

BA Pro

WEDGE ANCHOR

REVISION R02.00 16.02.2021

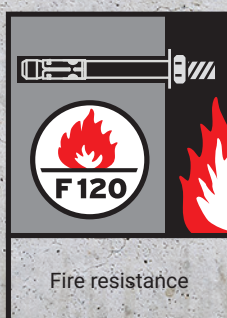
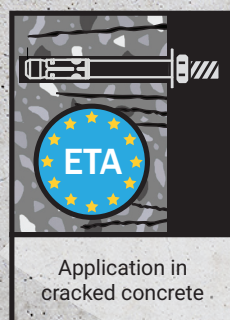


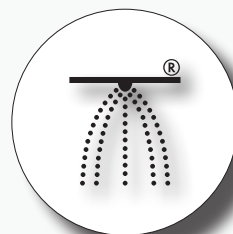
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Content

Page

1. General	3
Product description	3
Properties and benefits	3
Applications samples	3
2. Anchorage in concrete	4
Installation instructions	4
Installation tools	4
Installation instructions with filling the washer	5
Installation tools	5
3. BA Pro - Steel, zinc plated	7
Installation and packaging data	7
Recommended loads	8
4. BA Pro - Stainless-steel A4	10
Installation and packaging data	10
Recommended loads	11
6. Fire resistance	13





1. General

Product description

Due to its high performance as well as its easy and quick installation, the wedge anchor BA Pro with European Technical Assessment can be used for a wide variety of applications. The long thread length and two approved anchoring depths allow the BA Pro wedge anchor greater flexibility of use. The option for reduced anchoring depth saves time during drilling and reduces the installation effort. Using a suction drill also eliminates the need for blowing out the drilled hole.

The wedge anchors BA Pro M8 - M20 are also approved for use under seismic loading C1 and C2 up to an anchor length of 210 mm (only standard anchoring depth ¹⁾). By using the new VS filling washer, the permissible seismic loads can be increased even further.

The sherardized wedge anchor BA Pro sh version with a zinc thickness of more than 40 µm offers increased corrosion protection compared to zinc electroplating.

For timber construction, the BA Pro-UH-plus version is available packaged with the washer DIN EN ISO 7094 (DIN 440).

The stainless steel versions (A4) ensure a higher corrosion resistance and are better suitable for applications under more aggressive climate conditions.

¹⁾ Only standard anchorage depth

Properties and benefits

- Approved for use in cracked and non-cracked concrete (Option 1)
- Approved for seismic loads, performance categories C1 and C2 (M8 to M20, maximum anchor length 210 mm)
- Approved for use under fire exposure. Fire resistance ratings R30–R120
- Suitable for use in compression resistant natural stone (without approval)
- Two effective anchorage depths for greater flexibility (M8 to M16, maximum anchor length 210 mm)
- Anchoring with shorter effective anchorage depth reduces drilling and installation time.
- Anchoring with the standard effective anchorage depth is suitable for the highest load limits
- Particularly cost effective: the short “s” versions with only one effective anchorage depth in the sizes M8 to M16
- Suitable for surface, through, and stand-off fastening
- Suitable for sprinkler system installations complying with
- VdS requirements

Applications samples

Medium to heavy duty anchoring in cracked and non-cracked concrete: Steel beams, base plates, channels, tracks, wood structures, stadium seatings, facades.





2. Anchorage in concrete

Installation instructions

	<p>1. Drill hole perpendicular to concrete surface, positioning of the drill holes without damaging the reinforcement.</p>
	<p>2. Blow out dust.</p>
	<p>3. Check position of nut.</p>
	<p>4. Drive in anchor, such that h_{ef} or $h_{ef,red}$ is met. This is ensured, if the thickness of fixture is not greater than the maximum thickness of fixture marked on the anchor.</p>
	<p>5. Apply installation torque T_{inst} as specified in the tables of the "Recommended loads" for each anchor version.</p>

Installation tools

Hand pump



Torque wrench (calibrated)



