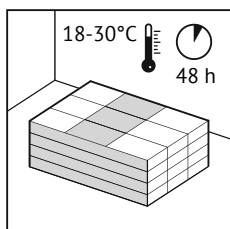


INSTALLATION INSTRUCTIONS FOR SPC Vinyl Floor.

This installation instruction is applicable for SPC Vinyl Floor collections with integrated underlay.

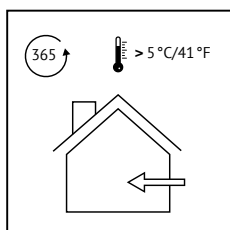
GOLDEN RULES



1

Install your floor between 18 and 30°C and a subfloor temperature of above 15°C.

SPC Vinyl Floor must be acclimatized in the room of installation between 18-30°C (64-86°F) for a period of at least 48 hours before installation. This floor & room temperature needs to be maintained prior to, during and for at least 24 hours after the installation is completed.

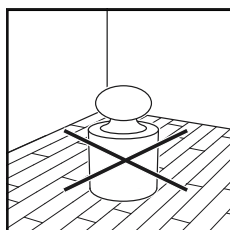


2

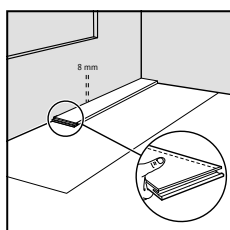
SPC Vinyl Floor has been designed for indoor heated (> 5°C) (41°F) installations, preferably at normal room temperature.

SPC Vinyl Floor cannot be installed in solariums, seasonal porches, camping trailers, boats and other unheated applications.

Heavy objects (for example a heavy wood stove, electrical accumulators, build-in cabinets and other fixed objects ...) should not be installed on top of the SPC Vinyl Floor floor. It is recommended to install the stove/accumulator first on top of a protection plate, and install the SPC Vinyl Floor around up to the plate and respect the expansion gaps.



If you have any concerns about the temperature of your floor, please contact the Vast American technical department.



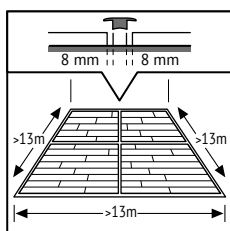
3

Make sure that you leave an expansion gap of 8 mm.

Never block the floor.

If heavy/fixed objects (ex. kitchen, kitchen island, build-in cabinets, heavy stoves) are on the floor they act as a wall, so the minimum expansion should be foreseen there.

Floating installation should stay floating!



4

In most cases you don't need an expansion profile between different rooms.

However, the use of an expansion profile is mandatory when:

- (a) the temperature in adjacent rooms will variate differently above and below the T-range of 18-30°C.
- (b) you have rooms with and without floorheating/-cooling.
- (c) the maximum room size is exceeded.

For standard residential use (15-35°C), the maximum room size is 13mx13m.

For rooms with more extreme temperatures (5-65°C), the maximum room size is 8mx8m. For

rooms with HVAC-system (18-25°C), the maximum room size is 30mx30m.

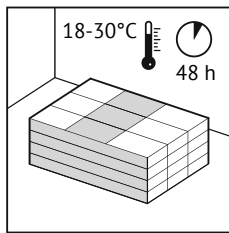
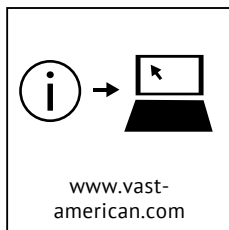
Larger rooms require additional expansion gaps and expansion profiles.

IN ORDER TO OBTAIN A GOOD RESULT, WE ADVISE ALL PARTIES TO FOLLOW ALL GIVEN INSTRUCTIONS CAREFULLY.

Please make sure that the floor user has a copy of this document.
National regulations regarding floor application must always be followed.

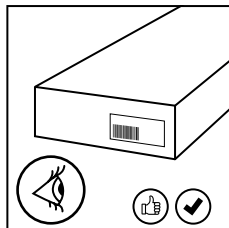
- Site and installation conditions must always comply with the relevant national regulations and installation standards.
- In case the national standards or regulation conflicts with the manufacturer's recommendations, the most stringent of the two prevails.

