



SIKA MARINE APPLICATION GUIDE

TEAK DECKING

Version 2/2017

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DECK COVERINGS

GENERAL DESCRIPTION

Deck coverings are of functional and esthetical importance. Since maritime conditions are harsh, the ship has to be produced not only with the best products but also in accordance with a professional workmanship.

This manual will help to produce durable bonding and sealing solutions. For project related informations we recommend to consult the corresponding national Technical Service.

TEAK DECK HISTORY

Teak has been used for hundreds of years as a durable deck material.

The hard wood is very durable. Natural antimicrobial and insecticide substances cause an excellent natural anti-rot and weathering resistance.

Alternatives for teak such as iroko, padouk etc. are used in some cases but needs an intensive protection work to assure a long time function. Usually they are used in workboats as thick protective floors.

Regardless of the type of wood used, all require sealants to protect the deck from water penetration that can cause severe damage. This can take the form of unsightly marks along the hull, rotting the woodwork and corroding metal components.

Watertight seals are therefore absolutely essential. Also, in addition to adding structural strength to the subdeck, a wooden deck contributes to the insulation in hot and cool climates alike.

Teak, however, is not a uniform material. Oil, fat, talc and resin-content, as well as porosity and colouration, differ depending on the source and age of the wood.

The following pages detail the correct procedures for the planning, laying, preparing and caulking of teak decks with Sika's Totally Glued Teak Decking System.

TYPES OF TEAK DECK

The Teak planks vary in dimension. The later have been used for luxury vessel decking's with mechanical fixation. Up to now the 22 mm planks applied with the Sikaflex® bonding technology result in the same durability at a more economic price.

The joint for caulking is realised in two ways:

1. SYMETRIC OR ASYMETRIC JOINTS

Advantages:

- Simple manufacturing process

Disadvantages:

- Limited joint depth for restoration or refurbishment grindings
- Higher risk of water penetration between planks and the deck (detachment due to wood swelling)



IMPORTANT:
A bond breaker tape on the bottom of the joint to prevent 3-side adhesion is not necessary.



2. DEEP JOINT METHOD

Advantages:

- High grinding (removal) reserve
- Cost saving by using thinner wood planks
- Better adsorption of wood expansion

Disadvantages:

- More complicated working procedure for curved planks



IMPORTANT:
We generally recommend to use the deep joint method whenever possible.



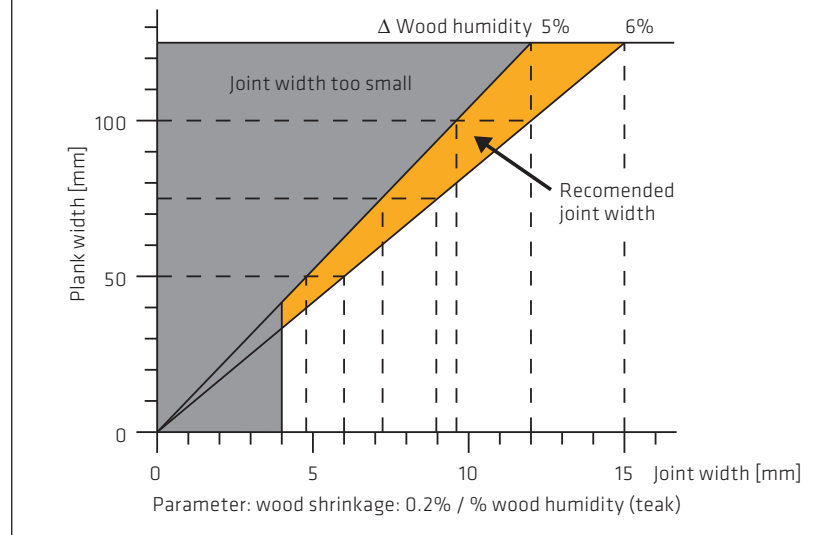
JOINT DIMENSIONING

The joint width depends on the width of the plank, the humidity of the wood when manufactured and the expected humidity in use of the ship.



IMPORTANT:
The change of wood humidity is under normal conditions (wood humidity max. 12 %) in the range of 5 % to 6 %.

GENERAL RECOMANDATION FOR JOINT WIDTH (TEAK)



The humidity of the wood can be measured or estimated from the following graph:

WOOD HUMIDITY (% BY WEIGHT)

	Tempera- ture	10°	15°	20°	25°	30°	35°	40°
Relative humidity	90 %	21.1	21.0	21.0	20.8	20.0	19.8	19.3
	85 %	18.1	18.0	18.0	17.9	17.5	17.1	16.9
	80 %	16.2	16.0	16.0	15.8	15.5	15.1	14.9
	75 %	14.7	14.5	14.3	14.0	13.9	13.5	13.2
	70 %	13.2	13.1	13.0	12.8	12.4	12.1	11.8
	65 %	12.0	12.0	11.8	11.5	11.2	11.0	10.7
	60 %	11.0	10.9	10.8	10.5	10.3	10.0	9.7
	55 %	10.1	10.0	9.9	9.7	9.4	9.1	8.8
	50 %	9.4	9.2	9.0	8.9	8.6	8.4	8.0
	45 %	8.6	8.4	8.3	8.1	7.9	7.5	7.1
	40 %	7.8	7.7	7.3	7.3	7.0	6.6	6.3
	35 %	7.0	6.9	6.7	6.4	6.2	5.8	5.5
	30 %	6.2	6.1	5.9	5.6	5.3	5.0	4.7
	25 %	5.4	5.3	5.0	4.8	4.5	4.2	3.8

Source: R. Kaylwert und Angaben des U.S. Forest Products Laboratory, Madison 1951

CALCULATION EXAMPLE:

Plank width: 50 mm

Production condition: wood humidity measured: 7%

Expected climatic conditions in use: 30 °C / 70 % r.h

Corresponding wood humidity (see table): 12.4 %

Maximal change in wood humidity: 12.4 % - 7 % = 5.4 %

Maximal plank movement (teak) 5.4 % x 0.2 % / % wood humidity change x 50 mm = 0.54 mm

Practical excepted joint movement: 10 % of the joint width

Calculated joint width: 0.54 mm x 10 = 5.4 mm (practical 6 mm)



IMPORTANT:
The minimal joint width is in any case 4 mm. Adjacent joints to walls and profiles should be doubled in size.

PRECONDITIONS OF TEAK BONDING

The teak quality is essential for an optimal result in respect of functionality and optical aspect.

Standing year rings as well as the absence of alternating spiral growth are essential to assure a uniform plank deformation under the different climates. Laying year rings may in addition lead to a danger of foot injuries due to scale of wood formation.

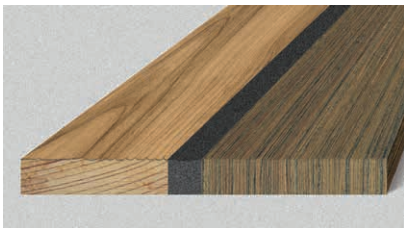


Fig. 1 Left side: laying year rings are not recommended. Right side: standing year rings are best.



