



Sika[®] and Tricosal[®] Waterstops For the Waterproofing of Expansion and Construction Joints



Innovation & Consistency | since 1910





Watertight Jointing Technology and Concepts with Sika® and Tricosal® Waterstop Systems

Sika was originally founded in 1910 by Kaspar Winkler in Switzerland. The company has grown to become one of the world's leading suppliers of construction chemicals, with the focus on complete and integrated system solutions. Sika has now extended its operations to more than 70 countries around the world with our international network of R&D, production and marketing organisations. In 2008 Sika acquired the well known Tricosal business which was founded in 1916 and based in Germany. Tricosal is also internationally renowned, particularly for its expertise and experience in the development, production and installation of watertight jointing products and systems, always focussed on providing the optimised sealing solutions.

Now you benefit from the combination of Sika and Tricosal expertise and experience.

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Sika® and Tricosal® Waterstops

High Quality Joint Waterproofing Solutions



Introduction

Sika and Tricosal have unrivalled experience of waterproofing all types of expansion and construction joints in reinforced concrete structures. Our continuous research and development also ensure the application of the latest available technologies in waterproofing, especially to modern methods of concrete construction and requirements. Providing cost effective, economic and reliably secure solutions for our customers is our priority. Due to the nature of these materials, concrete and reinforced concrete structures must always be built divided into sections, by forming joints – construction (daywork and isolation) joints and/or expansion (movement) joints.

For sealing and waterproofing of the concrete structure, waterstops are installed in all of these necessary joints. The selection of the right waterstop material, its overall waterproofing concept, design and profiles are dependent on the specific structure, its exposure and the construction process.

The functions of these waterstops are primarily to act as a waterproofing seal in the joint, plus to allow the two sections to move independently of each other – without restriction (free of tension).

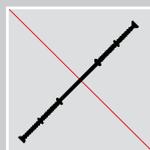
Key Advantages

- 50 years' technical and application experience
- Many different applications
- Alternative materials dependent on the requirements
- Alternative sizes and profiles
- Individual and customized solutions
- High performance sealing systems

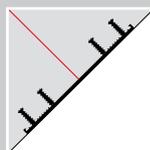
Sika® and Tricosal® Waterstops – Typical Applications

For Construction and Expansion Joints, all Types of Joints in Transitions, Connections and Special Applications

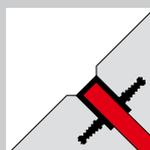
Construction joint waterstops, internal



Construction joint waterstops, external



Waterstops for capping joints



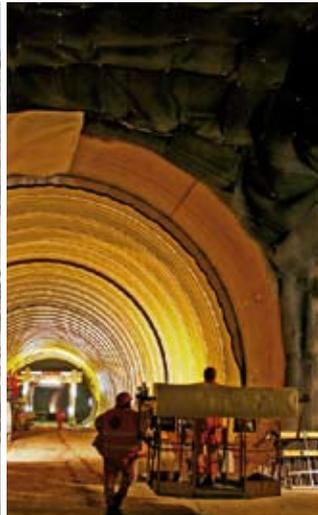
Sika® and Tricosal® Waterstops

Typical Applications in Different Types of Structures



Basements

Sika® and **Tricosal®** waterstops are the easy and economic way of expansion and construction joint sealing.



Infrastructure

For major civil engineering structures and their intersections with high exposure and performance demands; **Sika®** and **Tricosal®** waterstops are the ideal method of ensuring watertight joint sealing and waterproofing.



Water Tanks

Special **Sika®** and **Tricosal®** waterstops have been developed and approved for tank and service reservoir joint sealing in contact with potable water. These have proven durability and guarantee the consumer top quality drinking water.



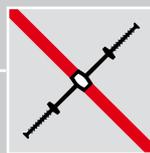
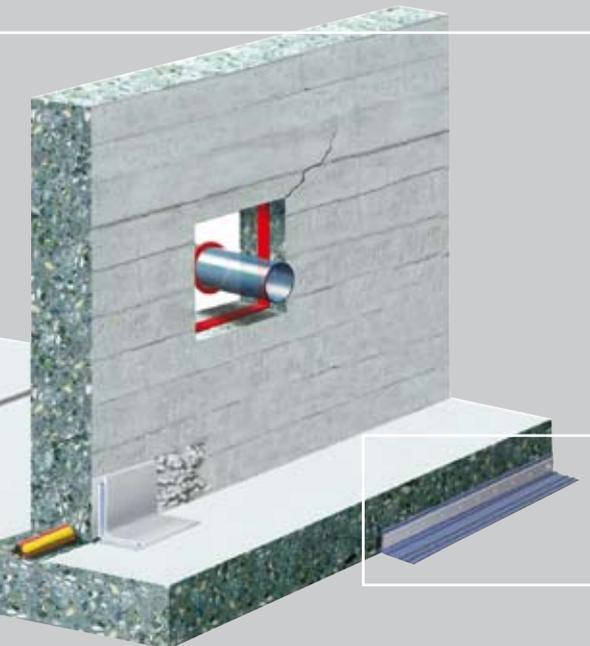
Industrial Facilities

The high chemical resistance of the **Sika® Tricosal® Westec®** waterstop series, provides the necessary high security for all types of processing and containment structures, which also ensures protection of the environment.

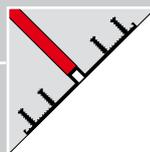


Refurbishment

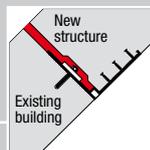
Sika® and **Tricosal®** waterstops can also be installed during refurbishment and extension works i.e. between new and existing structures. Flanged Waterstops are perfect for sealing all types of these difficult construction and expansion joints.



Expansion joint waterstops, internal

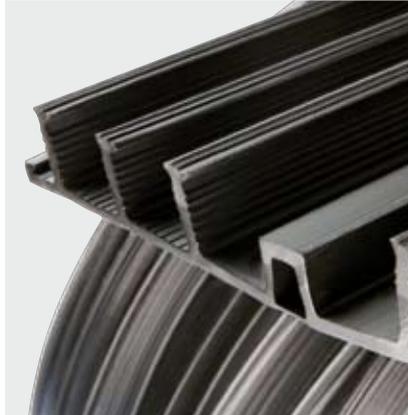


Expansion joint waterstops, external



Flanged waterstops for connecting new to existing structures

Types of Joints



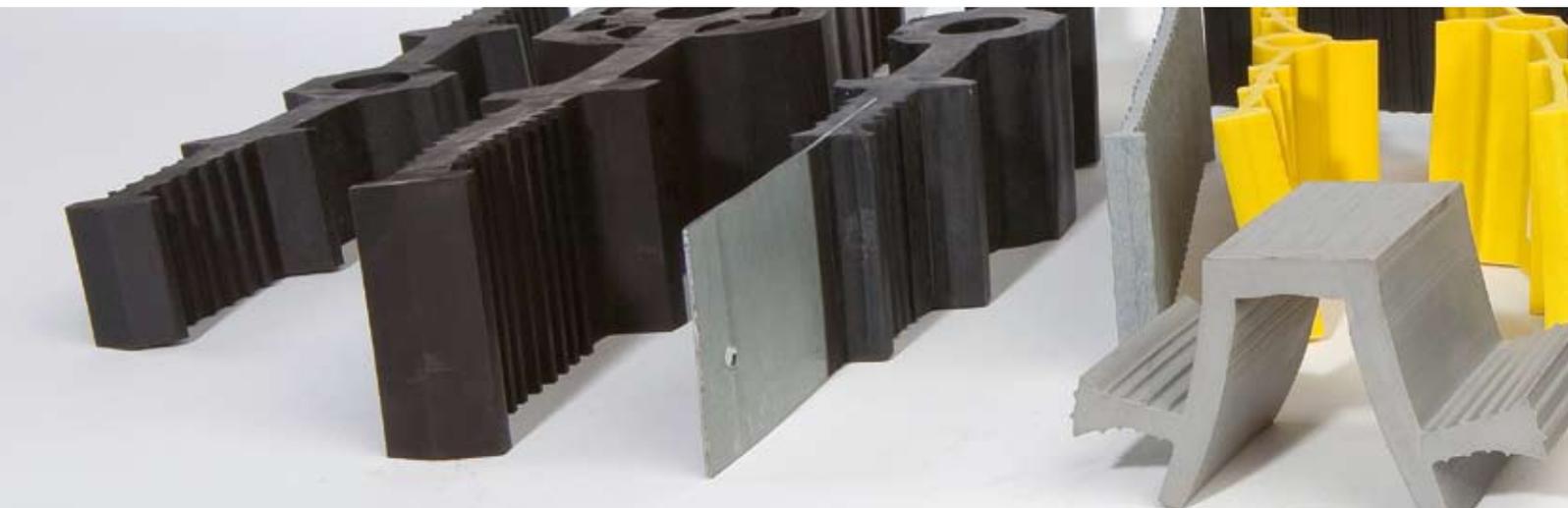
Type of Joint	Type of Waterstop	
Expansion Joints	<p>Expansion joint waterstop, internal</p>	<p>Waterstop for capping joint</p> <p>Expansion joint waterstop, external</p>
	<p>Construction joint waterstop, internal</p>	<p>Construction joint waterstop, external</p>
Special Joints	<p>Joint with big width</p> <p>Expansion joint waterstop with encased centre-bulb, internal</p>	<p>Pressed joint</p> <p>Expansion joint waterstop with encased centre-bulb, internal</p>
	Shrinkage crack joint	Sealing element for reduction of cross section, e.g. crack inducer

Waterstop Design and Function



Type of waterstop	Design and Function
Expansion joint waterstop, internal	
Expansion joint waterstop with steel plates, internal	
Expansion joint waterstop, external	
Waterstop for capping joints	

Alternative Materials for Waterstops



Introduction

Waterstops are available in different materials and qualities. The anticipated loading, i.e. the water pressure and movement, will determine the selection of the appropriate material, its quality and design. A securely closed solution for all of the expansion and construction joints must be achieved to achieve a watertight structure. Our engineers and technicians will assist you to find the right sealing system solution for your structure. We have the largest available range of joint sealing and waterproofing products, including many special jointing solutions. This ensures customized sealing system solutions for different technical, practical and economic requirements.

Base colours of Sika® and Tricosal® Waterstops:

Sika® Waterbar PVC-P waterstops:

for construction joints black

for expansion joints yellow

Tricosal® Tricomer® waterstops: black

Tricosal® Elastomer waterstops: black

Sika® Waterbar TPO waterstops: grey

Material	Quality	Tests to DIN	Joining technique
PVC-P	Not bitumen resistant	standard quality	welding
Tricomer®	Bitumen resistant	DIN 18541	welding
Elastomer	Standard quality SBR, other qualities on request	DIN 7865	vulcanisation
TPO	Thermoplastic Polyolefin of high flexibility	as Sikaplan® TPO membranes	welding

Sika® Waterbar PVC-P

Widely Tested and Approved

This material has many excellent properties for waterstops and also allows cost effective solutions. It has been in use with an outstanding track record for more than 70 years.

Sika® Waterbar PVC-P based waterstops are resistant against naturally occurring acidic and alkaline ground water, resistant to ageing, and suitable for totally homogeneous welding off and on site.

The following grades are available:

- Standard quality waterstops, not resistant to bitumen

Sika® Waterbar's connected by welding. (s. pages 46/47)

Physical Properties (standard test specification)			
No.	Property	Tests to DIN	NB
1	Tensile strength in N/mm ²	53455	≥10
2	Elongation at break in %		
	Waterstops for construction joints	53455	≥200
	Waterstops for expansion joints	53455	≥300
3	Shore-A-Hardness	53505	70±5
	Only type Forte	53505	80±5



Tricosal® Tricomer®

Produced in accordance with the requirements of DIN 18541

Tricomer® is a combination of PVC-P and NBR (nitrile butadiene rubber) compounds. This special polymer was developed and modified in our laboratories to meet DIN requirements.

The **Tricosal® Tricomer®** material has now been used successfully for nearly 30 years in the secure waterproofing of joints in concrete structures.

Tricosal® Tricomer® based products have a high elongation at break, excellent resistance to chemicals and ageing, together with a constant elasticity similar to rubber elastomers. It is used where a higher performance of the structure and the joint waterproofing is required.

The **Tricosal® Tricomer®** waterstops are connected by thermo-plastic welding which makes them easy and practical to use. (s. pages 46/47)

Tricosal® Tricomer® waterstops are produced in the grade BV (bitumen resistant according to DIN 18541).

Physical Properties (DIN 18541 Part 2)			
No.	Property	DIN Standard	Tricomer BV
1	Tensile strength in N/mm ²	53455	≥10
2	Elongation at break in %	53455	≥350
3	Shore-A-Hardness	53505	67±5
4	Tear strength in N/mm ²	53507	≥12
5	Behaviour at low temperatures (-20 °C), Elongation at break in N/mm ²	53455	≥200
6	Behaviour after storage on bitumen (28 days / 70 °C) Change in %: Tensile strength Elongation at break Modulus of elasticity	53455 53455 53455	≥±20 ≥±20 ≥±50

Tricosal® Elastomer

Produced in accordance with the requirements of DIN 7865

An Elastomer is an artificial rubber compound based on long chain polymers, cross linked to control their shape and deformation / movement under stress possibilities, by vulcanising them.

Their production process is non-reversible, therefore a special jointing process is also required.

Tricosal® Elastomer waterstops (internal and external types) are used for structures with large potential joint movement, frequent load changes and/ or low temperature exposure, as well as for resistance to very high water pressures.

The visible surface of the **Tricosal®** Elastomer FAE capping joint profiles have a grey cover plate. The profiles are manufactured from a UV-stable elastomer compound to suit this type of application.

Tricosal® Elastomer waterstops are connected by vulcanising. (see pages 48/49)

Physical Properties (DIN 7865 Part 2)			
No.	Property	DIN Standard	Performance level
1	Tensile Strength in N/mm ²	53504	≥10
2	Elongation at break in %	53504	≥380
3	Shore-A-Hardness	53505	62±5
4	Tear Strength in N/mm ²	53507	≥8
5	Behaviour at low temperatures (-20 °C), Shore-A-Hardness	53505	≥90
6	Dimensional stability when exposed to hot bitumen	7865	No change in shape
7	Metal adhesion	7865	Structural fracture in the Elastomer

Selection of the Correct Waterstops – Sika® Waterbar



Introduction

Waterstops are used for the waterproof sealing of construction and expansion joints against water penetration from percolating ground water and water under hydrostatic pressure, as well as for surface / end capping joints.

Joint waterstops in combination with watertight concrete construction techniques must ensure the watertightness of the whole structure. There are standard international or national design standards and requirements which must always be complied with and maintained.

The correct selection of the most suitable expansion and construction joint waterstops is determined primarily by the anticipated water pressure, joint movement requirements and the exposure of the joint waterstop.

