WCF-PESF / WCF-PESF-E / WCF-PESF-C

Polyester injection anchors - for medium loads, for use with non-cracked concrete, no styrene

ETA-15/0745

ETA 16/0677

Description

Polyester two-component (1:10) injection anchor without styrene. Dedicated for handymen for work around the house. Intended for installation of threaded rods into concrete substrates and into hollow bricks with mesh sleeves.

Content: 300 ml

Working temperatures for hardened anchor: -40˚C to +80˚C

Substrate material

- Non-cracked concrete (option 7) C20/25 through C50/60;
- Reinforced and non-reinforced concrete;
- Dry and wet concrete and flooded holes (Cat 2);
- Solid brick, hollow bricks

Related rods

- Threaded rods M8-M24 made of galvanized steel grades: 5.8 8.8 10.9;
- Threaded rods M8-M24 made of stainless steel grades: A2-70, A4-70, A4-80;
- Threaded rods M8-M24 made of HCR steel: 1.4529, 1.4565;
- Galvanized, hot-dip galvanized or thermodiffusion galvanized bars;

Application temperatures

5°C ÷ 30°C	10°C ÷ 45°C	-10°C ÷ 30°C
WCF-PESF-300	WCF-PESF-E-300	WCF-PESF-C-300

Features and advantages

Wide range of applications	Fence, gate, railing, white armature, wall cabinets, lighting, air-conditioning, calculated in accordance with TR 029
Styrene-free	Does not release volatile styrene compounds, making it safe for people and suitable for indoor applications
No stress in substrates during installation	It wallows for installation near the edges without risking cracking of the substrate
Quick and shrinkless hardening	Speeds up installation work
Long life	Valid for use within 12 months in normal storage conditions
Two mixers included	Ability to reuse the resin after completing work. Place the mixer on an unused cartridge mouth for next use, then unscrew the dried mixer and install the new one - the anchor is now ready for further work
Content - 300 ml	Small volume creates an affordable solution for small scope of work
Optional - mesh sleeves	Mesh sleeves used for installation in substrates with air gaps allows for holding resin in place of installation (the resin does not flow into the empty spaces), thus allowing for proper installation
Durable and safe packaging	Foil packaging prevents the resin from getting out during prolonged storage, while the plastic cartridge serves as an additional protection layer (store in upright position)

WCF-PESF / WCF-PESF-E / WCF-PESF-C

Polyester injection anchors - for medium loads, for use with non-cracked concrete and masonry, no styrene

TABLE 1 Ordering list

	Code	[°C]	Pcs.
300ml	WCF-PESF-300	5 ÷ 30	12
	WCF-PESF-E-300	10 ÷ 45	12
	WCF-PESF-C-300	-10 ÷ 30	12

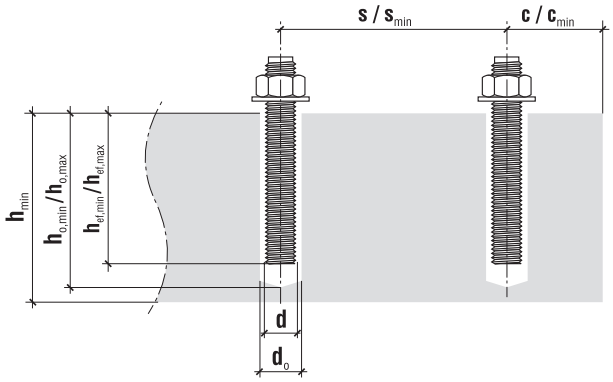


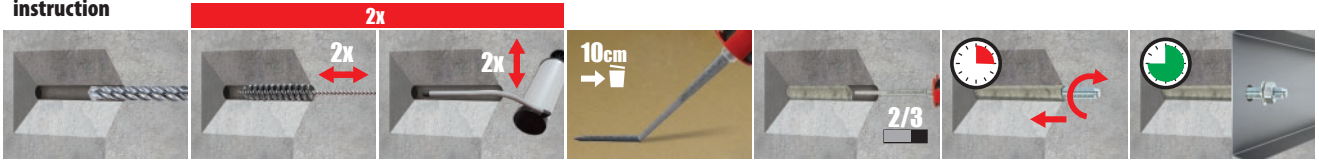
TABLE 2 Installation parameters - threaded rods - concrete substrate

