WATERPROOFING
Sika® Watertight CONCRETE SYSTEM

KEEPING IT OUT OR KEEPING IT IN
PUT WATER IN ITS PLACE

BUILDING TRUST

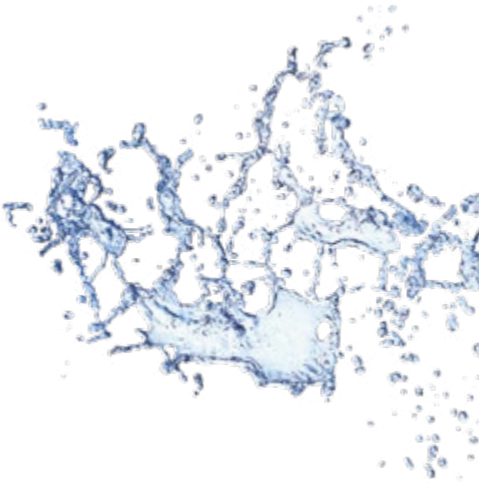
PROJECT:
ENGINEERING AND
COMPUTING BUILDING,
COVENTRY UNIVERSITY

100 YEARS OF WATERPROOFING EXPERTISE AND EXPERIENCE

SIKA IS A GLOBAL MARKET LEADER IN CONCRETE ADMIXTURE TECHNOLOGY.
Combining this with our expertise in waterproofing has led to the development and evolution of the Sika® Watertight Concrete System.

Our complete range of below-ground waterproofing solutions includes:

- Sika® Watertight Concrete System
- Sika Membrane Systems (SikaProof®, Sikaplan®, Sika BentoShield®)
- Sikalastic® – Liquid Applied Membrane System
- Sika®-1 Render System
- Sika® Waterproof Mortars and Bituminous Coating Systems
- Sika® CD System – Cavity Drainage System



PROJECT:

LIBRARY OF BIRMINGHAM

The Sika® Watertight Concrete System was used in this high-tech Library of Birmingham building, which on completion was the largest public building in Europe. The Sika® Watertight Concrete System was specified for both the basement and terraces. The system complies with BS 8102:2009 Grade 3 for habitable areas where no water penetration is acceptable, an essential consideration for the basement area.

THE Sika® Watertight CONCRETE SYSTEM CONCEPT

WHETHER KEEPING WATER OUT OR KEEPING WATER IN, a concrete structure can become truly watertight by using engineered waterproofing that incorporates the Sika® Watertight Concrete System. This rigid and integral system includes a full range of concrete admixtures for the production of watertight concrete, a complete spectrum of products for watertight joints as well as design detailing and cost engineering for complex structures.

WATERTIGHT CONCRETE

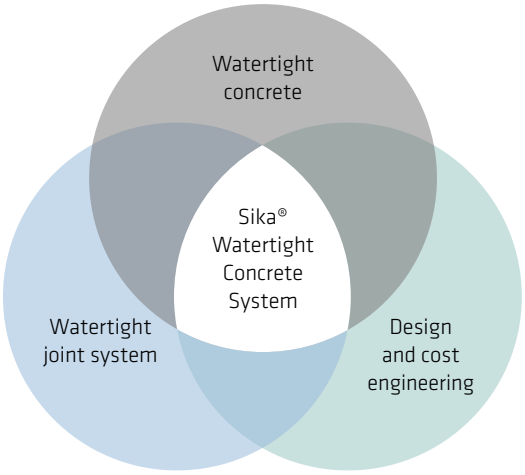
Watertight concrete describes only the concrete that is impermeable to water and is focused on the quality and performance of the product, which has been modified using admixtures such as superplasticisers, pore blockers, capillary crystalline materials and others to achieve its integral watertightness.

