

PESF Chemical Resin PESF310/PESF410

Polyester Styrene Free High Performance Low Odour Anchor Resin

Rev 2.

Version: 27/04/2023

Features and Benefits

- Good bond strength with High load resistance
- Used with all grades of threaded rod
- Used in concrete and masonry
- Used in dry and wet conditions
- **European approval** for use in concrete ETAG001 Option 7
- **European approval** for use in masonry with nylon sleeves
- Close edge distance and small spacing
- Extremely versatile
- Used for close edge distance fixings and short anchor spacings
- Manual cleaning up to 20mm diameter and embedment depths of 240mm
- Suitable for the fixing of **solar panels**

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Shelf Life and Storage

This product should be stored between +0°C & +30°C.

The Shelf life of the product is 18 months from the manufacture date.

IMPORTANT The information and data given is based on our own experience, research and testing and is believed to be reliable and accurate.

However, as we cannot know the varied uses to which its products may be applied, or the methods of application used, no warranty as to the fitness or suitability of its products is given or implied. It is the users responsibility to determine suitability of use. For further information please contact Our Technical Department.

PESF Chemical Resin PESF310/PESF410

Product Description

Timco PESF Top is a 2 component high strength 10:1 ratio chemical anchoring resin system. It is designed as a fast curing high strength resin fixing anchor for high loads and medium loads and is particularly advantageous for fixings in masonry due to the European approval.

Specific Benefits

- European Approved
- High loads possible
- Chemical resistance
- Studs and other fixings
- Approved for Concrete & Masonry

Approvals

- ETA Option 7 Non-Cracked Concrete. Includes flooded holes. M8-M16
- ETA - EAD 330076-00-0604 Hollow Wall / Masonry Installations M6-M12
- Tested according to LEED 2009 EQ c4.1, SCAQMD rule 1168 (2005).
- A+ Rating VOC content
- VOC Emission Test Report - Indoor Air Comfort GOLD®

Loads, Edge and Spacings based on Characteristic bond strengths - Showing steel failure

Size (mm)	Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		Characteristic distances (mm)			Min Edge and Spacing (mm)
	Tension	Shear	Tension	Shear	Tension	Shear	Edge	Spacing	Edge	
	N_{rk}	V_{rk}	N_{rd}	V_{rd}	N_{rec}	V_{rec}	$C_{cr,N}$	$S_{cr,N}$	$C_{cr,V}$	C_{min}, S_{min}
8	15.84		8.80		6.29					
	19.00	9.00	11.70	7.20	8.36	5.14	80	160	80	40
	19.00		12.70		9.07					
10	19.80		11.00		7.86					
	29.70	15.00	16.50	12.00	11.79	8.57	100	200	90	50
	30.20		20.10		14.36					
12	27.72		15.40		11.00					
	43.56	21.00	24.20	16.80	17.29	12.00	120	240	110	60
	43.80		29.20		20.86					
16	40.14		22.30		15.93					
	62.82	39.00	34.90	31.20	24.93	22.29	160	320	125	80
	81.60		54.40		38.86					
20	50.94		28.30		20.21					
	96.12	61.00	53.40	48.80	38.14	34.86	200	400	180	100
	127.40		84.90		60.64					
24	60.30		33.50		23.93					
	126.72	88.00	70.40	70.40	50.29	50.29	225	450	220	120
	183.60		122.40		87.43					
30	73.44		40.80		29.14					
	171.54	142.50	95.30	114.00	68.07	81.43	260	520	280	150
	292.00		194.50		138.93					

Nominal Embedment (mm)	Hole Diameter concrete (mm)	Hole Diameter fixture (mm)	Max Torque (Nm)
60			
80	10	9	10
160			
60			
90	12	12	20
200			
70			
110	14	14	40
240			
80			
125	18	18	80
320			
90			
170	22	22	120
400			
100			
210	28	26	160
480			
120			
280	35	32	200
600			

= steel failure

Partial safety factor = 1.5

PESF Chemical Resin PESF310/PESF410

Design Resistance used with various stud strengths, material and rebar.

