THERMORY®
Thermo-treated wood

ThermoryUSA.com

Thermo-Ash HANDBOOK

DECKING CLADDING & PORCH FLOORING

INSTALLATION • CARE • SPECIFICATIONS

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Handbook

Thermory® Decking, Cladding & Porch Flooring Installation/Care/Specifications Guide

Contents

1. Preface

For the production of thermo-ash decking, cladding, and porch flooring, we the manufacturer apply the kiln technology of the Finnish mechanical engineering company Jartek. Jartek is a manufacturer of thermo-kilns with the most advanced technology and the longest experience in the field. Jartek kilns are able to measure the moisture content of the wood at the beginning of the treatment process with computerized sensors. The entire process is guided so that homogenous conditions with respect to humidity and temperature are created in all parts of the kiln. This forms the atmosphere to produce consistent quality from charge to charge, as well as within one charge. The measuring devices in the kiln support the kiln operator in controlling the process parameters in point of time, length of time, temperature and humidity level.

A critical step in the treatment process is drying to 0% moisture content while increasing the temperature of the thermal chamber to 419°F along with the introduction of external sources of steam. Decisions made by the process operator concerning point of time and length of time at which the temperature is increased or decreased respectively, affects the relative humidity and the formation of steam. Our proprietary process has been proven to produce the most consistent thermally modified products with a consistent final equalized moisture content while minimizing cracks, brittleness and color differences in our end products.

2. Installation

Installing Thermory® requires following these particular steps to ensure a successful installation.

COLOR:

The color of thermo-Ash is not resistant to UV light. Nevertheless, wood that has turned silver/ grey is not less resistant to decay. To maintain the original color for a longer time or to restore the original color tones, we recommend applying Super Deck® finishes and cleaners. A light sanding will also remove the surface silvering and restore the original wood tones.

STORAGE:

Whenever possible, Thermory® should be stored inside, out of the weather and sun. When this is not possible, Thermory® needs to be elevated off the ground, stacked uniformly and covered with a waterproof tarp. Leave the ends of the tarp open so moisture is not trapped inside, making certain the stored wood is not subjected to the elements or sun as the UV rays will fade the material. Under no circumstances should Thermory®, even in original packaging, be subjected to rain or any moisture as it cannot dry properly when stacked and/or packaged.

INSTALLATION:

Decking:

- When installing decking, support joists should be no more than 16" on center when installing deck boards perpendicular to the joists.
- Maintain 1/8" gap between deck boards up to 4" in width and ¼" for deck boards over 4" in width.
- Thermory® hidden fastener clips automatically provide the proper gap between deck boards. Use silver colored 4" clips for 1 x 4 and 5/4 x 4 and dark colored 6" clips for 1 x 6 and 5/4 x 6 decking.
- Face screw the outside edges of the first and last decking boards using stainless steel screws.
- Thermory® recommends using Sihga® self-tapping, stainless steel trim head screws.
- Always use stainless steel screws when installing Thermory decking and porch flooring. Face screwing stainless steel screws using other than the recommended Sihga® screws requires predrilling a hole that is 1/32" smaller in diameter than the screw. The screw head's taper must be counter-bored as well. We recommend the utilization of a depth stop. The size of the screw head must match the size of the counter-bore.
- Minimum screwing distance from edge: ¾"Minimum screwing distance from end: 1 ½". Predrilling is required, even with recommended self tapping Sihga screw, less than 3" from the end of deck board.
- With Thermory's® exclusive JEM™ Joint (joint end match) the ends of the boards do not need to rest on the support joists. Each board must rest on and be fastened to a minimum of two joists.

Cladding:

- When installing horizontal Cladding, the tongue and groove boards must be installed with the tongue pointing upwards.
- Always use ***Sihga*** stainless steel screws or Thermory® fastening clips for fixing Thermory® cladding.
- Use Thermory® fastening clips for invisible fixing. B1 clip is suitable for some profiles. Use stainless steel ***Sigha,*** 40mm screws to attach the clips to the batten, 2 screws for each clip is recommended.
- Battens must be placed at least every 24" and a minimum of 3/4" thick. Ventilation should be provided behind the boards.

- Fix horizontal cladding to vertical battens, joint of the board must sit on the batten. If (JEM) joint end-matched material is used, the joint can also be placed between the battens.

- Fix vertical cladding to horizontal battens, joint of the board must sit on the batten. If (JEM) joint end-matched material is used, the joint can also be placed between the battens.