1. PREPARATION



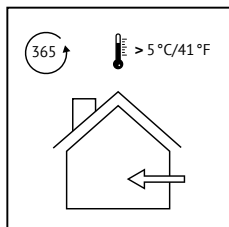
1

Always store and transport SPC Vinyl Floor floors carefully to prevent distortions. Store and transport the boxes on a flat surface in neat stacks. Never store the boxes upright or in moist or in dusty rooms. Do not store the boxes in very cold ($< 5^{\circ}\text{C}$) or very warm ($> 35^{\circ}\text{C}$) or in humid places. SPC Vinyl Floor floors must be acclimatized in the room of installation between $18\text{-}30^{\circ}\text{C}$ ($64\text{-}86^{\circ}\text{F}$) for a period of at least 48 hours before installation. This floor & room temperature needs to be maintained prior to, during and for at least 24 hours after the installation is completed. Install your floor between 18 and 30°C and a subfloor temperature of above 15°C .



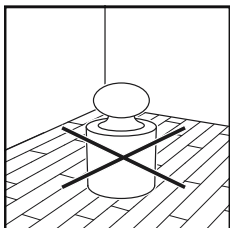
2

Vast American floors can be bought in different formats, decors and qualities. Make sure you have received the correct flooring that you ordered before starting the installation. It is always a good idea to store the end labels together with your purchasing receipt.



3

SPC Vinyl Floor has been designed for indoor heated ($> 5^{\circ}\text{C}$) (41°F) installations, preferably at normal room temperature ($= 18\text{-}30^{\circ}\text{C}$). SPC Vinyl Floor cannot be installed in solariums, seasonal porches, camping trailers, boats or any other unheated application.



4

Never block the floor.

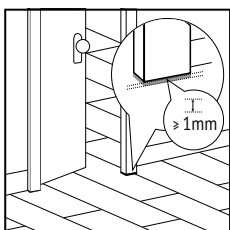
If heavy/fixed objects (ex. kitchen, kitchen island, build-in cabinets, heavy stoves, electrical accumulators, doorframes, stairs and others) are on the floor, they act as a wall.

- Heavy objects should be installed first and not placed on top of the SPC Vinyl Floor floor.
- For heavy objects with radiant heat, it is recommended to install the stove/accumulator first on top of a protection plate, and install the SPC Vinyl Floor around the plate and respect the expansion gaps.

The SPC Vinyl Floor floor must be able to move around the heavy objects to avoid open joints and separating planks. The expansion gaps size must be respected around all heavy/fixed objects.

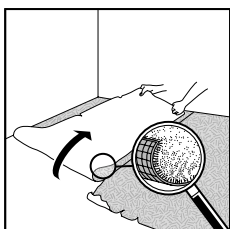
A floating installation should ALWAYS stay floating!

SPC Vinyl Floor is a floating floor and should never be adhered to the subfloor.



5

If the doorframe is installed after the floor installation, please make sure that a min. 1mm vertical gap is left between the base of the doorframe and the surface of the floor.

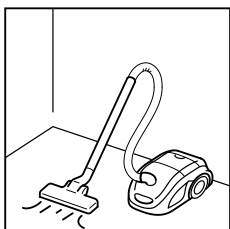


6

The type of subfloor, its quality and its preparation has a big influence on the final installation result. If the subfloor is not appropriate for the installation of SPC Vinyl Floor then necessary actions should be taken. Contact your Vast American dealer, who will be more than happy to help you. Be aware that unevenness in the subfloor may leave marks and can create gaps in your SPC Vinyl Floor floor. The subfloor should be stable and firmly fixed.

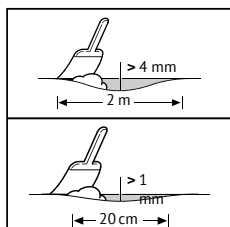
Furthermore it cannot be soft, damaged or loose laid.

Remove existing and /or too soft floorcoverings like carpet, needle felt, cushion vinyl. Floating floor coverings need also to be removed.



7

Make sure that the subfloor is dry, flat, stable, clean and free from grease and chemical substances. If needed, scrape off and clean up old adhesives. Prior to installation, carefully remove all debris (including nails), sweep and vacuum. Repair major surface imperfections and large cracks. It is recommended to remove old skirtings and to install new ones after the installation of the floor.



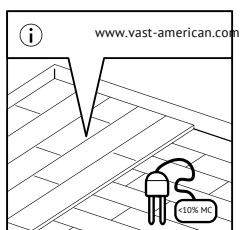
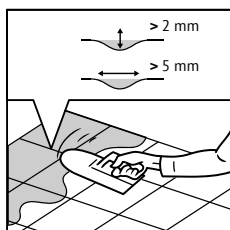
8

Cement joints between tiles or other gaps of more than 2mm (0,08inch) in depth and 5mm (0,2inch) in width should be levelled.

