

Tricosal® Waterbars - Tricomer BV Type

Waterstops for joint sealing in watertight concrete construction according to DIN 18541 and DIN 18541-2

Product Description	<p>Tricosal Tricomer BV Waterbars are highly flexible waterstops made from PVC/NBR copolymer for sealing expansion and construction joints in watertight concrete structures.</p> <p>They are available in a range of different types, shapes and sizes to suit different structures and applications.</p>
Designation	<ul style="list-style-type: none">■ Tricosal® Waterbars - Tricomer BV Type [DIN 18541]
Characteristics / Advantages:	<ul style="list-style-type: none">■ High tensile strength and elongation■ Permanent flexibility and high resilience■ Suitable for medium water pressures and stress■ Resistant to all natural mediums aggressive to concrete■ Bitumen resistant■ Resistant to a broad spectrum of chemical agents (testing necessary for any additional specific situations)■ Robust sections for handling on site■ Weldable
Principles for use:	<ul style="list-style-type: none">■ Design and installation principles according to DIN 18197■ Jointing system in accordance with DIN 18197 and DIN 18541
Uses:	<ul style="list-style-type: none">■ Joint sealing in concrete structures■ Expansion and construction joint sealing in insitu concrete■ For connecting to joints in existing structures use Tricomer clip-on profiles in accordance with DIN 18541-2 (see separate Product Data Sheet)■ Typical Structures: Residential building basements Commercial building basements, underground car parks Water treatment plants Dams (using the special profiles with injection hoses)
Standards / Directives:	<ul style="list-style-type: none">■ DIN 18541-1-2■ DIN 18197■ WU Directive DAfStb.■ Welding Instructions■ Welding jig SG 320 L instruction manual■ Tricosal® Waterbars - Tricomer BV Type installation Method Statements

Test Certificate / Approvals:	<ul style="list-style-type: none"> ■ Manufacturer's test certificate, other tests and approvals as required ■ Certificate of Conformity DIN 18541, parts 1 and 2 ■ External monitoring by MPA NRW ■ Standard external monitoring inspection certificates ■ Test certificates on resistance to sewage slurry, liquid manure and municipal wastewater
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Product Data

Materials:	<ul style="list-style-type: none"> ■ Tricomer = thermoplastic copolymer based on PVC-P with NBR, BV = bitumen resistant
Colour:	<ul style="list-style-type: none"> ■ Black ■ Exposed / Finishing Waterstop surfaces FA grey
Packaging:	<ul style="list-style-type: none"> ■ Standard rolls 20 or 25 m dependent on profile, on Euro or disposable pallets ■ Factory produced waterstopping systems in coils, on Euro or disposable pallets dependent on size
Storage:	<ul style="list-style-type: none"> ■ To be stored on the pallets as supplied on a flat base ■ For long-term storage ≥ 6 months in enclosed areas: The storage area should be covered, cool, dry, free from dust and moderately ventilated. The Tricomer waterstops must be protected from heat sources and strong artificial lights with a high UV content. ■ Short-term storage > 6 weeks and < 6 months in enclosed areas on construction sites, outdoors: <ul style="list-style-type: none"> - As for long-term storage i.e. - In dry storage protected by suitable covers from direct sunlight, snow and ice or any other form of contamination - Store separate from other potentially harmful materials, plant and equipment such as structural steel, reinforcement or fuels etc. - Store away from traffic and site roads in a dry area ■ Short-term storage ≤ 6 weeks on construction sites, outdoors: <ul style="list-style-type: none"> - Protected from contamination or damage - Protected by suitable covers from strong sunlight and snow or ice

Mechanical Properties

Shore-A Hardness:	67 \pm 5	DIN 53505
Tensile Strength:	≥ 10 MPa	EN ISO 527-2
Elongation:	$\geq 350\%$	EN ISO 527-2
Tear propagation resistance	≥ 12 N/mm	ISO34-1
Reaction to cold Elongation at -20°C	$\geq 200\%$	EN ISO 527-2

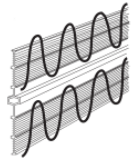
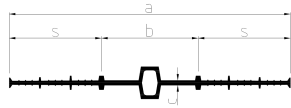


