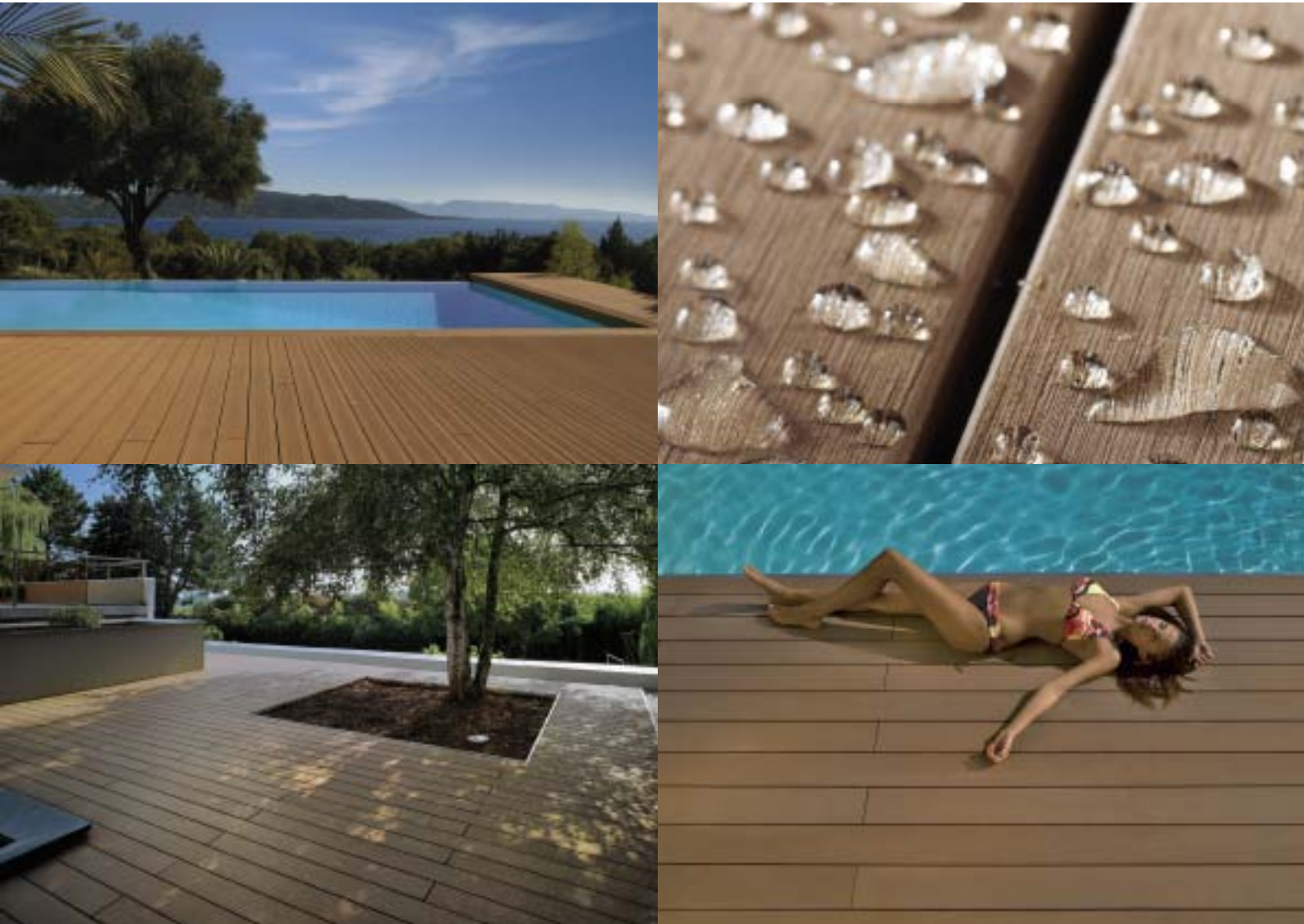


## Duo decking



### Geolam®: a stunning alternative to hardwood decking

Duo is a composite wood decking board requiring minimum maintenance. Durable and colour-fast, it will not crack or become slippery over time. Geolam® has a ten-year guarantee, is splinter-free, hard wearing and resistant to insect and fungus damage. Its cavity structure means it is stronger and lighter than a hardwood such as Ipe, for example. It can be recycled, and is manufactured using environmentally friendly processes.