PROCEDURE OF LEVELLING, BONDING AND CAULKING OF TEAK DECKS

GENERAL WORKING CONDITIONS

The preferred working conditions for applying sealant to decking are as follows:

- Outside temperature 5 °C to 35 °C and maximal 75 % relative humidity
- Avoid increasing temperature during the first day
- Avoid exposure to direct sunlight and rain
- Prevent exposure to the elements for a minimum of 8 hours after the last step of the process
- Ensure adequate ventilation if necessary
- Avoid dirt, dust, oil, fat, grease, water during all processes as these can cause adhesion failure

SURFACE PREPARATION AND PRIMER APPLICATION

Timber decks are usually applied on top of a sub deck of steel, aluminum, polyester GRP or wood. Aluminum and steel decks may be deformed by the welding process and require a levelling process whereas wooden and polyester GRP decks are normally even by nature.



Fig. 2 Typical welds and weld splatter of a steel deck

ALUMINUM OR STEEL DECKS



Steel: the surface must be grinded or sand-blasted to remove rust, loose particles, flaked paint, contaminants, etc.

When complete, remove all dust with a vacuum cleaner

Aluminum: This surface should be slightly sweep-blasted or sanded



SA 205

Treat the surface with Sika® Aktivator-205 using a clean, lint free rag or a paper towel. Change the rag frequently



Flash off: 10 minutes (min) to 2 hours (max)



Take care to avoid dust, dirt or other contaminates until the next step has been carried out



ZP

■ Check the air humidity and temperature and apply the product only if the surface temperature is higher than indicated in table on page 8 (Minimal substrate temperature to avoid water condensation). Respect the lower temperature limit.

■ Surface and air temperature has to be between 10 °C and 35 °C.

■ Mix the two parts of SikaCor® ZP Primer for 3 minutes, using an electric paddle mixer. Scrape the sides and the bottom of the container and mix for another 30 seconds. Do not split pre-packed cans. Use full kits only.

■ Always monitor the pot life (1 hour at 30 °C, 3 hours at 10 °C).

■ Apply SikaCor® ZP Primer with a short hair roller. SikaCor® ZP Primer consumption, approx 200g / m².



Drying time before next application:
10 °C: 5 to 14 hours
20 °C: 3 to 14 hours
30 °C: 2 to 14 hours

Protect the area until SikaCor® ZP Primer has hardened.

If the area is contaminated, vacuum clean again and then treat thoroughly using Sika® Aktivator-205.

If drying time exceeds the maximum 3 days flash of time, abrade the surface with a rotating sanding machine using P36 grit and vacuum clean thoroughly. Then reapply the SikaCor® ZP Primer.

GLASS FIBRE REINFORCED PLASTIC DECKS



208

Heavily soiled surfaces should be cleaned off first with a pure solvent (Sika® Remover-208) to remove the worst of the soiling



Lightly abrade the contact area with a sanding pad



Remove the dust with a vacuum cleaner



SA 205

Treat the substrate with Sika® Aktivator-205, using a clean, lint-free rag or a paper towel. Change the rag frequently!



Flash off time: 10 minutes (min) to 2 hours (max)



SMM

Apply a thin coat of Sika® Multi-Primer Marine using a clean brush, a foam pad or a felt applicator



Flash off time: 30 minutes (min) to 24 hours (max)



Fig. 3 Applying SikaCor® ZP Primer with a roller

DECK LEVELLING

Steel and aluminum decks are usually deformed by the welding process. They need to be levelled before applications of the teak panels. Levelling is carried out using SikaTransfloor®-352 SL (self levelling) or SikaTransfloor®-352 ST (slight thixotropic). SikaTransfloor®-352 SL should be used on even decks SikaTransfloor®-352 ST is more thixotropic and can be used for decks with a sheer of 3 degrees.

SikaTransfloor®-352 SL and SikaTransfloor®-352 ST show excellent adhesion to the SikaCor® ZP Primer. It represents a lightweight two-component polyurethane based system that cures to a smooth and efficient sound damping layer.

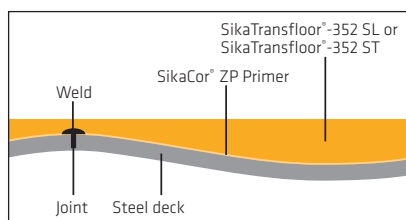


Fig. 4 Cross-sectional detail of deck showing levelling of high spots (weld) and uneven surface



IMPORTANT:
Condensation or water droplets on the levelled deck will cause adhesion failure; always monitor the dew point.

APPLICATION TEMPERATURE

The temperature (substrate / product / air) should be between 10 °C to 35 °C

In case of unfavourable climatic conditions, humidity in the air may condensate on a colder surface. Therefore the substrate temperature has to be controlled and should be equal or higher than indicated in the following graph (see page 7).

THE DECK LEVELLING PROCESS



352 SL or ST

Stir component A and add component B of SikaTransfloor®-352 SL or SikaTransfloor®-352 ST.



Mechanically mix for three minutes at a medium speed. Avoid air entrapment.



Fig. 5 Mixing SikaTransfloor®-352



Immediately transfer the entire contents of the SikaTransfloor®-352 (SL/ST) mixture to another container, scraping the sides and bottom. Mix the new container for another minute before transferring the mixture onto the deck. Never scrape the remaining contents out of a pail onto the deck as this may not be completely mixed. Instead transfer any remnants to the next pail in the process and mix in with a new quantity. Repeat this as many times as required



Fig. 6 Transferring the SikaTransfloor®-352 (SL/ST) to another container



Pour the SikaTransfloor®-352 (SL/ST) mixture onto the area to be applied. Always observe the working time restrictions: 45 minutes at 10 °C, 35 minutes at 20 °C and 25 minutes at 30 °C



Fig. 7 Pouring the SikaTransfloor®-352 (SL/ST) to the floor



Spread the mixed SikaTransfloor®-352 (SL/ST) onto the deck using a bar or straight edge at a thickness just exceeding the highest elevation point of the steel or aluminium deck. Do not apply at a thickness over 30 mm. If this should be necessary, the operation must be carried out in several consecutive processes with intermediate sanding of the cured SikaTransfloor®-352 (SL/ST) surface followed by vacuum cleaning. Working conditions: 10 °C to 35 °C and 80 % r.h. max.



Fig. 8 Spreading the SikaTransfloor®-352 (SL/ST)



Drying time: The SikaTransfloor®-352 (SL/ST) coating can be walked over after 24 hours and is ready for the next stage in the process

DECK BONDING AND BEDDING

Application on levelled surface with SikaTransfloor®-352 SL or SikaTransfloor®-352 ST.

Proceed with sanding the surface of cured SikaTransfloor®-352 (SL/ST) prior to application of the bonding / bedding compound Sikaflex®-298 or Sikaflex®-298 FC. In the time between the curing of the levelling compound and applying the bedding compound, the surface of the SikaTransfloor®-352 (SL/ST) must be kept free of soiling from footprints, dirt, dust, grease, fat, oil and other contaminants. The sanding process should be carried out using appropriate belt-sanding equipment with an 80 grit paper and followed by a thorough vacuum cleaning.

