



METHOD STATEMENT

SikaProof® A+

V02 / SIKA CANADA INC.

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1 SCOPE

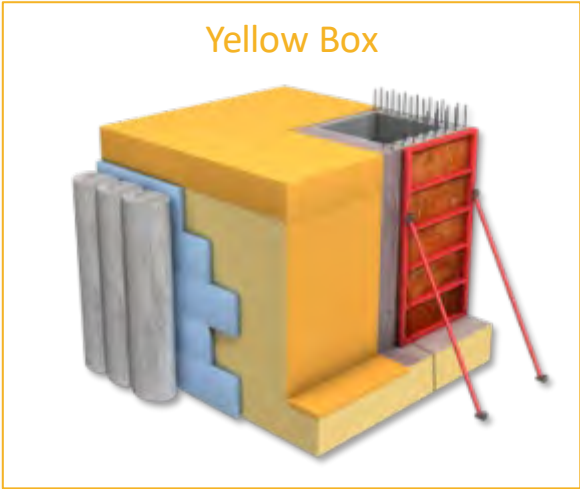
This *Method Statement* describes the system and installation procedure of the **SikaProof® A+**, the second generation of fully bonded membrane waterproofing systems.

2 SYSTEM DESCRIPTION

The **SikaProof® Yellow Box** system offers a unique solution against water ingress of concrete structures. This high-quality protection is achieved through the resistance to lateral water migration. The system can be used as a pre-applied solution, where the concrete is casted onto the waterproofing membrane and as a post-applied system, where the waterproofing membrane is applied onto the hardened concrete. This complete solution is made possible through the high-end technology of **SikaProof®**:

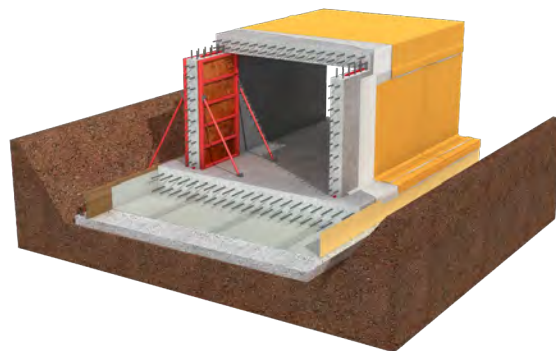
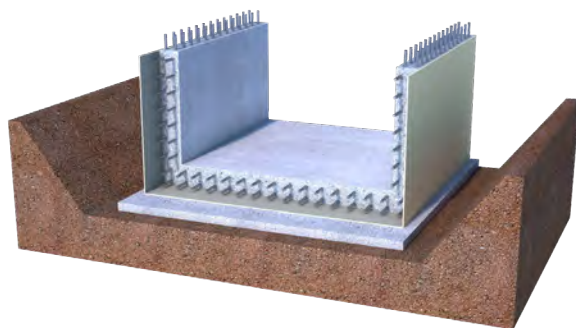
- Highly flexibly TPO-based membrane
- Fully bonded technology without any lateral water migration
- Adhered overlap joints with special adhesive tape for simple application

The technology used in the **SikaProof® Yellow Box** system gives an all-round compatible system solution for durable and permanently watertight basements and below ground structures.

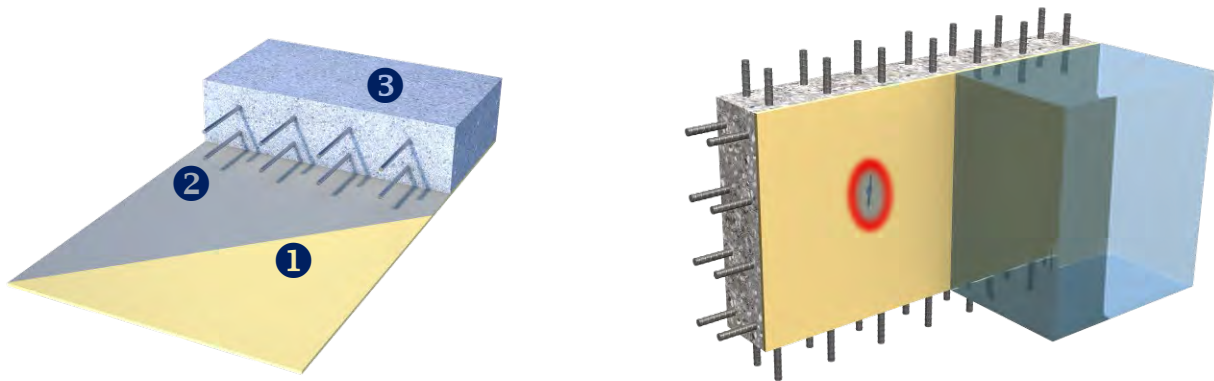


The **SikaProof® A+** pre-applied waterproofing system can easily be applied on the blinding concrete for the base slab and to the prepared vertical excavation wall (e.g. on diaphragm walls, piled walls, or similar). Alternatively, it can be applied directly onto double-faced formwork in open-cut excavation. In this type of projects, the shuttering anchor / tie-bar penetration holes must be sealed after the removal of the formwork.

The **SikaProof® P-1201**, post-applied waterproofing system, can be easily applied on existing concrete structures in open excavations on vertical walls and horizontal areas, e.g. protrusion/junction slab to wall or roof decks. In this case, the shuttering anchor penetrations will be sealed in one step together with the membrane on the entire area.



2.1 SikaProof® A+ PRE-APPLIED WATERPROOFING SYSTEM



SikaProof® A+ is a fully and permanently bonded, flexible sheet membrane waterproofing system. It consists of a **flexible polyolefin (FPO) membrane (1)** containing a **unique hybrid bonding layer on polyolefin (PO) basis (2)**, which bonds permanently with the **reinforced concrete structure (3)**.

The **SikaProof® A+** system is a cold- and pre-applied waterproofing system that is designed for installation before the steel reinforcement is fixed and the structural concrete is cast. The concrete is cast directly onto the **SikaProof® A+** membrane system, where the fresh concrete is embedded completely into the hybrid bonding layer and creates a permanent **DUAL BOND** (mechanically and adhesively). The dual bond prevents any lateral water migration between the **SikaProof® A+** membrane system and the hardened reinforced concrete of the structure.

To adhere and seal all overlaps of the membrane sheets and all detailing joints/connections within the **SikaProof® A+** system, either the **SikaProof® Tape A+** or **SikaProof® Sandwich Tape** are used.

USES

Damp-proofing, waterproofing and concrete protection for basements and other below ground concrete structures against ground water:

- Below ground reinforced concrete slabs
- Below ground reinforced concrete walls with both single and double-faced formwork
- Extensions and reconstruction work
- For prefabricated constructions/pre-casted elements

CHARACTERISTICS/ADVANTAGES

- Fully and permanently bonded to the reinforced concrete of the structure
- No lateral water migration between the concrete structure and the membrane system
- High watertightness tested according to various standards
- High flexibility (bi-axial) and crack-bridging capabilities
- Easy to install with fully adhered joints
- Resistant to ageing
- Resistant to aggressive natural mediums in ground water and soil
- Temporarily weather and UV-resistant during the installation / construction work
- Can be combined with other approved Sika waterproofing systems including:
 - **Sikaplan® WT** membranes, FPO-based sheet waterproofing membranes
 - **Sikadur®-Combiflex SG** system, FPO-based joint sealing system

2.2 REFERENCES

Approvals and certificates

- Product Declaration EN 13967 – Flexible sheets for waterproofing (type A&T)
- abP (allgemeine bauaufsichtliches Prüfzeugnis), German approval
- Function tests for resistance to lateral water migration of system and standard details
- Radon permeability according to EN ISO/IEC 17025:2005 – OL 124
- Environmental Product Declaration (EPD)

2.3 SELECTION OF SikaProof® A+ MEMBRANE SYSTEM

Selection Criteria	SikaProof® A+ 08	SikaProof® A+ 12
Typical Use	Base slabs Walls Precast elements Box in Box	Base slabs Walls Precast elements Box in Box
Maximum water head/pressure (System limitation)	≤ 12 m / ≤ 1.2 bar	≤ 20 m / ≤ 2.0 bar
Thermal Jointing	No	Yes
Thickness of base slab	≤ 800 mm	No limitation

Note: This list not exhaustive. Further limitation must be considered. Please see following section *Limitation of the SikaProof® A+ membrane system*.

2.4 LIMITATIONS

It is not only the water pressure that is relevant for the selection of **SikaProof® A+** membrane system. The exposure to different site conditions and the requirements of the construction process are important elements in the decision to use the **SikaProof® A+** membrane system. These include:

- Level and nature of the ground water: Damp soil, percolating water, or water under hydrostatic pressure
- Ground conditions: Aggressive mediums (such as sea/saltwater, radon/methane gas, etc.), type of soil, ground water temperature, seismic exposure to earthquakes, etc.
- Static and other loads: Static load, uplifting force, settlement, dynamic forces etc.
- Degree of water tightness required, whether minimal seepage can be tolerated, or if absolutely no water penetration, or even no water vapour penetration is permissible.
- Required level of durability and service life.