# Installation and maintenance guide

**Geolam® is a composite material made from recycled wood and**

**resins, and is easy to install. However, handling and fitting techniques are different to those deployed when using natural wood, so please be sure to follow the instructions below carefully...**

## Basic guidelines for using Geolam®:

- Sufficient space **MUST** be left between boards and support battens so they can expand. Values for end gaps to allow for expansion will depend on the cumulative length of the boards placed end-to-end, and to a lesser extent, on the difference between the maximum temperature of utilisation once installed, and the outdoor temperature at the time of installing (cf. Expansion table, Fig. C, and photo 8).
- When installing Geolam®, always leave an end gap of 14 mm minimum between two boards placed end-to-end (Fig. G). For a more precise value for the end gap required, refer to the values given for the shortest boards in the expansion table.
- Take care to respect the minimum distance of 12 cms (see Fig. B) between the ground and the underside of the board (to ensure adequate ventilation). Drainage of the ground beneath the decking must be to a high standard\*.
- Never screw boards down, but always use Geolam® Duo clips (Fig D. and photo 5).
- Always ensure there is good ventilation beneath terracing or decking so surfaces beneath the structure can dry out\* (see Fig. B).
- Each composite wood board must be secured by clips on a rigid supporting structure, itself assembled on a frame, or screwed to the ground (Fig. A). Boards must be fixed to joists or battens, and not fitted directly to a concrete surface, or to the damp-course of a terrace (Fig. B).
- The distance between two boards laid side by side is controlled through the use of the fixing clips. On installation, this inter-board distance cannot be less than 6mm to ensure adequate ventilation for the boards, and sufficient rain water drainage (Fig. F and photo 6).
- Always check local building regulations before installing Geolam®.

*\*Under no circumstances should water running off the decking be trapped or allowed to stagnate.*

## Storing Geolam® boards:

Store boards flat on battens spaced no more than 60 cms apart. Avoid any heavy impact to the boards while manipulating them.

## Sub-zero temperatures:

Never embark on an installation in sub-zero temperatures, as the angled surfaces of the boards may be fragile under these conditions.

## Tooling:

Geolam® can easily be worked with standard tools, and without generating splinters. Using carbon fibre wood saw blades, or even better, fine-toothed blades designed for cutting light metals will maximise the life of the cutting tools used, and improve the appearance of the cut edges

## Duo Clips:

Never screw boards down, but always use Duo clips (Fig. D) for fixing. Duo clips (Fig.P) enable rapid installation. Easily removable and discrete, they enable three-way expansion (lateral, longitudinal and widthways) of boards, while at the same time they allow the structure size to vary as the wood or metallic structures 'work' over time. The use of the clips prolongs the lifespan of your deck, and automatically maintains the minimum 6mm spacing required between boards (Fig. F). See [www.dclip.com](http://www.dclip.com).

Allow between 18 and 21 clips per square metre for any

rectangular deck with a surface area of more than 10 square metres. Up to 26 clips may be used per square metre for complex surfaces, or for installations where boards lie at an angle of 45°. For rectangular areas of more than 80 square metres, allow 18 clips per square metre.

## Stainless steel screws:

- These self-drilling screws are in A2 stainless steel, and are coated with a black outer surface layer. This anti-oxidation layer offers additional protection against corrosion, and also lubricates the screw to enable fixing without pre-drilling for most wood or aluminium battens or joists (photo 9). They have a narrow head, and must have minimum dimensions of 4 x 40 mm, with a flat screw-head, maximum diameter 6mm, to ensure the boards are not damaged when they are fitted, and to enable the tool to be inserted in the clip while holding the latter steady as shown in photos 1 and 6.

## Ground types below the terrace:

### Draining surface such as beaten earth or gravel:

Check that the ground beneath the terrace is stable and well-drained. Remove any substrate to a depth of 25 cms below the finished level of the terrace. Spread a layer of at least 10 cms of draining material (gravel, for example) and cover with a geo-textile to prevent weeds from growing up between the boards. Joists can be laid on plastic supports (these are often height adjustable) or longitudinal concrete supports, or small concrete slabs (40x40). The distance between the upper surface of boards and the ground – **at all points - should not be less than 14 cms** (i.e. with 12 cm empty space left at all points beneath the board, Fig. B).

