



METHOD STATEMENT

Application of Sikagard[®] hydrophobic impregnations

07/15 / VER.: 6 / SIKA SERVICES AG / M. DONADIO

REFURBISHMENT

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Method Statement

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1 SCOPE

This method statement describes the step by step procedure for applying hydrophobic impregnation (cream or liquid type) on concrete or masonry structures.

2 SYSTEM DESCRIPTION

The following refers to hydrophobic impregnation applied onto concrete structures (building or civil engineering) (whether liquid as shown on the left picture or cream type as shown on the right picture).



2.1 REFERENCES

This method statement has been written in accordance with the recommendations contained in European Standards EN 1504: Products and systems for the protection and repair of concrete structures, and the following relevant parts:

- EN 1504 Part 1: Definitions, requirements, quality control and evaluation of conformity
- EN 1504 Part 10: Site application of products and systems, and quality control of works

This method statement also makes references to the recommendation drawn in the Technical Guideline of ICRI No 03732 – 2002.

2.2 LIMITATIONS

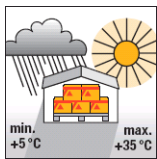
- Products shall only be applied in accordance with their intended use.
- Local differences in product may result in performance variations. The most recent and relevant local Product Data Sheets (PDS) and Material Safety Data Sheets (MSDS) shall apply.
- For specific construction / build information refer to the Architect's, Engineer's or Specialist's details, drawings, specifications and risk assessments.
- All work shall be carried out as directed by a supervising officer or a qualified engineer.
- This method statement is only a guide and shall be adapted to suit local product and standards, legislation or other local requirements.

3 PRODUCTS (NOT LIMITED)

* Information to be adapted for local use (do not include technical or mechanical information)

Sika Product Names	Colour	Appearance	Type	Shelf life
Sikagard®-706 Thixo	Milky white	Cream	Water based	12 months
Sikagard®-705 L	Colourless	Water like	Solvent free	25 months
Sikagard®-740 W	Milky white	Water like	Water based	9 months
Sikagard®-704 S	Colourless	Water like	Solvent containing	12 months
Sikagard®-730 Thixo	Milky white	Cream	Water/solvent based	12 months
Sikagard®-703 W	Milky white	Water like	Water based	12 months
Sikagard®-700 S	Colourless	Water like	Solvent containing	12 months
Sikagard®-71 W	Colourless	Water like	Water based	12 months

3.1 MATERIAL STORAGE



Materials shall be stored properly in undamaged original sealed packaging, in dry cooled conditions. Refers to specific information available on the product data sheet regarding minimum and maximum storage temperatures.

4 HEALTH AND SAFETY

4.1 RISK ASSESSMENT



The risk to health and safety from falling objects or defects in the structure shall be properly assessed.

Where structures are considered to be unsafe appropriate action shall be carried out to make the working area safe.

4.2 PERSONAL PROTECTION



Work safely!

Handling or processing (especially during spray application) of hydrophobic impregnation products may generate mist which can cause chemical irritation to the eyes, skin, nose and throat.

Appropriate eye protection shall be worn at all times while handling and mixing products.

Approved chemical masks shall be worn to protect the nose and throat from pulverisation mists.

Safety shoes, gloves and other appropriate skin protection shall be worn at all times.

Always wash hands with suitable soap after handling products and before food consumption.

FOR DETAILED INFORMATION REFER TO THE RELEVANT MATERIAL SAFETY DATA SHEET

4.3 FIRST AID



Seek immediate medical attention in the event of excessive inhalation, ingestion or eye contact causing irritation. Do not induce vomiting unless directed by medical personnel.

Flush eyes with plenty of clean water occasionally lifting upper and lower eyelids. Remove contact lenses immediately. Continue to rinse eye for 10 minutes and then seek medical attention.

Rinse contaminated skin with plenty of water. Remove contaminated clothing and continue to rinse for 10 minutes and seek medical attention

FOR DETAILED INFORMATION REFER TO THE MATERIAL SAFETY DATA SHEET

5 ENVIRONMENT

5.1 CLEANING TOOLS / EQUIPMENT

Clean all tools and application equipment immediately after use, with water (for the water based products) or with an appropriate solvent e.g. Colma Cleaner (for solvent free, solvent containing or cream products).