- It is recommended to leave minimum 12" gap at the bottom between the ground and cladding. Ventilation gap behind the cladding must stay open from below to ensure air circulation.

- Thermory® cladding does not require surface treatment. However, as with any wood, exposure to weather conditions and sunlight can cause the color to go gradually silver grey. To mimimize colour changes, Thermory® cladding can be protected by applying regular UV oil or pigmented UV oil. We recommend Superdeck – Exotic Hardwood Stain, 2500 Series.

- In any case we recommend to oil the ends and edges of the board prior to installation to prevent water intake. Oil manufacturer's guidelines for the treatment should be followed.

Porch Flooring:

- Thermory® porch flooring must be used only for covered porch applications with adequate pitch to allow run-off of wind- blown rain or snow melt. Note: Thermory® porch flooring is also used for siding, soffit and fascia applications, however, should never be used for uncovered decks.

- Allow a minimum of 4" of air space beneath decking and porch flooring. Proper drainage and air movement underneath decking and porch flooring is required.

SUB-VENTILATION:

It is essential that air can circulate under the decking, allowing the relative humidity above and below the decking to fluctuate evenly and be equal above and below at any given time. Do not trap moisture beneath the deck.

Example: For roof decking and pool side applications, the pitch must be at least ¼"per foot with no water pooling. Ends of the deck must be left open to allow air circulation. Support joists must not sit directly on the surface which will trap moisture beneath. Be sure to shim the joists up off the surface, allowing air circulation and drying.

CRACKS:

Thermory® can show small stress cracks. These are normally not wider than 1/16" and are not limited in length.

Surface hairline cracks are a natural occurrence with wood and are no reason for a claim. The surface of correctly installed Thermory® will always swell and shrink faster than its core causing the hairline cracks during the shrinking process. Due to the growing conditions of the wood, some boards will experience more surface-checking than others. Regular application of Super Deck® oils can help minimize the occurrence of surface hairline cracks.

End checking can be lessened by applying a marine wax to the ends of the boards prior to installation. Use caution that excess wax is not applied to the face of the decking as this may discolor that area of the surface.

COLOR DIFFERENCES AND SHAPE DISTORTION:

Color differences between boards may occur and is typical with natural wood products. These differences are no reason for a claim. Shape distortion of Thermory® is significantly less common than for untreated wood. Minor distortions can however occur, and are no reason for a claim.

HANDLING CLAIMS:

In case of a claim, damaged boards will be replaced by Thermory® USA, LLC. Replacement/installation at site or free shipment of the material to the customer will be handled on a case by case basis.

3. Maintenance & Care

Thermory® solid hardwood products are durable and naturally resist mold, mildew and damage from normal wear. With little maintenance, Thermory® products will remain beautiful and provide many years of enjoyment.

Thermal Ash will naturally age to a uniform silver/grey over time. This process will start immediately and, depending on the amount of UV exposure, will take anywhere from several months to a year. To maintain the original color for a longer time or to restore the original color tones, we recommend applying Super Deck® wood care finishes and cleaners. Always follow the instructions provided with the product. As the directions state, it is important to thoroughly clean the boards and when applying, do not use excess oil.

It is important to keep the surface clean and free of leaves, pine needles and debris which can hold moisture and attract mold and mildew.

Barbecue spills, wines, condiments, dog nails, high heels, etc. can stain and scratch the surface. Most of these will fade and become less noticeable over time. Deeper scratches and stains can be blended with a light sanding. Sanding will expose the original tone of the boards which will again gradually silver to match the surrounding area. For surfaces with an oil finish, reapply the oil to match the surrounding area.

4. Load Capacity/Bending Strength

Due to its extraordinary strength, thermo-treated ash is ideally suited for decking applications (see physical test results of Technical University of Tallinn on page 12).

LOAD CARRYING CAPACITY:

The load carrying capacity involves certain limit figures, which must be met in wood construction according American Forest & Paper Association, Inc and the IRC, (International Residential Code). There are only test results available and no valid U.S. standard for thermally modified wood. In decking construction one will never be faced to the limit figures of load bearing capacity due to the relevant limit figures of serviceability. Deck construction has to respect the appropriate installation code on a case-by-case basis. The limit figures of load bearing capacity are more than met with thermo-Ash decking of .785" thickness. Point load testing ran to failure, averages over 1,900 lbs with end matched joint, tested between joists of 16" on center with Thermory clips and face screwed. Test; ASTM D1037 with an Instron 5585H point load testing machine.