APPLICATION ON OTHER SUBSTRATES

If levelling with SikaTransfloor®-352 (SL/ST) is not required, planks should be offered up and their positions should be marked. When all have been marked, the planks should be removed ready for the primer.

	For all woods: Apply a thin continuous coat of Sika® Primer-290 DC or Sika® MultiPrimer Marine using a roller or spray equipment
	Flash off times: 30 min to 24 hours

Ideally the surface as well as the joint is primed if the planks are embedded and the sealing of the joint is executed in a short time period.



Fig. 9 Applying Sika® Primer-290 DC or Sika® MultiPrimer Marine to a teak deck with a roller (hidden side)

Application temperature	10 °C (50 °F)	20 °C (68 °F)	30 °C (86 °F)
Pot life SikaCore® ZP Primer	3 h	2 h	1 h
Waiting time before application of SikaTransfloor®-352 ST or SL	5 h - 14 h	3 h - 14 h	2 h - 14 h
Working time SikaTransfloor®-352 ST and -352 SL	45 min approx.	35 min approx.	25 min approx.
Waiting time before installation of timber decking with Sikaflex®-298	up to 14 days	up to 14 days	up to 14 days

Working / waiting / drying time for SikaCore® ZP Primer, SikaTransfloor®-352 (SL/ST)

MINIMAL SUBSTRATE TEMPERATURE TO AVOID WATER CONDENSATION ON THE SURFACE¹⁾

	Air humidity	< 50 %	50 %	60 %	70 %	80 %	90 %
Air temperature	5 °C	0	0	0	3	5	7
	10 °C	3	3	6	8	10	11
	15 °C	8	8	10	13	15	16
	20 °C	12	12	15	17	19	21
	25 °C	17	17	20	22	24	26
	30 °C	21	21	24	27	29	31

¹⁾ calculated by the dew point plus 3 °C security

gray = not allowed condition
yellow = allowed condition

Example air temperature 10 °C / relative humidity 60 % result: minimal surface temperature: 6 °C : conclusion: not allowed working conditions (minimal 10 °C).

APPLICATION OF Sikaflex®-298 AND EMBEDDING OF THE PLANKS

Sikaflex®-298 or Sikaflex®-298 FC is a low viscous, exceptionally strong flexible one-component adhesive which is applied with a 4 mm comb trowel. The consumption should be around 1.2 liters (2x 600 ml sausages) per m². The quantity has to be adjusted according to the surface texture. In any case the planks have to be embedded totally without any air pockets between substrate and planks.



Fig. 10 Carefully applying Sika® Primer-290 DC or Sika® MultiPrimer Marine

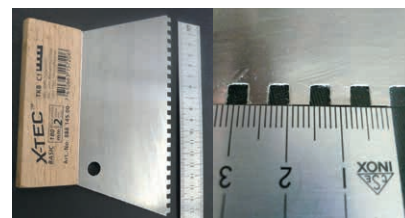


Fig. 11 Hand application picture comb trowel and comb trowel detail



IMPORTANT:

Only cover an area that will allow adequate time for a manageable quantity of deck planking to be placed before a skin forms on the adhesive (see Product Data-sheet).

Hold the planks in place by mechanical means such as weights / sandbags or by vacuum pressing.

The fixation may be released after 24 hours. If a shorter waiting time is needed or in case of low temperature / humidity we recommend spraying sparingly a mist of water over the surface just before placing the planks. The needed water quantity is only about 1 gram water per square meter of Sikaflex®-298.

In such a case the fixation time is reduced to some hours.



Fig. 12 Sikaflex®-298 applied with a comb spreader



Fig. 14 A teak floor being laid, showing the bedding compound and the weights to hold it in place



Fig. 13 Putting down the decking



Fig. 15 Vacuum press



Fig. 16 Vacuum equipment

DECK CAULKING WITH Sikaflex®-290 DC PRO

As soon as the teak planks are fixed, the caulking may be done.

PRIMING THE SUBSTRATE SEAMS

Priming of the planks is an absolutely vital step in the process of caulking with Sikaflex®-290 DC PRO.



If the planks are not already primed, this operation has to be done using a brush in a smaller size than the joint width



In order to achieve long-term adhesion of Sikaflex®-290 DC PRO to the sides of the joints, meticulous preparation of the seams is required. Remove all dirt with a vacuum cleaner.



Primer

Apply a thin coat of Sika® Primer-290 DC or Sika® MultiPrimer Marine to the edges of the joint seams. It can be applied by brush or spray in one coating operation. Application temperature: 10 °C to 35 °C



Drying time:
10 °C to 35 °C: 30 min to 24 hours



IMPORTANT:

If the caulking process is followed not later than one day after the bedding, priming can be done simultaneous for both working steps (plank priming including seams). Take care to avoid soiling of the teak before caulking has been done

APPLICATION OF Sikaflex®-290 DC PRO DECK CAULKING COMPOUND



Before any work commences, ensure that the temperature of the wood does not exceed 35 °C



In addition, the ambient temperature during application should be constant or falling and ideally within the range of 5 °C and 35 °C



290 DC PRO

Apply Sikaflex®-290 DC PRO ensuring that air is prevented from entering the seam by placing the tip of the nozzle against the bottom of the joint and keeping the gun at an angle of about 60°. If narrow joints need to be caulked a specially designed nozzle may be required. Use a handgun, a piston-driven airgun or a battery operated gun. Continue to apply along the seam so that the joint appears to slightly overfill behind the nozzle, but maintain a constant motion



After applying Sikaflex®-290 DC PRO but before skinning occurs, compress the excess material onto the surface of the deck using a slightly flexible spatula at an angle of 60°. This produces a convex appearance of the joint and fills the seam completely (see Fig. 19)



Protect the joints from rain and direct sunlight prior, during and after caulking, for a period of at least eight hours. Do not use excess material from the spatula to prevent bubbles in the joint



Sikaflex®-290 DC PRO is ready for sanding following the conditions outlined on the bar chart in Fig. 18

Relative air humidity	Air Temperature (°C)		
	10 °C	20 °C	30 °C
25 %	5.5 days	4.5 days	3.5 days
50 %	4 days	3.5 days	3 days
75 %	4 days	3 days	2 days

Fig. 18 Safe sanding time



Fig. 19 Compressing Sikaflex®-290 DC PRO with a spatula

DECK SANDING

For efficient sanding results, use an industrial sander. It is recommended to begin with a medium paper at about 80 grit, progressing up to 120 grit. Suitable sanders are belt sanders, flat plate, or elastically suspended sanders. Sanding should be carried out in line with the seams. The waiting time between application of Sikaflex®-290 DC PRO and sanding is indicated in Fig 18.

FINISHING

It is not recommended that a finish such as a varnish be applied to the exterior teak deck as these can contain solvents or plasticizers which can adversely affect the cured Sikaflex®-290 DC PRO or the drying of the lacquer. Varnishes do not often exhibit the flexible characteristics of a caulk, and so the finish may also show cracks, which could render the deck unsightly.

