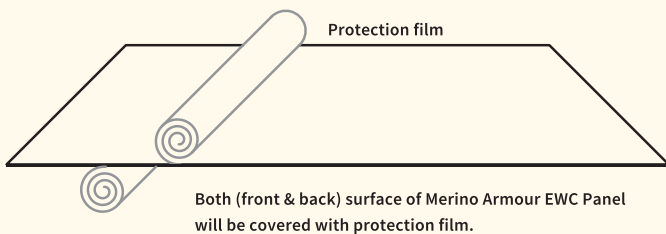
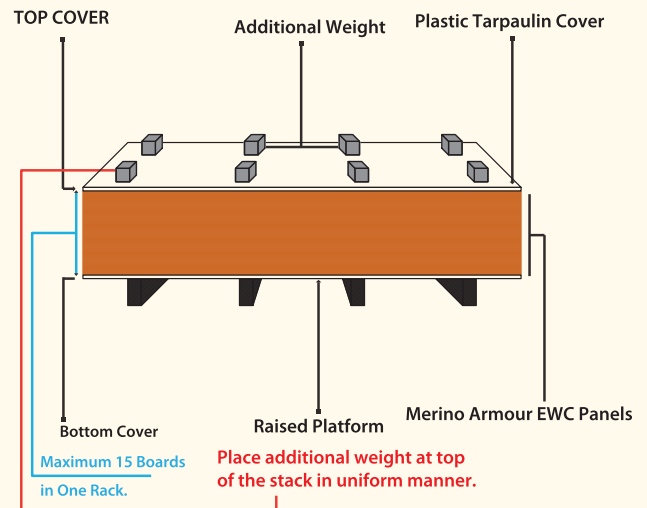
Fire Resistance

Reaction to Flame ASTM E-84 Flame Retardant Flame Characteristics

PROPERTIES	TEST METHOD	ATTRIBUTES PROPERTY	UNIT	EWC	
			Classification	Standard Value	Actual Merino Armour EWC value
Flame Characteristics (For FR Grade EWC)					
Reaction to flame	ASTM E-84	Flame retardant	Class 1	FSI 0-25	FSI 25
				SD Max. 450	SD 40

STACKING OF ARMOUR EWC PANELS

When it comes to compact laminate boards stacked at the top or bottom, warpage issues are commonly observed. However, if one follows the proper precautions during storage, the problem of warpage can be avoided. Please remember that even a small difference in moisture absorption between the two sides of compact laminate board could result in immediate warpage as these boards have extremely high density.