### Waterproof flooring such as concrete screed, raft foundations, paving or terrace with damp course

Check that the ground beneath the terrace is stable and well-drained. Raise and chock the joists so any running water can drain freely and rapidly. Check there are no obstructions to water draining such as earth or other plants. Always ensure that the distance between the upper surface of the boards and the ground is not less at **any point than 14 cms** (i.e. 12 cms of empty space beneath the boards: see Fig. B).

## Deck structure:

The decking structure may be in Class 4 treated wood, hardwood, or metal. As is the case for all composite woods, Geolam® should never be used to provide structural support. Joists made from composite material should likewise never be used. When using joists and beams in treated wood, we recommend fitting a plastic or bituminous strip over the joists in order to protect the structure, and to prevent creaking.

- Take care never to obstruct the free circulation of air under fitted boards. For decking that is flush with a lawn, or for a deck with a border or wall around it, it is vital to leave a clear gap of at least 12 cms and two sides open to the air (see Fig. B), in order to allow a natural level of ventilation to operate. Note that failure to comply with these conditions will render your Guarantee null and void.
- Always use joists with a minimum width of 50 mm, and a minimum height of 50 mm. The choice of the type and section of the joist will depend on its function, and the loads the terrace must bear.

- Fixing joists to a structure and fixing boards to joists: in order to prevent boards from lifting, Duo clips should be used to secure each board individually. Each board needs to be securely screwed down to the surface, or screwed at its extremity and at all points of contact with crossbeams or joists.

- Distance between joists: the spacing between boards is 45 cms maximum (axis-to-axis) for residential usage, and for boards laid perpendicular to the structure (see Fig. A). The spacing should be **30 cms maximum** for boards laid at an angle of 45° between joists and boards. For decking destined for public use, these inter-joist values should be reduced depending on the loads that are to be supported. Check local building regulations before installing.

### Installing boards around the edges of the deck:

Use Borda finishing clips (Fig. I, O and photo 3) or collar screws (Fig. J). Do not screw into the board. Edging boards can also be fitted as described below (photos A1, B1 and C1) and secured with hidden fixings (Fig. L and M, and photo 4).

### Fixing the decking boards:

Boards can be installed so that either the smooth side or the grooved side is visible. The smooth surface is easier to clean, and just as anti-slip as the grooved surface. Centre the clip on the joist (Fig. D and photo 6) and only use screws supplied with the clips to ensure the boards are not damaged during installation, but also in the event that the decking needs dismantling at a later date. Pre-screw the clips being sure to keep the drilling axis vertical. A discarded off cut can help support the drill in its vertical position (photo 2), or simply hold the clip between your index finger and second finger as shown in photo 1 so the clip doesn't move while screwing it in. Never screw all the way in.

Once the board is in place, place the next board at an angle in order to slide it in under the clips (see Fig. E and F). If necessary, use a rubber mallet to knock the board into place. Once all boards are fitted, check the expansion spaces (see Fig. C and G, and photos 7 and 8) and screw all the clips home (Fig. N) taking care, meanwhile, not to pierce the clip itself (put the drill into lowest gear, and proceed at minimum speed). The screwhead must on no account be screwed right down into the clip, but should remain flush with its sides (see photo 5 and 5').

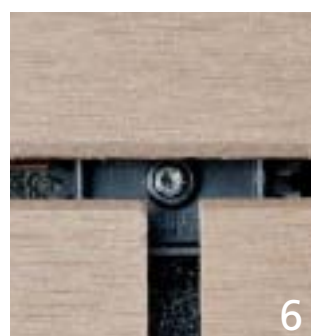
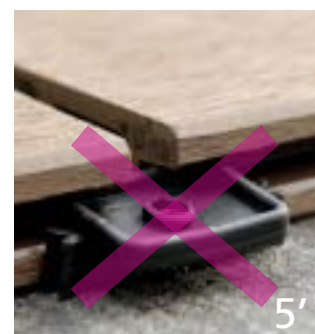
- When positioning boards end-to-end, be sure to position them so the expansion gap between them is at the centre of the joist. Clips may be used at joints between boards, but they must be accurately centred. The screwhead must be apparent in the middle of the end gap (see Fig. G and photos 5 and 6). It is vital that clips are doubled up at the joints, and that joists are doubled up every third end-to-end joint.