The maximum design water pressure resistance for each waterstop is given in the following tables; these are indicative figures based on our experience and subject, to the correct embedding of the waterstop into the concrete structure. The nominal width of the joints should normally be 20 mm to 30 mm, dependent on the specific waterstop and profile to be used.



Waterstops for Expansion Joints	Water pressure [m]	Movement [mm]	
		Expansion	Shear
Internal:			
Sika® Waterbar 0-20 L	5	10	5
Sika® Waterbar 0-25 L	5	10	10
	10	5	5
Sika® Waterbar 0-32 L	10	10	10
	15	5	5

Waterstops for Expansion Joints	Water pressure [m]	Movement [mm]	
		Expansion	Shear
Internal:			
Sika® Waterbar DK-19	5	10	10
Sika® Waterbar DK-24	5	10	15
	15	10	10
Sika® Waterbar 0-15	2	10	5
Sika® Waterbar 0-20	5	10	10
Sika® Waterbar 0-22	10	10	10
Sika® Waterbar 0-25	5	10	15
	15	10	10
Sika® Waterbar 0-32	10	10	15
	20	10	5
External:			
Sika® Waterbar DR-21	2	10	5
Sika® Waterbar DR-26	5	10	5
Sika® Waterbar DR-29	8	10	10
Sika® Waterbar DR-32	10	10	10

Waterstops for Construction Joints	Water pressure [m]	Movement [mm]
Internal:		
Sika® Waterbar AK-19	5	no anticipated movement ~ 3 mm
Sika® Waterbar AK-24	15	
Sika® Waterbar V-15	5	
Sika® Waterbar V-20	12	
Sika® Waterbar V-24	15	
Sika® Waterbar V-32	25	
External:		
Sika® Waterbar AR-20	2	no anticipated movement ~ 3 mm
Sika® Waterbar AR-25	5	
Sika® Waterbar AR-28	8	
Sika® Waterbar AR-31	10	
Sika® Waterbar AR-50	25	

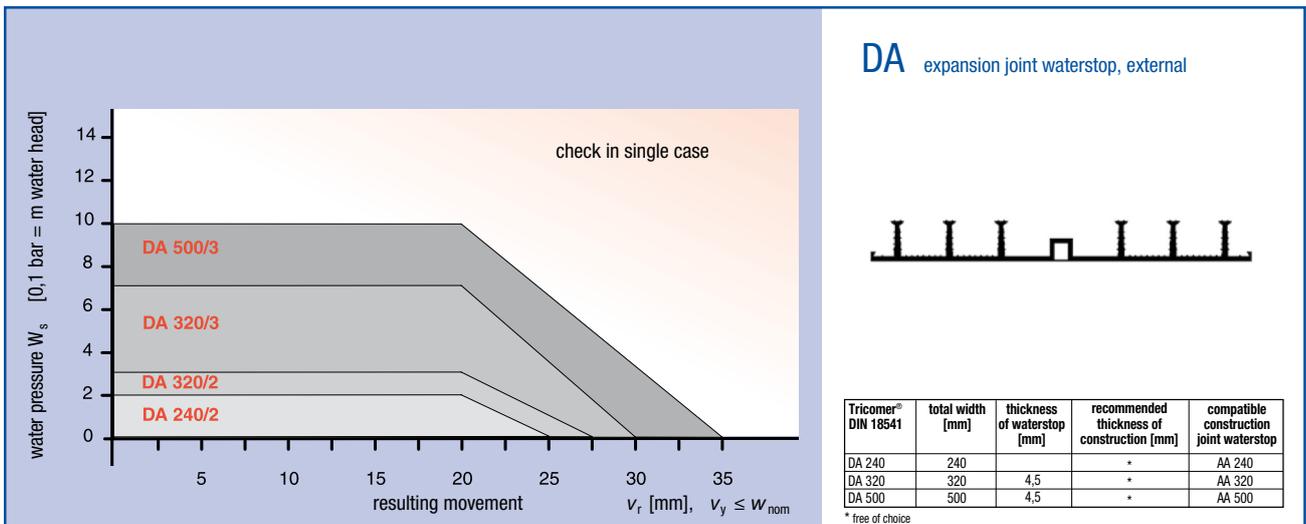
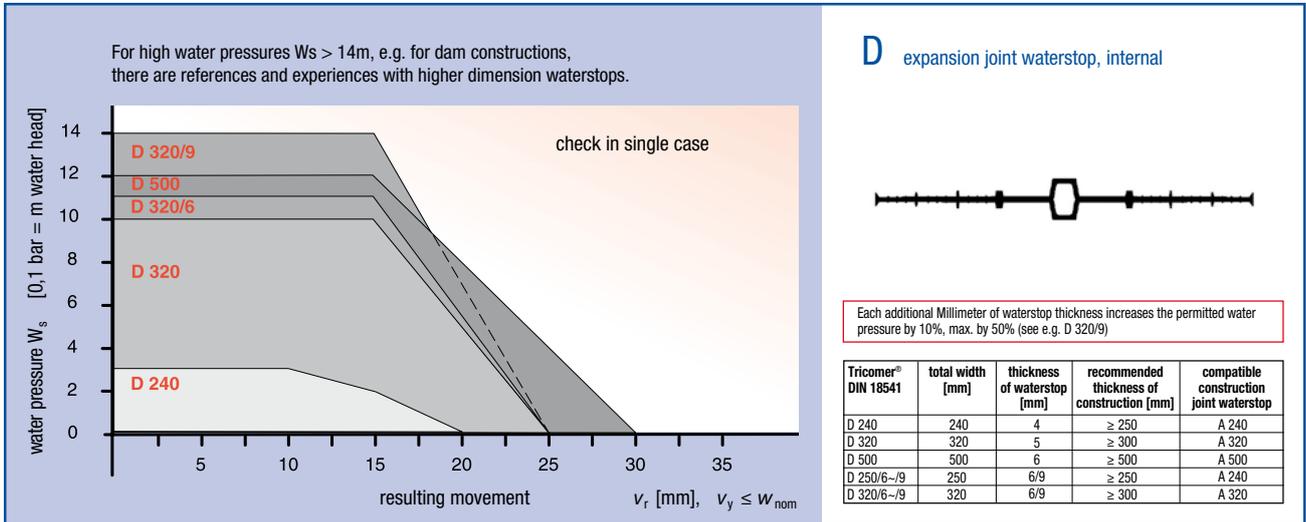


Waterstop Selection in Accordance with DIN V 18197 Tricosal® Waterstops

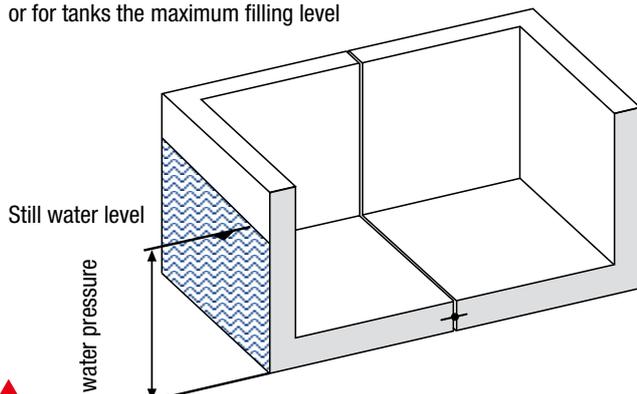
Tricosal® Tricomer® waterstops are produced according to DIN 18541.

The **Tricosal® Tricomer®** based waterstops generally have a higher performance than PVC-P waterstops.

If the waterstop specification is to be in accordance with DIN V 18197, then the following product selection tables should be used:

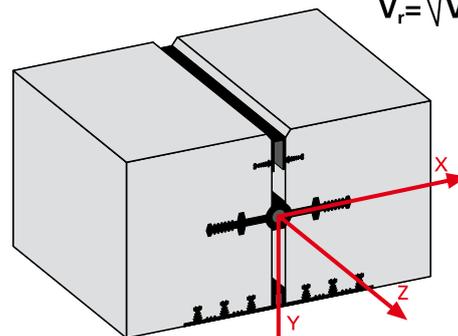


Ground water level:
The highest anticipated ground water or flood level,
or for tanks the maximum filling level



The resulting load and movement v_r :

$$V_r = \sqrt{V_x^2 + V_y^2 + V_z^2}$$



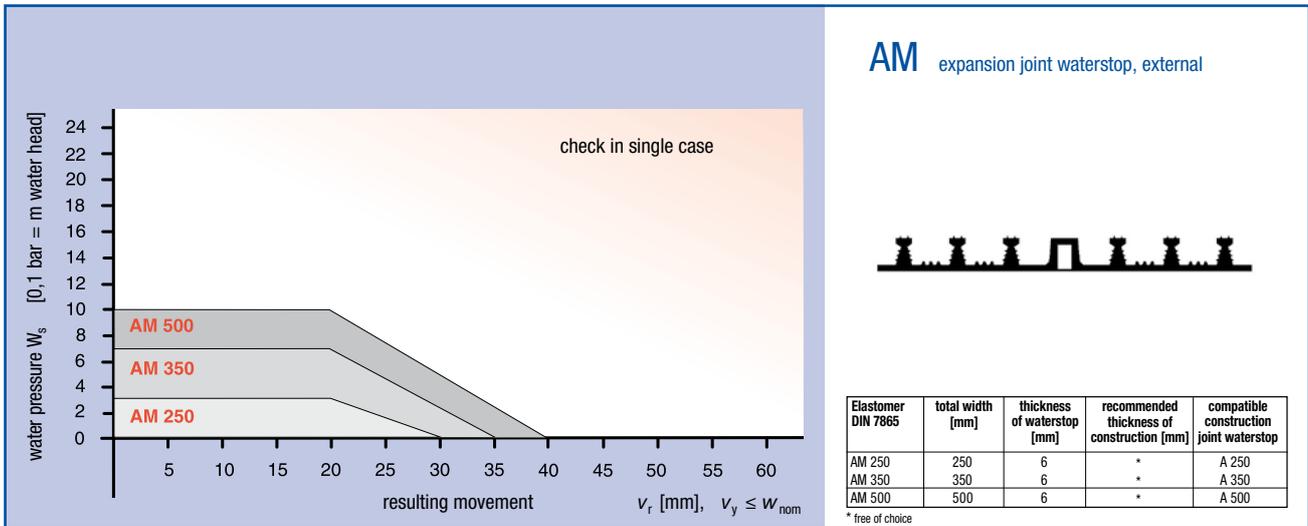
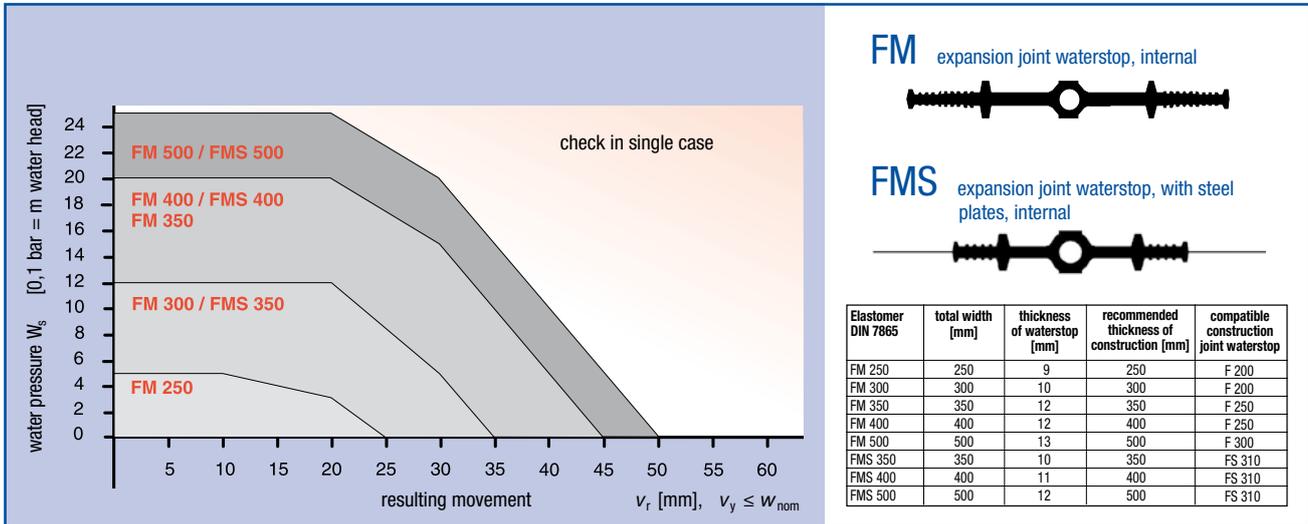
v_r = resulting movement
 v_y = deformation in y-axis

v_x = deformation in x-axis
 v_z = deformation in z-axis

Tricosal® Elastomer waterstops are produced according to DIN 7865.

Tricosal® Elastomer waterstops generally have an even higher performance than the **Tricosal**® **Tricomer**® waterstops.