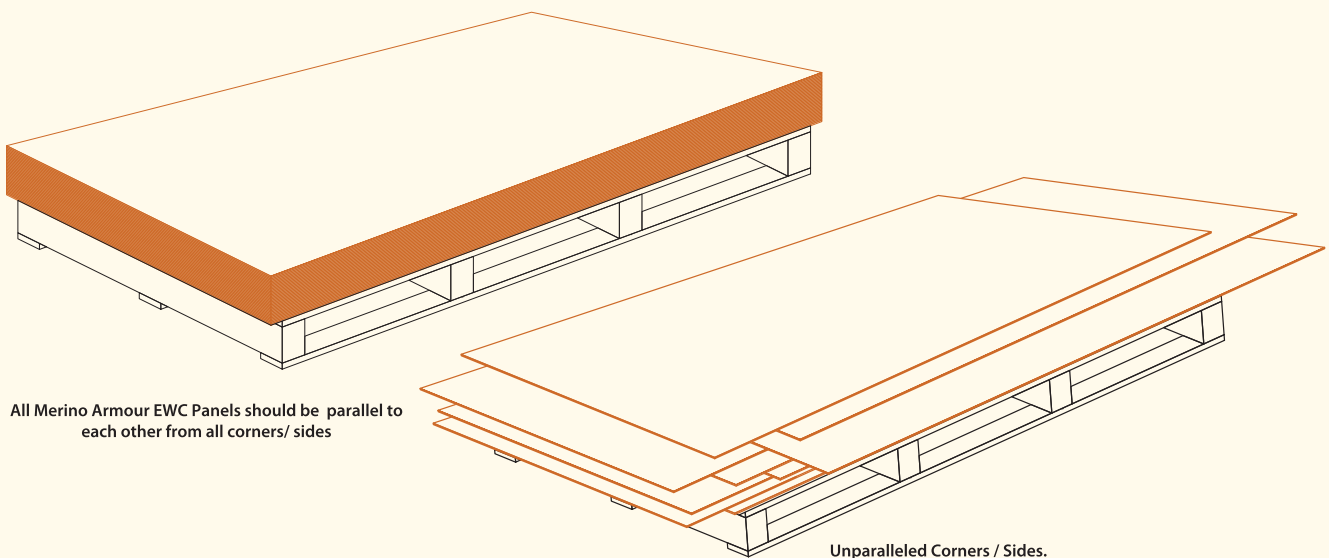


- It's important to observe a few safe practices while stacking Merino Armour EWC Panels. The surfaces of all laminates except the top and the bottom should be covered. Place one ply at the bottom and similarly follow the same procedure on top with some load on the top cover.

- Merino Armour EWC Panels must be stored in stocks of up to 15 boards by one sheet of ply each at the bottom.
- A little additional weight in a constant manner must be placed on top of all cases at appropriate places.

ARMOUR PANELS MUST BE ALIGNED WITH EACH OTHER IN A RACK OR PALLET.

Merino Armour EWC Panels that are stored in piles should be aligned with each other and no sides of the laminate should be found protruding.

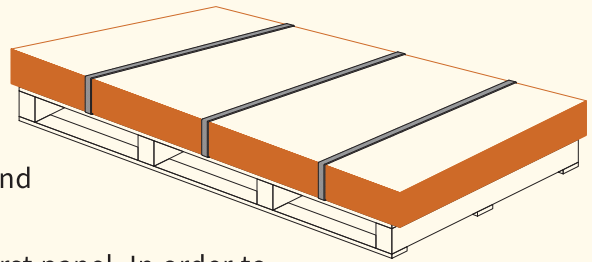


All Merino Armour EWC Panels should be parallel to each other from all corners/ sides

TRANSPORT

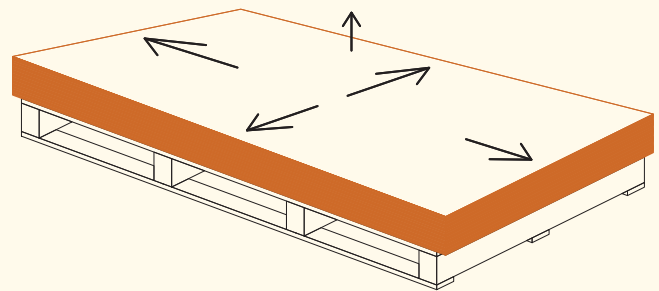
During transportation, the panels must be handled with utmost care, in order to avoid damage to the edges and decorative surfaces. Hence, the following precautions must be taken.

- To prevent distortion or damage, Merino Armour EWC panels must be stored horizontally on a flat and supporting pallet.
- Place a protective sheet between the pallet and the first panel. In order to protect the surface, keep one on top of the stack.
- To prevent damage, slippage and toppling, attach the panels to the pallet using steel or nylon straps. Make sure that it is firmly fixed. The edges and corners must be secured too.



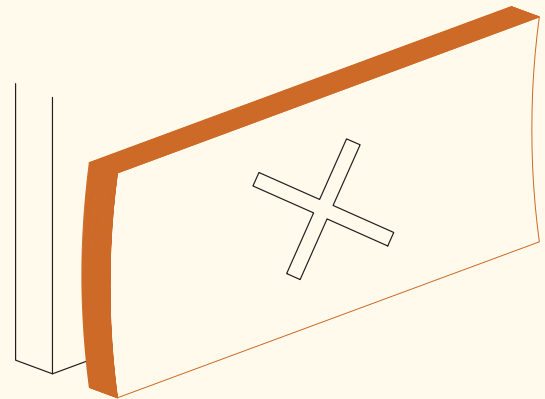
LOADING AND UNLOADING

- During loading and unloading of panels, ensure that they don't slide over each other.
- Lift them using your hands or a lifting system with suction cups and then transfer them to another location.