- When installing, make sure the board presses up against the side-wings, but without compressing them (photo 6).

- A slope of 1% is recommended to enable water to run-off the boards freely. Ensuring this slope is maintained, and good ventilation, will prevent water stains from forming.

- Each board end must be supported by a joist, and must be secured with 2 clips. If an overhang cannot be avoided, it should not exceed 5 cms (Fig. A).

- **A minimum of 3 contact points and 6 clips are required per board, whatever the length of the latter.** Any board less than 50 cms long should be supported by an additional joist, centred between the two other joists, and held by clips.
- Diagonal installations (boards placed at 45°): avoid damaging the flange running along the lower edge of the groove so the



board cannot lift of its own accord. It is vital to provide maximum support at the end of the board by doubling up on both joists and clips.

- Mitre cuts, or layouts where boards are placed at right angles to one another.

Remember to allow adequate play between boards to allow for expansion (refer to the expansion table).

## Composite wood boards will absorb some humidity:

A composite wood board of high quality is always thoroughly dried at the time of manufacture. The result is that there will inevitably be some re-absorption of humidity (to the tune of a few percentage points) during the first few months following installation, so the board will visibly expand in length, thickness, and width. The end gaps that must be left between boards during installation will be re-absorbed after a few months (see Fig. C and G and photos 6, 7 and 8). Depending on the amount of sunshine the decking is exposed to, and given the high density of the boards, this process may extend over a period of two years. Since the percentage humidity in the air will always be higher than the percentage humidity within the board, a Geolam® composite wood board will expand as it absorbs humidity. If the board were submerged in water for 365 days at a temperature of 23°, the saturation point would be reached after 290 days, and the expansion associated with this absorption of water would be of the order of 0.46%, and so 4.6 mm per linear metre of board. Variations in dimensions related to the outside temperature: Geolam® boards contain approximately 30% plastic resins, and so temperature variations will also cause variations in

the board dimensions. Unlike the expansion resulting from the absorption of humidity, this variation can manifest in two directions (expansion due to heat and shrinking due to the cold). The expansion/shrinking coefficient is  $3.6 \times 10^{-5}$  per degree Celsius. This means that for a variation of 50°C, a difference of 1.8 mm per linear metre is possible. The two phenomena described above can have a cumulative effect, and this is why with Geolam® - as with any other composite wood - it is essential to leave spaces for expansion between two boards placed end-to-end (Fig. G and photo 7). The same is true, of course, for joints between the ends of boards and any physical obstacle such as a wall, a border, surround, or for any board placed perpendicularly to the structure (Fig. C and photo 8).

• For boards more than 3 metres long, leave a minimum space of 14mm between two boards placed end-to-end (Fig. G).

• Depending on the total length of your deck or terrace (the cumulative length of boards placed end-to-end) and the difference between the extremes of temperature that might be encountered in their life-time in the immediate environment and the temperature on the day of installation, the end gaps given in the expansion table below must be respected. If in doubt, use an end gap of at least 5mm per linear metre of decking (cumulative length of the boards).

### Expansion table (total expansion space needed for one or several boards placed end-to-end, defined in mm).

Cumulative length of the boards:	1000 mm	2000 mm	3000 mm	4000 mm	5000 mm	6000 mm	7000 mm	8000 mm
10 °C	4	7	10	14	17	21	24	27
20 °C	4	8	12	15	19	23	27	30
30 °C	4	9	13	17	21	25	29	34
40 °C	5	9	14	18	23	28	33	37
50 °C	5	10	15	20	25	30	35	40

↑ Difference between the most extreme temperature likely to be encountered while in service and the ambient temperature on the day of installation.

Example of how to use the expansion table: for a deck 8 metres long (8,000 mm), fitted on a day when the temperature outdoors was 0°C. After a few months of being subjected to a temperature of 40°C, the cumulative length of the boards will be 8,037 mm. It is therefore vital to leave the expansion spaces as defined in the table.