Reaction after		
a) Storage in saturated limewash		
b) Heat ageing		DIN 53508
c) Impact of microorganisms		EN ISO 846
d) Weathering		EN ISO 4892-2
Allowable average value change ^{a)}		
Tensile strength	≤ 20%	
Elongation	≤ 20%	EN ISO 527-2
Elastic Modulus	≤ 50%	
Weldability		
(Division of the tensile strength with welded seams by the tensile strength without seams)	≥ 0.6	DIN 18541-2
Reaction in Fire		
EN 13501-1	Class E	EN ISO 11925-2 EN 13501-1
Reaction after storage in bitumen		
Allowable average value change ^{a)}		DIN 18541-.2 EN ISO 291
Tensile strength	< 20%	EN ISO 527-2
Elongation	< 20%	
Elastic Modulus	< 50%	
^{a)} Relative to initial value		

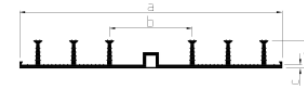
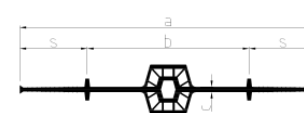
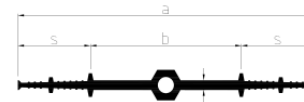
Expansion joint waterstop forms

The limits of water pressure and stress given in the tables below apply to standard uses without specific additional testing. Different values may be used when precise information on all of the relevant stresses and structural requirements is available.

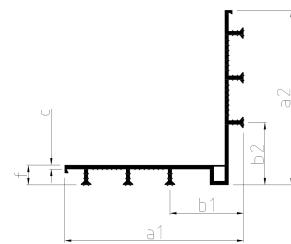
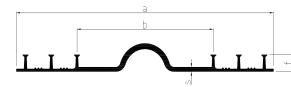
Waterproofing



D ... SF



DAO for joint width $w_{nom} \leq 10$ cm



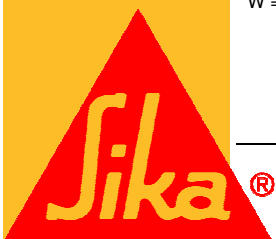
A = Stop anchor external
W = Stop anchor reciprocal

Art	Waterstop Type Tricomer BV	Total width	Width of expansion part	Thickness of expansion part	Width of sealing parts	Roll length	Water pressure	Strain
		a	b	C	s			
		[mm]	[mm]	[mm]	[mm]	[m]	[bar]	[mm]
D 240 *		240	85	4.5	78	25	0 0.3	20 10
D 320 *		320	110	5.5	105	25	0 1.0	25 15
D 500		500	155	6.5	173	25	0 1.2	30 15
D 250/6 *		250	120	6	65	25	0 0.36	20 10
D 320/6 *		320	170	6	75	25	0 1.1	25 15
D 250/9		250	120	9	65	25	0 0.45	20 15
D 320/9		320	120	9	100	25	0 1.5	25 15
D 240 SF **		240	85	4.5	78	25	0 0.1	20 15
D 320 SF **		320	100	5	105	25	0 0.3	25 15
D 260 TS		260	125	7/9	68	25	---- ¹⁾	
D 350 TS		345	175	9/11	85	25		
D 400 TS		400	195	10/11	103	25		
D 320 HS		320	170	5.5	75	25	0 1.0	25 15
Internal	Form D 320 HS with central hose sheathing is used specifically for compression joints with shear stress or joints with a width $w_{nom} > 30$ mm.							
				Stop anchor				
				N [1] x f [mm]				
DA 240	240	90	4.5	4 x 20	25	0 ¹⁾	25	
DA 240/2 *	240	90	4.5	4 x 25	25	0 0.2	25 20	
DA 240/3 *	240	104	5	4 x 35	20	0 0.2	25 20	
DA 320	330	104	4.5	6 x 20	25	0 ¹⁾	27	
DA 320/2 *	330	104	4.5	6 x 25	25	0 0.3	27 20	
DA 320/3 *	330	104	5	6 x 35	20	0 0.7	30 20	
DA 500	500	124	4.5	8 x 20	25	0	35	
DA 500/2	500	124	4.5	8 x 25	25	0 0.3	35 20	
DA 500/3	500	124	5	8 x 35	20	0 1.0	35 20	
DAO 500/25	500	250	8	6 x 25	25	0.1 ¹⁾	30	
DA 240 L-piece A **	146 /131	71/55	4.5	4 x 20	25	0 ¹⁾	15 ¹⁾	
DA 240 L-piece W **	146 /131	71/55	4.5	4 x 20	25	0 ¹⁾	15 ¹⁾	
DA 320 L-piece A **	192 /176	79/63	4.5	6 x 20	25	0 ¹⁾	15 ¹⁾	
DA 320 L-piece W **	192 /176	79/63	4.5	6 x 20	25	0 ¹⁾	15 ¹⁾	