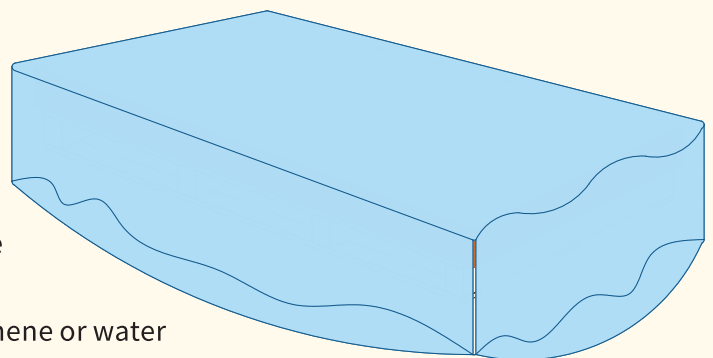
STORAGE

- If stored incorrectly, permanent deformation of the panels can take place.
- Store the panels horizontally on top of each other. Make sure that they are stored on a flat surface.
- Panels must not be made to stand on their edges.
- Use a sheet of polythene or other protective material to cover the outermost panel.



FOR TEMPORARY STORAGE OUTSIDE

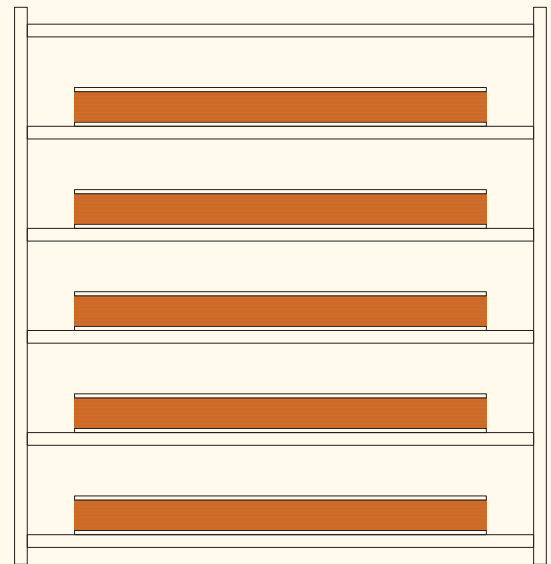
- Provide protection to the panels against various climatic conditions by covering them with polythene or tarpaulin.
- This will help in preventing moisture ingress in between the sheets.
- The delivered material must remain fasten and covered on the pallet until usage.
- After opening the pallet and using the material, a polyethylene sheet must be placed over the top sheet and re-strapped.
- The pile of sheet must be covered with polythene or water proof tarpaulin.



- The above precaution is of critical importance, especially if the protective film has been removed.
- Keep the pallet in a well-drained area, so as not to place it wet or damp conditions.
- Do not place the pallet over loose soil as these areas have higher ambient humidity.
- Re-stack the panels in the same manner that they were received from the warehouse, if they were manufactured in a workshop.
- The above is also applicable for panels which have been pre-prepared in the workshop by affixing hanging brackets etc.
- The panels which have distorted in shape due to moisture absorption should be positioned on hard wooden slats, placed between the panels, with a maximum distance corresponding to a value less than 20 %.
- Panels must be kept in parallel and fastened when not in use and covered in a well-ventilated manner with polythene or tarpaulin.

FOR STORAGE INSIDE

- We suggest you to store the Merino Armour EWC panels in a closed warehouse under (normal temperature 10-30°C humidity 40 to 65%).
- While they are inside the warehouse, place the Merino Armour EWC panels horizontally together, on a strong, well-supported flat rack.
- Please make sure to provide a protective sheet between the supporting rack and the first panel.
- Protect the top panel by covering it with a sheet, and on top of that keep a larger panel that has sufficient mass to exert a downward pressure on the pile of Merino Armour EWC panels.



ACCLIMATIZATION

- We suggest you to leave the panels in a well-supported ventilated position before processing - at least for a period of 1 day per mm thickness. This will allow them to acclimatize, in order to prevent any distortion of the panels.

