Technical Documentation

Sika AnchorFix®-1

Product Information

Sika Limited

BUILDING TRUST

TABLE OF CONTENTS

CHEMICAL RESISTANCE

The chemical adhesive has undergone extensive chemical resistance testing. The results are summarised in the table below.

Chemical Environment	Concentration	Result
Aqueous Solution Acetic Acid	10%	✓
Acetone	100%	✗
Aqueous Solution Aluminium Chloride	Saturated	✓
Aqueous Solution Aluminium Nitrate	10%	✓
Ammonia Solution	5%	✗
Jet Fuel	100%	✗
Benzene	100%	✗
Benzoic Acid	Saturated	✓
Benzyl Alcohol	100%	✗
Sodium Hypochlorite Solution	5 - 15%	✓
Butyl Alcohol	100%	C
Calcium Sulphate Aqueous Solution	Saturated	✓
Carbon Monoxide	Gas	✓
Carbon Tetrachloride	100%	C
Chlorine Water	Saturated	✗
Chloro Benzene	100%	✗
Citric Acid Aqueous Solution	Saturated	✓
Cyclohexanol	100%	✓
Diesel Fuel	100%	✓
Diethylene Glycol	100%	✓
Ethanol	95%	✗
Ethanol Aqueous Solution	20%	C
Heptane	100%	C
Hexane	100%	C
Hydrochloric Acid	10%	✓
	15%	✓
	25%	C
Hydrogen Sulphide Gas	100%	✓
Isoproyl Alcohol	100%	✗
Linseed Oil	100%	✓

Lubricating Oil	100%	✓
Mineral Oil	100%	✓
Paraffin / Kerosene (Domestic)	100%	C
Phenol Aqueous Solution	1%	✗
Phosphoric Acid	50%	✓
Potassium Hydroxide	10% / pH13	C
Sea Water	100%	C
Styrene	100%	✗
Sulphur Dioxide Solution	10%	✓
Sulphur Dioxide (40°C)	5%	✓
Sulphuric Acid	10%	✓
	50%	✓
Turpentine	100%	C
White Spirit	100%	✓
Xylene	100%	✗

✓ = Resistant to 75°C with at least 80% of physical properties retained.

C = Contact only to a maximum of 25°C.

✗ = Not Resistant

INSTALLATION PARAMETERS

Installation Parameters - Threaded Rods								
Size			M8	M10	M12	M16	M20	M24
Nominal Drill Hole Diameter	d_o	[mm]	10	12	14	18	22	26
Diameter of Cleaning Brush	d_b	[mm]	14	14	20	20	29	29
Torque Moment	T_{inst}	[Nm]	10	20	40	80	150	200
Minimum Embedment Depth	h_{ef}	[mm]	64	80	96	128	160	192
Maximum Embedment Depth	h_{ef}	[mm]	96	120	144	192	240	288
Minimum Edge Distance	c_{min}	[mm]	35	40	50	65	80	96
Minimum Spacing	s_{min}	[mm]	35	40	50	65	80	96
Minimum Member Thickness	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100mm			h_{ef} + 2d_o		

CHARACTERISTIC RESISTANCE

Characteristic Resistance - Combined Pullout & Concrete Cone Failure Using Threaded Rods For working life of 50 and 100 years								
Size			M8	M10	M12	M16	M20	M24
Characteristic Bond Resistance in Uncracked Concrete, -40°C to 80°C	$\tau_{Rk,uncr}$	N/mm²	9.0	8.0	9.0	9.5	8.5	8.0
Partial Safety Factor — Dry Concrete / Wet Concrete / Flooded Holes	γ_{Mp}	[-]	1.8					
Factor for Concrete	Ψ_c	C30/37	1.12					
		C35/45	1.19					
		C50/60	1.30					
Factor for influence of sustained load for a working life of 50 years — T1: -40°C to 80°C	Ψ^0_{sus}	[-]	0.78					

Splitting Failure								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Edge Distance	$c_{cr,sp}$	[mm]	2hef			1.5hef		
Spacing	$s_{cr,sp}$	[mm]	4hef			3hef		