## Finishing:

Edging strip: if need be, position the edging strip at the height that is most appropriate, even if it does not line up with the other boards. Edging bands expand in the same way as standard boards. Fix the edging strip with screws, having first made a series of oblong holes to permit expansion (Fig. H and photo 8) and take care to fix at frequent intervals along each board, every 45 cms.

• Fitting a board instead of a finishing strip (invisible fixing): First remove the groove by planing off the upper and lower flanges making up the groove, usually occupied by the clips (photo A1). Then sand the edge (photo B1), and make some keyhole openings in the underside of the board (Fig. K and photo C1). Lay the board, and wedge it in place onto the screwhead by rotating the board (photo D1).

• Always allow sufficient space for the expansion of these edging strips or finishing bands (refer to the Expansion table) and position the screw at the outside end of the oblong holes to allow expansion of the strip or finishing band to take place unhindered (Fig. H).

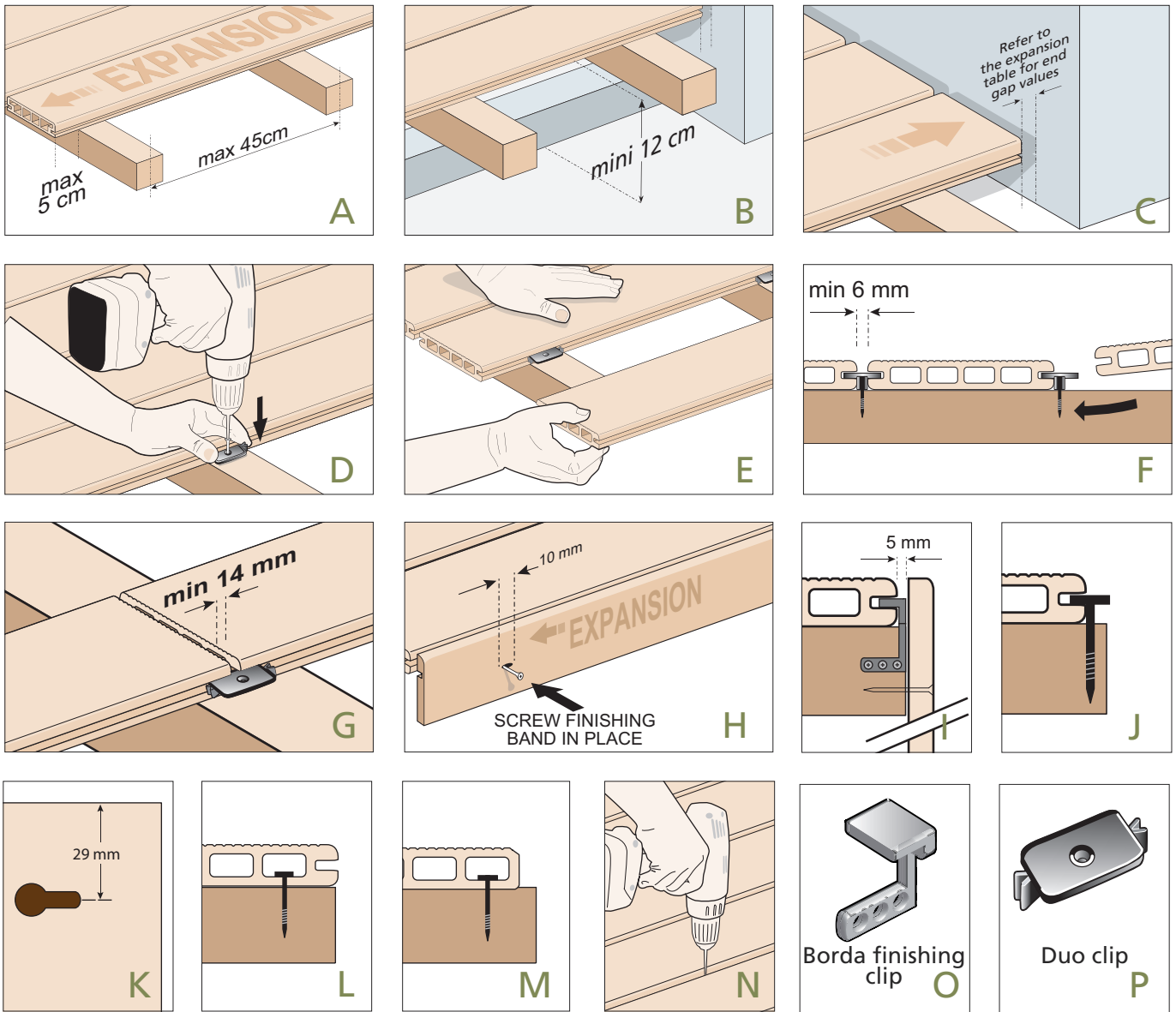
• Do not obstruct the cavities in the boards, always taking care to allow the free circulation of air. When finishing, use an edging strip, a board, specially designed paving or deck-edging or an aluminium corner strip.