See also chapter "MAINTENANCE OF TEAK DECKS" on page 14.



Fig. 20 Sanding the deck



Fig. 17 Applying Sikaflex®-290 DC PRO

PREFABRICATED TEAK DECKS

Many shipyards appreciate the use of prefabricated teak decks because they can be manufactured off-site, rather than on board where the process can block other activities. Prefabricated panels are efficient in their versatility to be produced in various shapes, quickly or on demand; as soon as the panel manufacturer has obtained the dimensions of the boat deck production can be started, thus saving substantially on labour costs. The prefabricated panels are also very easy to handle and to bond to the deck.

TYPES OF PREFABRICATED TEAK DECKS

In modern boat-building wooden decorative decks are often constructed in the form of prefabricated panels bonded or bedded onto the sub deck. This method is often favoured for time and cost savings.

These kinds of panels are either made to measure (custom made) from a template fitting the prescribed deck section, or are cut out of unidirectional panels. Prefabricated teak deck panelling comes either with or without a backing.

BACKINGS MAY BE

- Marine plywood in different thickness
- HPL (flat laminate)
- Fiberglass lamination with epoxy resins



Fig. 21 Customised teak decking made to measure



Fig. 22 A prefabricated teak deck is laid out in preparation for fitting



Fig. 23 Deep joint prefabricated teak decking and the strength and flexibility inherent in the adhesive

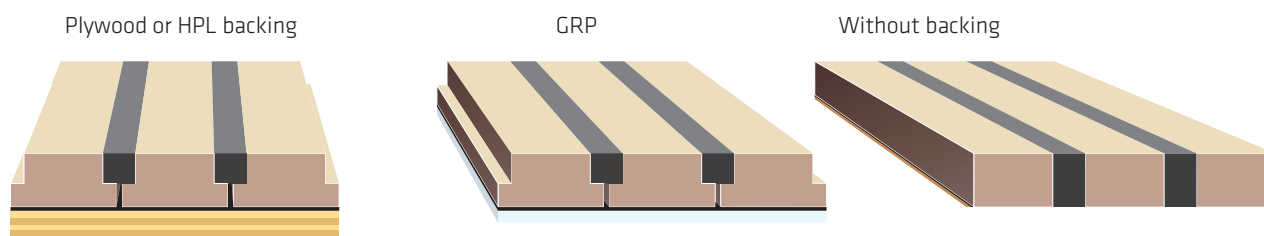


Fig. 24 Typical prefabricated teak deck profiles

BONDING OF THE PREFABRICATED ELEMENTS

To bond or bed the prefabricated panels, use one-component polyurethane adhesives such as Sikaflex®-298 or Sikaflex®-298 FC.

The adhesive has to act as an additional layer in between the sub deck and the panel in order to waterproof the overall surface of the deck. As a prefabricated feature deck does not have to be drilled for screws and bolts there is no puncturing of the layer and therefore no risk of water leakage which could damage the sub-deck.

SUBSTRATE PREPARATION

FIBREGLASS BACKINGS

 208	Heavily soiled surfaces should first be cleaned off with a pure solvent (Sika® Remover-208) to remove the worst of the soiling
	Lightly abrade the contact area with an abrasive pad very fine
	Remove the dust with a vacuum cleaner
 Primer	Treat the substrate with Sika® Primer-290 DC or Sika® MultiPrimer Marine, using a clean brush or roller
	Waiting time until deck bonding: 30 minutes (min) to 24 hours (max)

TIMBER OR PLYWOOD BACKINGS

	Abrade the contact area on the deck with a sanding pad (80 / 100 grit)
	Remove the dust with a vacuum cleaner
 Primer	Apply a thin, continuous coat of Sika® Primer-290 DC or Sika® MultiPrimer Marine using a clean brush or a roller applicator
	Drying times: Sika® Primer-290 DC or Sika® MultiPrimer Marine 30 min to 24 hours

WITH HPL-BACKINGS

	Abrade the contact area on the deck with a sanding pad (60-80 grit)
	Remove the dust with a vacuum cleaner
 Primer	Apply a thin, continuous coat of Sika® Primer-290 DC or Sika® MultiPrimer Marine using a clean brush or a roller
	Waiting time until deck bonding for Sika® Primer-290 DC or Sika® MultiPrimer Marine 30 min to 24 hours

WITHOUT BACKINGS

	Remove the dust with a vacuum cleaner
 Primer	Apply a thin, continuous coat of Sika® Primer-290 DC or Sika® MultiPrimer Marine using a clean brush or a roller
	Waiting time until deck bonding for Sika® Primer-290 DC or Sika® MultiPrimer Marine 30 min to 24 hours

TWO-COMPONENT COATING ON METALS

	Ensure that the treated metal deck is compatible with Sikaflex®-298. Test the paint with a solvent like acetone or a commercial available silicon remover or paint thinner. If the paint can be removed, sandblast off the paint down to the metallic surface and use SikaCor® ZP Primer
 SA 100	Treat the substrate with Sika® Aktivator-100, using a clean lint free rag or paper towel. Change the rag frequently!
	Waiting time until deck bonding: 10 minutes (min) to 2 hours (max)

ALUMINUM OR STEEL DECKS

	Steel: the surface must be ground or sand-blasted to remove rust, loose particles, flaked paint, contaminants, etc. When complete, remove all dust with a vacuum cleaner Aluminum: This surface should be slightly sweep-blasted
	Thoroughly vacuum clean the surface
 SA 205	Treat the surface with Sika® Aktivator-205 with a lint free paper towel
	Flash-off: 10 minutes (min) to 2 hours (max)
	Avoid dust or other contamination until the next step has been carried out
 ZP	Apply a continuous coating to the surface of SikaCor® ZP Primer within 2 hours of the Sika® Aktivator-205 treatment. Use a clean brush or a roller at a consumption of approx. 200 gm / m2 or 80 µm thickness.
	Waiting time until deck bonding: 10 °C minimal 5 to 14 hours 20 °C minimal 3 to 14 hours 30 °C minimal 1 to 14 hours

APPLICATION AND POSITIONING OF THE PREFABRICATED DECK ELEMENTS

Sikaflex®-298 or Sikaflex®-298 FC is a low viscosity, exceptionally strong flexible one-component adhesive which is applied with a 4-5 mm comb trowel. The consumption should be around 1.2 litres (2x 600 ml sausages) per m². The quantity has to be adjusted according to the surface texture. In any case the planks have to be embedded totally without any air pockets between substrate and planks.

Remove the air after the element was laid down with a steel roller. Start in the middle of the deck towards the edge of the element (See Fig. 11).