SERVICEABILITY:

Serviceability in terms of deck construction describes the appropriate choice of the dimension between joists to avoid objectionable bending of decking. The ALSC, (American Lumber Standard Committee sets forth modulus of elasticity deflection limits which shall not exceed L/180 which equals .081" for maximum deflection. University testing in the U.S. illustrates that interpolated test data derived from a 300 lb point load has an average deflection of .066". Test; ASTM D1037 with an Instron 5585H point load testing machine.

5. Modification of Wood in Exterior Application

Ultraviolet light and water

GENERAL:

UV-light splits, in a photolytic process a substance called lignin. The purpose of lignin is to bind the cellulose fibers in wood similar in purpose to glue. Lignin becomes water soluble due to the splitting process. Humidity renders lignin soft; driving rain may wash it out. Whitish cellulose fibers are left which are the basic needs for micro organisms that create a silver-gray patina on the wood. Over time, the cellulose fibers start to erode since they are lacking the lignin glue. A relief-like surface is created that stresses the natural grain of the wood. In shady spots blue stain and mold may form, especially close to vegetation. This can also lead to color variations, but does not damage the wood in the application considered here. A significant impact is the constant shift between humidity penetration and drying. Driving rain and condensate is taken up by capillary action of untreated wood, causing swelling. The cross-section shrinks again with the drying process caused by sun and wind. This cycle repeats itself which leads to surface cracks and distortion depending on conditions.

THERMO-ASH (419°F):

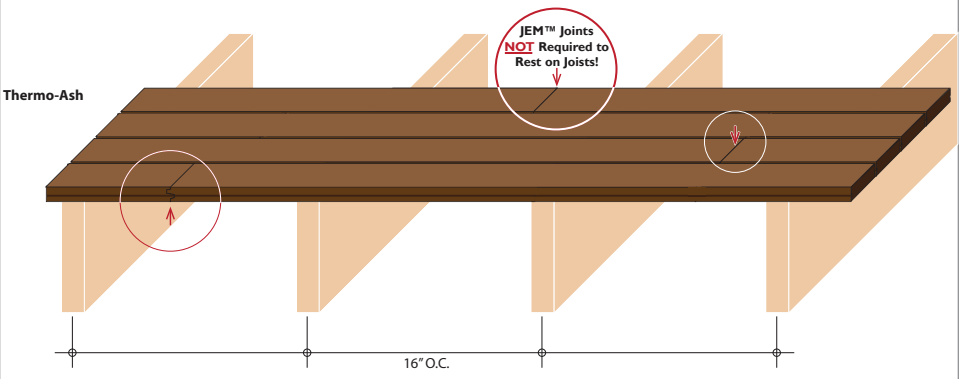
UV light and water impact thermo-ash as described above. The graying effect is present at similar times, and can only be slowed by applying surface oils with low surface tension which respect the low absorptive capacity of thermo-ash. Dimensional stability and resistance to fungi, mold, insects is better for thermo-ash than for untreated wood species.

Thermo-ash treated at 419°F is resistance/durability class 1, which is the same class predominant for some tropical hardwoods on the market, particularly Ipe and Teak. Thermo-Ash is therefore an alternative to tropical hardwoods. The application of thermo-ash contributes to saving tropical forests. Considering the physical test results of thermo-Ash, one can position thermo-Ash ahead of all tropical hardwoods. Dimensional stability (swelling and shrinking) is better than tropical hardwoods.

6. Installation Diagram

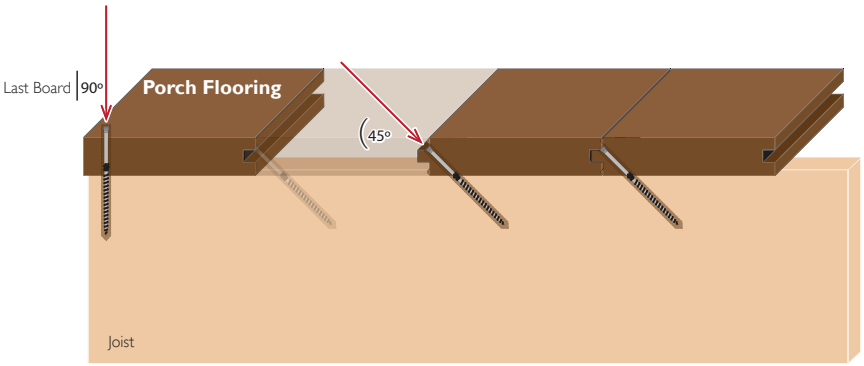
DECKING:

Sample installation suggestion-02



PORCH FLOORING:

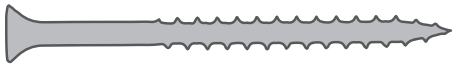
(ALSO INCLUDES JEM™ JOINTS AS SHOWN ABOVE)



7. Attaching Thermory® Decking

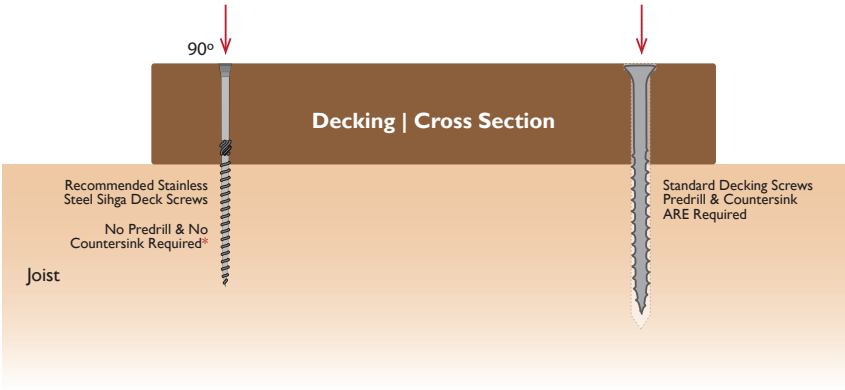
Screws:

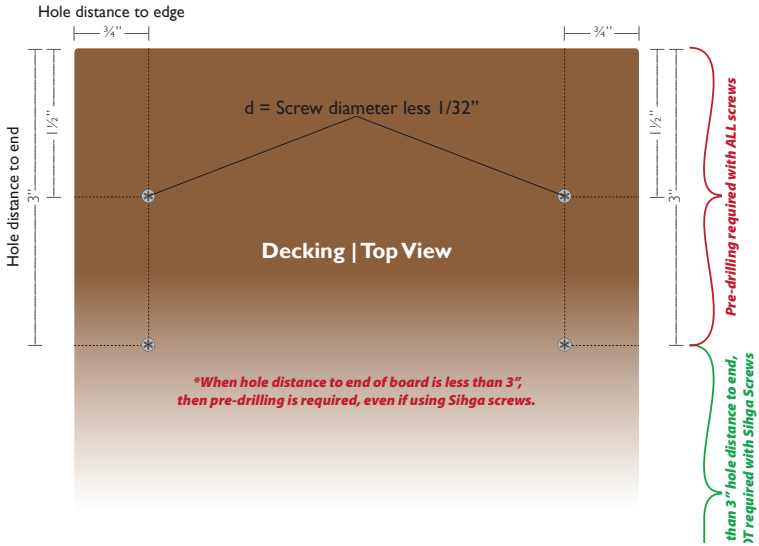
STANDARD SCREWS:
PRE-DRILL & COUNTERSINK



SIHGA SCREWS: {{ RECOMMENDED }}
NO PRE-DRILL REQUIRED
NO COUNTERSINK REQUIRED

Face Screw Installation:

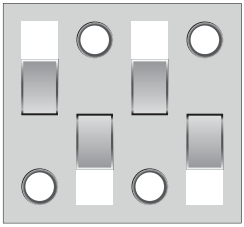




Thermory® 4” Silver Finish Hidden Clip System

Cross Section

Side View

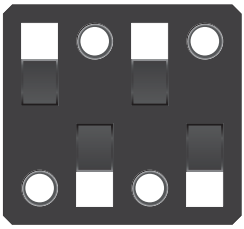


Top View

Thermory® 6” Matte Black Finish Hidden Clip System

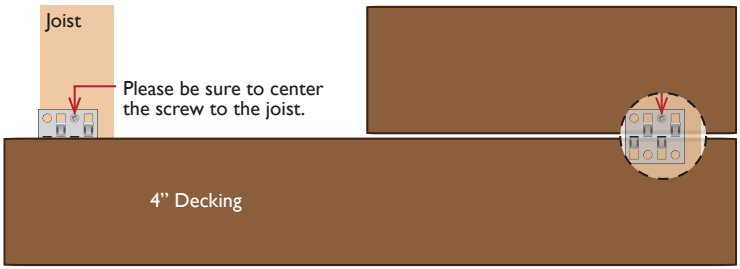
Cross Section

Side View



Top View

*****Please note, only one screw required per Clip.*****



CLIPS PER SF:

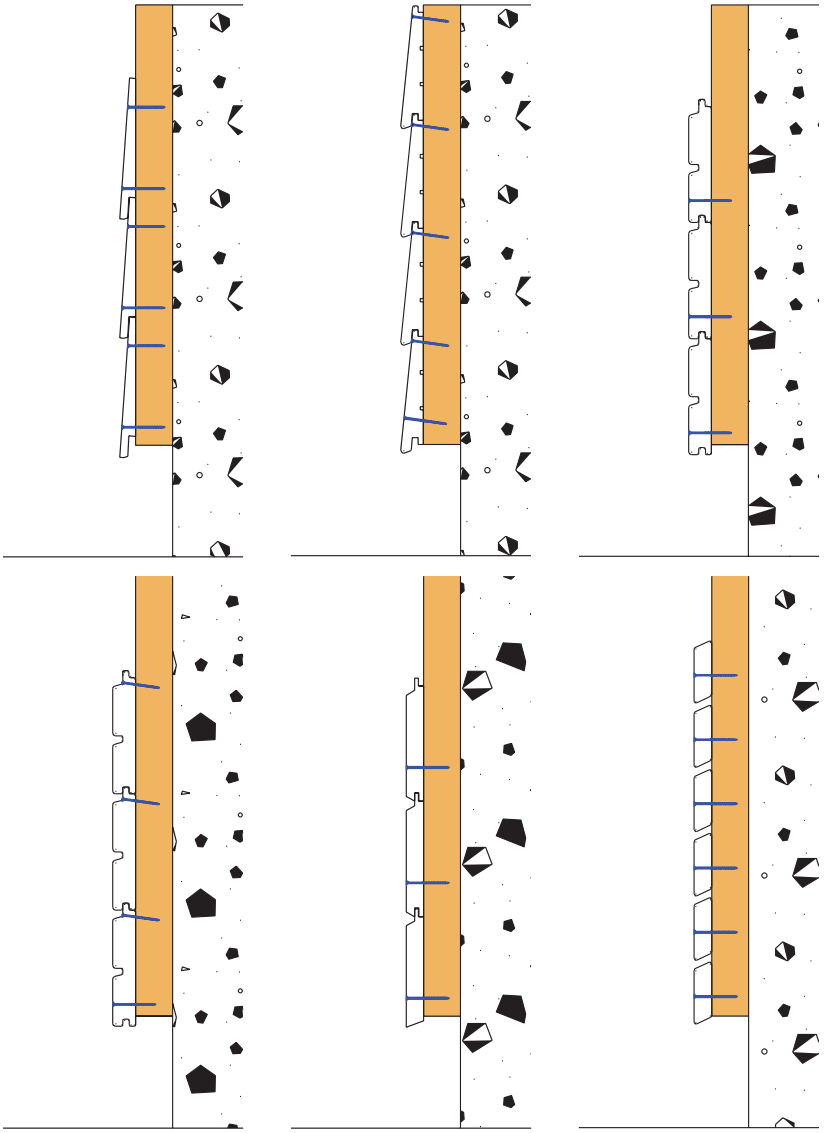
Size	*Clips per 100 SF (16" O.C.)*	*Sq Ft /Box*
1 x 4 (.79" x 3.7")	255	39
1 x 6 (.79" x 5.9")	160	63
5/4 x 4 (1.02" x 3.5")	270	37
5/4 x 6 (1.02" x 5.7")	170	59

8. Cladding Installation

HORIZONTAL CLADDING AND T/G INSTALLED FOR CALDDING PURPOSES:

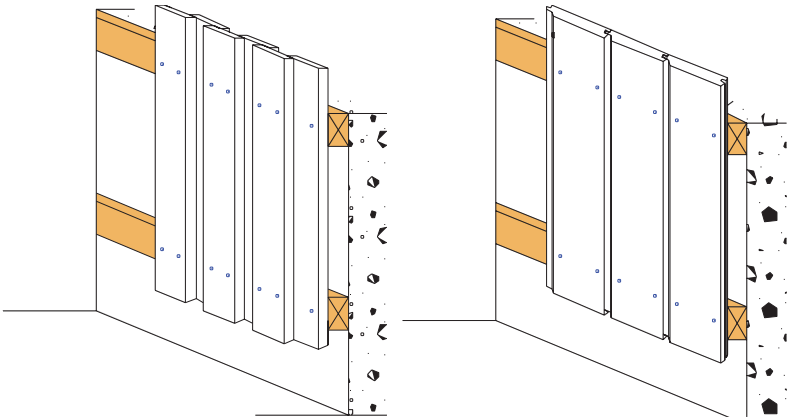
Tongue and groove boards must be installed with the tongue pointing upwards.