Parameters				THREADED RODS					
				M8	M10	M12	M16	M20	M24
Threaded rod diameter		d	[mm]	8	10	12	16	20	24
Hole diameter		d_0	[mm]	10	12	14	18	22	26
For minimum embedment depth = 8d	Min. embedment depth	$h_{ef,min}$	[mm]	64	80	96	128	160	192
	Min. hole depth	$h_{0,min}$	[mm]	69	85	101	133	165	197
	Min. distance from the edge	c_{min}	[mm]	35	40	50	65	80	96
	Min. spacing	s_{min}	[mm]	35	40	50	65	80	96
Maximum embedment depth = 12d	Max. embedment depth	$h_{ef,max}$	[mm]	96	120	144	192	240	288
	Max. crevice depth	$h_{0,max}$	[mm]	101	125	149	197	245	293
	Min. distance from the edge	c_{min}	[mm]	50	60	70	95	120	145
	Min. spacing	s_{min}	[mm]	50	60	70	95	120	145
Min. substrate thickness		h_{min}	[mm]	h_{ef}+30 mm > 100 mm				h_{ef}+2*d_0	
Torque		T_{inst}	[Nm]	10	20	40	80	150	200

TABLE 3 Curing time

Substrate temp [°C]	Resin type	-10 ÷ -5	-5 ÷ 5	5 ÷ 10	10 ÷ 20	20 ÷ 25	25 ÷ 30	30 ÷ 35	35 ÷ 40	40 ÷ 45	45
Working time [min.]	PESF	-	-	10	6	5	4	4	-	-	-
	PESF-E	-	-	-	15	10	7.5	5	3.5	2.5	2.5
	PESF-C	5	5	3.5	2	1.5	1	1	-	-	-
Hardening time [min]	PESF	-	-	145	85	50	40	35	-	-	-
	PESF-E	-	-	-	300	145	85	50	40	35	12
	PESF-C	240	125	60	40	20	15	10	-	-	-

Setting instruction



WCF-PESF / WCF-PESF-E / WCF-PESF-C

Polyester injection anchors - for medium loads, for use with non-cracked concrete and masonry, no styrene

TABLE 4 Loading resistances for tension

Bar size	Hole diameter [mm]	Torque T_{inst} [Nm]	Loading resistances of individual anchors installed into non-cracked concrete C20/25 maintaining basic installation conditions - characteristic and designed values																		
			Minimal value of {pull-out failure - $N_{R,p}$ [kN] ; concrete cone failure - $N_{R,c}$ [kN]}												Steel failure - $N_{R,s}$ [kN]					
			Safety factor - $\gamma_{Mc} = 1.8$												$\gamma_{Ms}=1.5$		$\gamma_{Ms}=1.4$	$\gamma_{Ms}=1.87$		$\gamma_{Ms}=1,6$
			Embedment depth h_{ef} [mm]												Steel grade					
			60	80	100	120	140	160	180	200	220	240	260	280	300	5.8	8.8	10.9	A2-70	A4-70	A4-80
M8	10	10	12.82	17.09	21.36	-	-	-	-	-	-	-	-	-	-	18.30	29.28	36.60	25.62	25.62	29.28
			7.12	9.49	11.87	-	-	-	-	-	-	-	-	-	-	12.20	19.52	26.14	13.73	13.73	18.30
M10	12	20	-	20.11	25.13	30.16	-	-	-	-	-	-	-	-	-	29.00	46.40	58.00	40.60	40.60	46.40
			-	11.17	13.96	16.76	-	-	-	-	-	-	-	-	-	19.33	30.93	41.43	21.75	21.75	29.00
M12	14	40	-	-	33.93	40.72	47.50	-	-	-	-	-	-	-	-	42.15	67.44	84.30	59.01	59.01	67.44
			-	-	18.85	22.62	26.39	-	-	-	-	-	-	-	-	28.10	44.96	60.21	31.61	31.61	42.15
M16	18	80	-	-	-	-	63.33	72.38	81.43	90.48	-	-	-	-	-	78.50	125.60	157.00	109.90	109.90	125.60
			-	-	-	-	35.19	40.21	45.24	50.27	-	-	-	-	-	52.33	83.73	112.14	58.88	58.88	78.50
M20	22	150	-	-	-	-	-	80.42	90.48	100.53	110.58	120.64	-	-	-	122.50	196.00	245.00	171.50	171.50	196.00
			-	-	-	-	-	44.68	50.27	55.85	61.44	67.02	-	-	-	81.67	130.67	175.00	91.88	91.88	122.50
M24	26	200	-	-	-	-	-	-	-	113.10	124.41	135.72	147.03	158.34	169.65	176.50	282.40	353.00	247.10	247.10	282.40
			-	-	-	-	-	-	-	62.83	69.12	75.40	81.68	87.96	94.25	117.67	188.27	252.14	132.38	132.38	176.50

Data for a single anchor without influence of distance or effects of spacing between the anchors.
As the spacing and distance from the edge decreases, the values given should be multiplied by reduction coefficients from tables 7 and 8.