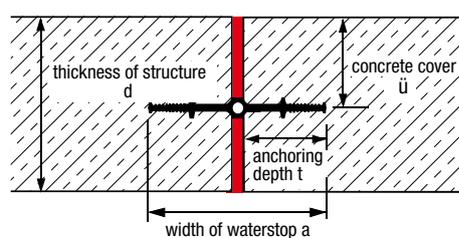
If the waterstop specification is to be in accordance with DIN V 18197, then the following product selection tables should be used:



Waterstop	Design/type	Width of joint w_{nom}
	FM, FMS/DA	20 – 30 mm
	FAE/FA	
	AM, DA	20 mm

These selection graphs are based on the initial joint width (w_{nom})

- w_{nom} 20 – 30 mm for internal expansion joint waterstops and waterstops for capping joints
- w_{nom} 20 mm for external expansion joint waterstops



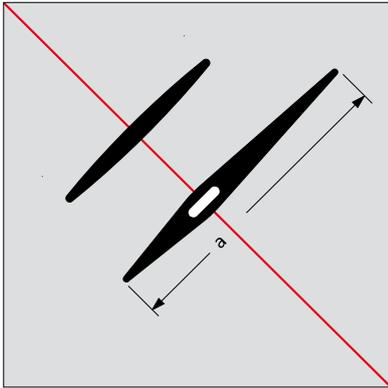
Concrete cover:

anchorage depth $t \leq$ concrete cover \ddot{u}

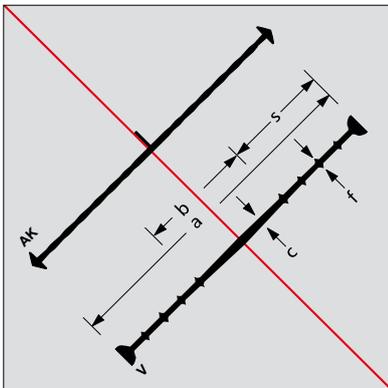
thickness of structure $d \geq$ total width of waterstop a

following DIN V 18197: thickness of structure $d \geq$ 30 cm for waterstop D 320

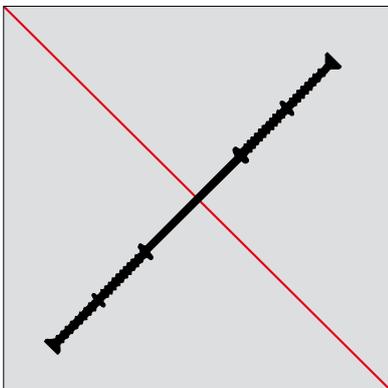
Construction Joint Waterstops – Internal



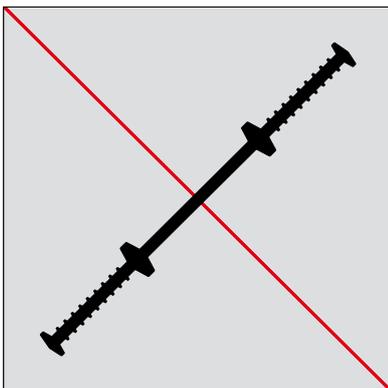
PVC-P	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Height of anchoring ribs
		a	b	c	s	f
Sika® Waterbar SI 80	175886	80	–	–	–	–
Sika® Waterbar SI 120	175887	120	–	–	–	–



PVC-P	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Height of anchoring ribs
		a	b	c	s	f
Sika® Waterbar AK 19	53283	190	30	3	80	16
Sika® Waterbar AK 24	53284	240	30	4	105	16
Sika® Waterbar V-15	5559	150	60	5	45	12
Sika® Waterbar V-20	5557	200	68	7	66	13
Sika® Waterbar V-24	5556	240	80	4	80	15
Sika® Waterbar V-32	8287	320	113	5,5	113	15

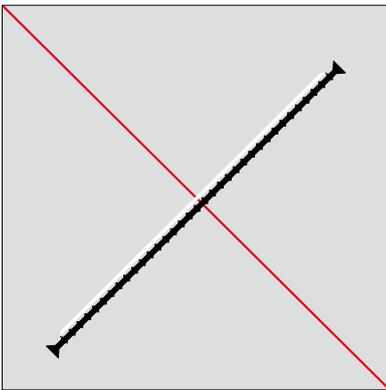


Tricomer® DIN 18541	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Height of anchoring ribs
		a	b	c	s	f
Tricosal® A 190 Tricomer®	176001	190	75	3,5	57,5	15
Tricosal® A 240 Tricomer®	176002	240	85	4	77,5	15
Tricosal® A 320 Tricomer®	176003	320	110	5	105	15



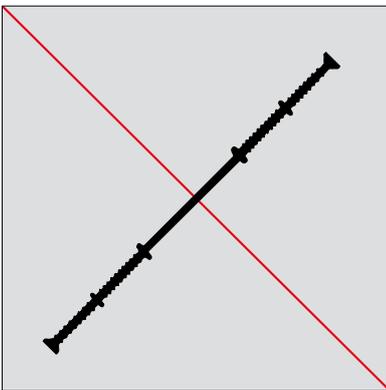
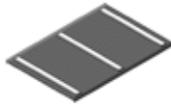
Elastomer (Rubber) DIN 7865	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Height of anchoring ribs
		a	b	c	s	f
Tricosal® F 200 Elastomer	175754	200	75	7	62,5	32
Tricosal® F 250 Elastomer	175755	250	80	8	85	32
Tricosal® F 300 Elastomer	175756	300	100	8	100	32

Construction Joint Waterstops – Internal Special Types



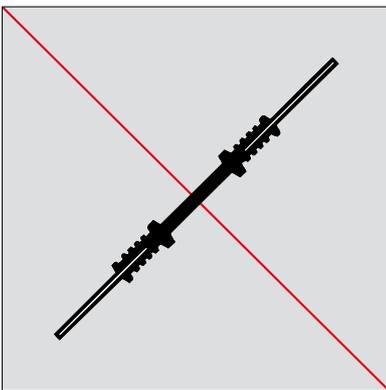
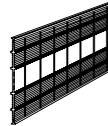
PVC-P	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Height of anchoring ribs
		a	b	c	s	f
Sika® Waterbar Forte 15	8750	150	–	3	–	10
Sika® Waterbar Forte 24	53335	240	–	3	–	10
Sika® Waterbar Forte 32	53337	320	–	3,5	–	11

Construction joint waterstops, externally reinforced with rigid PVC bars



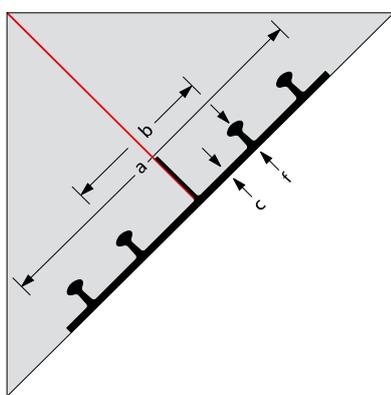
PVC-P	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Height of anchoring ribs
		a	b	c	s	f
Sika® Waterbar Fix 20	176343	200	70	3,5	65	15
Sika® Waterbar Fix 24	176344	240	80	3,5	80	15
Sika® Waterbar Fix 32	176345	320	100	4	110	15

Construction joint waterstops, with internal steel bar reinforcement

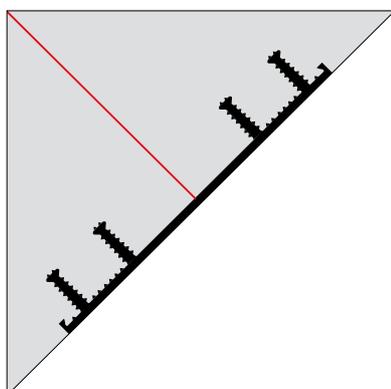


Elastomer DIN 7865	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Height of anchoring ribs
		a	b	c	s	f
Tricosal® FS 310 Elastomer	175788	310	80	8	115	22

Construction Joint Waterstops – External

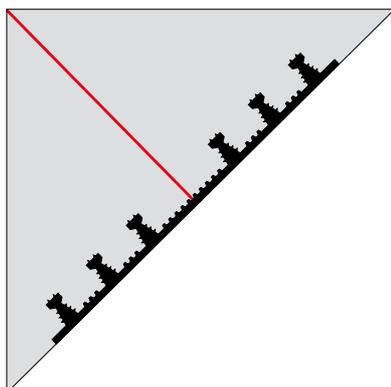


PVC-P	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
					f	N
Sika® Waterbar AR-20	5561	200	80	3,5	19,5	4
Sika® Waterbar AR-25	5560	250	105	3,5	19,5	4
Sika® Waterbar AR-28	5563	280	80	3,5	19,5	6
Sika® Waterbar AR-31	5562	310	90	4	20	6
Sika® Waterbar AR-50	53308	500	50	3,5	19,6	8



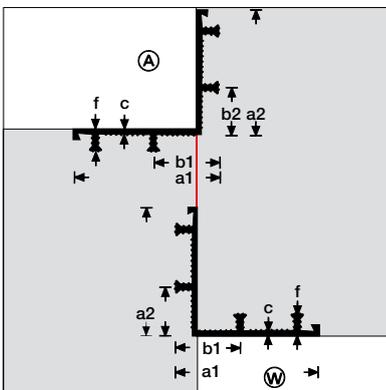
Tricomer® DIN 18541	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
					f	N
Tricosal® AA 240 Tricomer®	176049	240	90	4,5	20	4
Tricosal® AA 320 Tricomer®	176051	330	104	4,5	20	6

Other geometries available on request



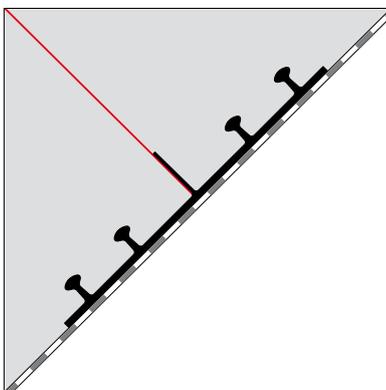
Elastomer (Rubber) DIN 7865	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
					f	N
Tricosal® A 250 Elastomer	175739	250	100	6	31	4
Tricosal® A 350 Elastomer	175741	350	100	6	31	6
Tricosal® A 500 Elastomer	175743	500	150	6	31	8

Construction Joint Waterstops – External Special Types



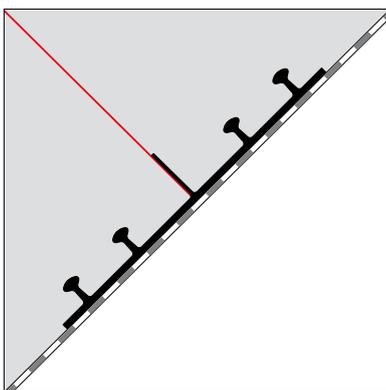
Tricomer® DIN 18541 Part 2	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
					a1/a2	b1/b2
Tricosal® AA 240 edge A Tricomer®	176058	136/120	61/45	4.5	30	4
Tricosal® AA 240 edge W Tricomer®	176059	136/120	61/45	4.5	30	4
Tricosal® AA 320 edge A Tricomer®	176061	181/165	68/52	4.5	30	6
Tricosal® AA 320 edge W Tricomer®	176062	181/165	68/52	4.5	30	6

A = external anchors
W = internal/external anchors



PVC-P	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
					a	b
Sika® Waterbar AR-20	5561	200	80	3,5	19,5	4
Sika® Waterbar AR-25	5560	250	105	3,5	19,5	4
Sika® Waterbar AR-31	5562	310	90	4	20	6
Sika® Waterbar AR-40*	61760	400	86	4	30	6
Sika® Waterbar AR-50*	107275	500	120	4	34	6
Sika® Waterbar AR-60*	61929	600	220	4	34	6

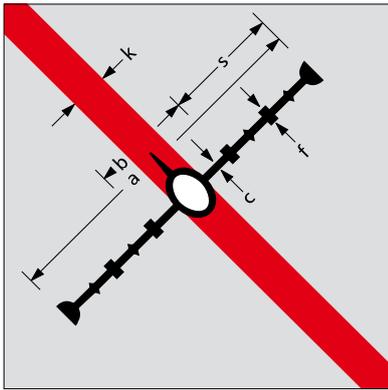
Waterstops in combination with membrane system: there is a full compatibility guaranty through equal material base of waterstop and membrane.
* with injection channels



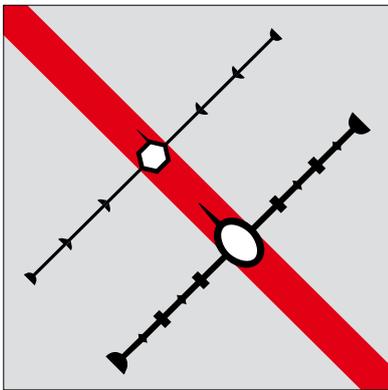
TPO	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
					a	b
Sika® Waterbar WT AF 130	110765	130	–	4	30	3
Sika® Waterbar WT AF 210	176232	210	45	4	30	3
Sika® Waterbar WT AF 240	176233	240	110	4	30	4
Sika® Waterbar WT AF 310	176234	310	110	4	30	4
Sika® Waterbar WT AF 400	176236	400	110	4	30	6
Sika® Waterbar WT AF 500	176227	500	170	4,5	30	6
Sika® Waterbar WT AF 600 Inject*	113624	600	215	4	34	6

Waterstops in combination with membrane system: there is a full compatibility guaranty through equal material base of waterstop and membrane.
* with injection channels

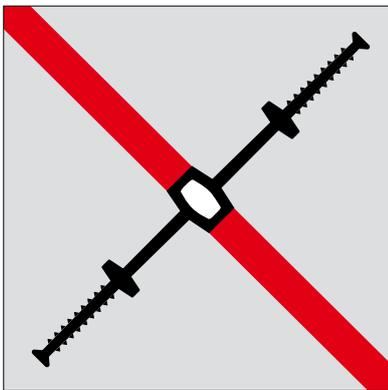
Expansion Joint Waterstops – Internal



PVC-P light	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Width of centre bulb	Height of anchoring ribs
		a	b	c	s	k	f
Sika® Waterbar 0-20 L	5554	200	77,5	3,5	61	20	8
Sika® Waterbar 0-25 L	5548	250	99	2	75,5	25	9
Sika® Waterbar 0-32 L	5555	320	117	2,5	101,5	25	10

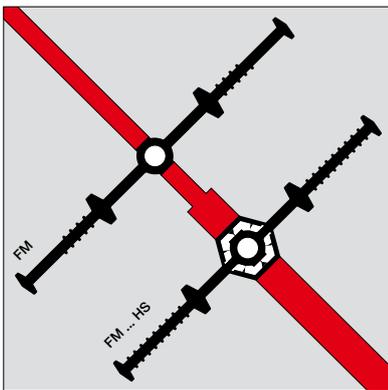


PVC-P	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Width of centre bulb	Height of anchoring ribs
		a	b	c	s	k	f
Sika® Waterbar DK-19	53319	190	94	3	48	15	15
Sika® Waterbar DK-24	53501	240	95	3	73	20	15
Sika® Waterbar 0-15	5704	150	62	2,5	44	20	8
Sika® Waterbar 0-20	5546	200	70	3	65	22	9
Sika® Waterbar 0-22	5705	220	88	3	66	24	8,5
Sika® Waterbar 0-25	5545	250	108	5	70,5	24	8,5
Sika® Waterbar 0-32	5542	320	114	5	103	30	10



Tricomer® DIN 18541	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Width of centre bulb	Height of anchoring ribs
		a	b	c	s	k	f
Tricosal® D 190 Tricomer®	175987	190	75	4	58	10	15
Tricosal® D 240 Tricomer®	175988	240	85	4.5	78	20	15
Tricosal® D 320 Tricomer®	175989	320	110	5.5	105	20	15
Tricosal® D 500 Tricomer®	175990	500	155	6.5	173	20	20

Other geometries available on request

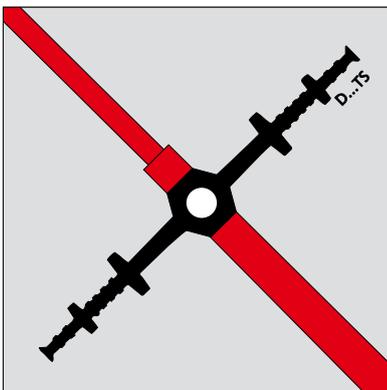


Elastomer (Rubber) DIN 7865	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Width of centre bulb	Height of anchoring ribs
		a	b	c	s	k	f
Tricosal® FM 200 Elastomer	175766	200	110	9	45	20	32
Tricosal® FM 250 Elastomer	175767	250	125	9	63	20	32
Tricosal® FM 300 Elastomer	175768	300	175	10	63	20	32
Tricosal® FM 350 Elastomer	175769	350	180	12	85	20	38
Tricosal® FM 400 Elastomer	175770	400	230	12	85	20	38
Tricosal® FM 500 Elastomer	175771	500	300	13	100	20	38