For SPC Vinyl Floor click floors: any unevenness of more than 1mm (0,04inch) over a length of 20cm (7,87inch) must be levelled out. The same applies to unevenness of more than 4mm (0,16inch) over a length of 2m (78,7inch).

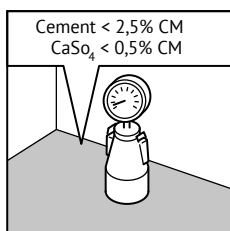
Bumps should be removed by sanding or scraping.

If an appropriate levelling compound is required, check if a primer or sealer is needed.



9

In case of installation on a wooden subfloor, please remove any existing floor covering first. No signs of mold and/or insect infestations should be present. If there is moist in the woodbased subfloor or there is no proper moisture barrier below the woodbased subfloor it has to be removed first. Reason is that the wood will rot after time because the moist is blocked by the new flooring and its underlay. Make sure the subfloor is level and nail or screw down any loose parts. Apply a suitable wooden floor panel, level floor, or use levelling compound on top for a perfect subfloor preparation. The levelling boards must be fixed with an appropriate glue or every 30cm with screws. An eventual crawl space under the plank floor must be sufficiently ventilated. In case there is no crawl space, make sure that the moisture content of all the floor layers (wooden subfloor + subfloor (for ex. cement screed, anhydrite or ...)) are lower then the mentioned values. Remove any obstacles and make sure there is sufficient ventilation (minimum 4 cm² total ventilation openings per m² of floor). The moisture content of the wood must not exceed 10%.

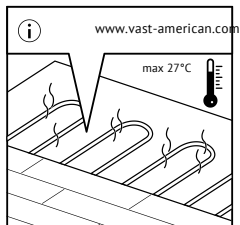


10

In case of installation on a mineral subfloor, it must be permanently and sufficiently dry prior to installation. Installation on cement subfloor requires a CM < 2,5% (75% RH). An installation on anhydrite subfloor requires a CM < 0,5% (50% RH). If floor heating is used, cement subfloor requires a CM < 1,5% (60% RH) and anhydrite subfloor requires a CM < 0,3% (40% RH). (see Floor Heating Instructions) Always measure, record and keep your moisture content results.

A new cement screed floor must dry at least 1 week per 1cm (3/8") thickness up to 4cm (1-1/2"). Thicknesses over 4cm (1-1/2") require twice as much drying time. For example, a 6cm (2-1/2") concrete subfloor must dry at least 8 weeks. For renovations, always measure the moisture content in all the different subfloor-layers and make sure that they are lower then the mentioned values.

SPC Vinyl Floor is moisture resistant, however, best practice should be followed to avoid bacteria and mould growth under the floorcovering: Direct-to-earth mineral subfloors must have an effective damp proof membrane (DPM) in accordance with the national standards for the installation of resilient floorcoverings. In most cases such a DPM has been installed during the building process, if not, post-construction solutions are available on the market. Where necessary, follow the manufacturer's detailed instructions for the installation of a surface applied DPM and the use of levelling compound.



11

Separate rooms / zones with and without floor heating, and/or with different temperature controllers / temperature behavior, must be installed with a transition -profile with respect of the expansion gaps of 8mm on each side.

Additional instructions apply if there is underfloor heating or cooling. For health and safety reasons and to avoid problems with the Vast American Floor, certain important basic rules need to be followed:

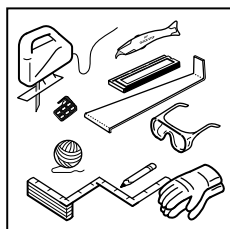
Floor Heating

- Firstly it is very important to ensure a floor surface temperature of maximum 27°C (80°F).
- Always change the temperature gradually at the start and end of a heating period.
- Finally try to avoid heat accumulation by carpets or rugs or by leaving insufficient space between furniture and the floor.
- Some water based and electrical floor heating systems are permitted. See separate installation instruction Floor Heating and Floor Cooling.

Floor Cooling

- For floor cooling, a heat-resistance of $< 0,15 \text{ m}^2\text{K/W}$ is prescribed.
- Ensure a proper safety system including automatic sensors that detect when the dew point (= start of condensation) is reached below or in the floorcoverings and then switch off the cooling.