BONDING PROCESS



298

Apply the adhesive to the previously prepared surface and spread it using a spreader with 4 mm triangular notches. The bed thickness may vary depending on the thickness of any gap that needs to be filled



If HPL or GRP-laminates have to be bonded, spray a light mist of water on the Sikaflex® prior to positioning the panels (about 1 g / m²). If one of the bonded partners is wood, the application of a water mist is not necessary but sometimes useful to accelerate the cure at lower temperature
The deck panel must be positioned accurately and pressed firmly into place Use a roller to eliminate air pockets



208

Uncured Sika adhesives or sealants should be removed with Sika® Remover-208 on non porous substrates. On porous substrates let harden the Sikaflex® soiled on teak and eliminate it mechanically



Clamps, weights or screws (removable once the adhesive has set) can be used to secure the panel. Alternatively, the vacuum press method can be used



After 24 hours the panels can carry their full service load and the temporary fastenings can be removed

FINISHING

Remaining joints should be caulked as soon as the fixation means are removed. For horizontal joints, Sikaflex®-290 DC PRO can be used. Vertical joints should be caulked with Sikaflex®-295 UV.



IMPORTANT:

If masking tapes are used, they have to be removed as soon as possible before skinning of the Sikaflex® occurs.



Fig. 25 Sealing the edges after renovation with Sikaflex®-295 UV



Fig. 26 Application of Sikaflex®-298



Fig. 27 Holding in place with weights

MAINTENANCE OF TEAK DECKS

The teak deck changes its color during exposure to the sun and will weather in time to a silver patina. The resulting greyish brown is sometimes wished. In such case we recommend to clean the deck surface regularly with Sika® Teak Cleaner. Use a sponge or a brush and work always in the direction of the wood grain. In warm climates this procedure should be carried out every day. Bleach, strong acids and aggressive chemicals should not be used at any time.

To maintain the colour and appearance of a new teak deck, Sika offers a maintenance system: Sika's Teak Maintenance System is fully compatible with Sikaflex®-290 DC PRO caulked teak decks.

Sika's Teak Maintenance System consists of the following:

SIKA® TEAK C+B BIO

This remove dirt, salt residue and oily pollution, as well as algae and it brightens natural weathered teak

Apply directly to either wet or dry teak using a scrubbing brush and/or a cloth. Work always in the direction of the wood grain. Leave for 10 minutes before rinsing off with fresh water.

Important: Work in segments to avoid drying or too long reaction time

SIKA® TEAK OIL NEUTRAL

Apply this with a clean rag, brush or roller to dry, cleaned wood and allow the oil to penetrate for about 30 minutes before removing the excess. Reapplication is recommended at the first signs of weathering.



Fig. 28 10 year old teak deck



Fig. 29 New teak deck



Fig. 30 Keep decks looking like new by using the appropriate maintenance products



Fig. 31 The Sika range of teak deck maintenance products

TEAK DECK REPAIR

Most quality timber decks are of teak. For this reason, most of the procedures outlined in this manual are focused on that material.

Deciding whether or not a wooden deck needs to be repaired is not always easy. First, it must be established that a joint has failed or that the wood has been damaged sufficiently to cause a problem.

Each and every joint should be closely inspected. Any points at which there is a small gap or crack in the caulk should be marked with distinctive chalk.

Similarly, the wood surface should also be closely examined for undue wear, gashes, splitting or splintering and should be marked with chalk in a similar way.

However, parts or all of damaged planks should be replaced, according to how badly they are damaged.

If joints are mostly in good condition, but are damaged in one or two places, these can be repaired by replacing the local caulk. More extensive damage, may suggest that all of the jointing would need to be replaced.

The following table shows the recommended responses to the outcome of a deck analysis.

	Serious wood damage	Slight wood damage	Wood undamaged
Serious joint damage	Replace deck with new prefabricated or built in-situ deck	Replace all joints, then sand and restore whole deck	Replace all joints
Slight joint damage	Replace damaged joint areas, replace damaged wood areas, then sand and restore whole deck	Replace damaged joint areas, then sand and restore whole deck	Replace damaged joints only
Joints undamaged	Replace damaged wood areas. Sand and restore whole deck	Sand and restore whole deck	Clean the deck. Restore the wood if necessary

Which repair solution will be chosen depends on the state of the deck and the expected result.

DECK ANALYSIS RESPONSES

Please note that water intrusion between wood and deck may lead to fouling of the wood. It is recommended to control the deck periodically and repair non tight areas before the whole deck is affected or part of the wood detaches from the deck due to the wood expansion with permanent water contact.

HOW TO DETECT UNTIGHT AREAS?

Wood that has become damaged by water trapped in a failed joint becomes more porous than the wood surrounding it. This can result in the damaged wood changing colour. It also means that it will remain wet after the rest of the deck has dried. Wetting the deck and closely examining the areas that remain wet after the rest has dried, is an effective method for identifying problem areas.



Fig. 32 Discolouration of the wood is a tell-tale sign of a failed or damaged joint in this teak deck

DETERMINATION OF THE TYPE OF ADHESIVE WHICH WILL BE REPLACED

In the following part all possible repair solutions are described. However to achieve a perfect result, the chemical composition of the original deck caulking material as well as the elastic adhesive of the planks have to be determined if they are not known.

One simple test is to observe the burning behaviour of the sealant or adhesive.

For that a small test piece of the test product will be ignited with a pocket lighter.

The type of flame, the flammability and the smoke gives a good indication of the product base.



If in doubt, consult your local Industry Departement.



IMPORTANT:
Never repair a joint simply by cutting the sealant out and replace it with a sealant unless the chemical base is identical.

REPAIR RECOMMENDATION

If the old joint is soft and sticky we recommend to eliminate the old material completely using a router. Enlarge the joint to ensure a proper wooden surface. After such a removal, **all sealant types** can be newly applied. Procedure of levelling, bonding and caulking of teak decks (see page 6-10).

REMOVING OF OLD CAULKING

There are four principal methods for removing old caulking. These are:

- Manual cutting with a sharp knife
- Using an oscillating cutter (Fein Tools) with a chisel-tip blade that is the same width as the joint
- Using an electrically heated rubber-cutting 'rubbercut' tool (Rema)
- Using a router. This method must be used if the old caulking material is not Sikaflex®-290 DC PRO as the sides of the joint will be shaved by the router blade

The method used normally reflects the size and the nature of the job. For a small, one-off job, the manual method would be the cheapest and the simplest method. A large job or a professional repair workshop would likely need to use either the oscillating cutter or the Rubbercut tool for both the time-saving and the quality of the finish.

The router would be used where it is necessary to make sure that there is no residue of the old caulking remaining. This would be especially important when the old caulking material is of unknown chemical composition as it might both have an unwelcome reaction with the new caulking material and have an inferior adherence to the sides of the joint.