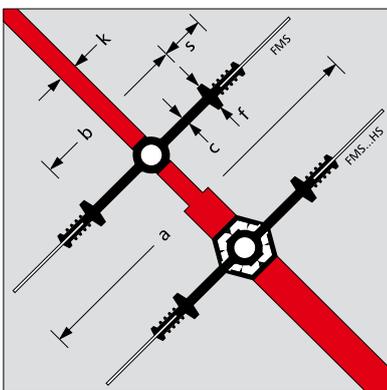
Expansion joint waterstop with encased centre bulb

Tricosal® FM 350 HS Elastomer	175800	350	180	12	85	35	38
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Expansion Joint Waterstops – Internal Special Types

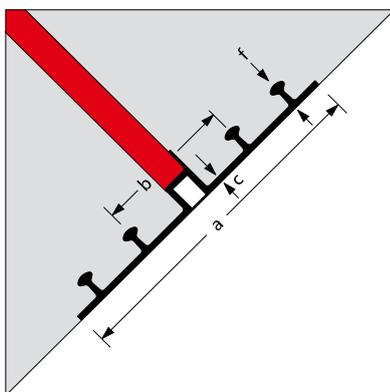


Tricomer® DIN18541, part 2	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Width of centre bulb	Height of anchoring ribs
		a	b	c	s	k	f
Expansion joint waterstops, thick sections							
Tricosal® D 260 TS Tricomer®	175997	260	125	9*	68	20	24
Tricosal® D 350 TS Tricomer®	175998	345	175	11*	85	20	27
Tricosal® D 400 TS Tricomer®	175999	395	195	11*	103	20	29
* at the centre bulb							

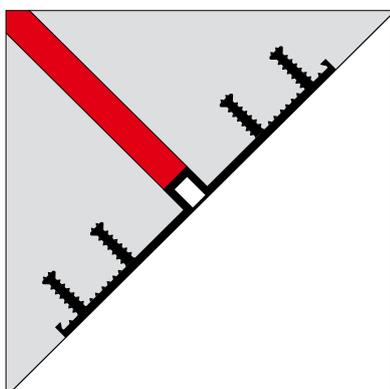


Elastomer (Rubber) DIN 7865	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Width of centre bulb	Height of anchoring ribs
		a	b	c	s	k	f
Expansion joint waterstops with steel plates							
Tricosal® FMS 350 Elastomer	175798	350	120	10	45	20	32
Tricosal® FMS 400 Elastomer	175772	400	170	11	45	20	32
Tricosal® FMS 500 Elastomer	175773	500	230	12	65	20	32
DIN 7865 Part 2 Expansion joint waterstops with steel plates and pre-formed, encased centre-bulb							
Tricosal® FMS 400 HS Elastomer	175776	400	170	11	45	35	32
Tricosal® FMS 500 HS Elastomer	175816	500	230	12	65	35	32
The profile range FMS ... HS is especially suitable for wide joints and contraction joints (joints not allowing expansion), but also for normal expansion joints when subsidence and seismic movements are expected. For further details see separate leaflet.							
* width of Elastomer (rubber) sealing part without steel plates							

Expansion Joint Waterstops – External

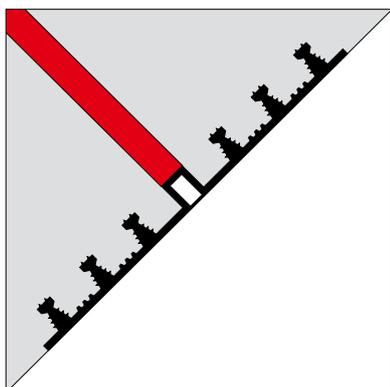


PVC-P	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
		a	b	c	f	N
Sika® Waterbar DR-21	5549	210	90	3,5	19,5	4
Sika® Waterbar DR-26	3661	260	110	3,5	19,5	4
Sika® Waterbar DR-29	1408	290	90	3,5	19,5	6
Sika® Waterbar DR-32	5544	320	100	4	22	6



Tricomer® DIN 18541	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
		a	b	c	f	N
Tricosal® DA 240 Tricomer®	176024	240	90	4,5	20	4
Tricosal® DA 240/2 Tricomer®	176025	240	90	4,5	25	4
Tricosal® DA 320 Tricomer®	176027	330	104	4,5	20	6
Tricosal® DA 320/2 Tricomer®	176028	330	104	4,5	25	6
Tricosal® DA 500 Tricomer®	176030	500	124	4,5	20	8
Tricosal® DA 500/3 Tricomer®	176032	500	124	5	35	8

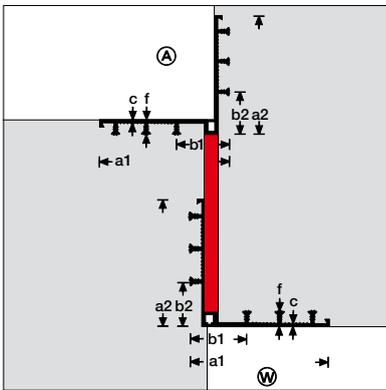
Other geometries available on request



Elastomer (Rubber) DIN 7865	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
		a	b	c	f	N
Tricosal® AM 250 Elastomer	175744	250	100	6	31	4
Tricosal® AM 350 Elastomer	175746	350	100	6	31	6
Tricosal® AM 500 Elastomer	174750	500	150	6	31	8

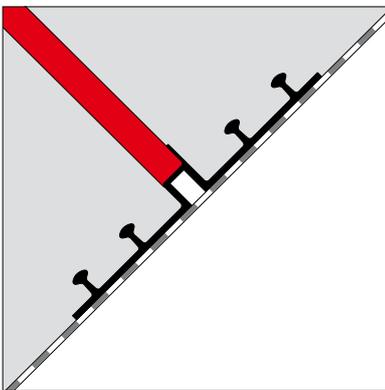
Expansion Joint Waterstops – External

Angled Profiles and Special Types of Waterstop



Tricomer® DIN 18541 Part 2	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
					a1/a2	b1/b2
Tricosal® DA 240 edge A Tricomer®	176034	146/131	71/55	4.5	30	4
Tricosal® DA 240 edge W Tricomer®	176035	146/131	71/55	4.5	30	4
Tricosal® DA 320 edge A Tricomer®	176037	192/176	79/63	4.5	30	6
Tricosal® DA 320 edge W Tricomer®	176038	192/176	79/63	4.5	30	6

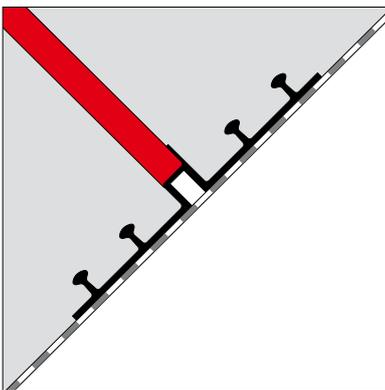
A = external anchors
W = internal/external anchors



PVC-P	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
					a	b
Sika® Waterbar DR-32	5544	320	100	4	22	6
Sika® Waterbar DR-50*	107278	500	120	4	34	6

Waterstop in combination with membrane systems:
There is full compatibility guaranteed using the same material basis for the waterstops and the membrane

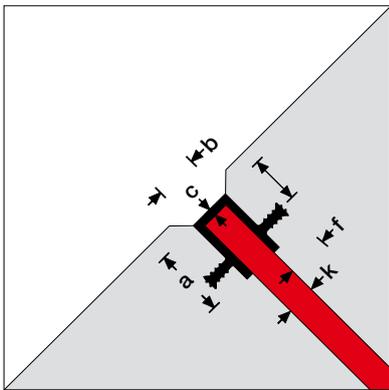
* with injection channels



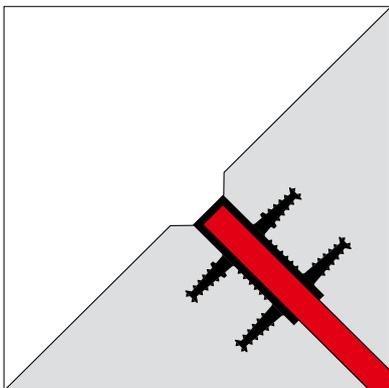
TPO	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
					a	b
Sika® Waterbar WT DF 400	176392	400	20/12	4	30	4

Waterstop in combination with membrane systems:
There is full compatibility guaranteed using the same material basis for the waterstops and the membrane

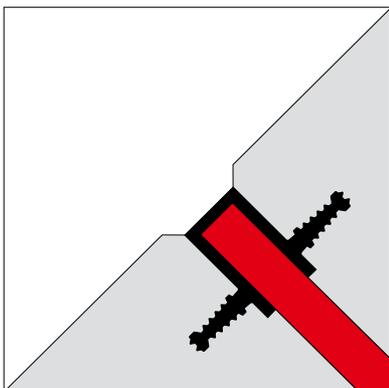
Waterstops for Capping Joints With Grey Coloured Cover Parts



PVC-P	SAP Art. Nr.	Total width	Height of loop	Width of joint cover part	Thick-ness of cover plate	Joint width	Sealing ribs	
							Height	Number
							a	l
Sika® Waterbar FF 5/3	176379	50	35	30	5	20	25	2
Sika® Waterbar FF 10/3	176384	95	35	30	5	20	25	4
Other dimensions available on request								



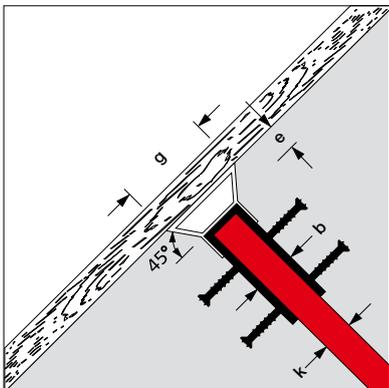
Tricomer® DIN 18541	SAP Art. Nr.	Total width	Height of loop	Width of joint cover part	Thick-ness of cover plate	Joint width	Sealing ribs	
							Height	Num-ber
							a	l
Tricosal® FA 50/3/2 Tricomer®	176073	50	35	30	5.5	20	25	2
Tricosal® FA 90/3/2 Tricomer®	176077	95	35	30	5.5	20	25	4
Tricosal® FA 130/3/2 Tricomer®	176079	140	35	30	5.5	20	25	6
Other dimensions available on request								



Elastomer (Rubber) DIN 7865 Part 2	SAP Art. Nr.	Total width	Height of loop	Width of joint cover part	Thick-ness of cover plate	Joint width	Sealing ribs	
							Height	Number
							a	l
Tricosal® FAE 50 Elastomer	175759	55	35	30	5	20	30	2
Tricosal® FAE 100 Elastomer	175758	100	35	30	5	20	30	4
Other dimensions available on request								

Waterstops for Capping Joints

Spacers and Joint Formers

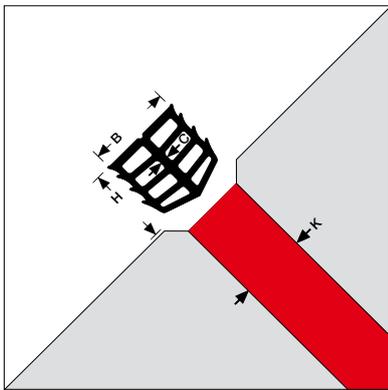


Spacers and Joint Formers For capping joint waterstops		SAP Art. Nr.	Total width	Visible width	Height of chamber	Width of spacer	Length
			k	b	e	g	
	Tricosal® TFL 20	177133	10	20	15	50	1000
	Tricosal® TFL 30	177134	20	30	15	60	1000
	Tricosal® TFL 40	177135	30	40	15	70	1000
	Tricosal® TFL 50	177136	40	50	15	80	1000

The spacers and joint formers are adjusted to the width of the joint cover parts of the capping joint profile. The size "k" of the spacers corresponds to the size "b" of the profiles.

Compression Seals

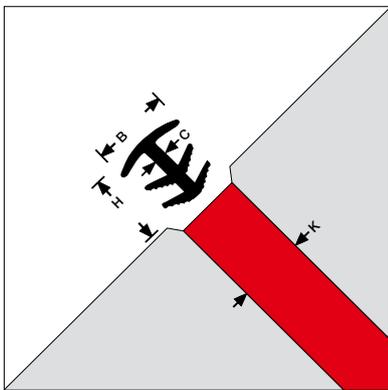
UV-Light and Weathering Resistant



Tricomer®, grey DIN 18541 Part 2	SAP Art. Nr.	Joint width	Width of profile	Height of profile	Thickness
		K	B	H	C
Tricosal® MK 15 Tricomer®	176212	13-17	20	22	2
Tricosal® MK 20 Tricomer®	176213	20-25	30	30	3
Tricosal® MK 30 Tricomer®	176214	30-35	40	40	4

Special profiles and colours on request

■ Depending on site requirements, installation with a stop plate for height adjustment or bonded to joint edges with Sikaflex® 11 FC elastic adhesive.