For a good preparation, read also the separate installation instructions for Floor Heating and Floor Cooling on vast-american.com

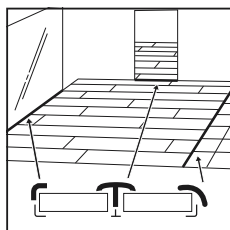


12

Because SPC Vinyl Floor comes with an integrated underlay already, a separate underlay is not allowed before installing the SPC Vinyl Floor.

The following standard tools are needed: hammer, saw with blades for plastic (a jig-saw, hand circular saw, hand saw, or cross-cut saw), mouth mask (during sawing), measurer, safety glasses, thin rope, gloves and a pencil. Besides that, you also need the following accessories: Vast American INSTALLATION SET (a pull-bar, spacers and a tapping block suitable for the Vast American click system) and suitable maintenance products.

The use of accessories other than Vast American accessories may cause damage to your SPC Vinyl Floor floor. In such cases the guarantee provided by Vast American will be void. For this reason we advise to use only SPC Vinyl Floor accessories, which have been specially designed and tested for use with your SPC Vinyl Floor floor.



13

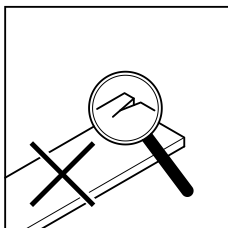
Choose the correct profile to cover the expansion gaps depending on the situation. In most cases you don't need an expansion profile between different rooms. However, the use of an expansion profile is mandatory when:

- the temperature in adjacent rooms will vary differently above and below the T-range of 18-30°.
- you have rooms with and without floorheating/cool.
- the maximum room size is exceeded.

For standard residential use (15-35°C), the maximum room size is 13mx13m.
For rooms with more extreme temperatures (5-65°C), the maximum room size is 8mx8m.
For rooms with HVAC-system (18-25°C), the maximum room size is 30mx30m.

A subfloor control joint can be covered with SPC Vinyl Floor flooring. Please check the subfloor flatness requirements.

Building movement joints must be transposed to the SPC Vinyl Floor floor and a profile must be used.



14

Check all panels before and during installation in optimal daylight conditions under the angle of light reflection.

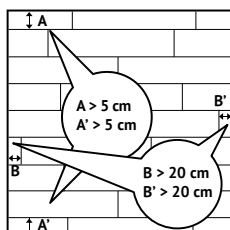
Check that the colours correspond to those ordered, the quantities are correct and no visible damage to the boxes. Check SPC Vinyl Floor during installation for any visible defects. Do not install any panels that display any imperfections.

Be aware that some designs have a natural variation within them.

Defective panels must never be used.

An installed plank is considered as accepted and cannot be claimed.

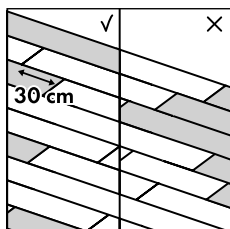
2. INSTALLATION



1

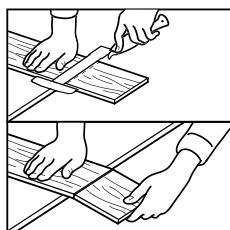
Before starting, carefully measure the length and the width of the room to plan a precise layout to achieve a balanced appearance of the floor.

As shown in the image, A and A' not less than 5 cm & B and B' more than 20 cm.



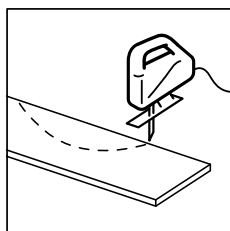
2

During installation, make sure that you mix the floor panels (and floor boxes) sufficiently so that there are not too many identical, lighter or darker planks next to each other. To obtain the best visual effect, it is best to install the panels in the direction of the longest wall and/or parallel to the incidence of light. Ensure that the end joints of the panels in 2 successive rows are never in line, they should be staggered by at least 30cm (12inch). For a natural look and better mechanical strength, we do not recommend an installation of the planks in a pattern but rather at random formation.



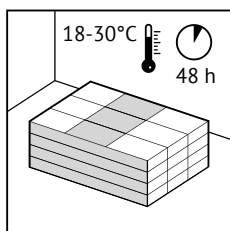
3

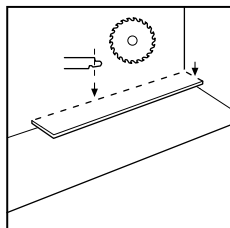
To shorten the length of the plank with a straight cut, you can cut the SPC Vinyl Floor floors with the decor side face up, using a special concave vinyl cutting knife. In order to cut the vinyl plank, draw a straight line along which you will be cutting, and use the knife to make a firm cut in the surface. You never need to completely cut through the vinyl. (TIP: the attached underlay should be cut too before you snap the plank.) Then break off the plank using both hands. For any other cuts, you need to saw the planks. Depending on the type of saw, position your plank with the decor side face-up or face-down. Before making the actual cut, use a leftover piece to determine how the cleanest cut can be obtained (decor side face-up or face-down).