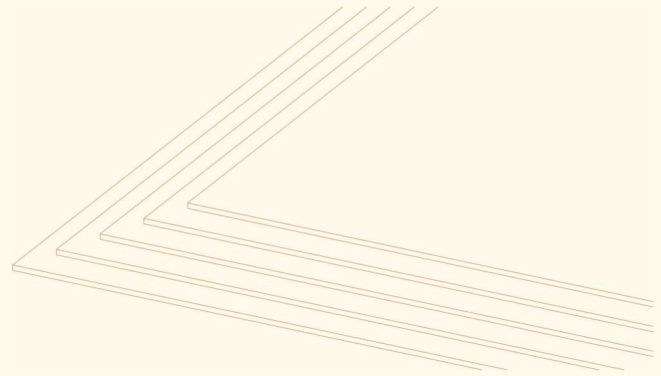
PROCESSING CONDITIONS

- The processing of Merino Armour EWC panels in the workshop must take place under normal conditions.
- Please ensure that machine surfaces are clean before laying the Merino Armour EWC panels on them.
- The light inside the room must be bright and the room must provide adequate dust extraction so that you are able to view the Merino Armour EWC panels correctly during processing.
- Check the ARMOUR panels for any production defects before you start processing.
- On witnessing any production defects in the panels, use the complaints protocol to report them to the supplier. The supplier will then contact the Merino technical representative.

- Merino is not obligated to compensate you for processing panels that might have a production defect.
- For Merino Armour EWC wood panels, make sure to match the wood grain as per the design.
- In case of Merino Armour EWC Concrete panels, make sure to match the decorative pattern as per the design.
- Turning the panels through 90°, 180° and or 270° can result in a noticeable colour distinction. Take extra care with the direction of all Merino Armour EWC panels and in particular with the Merino Armour EWC Metal typology.

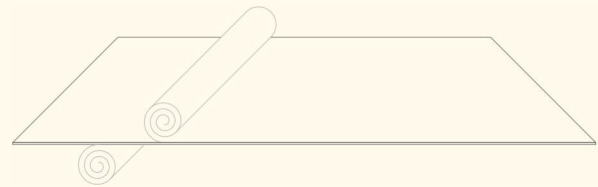
PANEL EDGE FINISHING

- We recommend to finish-mill the edges of the panels after sawing for better output. This will help in making it as smooth as possible to prevent water accumulation.
- To prevent burring, which in turn causes water and dirt accumulation, the edges of the panels should be chamfered at the visible side of the panel.



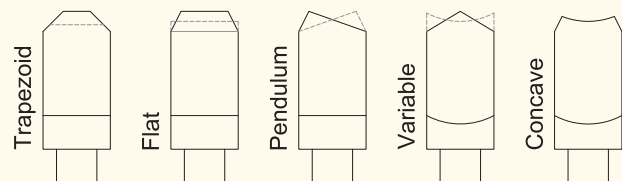
PROTECTION FILM

- The Armour comes with a protective film, applied from both sides of the panel.
- Please note that it is of utmost importance to rip the film off the surface at the same time on both sides together. For example, keeping the protection film just on the outer side of the panel in order to protect the surface from dirt and risk of damage is not appropriate. This would cause a distortion of the panel while assembling the facade.



TYPES OF TEETH

- **Trapezoid:** Preferred for high abrasive surface
- **Trapezoid:** Preferred for high abrasive surface
- **Flat:** Preferred for processing of Merino Panels
- **Pendulum:** On machines with no scoring units
- **Variable:** Alternate of Flat tooth
- **Concave:** Similar to pendulum with longer machine life with no scoring units



During the process, ratio of number of teeth (Z), feed rate (vf) to cutting speed (Vc) should be need

Tool	Vc	Fz
Equipment's	m/s	MM
Saw	40 - 60	0.02 - 0.1
Mill	30 - 50	0.3 - 0.5
Drill	0.5 - 2.0	0.1 - 0.6