There are various specific criteria and project requirements that influence the use of the **SikaProof® A+** membrane system. This list is not exhaustive.

Limitations for suitable applications and use of the system are described in the *Product Data Sheet (PDS)* of **SikaProof® A+**. Please refer to the current *PDS* regarding relevant limits for the following topics:

- Recommended applications
- Substrate nature and quality
- Ambient temperature and moisture
- Weathering and chemical resistance

Regarding the temporary UV and weathering resistance of the **SikaProof® A+** system during installation and construction works, the following limitations must be taken into consideration.

The **SikaProof® A+** membrane system has to be protected according to the following table:

	“inside” bonding layer	“outside” membrane layer
After membrane installation and before concreting	90 days	90 days
After removing formwork and before backfilling	90 days	90 days

If the membranes will be exposed for a longer period, then additional temporary protection must be provided:

- “Inside” bonding layer: The complete area must be protected, e.g. with UV resistant foil/geotextile.
- “Outside” membrane layer: The complete area must be protected, e.g. with UV resistant foil/geotextile.

3 PRODUCTS & SYSTEM

3.1 SYSTEM COMPONENTS

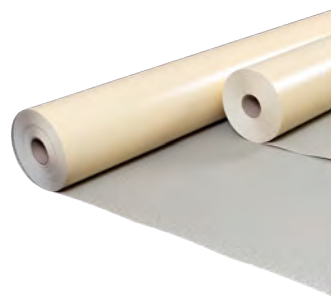
The **SikaProof® A+** membrane system consists of the following mandatory system components:

- SikaProof® A+ 12** membrane
- SikaProof® A+ 08** membrane
- SikaProof® Tape A+** for sealing and bonding of overlap joints and detailing
- SikaProof® Sandwich Tape** for sealing and bonding of overlap joints (optional jointing method)
- Accessories** for sealing of internal and external details according to general details

a) SikaProof® A+ 12

Supplied in 1.0 m (**571640**) and 2.0 m (**571641**) width rolls with a length of 20 m

	SikaProof® A+ 12
Membrane thickness [mm]	1.20
Total sheet thickness [mm]	≥ 1.75
Roll length [m]	20
Roll width [m]	1.0 / 2.0
Roll weight [kg]	35 / 70



b) SikaProof® A+ 08

Supplied in 1.0 m (**640222**) and 2.0 m (**640220**) width rolls with a length of 25 m

	SikaProof® A+ 08
Membrane thickness [mm]	0.80
Total sheet thickness [mm]	≥ 1.35
Roll length [m]	25
Roll width [m]	1.0 / 2.0
Roll weight [kg]	30 / 60



c) SikaProof® Tape A+ (571628)

Acrylate-based self-adhesive tape for internal jointing of the SikaProof A+ membrane sheet overlaps and sealing of details according to the general details. The tape contains the hybrid bonding layer of the SikaProof® A+ for the formation of the **DUAL BOND** with the concrete structure.

	SikaProof® Tape A+
Tape thickness, total [mm]	1.80
Roll width [mm]	150
Roll length [m]	25
Packaging-units per box	2 rolls (50 m)



d) SikaProof® Sandwich Tape (577412)

Acrylate-based, double sided, self-adhesive tape can be used as an optional method for internal jointing of the overlaps of SikaProof® A+ membrane sheets.

	SikaProof® Sandwich Tape
Tape thickness, total [mm]	1.00
Roll width [mm]	50
Roll length [m]	25
Packaging-units per box	5 rolls (125 m)



e) Accessories

SikaProof® Patch-200 B (457589)


Externally applied, butyl-based, self-adhesive patch tape is based on the 1.2 mm thick SikaProof membrane. It has a width of 200 mm and is used for any additional post sealing of joints, penetrations, or damage to the membrane, when working with double-faced formwork, see general details.

	SikaProof® Patch-200 B
Tape thickness, total [mm]	2.20
Roll width [mm]	200
Roll length [m]	20
Packaging-units per box	1 roll (20 m)



SikaProof® FixTape-50 (424701)

Butyl-based, double sided, adhesive tape is used for sealing details, see Section 6.5.3.

	SikaProof® FixTape-50	
Tape thickness, total [mm]	1.50	
Roll width [mm]	50	
Roll length [m]	20	
Packaging-units per box	5 rolls (100 m)	

3.2 STORAGE CONDITIONS / SHELF LIFE

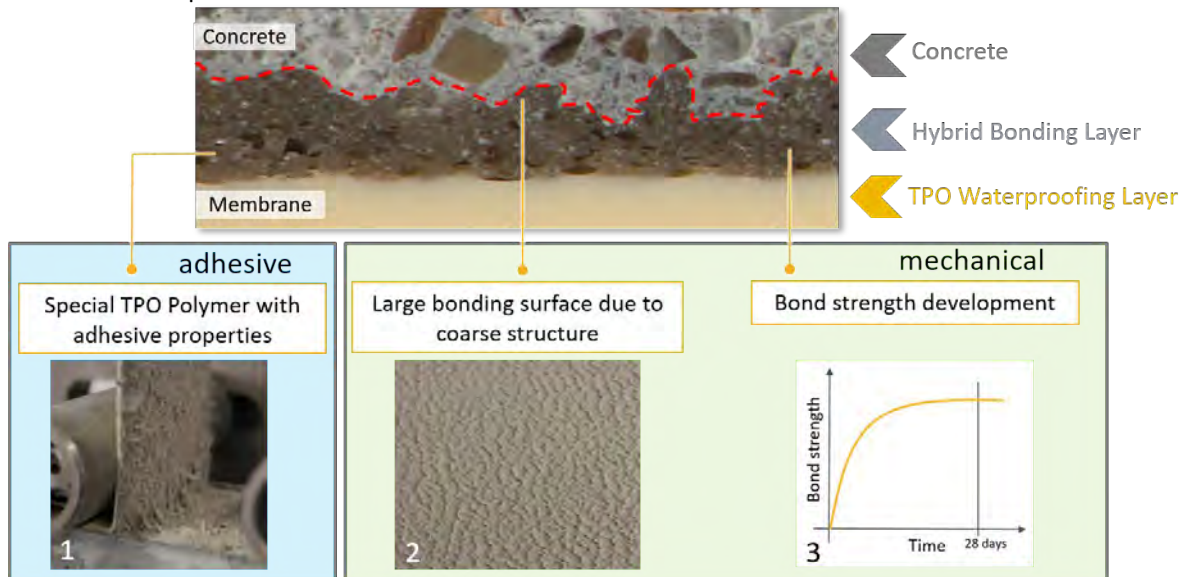
SikaProof® A+ membrane system components have a shelf life (see chart below) from their date of production if stored properly in unopened, undamaged original packaging, in a horizontal position, in dry conditions and at temperatures between 5 and 30 °C. They must also be protected from direct sunlight, rain, snow, and ice, etc. Do not stack pallets of the rolls on top of each other or under pallets of any other materials during transport or storage.

System Components				
Product	SikaProof® A+ 12	SikaProof® A+ 08	SikaProof® Tape A+	SikaProof® Sandwich Tape
Shelf Life	18 months	18 months	18 months	18 months

Accessories		
Product	SikaProof® Patch-200 B	SikaProof® FixTape-50
Shelf Life	18 months	18 months

3.3 SYSTEM BUILD-UP

The **SikaProof® A+** membrane system is a cold- and pre-applied waterproofing system that is designed for installation as a single-ply membrane, which is loosely laid onto the prepared substrate before the steel reinforcement is fixed and the structural concrete is poured.



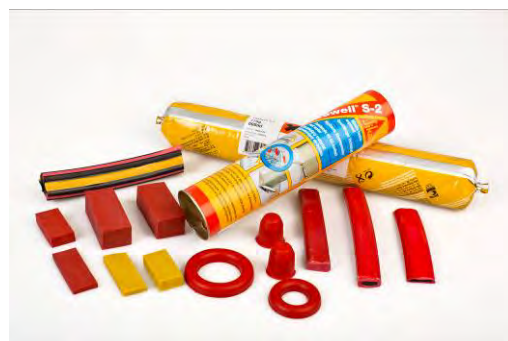
In order to achieve a full-surface and permanent **DUAL BOND** to the concrete structure, it is essential that the fresh concrete is cast directly onto the installed membrane system. The fresh concrete distributes itself through proper vibrating. The concrete has to fully cover the hybrid bonding layer of the **SikaProof® A+** membrane to take advantage of the innovative **DUAL BOND**. In the following microscopic image, the **DUAL BOND** formation between the concrete and the hybrid bonding layer is illustrated.