RESISTANCE VALUES

Resistance Values for Threaded Rod in Uncracke d Concrete
Combined Pullout & Concrete Cone Failure and Concrete Cone Failure
Temperature Range: -40°C to 80°C

Property	Unit		Anchor Diameter					
			M8	M10	M12	M16	M20	M24
Effective Embedment Depth = MIN = 8d	h_{ef}	[mm]	64	80	96	128	160	192
Design Resistance	N_{Rd}	[kN]	8.0	11.0	18.0	33.5	47.0	64.0
Effective Embedment Depth = 10d	h_{ef}	[mm]	80	100	120	160	200	240
Design Resistance	N_{Rd}	[kN]	10.0	13.5	22.5	42.0	59.0	80.0
Effective Embedment Depth = 12d	h_{ef}	[mm]	96	120	144	192	240	288
Design Resistance	N_{Rd}	[kN]	12.0	16.5	27.0	50.5	71.0	96.5

1. Resistance values are based on combined pullout & concrete cone failure and concrete cone failure according to EC2-4. Resistance for steel failure must also be considered - the lowest value controls.
2. Resistance values are for single anchors without close edges or eccentric loading considerations. The ratio of sustained tension loading is 0.
3. Tabulated values correspond to the above stated temperature range and installation conditions only.
4. Long term temperatures are those that remain roughly constant over prolonged periods. Short term temperatures occur over briefintervals, e.g.: diurnal cycling.
5. The compressive strength of the concrete ($f_{ck,cylinder}$) is assumed to be 20 N/mm².
6. Tabulated resistance values assume that the geometry of the anchor(s) and concrete member is sufficient to avoid splitting failure.

CHARACTERISTIC VALUES FOR STEEL

Threaded Rods - Characteristic Values for Steel Failure (Tension)								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Steel Grade 5.8	$N_{Rk,s}$	kN	18	29	42	79	123	177
Partial Safety Factor	γ_{Ms}	[-]	1.50					
Steel Grade 8.8	$N_{Rk,s}$	kN	29	46	67	126	196	282
Partial Safety Factor	γ_{Ms}	[-]	1.50					
Steel Grade 10.9*	$N_{Rk,s}$	kN	37	58	84	157	245	353
Partial Safety Factor	γ_{Ms}	[-]	1.40					
Stainless Steel Grade A4-70	$N_{Rk,s}$	kN	26	41	59	110	172	247
Partial Safety Factor	γ_{Ms}	[-]	1.90					
Stainless Steel Grade A4-80	$N_{Rk,s}$	kN	29	46	67	126	196	282
Partial Safety Factor	γ_{Ms}	[-]	1.60					
Stainless Steel Grade 1.4529	$N_{Rk,s}$	kN	26	41	59	110	172	247
Partial Safety Factor	γ_{Ms}	[-]	1.50					

**Galvanized rods of high strength are sensitive to hydrogen induced brittle failure.*

Threaded Rods - Characteristic Values for Steel Failure (Shear – without lever arm)								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Steel Grade 5.8	$V_{Rk,s}$	kN	9	15	21	39	61	88
Partial Safety Factor	γ_{Ms}	[-]	1.25					
Steel Grade 8.8	$V_{Rk,s}$	kN	15	23	34	63	98	141
Partial Safety Factor	γ_{Ms}	[-]	1.25					
Steel Grade 10.9*	$V_{Rk,s}$	kN	18	29	42	79	123	177
Partial Safety Factor	γ_{Ms}	[-]	1.50					
Stainless Steel Grade A4-70	$V_{Rk,s}$	kN	13	20	30	55	86	124
Partial Safety Factor	γ_{Ms}	[-]	1.56					
Stainless Steel Grade A4-80	$V_{Rk,s}$	kN	15	23	34	63	98	141
Partial Safety Factor	γ_{Ms}	[-]	1.33					
Stainless Steel Grade 1.4529	$V_{Rk,s}$	kN	13	20	30	55	86	124
Partial Safety Factor	γ_{Ms}	[-]	1.25					