WATERTIGHT JOINT SYSTEM

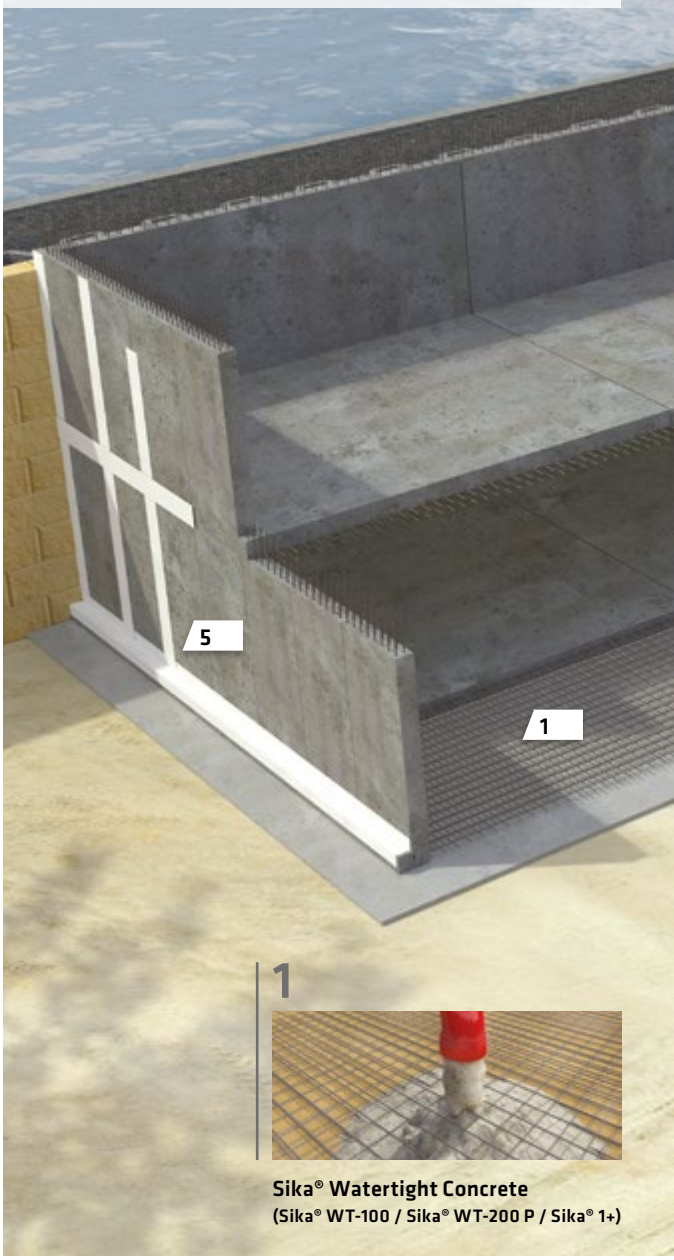
Building a below-ground concrete basement will include various working steps that incorporate construction and movement joints as well as penetrations. All joints and penetrations must have a watertight joint sealing solution.