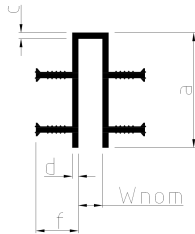
* Standard stock product ** Waterstop to DIN 18541-2

¹⁾ Special project-related data

v_r Resultant strain = $(v_x^2 + v_y^2 + v_z^2)^{1/2}$
 N No. of stop anchors with DA and FA
 f Depth of profile



Exposed / Finishing Waterbar forms



Art	Waterstop Type Tricomer BV	Total width	Joint width	Cover slab or waterstop leg thickness	No. of stop anchors Profile depth	Roll length	Water pressure	Strain
		a [mm]	W _{nom} [mm]	c / d [mm]	N x f [1] x [mm]	p [m]	p [bar]	V _r [mm]
	FA 50/2/3	50	10	5	2 x 35	25	0	20
	FA 50/3/2	50	20	5	2 x 25	25	0	20
	FA 50/3/3 *	50	20	5	2 x 35	25	0	20
	FA 70/3/4 *	70	20	5	2 x 45	25	0	40
	FA 70/5/4 *	70	40	5	2 x 45	25	0	40
	FA 90/3/2	95	20	5	4 x 25	25	0.1	20
	FA 90/3/3 *	95	20	5	4 x 35	25	0.1	20
	FA 130/4/3 **	140	30	5	4 x 35	25	0.1	30
	FA 130/6/3 **	140	50	5	4 x 35	25	0.1	30
	FA 130/3/2	140	20	5	6 x 25	25	0.3	20
	FA 130/3/3	140	20	5	6 x 35	25	0.3	20
	FA 50/5/15 ²⁾	50	20	5	1 x 45	25	0	20

* Standard stock product ** Waterstop to DIN 18541-2

²⁾ With 150 mm adhesive flange on one side for embedding in bituminous sealant

Installation of connecting waterstops with trapezoidal strip TFL, see Accessories.

for joint width 10 mm: TFL 20

for joint width 20 mm: TFL 30

for joint width 30 mm: TFL 40

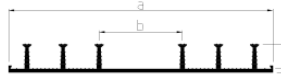
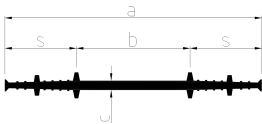
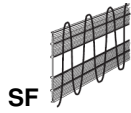
for joint width 40 mm: TFL 50

Waterproofing

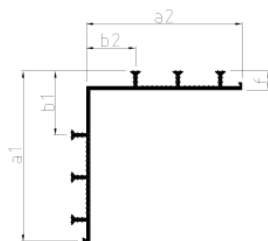
Construction joint Waterstop forms



A / FIX



AA 650/30
for construction joints with low clearance of ca. 20 cm, e.g. in suspended ceilings