4

Installations in areas colder than recommended, will influence the installation properties of SPC Vinyl Floor. The planks will be less flexible, cutting will be harder and small pieces difficult to cut out. The lower the temperature, the more difficult the installation and the higher the risk of damaging the click profile. Also, the risk of excessive expansion increases with decreasing installation temperature. Installation in areas warmer than recommended, increases the risk of excessive shrinkage/gaps between panels.

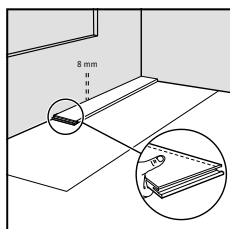




5

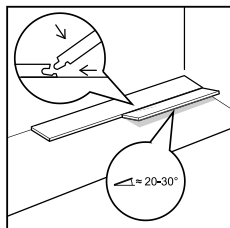
With SPC Vinyl Floor panels you can choose where you want to start in the room. Think about what will be the easiest way to install the floor. We will demonstrate the installation of SPC Vinyl Floor floor for right-handed people, from right to left (from front viewpoint). Because of the Uniclic click system, you can work in either direction.

SPC Vinyl Floor flooring has a patented locking system and is intended as a floating floor; panels should not be bonded to the subfloor, but in addition to that, it is not allowed to glue the joints between the planks. Only for a plank replacement, it is allowed to glue the joints between the planks locally.



6

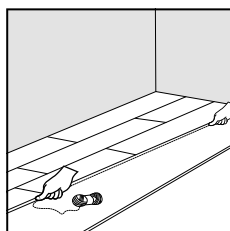
Start with the first planks that will be installed in the corner. Remove the click profile on both the long and the short side of the plank by sawing. For other planks of the first row (not in the corner), remove the click profile on the long side that will be directly next to the wall. Any side of a plank that is directly next to a wall, must have its click profile removed, in order to ensure the required expansion gap. Make sure that you leave everywhere an expansion gap of 8mm (0,315 inch).

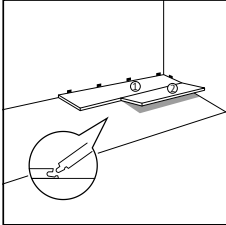


7

In order to make the start of the installation easier, assemble the first 3 rows away from the wall, so you can sit on the planks during the assembly. Then slide the first 3 rows at the wanted position close to the wall with distance spacers in place. Take a thin rope and hold it alongside the installed planks to check and adjust the straightness of your installed first 3 rows. It is recommended to make additional checks of the straightness, in order to confirm the straightness during the installation.

Remember to use the distance spacers for the expansion gap of 8mm (0,315 inch) along the perimeter.



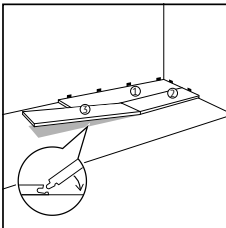


8

Uniclic® can be installed in two different ways.

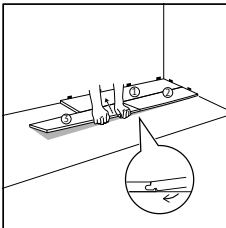
The preferred method is method A (angle-angle):

First, rotate the short side of the plank to be installed, into the short side of the already installed plank, by means of the angle principle.



Then raise the newly installed plank to an angle of 20°-30°.

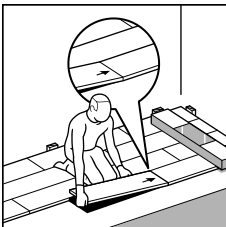
This will also raise the previously installed planks in the same row, because their short sides are already connected.



Now place your BOTH hands close to the joint as shown in the figure and pull the long side of the plank towards you.

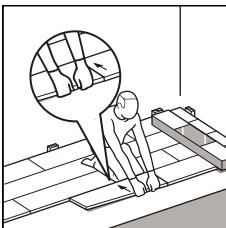
The panels will now click together.