3.4 JOINT SEALING

In addition to the membrane system, joint sealing is essential for a durable watertight construction. Therefore, we recommend the use of additional Sika joint sealing solutions. Depending on the requirements of a project, different setup of joint sealing solutions can be chosen. The Sika joint sealing solutions range from swelling materials to Water-bars/waterstops and up to preventive installations for post-injections. In the following, the most recommended Sika joint sealing solutions are listed.

SikaSwell® SWELLABLE PRODUCTS

The efficient solution for construction joints and complementary sealing of penetrations provides an additional security against water ingress. Use the full range of hydrophilic (swellable) profiles, rings, and gun applied sealants.



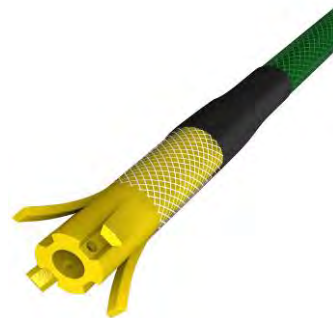
Sika® Waterbar

Waterbars/waterstops are the most common joint sealing solution for construction joints and are mandatory for expansion joints. The appropriate profile according to the requirements can be chosen from the wide **Sika® Waterbar** range.



SikaFuko® INJECTION HOSE SYSTEM

Typically used as secondary or complementary back-up system to seal construction or connection joints and for details (e.g. tension pile heads). The hose is repeatedly injectable, if used with the appropriate Sika injection material.



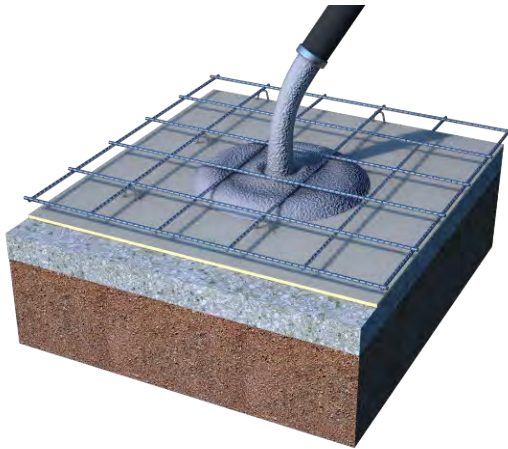
Sikadur-Combiflex® SG SYSTEM / SikaPlan® WT TAPE

The post-applied tape system adhered with epoxy resin onto the membrane side, provides an ideal solution for construction, connection, and expansion joints, in particular to seal the joints of precast constructions.



For further details on the Sika joint sealing solutions, contact *Sika Canada Technical Services* for assistance on the selection and specification of the appropriate solution for a specific project.

3.5 CONCRETE QUALITY



The concrete quality is a key factor for a durably successful waterproofing system. It enables a full-surface and permanently bonded solution, without any lateral water migration between the **SikaProof® A+** membrane and the concrete structure.

The concrete mix design varies from region to region depending on the local raw materials and the local environment. Therefore, it is recommended to define a standard concrete mix design, which is based on the locally available material resources and the local regulations. Prior to the application of a defined concrete mix design, its performance must be tested to confirm that the desired dual bond formation with the **SikaProof® A+** system is achieved.

The following requirements must be fulfilled for the proper dual bond formation:

- The **concrete structure** must be:
 - Stable and sufficiently reinforced concrete
 - Minimum thickness for refurbishment structures: 100 mm
- The **concrete mix design** needs to fulfil:
 - Standard construction concrete mix design requirements according to the relevant local standards and the available raw materials.
 - Please also refer to the *Sika Concrete Handbook* and *Sika Concrete Mix Design Calculator* for more specific concrete guidelines or contact your local *Sika Concrete Technical Sales representative*.
- The **concrete workmanship** is important:
 - A well-designed concrete mix must be accompanied by proficient concrete workmanship. A properly placed, compacted/vibrated and cured concrete is essential for a proper concrete structure and a permanent **DUAL BOND** of the **SikaProof® A+** membrane system.

The following table shows the possible Sika® solutions to achieve a **watertight concrete**. For more details on concrete mix design, contact *Sika Canada Technical Services* for assistance on the selection and specification of the appropriate solution for a specific project.

Components	Description	Recommendation
Aggregates	Any quality aggregates possible	All aggregate sizes are possible
Cement	Any cement meeting local standards	350 kg/m ³
Powder additives	Fly ash or ground granulated blast furnace slag	Sufficient fines content by adjustment of the binder content
Water content	Fresh water and recycling water with requirements regarding fines content	w/c-ratio according to standards regarding exposure class < 0.45
Concrete admixtures	Superplasticizer Type dependent on placement and workability time Water resisting admixture	Sika® ViscoCrete® or 0.60 – SikaPlast® or 1.50% Sikament® 1.00 – Sika® WT 2.00%
Installation requirements and curing	Curing compound Curing that starts as early as possible and is maintained for a sufficient period has significant influence on plastic and drying shrinkage	Subsequent curing to ensure high quality (compactness) of surfaces Sika® Antisol®
Joint sealing	Sealing of movement joints, construction joints, penetrations, and construction damage	Sika®-Waterbars Sikadur®-Combiflex® SikaFuko® System SikaSwell®
Waterproofing systems	Flexible waterproofing membrane systems, if required with single or double compartment	SikaProof® SikaPlan®

4 PROJECT DESIGN

The successful waterproofing of basements requires detailed planning and should be considered in the early stages of the design process.

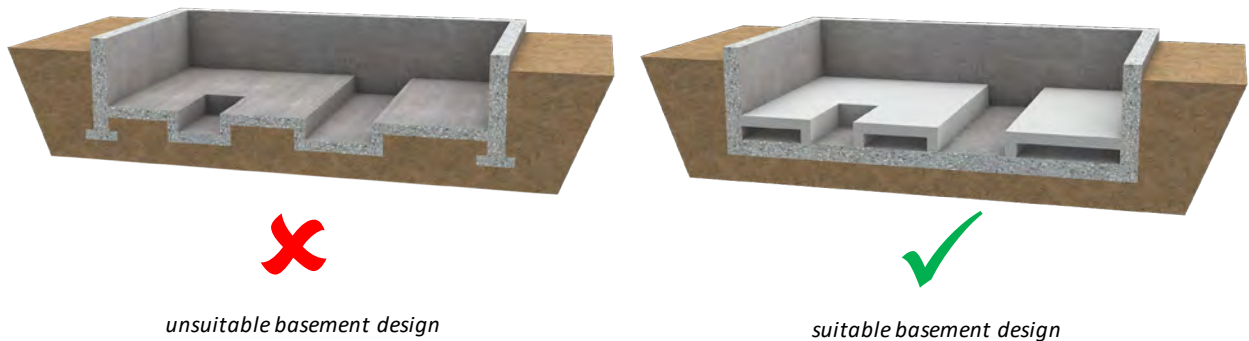
The project's specific location, function, exposure, and any other requirements must be defined in its entirety in order to select the most appropriate Sika waterproofing solution. This includes consideration and assessment of all of the following aspects:

- Type of excavation and substrates
- Construction method
- Maximum water pressures
- Type and degree of any chemical attack
- Climate and environment during construction and in service
- Minimum thickness of the structure
- Level of any anticipated settlement
- Concrete type and consistency
- Construction program and scheduling for efficient installation of the waterproofing system
- Any other construction related aspect or details that could influence the functionality of the **SikaProof® A+** system, such as excavation dewatering systems, potential damage or loading on the membrane etc.

The design of the concrete structure should aim to reduce restraint stresses in the concrete during the curing and hardening phases. The following basic rules are recommended to be followed with:

- The ground plan of the structure should be as simple and rectangular as possible and with a clearly defined distribution of load.
- The structure should be built on a stable, load bearing base and bedded to be as restraint free as possible with low deformation, minimal restriction, and the avoidance of constraint, i.e.:
- Homogeneous component thickness without significant changes of thickness in the same pour
- No offsets, pits, or recesses in the same pour
- A flat surface below the base slab

The following images illustrate a suitable and an unsuitable basement design.



5 ENVIRONMENT, HEALTH & SAFETY

5.1 PERSONAL PROTECTION EQUIPMENT (PPE)

For the installation of **SikaProof® A+ membrane** system, there is no special personal protection equipment (PPE) or safety equipment required. Except for compliance with any specific local regulations or requirements.

5.2 WASTE DISPOSAL

The generation of waste should be avoided or minimized wherever possible. Any waste from **SikaProof® A+** membrane sheets and the ancillary tapes produced from synthetic polymers, plus the packaging material (cardboard and liners) can all be recycled and/or disposed in accordance with local regulations.

6 APPLICATION & INSTALLATION

6.1 APPLICATION

SikaProof® A+ is a cold- and pre-applied waterproofing system that is installed as loose-laid, single-ply membranes onto prepared substrates before the steel reinforcement is fixed and the concrete is cast. **SikaProof® A+** membranes must be installed with the hybrid bonding layer upwards and positioned so that it will be in direct contact with the structural concrete when it is cast.

