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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. **SYMERIC OR ASYMMETRIC 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.

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

**WOOD HUMIDITY (% BY WEIGHT)**

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

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 50mm = 0.54 mm
Practical expected 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.

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**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, aluminium, polyester GRP or wood. Aluminium 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.

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

**Aluminium:** This surface should be slightly sweep-blasted or sanded

- 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
- 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

- 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
- 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)
- 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)
**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 shear 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.

**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).

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**THE DECK LEVELLING PROCESS**

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.

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.

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.

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.

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.

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

Prime

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.

APPLICATION OF Sikaflex®-298 AND EMBEDDING OF THE PLANKS

Sikaflex®-298 or Sikaflex®-298 FC is a low viscous, exceptionally strong 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.

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.

MINIMAL SUBSTRATE TEMPERATURE TO AVOID WATER CONDENSATION ON THE SURFACE

<table>
<thead>
<tr>
<th>Air temperature</th>
<th>Air humidity</th>
<th>50%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 °C</td>
<td>&lt; 50%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>10 °C</td>
<td>50%</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>15 °C</td>
<td>60%</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>13</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>20 °C</td>
<td>70%</td>
<td>12</td>
<td>12</td>
<td>15</td>
<td>17</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>25 °C</td>
<td>80%</td>
<td>17</td>
<td>17</td>
<td>20</td>
<td>22</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>30 °C</td>
<td>90%</td>
<td>21</td>
<td>21</td>
<td>24</td>
<td>27</td>
<td>29</td>
<td>31</td>
</tr>
</tbody>
</table>

1 calculated by the dew point plus 3 °C security

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

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

Fig. 11 Hand application picture comb trowel and comb trowel detail
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. 13 Putting down the decking

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

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.

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.

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

<table>
<thead>
<tr>
<th>Air Temperature (°C)</th>
<th>10°C</th>
<th>20°C</th>
<th>30°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 %</td>
<td>5.5 days</td>
<td>4.5 days</td>
<td>3.5 days</td>
</tr>
<tr>
<td>50 %</td>
<td>4 days</td>
<td>3.5 days</td>
<td>3 days</td>
</tr>
<tr>
<td>75 %</td>
<td>4 days</td>
<td>3 days</td>
<td>2 days</td>
</tr>
</tbody>
</table>

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 seems. 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.
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

Plywood or HPL backing

GRP

Without backing
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

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

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)

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 205

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

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

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

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

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.

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

<table>
<thead>
<tr>
<th>Serious joint damage</th>
<th>Slight joint damage</th>
<th>Joints undamaged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace deck with new prefabricated or built in-situ deck</td>
<td>Replace damaged joint areas, replace damaged wood areas, then sand and restore whole deck</td>
<td>Replace damaged wood areas. Sand and restore whole deck</td>
</tr>
<tr>
<td>Replace all joints, then sand and re-store whole deck</td>
<td>Replace damaged joint areas, then sand and restore whole deck</td>
<td>Sand and restore whole deck</td>
</tr>
<tr>
<td>Replace all joints</td>
<td>Replace damaged joints only</td>
<td>Clean the deck. Restore the wood if necessary</td>
</tr>
</tbody>
</table>

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.

| Flammable. Yellow flame with an intense black fume and black ashes indicates a polyurethane |
| Flammable. Yellow flame without black fumes indicates a Product based on Hybrids or MS-polymers |
| Non propagating light yellow flame with a white to grey fume and white ashes indicates a Silicon based product |

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.

<table>
<thead>
<tr>
<th>OLD JOINT</th>
<th>NEW JOINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUR</td>
<td>MS / Hybrides</td>
</tr>
<tr>
<td>Pur</td>
<td>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</td>
</tr>
<tr>
<td>MS or Hybrid</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Silicone</td>
<td>Not recommended</td>
</tr>
</tbody>
</table>

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

![Fig. 33 Always ensure that the direction of cut is WITH the grain to avoid 'digging-in' damage to the sides of the planks](image)

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.

- 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.

- Insert the blade at an angle from the top of one side of the joint to the bottom of the other.

- 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.

- 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.

- Adjust the blade to cut an opposite diagonal, to remove half of the remaining caulking.

- 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.

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.

REMOVAL WITH AN OSCILLATING CUTTER

- Switch on the oscillating cutter. Grind the blade with a grinding stone (from the tool manufacturer).

- Insert the blade in the joint and remove it. For this joints it may be necessary to do this in two steps.

- The cut caulking will be ejected out of the joint with a continuous strip.
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).

REPLACING DEFECTIVE PLANKS

1. 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.

2. 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.)

3. 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.

4. 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.

5. Analyse the type of sealant. (see page 15)

6. 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.

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

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

9. 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

10. Drying time: 30 min to 24 h

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

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

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

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

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

16. 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.

17. 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.
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.
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, afrormosia, basalocus, 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](image)
**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 non-porous 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!

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.

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!

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.

Drying times: Sika® Primer-290 DC or Sika® MultiPrimer Marine – 30 minutes (min) to 24 hours (max)

**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!

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 sau-

gages 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.

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.

**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 he distributor in order to recieve an adhesive which is recommend-
ed 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.

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**SIKA MARINE APPLICATION GUIDE**

Teak Decking

Version 2/2017

SIKA SERVICES AG

22
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 a instant fixation until the hardening process took place (horizontal applications).
## SUBSTRATE PREPARATION

### GRP

- Heavy 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.
- 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).
- 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 dissolveable 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.
- 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).
- 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).

### 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.
- 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

- Heavy 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.
- 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).
- 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, inclinates 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 squiring out during vacuum application.
- 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.
GLOBAL BUT LOCAL PARTNERSHIP

FOR MORE MARINE INFORMATION:

www.sika.com/marine

WHO WE ARE
Sika is a specialty chemicals company with a leading position in the de-
velopment 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.
Please consult the Data Sheet prior to any use and processing.

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