BASIC HORIZONTAL INSTALLATIONS



VERTICAL CLADDING

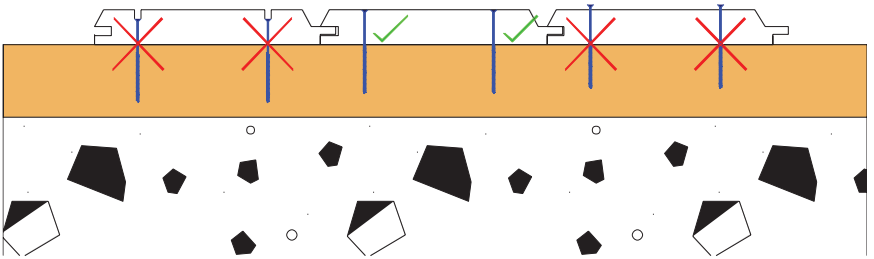
SOME BASIC VERTICAL INSTALLATION



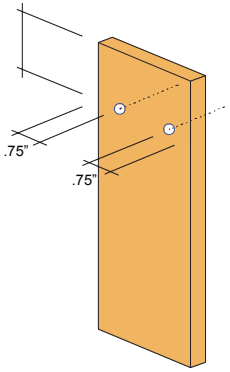
FIXING WITH STAINLESS STEEL SCREWS OR WITH THERMORY CLIPS

Always use ***Sihga*** stainless steel screws or Thermory® fastening clips for fixing Thermory® cladding.

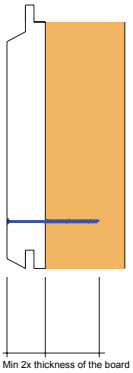
- Fixing with screws:
- ***Sihga*** screws are self tapping however predrilling within 8" of ends is recommended



Screw head must not penetrate too deep into the wood and must be flush with the surface of the board to prevent excessive moisture absorbtion.



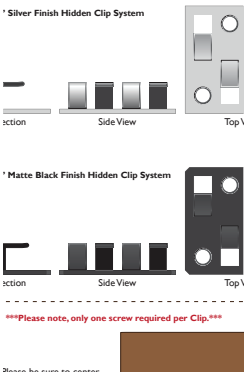
In order to avoid splitting, leave a minumum of .75" space from the edge of the board.

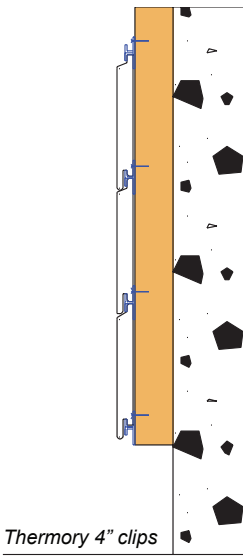


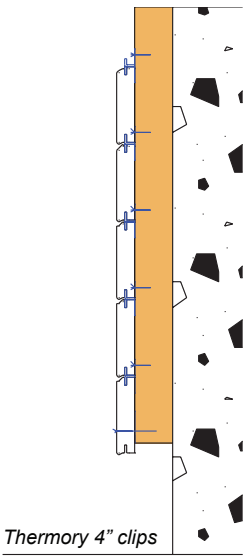
Length of screw/nail: minimum 2x thickness of the board at its thickest point: 40mm Sihga screws recommended for .79" stock and 60mm Sihga screws recommended for 1.02" profiles.

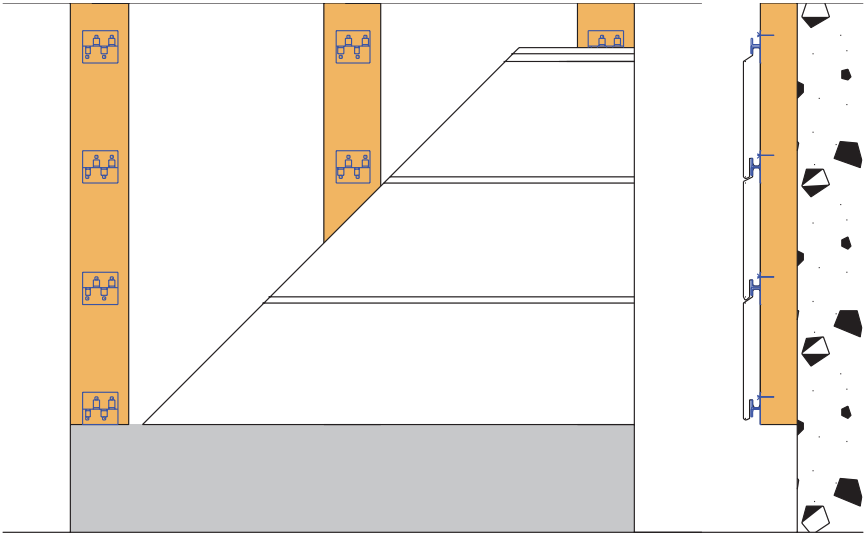
FIXING WITH THERMORY® CLIPS:

Use Thermory® fastening clips for invisible fixing. B1 clip is suitable for some profiles. Use stainless steel ***Sigha,*** 40mm screws to attach the clips to the batten, 2 screws for each clip is recommended.







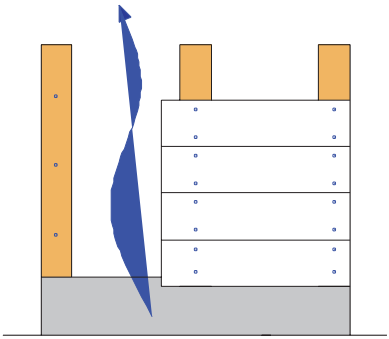


Installation with Thermory clips

BATTENS

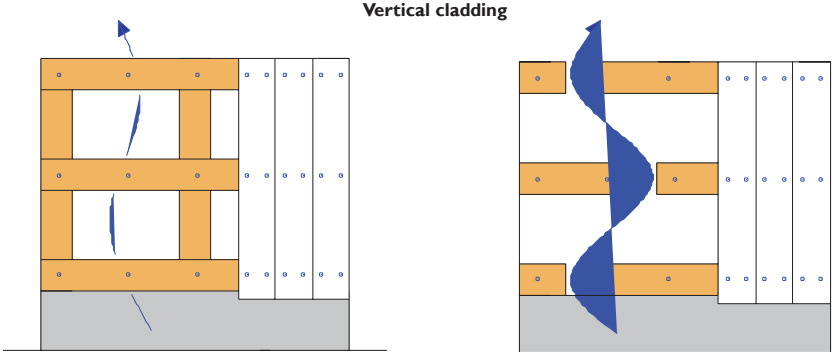
Battens must be placed at least every 24” and a minimum of 3/4” thick. Ventilation should be provided behind the boards.

Horizontal cladding



Fix horizontal cladding to vertical battens, joint of the board must sit on the batten. If (JEM) joint end-matched material is used, the joint can also be placed between the battens.

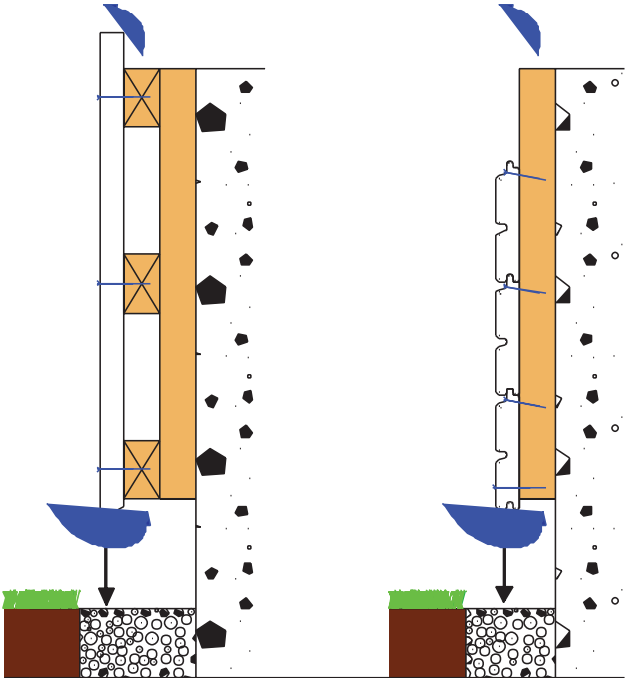
Vertical cladding



Fix vertical cladding to horizontal battens, joint of the board must sit on the batten. If (JEM) joint end-matched material is used, the joint can also be placed between the battens.