Hardened material can only be mechanically removed.

5.2 WASTE DISPOSAL



Do not empty surplus material into drains; dispose responsibly through licensed waste disposal contractor in accordance with legislation and local / regional authority requirements. Avoid run off onto soil or into waterways, drains or sewers.

FOR DETAILED INFORMATION REFER TO THE MATERIAL SAFETY DATA SHEET

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6 SURFACE PREPARATION

The mineral substrate (concrete or masonry) shall be free of dust, dirt, oil, efflorescence and existing paint coatings.

Unless specific penetration depth is achieved, cracks in concrete more than 300 microns must be repaired first prior to carry out the hydrophobic treatment – refer to section 7.2.

Cleaning is best done by light blast-cleaning, steam cleaning, low pressure cleaning (less than 180 bars) etc. On parking decks, cleaning is best done by grit blasting in order to avoid saturating the surface with water.

If the concrete surface is coated with an existing paint, or saturated with chloride salt deposits, this shall be removed by wet grit blasting or by high water jetting (500 to 1000 bars). Normal water jetting pressure of around 180 bars won't be sufficient to remove well adhering coating, especially old epoxy coating or old chloride salt deposit. However, the surface shall be completely dry before applying the hydrophobic impregnation.

Concrete surface profile shall fit to CSP 1, 2 or 3 as per ICRI 03732-7



CSP 1



CSP 2



CSP 3

The substrate shall look dry with no damp patches (surface humidity when measured with Tramex shall not exceed 5-6%). Best results are obtained when applying on dry and very absorbent substrates.

Care shall be taken that application is carried out at a temperature at least 3°C above dew point.

On brick structures, it may be required to proceed with acid cleaning in order to remove any trace of cement due to the building process – proper washing to remove any trace of acid shall be done and adequate drying shall be observed prior to apply the hydrophobic impregnation.

7 PRELIMINARY TESTING

7.1 TESTING

To define appropriate material consumption, a few weeks before work commencing, the Supervising Officer shall assign a typical concrete surface with a representative area of at least 10 m². The surface preparation shall be undertaken by the applicator in the same way as prescribed for the project (refer to section 6 above). An experience supervisor of the manufacturer shall assist at the trial operation.

Before application of the planned hydrophobic impregnation, 3 cores shall be taken from the test area to define the water absorption coefficient of the untreated concrete surface in accordance with NCHRP 244 series II or EN 1062-3.

The application of the selected product shall be carried out as recommended in the section 8 – the consumption and site conditions (wind, temperature, humidity, etc...) shall be properly recorded.

Three (3) weeks after the trial application, 6 cores of diameters of 50 mm (depth in accordance with concrete cover but at least 50 mm) shall be taken from the area and the surface shall be restored thereafter with appropriate Sika repair material.

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No later than 24 hours after removing the cores, 3 of them shall be cut into 2 parts and the penetration depth shall then be defined by spraying water on the cut portion. From the difference of water absorption, the penetration of the hydrophobic impregnation can be visually recorded to the nearest mm. For each core, at least 6 points of measure shall be taken and the overall average calculated with the standard deviation.

The remaining 3 cores shall be sent to a laboratory to carry out the water absorption test as per NCHRP 244 series II or EN 1062-3. This test can also be done on depth profiles (extra cores are then needed - 3 for each depth profiles).

Water absorption test may also be calculated on job site using a site test with a funnel. The funnel is glued to the concrete surface – refer to picture enclosed. As this is not a standardised method, it is important to compare it with a non-treated zone (making sure the non-treated zone is well away from the treated one to avoid surface pollution/migration that might alter the results).

If required, additional tests can be carried out (e.g. determination of active ingredients using FT-IR method in the depth profiles)



7.2 TARGETED PENETRATION DEPTH

7.2.1 GENERAL CONDITIONS

As a guide, the following penetration depths shall be considered for durability and efficiency of concrete protection:

Environment	Penetration depth during preliminary testing	Penetration depth during the project
Marine structures (splash and tidal zones)	6 – 7 mm	> 5 mm
Marine structures (away from the sea – air borne chloride pollution)	4 – 5 mm	> 3 mm
De-icing salt / freeze and thaw cycles improvement	5 – 6 mm	> 4 mm
Normal protection (other than above)	3 – 4 mm	> 2 mm

7.2.2 CRACKED CONCRETE

Swiss authorities in their publication of July 2005 give some recommendation to treat cracks when applying hydrophobic impregnation:

Pre-existing cracks of a width $\omega \leq 0.3$ mm do not require particular treatment. With a correctly applied treatment, cracks walls and pores walls become hydrophobic.