5.8 Grade Steel Studding

Stud Diameter	Hole Diameter	Embedment Depth h _{ef}																		h _{ef}	F _{d,s}		
																				failure	design load		
(mm)	(mm)	60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	(mm)	(kN)		
8	10	8.8	10.3	11.7	12.7																87	12.7	
10	12	11.0	12.8	14.7	16.5	18.3	20.1															110	20.1
12	14		15.4	17.6	19.8	22.0	24.2	26.4	28.6	29.2											133	29.2	
16	18			22.3	25.1	27.9	30.7	33.5	36.3	39.1	44.7	54.4								195	54.4		
20	22			25.1	28.3	31.4	34.6	37.7	40.8	44.0	50.3	62.8	75.4	84.9						270	84.9		
24	28					33.5	36.9	40.2	43.6	46.9	53.6	67.0	80.4	93.8	107.2	122				365	122.4		
27	30						38.9	42.4	46.0	49.5	56.6	70.7	84.8	99.0	113.1	141.4	159			450	159.1		
30	35							40.8	44.2	47.7	54.5	68.1	81.7	95.3	108.9	136.2	163.4	183.8	195	571	194.5		
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600				

8.8 Grade Steel Studding

Stud Diameter	Hole Diameter	Embedment Depth h _{ef}																		h _{ef}	F _{d,s}	
																				failure	design load	
(mm)	(mm)	60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	(mm)	(kN)	
8	10	8.8	10.3	11.7	13.2	14.7	16.1	17.6	19.1	19.5											133	19.5
10	12	11.0	12.8	14.7	16.5	18.3	20.2	22.0	23.8	25.7	29.3	30.9									169	30.9
12	14		15.4	17.6	19.8	22.0	24.2	26.4	28.6	30.8	35.2	44.0	45.0							204	45.0	
16	18			22.3	25.1	27.9	30.7	33.5	36.3	39.1	44.7	55.9	67.0	78.2	83.7					300	83.7	
20	22			25.1	28.3	31.4	34.6	37.7	40.8	44.0	50.3	62.8	75.4	88.0	100.5	125.7				416	130.7	
24	28					33.5	36.9	40.2	43.6	46.9	53.6	67.0	80.4	93.8	107.2	134.1	160.9			562	188.3	
27	30						38.9	42.4	46.0	49.5	56.6	70.7	84.8	99.0	113.1	141.4	169.7	190.9		693	244.8	
30	35							40.8	44.2	47.7	54.5	68.1	81.7	95.3	108.9	136.2	163.4	183.8	204.2	879	299.2	
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600			

cont.

Design Resistance used with various stud strengths, material and rebar.

10.9 Grade Steel Studding

Stud Diameter	Hole Diameter	Embedment Depth h_{ef}																		h_{ef}	$F_{d,s}$	
																				failure	design load	
(mm)	(mm)	60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	(mm)	(kN)	
8	10	8.8	10.3	11.7	13.2	14.7	16.1	17.6	19.1	20.5	23.4									186	27.2	
10	12	11.0	12.8	14.7	16.5	18.3	20.2	22.0	23.8	25.7	29.3	36.7									235	43.1
12	14		15.4	17.6	19.8	22.0	24.2	26.4	28.6	30.8	35.2	44.0	52.8							285	62.6	
16	18			22.3	25.1	27.9	30.7	33.5	36.3	39.1	44.7	55.9	67.0	78.2	89.4					418	116.6	
20	22			25.1	28.3	31.4	34.6	37.7	40.8	44.0	50.3	62.8	75.4	88.0	100.5	125.7				579	182.0	
24	28					33.5	36.9	40.2	43.6	46.9	53.6	67.0	80.4	93.8	107.2	134.1	160.9			782	262.2	
27	30						38.9	42.4	46.0	49.5	56.6	70.7	84.8	99.0	113.1	141.4	169.7	190.9		965	341.0	
30	35							40.8	44.2	47.7	54.5	68.1	81.7	95.3	108.9	136.2	163.4	183.8	204.2	1224	416.7	
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600			

A4-70 Stainless Steel Studding

Stud Diameter	Hole Diameter	Embedment Depth h_{ef}																		h_{ef}	$F_{d,s}$
																				failure	design load
(mm)	(mm)	60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	(mm)	(kN)
8	10	8.8	10.3	11.7	13.2	13.7														93	13.7
10	12	11.0	12.8	14.7	16.5	18.3	20.2	21.7												118	21.7
12	14		15.4	17.6	19.8	22.0	24.2	26.4	28.6	30.8	31.6									143	31.6
16	18			22.3	25.1	27.9	30.7	33.5	36.3	39.1	44.7	55.9	58.8							210	58.8
20	22			25.1	28.3	31.4	34.6	37.7	40.8	44.0	50.3	62.8	75.4	88.0	91.7					292	91.7
24	28					33.5	36.9	40.2	43.6	46.9	53.6	67.0	80.4	93.8	107.2	132.1				394	132.1
27	30						38.9	42.4	46.0	49.5	56.6	70.7	80.2							227	80.2
30	35							40.8	44.2	47.7	54.5	68.1	81.7	95.3	98.1					288	98.1
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600		

*1 = Tensile strength 500N/mm²

Design Resistance used with various stud strengths, material and rebar.