OLD JOINT	NEW JOINT		
	PUR	MS / Hybrides	Silicones
PUR	Just cut out the defective joint. Pre-treat the surface to be resealed with Sika® Aktivator-100 and leave it for at least one hour before the application of the new sealant	Not recommended	Not recommended
MS or Hybrid	Not recommended	Seek advice from the manufacturer	Not recommended
Silicone	Not recommended	Not recommended	Cut out the defective material, clean with Isopropyl alcohol and seal the joints after 1 hour flash off time



Fig. 33 Always ensure that the direction of cut is with the grain to avoid 'digging-in' damage to the sides of the planks

IMPORTANT:
It is important to take care and ensure that the directions of cut is **WITH** the grain as shown in Fig. 33



Fig. 34 Using a craft knife to cut along the part of the joint to be removed

REMOVAL WITH A SHARP KNIFE

	Insert the blade of a craft knife into one side of the joint perpendicular to the deck surface	Fig. 35 First cut using blade in left of joint at 90°
	Cut along the joint taking care to keep the blade straight otherwise the wood might get damaged, or the old caulking will not be completely cut away	Fig. 36 Second cut using blade in right of joint at about 45°
	Insert the blade at an angle from the top of one side of the joint to the bottom of the other	Fig. 37 Third cut using blade in right of cut at 90°
	Cut along the joint taking care to keep the blade at a constant angle. This will remove a triangular bead of old caulking along the length of the joint	Fig. 38 Fourth cut using blade at about 45° to the left
	Insert the blade vertically at the other side of the joint. Once again, care should be taken to keep the blade straight otherwise the wood might get damaged, or the old caulking will not be completely cut away	Fig. 39 Fifth cut using a scraper along the bottom of the joint
	Adjust the blade to cut an opposite diagonal, to remove half of the remaining caulk	Fig. 39 Fifth cut using a scraper along the bottom of the joint
	Remove the 'A' shaped remainder using a scraper of appropriate width. A hand-chisel of the same width of the joint or slightly less would be ideal for this purpose	Fig. 39 Fifth cut using a scraper along the bottom of the joint

REMOVAL WITH AN OSCILLATING CUTTER

	Switch on the oscillating cutter. Grind the blade with a grinding stone (from the tool manufacturer).	Fig. 40 The oscillating cutter
	Insert the blade in the joint and remove it. For this joints it may be necessary to do this in two steps.	Fig. 41 Removal of joints
	The cut caulking will be ejected out of the joint with a continuous strip.	Fig. 42 Removal blades

REMOVAL WITH AN ELECTRICAL RUBBERCUT TOOL

	Switch on the Rubbercut tool
	Exert a pressure to the cutting head in the forward direction. The tip will heat up to a temperature which cuts the old caulking
	Insert the tool and advance it along the joint, taking care not to damage the planks at the sides of the joint and in the case of smoking, insert a new cutting blade
	The cut caulking will be ejected out of the joint in a continuous strip



Fig. 43 The rubbercut tool



Fig. 44 Blades for rubbercut

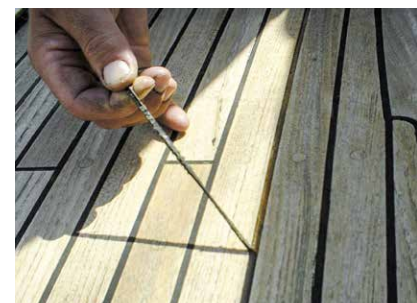


Fig. 45 A triangular cut of the old caulking being removed manually

REPLACING OF OLD JOINTS

Old and damaged or detached sealants should be replaced to prevent water intrusion in between Teak and Substrate. One of the problems could be a incompatibility of the old sealants with the new joint sealant.

The best solution is to remove the old sealant completely using a guided router and the new sealant adheres to the teak-wood.

If the old sealant cannot be removed completely, an analyse of the old sealant should be done to detect possible incompatibilities between old and new sealant (see page 15)

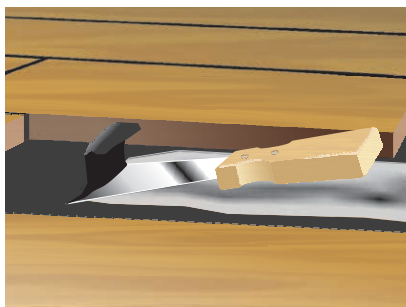


Fig. 46 Old bedding should first be scraped off using a scraper



Fig. 47 A useful and effective vibrating scraper power tool

REPLACING DEFECTIVE PLANKS



Completely remove the caulking from the joints around any planks that are to be removed. (See 'Removing Old Caulking' on page 16). Identify the damaged planks with a chalk



Remove the damaged plank, taking care not to damage the substrate. (If a strong adhesive has been used to bed the plank in place, it may be necessary to destroy the first plank removed in any series. The aperture can then be used to insert a shim beneath adjacent planks to enable their removal if necessary.)



If only part of the plank is to be replaced. Cut off the damaged area using a vibrating saw. Prepare the new plank to the same dimensions as the damaged one



Remove any old adhesives, bedding or other foreign matter from the substrate and remove the jointing material from around the edge using a craft knife, a scraper and sandpaper to ensure that the exposed edges are completely free of any residue



Analyse the type of sealant. (see page 15)



In case of silicone as original sealant, grind the edge of the planks or better using a router with a guide to assure a complete removal of the old sealant



Dry fit the new plank to make sure that it will locate and align with the existing planks



Clean, or if necessary, prime the substrate according to the type of material as described in the appropriate procedure



Prime all faces of the remaining planking as well as of the new plank (including the hidden side) using Sika® Primer-290 DC or Sika® MultiPrimer Marine



Drying time: 30 min to 24 h



Apply and spread bedding compound Sikaflex®-298 or Sikaflex®-298 FC at the appropriate depth to the sub deck



Insert the replacement plank, bedding it in place and aligning and levelling it carefully with existing planking



Hold the new planking in position using weights, screws or wedges



Allow the Sikaflex®-298 or Sikaflex®-298 FC to cure for a minimum period of 24 hrs



Apply Sikaflex®-290 DC PRO caulking, ensuring that no air is trapped in the joints and allowing the compound to slightly overfill the gap



Slightly overfill the joint. Leave it if the deck will be sanded after caulking or use a spatula at 60° angle to press the sealant slightly into the joint.



Let the Sikaflex® 290 DC PRO cure as indicated in Fig. 18



IMPORTANT:
If the deck should not be grinded, the joint filling process can be done using masking tapes



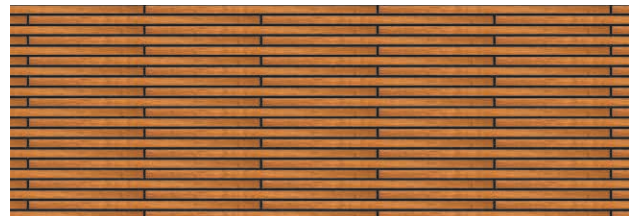
1. Damaged area



2. Removed planks



3. Embedded new planks



4. Repaired deck



Fig. 48 Cutting planks with vibrating knife



Fig. 49 Picture Removal overstanding Sikaflex®-290 DC PRO with a vibrating scraper power tool



Fig. 50 Belt sander

SANDING OF THE DECK

	To reduce sanding time we recommend to remove most of the hardened bead of Sikaflex®-290 DC PRO with an electric vibrating scraper
	For efficient sanding results, use an industrial sander. It is recommended to begin with a medium paper at about 80. Suitable sanders are belt sanders, flat plate, or elastically suspended sanders
	Connection areas may be sanded with a palm sander (see Fig. 51)
	When the surface is uniformly smooth. Change the sanding belt to 120 grit and re-sand the whole area again, keeping the sander aligned with the wood grain as much as possible
	Remove all dust with a vacuum cleaner

REPLACING THE WHOLE DECK

In such case the wood has to be removed and the deck has to be cleaned. Sanding or sandblasting has to be done down to the original substrate. Then install a new deck as outlined in chapter "PROCEDURE OF LEVELLING, BONDING AND CAULKING OF TEAK DECKS", pag. 6 and chapter "PREFABRICATED TEAK DECKS", pag. 11.