A = Stop anchor external
I = Stop anchor internal
W = Stop anchor reciprocal

Type	Waterstop Type Tricomer BV	Total width	Width of expansion part	Thickness of expansion part	Width of sealing part	Roll length	Water pressure	Strain
		a	b	C	s			
Form		[mm]	[mm]	[mm]	[mm]	[m]	[bar]	[mm]
	A 240 *	240	85	4	77.5	25	0.3	3
	A 320 *	320	110	5	105	25	1.0	
	A 500	500	155	6.5	172.5	25	1.2	
	A 240 FIX *	240	80	4	80	25	0.3	
	A 320 FIX *	320	100	5	110	25	1.0	
	A 240 SF **	240	70	4	85	25	0.1	
	A 320 SF **	320	110	5	105	25	0.3	
	A 260 TS	260	115	9	72.5	25	---- ¹⁾	
	A 320 TS	320	165	10	77.5	25		
				Stop anchor				
					N x f			
					[1] x [mm]			
	AA 240	240	90	4.5	4 x 20	25	0 ¹⁾	3
	AA 240/2 *	240	90	4.5	4 x 25	25	0.2	
	AA 240/3 *	240	104	5	4 x 35	20	0.2	
	AA 320	330	104	4.5	6 x 20	25	0 ¹⁾	
	AA 320/2 *	330	104	4.5	6 x 25	25	0.3	
	AA 320/3 *	330	104	5	6 x 35	20	0.7	
	AA 500	500	124	4.5	8 x 20	25	0 ¹⁾	
	AA 500/2	500	124	4.5	8 x 25	25	0.3	
	AA 500/3	500	124	5	8 x 35	20	1.0	
	AA 650/30	650	165	6	6 x 35	20	0.7	
		a1/a2	b1/b2					
	AA 240 L-piece A	136/120	61/45	4.5	4 x 20	25	0 ¹⁾	
	AA 240 L-piece W	136/120	61/45	4.5	4 x 20	25	0 ¹⁾	
	AA 240 L-piece I	136/120	61/45	4.5	4 x 20	25	0 ¹⁾	
	AA 320 L-piece A	181/165	68/52	4.5	6 x 20	25	0 ¹⁾	
	AA 320 L-piece W	181/165	68/52	4.5	6 x 20	25	0 ¹⁾	
	AA 320 L-piece I	165/165	52/52	4.5	6 x 20	25	0 ¹⁾	

* Standard stock product ** Waterstop to DIN 18541-2

¹⁾ Special project-related data

v_r Resultant strain = $(v_x^2 + v_y^2 + v_z^2)^{1/2}$

N No. of stop anchors for AM and FAE/FFK

f Depth of stop anchor



Waterstop selection

Water pressure / Cover Depth / Stress

The data in the above tables on water pressure and the resultant stress reflects the general application range in which the waterstops can be used without additional testing.

Shear strains in the y direction (transverse longitudinal to the waterstop) are limited to the dimensions of the nominal joint width w_{nom} without additional measures.

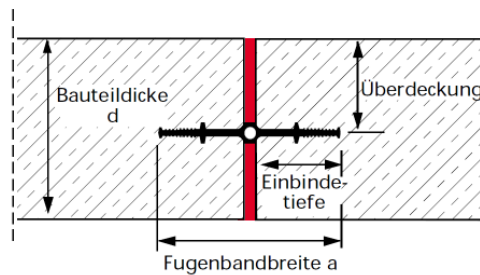
The forms of waterstop are to be selected as detailed in DIN 18197.

If the water pressure and/or resultant strain value is to be exceeded, the values applicable to the waterstop should be specified on the basis of specific references, calculations or tests, with allowance for all the actual influences and stresses.

Rule of cover depth

As applicable to internal waterstop forms:

Concrete cover \geq embedment depth
or
Total waterstop width $a \approx$ Member thickness



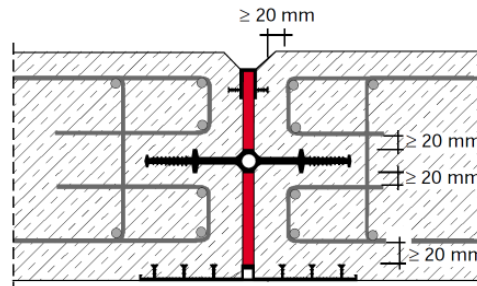
Member thickness Waterbar width a Embedment depth Cover

External waterstops and finishing waterstops can be selected without considering the member thickness.