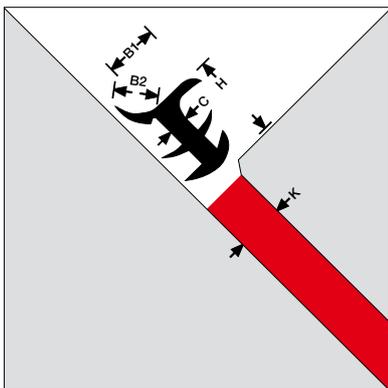


Tricomer®, grey DIN 18541 Part 2	SAP Art. Nr.	Joint width	Width of profile	Height of profile	Thickness
		K	B	H	C
Tricosal® F 10 Tricomer®	176215	10 – 13	15	35	6
Tricosal® F 20 Tricomer®	176216	13 – 20	30	30	4
Tricosal® F 25 Tricomer®	176217	21 – 25	35	35	5
Tricosal® F 30 Tricomer®	176218	22 – 35	50	45	5.5
Tricosal® F 25/66 Tricomer®	176219	20 – 28	66	43	14**
Tricosal® F 20/80* Tricomer®	176221	15 – 20	80	50	5

* with wide cover plate for overlapping the joint flanges by approx. 15 mm

** multi hollow chambers, see MK types

Special profiles and colours on request

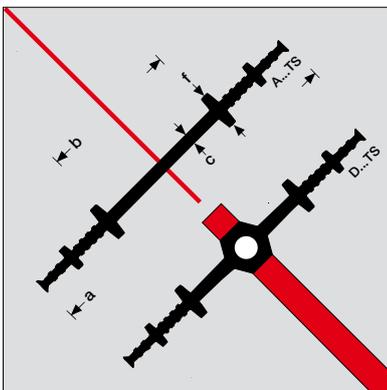


Tricomer®, grey DIN 18541 part 2	SAP Art. Nr.	Joint width	Width of profile	Height of profile	Thickness
		K	B	H	C
Tricosal® F 20 edge Tricomer®	176220	17 – 23	21/23	34	5

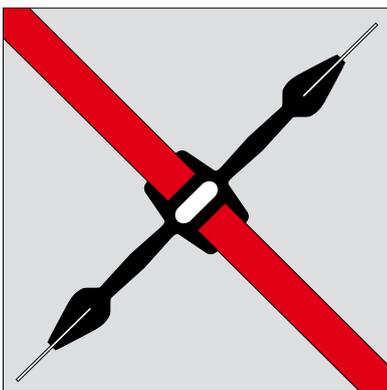
Special profiles and colours on request

Special Waterstopping Profiles

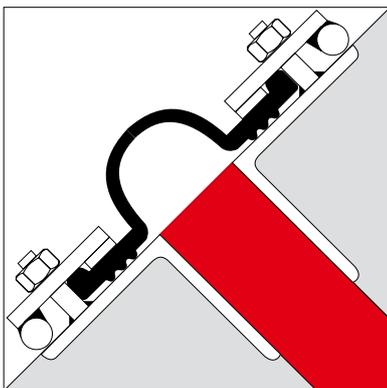
For Hydraulic Civil Engineering Structures



Tricomer®	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of centre bulb	Height of anchoring ribs
		a	b	c1/c2	k	f
Expansion joint waterstops, thick sections						
Tricosal® D 260 TS Tricomer®	175997	260	125	9*	20	24
Tricosal® D 350 TS Tricomer®	175998	350	175	11*	20	27
Tricosal® D 400 TS Tricomer®	175999	400	195	11*	20	29
Construction joint waterstops, thick sections						
Tricosal® A 260 TS Tricomer®	176006	260	113	9	--	24
Tricosal® A 320 TS Tricomer®	176007	320	165	10	--	26
<ul style="list-style-type: none"> ■ Waterproofing of block joint in concrete dams ■ Additional security by combination with SikaFuko® injection hose system 		Further options with Elastomer waterstops, e.g. FMS 350, FMS 400, FMS 400 HS * web thickness of expansion part, measured next to the centre bulb				



Elastomer	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of centre bulb	Thickness of end bulb
		a	b	c1/c2	k	f
Expansion joint waterstop with steel plates						
Tricosal FMS 450 S Elastomer	175817	450	186	11/14	32	35
Materials as DIN 7865: SBR Styrene Butadiene Rubber EPDM Ethylene Propylene Diene Rubber CR Chloroprene Rubber (available on special request)		Joint width: 30 mm standard, with a centre bulb 32 mm wide (other joint widths such as 40 and 50 mm available on special request) e.g. for use in joints between sections or segments in hydraulic structures				



Elastomer	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of centre bulb	Thickness of end bulb
		a	b	c1/c2	k	f
Omega profiles for subsequent joint waterproofing						
Fields of application: <ul style="list-style-type: none"> ■ Flood protection wall ■ Connection joints in channels ■ Immersed tunnel elements 		<ul style="list-style-type: none"> ■ Hydraulic gates/navigation locks ■ Special solutions (e.g. connections for bored rail tunnels entry into railway stations) 				

Potable Water Structures

Waterstops Approved for Drinking Water



Introduction

For potable (drinking) water to be collected and held in service reservoirs without water loss or contamination, watertight construction and joint sealing which is efficient, food-safe, harmless to health and durable is needed.

Given the rise in environmental awareness, public and private customers and designers are demanding and specifying higher ecological standards to be used for the waterproofing and sealing materials.

All of the products to be used should comply with the strict international and national regulations and approvals covering materials in contact with drinking water.

Tricosal[®] waterstops for use in contact with potable water have proven durability and guarantee top quality drinking water, with their functionality being maintained for many years.

With our extensive range of many other different types of products that are also approved for contact with drinking water, Sika has the right sealing and waterproofing solution for every project, including concrete and steel protection for contact with aggressive soft water.

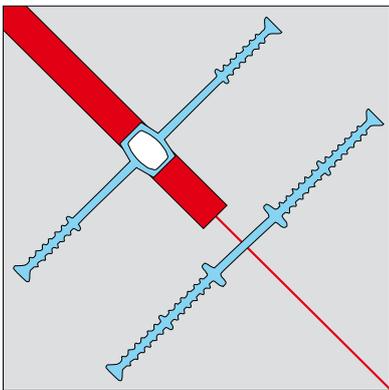
Fields of Application

- Drinking water tanks and reservoirs
- Dams, river and canal structures
- Food processing industry
- All types of wet areas
- All types of structure where micro-organism and pollutants must be kept under control



Drinking Water Quality

According to the requirements of the German specifications DVGW, worksheet W 270, microbial growth can only take place to a very low limit and according to the German KTW recommendations, no harmful contents shall enter into the drinking water. Similar regulations apply in most countries. The **Tricosal**® waterstop range for use in drinking water structures is tested according to the German DVGW and KTW specifications and fulfils all of the performance requirements. They are also approved by the Hygienic Institute in Gelsenkirchen for use in contact with food stuffs and drinking water. **Tricosal**® waterstops are made out high quality TPO material and have excellent physical performance properties and can be connected by the usual waterstop welding technology. Handling and installation on site are therefore the same as for general thermoplastic PVC or **Tricomer**® waterstops.



TPO-Waterstops	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Width of centre bulb	Height of anchoring ribs
		a	b	c	s	k	f
Waterstop for expansion joint Tricosal® D 320/5 DW	176401	320	110	5	105	20	15
Waterstop for Construction joint Tricosal® A 240/4 DW	176095	240	85	3,5	77,5	–	15



Technical Data

- > 600% Elongation at break
- > 15 N/mm² Tensile strength
- Weldable

Tricosal waterstops for use in potable water structures are material compatible with Sikaplan® WT 4220 waterproof sheet membranes that are also approved for use in contact with drinking water.

Flanged Retrofit Joint Sealing Waterstops



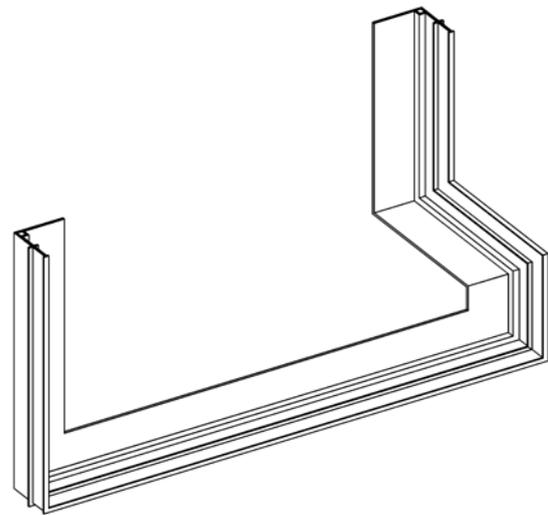
Introduction

Flanged retrofitted joint seals for waterproofing joints connecting 'new to existing structures' are typically one side flanged and one side embedded in new concrete.

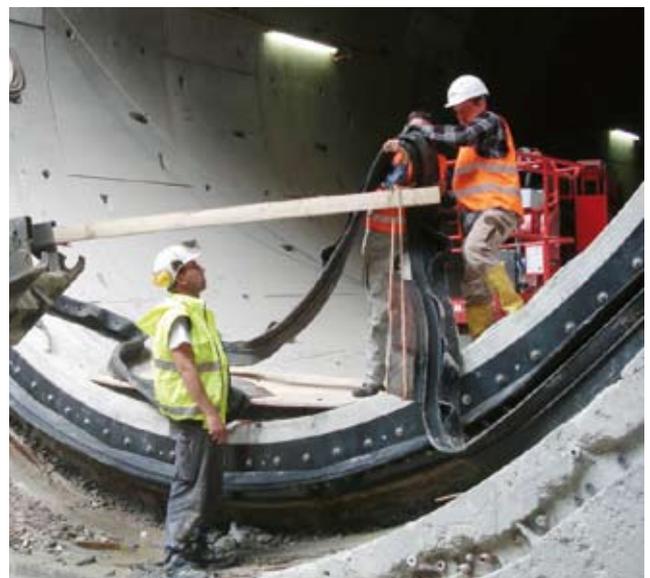
In addition flanged joint seals can also be used for retrofit waterproofing of existing joints i.e. both sides fixed to the existing concrete; or for sealing joints between separate sections of bridge superstructures for example.

There is a wide range of flanged profiles available for use in most difficult applications and highest loads, allowing secure waterproofing even in extreme exposed conditions.

These factory made waterstopping systems can also be used for loose flange seals or for combinations of loose and fixed flange joint sealing.



Flanged Retrofit Joint Seals should be installed by Professional Applicators to ensure watertightness in the longterm even in extremely exposed conditions and with high joint movements.





Key Advantages

- Safe waterproofing even for highest loadings
- Factory made systems
- Omega waterstop joint seals for the highest watertight demands



A Selection of References for Flanged Joint Seals

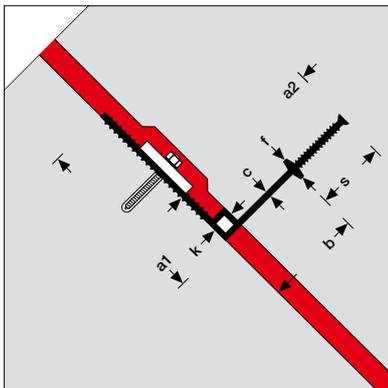
Single Sided (Unbold) or Both Sides Fixed

- Airport 2000 Plus, Düsseldorf, Germany
- Elevator, Castle Dresden, Germany
- Daimler Chrysler, Mettingen, Germany
- BASF containment tank facility, Ludwigshafen, Germany
- Wieland factory, Vaöhringen, Germany
- Dorint Congress Hotel, Karlsruhe, Germany
- Tunnel Neuland, rapid transit railway, Hamburg, Germany
- Airport Tunnel, Cologne-Bonn, Germany
- Sluice at fishers harbours, Bremerhaven, Germany
- A & T Potsdamer Platz, Berlin, Germany
- Mubarak Pumping Station, Egypt
- Mondrian Tower, The Netherlands



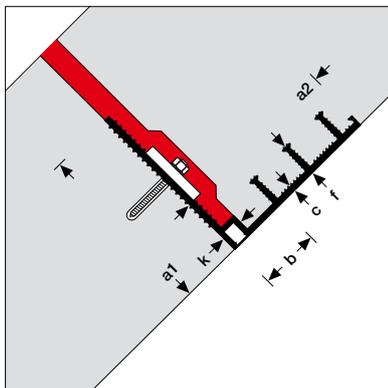
Flanged Joint Sealing Waterstops

For Connecting New to Existing Buildings (One Side Flanged, One Side Embedded in Concrete)



Tricomer® DIN 18541 Part 2	SAP Art. Nr.	Total width	Width of expansion part	Web thick- ness	Width of sealing	Width of centre bulb	Height of anchoring ribs
		a1/a2	b	c	s	k	f
Tricosal® D 320 K Tricomer®	176086	179/170	95	5	95	22	23
Tricosal® D 350 K TS Tricomer®	176093	220/267	100	11	167	35	28

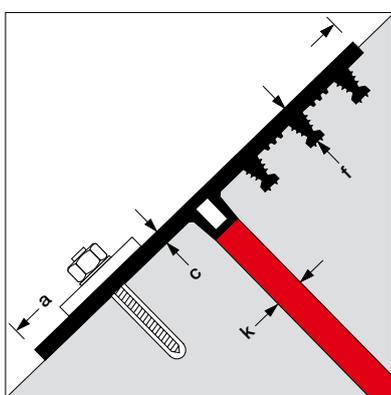
Tricosal Elastomer waterstops for high water pressure and joint movement are available on request.



Tricomer® DIN 18541 Part 2	SAP Art. Nr.	Total width	Width of expansion part	Web thick- ness	Width of centre bulb	Height of anchoring ribs
		a1/a2	b	c	k	f
Tricosal® DA 320 K I Tricomer®	176085	179/204	88	5	22	35
Tricosal® DA 320 K A Tricomer®	176091	179/204	88	5	22	35

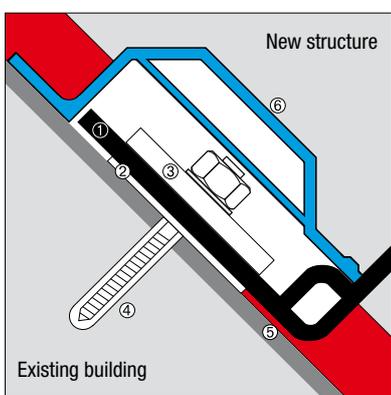


Tricosal Elastomer waterstops for high water pressure and joint movement are available on request.



Tricomer® DIN 18541 Part 2	SAP Art. Nr.	Total width	Web thickness	Width of centre bulb	Height of sealing ribs
		a	c	k	f
Tricosal® DA 320 KF Tricomer®	176087	320	5	20	35

Tricosal Elastomer waterstops for high water pressure and joint movement are available on request.