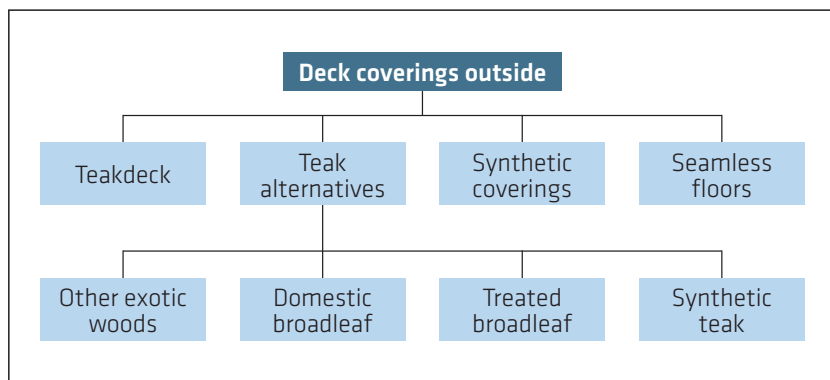
Fig. 51 palm sander

ALTERNATIVES TO TEAK

Teak has been used for hundreds of years as a durable deck material.

Alternatives for teak such as iroko, padouk etc. are used in some cases but necessitate an intensive protection work to assure a long time function. Usually they are used in workboats as thick protective floors.

Teak deck alternatives are shown in the chart beside



OTHER WOODS

ADVANTAGES:

- Not submitted to legislation (FSC-label)
- Good relation price / durability

DISADVANTAGES:

- Durability of these wood is lower than teak
- Shrinkage (hygric) is higher than teak
- No longtime experience in decking's are known
- More irregular grain such as alternating spiral growth etc. Periodical deck control is necessary.

Frequently used woods:



Iroko (Kambala)



Padouk

Others possible alternatives are: oregon pine, afromosia, basralocus, cedro, cordia, kahja, sipo, IPE etc.



IMPORTANT:

Decks done with these woods may show an irregular hygric movement. Such deck coverings have to be observed frequently and eventually noticed joint detachments have to be repaired immediately

Surface preparation are identical to the manufacture of a teak deck (see chapter "PROCEDURE OF LEVELLING, BONDING AND CAULKING OF TEAK DECKS").

TREATED BROADLEAF

This type of wood are home-grown broadleaf treated with natural or synthetic resins.

One example of these product types is Kebony. This is a maple wood treated with natural resins.

With this treatment the following characteristics are achieved:

- Durability comparable to teak with the same colour change to grey - brown
- Hardness, abrasion resistance higher than Teak
- Expansion property as teak

Surface preparation and adhesives are identical to chapter "PROCEDURE OF LEVELLING, BONDING AND CAULKING OF TEAK DECKS".



Fig. 52 Kebony new

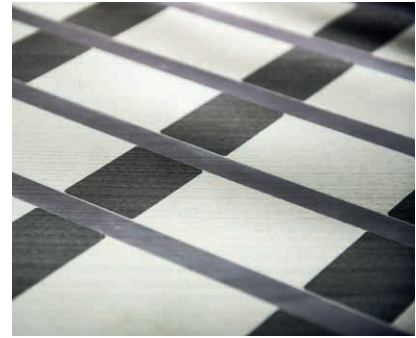


Fig. 53 Kebony aged

SYNTHETIC (ENGINEERED) TEAK

Synthetic teak consists in thin layers of teak which are bonded together. The advantage of this process is the use of the entire tree. (Heartwood and sapwood).

Further information's have to be requested by the manufacturer.



SYNTHETIC COVERINGS

These prefabricated decks are made of different plastics. Quality and durability may differ as well as slip resistance and feel. These coverings are mainly used on yachts.

We distinguish between principally three types of synthetic coverings:

- Polyurethane elastomers / GRP backing
- Synthetic rubber composites
- PVC based coverings
- PU resins



Fig. 54 Different designs

PREPARING PUR BASED DECK COVERINGS

	The covering material must be free from release agents or other media used in the production process. Use appropriate solvent recommended by the manufacturer
	
	On nonporous coverings, the side that is to be bonded should be cleaned with Sika® Aktivator-100, using a clean, lint-free rag or a paper towel. Change the rag frequently!
SA 100	
	Flash-off: 10 minutes (min) to 2 hours (max)

PREPARATION OF THE DECK**GRP DECKS**

	Heavily soiled surfaces should first be cleaned off with a pure solvent like, Sika® Remover-208, to remove the worst of the soiling
208	
	Lightly abrade the contact area with a very fine sanding pad
	Remove the dust with a vacuum cleaner
	Clean the substrate with Sika® Aktivator-100, using a clean, lint-free rag or a paper towel. Change the rag frequently!
SA 100	
	Flash-off: 10 minutes (min) to 2 hours (max)

TIMBER DECKS

	Abrade the contact area on the deck with a sanding paper (80 / 100 grit)
	Remove the dust with a vacuum cleaner
	Apply a thin, continuous coat of Sika® Primer-290 DC or Sika® MultiPrimer Marine using a clean brush or a felt applicator.
Primer	
	Drying times: Sika® Primer-290 DC or Sika® MultiPrimer Marine – 30 minutes (min) to 24 hours (max)

ALUMINUM OR STEEL DECKS

	Steel: Grind (36 P grit) or sand-blast the surface in accordance with ISO 8501-1: 1996 SA 2½
	Aluminum: Lightly sweep-blast the surface
	Thoroughly vacuum clean the surface
	If the area is contaminated, treat the surface with Sika® Aktivator-205 using a clean towel
SA 205	
	Flash-off: 10 minutes (min) to 2 hours (max)
	Avoid dust or other contamination until the next step has been carried out
	Apply a continuous coating of two-component SikaCor® ZP Primer within 2 hours of the Sika® Aktivator-100 treatment to the surface, using a clean brush or a roller at a consumption of approx. 200 gr / m2 or 80 µm thickness.
ZP	

ALUMINUM OR STEEL DECKS, COATED WITH A TWO-COMPONENT PAINT, VARNISH OR FAIRING COMPOUND

	Ensure that the treated metal deck is compatible with Sikaflex®-298. Test the paint with a solvent like acetone or a commercial available silicon remover or paint thinner. If the paint can be removed, sand-blast off the paint down to the metallic surface and use SikaCor® ZP Primer (see page 5)
	Lightly abrade the contact area with a very fine abrasive pad
	Treat the substrate with Sika® Aktivator-100, using a clean, lint-free rag or paper towel. Change the rag frequently!
SA 100	
	Flash-off: 10 minutes (min) to 2 hours (max)

For the preparation of other substrates, please refer to the Pre-Treatment Charts for Sika Marine Applications.