Anchorage depth

The anchorage depth/concrete cover of the anchor ribs or stop anchors must be 30 mm minimum.

Reinforcement clearance



Nominal joint widths

The nominal joint width is:

Internal expansion waterstops	$w_{nom} = 20$ or 30 mm
External expansion waterstops	$w_{nom} = 20$ mm
Finishing waterstops	$w_{nom} =$ in accordance with the profile clearance (10, 20, 30, 40 mm)

For a greater nominal joint width or compression joints subject to shear stress, internal expansion waterstops with central hose sheathing are used.

Temperature range

The service temperature (waterstop temperature) is:

For pressurised water:	-20 °C to $+40$ °C,
For non pressurised water:	-20 °C to $+60$ °C.

Special stresses and exposures

Exposure to Different Temperatures and Chemical agents

For special stresses or exposure to different temperatures and/or chemical mediums outside the substances or situations specifically defined in DIN 4033, separate tests are always necessary.

System Information

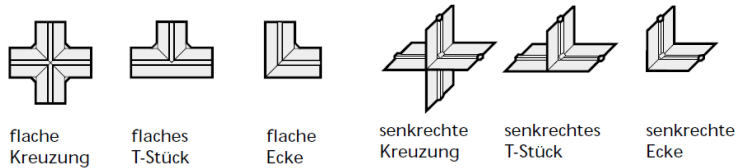
General

As specified in DIN 18197 only butt joints should be formed on site with Tricomer based waterstops; the other jointing profiles are factory produced. The factory production of different waterstopping systems and profiles reduces the joints required to be formed on site to a minimum.

Factory Produced Jointing Pieces

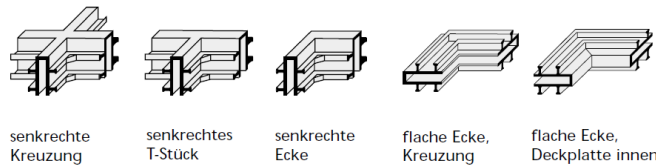
Special profiles or waterstopping systems can be factory produced for specific projects

Standard joint profiles for internal and external Tricomer Waterstops include:



flache Kreuzung; flaches T-Stück; flache Ecke; senkrechte Kreuzung; senkrechtes T-Stück; senkrechte Ecke

Standard joint profiles of exposed / finishing Waterstops include:



senkrechte Kreuzung; senkrechtes T-Stück; senkrechte Ecke; flache Ecke, Kreuzung; flache Ecke, Deckplatte innen

Production of these profiles is preferably in 90° sections, or in standard internal or external angles 60° - 175°.

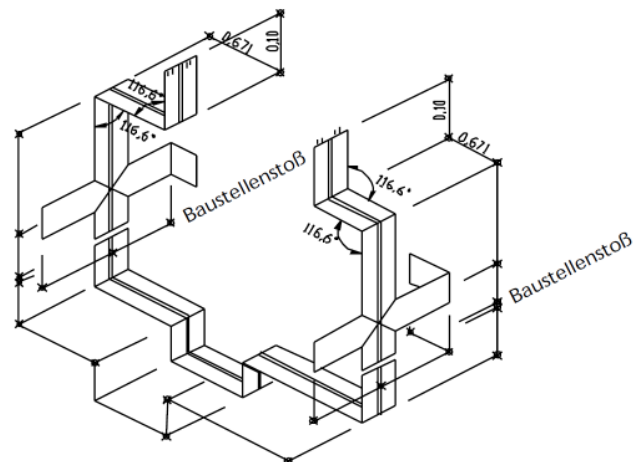
Special joints

Combined joints using different waterstop forms (as connections), e.g. form D with DA, or DA with FA.

In the standard approach the joint profiles are built into the joint waterstopping system. The sizes of the system components are dependent on the waterstop forms involved and the type and number of joints required. The normal maximum total length of waterstopping systems is up to 25 m maximum (total for all separate lengths).