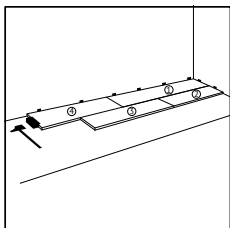
You can either insert the tongue into the groove, or the groove on to the tongue. The tongue in groove method is the most common and easiest way.



Tips:

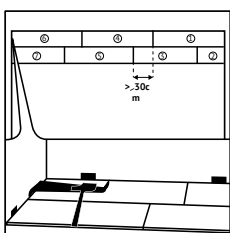
** It is advisable to sit with your knees or stand with your feet on the already installed panels, to ensure that they don't start shifting during further installation.*





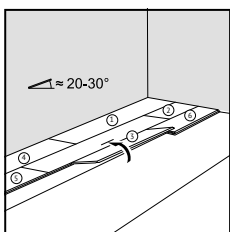
9

If method A is not possible (at hard to reach places by example), you can use method B (tapping):
With Uniclic® you can also join the panels, by tapping the planks into each other, eliminating the need to lift them. This method requires the use of the special Uniclic® tapping block. The planks should not be joined with a single tap. To avoid damaging the panels you must tap them together gradually. You can angle the short or long side of the plank first and then tap to connect the other side.



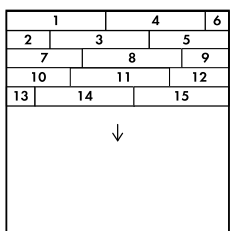
10

In places where it is too difficult to install the Uniclic® planks with the tapping block (e.g. against the wall), you can pull them together using the pull-bar and a hammer.



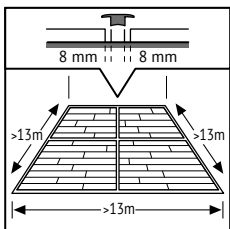
11

After the installation of each plank and before continuing with the next plank, check each short and long side joint to make sure there are no height differences and no openings.



12

Continue the installation like this - row by row - towards the end of the room. The easiest way to work is to sit on the already installed planks.



13

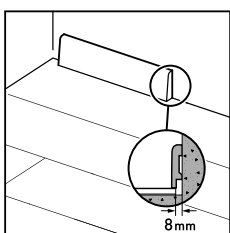
Room temperature varies continuously, so it is vital that the floor is able to expand and contract. For this reason, make sure you leave an expansion gap of 8 mm (5/16") on all sides of the floor, around pipes, thresholds and under door frames. Expansion gaps can be finished by means of a skirting that is attached to the walls or with an expansion profile.

In most cases you don't need an expansion profile between different rooms. However, the use of an expansion profile is mandatory when:

- (a) the temperature in adjacent rooms will vary differently above and below the T-range of 18-30°.
- (b) you have rooms with and without floorheating/-cooling.
- (c) the maximum room size is exceeded.

For standard residential use (15-35°C), the maximum room size is 13mx13m.
For rooms with more extreme temperatures (5-65°C), the maximum room size is 8mx8m.
For rooms with HVAC-system (18-25°C), the maximum room size is 30mx30m.

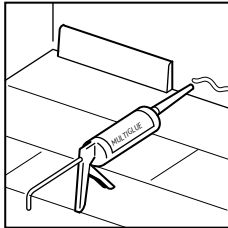
Larger rooms require additional expansion gaps and expansion profiles.



3A. FINISHING

Remove all spacers.

Inspect the final surface of the installed floor.

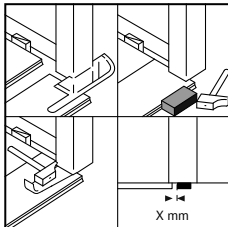


1

Install the skirting-board against the wall. Never attach the skirting-board to the floor. This method allows the floor to expand and contract under the skirting-board.

Do not fill the expansion gaps with silicone, sealant or other kit.

If you would like to finish your floor fully waterproof, read the instructions below "3B. FINISHING OF THE FLOORING IN WET AREAS" **before** installing the skirtings.

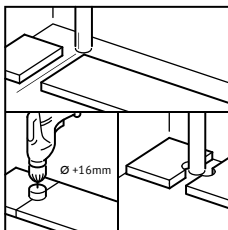


2

When the new floor meets a threshold or a doorway, we recommend undercutting the door frames or moldings. To secure the correct cut, turn a plank upside down with the underlay below, and place it on the floor up to the door frame. This ensures that the cut will be made at the correct height. Then place a multi tool or hand saw flat against the plank and simply cut through the frame. When sawing the panels make sure that the expansion gap under the door is 8mm. Remove the cut out pieces and vacuum away any debris.