**Galvanized rods of high strength are sensitive to hydrogen induced brittle failure.*

Threaded Rods - Characteristic Values for Steel Failure (Shear – with lever arm)								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Steel Grade 5.8	$M^0_{Rk,s}$	N.m	19	37	66	166	325	561
Partial Safety Factor	γ_{Ms}	[-]	1.25					
Steel Grade 8.8	$M^0_{Rk,s}$	N.m	30	60	105	266	519	898
Partial Safety Factor	γ_{Ms}	[-]	1.25					
Steel Grade 10.9*	$M^0_{Rk,s}$	N.m	37	75	131	333	649	1123
Partial Safety Factor	γ_{Ms}	[-]	1.50					
Stainless Steel Grade A4-70	$M^0_{Rk,s}$	N.m	26	52	92	233	454	786
Partial Safety Factor	γ_{Ms}	[-]	1.56					
Stainless Steel Grade A4-80	$M^0_{Rk,s}$	N.m	30	60	105	266	519	898
Partial Safety Factor	γ_{Ms}	[-]	1.33					
Stainless Steel Grade 1.4529	$M^0_{Rk,s}$	N.m	26	52	92	233	454	786
Partial Safety Factor	γ_{Ms}	[-]	1.25					

Concrete pryout failure		
Factor k **		2
Partial Safety Factor	γ_{Ms}	1.50

**Galvanized rods of high strength are sensitive to hydrogen induced brittle failure.*

*** K Value from TR029 Design of bonded anchors pt 5.2.3.3*

USING SIKA ANCHORFIX-1 IN MASONRY

INSTALLATION PARAMETERS

Anchor Type			Anchor rod					Internally threaded socket				
Anchor Size			M8		M10		M12	M8		M10		M12
Internal Threaded Socket	d_{to} x l_t	[mm]	-		-		-	12x80		14x80		16x80
Plastic Sleeve	l_s	[mm]	85		85		85	85		85		85
	d_s	[mm]	15	16	15	16	20	15	16	20		20
Nominal Drill Hole Dia.	d_o	[mm]	15	16	15	16	20	15	16	20		20
Cleaning Brush Dia.	d_b	[mm]	20 ± 1		20 ± 1		22 ± 1	20 ± 1		22 ± 1		22 ± 1
Drill Hole Depth	h_o	[mm]	90					90				
Effective Anchoring Depth	h_{ef}	[mm]	85					80				
Clearance Hole Dia.	$d_f \leq$	[mm]	9		12		14	9		12		14
Torque Moment	$T_{inst} \leq$	[Nm]	2					2				

EDGE DISTANCES AND SPACING

Edge distances and spacing									
Anchor rod									
	M8			M10			M12		
Base Material	$c_{cr}=c_{min}$	$s_{cr,\parallel}=s_{min,\parallel}$	$s_{cr,\perp}=s_{min,\perp}$	$c_{cr}=c_{min}$	$s_{cr,\parallel}=s_{min,\parallel}$	$s_{cr,\perp}=s_{min,\perp}$	$c_{cr}=c_{min}$	$s_{cr,\parallel}=s_{min,\parallel}$	$s_{cr,\perp}=s_{min,\perp}$
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Brick No 1	100	235	115	100	235	115	120	235	115
Brick No 2	100	240	113	100	240	113	120	240	113
Brick No 3	100	250	237	100	250	237	120	250	237
Brick No 4	128	255	255	128	255	255	128	255	255
Brick No 5	100	255	255	128	255	255	128	255	255
Brick No 6	100	250	240	100	250	240	120	250	240
Brick No 7	100	250	248	100	250	248	-	-	-
Brick No 8	100	250	248	100	250	248	120	250	248
Brick No 9	100	370	238	100	370	238	120	370	238