BONDING PROCESS

	Apply Sikaflex®-298 on the previously prepared surface and spread using a spreader with 4 mm comb trowel. The thickness layer should be about 1.2 mm, 2x 600 ml sausages per m².
	The covering material must be placed in position within 20-30 minutes of applying the adhesive, therefore the adhesive should be applied only to an area large enough to receive the section of covering that can be fitted in this time. Prevent air entrapment!
	Once the covering has been placed in position it should be rolled down with a rubber roller, working from the centre outwards to expel any entrapped air and push any excess adhesive out to the edges, where it can be removed. It is essential to ensure that no trapped air remains
Steel	To accelerate the curing process we recommend to apply a mist of water using a paint gun. Do it sparingly as Sikaflex® needs only 1 gram of water per square meter.
	Caution: If the covering material is laid under tension, the edges must be held or suitably weighted
	Fix the deck with weights or vacuum press over night
	Uncured Sikaflex® may be removed from Tools with Sika® Remover-208. On rough surfaces we recommend to leave the adhesive to cure and remove it mechanically
208	

PVC-COVERINGS

Most of the alternatives for teak decks are based on PVC. The composition varies for each deckings. PVC coverings contain organic plasticizer. This plasticizer may have an long time interaction with the used adhesive. Therefore we do not give any recommendation for bonding such products. In such case it is best to get in contact with the distributor in order to receive an adhesive which is recommended by the manufacturer.

**IMPORTANT:**

Due to the variety of the deck coverings we recommend to seek advice from the procedure of the coverings or contact your local Technical Service department, Sika Industry.

BONDING OF TIMBER ELEMENTS

In yachts and pleasure craft as well as in ocean-going vessels, stairs, companionways and handrails are frequently made from tropical hardwood, chosen both for their durability and their attractive appearance.

The use of screws to attach these fixtures can impair both their durability and their appearance as they are vulnerable to moisture gaining access through the fixing holes. Hardwood components like these can be fixed with adhesives, where the absence of screw holes leaves the wood unimpaired and more resistant. This is of particular importance where the wood is load bearing as in the construction of accommodation ladders.



Bonding also has other benefits. The resilient adhesive layer softens the sound of footsteps and cushions vibrations, the integrity of painted surfaces can be preserved without loss of corrosion protection and the effects of moisture penetration are eliminated.

The Sika products for bonding timber elements are Sikaflex®-298 or Sikaflex®-298 FC (low viscous) for big bonding parts or parts which do not need an instant fixation until the hardening process took place (horizontal applications).



SUBSTRATE PREPARATION

GRP

 208	Heavily soiled surfaces should first be cleaned off with Sika® Remover-208 to remove the worst of the soiling
	Lightly abrade the contact area with a very fine sanding pad (abrasive pad very fine)
	Remove the dust with a vacuum cleaner
 SA 205	Treat the substrate with Sika® Aktivator-205, using a clean, lint-free rag or paper towel. Change the rag frequently!
	Flash-off: 10 minutes (min) to 2 hours (max)
 Primer	Apply a thin, continuous coat of Sika® Primer-290 DC or Sika® MultiPrimer Marine using a clean brush or a felt applicator
	Drying time: 30 minutes (min) to 24 hours (max)

METALL DECK COATED WITH A 2 C-PAINT

	Ensure that the painted metal deck is compatible with Sikaflex®-298. Test the surface with a rag and thinner. The paint should not be removable by this operation. When the paint is disolvable sandblast off the paint down to the metallic surface and use SikaCor® ZP Primer (see page 6)
	Lightly abrade the contact area with a very fine sanding pad (Scotch Brite very fine)
	Remove all dust with a vacuum cleaner
 SA 100	Treat the substrate with Sika® Aktivator-100, using a clean lint-free rag or paper towel. Change the rag frequently!
	Flash-off: 10 minutes (min) to 2 hours (max)

UNTREATED WOOD

	If the surface is soiled, abrade the contact area with a sanding pad (80 / 100 grit)
	Remove the dust with a vacuum cleaner
 Primer	Apply a thin, continuous coat of Sika® Primer-290 DC or Sika® MultiPrimer Marine, using a clean brush or a felt applicator
	Drying time: 30 minutes (min) to 24 hours (max)

STAINLESS STEEL

 208	Heavily soiled surfaces should first be cleaned off with Sika® Remover-208 to remove the worst of the soiling
	Lightly abrade the contact area with a very fine abrasive pad (abrasive pad very fine)
	Clean with a proper rag or a vacuum cleaner
 SA 100	Pre-treat the substrates with Sika® Aktivator-100, using a clean, lint-free rag or a paper towel. Change the rag frequently!
	Flash-off: 10 minutes (min) to 2 hours (max)
 Primer	Apply a thin, continuous coat of Sika® Primer-290 DC or Sika® MultiPrimer Marine using a clean brush or a felt applicator
	Drying time: 30 minutes (min) to 24 hours (max)

APPLICATION OF Sikaflex®-298

The choice whether you use Sikaflex®-2xx or -298 depends on the parts to be bonded.

Big horizontal areas are better to bond with Sikaflex®-298 as this low viscous product is easier to apply with a trowel. The bedding process should be made with weights or with a vacuum press.

Smaller parts, inclines on vertical applications, or parts which have to be fixed with a vacuum press are best to be bonded with Sikaflex®-2xx. The higher viscosity of this product prevents a squirting out during vacuum application.

 291i	Apply Sikaflex® with a notched trowel on the prepared surface. Use a notched trowel with 4 mm rectangular notches depending of the roughness of the substrates
 291i	The thickness of the layer depends on the roughness of the surface but has to be at least 1.2 mm (2 sausages 600 ml / m²)
	Apply the timber within the open time of 15 minutes. Fix the components for 24 hours



Fig. 55 Application of Sikaflex®-298



IMPORTANT:

it is essential that the elements are completely pressed down to the substrate to avoid water penetration underneath the timber element. This may create fouling and subsequent degradation of the wood.

Remove cured excess Sikaflex®-298 with a knife and seal the edge without additional pre-treatment.

If necessary joints on the side of the elements may be sealed with a weathering resistant sealant like Sikaflex®-295 UV.

DISCLAIMER

The information, and, in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered.

The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users should always refer to the most recent issue of the Sika Product Datasheet for the product concerned, copies of which will be supplied on request.

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www.sika.com/marine

WHO WE ARE

Sika is a specialty chemicals company with a leading position in the development and production of systems and products for bonding, sealing, damping, reinforcing and protecting in the building sector and the motor vehicle industry. Sika has subsidiaries in 94 countries around the world and manufactures in over 170 factories. Its more than 17,000 employees generated annual sales of CHF 5.49 billion in 2015.

Our most current General Sales Conditions shall apply.
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