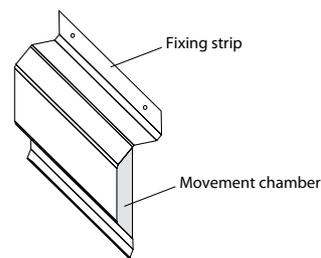


KSP Protection Profile for one-sided flanging constructions	SAP Art. Nr.	Height	Width of chamber	Joint width	Length
		h	b	k	
Tricosal® KSP 230	177158	240	65	50	1500

KSP provides space for joint movements in one-sided fixed flanged joint seals

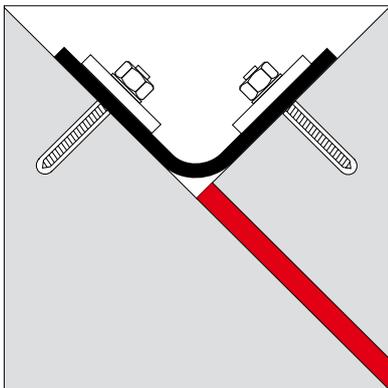
Accessories for Loose Flange Joint Seals

Basic details, additional dimensions on request



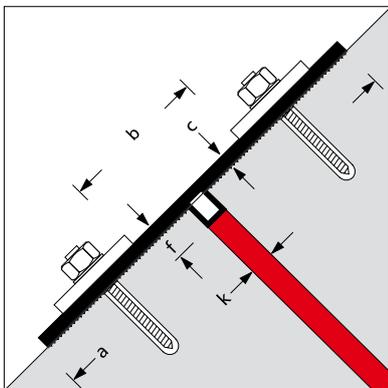
- ① **Waterstopping-flanged profile**, see pages 28 – 32
- ② **Raw rubber sealing strip**
Sizes in mm: 50 × 4, 80 × 4, 100 × 4, 120 × 4
- ③ **Metal flange** (galvanized or stainless steel)
Sizes in mm: 40 × 6, 80 × 8, 80 × 10, 100 × 10, 100 × 12, 120 × 10, 120 × 12
Distance of holes e = 150 mm, in case of size 40 × 6 : e = 200 mm
90° Internal and external edges in galvanized or stainless steel quality: 80 × 10, 100 × 10
- ④ **Chemical anchor**
with anchor bolt, washer and nut in galvanized or stainless steel quality
M 10 × 115 for metal flange 40 × 6
M 12 × 160 for metal flange 80 × 8
M 16 × 190 for metal flange 80 × 10, 100 × 8/10/12
M 20 × 260 for metal flange 120 × 10/12
- ⑤ **Patching mortar** for surface repair / making good
- ⑥ **Protection profile KSP 230**

Retrofit Waterproofing of Existing Joints With Flanged Joint Sealing Waterstops



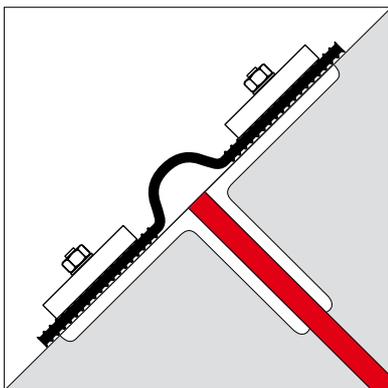
Tricomer® DIN 18541 Part 2	SAP Art. Nr.	Total width	Web thickness			
		a	b			
Tricosal® FP 300 Tricomer®	176089	300	5			

Tricosal Elastomer material, particularly resistant to weathering and UV-light
Additional dimensions on request



Tricomer® DIN 18541 Part 2	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Width of centre bulb	Height of centre bulb
		a	b	c	k	f
Tricosal® LF 320 Tricomer®	176090	320	–	5	20	25

Tricosal® Elastomer waterstops for high water pressure and joint movement are available on request

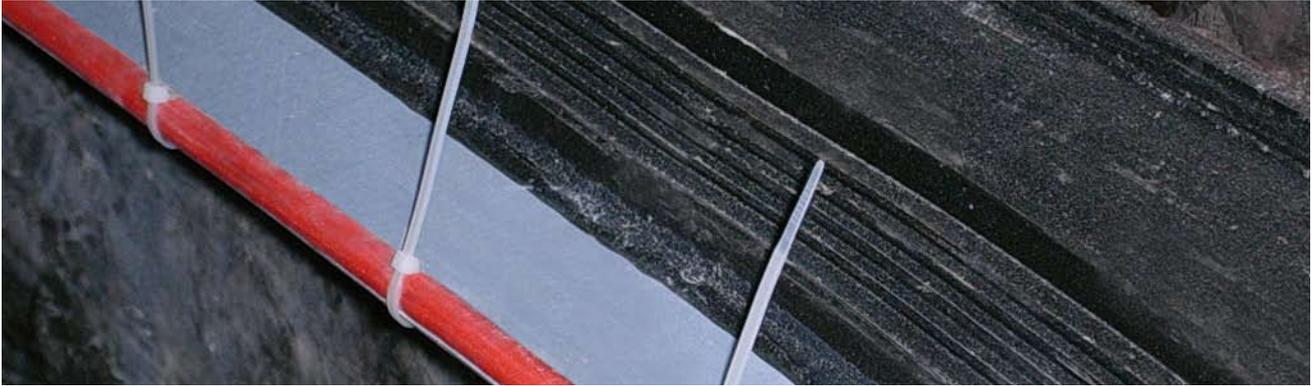


Tricomer® DIN 18541 Part 2	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Width of loop	Height of loop
		a	b	c	k	f
Tricosal® ZW 360 Tricomer®	176092	360	66	7	40	60

Loose- / fixed flange construction

The flanged waterstop profile ZW 360 can be used for both, loose flange or loose-/fixed flange joint sealing

Waterstops Combined with Injection Hoses



Waterstops can be combined with injection hoses such as **SikaFuko® VT1** or **SikaFuko® Eco 1** as a back up security system for critical or extremely exposed structures.

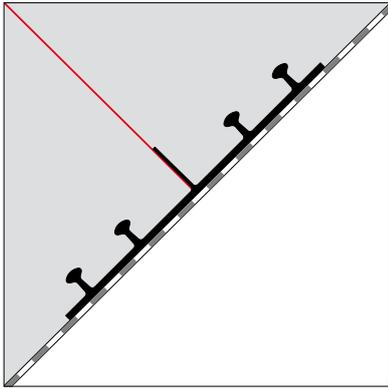
This allows easy access to repair or reseal the waterstops and joints in case of:

- Leaks due to bad concreting work
- Leaks in case of inadequate embedding of the waterstops into the concrete
- Maintenance for extended live expectancy

Additionally the **SikaFuko®** injection hose systems allow the watertightness to be tested and are re-injectable in case of future damage etc. The watertightness of the joints can be tested by applying a defined water pressure through the injection hose system **SikaFuko® VT1** or **SikaFuko® Eco 1**



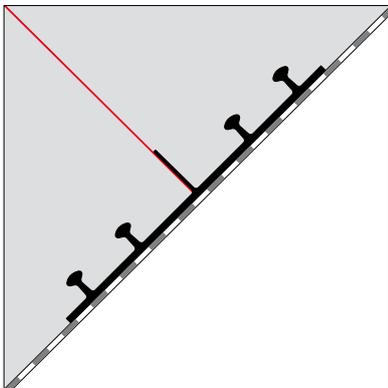
Waterstops Combined with Sika Membrane Systems For Watertight Basement and Tunnel Constructions



PVC-P	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
					a	b
Sika® Waterbar AR-20	5561	200	80	3,5	19,5	4
Sika® Waterbar AR-25	5560	250	105	3,5	19,5	4
Sika® Waterbar AR-31	5562	310	90	4	20	6
Sika® Waterbar AR-40*	61760	400	86	4	30	6
Sika® Waterbar AR-50*	107275	500	120	4	34	6
Sika® Waterbar AR-60*	61929	600	220	4	34	6

Waterstops in combination with membrane system:

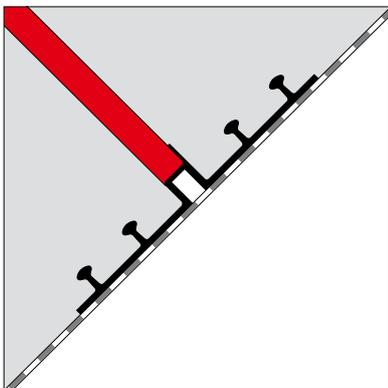
There is full compatibility guaranteed using the same material basis for the waterstops and the membrane
* with injection channels



TPO	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
					a	b
Sika® Waterbar WT AF 130	110765	130	–	4	30	3
Sika® Waterbar WT AF 210	176232	210	45	4	30	3
Sika® Waterbar WT AF 240	176233	240	110	4	30	4
Sika® Waterbar WT AF 310	176234	310	110	4	30	4
Sika® Waterbar WT AF 400	176236	400	110	4	30	6
Sika® Waterbar WT AF 500	176227	500	170	4,5	30	6
Sika® Waterbar WT AF 600 Inject*	113624	600	215	4	34	6

Waterstops in combination with membrane system:

There is full compatibility guaranteed using the same material basis for the waterstops and the membrane
* with injection channels

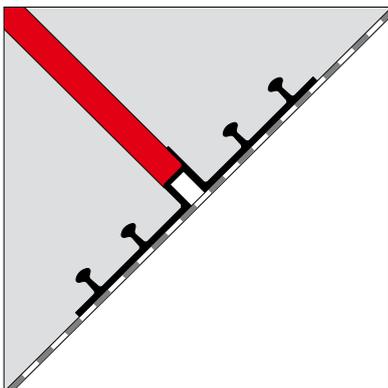


PVC-P	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
					a	b
Sika® Waterbar DR-32	5544	320	100	4	22	6
Sika® Waterbar DR-50*	107278	500	120	4	34	6

Waterstop in combination with membrane systems:

There is full compatibility guaranteed using the same material basis for the waterstops and the membrane

* with injection channels



TPO	SAP Art. Nr.	Total width	Width of expansion part	Web thickness	Sealing ribs	
					Height	Number
					a	b
Sika® Waterbar WT DF 400	176392	400	20/12	4	30	4

Waterstop in combination with membrane systems:

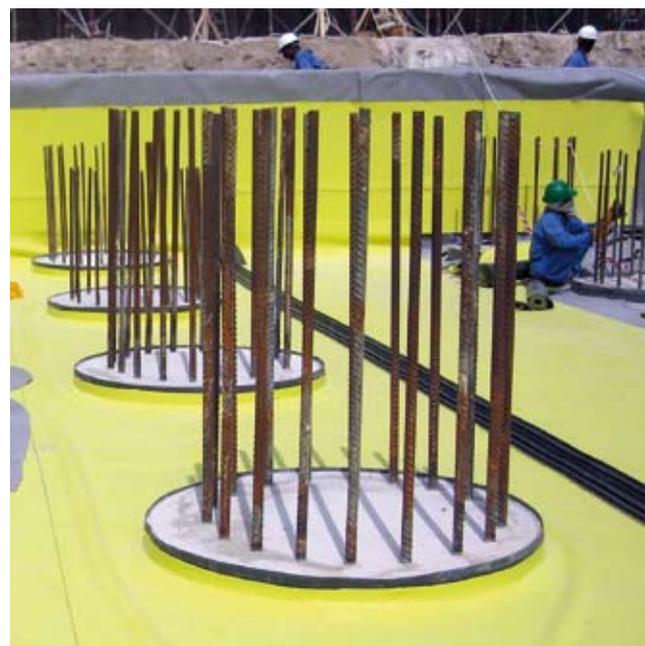
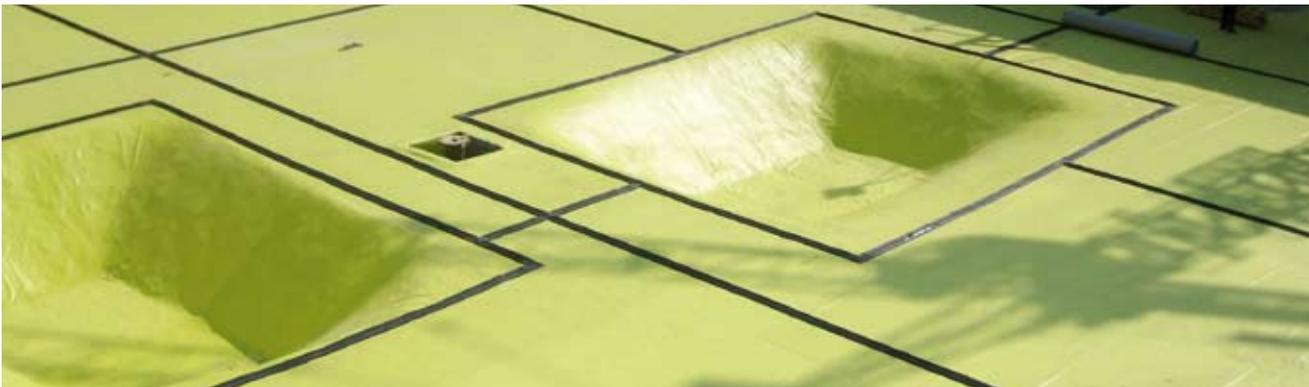
There is full compatibility guaranteed using the same material basis for the waterstops and the membrane

Waterstops Combined with Sika Membrane Systems For Compartment Systems and Around Pile Heads



A compartmental waterstopping system composed of **Sika® Waterbar** and welded single or double layer **Sikaplan®** sheet membranes is combined with Sika injectable pipes and ports casted into the concrete structure, to provide the security of complete watertightness control,

allowing fast location, then fast and easy repairs using **Sika®** injection resins, if this is ever required at any time during the construction period or the entire service life of the structure. Around pile heads **Sikaplan®** membranes are welded to **Sika® Waterbar**.



Tricosal® Westec® Waterstops

For the Environmental Protection in Industrial Facilities

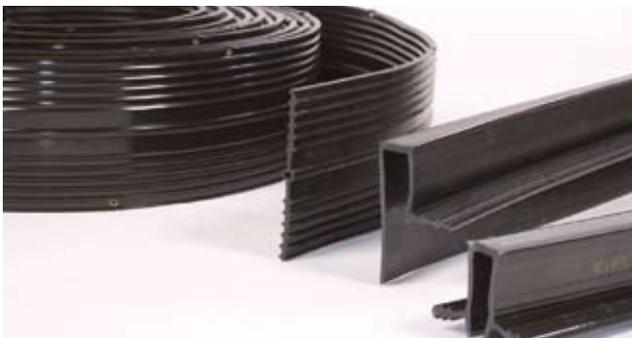


Introduction

- Approved by the German Institute for Construction Technology DIBt for the waterproofing of LAU-facilities (containment facilities for the storage, filling and transfer of water contaminating substances)
- European Technical Approval
- Highest chemical resistance
- Homogeneously weldable waterproofing system
- Installation and processing by trained applicators (WHG specialist contractor)

A Selection of Recent References

- Containment tank Grünau, Illertissen, Germany
- BASF, Ludwigshafen, Germany
- Bio energy plant, Zörbig, Germany
- Containment tank facility Infraseriv, Gendorf, Germany
- German BP, Cologne, Germany
- Dachser storage facilities for hazardous goods, Langenau, Germany
- Reinstatement of aircraft fuelling, Fritzlar, Germany
- Storage facilities, Solvay, Besigheim, Germany
- Railway Station, St. Petersburg, Russia
- Crude oil storage facilities, Middle East



Chemical Resistance of the Tricosal® Westec® Waterstops		
		PE
1.	Gasoline according to DIN 51 600 and DIN EN 228	High
2.	Aircraft fuel	High
3.	Heating oil, diesel fuel, unused combustion motor oil, unused motorized vehicle gear oil,	High
4.	Mixture of saturated and aromatic hydrocarbons with an aromatic content All Hydrocarbons including 2 and 3, except 4a and 4b, and used combustion motor oils and used motorized vehicle gear oils	High
4a.	Benzene and benzene-containing mixtures (including 2 – 4b)	High
4b.	Crude oils	High
5.	Univalent and polyvalent alcohols, glycol ether	High
5a.	All alcohols and glycol ether (including 5)	High
6.	Aliphatic halogenated hydrocarbons C2 (including 6b)	High
6a.	All halogenated hydrocarbons	High
6b.	Aromatic halogenated hydrocarbons	High
7.	All organic esters and ketones	High
8.	Aqueous solutions of aliphatic aldehydes up to 40%	High
8a.	Aliphatic aldehydes and their aqueous solutions	High
9.	Aqueous solutions of organic acids and their salts,	High
9a.	Organic acids (carbonic acids, not including formic acid) as well as their salts (in aqueous solution)	High
10.	Mineral acids up to 20% as well as acidic hydrolyzing, inorganic salts in aqueous solution (pH < 6), not including hydrofluoric acid and oxidizing acids and their salts	High
11.	Inorganic lyes as well as alkaline hydrolyzing inorganic salts in aqueous solution (pH > 8), except for ammonia solutions and oxidizing solutions of salts (for example hypochlorite)	High
12.	Aqueous solutions of non oxidizing salts with a pH value between 6 and 8	High
13.	Amines and their salts (in aqueous solution)	High
14.	Aqueous solutions of organic surfactants	High

For the design, installation and use of these special waterstop systems the requirements of the local building regulations and any relevant processing guidelines must also be taken into account.