A4-80 Stainless Steel Studding

Stud Diameter	Hole Diameter	Embedment Depth h _{ef}																		h _{ef} failure	F _{d,s} design load
(mm)	(mm)	60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	(mm)	(kN)
8	10	8.8	10.3	11.7	13.2	14.7	15.7													107	15.7
10	12		12.8	14.7	16.5	18.3	20.2	22.0	23.8	24.8										135	24.8
12	14		15.4	17.6	19.8	22.0	24.2	26.4	28.6	30.8	35.2	36.1								164	36.1
16	18			22.3	25.1	27.9	30.7	33.5	36.3	39.1	44.7	55.9	67.2							240	67.2
20	22			25.1	28.3	31.4	34.6	37.7	40.8	44.0	50.3	62.8	75.4	88.0	100.5	104.8				334	104.8
24	28					33.5	36.9	40.2	43.6	46.9	53.6	67.0	80.4	93.8	107.2	132.1				394	132.1
27	30						38.9	42.4	46.0	49.5	56.6	70.7	80.2							227	80.2
30	35							40.8	44.2	47.7	54.5	68.1	81.7	95.3	98.1					288	98.1
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600		

High bond reinforcing bars F_{yk}=500N/mm²

Rebar Diameter	Hole Diameter	Embedment Depth h _{ef}																		h _{ef} failure	F _{d,s} yield load
(mm)	(mm)	60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500	560	640	(mm)	(kN)
8	10	7.8	9.1	10.5	11.8	13.1	14.4	15.7	17.0	18.3	20.9									167	21.9
10	12	9.8	11.4	13.1	14.7	16.3	18.0	19.6	21.2	22.9	26.1	32.7								209	34.1
12	14		12.7	14.5	16.3	18.1	19.9	21.7	23.5	25.3	29.0	36.2	43.4							272	49.2
16	20			17.3	19.5	21.6	23.8	25.9	28.1	30.3	34.6	43.2	51.9	60.5	69.2					404	87.4
20	25			20.1	22.6	25.1	27.6	30.2	32.7	35.2	40.2	50.3	60.3	70.4	80.4	100.5				543	136.6
25	30					27.5	30.2	33.0	35.7	38.5	44.0	55.0	66.0	77.0	88.0	110.0	137.5			715	196.5
28	35						29.0	31.7	34.3	36.9	42.2	52.8	63.3	73.9	84.5	105.6	132.0	147.8		1015	267.8
32	40								39.2	42.2	48.3	60.3	72.4	84.5	96.5	120.7	150.8	168.9	193.0	1159	349.7
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500	560	640		

*1 = Tensile strength 500N/mm²

*2 = Tensile strength 700N/mm²

PESF Chemical Resin PESF310/PESF410

Characteristic and Design Load resistances based on characteristic bond strengths for hef 4d (minimum embedment) to 20d

Size (mm)	Non Cracked Concrete						Cracked Concrete						Nominal Embed- ment (mm)
	Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		
	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	
	N _{rk}	V _{rk}	N _{rd}	V _{rd}	N _{rec}	V _{rec}	N _{rk}	V _{rk}	N _{rd}	V _{rd}	N _{rec}	V _{rec}	
8	15.84	9.00	8.80	7.20	6.29	5.14	Not Applicable		Not Applicable		Not Applicable		60
	21.06		11.70		8.36								80
	42.12		23.40		16.71								160
10	19.80	15.00	11.00	12.00	7.86	8.57	Not Applicable		Not Applicable		Not Applicable		60
	29.70		16.50		11.79								90
	66.06		36.70		26.21								200
12	27.72	21.00	15.40	16.80	11.00	12.00	Not Applicable		Not Applicable		Not Applicable		70
	43.56		24.20		17.29								110
	95.04		52.80		37.71								240
16	40.14	39.00	22.30	31.20	15.93	22.29	Not Applicable		Not Applicable		Not Applicable		80
	62.82		34.90		24.93								125
	160.92		89.40		63.86								320
20	50.94	61.00	28.30	48.80	20.21	34.86	Not Applicable		Not Applicable		Not Applicable		90
	96.12		53.40		38.14								170
	226.26		125.70		89.79								400
24	60.30	88.00	33.50	70.40	23.93	50.29	Not Applicable		Not Applicable		Not Applicable		100
	126.72		70.40		50.29								210
	241.38		134.10		95.79								480
30	73.44	142.50	40.80	114.00	29.14	81.43	Not Applicable		Not Applicable		Not Applicable		120
	171.54		95.30		68.07								280
	367.56		204.20		145.86								600