In the presence of cracks with width $\omega \geq 0.3$ mm, or if it is expected that cracks develop after treatment, it is necessary to achieve a minimal guaranteed depth of penetration x_{ω} . This targeted depth is then in relation to the width of the cracks:

$$x_{\omega} \geq 12\omega + 2$$

This is valid up to 0.750 mm width cracks..... For the maximum opening allowed, then the measured penetration depth of the hydrophobic impregnation shall be at least 11mm when measured on the existing structure.

If the existing or expected cracks are wider than 750 microns, hydrophobic treatment cannot be used to prevent penetration of aggressive elements. They shall therefore be repaired using conventional techniques (e.g. crack injection, joint sealant or wider opening of the cracks and patching with mortar, etc.).

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8 APPLICATION

8.1 BEFORE APPLICATION

Working space shall be clean and tidy with no obstructions.

Record the substrate, ambient temperature and relative humidity.

External applications shall be adequately protected. Do not apply hydrophobic impregnation in windy or rainy conditions, or if there is a risk of frost within 24 hours.

Calculate the required volume for the targeted consumption (determined by the preliminary test) based on the surface to be treated.

Areas such as window frames which still need to be painted must be securely covered to avoid contact with the hydrophobic impregnations.

Areas not to be impregnated such as window panes need to be protected from being accidentally contaminated with the hydrophobic impregnations.

Generally, hydrophobic impregnation can damage some coatings and bituminous products..



8.2 APPLICATION METHOD

8.2.1 CREAM TYPE

For **large scale** application, cream type hydrophobic impregnation like Sikagard®-706 Thixo or Sikagard®-730 Thixo can be applied with airless spray.

Typical setting of the airless machine is:

Pressure:	70 to 100 bars
Nozzle:	0.23 to 0.43 mm
Filter:	100 to 200 mesh
Spray angle:	50 to 80°

When working with airless spray, attention is drawn not to exceed excessive pressure to avoid risk of phase separation of the cream emulsion – this pressure might vary according to the environment temperature – conduct preliminary test.

For **small scale** application the cream type hydrophobic impregnation can be applied using a professional brush or long hair roller.

Normally, cream type hydrophobic impregnations are applied in one coat of approximately 200 to 300 g/m².

In the case of dense concrete and/or deep penetration targeted, a second coat of the same consumption can be applied once the first one has dried and the concrete is also dry enough.

Tip: The concrete surface is ready to receive the second coat when placing the bare hand on the surface and removing it no wetness on the hand is observed.

Note: After application, the concrete surface shall be fully covered by the product and whitish. This whitish aspect will disappear once the product has penetrated the concrete.



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8.2.2 LIQUID TYPE

For large scale application, liquid type hydrophobic impregnation can be applied with airless spray or low pressure gun

Typical setting of the airless machine is:

Pressure: 50 to 80 bars
Nozzle: 0.18 to 0.28 mm
Filter: 200 mesh
Spray angle: 50 to 80°

When working with low pressure gun, make sure that the nozzle is well open so to generate adequate mist.

For small scale application, liquid type hydrophobic impregnation can be applied with professional brush or short hair roller. Care shall be taken not to let the product run down the surface especially in vertical or overhead application.

Liquid type hydrophobic impregnation needs to be applied in at least 2 layers. In some situations, depending on the consumption, a 3rd or 4th layers might need to be applied to achieve the targeted penetration depth.

Prepare the quantity of hydrophobic impregnation required for a given area based on the targeted consumption rate.

On vertical surface, apply preferably the product from bottom up in successive passes until the targeted consumption for the first coat is achieved.

Tip: Successive passes are done when the concrete surface is still mat from the product but no longer wet (e.g. when placing the bare hand on the surface and removing it, no wetness on the hand is observed).