For the Protection of Our Environment Tested and Approved!

Today the environment has to be protected against a multitude of chemical substances, which are stored and processed in many facilities. Appropriate containment bunds and secondary containment tanks built in reinforced concrete, therefore require joint waterproofing materials with sufficient chemical resistance.

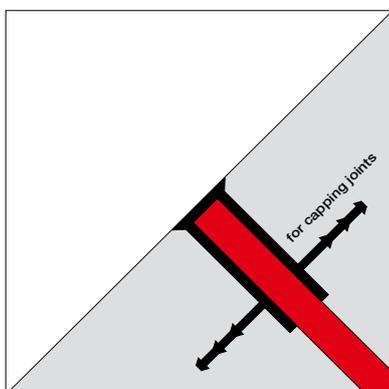
The **Tricosal® Westec®** waterstop range is produced in a special chemically resistant PE polyethylene material.

In comparison with standard waterstopping materials according to DIN 7865 or DIN 18541 this material is considerably more resistant to most

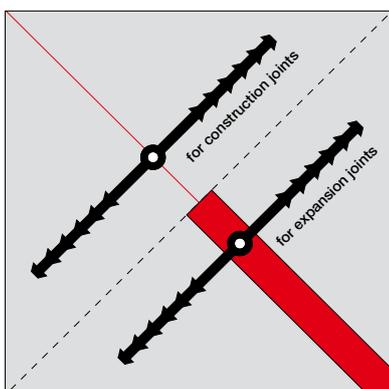
aggressive chemical media. This applies in particular to dangerous hydrocarbon based chemicals (fuels, oils, solvents, etc.).

In order to meet strict safety requirements, the **Tricosal® Westec®** waterstop system was tested according to The Approval Principles for Joint Waterproofing Systems in facilities for the storage, filling and transfer of water-contaminating substances ("LAU-facilities"), to confirm their suitability for both function and resistance. It was approved by the German Institute for Construction Technology.

Information for design and installation, together with full product details and their chemical resistance, are given in the corresponding approval document or our separate installation guides.



Waterstops for Capping Joints	SAP Art. Nr.	Total width	Height of profile	Width of joint cover part	Web thick- ness	Joint width	Sealing ribs	
							Height	Number
		a	l	b	c	k	f	N
Polyethylene PE								
Westec® Type 631	176097	104.5	76.2	34.9	3.2	19.0	38.1	2
<ul style="list-style-type: none"> ■ Profile is approved for the use in LAU-facilities (facilities for the storage, filling and transfer of water-contaminating substances) ■ European Technical Approval: ETA-04/0044 ■ Profiles are trafficable for vehicles with air-filled tires, (up to SLW 60) and a traffic load III (VB 900 to 300) and (VB 300 to 60) (Guidelines for the Standardization of Traffic Surface Finishes) 								



Internal Waterproofing	SAP Art. Nr.	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Height of centre bulb
Polyethylene PE						
Westec® Type 050	176098	152.4	50.8	4.7	50.8	11.1
<ul style="list-style-type: none"> ■ Profile is approved for the use in LAU-facilities (facilities for the storage, filling and transfer of water-contaminating substances) ■ European Technical Approval: ETA-04/0044 ■ Profiles are suitable for Expansion and Construction Joints ■ Easy and safe installation with lateral eyelets 						

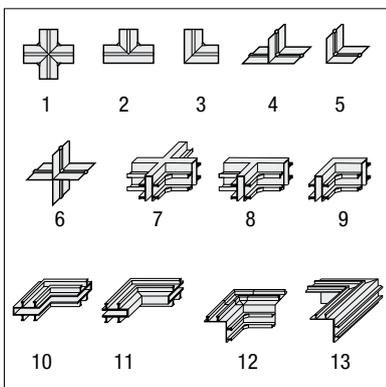
Preformed Junctions and Joints

For Sika® Waterbar and Tricosal® Waterstops

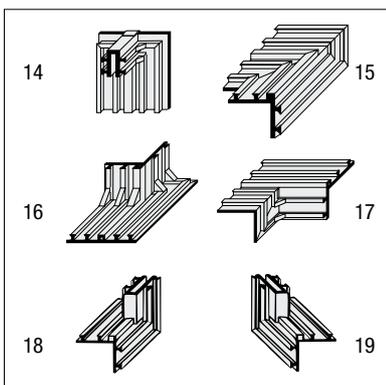


Performed Junctions / Jointing Pieces

A wide range of standard preformed junction pieces are available for **Sika® Waterbar** and **Tricosal®** waterstop connections and jointing on request. All have a 50 cm free wing, allowing easy butt-jointing on site. Non standard sections are also available and can be produced, to your engineering drawings giving the exact details and measurements required.



Standard Junctions			
PVC-P and TPO	Available Types:	1 – 13	
Tricomer®	Available Types:	1 – 13	
Elastomer	Available Types:	1 – 11 Symmetric corner, type 12 – on request Angle corner, type 13 – on request	
PE	Available Types:	1, 2, 3, 5	
1. flat cross	5. vertical edge	9. flat edge,	13. symmetric corner
2. flat T	6. vertical cross	10. cover plate external	14. angle corner
3. flat edge	7. vertical T	11. flat edge,	
4. vertical T	8. vertical edge	12. cover plate internal	

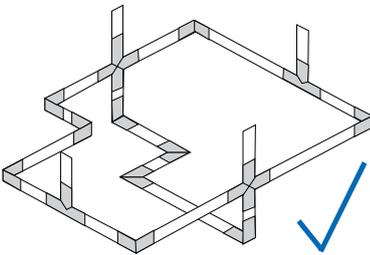


Composite Junctions		
PVC-P and TPO	Available Types:	14 – 19
Tricomer®	Available Types:	14 – 19
Elastomer	on request	
The types shown (14 – 19) are only a selection of the possible composite types		

Waterstop Specification

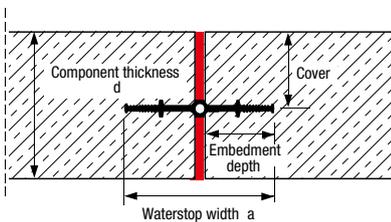


Design



Closed Waterproofing System

Waterstops must create a closed waterproofing system within the reinforced concrete structure. Joint intersections with each other and with penetrations and edges of the structure should be made as square as possible. The clearance from the edges of the structure should generally be 0.5 m minimum. The overall waterstop section system specification and method statement for a project are divided into logical sections. These are linked to the drawings of the system and its components, their factory prefabrication or assembly and for their installation on site. This also provides part of the project documentation and confirmation of the specific waterstop qualities required. The waterstops should conform with the local regulations and specifications.



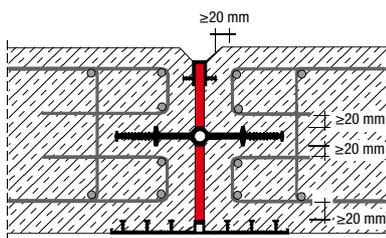
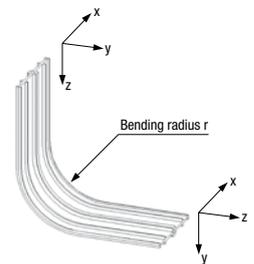
Waterstop Width Rule

The component thickness d around internal waterstops should be at least equivalent to the waterstop width a (embedment depth \leq cover). A component thickness of 300 mm is sufficient for 320 mm wide waterstops according to DIN 18541 (types D and A). The choice of waterstops is based on the load and exposure, e.g. in accordance with DIN V18197. Our Product Engineering department will be pleased to assist you in your projects.

Bending radius r	
	≥ 25 cm
	≥ 15 cm
	$\geq 50 \times$ Stop anchor depth f (Example: $f = 30$ mm $\rightarrow r \geq 1,50$ m)
	$\geq 30 \times$ Profilhöhe a (Example: $a = 70$ mm $\rightarrow r \geq 2,10$ m)
Otherwise	
Mitred angled joint (factory made joint)	

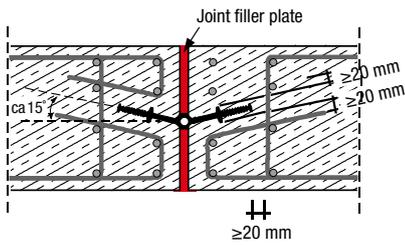
Bending Radius r

When there are changes of direction perpendicular to the waterstop level, waterstops may be bended strictly regarding the indicated minimum bending radius r . If the required bending radius r cannot be maintained, a factory-made vertical angle should be specified.



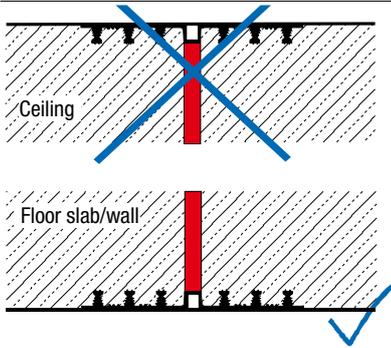
Concrete and Reinforcement Cover

The clearance between waterstop and reinforcement shall be at least 20 mm.



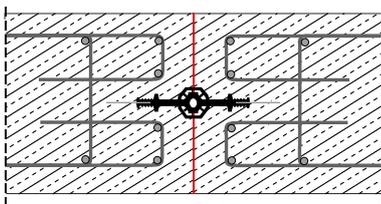
Horizontal Waterstop Installation in Slabs

Internal waterstops in horizontal base or deck slabs should be installed in a v-shape at an angle of about 15° upwards, to allow the waterstop sides to be embedded without voids and to prevent concrete honeycombing (from grout loss / segregation during concreting).



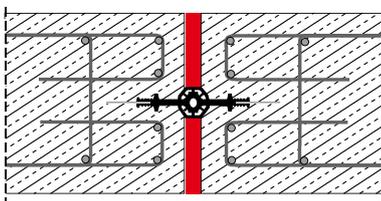
Use of External Waterstops

External waterstops are always fitted on the water contact side. They must not be casted in on the top of horizontal and low angled components (due to the risk of air entrapment and voids). External waterstops must be given adequate durable protection against mechanical damage (e.g. by backfilling with soil, sand, similar fillers without angular crushed stone).



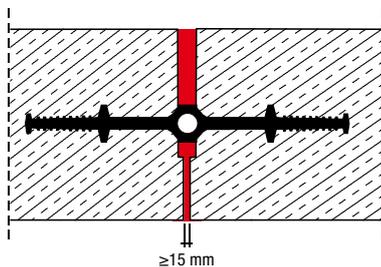
Design of Constraction Joints

Expansion joint waterstops are also used in contraction joints. If shear movement can occur in a contraction joint, a deformation void must be created using an encased centre-bulb (e.g. waterstop type **Tricosal**® FMS 500 HS Elastomer).



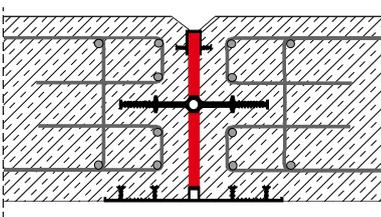
Design of Wide Joints

For expansion joints with a nominal joint width $W_{nom} \geq 30$ mm and if shear force $VY > W_{nom}$ occurs, measures must be taken to prevent any possible damage to the waterstop from the concrete edges (e.g. use encased centre-bulb waterstop type: **Tricosal**® FMS 500 HS Elastomer).



Minimum Joint Width

For the joints in service, under their intended deformation, the joint width at a nominal width of $W_{nom} = 20$ mm must not be less than 15 mm and at a nominal width of $W_{nom} = 30$ mm, not less than 20 mm. Otherwise a deformation void must be created by forming an encased centre bulb (e.g. waterstop type **Tricosal**® FMS 500 HS Elastomer – see Contraction Joint above).



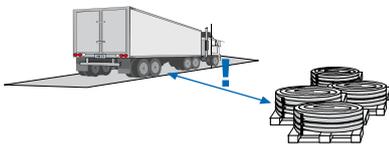
Joint Seal at Open and Below Ground Ends

To protect joints from contamination, external waterstop should be installed at below ground ends with a suitable joint sealant or capping waterstop at the open air ends.

Waterstop Handling Guidelines

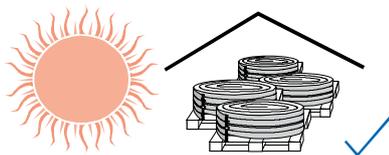


Storage



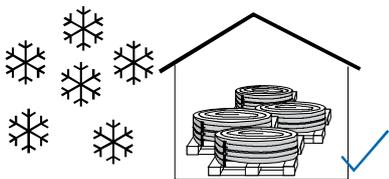
Protected Storage

When delivered to site, the waterstop products must be unloaded carefully and inspected immediately for completeness and integrity, including form and dimensions. Before installation the waterstops must be kept in a sheltered place on boards or some other firm base (e.g. pallets, concrete surfaces) and protected from contamination or damage.



Storage in Summer

Waterstops must be protected from direct sunlight, specially in summer, e.g. by covering. In high outside temperatures waterstops must be taken to the point of installation and laid out under no tension.



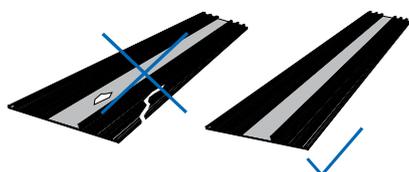
Storage in Winter

Waterstops should be kept in covered storage if possible and then be put in heated rooms for at least one full day prior to their installation, to make their handling and installation easier and less prone to damage (thermoplastic material).

Waterstop Installation Guidelines

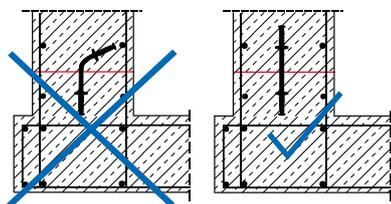


Installation and Fixing



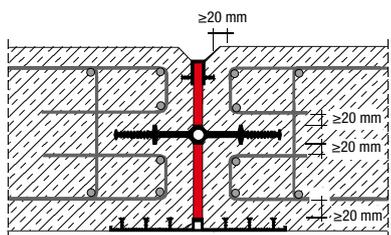
Cleanliness and Integrity

Waterstops must not be installed if they have suffered deformation or damage which might impair their function. Waterstops must be installed without creasing or distortion. Deformation in external PCV-P, TPO or **Tricomer**[®] waterstops caused during storage or handling (e.g. creasing or distortion of the anchors) should be corrected by stretching on a level base and heat treatment. Waterstops can only be installed at a material temperature of over $\pm 0^{\circ}\text{C}$ and in weather conditions not endangering the safe installation of the whole waterproofing system.