Membrane overlap joints and other detailing connections are sealed and bonded using either **SikaProof® Tape A+** or **SikaProof® Sandwich Tape**. In addition, the **SikaProof® A+ 12** membrane can be thermally jointed. Please see the document *Method Statement – Extension Thermal Jointing* for more details.

6.2 SUBSTRATE PREPARATION

Substrates for installation of the **SikaProof® A+** membrane system need to have sufficient stability to avoid movement during the installation and subsequent construction works, including concreting. The requirements for substrates and their preparation include the following:

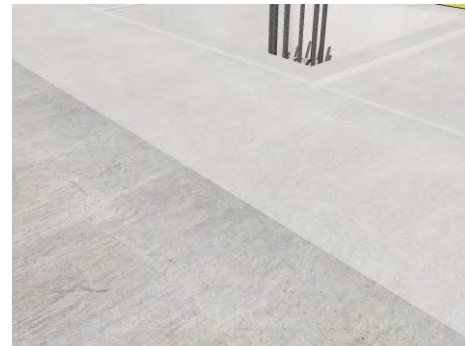
- A smooth, uniform, and clean substrate surface is mandatory to prevent damages the membranes.
- The substrate has to be free from oil and grease, dust, and any other loose particles.
- Large gaps and voids (> 12 - 15 mm) must be filled before the installation.
- The substrate can be damp or slightly wet, but ponding water must be avoided.
- The substrate temperature has to be minimum 5 °C.

Suitable substrates:

- Concrete blinding with a smooth surface finish (an additional geotextile layer is recommended, > 300 g/m² depending on the blinding)
- Formwork
- Rigid thermal insulation
- Plywood

If there is an uneven, rough surface or ponding water, then an additional protection or drainage layer is recommended, e.g.

- **Sikaplan® WT Protection sheet**
- **Sikaplan® W Tundrain**
- **Sikaplan® W Felts or Geotextile > 500g/m²**



6.3 GENERAL INSTALLATION PROCEDURE

First ensure the substrate fulfils the requirements described in *Section 6.2*.

1. Use **SikaProof® A+** membrane sheets for the perimeter edges and connections on the walls and upstands.
2. Form internal and external corners by folding the laid out **SikaProof® A+** membrane used for the perimeter edges.
3. Lay out the **SikaProof® A+** membrane sheets in the area (horizontal or vertical) using 1.0 m or 2.0 m width rolls (as appropriate) and bond the sheets together using the self-adhesive tape **SikaProof® Tape A+** or the double-sided tape **SikaProof® Sandwich Tape**.
4. Form all the necessary details, such as pipe penetrations, connections, sumps or lift pits, pile caps, expansion joints and any others that are required using the appropriate **SikaProof® A+** system accessories and other compatible Sika waterproofing solutions according to general details.
 - After the installation is completed inspect the installed **SikaProof® A+** membrane system to check all the overlap joints, connections, and details, to ensure they are correctly installed.

- After the reinforcement is fixed and before the concrete is poured a final inspection is mandatory to check if there is any damage or other influences that could impair the full-surface bond formation of the **SikaProof® A+** system to the structural concrete.
5. After removing the formwork all penetrations (such as tie-bars), any construction or expansion joints (if not sealed internally) and any membrane damage have to be sealed using the appropriate **SikaProof® A+** accessories or complementary Sika waterproofing solution (e.g. **SikaProof® Patch-200 B** or the **Sikadur® Combiflex SG** system).
- After removing the formwork, the **SikaProof® A+** membrane system must be inspected and repaired if any damage has occurred. Finally, the membrane must be protected against any accidental damage to the membrane (e.g. placing of sharp material). Further, the membrane needs protection against UV radiation according to the defined exposure period listed in *Section 2.4*.
 - Before backfilling the structure, the **SikaProof® A+** membrane must be appropriately protected.

6.4 DETAILING

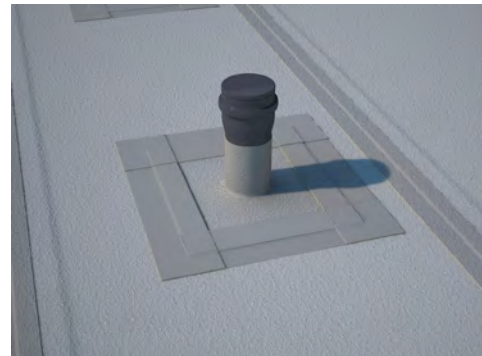
Details are the most critical part in fully bonded waterproofing systems. The execution with precise workmanship is mandatory to ensure a watertight basement. The **SikaProof® A+** system offers with its taping solution a highly reliable and easy way of executing proficient details. Sika provides general detail drawings, which show how to execute the most common details in application. These details are described more extensively in the following section. For more information regarding installation, refer to the **SikaProof® A+ Application Manual, General and 3D Details**.

6.4.1 PIPE PENETRATION

This standard detail for pipe penetrations can also be used for similar penetrations, such as inlets, small pits/shafts, etc.

General Procedure:

1. Cut a pipe sized cross in the membrane sheet and lay it out.
2. Cut out a separate square piece of membrane, which goes over the pipe and overlaps with the underlying membrane minimum 50 mm on all four sides.
3. Take the square piece and cut out a circular piece with a diameter, which is 25 mm smaller than the diameter of the pipe.
4. Slightly heat the circular are of the square piece with a hot air blower.
5. Put the square piece over the pipe.
6. Bond the **SikaProof® Tape A+** on top of all four sides of the square membrane piece and the underlying membrane.
7. Seal the pipe vertically with an overlap of minimum 50 mm and on top of the square piece a minimum of 25 mm.



Important note:

The pipe surface must be appropriately prepared and pre-treated prior to bonding the **SikaProof® Tape A+** with it. Ensure that the pipe surface is clean, dry, and free from any materials (oils, grease, dust, dirt, etc.) that could impair the adhesion.

In addition, the following preparation is required:

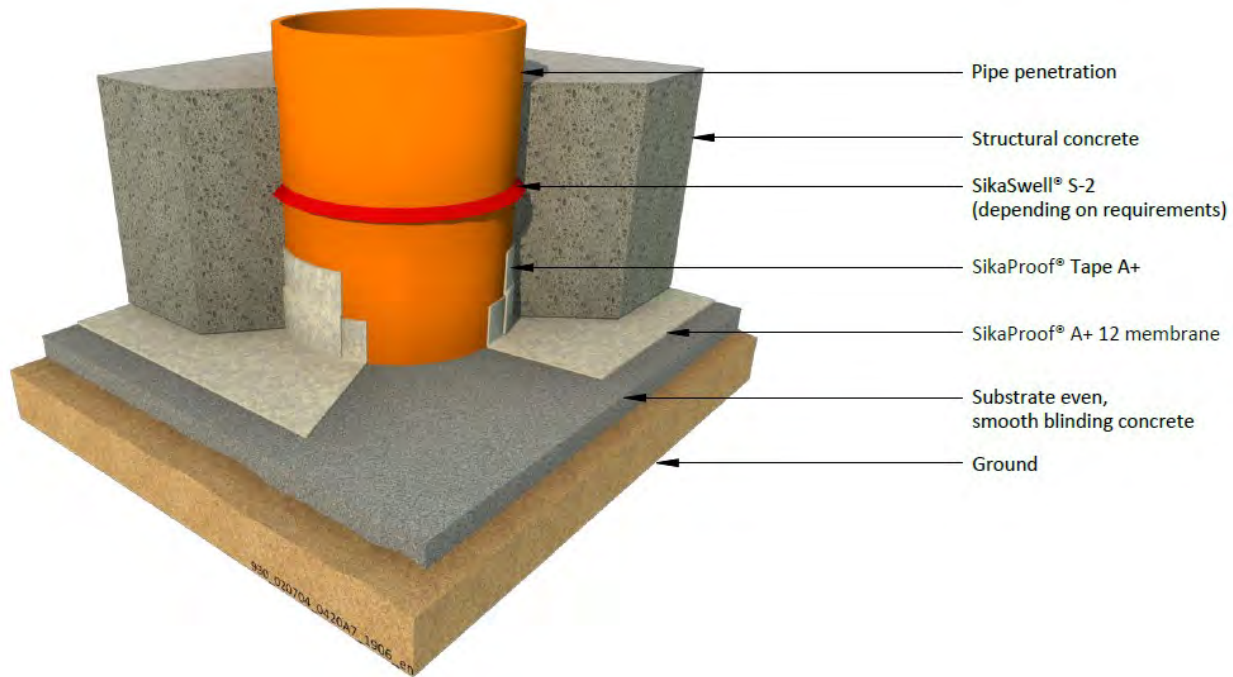
- PP/PE based pipes: pretreat with an open flame gun
- PVC based pipes: pretreat by abrading the surface with sandpaper

- For other penetrating material in direct contact with the adhesive of the **SikaProof® Tape A+** (such as any synthetics etc.), the compatibility and appropriate pretreatment must be evaluated and confirmed.