Characteristic values Design values

TABLE 5 Loading resistances for shearing

Bar size	Hole diameter [mm]	Torque T_{inst} [Nm]	Loading resistances of individual anchors installed into non-cracked concrete C20/25 affected by shearing force maintaining basic installation conditions - characteristic and designed values																		
			Minimal value of {pry-out - $V_{R,p}$ [kN] ; concrete edge failure - $V_{R,c}$ [kN]}													Steel failure - $V_{R,s}$ [kN]					
			Safety factor - $\gamma_{Mc} = 1.5$													$\gamma_{Ms}=1.25$		$\gamma_{Ms}=1.5$	$\gamma_{Ms}=1.56$		$\gamma_{Ms}=1.33$
			Embedment depth h_{ef} [mm]													Steel grade					
			60	80	100	120	140	160	180	200	220	240	260	280	300	5.8	8.8	10.9	A2-70	A4-70	A4-80
M8	10	10	15.63	24.12	33.76	-	-	-	-	-	-	-	-	-	-	9.15	14.64	18.30	12.81	12.81	14.64
			10.42	16.08	22.50	-	-	-	-	-	-	-	-	-	-	7.32	11.71	12.20	8.24	8.24	10.98
M10	12	20	-	24.85	34.78	45.75	-	-	-	-	-	-	-	-	-	14.50	23.20	29.00	20.30	20.30	23.20
			-	16.57	23.19	30.50	-	-	-	-	-	-	-	-	-	11.60	18.56	19.33	13.05	13.05	17.40
M12	14	40	-	-	35.65	46.90	59.12	-	-	-	-	-	-	-	-	21.08	33.72	42.15	29.51	29.51	33.72
			-	-	23.77	31.27	39.41	-	-	-	-	-	-	-	-	16.86	26.98	28.10	18.97	18.97	25.29
M16	18	80	-	-	-	-	61.53	75.17	89.68	105.01	-	-	-	-	-	39.25	62.80	78.50	54.95	54.95	62.80
			-	-	-	-	41.02	50.11	59.79	70.00	-	-	-	-	-	31.40	50.24	52.33	35.33	35.33	47.10
M20	22	150	-	-	-	-	-	77.59	92.57	108.38	124.99	142.36	-	-	-	61.25	98.00	122.50	85.75	85.75	98.00
			-	-	-	-	-	51.73	61.71	72.26	83.33	94.91	-	-	-	49.00	78.40	81.67	55.13	55.13	73.50
M24	26	200	-	-	-	-	-	-	-	111.28	128.33	146.15	164.72	183.99	203.95	88.25	141.20	176.50	123.55	123.55	141.20
			-	-	-	-	-	-	-	74.18	85.55	97.44	109.81	122.66	135.97	70.60	112.96	117.67	79.43	79.43	105.90

Data for a single anchor without influence of distance or effects of spacing between the anchors.
As the spacing and distance from the edge decreases, the values given should be multiplied by reduction coefficients from tables 7 and 9.

Characteristic values Design values

WCF-PESF / WCF-PESF-E / WCF-PESF-C

Polyester injection anchors - for medium loads, for use with non-cracked concrete and masonry, no styrene

TABLE 6 Base installation conditions allowing for maintaining loading resistances from table 4.5

Parameter	Bar size	Formula	Embedment depth h_{ef} [mm]											
			60	80	100	120	140	160	180	200	220	240	260	280	300
Distance from the edge - c[mm]	M8-M24	c=1,5*hef	90	120	150	180	210	240	270	300	330	360	390	420	450
Anchor spacing - s[mm]	M8-M24	s=3*hef	180	240	300	360	420	480	540	600	660	720	780	840	900

TABLE 7 Reduction factors for tension and shearing - effects of anchor spacing, "s"

Effects of anchor spacing (reduction coefficient) - $\Psi_{sn,v}$																										
s/h_{ef}	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	≥3
M8-M24	0.58	0.60	0.62	0.63	0.65	0.67	0.68	0.70	0.72	0.73	0.75	0.77	0.78	0.80	0.82	0.83	0.85	0.87	0.88	0.90	0.92	0.93	0.95	0.97	0.98	1.00

Spacing between anchors cannot be lower than 0,5 of embedment depth (h_{ef})

$0,5\ h_{ef} < s < 3\ h_{ef}$	M8-M24

TABLE 8 Reduction factors for tension - effects of distance from the edge "c"