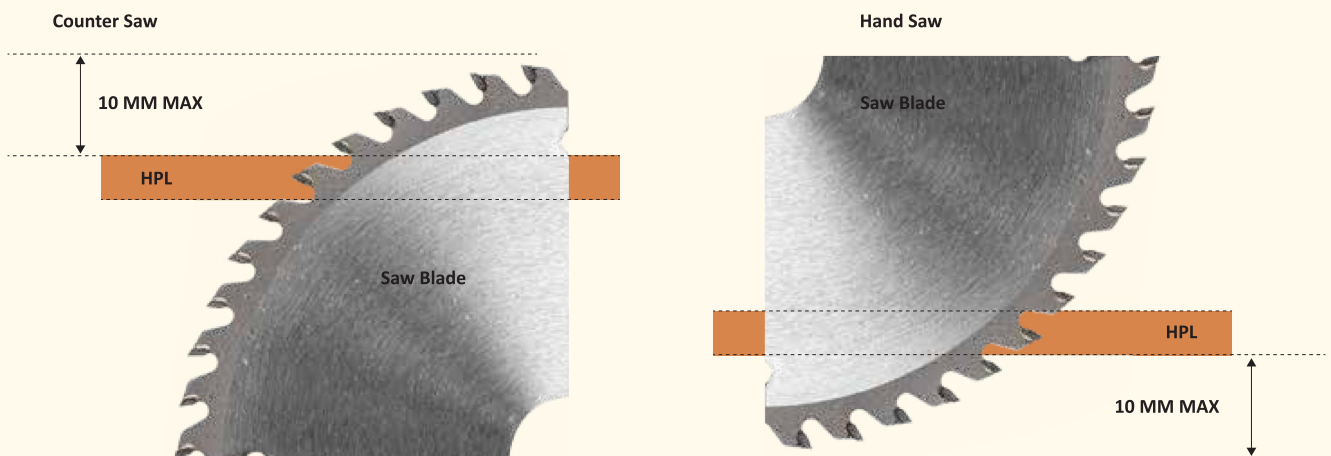
Calculations

$$\text{Cutting speed} = \frac{(\text{Diameter of tool}) * (\pi) * (\text{Rotational speed of tool})}{60}$$

$$\text{Feed speed} = \frac{(\text{Tooth feed}) * (\text{Rotational speed of tool}) * (\text{No. of teeth})}{1000}$$

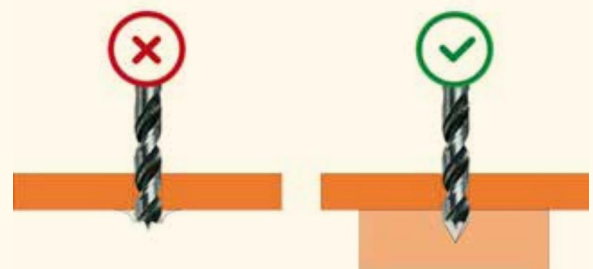
CUTTING

The saw blade will need to be adjusted to a higher level and to a lower level for an unclean cut of the underside, in case the upper cutting edges are unclean. The thumb rule is to plan to have continuously two full teeth in the thickness of the panel. The blade overhang, entrance and exit angles decide the quality of cutting edges. The best way to determine height adjustment is to observe.