• For swimming pool surrounds or deck edges, for the best

effect, change the direction of the boards surrounding the edges of the pool so they lie at 90° to the main installation.



# Geolam® - installation diagrams A-P



## Precautions when using Geolam®:

Geolam® boards are colour-fast, and even in strong sunlight. A slight variation in colour may occur in the first few months following installation, but will stabilise after six months. This slight variation in colour is normal, and only occurs on the surface of the boards.

Just as is the case for hardwood decking, the surface of boards can get very hot when exposed to long periods of strong sunshine. Dark coloured surfaces will absorb the sun's rays to the greatest extent, and will therefore be hotter than light coloured surfaces. Take care, therefore, in hot weather, to protect your feet, but above all those of children playing on a deck or terrace. Composite wood is vulnerable to fire, so any heat source should be used with care near the installation, and fires should never be lit directly on the surface. Although Geolam® is anti-slip, we still recommend taking care when walking on a wet Geolam® surface.

Take care not to overload decks or terraces, and distribute the weight of heavy objects evenly, taking due care at the outset to build an adequate structure to support heavy weights.

Take care not to pierce the boards with pointed objects such as the spike of a parasol or high heeled shoes. These can deform the surface or leave marks.

Wipe up spills of oils, organic solvents or fuel immediately. Do not leave rusting objects for long periods of time on a Geolam® surface, as they may leave stains that are difficult to remove.

You should not bite or lick Geolam®, even though its components are not harmful to health. Once a year, or after the passage of destructive natural phenomena such as typhoons, tornadoes, or earthquakes, we recommend you inspect your decking to detect any resulting problems (detached screws, cracks or splitting) which could be a danger to users.

## Daily care of your Geolam® decking:

Geolam® is a high quality product, and is relatively dense and water repellent. Substances that stain, if removed in time, cannot penetrate the board, and so stains remain on the surface and will fade with the passage of time.

Regular and periodic maintenance of your terrace or swimming pool deck will help preserve it and ensure its long life. A clean deck is one on which no-one will slip or fall. We recommend avoiding concentrated chemical substances when cleaning Geolam®. Always use soap, soft detergent, or a neutral washing-up liquid in preference to other substances. Don't wait for dirt to get entrenched on the boards, but wash it off with a hose or high pressure cleaner and soapy water.

- Always work in a longitudinal direction on boards.
- When embarking on any maintenance task, try the procedure out on a less visible area of deck, or a discarded board before applying to the main area.
- Lightly sanding the boards with very fine sandpaper can be the best solution for many of the problems described in the following paragraphs.

### Black stains caused by dampness, fallen leaves, or decomposing material

Use a conventional cleaning product containing bleach (sodium hyperchlorite, to be used with full precautions as stipulated by the manufacturer) or detergent. Always try to remove stains before they become engrained. Use a floor cloth to rub the stain in a backward and forward movement, and along the grain of the board (i.e. longitudinally). For stubborn stains, use a stiff brush. Rinse thoroughly afterwards with plenty of water.

### Rust and dirt

Any stain remover containing phosphoric acid can be used to remove traces of rust or dirt. For stubborn stains, try a rust remover. Use this kind of product with care, however. If necessary, use rough grain sand wrapped around a wooden block and sand delicately, without applying pressure, and in a longitudinal direction (photos 10 and 11). Rinse abundantly with water afterwards.