Table notes : see back page

PESF Chemical Resin PESF310/PESF410

Bond Strength Factors

Influence of concrete strength on combined pull out and concrete cone resistance

Concrete Strength N/mm ²	C15/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Non-Cracked f_c =	0.97	1.00	1.02	1.04	1.07	1.10	1.12	1.15

Influence of environmental conditions in non cracked concrete

		M8	M10	M12	M16	M20	M24	M30
Temp I 40°C / 24°C	Dry and Wet	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Temp II 80°C / 50°C	Dry and Wet	0.90	0.88	0.87	0.86	0.85	0.84	0.82

Select concrete strength and environmental condition and apply to bond strength table on page 4

PESF Chemical Resin PESF310/PESF410

Characteristic and Design Load resistances for REBAR based on characteristic bond strengths for *hef 4d (min embedment) to 20d*

Rebar Ø	Non Cracked Concrete						Cracked Concrete						Nominal Embed- ment (mm)																		
	Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)																				
	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear																			
	N _{rk}	V _{rk}	N _{rd}	V _{rd}	N _{rec}	V _{rec}	N _{rk}	V _{rk}	N _{rd}	V _{rd}	N _{rec}	V _{rec}																			
8	14.04	13.95	7.80	9.30	5.57	6.64	Not Applicable		Not Applicable	Not Applicable	Not Applicable	Not Applicable	60																		
	18.90		10.50		7.50								80																		
	37.62		20.90		14.93								160																		
10	17.64	21.45	9.80	14.30	7.00	10.21							Not Applicable		Not Applicable	Not Applicable	Not Applicable	Not Applicable	60												
	26.46		14.70		10.50														90												
	58.86		32.70		23.36														200												
12	22.86	31.05	12.70	20.70	9.07	14.79													Not Applicable		Not Applicable	Not Applicable	Not Applicable	Not Applicable	70						
	35.82		19.90		14.21																				110						
	78.12		43.40		31.00																				240						
16	31.14	55.50	17.30	37.00	12.36	26.43																			Not Applicable		Not Applicable	Not Applicable	Not Applicable	Not Applicable	80
	48.60		27.00		19.29																										125
	124.56		69.20		49.43																										320
20	40.68	86.55	22.60	57.70	16.14	41.21	Not Applicable		Not Applicable	Not Applicable	Not Applicable	Not Applicable																			90
	76.86		42.70		30.50																										170
	180.90		100.50		71.79																										400
25	49.50	135.00	27.50	90.00	19.64	64.29							Not Applicable		Not Applicable	Not Applicable	Not Applicable	Not Applicable													100
	103.86		57.70		41.21																										210
	247.50		137.50		98.21																										500
28	52.20	168.75	29.00	112.50	20.71	80.36													Not Applicable		Not Applicable	Not Applicable	Not Applicable	Not Applicable							110
	133.02		73.90		52.79																										280
	266.04		147.80		105.57																										560
32	70.56	220.95	39.20	147.30	28.00	105.22																			Not Applicable		Not Applicable	Not Applicable	Not Applicable	Not Applicable	130
	173.70		96.50		68.93																										320
	347.40		193.00		137.86																										640

Table notes : see back page

PESF Chemical Resin PESF310/PESF410

Bond Strength Factors - REBAR

Influence of concrete strength on combined pull out and concrete cone resistance

Concrete Strength N/mm ² (MPa)	C15/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
non cracked f_c =	0.97	1.00	1.02	1.04	1.07	1.10	1.12	1.15

Influence of environmental conditions in non cracked concrete

		Ø 8	Ø 10	Ø 12	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Temp I 40°C / 24°C	Dry and Wet	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Temp II 80°C / 50°C	Dry and Wet	0.90	0.90	0.88	0.88	0.86	0.86	0.84	0.84

Table notes : see back page

PESF Chemical Resin PESF310/PESF410

Material Properties for grades of threaded rod

	Stud Grade 8.8		Stud Grade 10.9		Stud Grade A4-70		Stud Grade A4-80	
Stud Diameter (mm)	N _{rk, s} (kN)	N _{rd, s} (kN)	N _{rk, s} (kN)	N _{rd, s} (kN)	N _{rk, s} (kN)	N _{rd, s} (kN)	N _{rk, s} (kN)	N _{rd, s} (kN)
M8	29.2	19.5	38.1	27.2	25.6	13.7	29.2	15.6
M10	46.4	30.9	60.3	43.1	40.6	21.7	46.4	24.8
M12	67.4	44.9	87.7	62.6	59.0	31.6	67.4	36.0
M16	125.6	83.7	163.0	116.4	109.9	58.8	125.7	67.2
M20	196.1	130.7	255.0	182.1	171.5	91.7	196.0	104.8
M24	282.5	188.3	367.0	262.1	247.1	132.1	293.0	132.1
M30	448.8	299.2	583.0	416.4	280.5	150.0	392.7	210.0