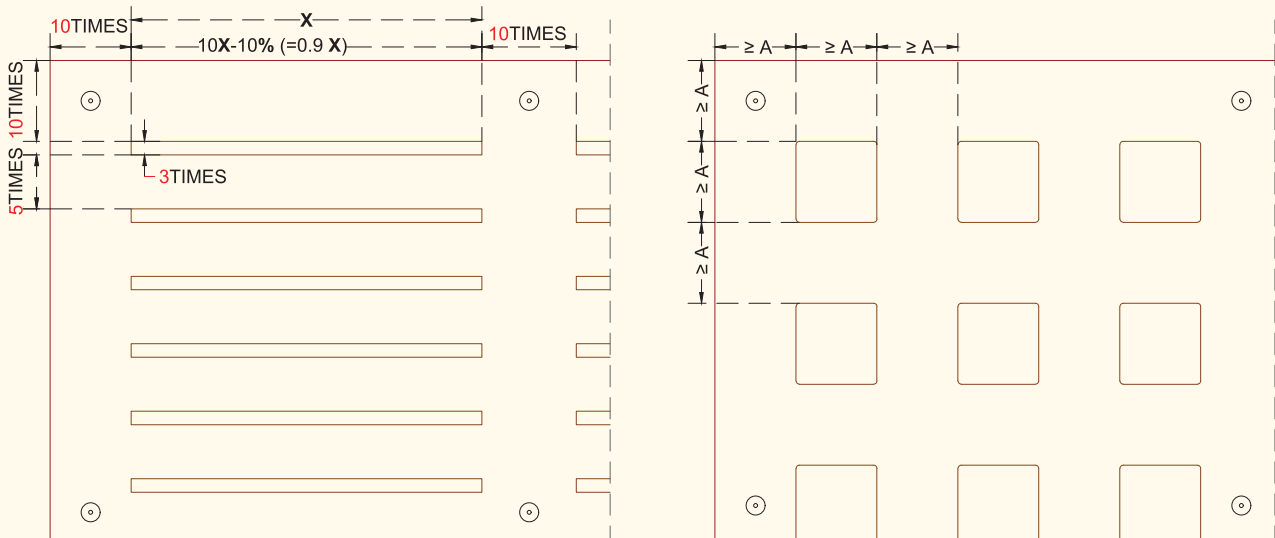
DRILLING

- We suggest you to place the panels which are to be drilled on a sacrifice board. Also, make sure that the hole stays clean on both sides. Superior cutting performance in drilling are helicoidally drills with a drill point angled at 60° to 80° (instead of 120° for conventional metal drills) and with steep chip evacuation (so-called rapid inclination) and a wide channel.
- To ward off any possibility of chipping, we recommend you to place the panels which are to be drilled on a sacrifice board. You can use hole saws for large diameters.



CNC - PERFORATION

- Depending on the application, panel thickness above 6 mm could be used.
- Perforation could weaken the panels, and with limited thickness, they might become even weaker.
- Please ensure that more than 40% of the panel is not removed.
- The minimum space between two CNC's perforations should be 30 mm. This space must be provided from outer core to CNC's design equal to the opening or diameter of the perforation. The same also applies to edge distances.
- Always use a maximum length equal to the span distance "X" between fixing points minus 10% for grooves. In other words, the maximum length of the grooves should be equal to $0.9X$.
- The wideness of the groove should not be more than 3 times the panel's thickness.
- Make sure that the distance between the grooves is equal to 5 times the panel's thickness.
- Make sure that the distance between the grooves in their prolongation is equal to 10 times the thickness of the panel.
- Make sure that the distance between the 1st groove and the parallel edge of the panel is equal to 10 times the panel thickness.
- We suggest you to execute a mock-up in order to check the stiffness and strength of the panel with the fixation.
- Please ensure that you always follow the local regulations with respect to openings in cladding, especially to wind loads, fire regulation and children safety.