Fixed in a Stable Position

Waterstops should be installed in their specified position, symmetrical to the joint axis, and be fixed so that their position can not change or move during the concreting works.

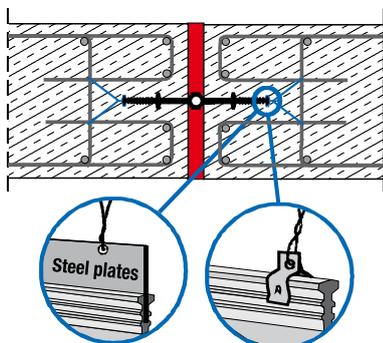


Concrete and Reinforcement Cover

The minimum clearance and concrete cover shall be at least 20 mm.

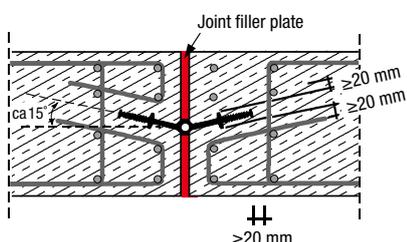
Waterstop Installation Guidelines on Site

During the Waterstop Installation



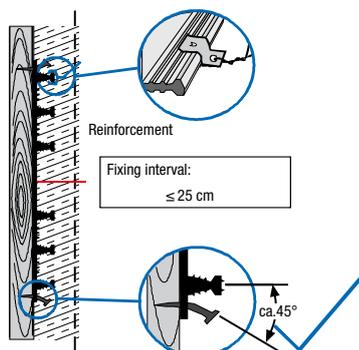
Fixing Internal Waterstops

Internal waterstops are anchored to the reinforcement. The waterstops are fixed to the edge anchors with the special waterstop clip or, in the case of waterstops with steel plates (FMS, FS) to the edge perforation of the steel plates at maximum intervals of 25 cm.



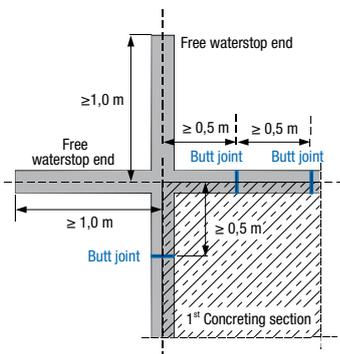
Horizontal Waterstop Positioning in Slabs

To prevent honeycombing or concreting voids, the internal waterstops in bases and decks should be installed in a v-shape at an angle of about $\geq 15^\circ$ upwards.



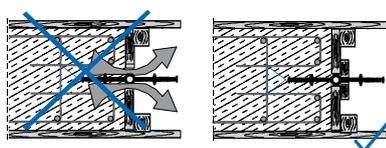
Fixing of External Waterstops

External waterstops for walls are fixed with nails to the formwork at the edges, nailing plates with an embedment depth maximum 1/3 of nail length and bent around approx. 45° . If there is a risk of a stop end anchor snapping (e.g. due to concrete dropping too heavily by mistake), it should be fixed to the reinforcement with waterstop clips every 25 cm, e.g. the top stop end anchors of the waterstop system in the base/wall joints. External waterstops for horizontal installation under bases are fixed directly to the concrete blinding.



Spacing Between Joints in the Waterstops Themselves

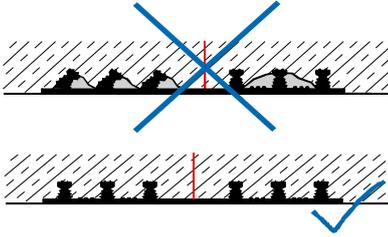
The spacing between two joints in the waterstops themselves should be 0.50 m minimum. In every configuration the length of the free waterstop ends should be 1.00 m minimum so that these connection joints can be formed easily and correctly on site.



Tight Bulkhead Formwork

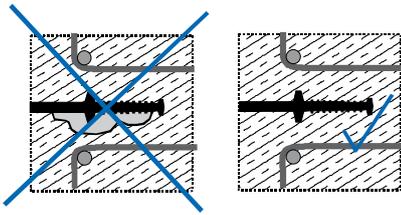
When installing the waterstop system, ensure that the bulkhead formwork is tight, stable and immovable. The stopend formwork must lie tight against the waterstops. The waterstop must be protected from damage before and during the concreting works.

During the Concreting Works



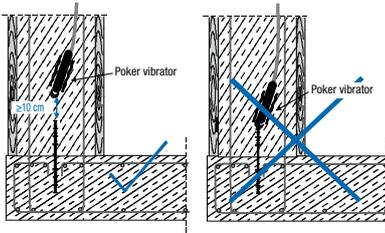
Embedding of External Waterstops

Waterstops must be free from contamination and ice when casted in. If necessary they should be cleaned before concreting (e.g. removal of any accumulated site debris such as sawdust, sand, concrete residues, cement laitance, oil, grease, snow, ice etc.). This is particularly important for external waterstops in the base of a structure.



Casting Without Honeycombing or Voids

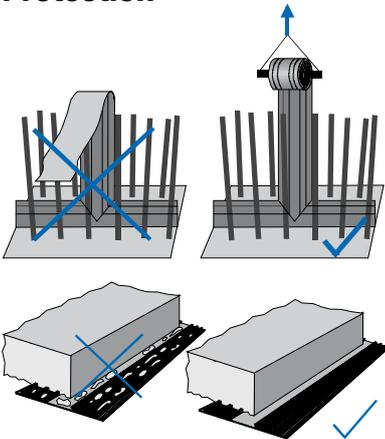
The waterstops must be fully enclosed in concrete and the concrete must be free from voids. Make sure that there is a low concrete drop height, good flow without segregation and even distribution.



Clearance Between Poker Vibrators and Waterstops

The poker vibrators must never touch the waterstop or its fixings (minimum clearance ≥ 10 cm). It is usually preferable to compact around external waterstops with external vibrators, which will also give better compaction around stop end anchors.

Protection

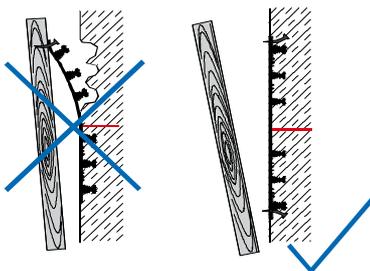


Protection of Exposed Waterstops On Site

The waterstops should be protected from damage until they are fully casted in. Examples of suitable protective measures are:

- For waterstops in walls: cover reinforcement ends with boarding, box in or roll up and suspend the waterstop till later
- For waterstops to be trafficked: completely cover or bed in sand
- For waterstop ends to be exposed for some time: box in to fully protect

Striking of Formwork



Striking Around External Waterstops

Take great care that external waterstops do not come loose during striking of adjacent or attached formwork. Extend the time before striking these areas if necessary.

Equipment, Tools and Accessories For the Welding of Thermoplastic Waterstops



Introduction

Joints between thermoplastic waterstops are made with a heat welding process.

This process is reversible. The principle of welding consists of softening the mating surfaces of both of the two parts to be joined by heating them to the melting temperature, quickly pressing them together, and allowing them to cool.

Welding is not possible merely by heating and softening one of the two pieces to be welded together.

Although the welding of thermoplastic materials is easier and cheaper on site than the vulcanising of Elastomers (artificial rubber based materials), it demands more manual skill and dexterity, as well as ensuring good workmanship and quality control .



Welding Equipment for Sika® Waterbar PVC-P and Tricosal® Tricomer® Waterstops

Semi-Automatic Tools
Welding equipment type SG 320 L Semi automatic Welding equipment with clamping moulds, dependant on profiles
Tools for Hand Welding
Axe-shaped welding tool 200 W Welding tip 50 W Welding tongue 125 W Hot air blower: – round nozzle, short – round nozzle, long – flat nozzle – quick welding nozzle, round
Welding Accessories
Welding foil Welding strip
Tools
Special knife Special tongue for waterstop clips
Accessories for Installation
Waterstop clip type 1 Waterstop round clip Clip for Sika® Waterbar Clamping Plates – KS 12 – KS 15 – KS 24 – KS 32

All electrical tools are 220 V as standard, 110 V models are available to meet some countries regulations on request. For equipment, tools and accessories for installing Tricosal flanged waterstops see page 31.



Welding of Sika® Waterbar and Tricosal® Waterstops Made of PVC-P, TPO and Tricomer®



Measuring, marking, cutting



Axe-shaped welding tool



Welding equipment type SG 320 L



Sparktester



Preparation of overlapping



Overlapping joint with hotair blower



Strengthening with welding foil using hot air gun



Strengthening with welding strip using welding tip

Equipment, Tools and Accessories For the Vulcanizing of Tricosal® Elastomer Waterstops



Introduction

Joins of **Tricosal**® Elastomer (rubber) waterstops are made in a vulcanizing process.

This process is irreversible, i.e. it can be carried out only once and therefore requires careful, consistent and complete execution of all of the working steps.

Standard junctions, e.g. flat cross, vertical T, flat edges etc. are all prefabricated in our factory using specialist equipment i.e. autoclaves.

Therefore only the butt joints should be made on site.



Vulcanizing Equipment for Tricosal® Elastomer Rubber Waterstops

<p>Vulcanizing equipment VG 450 with moulds, dependant on equipment and profiles Vulcanizing equipment VG 600 with moulds, dependant on equipment and profiles</p>
<p>Vulcanizing Accessories</p> <p>Vulcanizing Solvent Adhesion foil Strip type 0 Strip type 1 Bonding agent for steel/rubber connections, including primer Talcum Plug</p>
<p>Tools</p> <p>Special knife Roller Taping Rod Grinder</p>
<p>Accessories</p> <p>Waterstop clip type 2</p>



Vulcanizing of Tricosal® Waterstops Made of Elastomer Rubber Material



Measuring, marking, cutting



Grinding of the rubber surface



Applying the vulcanizing solution to the rubber surface



Plugging of the centre bulb with a cellular foam plug and inserting a raw rubber plug



Applying the adhesion strip



Joining the waterstop, tightening with the fixing Clamps



Application of cover strips; pressing home of both cover strips



Powdering of waterstop and inserting into the vulcanizing equipment

Case Studies



Fürstenaupark Apartment Buildings Wil, Switzerland

Project Description

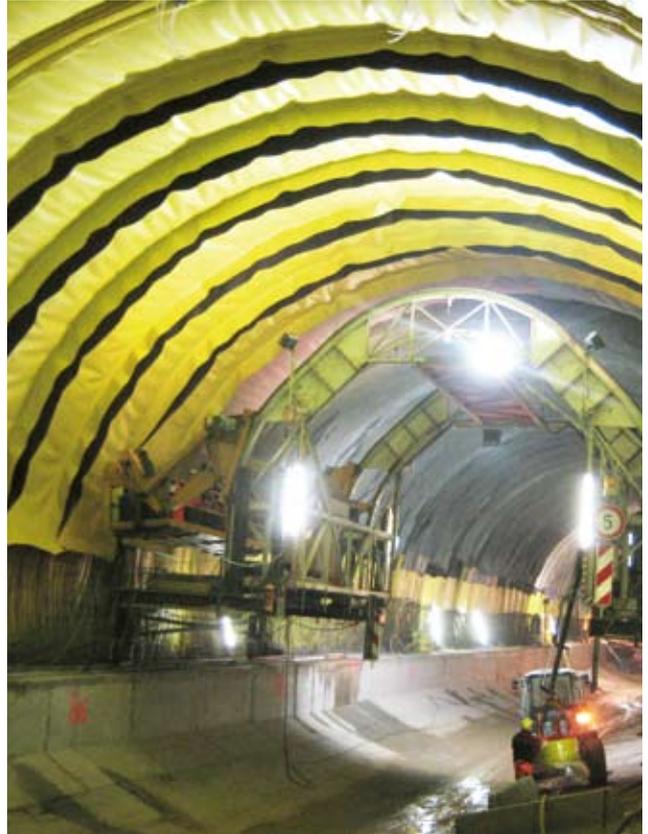
New apartment buildings with underground parking garages
Construction Period: 2000 – 2005

Sika Solution

Sealing of the below ground expansion and construction joints with
Sika® Waterbar.

Sika Products

Sika® Waterbar AR-26
Sika® Waterbar DR-29



Grouft Road Tunnel Luxemburg

Project Description

The longest structure on the Route du Nord
Construction Period: 2005 – 2009

Sika Solution

Compartmentalization of the tunnel waterproof membrane lining system for localised injection and sealing of any leaks or damage.

Sika Products

Sika® Waterbar AR-60/6 PVC Inject



Naga Hammadi Barrage Dam Egypt

Project Description

A major new dam to provide water for irrigation and produce hydro electric energy.

Construction Period: 2002 – 2008

Sika Solution

Sealing of the expansion and construction joints with **Tricosal®** Elastomer high performance waterstops.

Sika Products

Tricosal® FS 310 Elastomer

Tricosal® FM 300 Elastomer

Tricosal® FMS 500 Elastomer

Tricosal® FMS 500 HS Elastomer



City-Tunnel Leipzig, Germany

Project Description

New main arterial railway tunnel in the city and region of Leipzig

Construction Period: 2003 – 2012

Sika Solution

Sealing of the expansion and construction joints, including the underground station entries with **Tricosal® Tricomer®** and Elastomer high performance waterstops.

Sika Products

Tricosal® FMS 400 Elastomer

Tricosal® FMS 400 HS Elastomer

Tricosal® FAE 100 Elastomer

Tricosal® AM 250 Elastomer

Tricosal® FM 350 K Elastomer

Tricosal® A 250 Elastomer and others

Tricosal® FA 50/30/2 Tricomer®

Flanging constructions

Tricosal® FM 350 K Elastomer

Tricosal® OKB 30 Elastomer

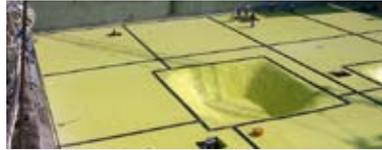
Sika Full Range Solutions for Construction

Concrete Production



Sika® ViscoCrete®
Sika® Retarder®
Sika® SikaAer®

Waterproofing



Sikaplan®, Sikalastic®
Sika® & Tricosal® Waterstops
Sika® Injection Systems

Flooring



Sikafloor®
SikaBond®

Corrosion and Fire Protection



SikaCor®
Sika® Unitherm®

Concrete Repair and Protection



Sika® MonoTop®
Sikagard®
Sikadur®

Structural Strengthening



Sika® CarboDur®
SikaWrap®
Sikadur®

Joint Sealing



Sikaflex®
Sikasil®

Grouting



Sikadur®
SikaGrout®

Roofing



Sarnafil®
Sikaplan®
SikaRoof® MTC®

Other Available Sika Waterproofing Brochures



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