	Stud Grade 8.8		Stud Grade 10.9		Stud Grade A4-70		Stud Grade A4-80	
Stud Diameter (mm)	V _{rk, s} (kN)	V _{rd, s} (kN)	V _{rk, s} (kN)	V _{rd, s} (kN)	V _{rk, s} (kN)	V _{rd, s} (kN)	V _{rk, s} (kN)	V _{rd, s} (kN)
M8	14.6	11.7	19.0	15.2	12.8	8.2	14.6	9.4
M10	23.2	18.6	30.2	24.1	20.3	13.0	23.2	14.9
M12	33.7	27.0	43.8	35.1	29.5	18.9	33.7	21.6
M16	62.8	50.2	81.6	65.3	55.0	35.2	62.8	40.3
M20	98.0	78.4	127.4	101.9	85.8	55.0	98.0	62.8
M24	141.2	113.0	183.6	146.8	123.6	79.2	141.2	90.5
M30	224.4	179.5	291.5	215.9	140.3	89.9	196.4	125.9

	Rebar BSt 500 to DIN 488		Rebar BSt 500 to DIN 488	
Rebar Diameter (mm)	N _{rk, s} (kN)	N _{rd, s} (kN)	V _{rk, s} (kN)	V _{rd, s} (kN)
8	28.0	20.0	14.0	9.3
10	43.0	30.7	21.5	14.3
12	62.0	44.3	31.0	20.7
14	85.0	60.7	42.5	28.3
16	111.0	79.3	55.5	37.0
20	173.0	123.6	86.5	57.7
25	270.0	192.9	135.0	90.0
32	442	315.7	221	147.3

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Effect of Anchor Spacing - Tension

Anchor Spacing	Stud / Rebar Diameter						
(mm)	8	10	12	16	20	24	30
40	0.64						
50	0.67	0.63					
60	0.70	0.65	0.63				
70	0.73	0.67	0.64				
80	0.76	0.69	0.66	0.63			
90	0.79	0.72	0.68	0.64			
100	0.82	0.74	0.70	0.65	0.63		
120	0.87	0.79	0.74	0.68	0.65	0.63	
150	0.96	0.86	0.80	0.73	0.68	0.65	0.63
160	1.00	0.88	0.82	0.74	0.70	0.66	0.64
175		0.92	0.85	0.76	0.71	0.68	0.65
200		1.00	0.90	0.80	0.74	0.71	0.68
225			0.95	0.84	0.77	0.74	0.70
240			1.00	0.86	0.79	0.76	0.72
250				0.87	0.80	0.77	0.73
275				0.91	0.83	0.80	0.75
280				0.92	0.84	0.80	0.76
300				0.95	0.86	0.82	0.78
320				1.00	0.88	0.85	0.80
350					0.92	0.88	0.83
400					1.00	0.94	0.88
425						0.97	0.90
450						1.00	0.93
480							0.96
520							1.00

Effect of Edge Distance - Tension

Edge Distance	Stud / Rebar Diameter						
(mm)	8	10	12	16	20	24	30
40	0.64						
50	0.73	0.63					
60	0.82	0.70	0.63				
70	0.90	0.77	0.68				
80	1.00	0.84	0.74	0.63			
90		0.91	0.80	0.67			
100		1.00	0.86	0.71	0.63		
110			0.92	0.76	0.66		
120			1.00	0.80	0.70	0.64	
140				0.89	0.77	0.68	0.63
160				1.00	0.84	0.76	0.66
180					0.91	0.84	0.72
200					1.00	0.92	0.78
225						1.00	0.86
250							0.94
260							1.00

Effect of Edge Distance - Shear

Edge Distance	Stud / Rebar Diameter						
(mm)	8	10	12	16	20	24	30
40	0.25						
50	0.44	0.30					
60	0.63	0.48	0.30				
70	0.81	0.65	0.44				
80	1.00	0.83	0.58	0.40			
90		1.00	0.72	0.53			
100			0.86	0.67	0.35		
110			1.00	0.80	0.44		
125				1.00	0.58	0.35	
140					0.72	0.45	0.30
160					0.91	0.58	0.36
180					1.00	0.71	0.47
200						0.84	0.59
225						1.00	0.74
250							0.88
280							1.00

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Minimum Curing Time

Concrete Temperature	Gel - Working Time	Minimum curing time in dry concrete	Minimum curing time in wet concrete
- 10°C *	50 min	240 min	x2
-5°C *	40 min	180 min	x2
5°C	20 min	90 min	x2
15°C	9 min	60 min	x2
25°C	5 min	30 min	x2
35°C	3 min	20 min	x2

* Resin temperature must be at least 20°C

- All specifications based on supplied mixer

Temperature Ranges

Temperature Range	Concrete Service Temperature	Maximum Long Term Concrete Temp	Maximum Short Term Concrete Temp
Range I	-40°C to +40°C	+24°C	+40°C
Range II	-40°C to +80°C	+50°C	+80°C

Service temperature range: Range of ambient temperatures after installation and during the lifetime of the anchor.