Internal Threaded Socket									
	M8			M10			M12		
Base Material	$c_{cr}=c_{min}$	$s_{cr,\parallel}=s_{min,\parallel}$	$s_{cr,\perp}=s_{min,\perp}$	$c_{cr}=c_{min}$	$s_{cr,\parallel}=s_{min,\parallel}$	$s_{cr,\perp}=s_{min,\perp}$	$c_{cr}=c_{min}$	$s_{cr,\parallel}=s_{min,\parallel}$	$s_{cr,\perp}=s_{min,\perp}$
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Brick No 1	100	235	115	120	235	115	120	235	115
Brick No 2	100	240	113	120	240	113	120	240	113
Brick No 3	-	-	-	120	250	237	120	250	237
Brick No 4	128	255	255	128	255	255	128	255	255
Brick No 5	100	255	255	128	255	255	128	255	255
Brick No 6	100	250	240	120	250	240	120	250	240
Brick No 7	100	250	248	120	250	248	120	250	248
Brick No 8	-	-	-	120	250	248	120	250	248
Brick No 9	100	370	238	120	370	238	120	370	238

CHARACTERISTIC RESISTANCE

Characteristic resistance under tension and shear loading			
Base Material	Anchor Rods		
	M8	M10	M12
	$N_{RK}=V_{RK}$ [KN] 1)	$N_{RK}=V_{RK}$ [KN] 1)	$N_{RK}=V_{RK}$ [KN] 1)
Brick No 1	2.5	2.0	2.0
Brick No 2	0.75	1.2	0.50
Brick No 3	0.75	1.2	0.50
Brick No 4	1.50	1.5	3.0
Brick No 5	0.75	0.90	1.5
Brick No 6	1.2	1.2	0.90
Brick No 7	0.60	0.30	-
Brick No 8	0.60	1.5	1.2
Brick No 9	2.5	1.5	2.5

1) For design according ETAG 029, Annex C: NRk = NRk,p= NRk,b = NRk,s; NRk,pb according to ETAG 029, Annex C For VRk,s see Annex C1, Table C2; Calculation of VRk,pb and VRk,c according to ETAG 029, Annex C

Characteristic Bending Moment			
Steel Grade	Anchor Diameter		
	M8	M10	M12
	$M_{Rk,s}$ [Nm]	$M_{Rk,s}$ [Nm]	$M_{Rk,s}$ [Nm]
Steel Grade 5.8	19	37	66
Steel Grade 8.8	30	60	105
Steel Grade 10.9*	37	75	131
Stainless Steel A2-70, A4-70	26	52	92
Stainless Steel A4-80	30	60	105
Stainless Steel 1.4529 strength class 70	26	52	92
Stainless Steel 1.4565 strength class 70	26	52	92

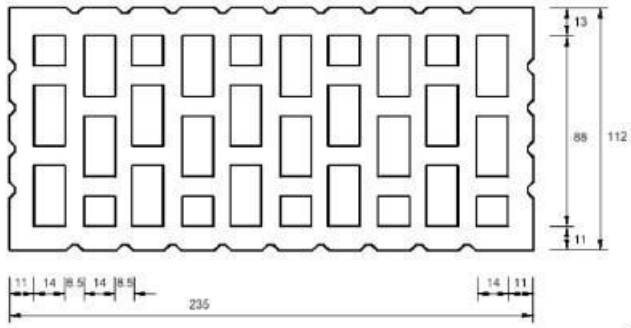
Displacements under tension and shear load					
Base Material	F [kN]	δN0 [mm]	δN∞ [mm]	δV0 [mm]	δV∞ [mm]
Solid Bricks	$N_{Rk}/(1.4 \cdot \gamma_M)$	0.6	1.2	1.0 1)	1.5 1)
Perforated & Hollow Bricks		0.14	0.28	1.0 1)	1.5 1)

1) the hole gap between bolt and fixture shall be considered additionally

β - Factors for Job Site Test According to TR053									
Brick No.	No 1	No 2	No 3	No 4	No 5	No 6	No 7	No.8	No.9
β - Factor	0.62	0.28	0.22	0.48	0.26	0.43	0.42	0.36	0.60