- After sanding, a slight discoloration can appear, but it will fade in time

**Oil, coffee or food stains:** cleaners containing lemon are effective for oil, coffee and food stains. Apply the cleaner (including acetone or alcohol type cleaners) as quickly as possible before the stain becomes engrained. If the stain persists, use a rough grain sandpaper wrapped around a block of wood to remove it, sanding delicately and without applying pressure, in a longitudinal direction along the boards (see photos 10 and 11). Rinse abundantly with water straight afterwards.

- After sanding, a slight discoloration can appear, but it will fade in time

**Bloodstains, or other stains of organic origin:** use iced water and wash the stains several times. If necessary, use a lemon based cleaner to clean away any residue.

**Red wine stains:** use soda water and allow to act for a few minutes. Do not allow the stain to dry out. Rinse thoroughly with water. Repeat this operation several times if necessary.

**Water marks:** in dry weather, pinkish stains may appear on your deck, especially if the installation instructions have not been adhered to, so that water does not run off, or if the deck is badly ventilated. To remove these stains, use a pressure hose with

soapy water and dry the boards immediately afterwards using a rubber-edged 'squeegee' type of implement, or a dry rag.

**Scratches or burns:** use a rough grain sandpaper wrapped around a small block of wood and sand delicately, without applying pressure, and in a longitudinal direction along the boards (photos 10 and 11). Rinse thoroughly with water and a floor cloth.

- Sanding can result in a slight discoloration, but this will fade in time.

**Frost and snow:** Calcium chloride or salt can be used to melt snow or ice on your decking.

If possible, do not allow the snow to melt naturally, but sweep it off at the earliest moment possible.

**Serious scratches or other damage:** After a few years, in the same way as for an internal parquet floor, your Geolam® deck can be given a general overhaul. Thoroughly clean the deck with lots of water. The surface should be free of dirt or any extraneous objects before sanding it with a suitable band sander and a rough grain sandpaper (24) sanding just once and in the longitudinal direction, and without applying pressure (photo 12).

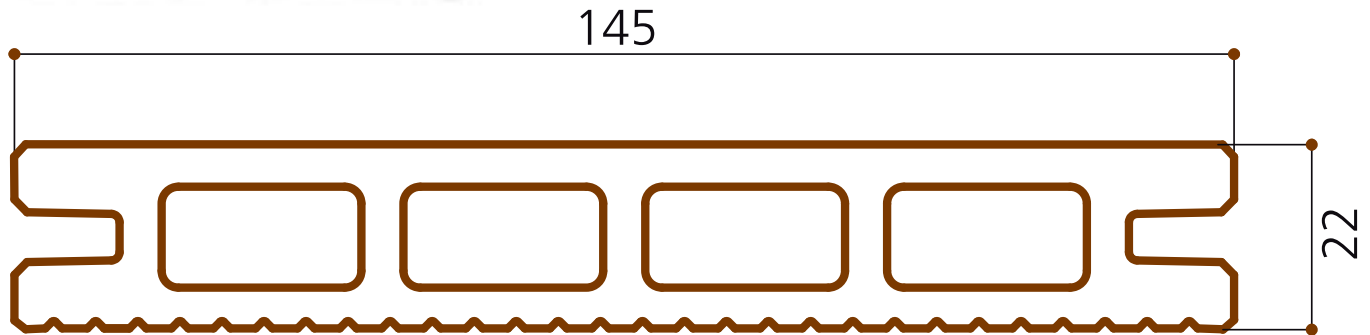
- Avoid using circular movements, as the area sanded in this way will have a slightly different appearance from the surrounding boards, depending on the type of sanding applied.

You can download these installation and maintenance instructions at [www.geolam.com](http://www.geolam.com).



# Duo decking

## Technical specification



Composition	Value	Notes
Wood fibre	50 %	Sourced from wood-working in our factories
Polypropylene	30 %	Recycled and free of any other plastics
Bulking agents	10 %	Anti-slip properties Enhancers of Geolam's technical characteristics Improved resistance properties Colour-fast properties
Additives		
Stabilisers		
Pigments		