Short term temperature: Temperatures within the service temperature range which vary over short intervals, e.g. day/night cycles and freeze/thaw cycles.

Long term temperature: Temperature, within the service temperature range, which will be approximately constant over significant periods of time.

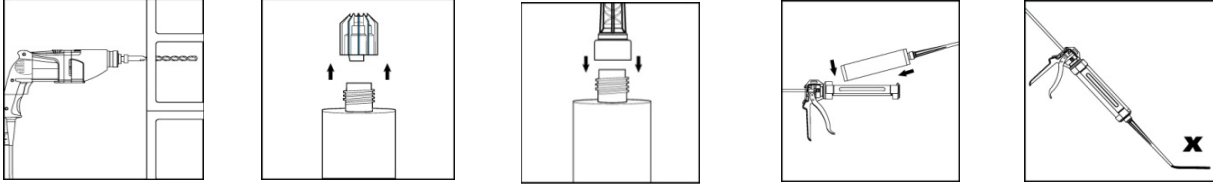
Long term temperatures will include constant or near constant temperatures, such as those experienced in cold stores or next to heating installations.

Physical Properties

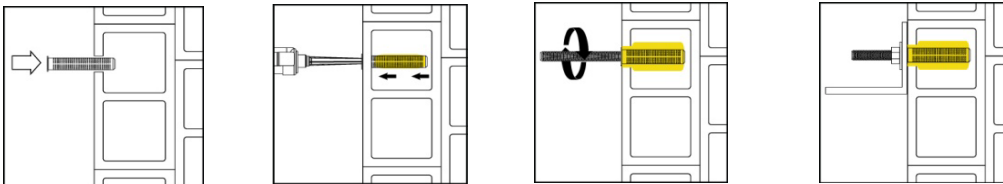
	N/mm2	Test Method
Compressive Strength	43.5	EN ISO 604 / ASTM 695
Flexural Strength	15.9	EN ISO 178 / ASTM 790
Flexural Modulus	2803	EN ISO 178 / ASTM 790
Tensile Strength	9.3	EN ISO 527 / ASTM 638
E Modulus	4874.5	EN ISO 527 / ASTM 638
VOC Content	A+ Rating	-

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Installation parameters: drilling hole cleaning and installation HOLLOW WALL



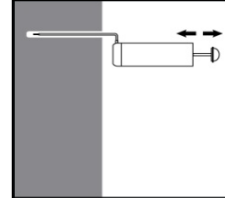
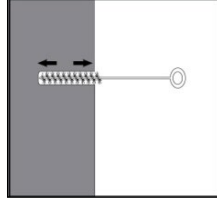
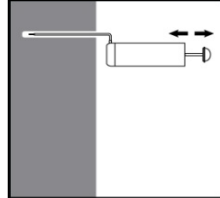
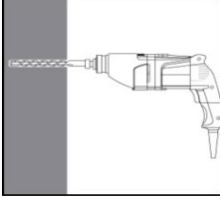
Drill hole in the substrate to the required embedment depth using the appropriately sized carbide drill bit. Bore hole cleaning Just before setting an anchor, the bore hole must be free of dust and debris. Remove the threaded cap from the cartridge. Tightly attach the mixing nozzle. Do not modify the mixer in any way. Make sure the mixing element is inside the mixer. Use only the supplied mixer. Insert the cartridge into the dispenser gun. Discard the initial trigger pulls of adhesive. Discard the first 10ml of resin until an even colour is achieved.



Introduce the sleeve of suitable dimensions. Insert the nozzle to the end of the sleeve and inject the resin so long till the sleeve will fill into 100%. Insert the anchor, slowly with a slight twisting motion into the sleeve. Remove excess resin and leave the fixing until minimum curing (loading) times has elapsed.