For solvent containing or solvent free products (Sikagard-705 L, -704 S or -700 S), the following coat can be applied when the concrete is completely dry (e.g. the following day).

On horizontal surface, flooding technique can be used but care shall be taken to avoid excessive ponding of the material as this will lead to unnecessary evaporation of the product.



8.3 CURING

Protective coatings do not require any special curing but must be protected from rain.

Product	Minimum time before rain
Sikagard®-706 Thixo	~ 3 hours at 20° C
Sikagard®-730 Thixo	~ 3 hours at 20° C
Sikagard®-705 L	~ 3 hours at 20° C
Sikagard®-704 S	~ 3 hours at 20° C
Sikagard®-740 W	~ 6 hours at 20° C
Sikagard®-700 S	~ 3 hours at 20° C
Sikagard®-703 W	~ 3 hours at 20° C
Sikagard®-71 W	~ 24 hours at 20° C

8.4 OVERCOATABILITY

All products mentioned but Sikagard®-71 W, in this method statement above can generally be over-coated with water and solvent based polymer paint such as Sikagard®-680 S BetonColor, Sikagard®-550 W Elastic, Sikagard®-675 W ElastoColor or Sikagard-690 W HD.

In general, these hydrophobic impregnation products can be used as a water repellent primer under many Sikagard® protective coatings. Penetration of water is thus prevented at possible weak spots or in the event of damage to the top coat. The risk of consequential damages such as paint flaking is therefore reduced.

Refer to the relevant data sheet for confirmation of over-coating possibility

Waiting time: minimum 5 hours, maximum 1 week

Above 1 week, additional surface preparation shall be carried out before to overcoat with a protective coating.

Note: When other coating need to be applied, contact the proposed paint manufacturer for recommendations

8.5 APPLICATION LIMITS

- On concrete surface, in general best results are achieved when hydrophobic impregnation is applied on 28 day old concrete. However, due to its high alkali resistance, it is still possible to apply it at a very early age – lower penetration might then be expected. – refer to the relevant data sheet for specific information regarding the application age.
- Hydrophobic impregnation cannot be over-coated with lime-wash or cement paint.
- It is recommended to apply the hydrophobic impregnation onto a sample area to confirm consumption rates versus penetration depth (refer to section 8.3).
- In some rare exception, hydrophobic impregnation can lead to darkening of substrate, apply sample areas first.
- If overdosed of Sikagard®-71 W is applied, some efflorescence may occur on dark substrates like brick or roof tile – cleaning shall then be done using light acid or vinegar.

9 INSPECTION, SAMPLING, QUALITY CONTROL

The following information follows the recommendations of EN 1504-10 Annex A and Technical Guideline of ICRI No 03732 – 2002. As part of established “Good Practice”, the applicator shall also provide Site QC reports containing the following recommended site record details.

9.1 BEFORE AND AFTER THE PREPARATION WORKS

Characteristic	References	Frequency	Parameters
Delamination	Hammer sounding	Once before application	Sound
Cleanliness of Concrete	Visual	After preparation & immediately before application	Free of dust, dirt, oil, efflorescence and existing paint coats.
Surface tensile strength of the prepared substrate (if required by the Engineer)	EN 1542	After preparation works	>1.0 N/mm ²

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9.2 BEFORE, DURING AND AFTER THE MATERIAL APPLICATION

Characteristic	References	Frequency	Parameters
Substrate humidity		Before and throughout the application	No damp patches; <5-6% with Tramex
Temperature (ambient & substrate)		Throughout the application	Within the data sheet limits 3°C above dew point
Ambient relative humidity		Throughout the application	To be able to be 3°C above the dew point temperature
Precipitation		daily	As recorded
Batch number		Each time new material is provided on site	As recorded

9.3 PERFORMANCE TESTING

The following can be used to check the adequacy of the application:

Characteristic	References	Frequency	Parameters
Penetration depth	EN 12504-1 ISO 2808	Once every 1'000 m ² or as required by the site engineer	Within requirement (refer to Section 7.1: Targeted Penetration depth)
Water absorption	EN 12390-8 ISO 2808	Once every 1'000 m ² or as required by the site engineer	Within requirement

10 LEGAL NOTE

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 accordance with Sika's recommendations. 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 user of the product must test the products suitability for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. 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.

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