Duo Boards		Notes
Thickness	22 mm	Tolerance +/- 1mm
Width	145 mm	Tolerance: +/- 1mm
Length	3850 mm	Tolerance: +/- 1mm
Weight	2.4 kg/lm	9.24 kg per board, and 15.89 kg/m <sup>2</sup>
Surface	One side smooth, one side grooved	Select smooth or grooved appearance at the time of installation
Colours	Teak, Rosewood or Ebony	
Fixing	Use Duo clips	
Maximum load per board (3-point test)	> à 155 kg	450 mm between supports (3-point test) Speed at which board is subjected to load 10mm/minute
Distributed load simulation	450 Kg/m <sup>2</sup>	450 mm between supports (with fixed extremities)
Deformation limit	1.5 mm	value obtained: 0.41 mm
Longitudinal warp radius	5 mm / 2 m	
Longitudinal deformation	4 mm / 3 m	
Inter-joint distance (between mid-points)	45 cm	
Number of clips per m <sup>2</sup>	18-21 depending on the type of installation	

Physical properties	Units	Value	Organism and procedure
Specific density	g/cm <sup>3</sup>	1.27	JIS K7112
Deformation temperature	°C	116	JIS K7191
Thermal expansion coefficient	mm/°C	3.6x10 <sup>-5</sup>	JIS K7197
Absorption of humidity	24 hours at 20°C	0.2	JIS A5905
Linear expansion after immersion (longitudinally)	%	0	JIS A5905
Ageing test – resistance to traction after 500 hours under a Xenon blade	%	-5%	JIS A5721

Mechanical properties	Units	Value	Organism and procedure
Elasticity module (transversal)	Mpa	2000	JIS K7171
Resistance to deformation	Mpa	32	JIS K7171
Resistance to traction (transversal)	Mpa	18.9	JIS A5721
Resistance to compression (transversal)	Mpa	31	JIS K7181
Resistance to shearing	Mpa	11	JIS Z2101
Resistance to the Charpy resilience test	KJ/m <sup>2</sup>	4.0	JIS K7111
Resistance to tearing (screw extraction)	N	900	JIS A5908

JIS: Japanese Industrial Standards Committee (<http://www.jisc.go.jp>)

## High-tech material

	Colour-fast in sunlight	Rot-proof, no treatment needed	No maintenance needed	Anti-slip	Easy and rapid laying	Hardwearing and natural	No treatment needed	Insect-repellent	Will not split
<b>Geolam®</b>	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
<b>Wood</b>				■	■	■			
<b>Plastic</b>		■ ■	■ ■		■		■	■ ■	■

## An eco-friendly product

### An eco-friendly product

This product has been awarded the latest environmentally correct certification by Japan's national laboratory (reference JIS A 5741) designed to qualify all composite woods and recycled plastics. This certification guarantees that Geolam® is absolutely free of any toxic product potentially harmful to health!

### Table of values obtained

Volatile substance emissions (formaldehyde)	Less than 0.1 mg/l	milligrams/litre	JIS A1460
<b>Elution of toxic substances</b>			
Cadmium	< 0,01	milligrams/litre	JIS K6743
Lead	< 0,01	milligrams/litre	JIS K6743
Mercury	< 0.0005	milligrams/litre	JIS K6743
Selenium	< 0.01	milligrams/litre	JIS K6743
Arsenic	< 0.01	milligrams/litre	JIS K0400
Hexavalent chromium	< 0.05	milligrams/litre	JIS K0400

JIS: Japanese Industrial Standards Committee (<http://www.jisc.go.jp>), a member of the Japanese association of standards (<http://www.jsa.or.jp/>)

### Geolam awarded the Eco Mark label

No tree has been felled in the manufacture of Geolam®, and nor has any plastic been incinerated, while forests and natural resources have been preserved. Not only is Geolam® manufactured from a mixture of recycled woods and resins, but it is also recyclable, guaranteed solvent free, and free of glue or any product that endangers the environment. Even when incinerated, boards do not generate anything harmful to health.

Geolam® has been awarded the Eco Mark label, a label that evaluates the full life cycle of recycled products designed for use in the building trade.

The Eco Mark label is awarded by the Japanese Association of the Environment (<http://www.ecomark.jp/english/>) a member of the Global Network of Eco-labels (<http://www.globalecolabelling.net/>), and is equivalent to the European Union of Eco Labels ([http://ec.europa.eu/environment/ecolabel/index\\_en.htm](http://ec.europa.eu/environment/ecolabel/index_en.htm)) certification.

07123009