Additional waterproofing measures:

As an additional barrier, the use of **SikaSwell® S-2** sealants around the pipe or other penetrations within the concrete element is highly recommended.

3D Detail:



6.4.2 PILE CAPS

This standard detail for pile heads/caps can be also used for similar penetrations. Depending on the project requirements, this detail may need additional waterproofing measures, such as **SikaFuko®** injection hose system and **SikaSwell®** sealant or profiles.

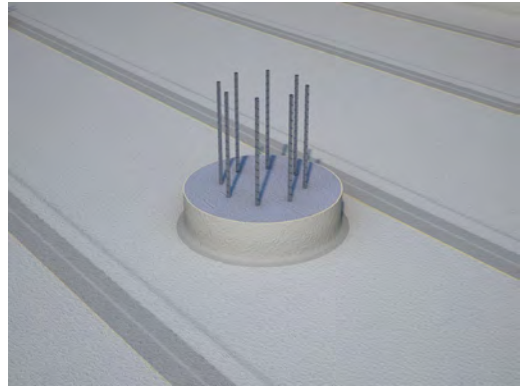
Preparation work:

- The concrete surface around the pile must be stable and smooth.
- The pile head must be chiseled down to a minimum height of 50 mm above base level.
- Rust must be removed from all exposed steel reinforcement by blast cleaning or mechanical wire brushing.



General procedure:

1. Cut out the membrane as close as possible around the pile head.
2. Install the formwork around the pile onto the **SikaProof® A+** membrane. The diameter of the formwork must be minimum 100 mm longer than the membrane cut out (overlap all round of minimum 50 mm).
3. Fill up the formwork with watertight concrete or **SikaGrout®** to maximum 10 mm below the height of the formwork.
4. Remove the formwork after the watertight concrete or **SikaGrout®** has cured.
5. Place a new formwork, which has a 30 mm larger radius.
6. Fill the formwork **Sikadur®-42 HE** or another epoxy-based mortar with sufficient compressive strength (refer to current *Product Data Sheet* to ensure a proper application). The epoxy-based mortar must cover the watertight concrete or **SikaGrout®** at least 15 mm.
7. Remove the formwork and apply the **SikaProof® Tape A+** around the epoxy-based mortar layer of the pile head.
8. Check that the **SikaProof® Tape A+** is at least covering 50 mm of the epoxy-based mortar layer.



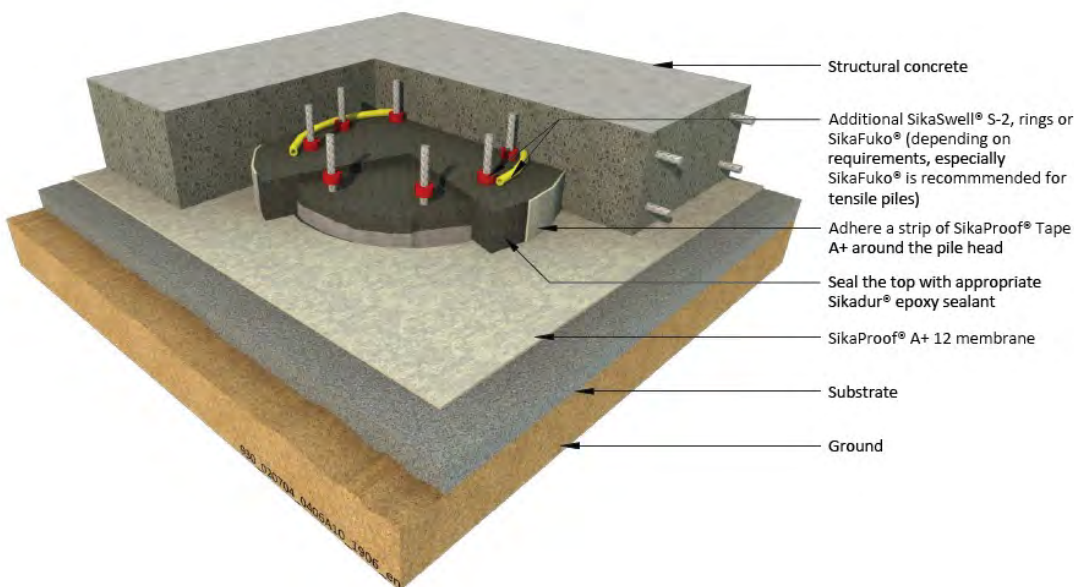
Important note:

Sikadur®-42 HE must be tight and fully connected to the cleaned (with wire brush and free of oil/grease) steel reinforcement.

Additional waterproofing measures:

Depending on the project requirements, an additional barrier, such as **SikaSwell® S-2** sealants, is highly recommended around each rebar of the pile head (or other similar penetrations). For higher requirements, the use of **SikaFuko® VT-1** injection hose is mandatory, especially for tension piles.

3D Detail:



6.5 SEALING OF JOINTS

Any designed joints or connections in or from the structure must be sealed by complementary Sika® Waterproofing Joint Sealing solutions. Water can easily enter structures through all types of joints, gaps, voids, cracks, or honeycombs, where the membrane is not fully bonded to the reinforced concrete. Therefore, all joints, gaps and voids must be sealed with the following solutions:

- SikaSwell® A / SikaSwell® S-2
- Sika® Waterbars / Waterstops
- SikaFuko® injection hose system

Depending on the requirements of a project, different joint sealing solutions must be applied. In the following sections, the different types of joints and the corresponding sealing solutions are described in more detail.

6.5.1 CONSTRUCTION JOINTS (PRE-INSTALLED) "

For the pre-sealing of construction joints always use **SikaSwell® A** profiles as the minimum complementary waterproofing solution. For projects, where high performance is required, use the **SikaFuko®** injection hose system. Further, the use of **Sika® Waterbars** is recommended if the project requirements and the method of construction demand a more extensive solution.



Important Note:

Always consider and check that connections, terminations, and joint sealing systems are installed correctly and are executed according to the current *Product Data Sheet* and *Method Statements*.

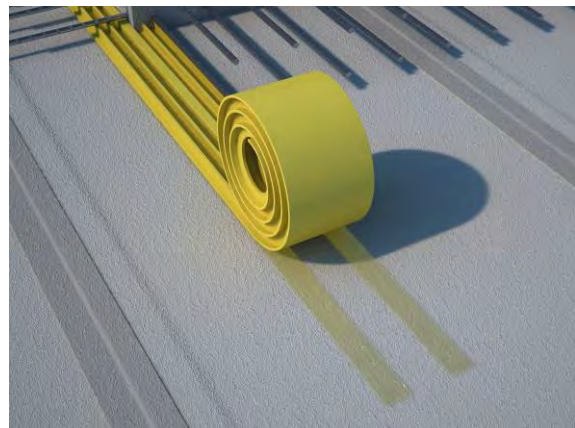
6.5.2 EXPANSION JOINTS (PRE-INSTALLED)

For the secure sealing of expansion joints, it is essential to use **Sika® Waterbar** for the additional pre-sealing and optimum movement accommodation. Therefore, normal watertight constructions and joint dimensioning is required.

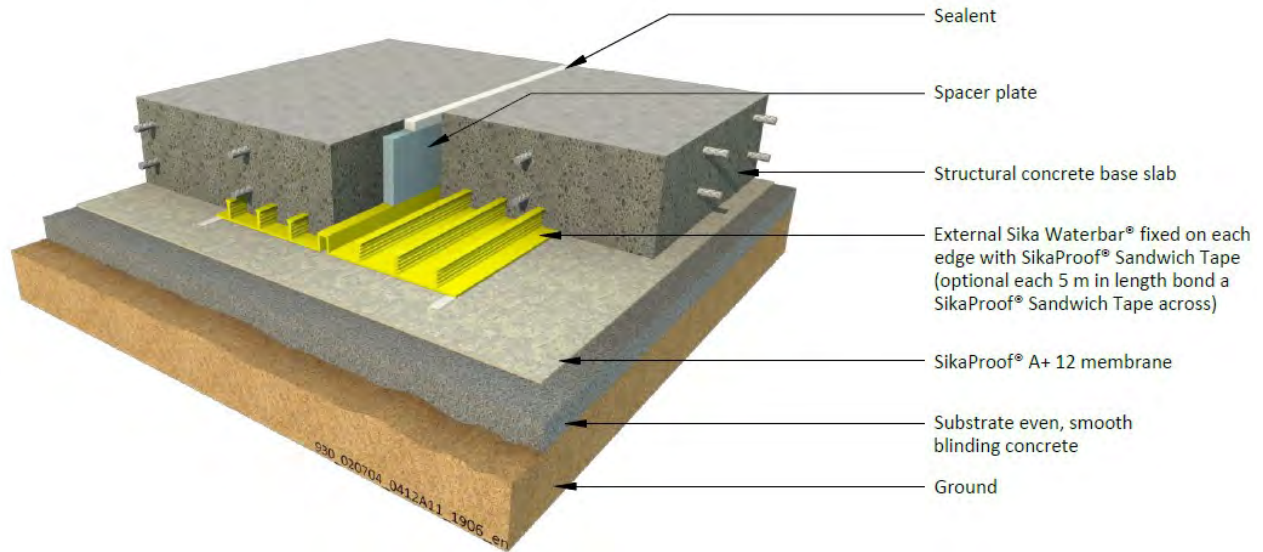
For further information regarding design and dimension of expansion joints, contact *Sika Canada Technical Services*.