Effects of anchor distance from the edge (reduction coefficient) - $\Psi_{sn,v}$											
c/h_{ef}	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	≥1,5
M8-M24	0.53	0.57	0.62	0.67	0.71	0.76	0.81	0.85	0.90	0.95	1.00

Distance from the edge cannot be lower than 0,5 of embedment depth (h_{ef})

$0,5\ h_{ef} < c < 1,5\ h_{ef}$	M8-M24

TABLE 9 Reduction factors for cutting - effects of distance from the edge "c"

Effects of anchor distance from the edge (reduction coefficient) - Ψ_{cv}											
c/h_{ef}	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	≥1.5
M8-M24	0.23	0.29	0.36	0.43	0.50	0.58	0.66	0.74	0.82	0.91	1.00

Distance from the edge cannot be lower than 0,5 of embedment depth (h_{ef})

$0,5\ h_{ef} < c < 1,5\ h_{ef}$	M8-M24

TABLE 10 Consumption - concrete

Rod size	Hole diameter [mm]	Bending torque T_{inst} [Nm]	Estimated number of anchors made from one cartridge - capacity 300 ml												
			Anchoring depth h_{ef} [mm]												
			60	80	100	120	140	160	180	200	220	240	260	280	300
M8	10	10	85	64	51	-	-	-	-	-	-	-	-	-	-
M10	12	20	-	44	35	29	-	-	-	-	-	-	-	-	-
M12	14	40	-	-	26	22	19	-	-	-	-	-	-	-	-
M16	18	80	-	-	-	-	11	10	9	8	-	-	-	-	-
M20	22	150	-	-	-	-	-	7	6	5	5	4	-	-	-
M24	26	200	-	-	-	-	-	-	-	4	3	3	3	3	3

WCF-PESF / WCF-PESF-E / WCF-PESF-C

Polyester injection anchors - for medium loads, for use with non-cracked concrete and masonry, no styrene

TABLE 1 Ordering list

	Code	[°C]	Szt.
300ml	WCF-PESF-300	5 ÷ 30	12
	WCF-PESF-E-300	10 ÷ 45	12
	WCF-PESF-C-300	-10 ÷ 30	12

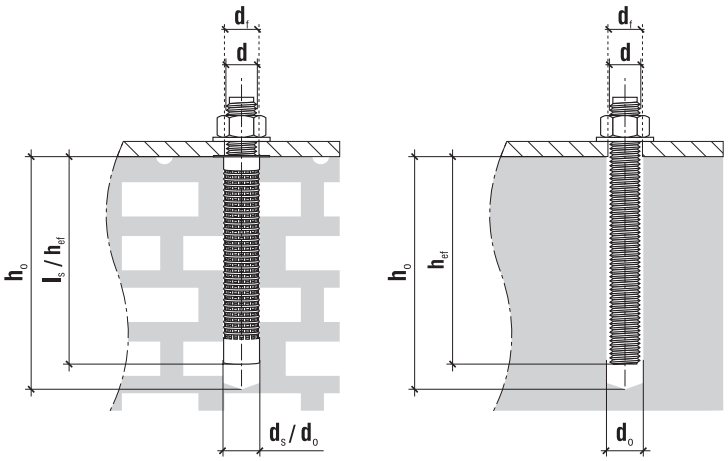


TABLE 2 Installation parameters - threaded rods - masonry

Parameters			THREADED RODS					
Substrate			Full ceramic bricks			Hollow bricks		
Threaded rod diameter	d	[mm]	M8	M10	M12	M8	M10	M12
Nylon mesh sleeve length	l_s	[mm]	-	-	-	85	85	85
Nylon mesh sleeve diameter	d_s	[mm]	-	-	-	15	15	20
Hole diameter	d_0	[mm]	16	16	20	16	16	20
Min. hole depth	h_0	[mm]	90					
Min. anchorage depth	h_{ef}	[mm]	85					
Fixed element hole diameter	d_f	[mm]	9	12	14	9	12	14
Torque	T_{inst}	[Nm]	2					

TABLE 3 Curing time

Substrate temp [°C]	Resin type	-10 ÷ -5	-5 ÷ 5	5 ÷ 10	10 ÷ 20	20 ÷ 25	25 ÷ 30	30 ÷ 35	35 ÷ 40	40 ÷ 45	45
Working time [min.]	PESF	-	-	10	6	5	4	4	-	-	-
	PESF-E	-	-	-	15	10	7.5	5	3.5	2.5	2.5
	PESF-C	5	5	3.5	2	1.5	1	1	-	-	-
Hardening time [min]	PESF	-	-	145	85	50	40	35	-	-	-
	PESF-E	-	-	-	300	145	85	50	40	35	12
	PESF-C	240	125	60	40	20	15	10	-	-	-