DESIGN AND COST ENGINEERING

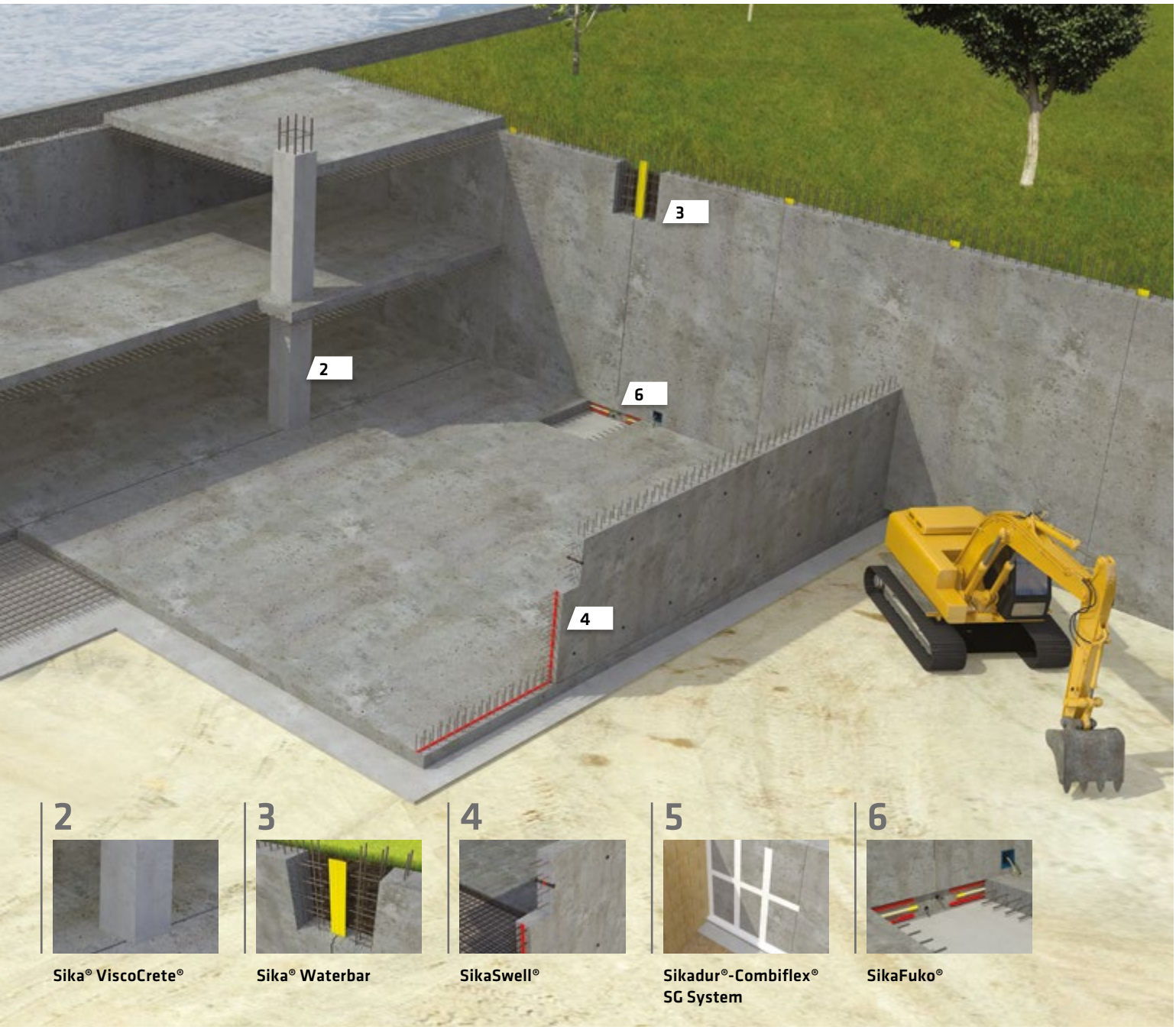
To ensure that the appropriate level of watertightness can be achieved, consideration and guidance for the concrete, the structural design, construction and the concreting works on site must be taken into account.



WATERTIGHT JOINT SYSTEM



Sika® Watertight Concrete
(Sika® WT-100 / Sika® WT-200 P / Sika® 1+)



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Sika® ViscoCrete®

3

Sika® Waterbar

4

SikaSwell®

5

Sikadur®-Combiflex® SG System

6

SikaFuko®

CONCRETE TECHNOLOGY

THE Sika® Watertight CONCRETE SYSTEM HAS CONSTANTLY EVOLVED OVER THE LAST 50 YEARS to incorporate the latest admixture technology. The system is robust in service and simple to produce, and its effectiveness has been proven both by its use in countless projects and through testing by independent bodies such as the British Board of Agrément.

SUSTAINABILITY AND COST OPTIMISATION

The design of concrete is more than just a technical issue. The sourcing of sustainable raw materials which are also cost-effective is essential in today's market and central to the Sika philosophy.

The use of the Sika® Watertight Concrete System is not only cost-effective, but when used in lieu of secondary waterproofing systems eliminates the use of oil-based and other synthetic products such as membranes, greatly reduces waste on site, reduces vehicle movements to site and is 100% recyclable.

PROJECT:

ROYAL SHAKESPEARE THEATRE, STRATFORD-UPON-AVON

The grade II* listed Royal Shakespeare Theatre in Stratford-upon-Avon has undergone a highly successful transformation that greatly enhances the live theatre experience of the audience. As part of the refurbishment, the Sika® Watertight Concrete System was used during the construction of the 7m deep stage basement which is used to create a scenic spectacle on the new main stage.

THE PRINCIPLES OF ACHIEVING WATERTIGHT CONCRETE

EVEN GOOD QUALITY CONCRETE WILL ALLOW THE PASSAGE OF WATER THROUGH IT as a function of capillarity, the volume of capillary pores in concrete is proportional to the water/cement (w/c) ratio.