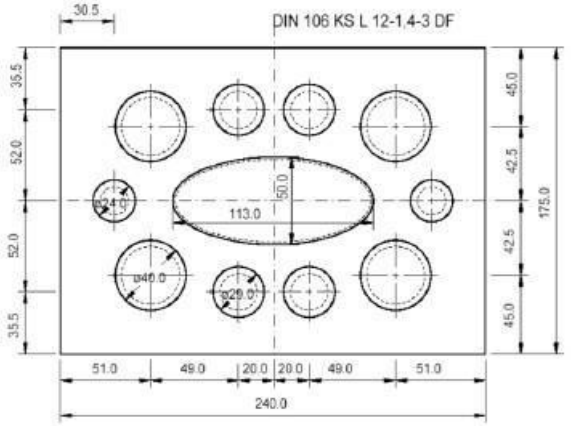
TYPES AND DIMENSIONS OF BRICKS AND BLOCKS

Brick N° 1



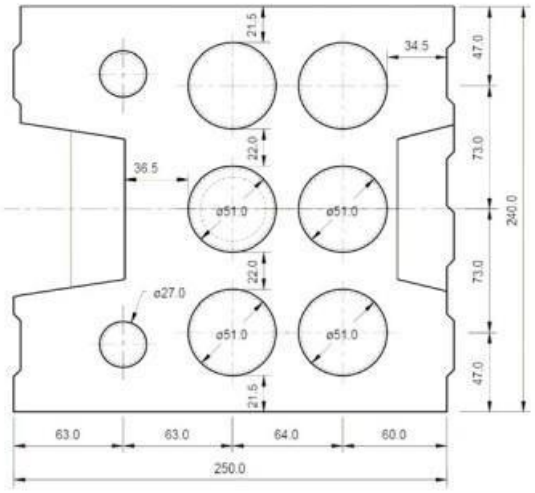
Hollow clay brick HLz 12-1,0-2DF
according to EN 771-1
length/width/height = 235 mm/112 mm/115 mm
$f_b \geq 12$ N/mm² / $\rho \geq 1{,}0$ kg/dm³

Brick N° 2



Hollow sand lime brick KSL 12-1,4-3DF
according to EN 771-2
length/width/height = 240 mm/175 mm/113 mm
$f_b \geq 12$ N/mm² / $\rho \geq 1{,}4$ kg/dm³

Brick N° 3



Hollow sand lime brick KSL 12-1,4-8DF
according to EN 771-2
length/width/height = 250 mm/240 mm/237 mm
$f_b \geq 12$ N/mm² / $\rho \geq 1{,}4$ kg/dm³

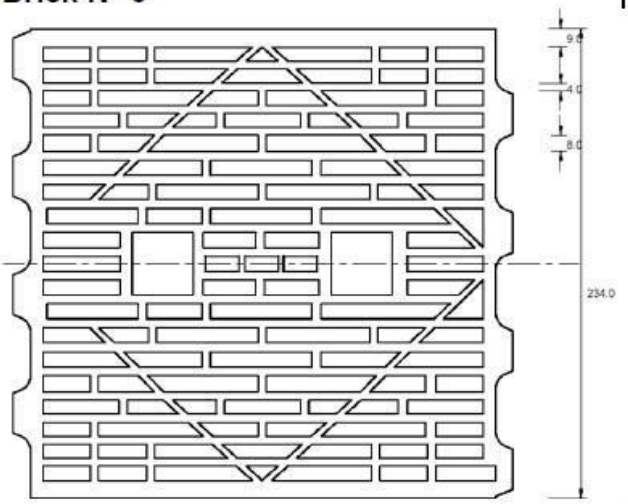
Brick N° 4

Solid clay brick Mz 12-2,0-NF
according to EN 771-1
length/width/height = 240 mm/116 mm/71 mm
$f_b \geq 12$ N/mm² / $\rho \geq 2{,}0$ kg/dm³

Brick N° 5

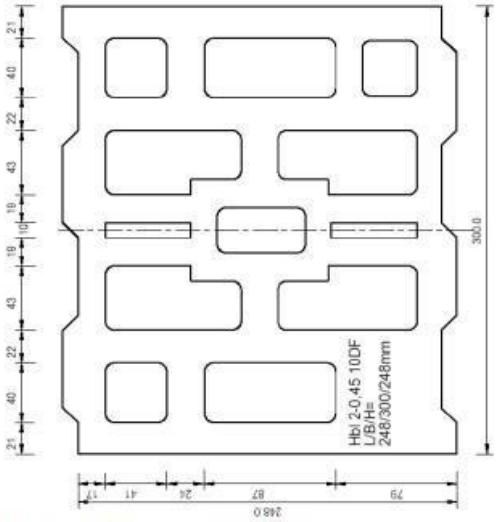
Solid sand lime brick KS 12-2,0-NF
according to EN 771-2
length/width/height = 240 mm/115 mm/70 mm
$f_b \geq 12$ N/mm² / $\rho \geq 2{,}0$ kg/dm³