Setting instruction

WCF-PESF / WCF-PESF-E / WCF-PESF-C

Polyester injection anchors - for medium loads, for use with non-cracked concrete and masonry, no styrene

TABLE 4 Loading resistances for tension and shearing

Loading resistances of individual anchors installed for tension and shearing in masonry - characteristics and design values - $N_{Rk}=V_{Rk}$*			
Safety factor $\gamma_{Mc}=2,5$			
Substrate	Rod size		
	M8	M10	M12
Solid clay brick MZ 12-2,0-NF	1,50	1,50	3,00
	0,60	0,60	1,20
Solid sand-lime brick KS 12-2,0-NF	0,75	0,90	1,50
	0,30	0,36	0,60
Hollow clay brick HLZ 12-1,0-2DF**	2,50	2,00	2,00
	1,00	0,80	0,80
Hollow sand lime brick KSL 12-1,4-3DF**	0,75	1,20	0,50
	0,30	0,48	0,20
Hollow sand lime brick KSL 12-1,4-8DF**	0,75	1,20	0,50
	0,30	0,48	0,20
Hollow clay brick HLZW 6-0,7-8DF**	1,20	1,20	0,90
	0,48	0,48	0,36
Lightweight concrete hollow block HBL 2-0,45-10DF**	0,60	0,30	-
	0,24	0,12	-
Lightweight concrete hollow block HBL 4-0,7-8DF**	0,60	1,50	1,20
	0,24	0,60	0,48
Concrete masonry unit HBN 4-12DF**	2,50	1,50	2,50
	1,00	0,60	1,00

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

** To use with mesh sleeve

Characteristic values
Design values

WCF-PESF / WCF-PESF-E / WCF-PESF-C

Polyester injection anchors - for medium loads, for use with non-cracked concrete and masonry, no styrene

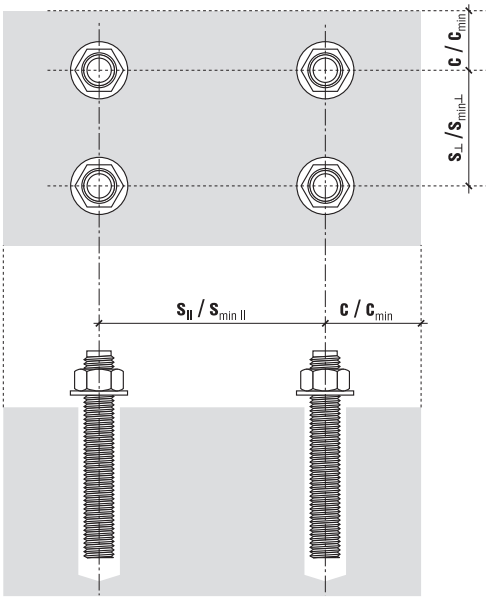


TABLE 5 Edge distances and spacing

Substrate	Rod diameter								
	M8			M10			M12		
	$c = c_{min}$	$s_{\parallel} = s_{min\,\parallel}$	$s_{\perp} = s_{min\,\perp}$	$c = c_{min}$	$s_{\parallel} = s_{min\,\parallel}$	$s_{\perp} = s_{min\,\perp}$	$c_{cr} = c_{min}$	$s_{\parallel} = s_{min\,\parallel}$	$s_{\perp} = s_{min\,\perp}$
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Solid clay brick MZ 12-2,0-NF	128	255	255	128	255	255	128	255	255
Solid sand-lime brick KS 12-2,0-NF	128	255	255	128	255	255	128	255	255
Hollow clay brick HLZ 12-1,0-2DF	100	235	115	100	235	115	120	235	115
Hollow sand lime brick KSL 12-1,4-3DF	100	240	113	100	240	113	120	240	113
Hollow sand lime brick KSL 12-1,4-8DF	100	250	237	100	250	237	120	250	237
Hollow clay brick HLZW 6-0,7-8DF	100	250	240	100	250	240	120	250	240
Lightweight concrete hollow block HBL 2-0,45-10DF	100	250	248	100	250	248	-	-	-
Lightweight concrete hollow block HBL 4-0,7-8DF	100	250	248	100	250	248	120	250	248
Concrete masonry unit HBN 4-12DF	100	370	238	100	370	238	120	370	238

TABLE 6 Consumption - masonry

Rod size	Hole diameter [mm]	Bending torque T_{inst} [Nm]	Estimated number of anchors made from one cartridge - capacity 300 ml	
			Anchoring depth h_{eff} = 85mm	
			Soild brick	Hollow brick
M8	16	2	20	15
M10	16	2	24	18
M12	20	2	15	11