Incorporating Sika® Watertight Concrete admixtures reduces the w/c ratio whilst producing a highly workable concrete to aid placing and compaction. The remaining capillary pores are blocked using the hydrophobic or crystalline material contained within the watertight concrete admixture.

The Sika® Watertight Concrete System should be obtained from a ready-mixed concrete supplier with a recognised third party accreditation such as BSI or QSRMC.

PROJECT:

BDP STUDIOS, MANCHESTER

The Sika® Watertight Concrete System was chosen to ensure a dry basement for the stunning new BDP (Building Design Partnership) Studios, situated at 11 Ducie Street on the Piccadilly Basin in Manchester. Built right on the water's edge, it was a requirement that the basement should conform to BS 8102:2009 Grade 3, giving a controlled environment capable of storing archives, sensitive materials and computers.

WATERTIGHT CONCRETE

STANDARD CONCRETE IS A NATURALLY-POROUS MATERIAL, because its capillaries are potential migratory paths for water to pass through. Concrete's ability to withstand water penetration, or impermeability, is determined by its binder matrix.

The impermeability of concrete can be improved by adding special components. Active components will form non-soluble materials throughout the pores and capillary structure of the concrete and effectively seal the concrete permanently against the penetration of water and other liquids. In addition there are other special ingredients which can enhance the self-healing properties of concrete and which improve the concrete's ability to heal any cracks that form.

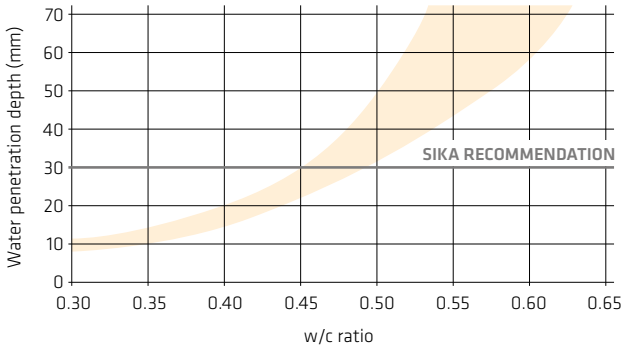
For concrete to be impermeable, the volume of water that penetrates into the concrete structure on one side has to be lower than the volume of water that can evaporate at the opposite side. The water conductivity test is a measurement of this performance.

Different requirements regarding the limitation of water permeability through the concrete must be fulfilled to achieve a watertight concrete.

The most important performance criteria of the concrete are:

- Water penetration depth <30mm
- Water conductivity <6 g/m²/h
- Drying shrinkage <0.05%
- Water absorption
- Self-healing properties

This performance can be enhanced considerably with the use of Sika products.



Sika® Watertight CONCRETE MIX DESIGN AND PROPERTIES

COMPONENTS	DESCRIPTION	EXAMPLE FORMULA
Aggregates	Aggregates for Concrete EN12620	Aggregates for Concrete complying with EN12620
Cement and all cement combinations	CEM I (OPC) EN197-1, GGBS EN15167-1, PFA EN450	Minimum 350 kg/m³
Water	Fresh water	≤0.45
Waterproofing additives	Hydrophobic or crystalline waterproofing additives	WT-100 (WCP): 1 bag per m³. Sika® 1+: 5.25 litres per m³. WT-200: 2 bags per m³ (Note: example dosages are correct at the time of printing)
Concrete admixtures	Plasticiser/Superplasticiser – type dependent on placement method, workability requirements and time	Sika® ViscoCrete® or SikaPlast® or Sikament® or Sika® Plastiment® or Sika® ViscoFlow®
Installation requirements	Curing compound	Subsequent curing to ensure high quality of surfaces using Sikafloor®-ProSeal

PROJECT:

CASTLE QUAY DEVELOPMENT, ST HELIER, JERSEY

The Sika® Watertight Concrete System was a key ingredient in the building of a prestigious new £68 million development constructed by Dandara, on abandoned industrial land, right on the St Helier waterfront in Jersey.

Sika® Metal Waterbar was used in construction joints in the slab as well as the kicker/wall junction. The SikaSwell® joint protection system was used in all other areas.