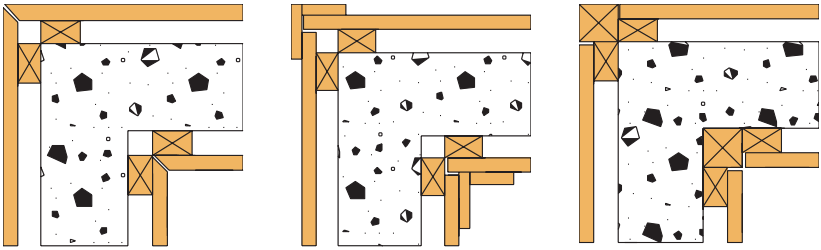
BOTTOM FIXING

It is recommended to leave minimum 12" gap between the ground and cladding. Ventilation gap behind the cladding must stay open from below to ensure air circulation.



CORNER DESIGN

External and Internal corners



SURFACE TREATMENT

Thermory® cladding does not require surface treatment. However, as with any wood, exposure to weather conditions and sunlight can cause the color to go gradually silver grey. To mimimize colour changes, Thermory® cladding can be protected by applying regular UV oil or pigmented UV oil. We recommend Superdeck – Exotic Hardwood Stain, 2500 Series.

In any case we recommend to oil the ends and edges of the board prior to installation to prevent water intake.

Oil manufacturer's guidelines for the treatment should be followed.

9. Physical Properties

TEST REPORT

No. 239 2007-07-05

Product description: Heat treated (419 °F) ash wood .78" x 5.315" x 39.37"
Reason for test: Determine strength characteristics for suitable building materials
Test target: Determination of physical & mechanical properties of Thermory decking

Test methods.

Moisture content of all samples was determined in a dry kiln at temperatures between 217°F and 221 °F until a constant mass was achieved. Density, bending strength and surface hardness were measured at an equilibrium moisture of 4.6% in the laboratory. For obtaining the equilibrium moisture in exterior conditions the samples were exposed to a relative humidity of 85% until a constant mass was achieved.

Test results.

Moisture level at (normal) laboratory conditions

Sample No.	1	2	3	4	5	6	**Average**
Moisture level, %	4.4	4.7	4.7	4.5	4.7	4.7	**4.6**

Density

Sample No.	1	2	3	4	5	6	**Average**
Density - lbs/ft3	37.25	37.31	63.32	36.19	37.94	35.88	**36.82**

Equilibrium moisture at average exterior conditions

Sample No.	1	2	3	4	5	6	**Average**
Moisture level, %	7.7	8.0	7.9	7.8	7.9	8.1	**7.9**

Bending strength

Sample No.	1	2	3	4	5	**Average**
Bending strength - lbs/inch2	15,954	14,837	12,937	14,561	12,110	
Sample No.	6	7	8	9	10	
Bending strength - lbs/inch2	11,907	16,244	13,691	14,358	13,503	**14,010**

10. Resistance

Testing for rot and decay resistance was administered by EPH (International Independent Testing for Residential and Commercial Acceptance – Dresden, Germany). To achieve Class 1 Durability a mass loss of less than 5% is needed; Thermory® test results show less than 1% mass loss in accordance with the following tests.

Resistance and durability classes according to standardized testing EN-15083-1 (EN84)

Mass loss on reference average (no thermal treatment)		*Coniophora puteana*	*Trametes versicolor*
		35%	32.1%
Average mass loss % of Thermo Ash	**BATCH I**	0.2%	.6%
	BATCH II	0.1%	.7%
	BATCH III	0.3%	.6%
	BATCH IV	0.2%	.6%

Class	*Nomination*	*Time period*	*% Mass Loss in Testing*
1	very durable/resistant	25 years or more	less than 5%
2	durable/resistant	15-25 years	more than 5%, less than 10%
3	moderately durable/resistant	10-15 years	more than 10%, less than 15%
4	hardly durable/resistant	5-10 years more than	15%, less than 30%
5	not durable/resistant	2-5 years	more than 30%

Examples for different wood species

SPECIES	**DURABILITY CLASS**
Thermory Ash	1
Ipe	1
Teak	1
Bangkirai	2
Larch	3-4
Douglas fir	3-4
Pine	3-4
Spruce	4
Fir	4
Beech	5
Birch	5

11. Testing

Thermory® solid hardwood products have undergone extensive testing concluding that our thermo-Ash is extremely durable, stable and resistant to termites. Thermory® Ash carries a Class B flame spread rating. For more information on these and other test results, visit www.ThermoryUSA.com.