Install the plank on the long side, keeping the short side close to the undercut molding. Then slide the plank underneath the undercut towards the already installed plank in order to close the short end joint. Use the Vast American pull bar and/or tapping block to secure absolute tightness in the long and short joint.

If you cannot lift the panel (e.g. under radiators), use the Vast American pull bar and/or tapping block to tap the planks together.

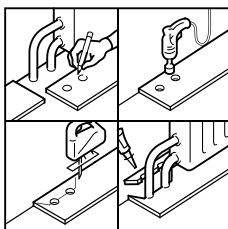


3

In rows where there is a pipe, make sure the pipe falls exactly in line with the short side of two planks. Take a drill bit with the same diameter as the pipe plus 16mm (0,63 inch).

Click the planks together on the short side and add a third plank on the long side for stability. Drill a hole centered on the joint between the two planks.

Now you can install the planks.



4

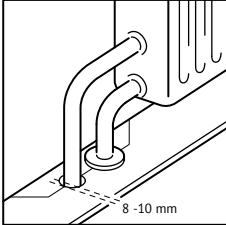
In rows where there is a double pipe, proceed as follows:

1. Measure where the pipe will come through the plank. Don't forget to allow room for the expansion gap. Measure the diameter of the pipe plus 16 mm for the expansion.

2. Drill through the panel where the pipe will come through

3. Extend the hole to the edge of the panel

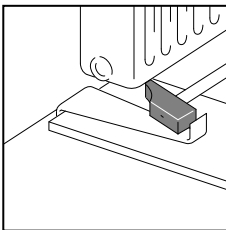
4. Lay the panel around the pipe.



5

Then, using an appropriate PVC glue along the cut edges of the piece you cut out, glue the piece in place. Be sure no glue comes between the cut out piece and the subfloor.

For a perfect finish around pipes, use Vast American pipe covers (floating placement).



6

In places where it is difficult to install the planks with the tapping block (e.g. underneath radiators), you can tap them together with the pulling iron and a hammer.

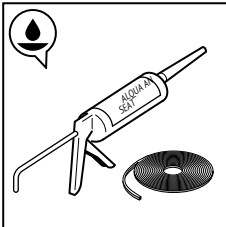
3B. FINISHING OF THE FLOORING IN WET AREAS

This installation instruction can prevent water infiltration around the perimeter and obstacles of your SPC Vinyl Floor. Following these instructions carefully ensures the water-resistant floor will perform in most applications / room settings. These instructions will help to seal the perimeter of the floor preventing water infiltration into the vinyl core in high-risk areas - i.e. areas with risk of liquid spillages on the surface, direct access to outside, etc.

The floor is not suitable for use in *damp spaces* i.e. within shower enclosures, pool areas, saunas, and rooms with built-in drainage.

Please note that some national regulations do not allow floating installation in wet rooms, such regulations regarding floor applications must always be followed.

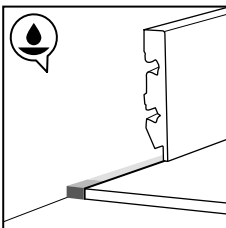
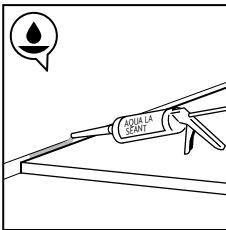
For a water resistant finishing, use the elastic waterproof transparent paste (Vast American Aqua Sealant) and the foamstrip (NEVRFOAMSTRIP15).



1

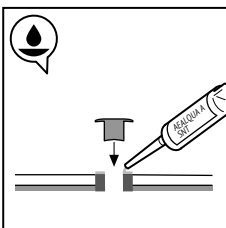
Sealing the perimeter expansion gaps combines a compressible PE foamstrip and the flexible and waterproof Vast American Aqua sealant. Place the PE foamstrip in the expansion gaps with the help of the self-adhesive backing and apply the flexible Vast American Aqua sealant under slight angle towards the Vast American floor. Make sure that the Vast American Aqua sealant covers about 1 to 2 mm of the wall, the whole foamstrip and 1 to 2 mm of the floor.

Tip : To make work more clean, remove any excess Aqua Sealant immediately.