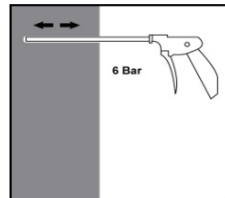
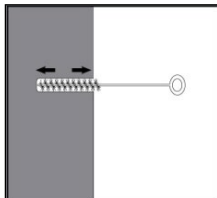
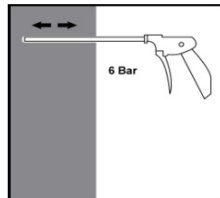
PESF Chemical Resin PESF310/PESF410

Installation parameters: drilling hole cleaning and installation

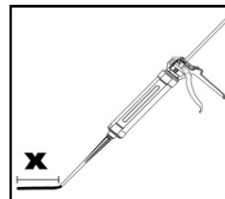
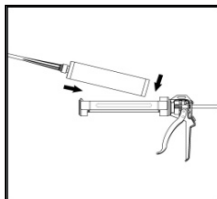
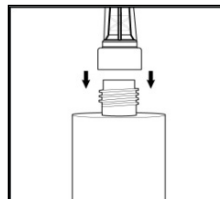
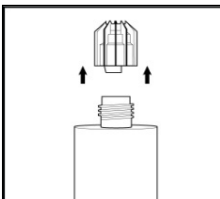


Drill hole in the substrate to the required embedment depth using the appropriately sized carbide drill bit. Bore hole cleaning Just before setting an anchor, the bore hole must be free of dust and debris. The manual pump shall be used for blowing out bore holes up to diameters $\leq 24\text{mm}$ and embedment depths up to $h_{ef} \leq 10d$. Blow out at least 4 times from the back of the bore hole, using an extension if needed. Brush 4 times with the specified brush size (see Table 6) by inserting the steel brush to the back of the hole (if needed with an extension) in a twisting motion and removing it. Blow out again with manual pump at least 4 times.

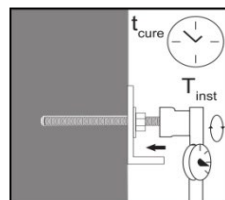
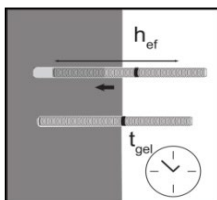
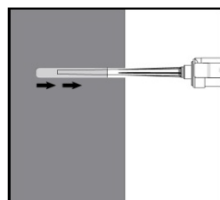
Compressed air cleaning (CAC) for all bore hole diameters do and all bore hole depths



Blow 2 times from the back of the hole (if needed with a nozzle extension) over the whole length with oil-free compressed air (min. 6 bar at 6 m^3/h). Brush 2 times with the specified brush size (see Table 6) by inserting the steel brush to the back of the hole (if needed with an extension) in a twisting motion and removing it.
X 2 Blow out again with compressed air at least 2 times.



Remove the threaded cap from the cartridge. Tightly attach the mixing nozzle. Do not modify the mixer in any way. Made sure the mixing element is inside the mixer. Use only the supplied mixer. Insert the cartridge into the dispenser gun. Discard the initial trigger pulls of adhesive. Discard the first 10ml of resin.



Inject the adhesive starting at the back of the hole, slowly withdrawing the mixer with each trigger pull. Fill holes approximately 2/3 full, to ensure that the annular gap between the anchor and the concrete is completely filled with adhesive along the embedment depth. Before use, verify that the threaded rod is dry and free of contaminants. Install the threaded rod to the required embedment depth during the open gel time tgel has elapsed. The working time tgel is given in Table 7. The anchor can be loaded after the required curing time tcure (see Table 7). The applied torque shall not exceed the values Tmax given in Table 1.

PESF Chemical Resin PESF310/PESF410

Characteristic and recommended loads for masonry:

The design details are fully disclosed in the ETA. The recommended load are valid under the following conditions:

- dry environment
- masonry mortar class more than M2.5
- space distance $s \geq s_{cr}$
- edge distance $c \geq c_{cr}$
- joints (vertical and horizontal) are visible and filled with mortar
- no pre-stressing force on the wall
- steel strength of anchor 5.8 or higher
- no interaction of tension and shear loads considered
- temperature range from -40 to +40°C

Brick type and strength: solid clay brick with compressive strength ≥ 18 Mpa Bulk density 1,60 kg/dm³

Brick "Mattone Pieno"

Brick "Mattone Pieno"			M6	M8	M10	M12
Anchorage depth	h_{ef}	mm	80	80	85	85
Drill diameter (hole diameter)	d_0	mm	8	10	12	14
Minimum wall thickness	h_{min}	mm	$h_{ef} + 5\text{mm}$			
Minimal space distance	s_{min}	mm	240		255	
Minimal edge distance	c_{min}	mm	120		127.5	
Critical space distance	$s_{cr,N}$	mm	240		255	
Critical edge distance	$c_{cr,N}$	mm	120		127.5	
Installation torque	T_{ins}	Nm	2			
Characteristic tension load	N rk	kN	4	4	4	4
Recommended tension load	N rec	kN	1,14			
Characteristic shear load	V rk	kN	6	6	6	6
Recommended shear load	V rec	kN	1,71		2	