General procedure for the installation of Sika® Waterbar:

1. Measure and mark the position
2. Fix and bond the **Sika® Waterbar** by using a strip of **SikaProof® Sandwich Tape** along each side
3. Bond a strip of **SikaProof® Sandwich Tape** across every 1 - 3 m to create small compartments between the **SikaProof® A+** membrane and the **Sika® Waterbar**



3D Detail:



6.5.3 FORMWORK TIE-BAR HOLES (POST-INSTALLED)

After removing double-faced formwork, the tie-bar holes and any open penetrations must be sealed either with **SikaProof® Patch-200 B** or alternatively with the **Sikadur® Combiflex® SG** system.

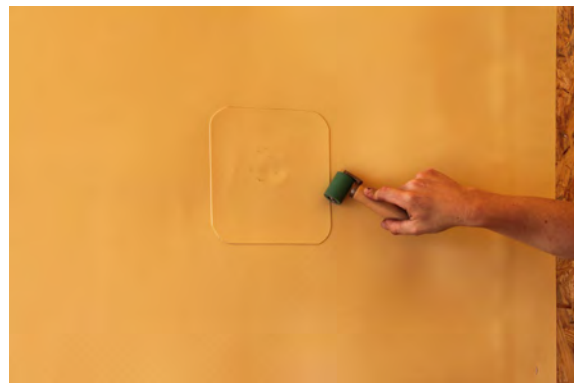
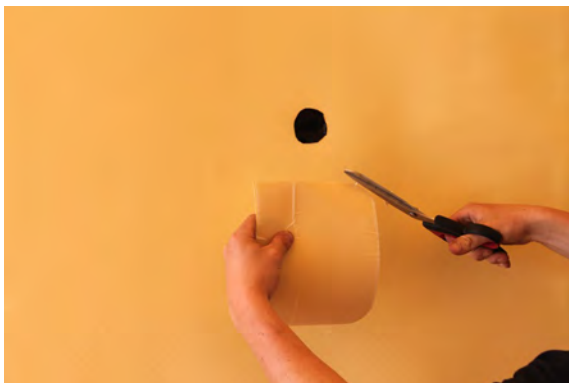
General procedure for using the SikaProof® Patch-200 B:

1. Close the tie-bar holes with appropriate plugs or mortar (to stop water ingress inside through the holes)
2. Clean the membrane surface around the penetration

Important note:

For the adhesion of **Sikadur® Combiflex® SG** system, the surface must be briefly pre-treated crosswise with an open torch!

3. Level and smoothen the edges around the tie plugs with a piece of **SikaProof® Sandwich Tape** or **SikaProof® FixTape-50**
4. Cut a suitably sized piece of **SikaProof® Patch-200 B** and round the corners
5. Position the patch centered over the penetration (minimum 50 mm on either side) and bond it onto the **SikaProof® A+** membrane
6. Use a pressure roller to ensure a complete sealing and bonding without air pockets



6.5.4 EXTERNAL JOINT SEALING (POST-INSTALLED)

Depending on the project requirements, all joints must be sealed by complementary Sika Waterproofing Systems. Use the following solutions to seal external joints and connections:

- **SikaProof® Patch-200 B**
- **Sikadur® Combiflex® SG** system

6.5.4.1 CONSTRUCTION JOINTS (POST-INSTALLED)

Construction joints without any structural or dynamic use, can easily be sealed using **SikaProof® Patch-200 B**. For any other construction joint, especially for precast concrete elements and connections to existing structures, it is recommended to use **Sikadur® Combiflex® SG** system.

General procedure for using the SikaProof® Patch-200 B:

1. First clean the surfaces along the joint
2. Fill any gaps or voids to level the surface (e.g. with **Sikadur Combiflex® Adhesive**)
3. Bond **SikaProof® Patch-200 B** centered over the joint and onto the **SikaProof® A+** membrane with a minimum overlap of 50 mm on both sides.
4. Use a pressure roller to permanently seal and bond the tapes/patches to ensure that there are no air pockets

6.5.4.2 JOINT SEALING OF PRECAST CONCRETE ELEMENTS

For the use of **SikaProof® A+** with precast concrete elements, the following points must be taken into consideration:

- Waterproofing design of the precast structure / system
- Design of the precast concrete elements (concrete edge, element thickness)
- Layout of **SikaProof® A+** membrane joints
- Workmanship and general finish on precast elements
- Precast element transport and installation method
- Pre- and post-sealing of construction joints between precast elements

All joints and connections between precast elements must be sealed with complementary Sika joint sealing systems according to the project requirements.

- **SikaSwell® A / SikaSwell® S-2 / SikaSwell®** rings
- **Sika® Waterbars / Waterstops**
- **SikaFuko®** injection hose system

Layout of SikaProof® A+ membrane overlaps

- Respect the umbrella principal, that means all overlap joints in the final layer of the **SikaProof® A+** system must be orientated downwards or sideways (on some vertical surfaces).

Layout of precast elements joints

The following aspects must be fulfilled for a durable and watertight joint sealing with **Sikadur® Combiflex® SG** system and **SikaProof® A+** membrane system

- Thickness of the outside pre-cast plate
- Concrete edge without **SikaProof® A+** membrane

- Minimal adhesion surface/width onto the **SikaProof® A+** membrane



General procedure:

1. Pre-treat the concrete surface of the edge mechanically
2. Clean the membrane surface
3. Briefly pre-treat the membrane surface crosswise with an open torch
4. Apply the **Sikadur Combiflex® SG** system, according to the current *System Data Sheet* and *Method Statement*

Important note:

For detailed information on the installation procedure, refer to the current *Method Statement* of **Sikadur Combiflex® SG** system.

For construction joints with **Sikadur Combiflex® SG** system, the tape dimensions and minimum overlap widths/bonding area must comply with the following table.

	Waterproofing
	Water pressure ≤ 20 m (≤ 2.0 bar)
Minimum tape thickness	≥ 2 mm
Minimum tape width	≥ 250 mm
Adhesive on concrete edge (each site of the joint) *	≥ 50 mm
Adhesive on membrane (each site of the joint) **	≥ 65 mm

* Concrete treatment according to *Method Statement* of **Sikadur® Combiflex® SG** system

** The bonding surface of the **SikaProof® A+** membrane must be

- Fully bonded to the precast concrete element
- Briefly pre-treat crosswise with open torch

*** Essential to ensure a permanent resistance to lateral water migration

6.5.4.3 EXPANSION JOINTS (POST-INSTALLED)

For joints with anticipated movement, the use of **Sikadur® Combiflex® SG** joint sealing system is recommended. **SikaProof® Patch-200 B** is **not suitable** for these types of application. For optimal joint movement capability, the appropriate **Sikadur® Combiflex® SG** type must be selected. For further information, consult the current Method Statement of **Sikadur® Combiflex® SG** system.

1. Pre-treat the concrete surface of the edge mechanically
2. Clean the membrane surface
3. Briefly pre-treat the membrane surface crosswise with an open torch
4. Apply the **Sikadur® Combiflex® SG** system, according to the current *Method Statement*



Important note:

- For more detailed information of the installation procedure consult to the current *Method Statement*
- Make sure that the central expansion part of the **Sikadur® Combiflex® SG Tape**, is free of adhesive for optimal movement capacity.

For expansion joints with **Sikadur® Combiflex® SG** system, tape dimensions and minimum overlap widths/bonding surfaces must be used.

	Waterproofing
	Water pressure ≤ 20 m (≤ 2.0 bar)
Minimum tape thickness	≥ 2 mm
Minimum tape width	≥ 250 mm
Adhesive on concrete edge (each site of the joint) *	≥ 50 mm
Adhesive on membrane (each site of the joint) **	≥ 65 mm

* Concrete treatment according to *Method Statement* of **Sikadur® Combiflex® SG** system

** The bonding surface of the **SikaProof® A+** membrane must be

- Fully bonded to the precast concrete element
- Briefly pre-treat crosswise with open torch

Consult the current *Method Statement* for more information on the dimensions and movement width of the tapes.