Brick N° 6



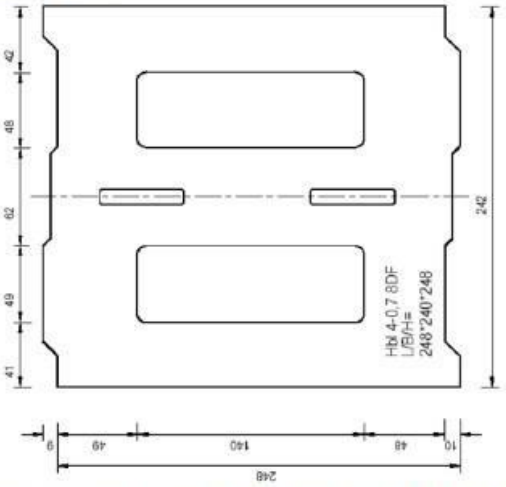
Hollow clay brick HLzW 6-0,7-8DF
according to EN 771-1
length/width/height = 250 mm/240 mm/240 mm
$f_b \geq 6$ N/mm^2 / $\rho \geq 0{,}8$ kg/dm^3

Brick N° 7



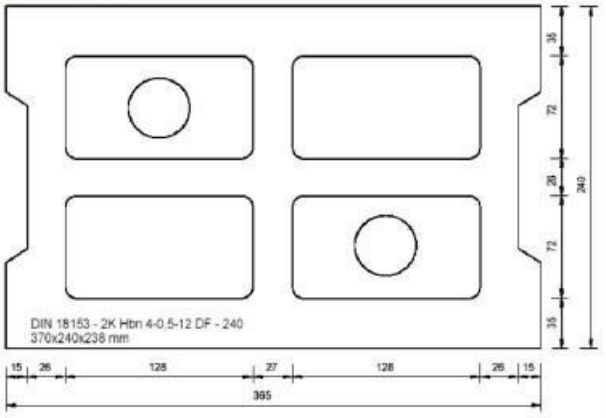
Lightweight concrete hollow block
Hbl 2-0,45-10DF
according to EN 771-3
length/width/height = 250 mm/300 mm/248 mm
$f_b \geq 2{,}0$ N/mm^2 / $\rho \geq 0{,}45$ kg/dm^3

Brick N° 8



Lightweight concrete hollow block Hbl 4-0,7-8DF
according to EN 771-3
length/width/height = 250 mm/240 mm/248 mm
$f_b \geq 4{,}0$ N/mm^2 / $\rho \geq 0{,}7$ kg/dm^3

Brick N° 9



Concrete masonry unit Hbn 4-12DF
according to EN 771-3
length/width/height = 370 mm/240 mm/238 mm
$f_b \geq 4$ N/mm^2 / $\rho \geq 1{,}2$ kg/dm^3

IMPORTANT NOTES

Use in Porous Substrates

This bonded anchor is not intended for use as a cosmetic or decorative product. When anchoring into porous or reconstituted stone. it is recommended that technical assistance is sought. Due to the nature of the product, migration of the monomer in the resin may cause staining in certain materials. If you are still uncertain, it is advisable to test the resin by applying it in a small, discrete area and testing before using the resin on the project.

Important Note

Whilst all reasonable care is taken in compiling technical data on the Company's products, all recommendations or suggestions regarding the use of such products are made without guarantee, since the conditions of use are beyond the control of the Company. It is the customer's responsibility to satisfy themself that each product is fit for the purpose for which they intend to use it, that the actual conditions of use are suitable and that, in the light of our continual research and development programme, the information relating to each product has not been superseded.