Brick type and strength: hollow brick - compressive strength ≥ 6 Mpa

Bulk density 0,9 kg/dm³

Brick "Doppio UNI"

			M6	M8	M10	M12
Sleeve dimension (nylon or plastic)		mm	12 x 80		16 x 85	
Anchorage depth	h_{ef}	mm	80	80	85	85
Drill diameter (hole diameter)	d_0	mm	12	12	16	16
Minimum wall thickness	h_{min}	mm	$h_{ef} + 5\text{mm}$			
Critical space distance parallel to horizontal joint	$s_{cr,\parallel}$	mm	250	250	250	250
Critical space distance perpendicular to horizontal joint	$s_{cr,\perp}$	mm	120	120	120	120
Minimal space distance parallel to horizontal joint	$s_{min,\parallel}$	mm	250			
Minimal space distance perpendicular to horizontal joint	$s_{min,\perp}$	mm	120			
Critical edge distance	c_{cr}	mm	100	100	100	100
Minimal edge distance	c_{min}	mm	100			
Installation torque	T_{ins}	Nm	1,5			
Characteristic tension load	N rk	kN	2	2	2	2
Recommended tension load	N rec	kN	0,57			
Characteristic shear load	V rk	kN	2	2	2	2
Recommended shear load	V rec	kN	0,57			

PESF Chemical Resin PESF310/PESF410

Properties for installation in vary type of wood

Wood Type	Bar size	Hole size [mm]	Embedment depth [mm]	Characteristic Tension Load [kN]	Characteristic Bond strength [MPa]
OAK	M8	10	60	5	3.3
Glulam spruce	M12	16	120	15	3.3
Glulam spruce	M16	19/20	150	25	3.3

Wood Type	Bar size	Hole size [mm]	*Load for 60mm embedment depth [kg]	*Load for 120 mm embedment depth [kg]	*Load for 150 mm embedment depth [kg]
OAK	M8	10	510	1020	1275
Glulam spruce	M12	16	765	1530	1913
Glulam spruce	M16	19/20	1020	2040	2550

*** Note:**

The load is in function of the embedment depth and should be factored down with a safety factor (≥ 4)

PESF Chemical Resin PESF310/PESF410

Notes

PAGE 2 :

Typical characteristic and design resistance performance with 5.8 grade studding and associated installation data

All data is based on correct installation - see instructions

No influence of edge and spacing

Minimum base material thickness $h_{ef} + 30\text{mm} > 100\text{mm}$ for M8 to M12 and for M16 to M30 $h_{ef} + 2d$

h_{ef} range minimum or $4d$ whichever is greatest to $20d$

Concrete strength C20/25 - f_c cube = 25N/mm^2 (25MPa)

Temperature range i maximum long term / short term temperature +24/40°C

PAGE 3 to 5 :

Design Resistance with various stud strengths, material and rebar.

Note 1 for stainless steel tensile strength is 500N/mm^2 (500MPa)

Note 2 for stainless steel tensile strength is 700N/mm^2 (500MPa)

Data shown below the minimum embedment depth is for reference only. Please refer to manufacturer for advice.

PAGE 6 and 8 :

Characteristic and Design Load resistances based on characteristic bond strengths for $h_{ef} 4d$ (minimum embedment) to $20d$

All data is based on correct installation - see instructions

No influence of edge and spacing

Minimum base material thickness $h_{ef} + 30\text{mm} > 100\text{mm}$ for M8 to M12 and for M16 to M30 $h_{ef} + 2d$

h_{ef} range minimum or $4d$ whichever is greatest to $20d$

Concrete strength C20/25 - f_c cube = 25N/mm^2 (25MPa)

Temperature range i maximum long term / short term temperature +24/40°C

PAGE 7 & 9 :

Bond Strength Factors

Select concrete strength and environmental condition and apply to bond strength table on page 6

PAGE 10 :

Material Properties for grades of other threaded rod and rebar

All grades shown for information

M30 studding is 8.8 grade instead of 5.8 grade

M30 for A4-70 tensile strength of 500N/mm^2 (500MPa), instead of 700N/mm^2 (700MPa)

Safety factor is 1.5 tension and 1.25 shear for all carbon steel

Safety factor is 1.56 for stainless steel, up to M24, M30 and M36 is 2.0

Safety factor is 1.4 tension and 1.5 shear for BSt 500 rebar

Partial Safety Factors for pages 2,3,4,5,6,8 :

1.8 for all sizes studs

1.8 for all sizes rebar