PRODUCTS USED IN MIX DESIGNS FOR Sika® Watertight CONCRETE

Sika® WT-100

(SIKA® WATERTIGHT CONCRETE POWDER)

Sika® Watertight Concrete Powder is a combined water-resisting and HRWR/Superplasticising admixture, used to enhance the workability of and reduce the water permeability of concrete. The product incorporates Sika® ViscoCrete® Superplasticiser Technology and, depending on material package, will produce watertight concrete at an S3 consistence with a w/c ratio of <0.45 without the addition of a separate HRWR/Superplasticiser.

BENEFITS

- Reduced water absorption
- Reduced water penetration
- Accurate control of w/c ratio
- In combination with a Sika® ViscoCrete® HRWR/Superplasticiser, self-compacting concrete can be produced
- Reduced shrinkage and creep
- Provided in a water-soluble bag for ease of dispensing
- Consistent performance

Sika® WT-200 P

(CRYSTALLINE WATERPROOFING CONCRETE ADMIXTURE)

Sika® WT-200 P is a combined crystalline waterproofing and HRWR/Superplasticising admixture, used to enhance the workability and reduce the water permeability of concrete. The product incorporates Sika® ViscoCrete® Superplasticiser Technology. Sika® WT-200 P consists of a mixture of cements, amino alcohols and fillers. These active materials will form non-soluble materials throughout the pores and capillary structure of the concrete and seal the concrete permanently against penetration of water and other liquids. Watertight concrete can be produced which is suitable for BS 8102:2009 Type B construction (Grades 1-3). Sika® Watertight Concrete Powder meets the requirements of BS EN 934-2 Table 9.

BENEFITS

- Reduced water penetration under pressure
- Accurate control of w/c ratio
- Reduced water absorption
- Enhances self-healing properties of the concrete
- In combination with a Sika® ViscoCrete® HRWR/Superplasticiser, SCC can be produced
- Improved resistance against chemical attack
- Reduced shrinkage and creep
- Consistent performance
- Reduced vapour transmission
- Provided in a water-soluble bag for ease of dispensing

Sika® 1+

(LIQUID WATERPROOFING ADMIXTURE)

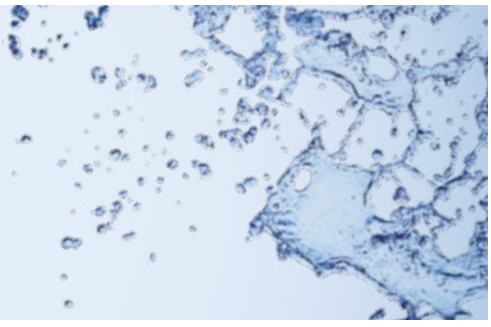
Sika® 1+ is a liquid water-resisting admixture used to reduce the water permeability of concrete. Used in combination with Sika® ViscoCrete® Superplasticiser Technology, watertight concrete can be produced which conforms to BS 8102:2009 Type B construction (Grades 1-3).

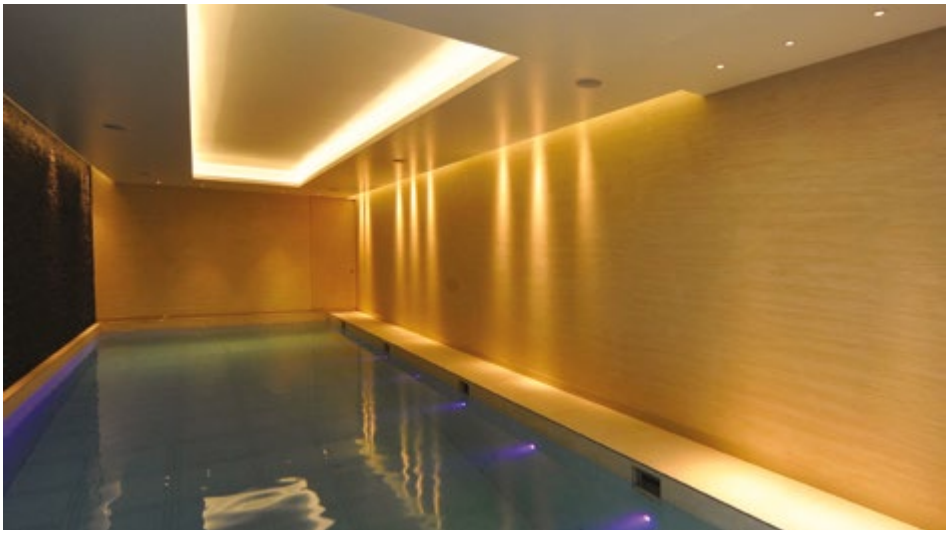
BENEFITS

- Suitable for large concrete pours
- Reduced water absorption
- Reduced water penetration
- Accurate control of w/c ratio
- In combination with a Sika® ViscoCrete® HRWR/Superplasticiser, self-compacting concrete can be produced
- Reduced shrinkage and creep
- Provided in bulk IBCs
- Consistent performance

Our guarantees are watertight...