Typical Waterstop system (as example)

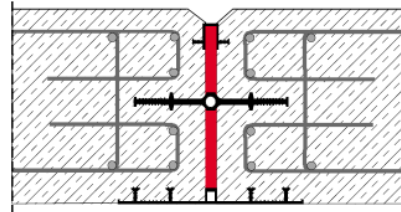
Site joint



Documentation	<ul style="list-style-type: none"> ■ Manufacturer's test certificate, other test certificates as required ■ Certificate of Conformity ■ Regular external monitoring inspection certificates ■ System drawings of the systems and components with detailed dimensions.
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Handling	<p>As specified in DIN 18197.</p> <ul style="list-style-type: none"> ■ Careful transport and handling on site ■ Installation only at waterstop material temperatures $\geq 0^{\circ}\text{C}$ ■ Protection is required until the waterstopping system is fully cast in ■ Special care to be taken of free waterstop ends ■ Waterstops are cleaned before casting in
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Application	As specified in DIN 18197.
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- Internal waterstops are installed within the concrete section and clearance from the edge of the concrete must be at least half the total width of the waterstop.
- External waterstops are installed flush with external face of the concrete. Do not install on the top surface of horizontal or slightly sloping concrete.
- Finishing waterstops are installed in the joint, set back by the dimension of the joint chamfer.

Detailed information on installation is given in the relevant method statements and instructions for use of each form.

If there are very high stresses or difficult concreting conditions, the waterstops can be supplied in forms with integrated injection hoses to additionally inject / grout around the cast-in parts at a later date.

Jointing on site: Site joints	<p>The thermoplastic Tricomer waterbars are butt jointed together by welding. The edges for connection are melted and joined together in the plastic state.</p> <p>Jointing with adhesives is not permitted under DIN 18197.</p> <p>Site joints must be formed as stated in the welding instructions.</p> <p>Requirement: Minimum ambient temperature $+ 5^{\circ}\text{C}$ and dry weather conditions. The requirements and limitations of DIN 18197 apply to the jointing techniques. The welding jig used must allow a weld over the full cross-section of the waterstop, be temperature controlled and allow measured pressure.</p> <p>Site joints must be formed only by trained and qualified personnel. Their welding training completion certificates must not be more than 2 years old. Training courses leading to operative certification are run by Sika Deutschland GmbH, Structural Sealing Division, Illertissen.</p> <p>The key steps for site jointing and complying with the welding instructions are:</p> <ol style="list-style-type: none"> 1) Cut the waterstop ends, straight and square 2) Butt joint with welding jig SG 320 L, or in special situations with a welding blade <p>Welding process:</p> <ul style="list-style-type: none"> Align Heat/melt Change round Join together Cool (in ambient temperature - Do not use coolant)
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3) Inspect and protect the seam as necessary

After cooling for about half an hour the joint is normally finished and may be fixed / installed / stressed.

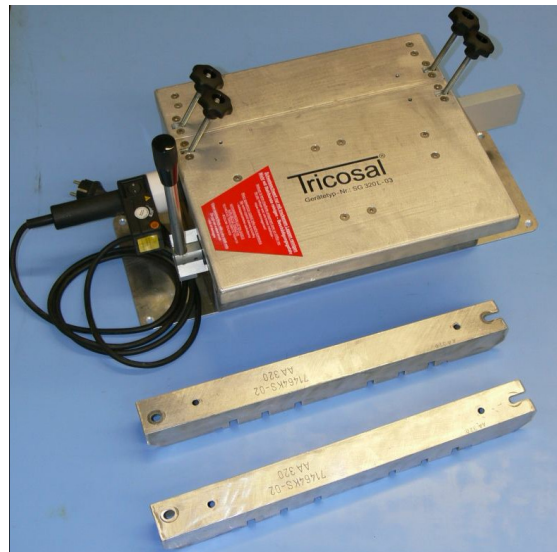
Further steps may be necessary dependent on the joint requirements and the waterstop form.

These steps are described in full for all waterstop types in the individual waterstop welding instructions. These instructions are enclosed with every jig unit or are supplied direct to the contract on request.

All welding work is subject to the relevant local Health and Safety regulations. Formation of these site joints takes about a half to three-quarters of an hour of working time per joint, dependent on the specific waterstop form and therefore this time must be scheduled and the work completed properly before the next operations proceed..