6.5.5 FURTHER SEALING SOLUTIONS

To seal subsequent pipe penetrations and other connections, the general recommendation is the use of **Sikadur® Combiflex® SG** system.

For further information, please consult the current *Method Statement* for **Sikadur® Combiflex® SG** system or contact *Sika Canada Technical Services*.

7 PROTECTION AND CLEANING

In general, damages, soiling and any other impairments of the **SikaProof® A+** system must be prevented at any time during and after the application. For this purpose, the protection, cleaning, and repair have a substantial role for the successful application of the **SikaProof® A+** system.

7.1 PROTECTION

The installed **SikaProof® A+** membrane system must be protected temporarily in order to:

- Prevent soiling from construction work and uncommon conditions on site (e.g. high level of mud or sand)
- Prevent any damages caused by the installation of steel reinforcement or other trades
- Protect the membrane for weathering (e.g. UV exposure)

Fully bonded waterproofing membranes must be in direct contact with fresh concrete over the entire bonding area, to ensure a full surface bond and no lateral water migration. Hence, any other materials (e.g. membrane cut-off, release liners, protective films, protective mortar, etc.) will impair the bond formation with fresh concrete, if these materials are not completely removed prior to casting the concrete.

Consequently, **every membrane protection layer is temporary!**

During the concreting of any area close to the **SikaProof® A+** membrane, a protection layer is required to prevent any soiling on the membrane. Additionally, in cases, where the membrane is exposed longer than 90 days, the **SikaProof® A+** system must be protected by a UV-resistant layer. Some options for protection layers are listed in the following.

- Plastic film/foil (UV resistant)
- Geotextile (UV resistant)
- Other equivalent measures

Important note:

If any materials such as reinforcement must be stored temporarily on the membranes, always use some protection (e.g. plywood sheets) to prevent any damage to the membrane.

7.2 CLEANING

The **SikaProof® A+** membrane must be cleaned if it is soiled or contaminated with any other materials to ensure a full bond with fresh concrete on the entire area of the membrane.

Remove all:

- Liners, membrane cut-offs and other waste materials
- Debris, dirt, dust, soil, sand, concrete / cement residues
- Anything that could create a separation layer or cause delamination

Cleaning procedure:

Clean the **SikaProof® A+** membrane surface with compressed air or controlled high-pressure water cleaner.

Important note:

- Maximum pressure ≤ 200 bar
- Flat nozzles – no spirals!
- Minimum distance between the membrane surface and the jet nozzle ≥ 300 mm
- Do not point the nozzle directly at overlap joints
- Optimum angle for the jet $\leq 60^\circ$

Always conduct an initial test on a spare piece of membrane with any high-pressure water cleaning equipment. Further, use a spare piece of membrane to set up and adjust the equipment appropriately without causing damage. Finally remove any standing water from the formwork and membrane surface.

7.3 REPAIR

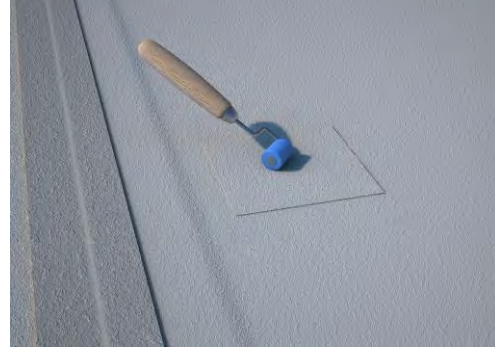
Any damage of the **SikaProof® A+** membrane system must be repaired to achieve a tight waterproofing system. This ensures that the **SikaProof® A+** system remains a durable, watertight, and protective waterproofing system.

7.3.1 REPAIR WORK DURING INSTALLATION

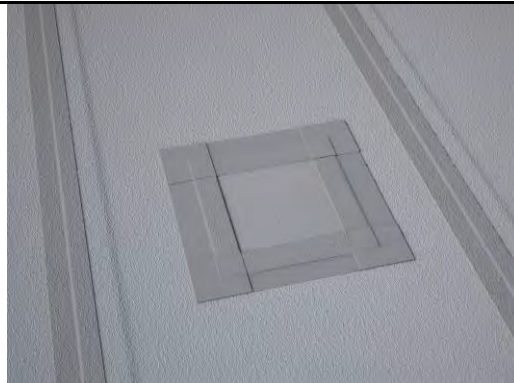
During the installation process, the elements of a construction site (such as tools, hard materials, machines, etc.) can cause damage on the membrane, if not considered accordingly. The following steps describe the methods to repair and rectify such damages.

Membrane damage:

Membrane cuts or damages equal or less than 10 mm ($d \leq 10$ mm): Seal & bond using **SikaProof® Tape A+**



Membrane cuts or damage more than 10 mm ($d > 10$ mm): Seal and bond using **SikaProof® A+** membrane and **SikaProof® Tape A+**



If working with double-sided formwork, the repair of potentially damaged area must be performed from the yellow side of the membrane. The following steps describes the methods to execute the repair appropriately.

Repair after installation (only for double-sided formwork):

Insufficient/incorrect bond of overlaps:

- Clean the overlap seal & bond it again with an additional **SikaProof® Patch-200 B** or **SikaProof Sandwich® Tape**
-

Membrane damage:

- Small areas of membrane damages less than $d \leq 30$ mm:
 - Seal & bond using **SikaProof Patch-200 B**
 - For areas $d > 30$ mm seal:
 - Seal & bond **SikaProof® P-1201** or **Sikadur Combiflex® SG** system
-

Delamination, insufficient bond to concrete:

- Small areas of delamination, bubbles less than $d \leq 100$ mm with intact membrane:
 - No damage, no repair!
 - Any delamination or bubbles > 100 mm with/without intact membrane
 - Remove the membrane and reseal the area with **SikaProof® P-1201** or **Sikadur Combiflex® SG** system
-

Depending on weather conditions, the connection to previously installed membrane can be impaired since the installed membrane has been exposed to site conditions. In order to proceed with the installation, check the 3D Detail *Transition between exposed and fresh membrane – 930-020704_0072A1-2007-en*.

7.3.2 REPAIR WORK DURING SERVICE LIFE

If any damage occurs throughout the service life, the damage is locally limited due to the full surface bond of the **SikaProof® A+** membrane system preventing any lateral water migration.

- Additional sealing or resealing of any joints is essential to prevent any uncontrolled leakage through any construction, movement, or connection joints
- Any local damaged areas or cracks can easily be sealed e.g. by localised injection
- For more information on Sika's injection resin solutions, contact *Sika Canada Technical Services*

8 ACCOMPANYING TRADES

Successful waterproofing with the **SikaProof® A+** membrane system depends on its full-surface bond to the reinforced concrete of the main structure. This functionality can also be affected by the labourers and other trades, who are out of the control of waterproofing contractors.

Therefore, it is important to take the following points into consideration during the early design and planning stages of a project:

- Excavation
- Formwork / shuttering work
- Reinforcement work
- Concrete work
- Backfilling work
- Other work

The specific construction steps depend on the specific local construction requirements and methods. The following table describes some of the general aspects, which must be taken into consideration.

A) Excavation Work / Substrate Preparation

These factors can significantly affect the installation of **SikaProof® A+**:

- The excavation method and type of retaining wall (e.g. method of tie-back for the wall)
- Dewatering systems (e.g. temporary pipe penetrations needed)
- Substrate requirements (e.g. drilled pile or diaphragm walls have rough and uneven surfaces)
- Connection of the different construction elements (e.g. the pile or the diaphragm wall to the base slab)



- Tie-back (anchoring) of the retaining wall:
Not a uniform and continuous substrate or requires a temporary recess for tie-back.



- Dewatering system with temporary pipe penetrations



- Piled retaining wall with anchors:
The uneven substrate with additional levelling/facing concrete/mortar



B) Formwork / Shuttering Work

The formwork must be suitably designed to fulfil all of the requirements for the concrete substrate, as described above in *Section 6.2*.

The following points must be respected:

- Do not use any release agents on the formwork, as these will leave residues that can prevent or reduce the bond of the **SikaProof® A+** system to concrete.
- Choose **appropriate method to fix the membrane**, e.g. staples
- Early stripping (before the concrete is sufficiently hardened) could result in peeling of the membrane (see picture)
- **Respect the local stripping period**, e.g. DIN standard 1045 – part 3 (**minimal concrete strength $\geq 10 \text{ N/mm}^2$**)
- Remove the formwork carefully



- Pay attention to the shuttering and slabs between concrete stages to prevent any membrane punctures/damage!



- Reuse the existing tie-bar penetrations in the structure to fix the next shuttering stages.



- Formwork needs to be prepared for continuous membrane placing and installation.



C) Reinforcement Work

Unlike other membrane waterproofing systems, **no additional protection layers, such as screeds**, is required for the **SikaProof® A+** membrane system.