FIXED AND LOOSE POINTS

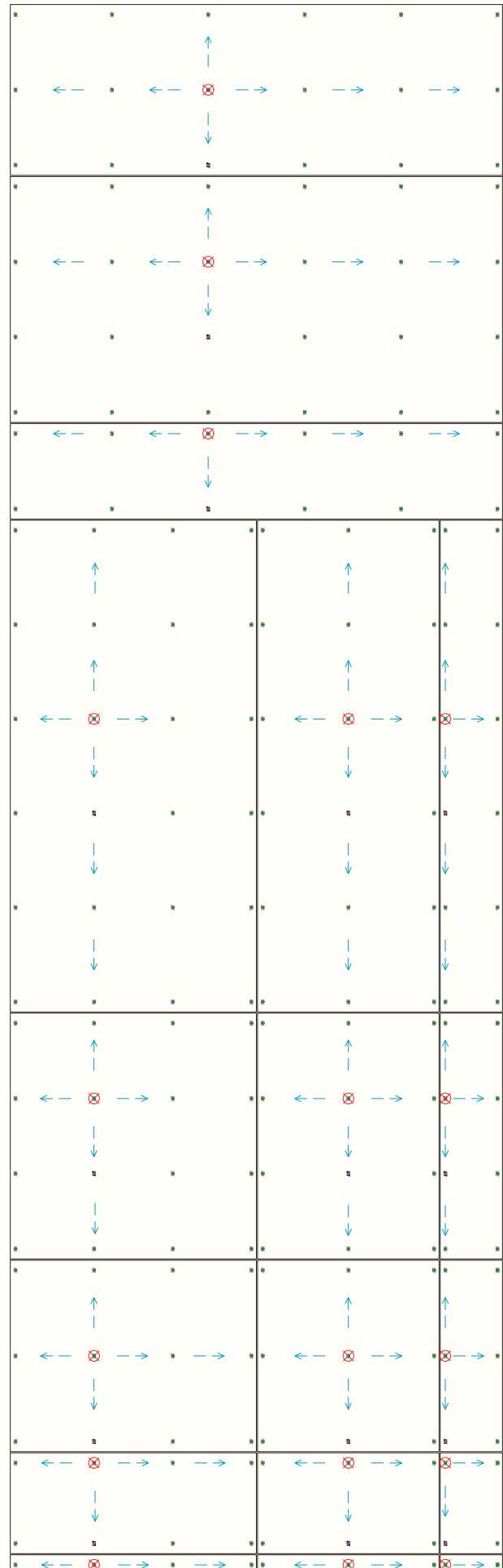
- In Merino Armour EWC, the diameter of the drill hole must be drilled larger than the diameter of the Rivet fastening.
- This depends greatly on the required expansion clearance.
- This is equivalent to the shaft diameter of the fastening plus 2 mm for every meter of Armour Cladding starting from the fixed point.
- The head of the Rivet fastening must be big enough so that the drill hole in Merino Armour EWC is always covered.
- The rivet fastening must be placed in a manner that the cladding panel can move.
- The rivets must be put in place with flexible mouth-pieces.
- The clearance set for the rivet head must allow movement of the elements in the drill hole.
- Clearance 0.3 mm or 0.4 fixings must not be over-tightened.
- If need be, please avoid using any countersunk screws.
- The centre point of the drill hole in the Sub-Frame must coincide with the centre point of the drill hole in Merino Armour EWC cladding panel.
- The fastenings should be put in place starting from the middle of panel outwards.

FIXED POINTS

- These are used for uniform distribution (halving) of the expansion and shrinkage movements.
- The diameter of the drill hole in the Merino Armour panels is the same dimensions as the diameter of the fastening.

LOOSE POINT

- The loose point is in addition to the fixed point will be able to hold the weight of the panel.
- It should be placed in the same level. Expansion and shrinking are not constrained.



GENERAL MEASURES

When it comes to building guidelines, obligations and legislations, if any, it is presumed that local and national building codes are known to the client.

Please ensure that these guidelines and legislations are implemented exactly as they are written here.

In case, the local or national guidelines conflicts with processing guidelines as provided in the manual. Kindly consult Merino technical representative.

PRINCIPLE – VENTILATED FAÇADE

Between the bearing structure insulated on the outside and the panel secured to it, a naturally ventilated cavity is created.

A well-realized ventilated facade has the following benefits:

- Infiltrating rainwater (with open joints) is allowed to drain away and condensation is allowed to dry by the ventilated cavity.
- This is beneficial for a long-term qualitative insulation that doesn't get wet.
- A joint profile stops rainwater infiltration and hence minimizes the amount of moisture behind the panel.
- Application of a joint profile (e.g. aluminium L&T profile) helps give the facade a neatly finished appearance.
- This supports in moderating moisture and temperature fluctuations.
- The thickness of the thermal insulation is to be adapted as per local needs and regulations. The differential temperature and pressure of bottom and top of the building causes a natural air flow (chimney effect) behind panel.
- Helps to moderate, moisture from the construction and condensation from the use of the building through the ventilated gap behind the panels.
- The external insulation of bearing construction stabilizes any structural setting of the building, which allow, low temperature variations at the inside of the building. This also minimizes the risk of cold bridges.