- **15-year guarantee** when used as a single system.
- **20-year guarantee** when used in a dual system in conjunction with SikaProof® membrane.





PROJECT:

UNDERGROUND MANSION, KENSINGTON

The Sika® Watertight Concrete System enabled A P Arcon Construction to build an exciting partly subterranean mansion, on a strip of previously vacant land between two existing buildings in Kensington. The main living, entertainment and swimming pool areas are all underground.

PROJECT:

CANADA WATER LIBRARY, SOUTHWARK

The £14 million Canada Water Library, opened in 2011 by Southwark Council on the edge of the Canada Water Basin, has a basement constructed using the Sika® Watertight Concrete System.

The basement, which houses various items of plant and water tanks, needed to be protected from water ingress from both a high water table and its position close to the water's edge.

JOINT SEALING – CONSTRUCTION JOINT

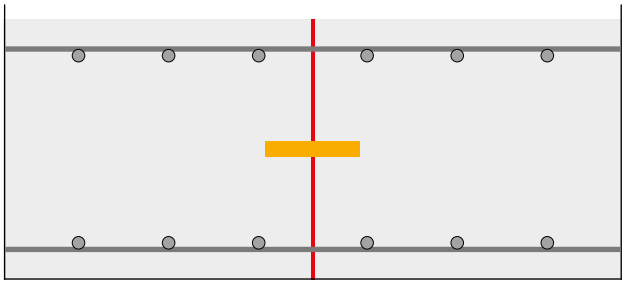
DUE TO THE NATURE OF CONCRETE AND REINFORCED CONCRETE, structures must always be built divided into sections by forming joints. Waterstops are necessary products used for the sealing of construction joints (construction or day-work joints).

Waterstops should be used to prevent water transmission at joints, and must be installed in all joints to produce a closed joint sealing system.

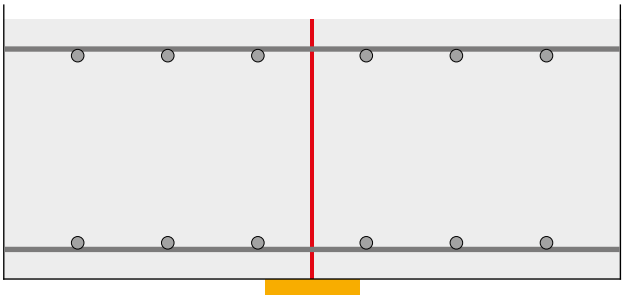
There are a range of waterstops available for different requirements, tested and approved to meet local regulations and specifications:

- Hydrophilic Gaskets (profiles and sealants)
- Thermoplastic Waterbars
- Adhesive Tapes
- Injection Hose Systems

CONSTRUCTION JOINT WATERSTOP – INTERNAL



CONSTRUCTION JOINT WATERSTOP – EXTERNAL



The positioning of the waterstop should be appropriate for the method of construction and the risk level.

PRODUCTS USED FOR THE SEALING OF CONSTRUCTION JOINTS

HYDROPHILIC GASKET – INTERNAL

SikaSwell®
- Highly economical
- No influence on formwork or reinforcement
- Can be used as a back-up system
- Tested and approved system
- Alternative profiles available for different requirements

ADHESIVE TAPE – EXTERNAL

Sikadur®-Combiflex® SG System
- Approved for the use in contact with drinking water
- Easily adaptable to the construction method
- Excellent adhesion to different substrates

THERMOPLASTIC WATERBAR – INTERNAL/EXTERNAL

Sika® Waterbar
- Easy design of closed systems for construction and expansion joints
- Easy connections by welding
- Pre-fabricated waterstop systems are possible
- Internal and external waterstops available