Two people are required for the welding of site butt joints with a welding axe. For internal construction joint waterstops, a manually welded lap joint is possible (with only 1 person required).

Welding jigs (provided on hire)



Welding jig SG 320 L for waterstops up to 320 mm total width

Welding jig SG 600 for waterstops up to 500 mm total width

Clamping bars – according to the profiles being used.

Welding jigs are electrical appliances which are subject to standard regular safety checks (under BGV A 3 for example), which must be scheduled and arranged when due by the hirer.

The operating instructions for welding jig SG 320 L describe all of the steps required for waterstop welding and these must be closely followed when forming joints.

The welding jigs may only be used as described and according to all relevant regulations as stated in the operating instructions.

Manual equipment and tools

Cutting

Tape measure, metre rule, set square
Marker pen
Cutting knife

Seam protection:

With welding strip ca. 25 x 2.5 mm

Scissors
Welding blade 200 W
Hot-air gun
Wire brush

With welding cord Ø 4 mm

Scissors
Pointed 50 W piston
Wire brush



Seam inspection tester

Spark tester / holiday detector

Welding material

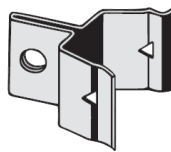
Welding foil ca. 25 x 2.5 mm
Welding cord Ø ca. 4 mm

Roll ca. 25 m
Coil ca. 2.3 kg

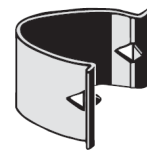
Welding materials are supplied to order.
Welding materials must be stored away from dust and contamination.

Accessories

Waterstop clips



Größe 1
Size 1



Rundklammern
Round clips

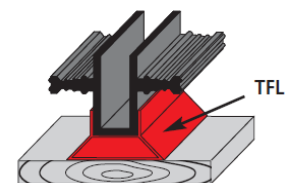
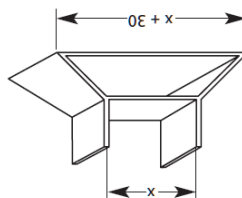


The waterstop fixings should be installed at maximum 25 cm centres.

Fixing to the reinforcement.

TFL insert profile

for the secure installation of finishing waterstops



Profile	Joint width $w_{nom} = x$ [mm]	Units [m]
TFL 20	10	1 m / 2.50 m in coil of 10
TFL 30	20	1 m / 2.50 m in coil of 10
TFL 40	30	1 m
TFL 50	40	1 m

Future Injection Capability

- Injection hose SikaFuko® -VT 1 and 2 or SikaFuko® -Eco 1
- Round clip 16/18 (for SikaFuko® -VT 1 and waterstop form FM/F)
- Round clip 22 (for SikaFuko® -VT 2 waterstop form FM/F)

Fixings to be at 12.5 cm centres max.

Installation and injection of the SikaFuko injection hoses is detailed in their respective Product Data Sheets Sika Method Statement / Installation guidelines and the relevant local regulations for the specific Sika injection hoses used.

Hose Stoppers

to plug the injectable hoses at free waterstop ends (as DIN 18197, section. 5.2.1).

On permanent free hose ends the projecting part is sealed / stopped and cut off.

On temporary free hose ends the stoppers are removed before forming the connecting butt joint.

Waterproofing

Ecology, Health and Safety Information:	For information and advice on the safe handling, storage and disposal of chemical products, users shall refer to the most recent Material Safety Data Sheet containing physical, ecological, toxicological and other safety-related data.
Value Base:	All technical data stated in the Product Data Sheet are based on laboratory tests. Actual measured data may vary from country to country. Please consult the local Product Data Sheet for the exact description of the application fields.
Legal Notes:	The above information, in particular the recommendations relating to the application and use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any verbal advice or consultation, unless we have acted intentionally or with gross negligence. In such a case, the user must prove that he has provided Sika with all the information, which is necessary for the proper and successful assessment of the case by Sika, in full, in time and in writing. The user of the product shall ensure that the product is suitable for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms and conditions of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which can either be requested from us or downloaded from our website at www.sika.de .

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