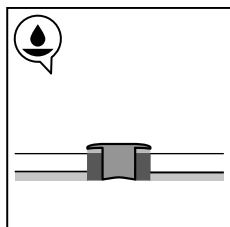
2

Install the skirting-board with Vast American Multiglu against the wall. When choosing the matching colored skirting or scotia, use the respective Hydrostrips to prevent water penetration and to obtain a neatly finished appearance.



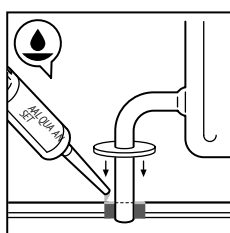
3

Fix the Incizo base profile to the subfloor with Vast American Multiglu. Apply the flexible Aqua sealant on the PE foam that is in the expansion gap.



4

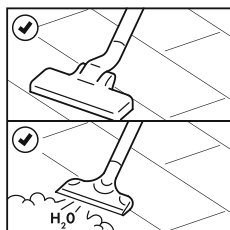
Push the Incizo profile in the base profile and the wet Aqua sealant.



5

For a perfect finish around pipes, use Vast American pipe covers and the elastic waterproof transparent Vast American Aqua sealant, taking into account the expansion of 8mm. Place the foamstrip in the expansion gaps. Apply Vast American Aqua sealant on the foamstrip. Then place the pipe covers in a floating installation.

4. MAINTENANCE



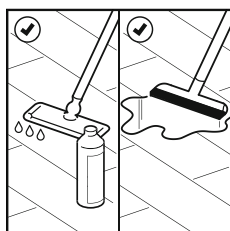
1

You can immediately walk on your new SPC Vinyl Floor floor after installation.

Appropriate maintenance procedures will help to preserve the appearance and will extend life of a SPC Vinyl Floor floor. The frequency of maintenance will depend on the amount and type of traffic, degree of soiling, the floor colour and type. For full maintenance instructions and recommended products we refer you to vast-american.com.

For dry maintenance, we advise a Vast American mop or vacuum cleaner. Make sure the vacuum cleaner is equipped with soft wheels and a special brush to avoid scratches on your floor.

You can use a steam cleaner on the SPC Vinyl Floor range, if there's no steam directly coming on the SPC Vinyl Floor. So it must always be used with an appropriate cloth on the steam opening, which guarantees also an homogeneous heat and steam distribution. It is also important to take care to hold the apparatus not too long on the same place and clean the floor in the length direction of the planks.



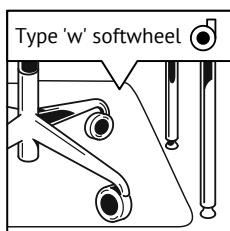
2

Your SPC Vinyl Floor floor can be cleaned with a damp or wet mop. Vast American Cleaner is a maintenance product specifically developed to keep your new vinyl floor in top condition. Never use natural soap detergents since this will leave a sticky film on the surface which will collect dust and dirt and will be difficult to remove. The same with cleaning agents containing abrasive particles, these might matt down the surface. It is always important not to overdose any cleaning agent, as this will lead to a build up of cured cleaning agent which is difficult to remove without using a vinyl stripper.

Bad maintenance can damage your floor.

For further information on how to clean and maintain your floor, please visit vast-american.com. For specific cleaning instructions in commercial applications or projects, you can contact the Vast American technical department.

Always remove spilled liquids from the floor immediately.



3

Protect furniture and chair legs. Use (office) chairs type W and seats with soft wheels that are suitable for a vinyl floor and/or use a desk mat that is suitable for Vast American.



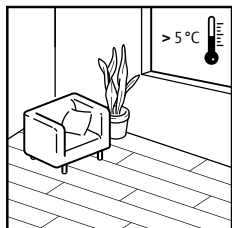
4

Never drag heavy items or furniture over the floor, but lift them up.

Make sure furniture legs have a large floor surface and are provided with non-staining floor protectors. The taller and/or wider the furniture feet are, the better the weight distribution on the floor will be, and the less chance there is to damage the floor.

Place non-rubber backed mats at all outside entrances to prevent dirt, grit and soil from being transferred onto your floor. This will reduce damages, the maintenance requirement and extend the life of your floor. Please note that prolonged contact with some rubber types and/or latex can cause a permanent stain.

Do not allow cigarettes, matches or other very hot items to contact the floor as this may cause permanent damage.



5

Ensure that the indoor climate conditions are always kept $> 5^{\circ}\text{C}$ (41°F) and preferably between $18\text{-}30^{\circ}\text{C}$ ($64\text{-}86^{\circ}\text{F}$). It is also important to keep the subfloor in the temperature range mentioned above.