INJECTION HOSE SYSTEM – INTERNAL

SikaFuko®
- Suitable for complex situations
- No influence on formwork or reinforcement
- Can be used as a stand-alone or back-up system
- A good injection fills the complete joint and prevents any entry of water
- Re-injectable systems

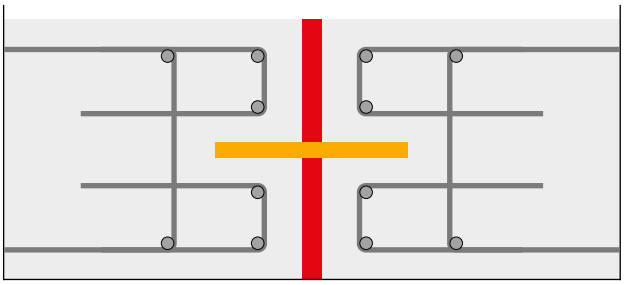
JOINT SEALING – MOVEMENT JOINT

SPECIAL ATTENTION SHOULD BE GIVEN to the use of waterstops at movement joints. Movement joints are necessary because of movement in the structure as a result of settlement, traffic loads, shrinkage or other causes.

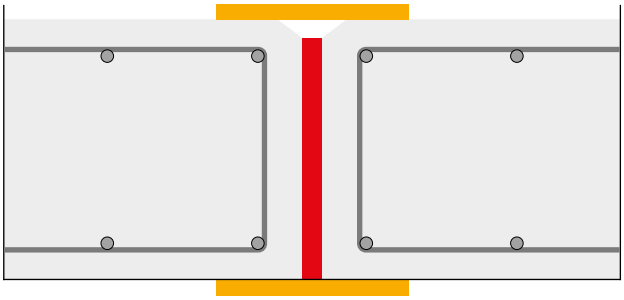
In addition to the function of the waterstops to act as a waterproofing seal in the joint, the waterstop should allow the sections to move independently of each other – without restriction and free from tension.

Construction and movement (expansion) waterstops must create a closed waterproofing system. For sealing and waterproofing of the concrete structure, waterstops are installed in all of these types of joints.

EXPANSION JOINT WATERSTOP – INTERNAL



EXPANSION JOINT WATERSTOP – EXTERNAL



Where internal waterstops are used, correct fixing is essential to keep the waterstops in place during the concreting operations. Good compaction of the concrete around the waterstops is also necessary to avoid paths for water ingress.

PROJECT:

THE PODS, SCUNTHORPE

Sika® Watertight Concrete was used on The Pods, a high quality, futuristic leisure centre that opened in Scunthorpe in 2011. Constructed by Bowmer and Kirkland for North Lincolnshire Council, this unique structure is made up with a collection of five giant timber framed domes. It replaces the 27 year old Scunthorpe Leisure Centre.

The £21 million facility boasts a 25m swimming pool, a training pool, state-of-the-art gym, dance studio, six multi-use sports halls, café and crèche. The filter/plant room is constructed using Sika® Watertight Concrete, to ensure total watertightness.

WATERPROOFING DETAILS – PENETRATIONS, ISOLATION JOINTS, FORM SPACERS

ENGINEERED WATERPROOFING is all about the details. Therefore, details such as sealing around formwork spacers, service entries, isolation joints between different material and pipe penetrations also have to be considered.

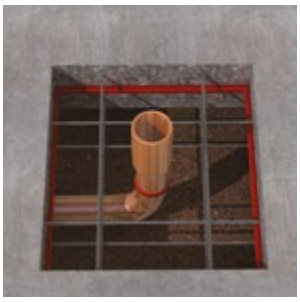
Very effective solutions to seal such details are SikaSwell® swellable profiles and sealants. The SikaSwell® products develop an expansive swelling pressure between the expanding SikaSwell® and the surrounding concrete structure. This blocks the penetration of water through the joint and provides a durable waterproofing solution.

SikaSwell® PRODUCTS USED FOR WATERPROOFING DETAILS

FORMWORK SPACERS

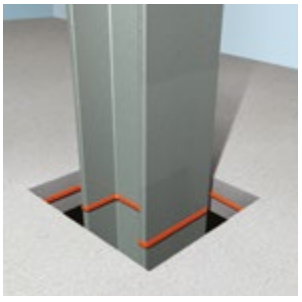
X-Plugs and SikaSwell® Rings are an easy and secure way of sealing around all types of formwork spacers. Different sizes are available for most common spacers. The SikaSwell® Ring seals around the outside of the spacer while the X-Plug seals the inner side.