The **SikaProof® A+** membranes must bond to the reinforced concrete surface of the structure.

To ensure complete and easy flow of the fresh concrete around the spacers and onto the entire surface of the membrane, always:

- Use curved spacer surfaces rather than flat
- Position and fix the spacers offset, not in lines
- Use single or linear spacers

Due to the requirement of full-surface bond, the steel reinforcement must be fixed carefully on the membrane using appropriate spacers.

Important note:

- Prevent any reinforcement being stored on the membranes. If this is unavoidable during the steel fixing works, then use plywood or similar covering to protect the membrane from damage.
- If the membrane is damaged, it must be repaired with a patch of **SikaProof® Tape A+** immediately.



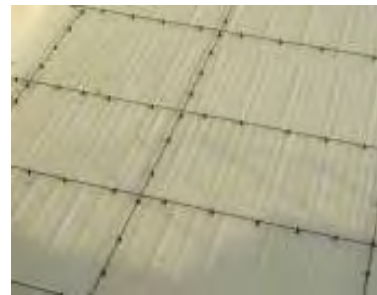
- Use the recommended cement mortar spacers with waved surfaces for fair faced concrete



-
- Use single spacers, standard products, that are stable and without sharp edges



-
- Create an initial mesh framework of reinforcing steel to install the rest onto



D) Concrete Work

The concrete quality (see *Section 3.4*) and workmanship are key factors for successful waterproofing with a permanent and full-surface bond of the **SikaProof® A+** membrane system to the reinforced concrete structure preventing any water lateral migration.

The following aspects of workmanship are particularly important:

- Inspect the **SikaProof® A+** system before concreting to:
 - Identify any damages
 - Remove any excess materials, waste etc.
 - Remove any ponding water or any ice or snow
- Pour the concrete carefully, especially in vertical application, e.g. walls (take caution not to tear the membrane, especially at the overlap joints)
- Proceed according to standard proficient concrete practise
- Take special care of the vibration and compaction (to prevent honeycombing and any membrane contact/damage)
- Protect adjacent membrane connection areas from concrete splashes



E) Backfilling Work

As with all membrane waterproofing systems **SikaProof® A+** membrane must be protected against any damage

- from the backfill material
- caused of settlement/friction from the soil (separation layer)

The protection layer must withstand the following:

- The filler particle diameter/shape
- The nature of the filler/soil
- The method of compaction

The following ancillary products are available to protect the membrane:

- **Sikaplan® WT Protection**
- **Sikaplan® W Tundrain**
- **Sikaplan® W Felts / Drain**
- Geotextiles: > 500g/m²
- Insulation boards: > 40 mm



F) Other Works

During and after the installation of the **SikaProof® A+** membrane system, there are no other trades or any heavy equipment (see picture) allowed onto the installation area of the membrane at any time.

- If required and accepted by the waterproofing contractor, the following may be permitted:
 - Other trades with lightweight materials and equipment could work on sufficiently protected areas
 - Welding works with special attention and protection.
- No heavy equipment is allowed on the membrane at all



9 INSPECTION, QUALITY CONTROL

The **SikaProof® A+** system must only be installed by Sika trained and approved contractors. As a rule, a continuous workflow during the installation and a well-defined procedure is mandatory to prevent any mistakes. Sika recommends that membrane installation contractors record all relevant details and facts in a written record/report with pictures, to ensure a successful application and provide a reference for the owner.

A) Prior to installation

Prior to the installation the substrate must be inspected and confirmed as being ready for application.

The substrate must meet the following requirements:

- Sufficient stability to avoid movements
- Smooth, uniform, and clean to prevent membrane damage
- Gaps and voids (> 12 - 15 mm) must be filled and closed prior to the installation
- Preferably a dry or damp, **no ponding water**



B) After the installation of SikaProof® A+

When the installation is completed, quality control checks of the system must be conducted by means of a visual inspection of the entire surface, paying particular attention to the bonded joints.

Important Note:

This inspection is essential due to the fact, that the contractor has no further opportunity to influence the success of the fully and permanently bonded waterproofing system. Because it is outside of the control and responsibility of all following trades and main contractors that potentially must work on the **SikaProof® A+** membrane.



Checklist for inspection after installation:

- The installation is complete in all areas without any damage
- All overlap tapes and connections have been correctly bonded.
- All details are completely and properly executed
- Remove all release liners, all excess materials and waste (such as membrane cut-offs) and any other debris from the installation of the membrane system



C) Before the concrete is placed

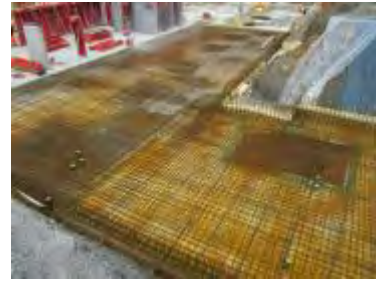
When the reinforcement is installed and before the concrete is cast the **SikaProof® A+** membrane system must be inspected finally to ensure a successful fully bonded waterproofing system.

Checklist for final inspection:

- Check if any membrane damage, such as cuts or holes, which occurred during the reinforcement work, have been repaired
- Remove any excess membrane, any waste and any dirt, debris, and ponding water



- Remove and clean anything that could prevent the full-surface bond formation of the system with the concrete structure, such as any temporary protection layers



D) After the removing of the formwork

Respect the stripping period according to the local standard and the **minimum concrete strength $\geq 10 \text{ N/mm}^2$** (see Section 8 B)

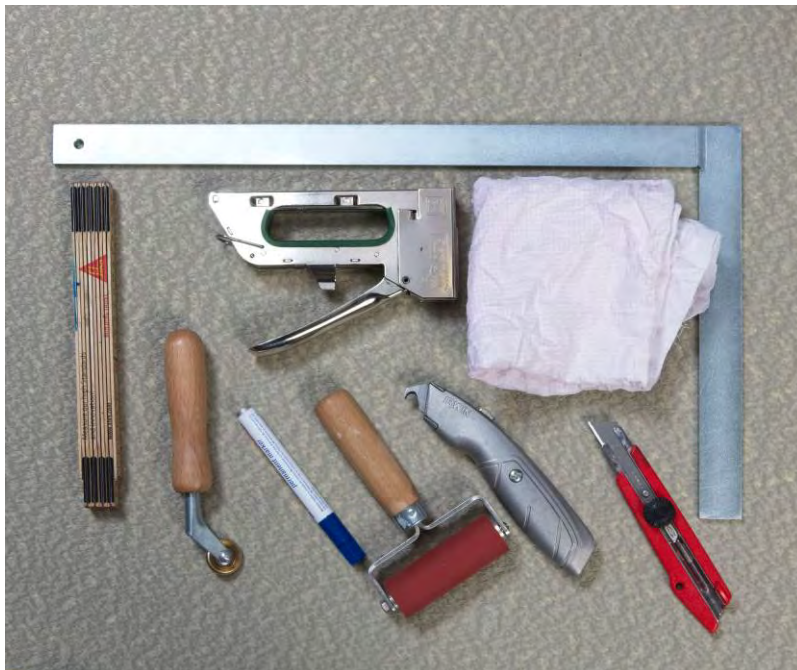
After removing the formwork

- Check the external membrane side of **SikaProof® A+** system for damages)
- Repair and seal any damage and tie rod penetrations according to the appropriate procedure



10 EQUIPMENT, TOOLS

SikaProof® A+ membrane system is an easy, fast, and secure system with a simple application. For a correct and safe installation, the following tools are required. For more information on the installation, consult the application manual:



- Tape measure
- Marking pen
- Membrane cutter
- Small / telescopic pressure roller
- Metal straight edge for cutting
- Protective sheet for cutting on clean, dry cloth
- Stapler for fixing the membrane

11 CERTIFICATES & APPROVALS

Fully bonded sheet membrane waterproofing systems for basements, such as **SikaProof® A+**, are not yet subject to any agreed International Standards. Therefore, existing tests and standards were adapted to assess and confirm the suitability of the system in terms of its watertightness and the fully bonded performance. These include:

- Product Declaration EN 13967 – Flexible sheets for waterproofing (type A&T)
- abP (allgemeine bauaufsichtliches Prüfzeugnis), German approval
- Function tests for resistance to lateral water migration of system and standard details
- Radon permeability according to EN ISO/IEC 17025:2005 – OL 124
- Environmental Product Declaration (EPD)

12 LEGAL NOTE

The information contained herein, and any other advice 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 accordance with Sika's recommendations. The information only applies to the application(s) and product(s) expressly referred to herein and is based on laboratory tests which do not replace practical tests. In case of changes in the parameters of the application, such as changes in substrates etc., or in case of a different application, consult Sika's Technical Service prior to using Sika products. The information contained herein does not relieve the user of the products from testing them for the intended application and purpose. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request or may be downloaded from our website at: www.sika.ca

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Method Statement
SikaProof® A+
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