PENETRATIONS



Waterproofing details are required at all types of penetrations. The SikaSwell® system using sealants and different-sized profiles can meet many different requirements.

ISOLATION JOINTS



SikaSwell® can seal the isolation joints between different materials very easily. It can be bonded to many different substrates as well as concrete, including stone, metals and many plastics.

There are different materials, products and methods used to seal the waterproofing details. Besides the swellable products, the post-applied bonded tape Sikadur®-Combiflex® SG System is a reliable and easy-to-apply sealing solution for such details and creates a closed waterproofing system.

The Sikadur®-Combiflex® SG System is adjustable to different detailing, and highly flexible; therefore it can be used here as well as for sealing construction and movement joints, especially, for waterproofing details such as penetrations and connection joints between precast concrete elements.

Sikadur®-Combiflex® SG SYSTEM USED FOR WATERPROOFING DETAILS

PENETRATIONS

All penetrations such as service entries or pipe penetrations must be sealed to create a closed sealing system. The Sikadur®-Combiflex® SG System can be used as a post-applied system to secure such areas and seal them durably.

CONNECTION JOINTS

Connection joints between precast concrete elements need to be sealed after installation of the individual segments. In addition, all transitions/connections to in situ concrete must be sealed – typically using the Sikadur®-Combiflex® SG System.

SIKA SUPPORT

DESIGN SUPPORT

- Selection of appropriate concept and system solutions
- Concrete mix design and control
- Engineering details, custom solutions
- Cost/performance/life-cycle analysis

SPECIFICATION SUPPORT

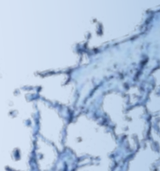
- Specifications and method statements
- Detail drawings including CAD and 3D
- Watertight guarantee concepts

SITE SUPPORT

- Concrete laboratories (including mobile units)
- Application training on site
- Troubleshooting
- Quality control procedures
- Registered contractor scheme

MAINTENANCE SUPPORT

- Maintenance manuals
- Refurbishment systems
- Repair and refurbishment documentation
- Site inspection and refurbishment proposals
- Approved contractor scheme



PROJECT:
THE PODS,
SCUNTHORPE

SIKA FULL RANGE SOLUTIONS FOR CONSTRUCTION:

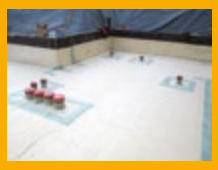
LIQUID APPLIED ROOFING

SINGLE PLY ROOFING

CONCRETE

CONCRETE REPAIR

STRUCTURAL STRENGTHENING



WATERPROOFING

JOINT SEALING

FAÇADE STRUCTURAL ADHESIVES

FLOORING

INDUSTRY

DISTRIBUTION

BUILDING TRUST

FOR MORE INFORMATION:

Visit **www.sikawaterproofing.co.uk**

WHO WE ARE

Sika Limited and Sika Ireland Limited are part of the global Sika Group, specialising in the manufacture and supply of chemical based products. Sika have a leading position in the development and production of systems and products for bonding, sealing, damping, reinforcing, and protecting in the building sector and the motor vehicle industry. Sika has subsidiaries in 101 countries around the world and manufactures in over 200 factories. With more than 20,000 employees Sika generates annual sales of CHF 7.09 billion (£5.45bn). We are also committed to providing quality, service, safety and environmental care.

In the UK and Ireland, we provide market-leading solutions for concrete, waterproofing, roofing, flooring, refurbishment, sealing & bonding, and industry, and have manufacturing sites in Welwyn Garden City, Preston, Leeds and Dublin with more than 870 employees and a turnover of more than £260 million.

SYSTEM CERTIFICATION ISO 9001 SGS SYSTEM CERTIFICATION ISO 14001 SGS SYSTEM CERTIFICATION OHSAS 18001 SGS

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BUILDING TRUST

CONCRETE AND WATERPROOFING/SIKA WATERTIGHT CONCRETE INDIVIDUAL BROCHURE MARCH 2019
WP/2k/October2016