Setting tool





Installation instructions with filling the washer

	<p>1. Drill hole perpendicular to concrete surface, positioning of the drill holes without damaging the reinforcement.</p>
	<p>2. Blow out dust.</p>
	<p>3. Check position of nut.</p>
	<p>4. Drive in anchor, such that h_{ef} or $h_{ef,red}$ is met. This is ensured, if the thickness of fixture is not greater than the maximum thickness of fixture marked on the anchor.</p>
	<p>5. Apply installation torque T_{inst} as specified in the tables of the "Recommended loads" for each anchor version.</p>
	<p>6. Fill the annular gap between stud and fixture with mortar (compressive strength > 40 N/mm², eg.g. STVK or UM-H). Use enclosed reducing adapter. Observe the processing information of the mortar! The annular gap is completely filled, when excess mortar seeps out.</p>



Installation tools

Hand pump



Torque wrench (calibrated)



Dispensing tools



Filling washer and mixer reduction nozzle



Setting tool





3. BA Pro - Steel, zinc plated

Installation and packaging data

Description	Standard anchorage depth				Reduced anchorage depth				Anchorage length	Thread	pieces per pkg.	weight per pkg.
	max. Fixture thickness	Drill hole Ø x depth	Setting epth h _{nom}	Anchorage depth h _{ef}	max. Fixture thickness t _{fix,red}	Drill hole Ø x depth	Setting depth h _{nom,red}	Anchorage depth h _{ef,red}				
[-]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[pcs]	[kg]
BA 8-6/60 s	-	-	-	-	6	8x49	41	35	60	M8x16	100	2,54
BA 8-11/65 s	-	-	-	-	11	8x49	41	35	65	M8x22	100	2,69
BA 8-10-21/75	10	8x60	52	46	21	8x49	41	35	75	M8x32	100	2,99
BA 8-15-26/80	15	8x60	52	46	26	8x49	41	35	80	M8x37	100	3,14
BA 8-30-41/95	30	8x60	52	46	41	8x49	41	35	95	M8x52	100	3,60
BA 8-50-61/115	50	8x60	52	46	61	8x49	41	35	115	M8x72	100	4,24
BA 8-100-111/165	100	8x60	52	46	111	8x49	41	35	165	M8x122	50	2,94
BA 10-10/70 s	-	-	-	-	10	10x55	48	40	70	M10x22	50	2,44
BA 10-20/80 s	-	-	-	-	20	10x55	48	40	80	M10x32	50	2,69
BA 10-10-30/90	10	10x75	68	60	30	10x55	48	40	90	M10x42	50	2,94
BA 10-15-35/95	15	10x75	68	60	35	10x55	48	40	95	M10x47	50	3,06
BA 10-20-40/100	20	10x75	68	60	40	10x55	48	40	100	M10x52	50	3,18
BA 10-30-50/110	30	10x75	68	60	50	10x55	48	40	110	M10x62	50	3,44
BA 10-50-70/130	50	10x75	68	60	70	10x55	48	40	130	M10x82	50	3,95
BA 10-75-95/155	75	10x75	68	60	95	10x55	48	40	155	M10x107	50	4,55
BA 10-100-120/180	100	10x75	68	60	120	10x55	48	40	180	M10x132	50	5,16
BA 10-150/230	150	10x75	68	60	-	-	-	-	230	M10x80	25	3,49
BA 12-10/85 s	-	-	-	-	10	12x70	60	50	85	M12x26	25	2,10
BA 12-20/95 s	-	-	-	-	20	12x70	60	50	95	M12x36	25	2,28
BA 12-10-30/105	10	12x90	80	70	30	12x70	60	50	105	M12x46	25	2,49
BA 12-15-35/110	15	12x90	80	70	35	12x70	60	50	110	M12x51	25	2,55
BA 12-20-40/115	20	12x90	80	70	40	12x70	60	50	115	M12x56	25	2,66
BA 12-30-50/125	30	12x90	80	70	50	12x70	60	50	125	M12x66	25	2,84
BA 12-50-70/145	50	12x90	80	70	70	12x70	60	50	145	M12x86	25	3,23
BA 12-65-85/160	65	12x90	80	70	85	12x70	60	50	160	M12x101	25	3,49
BA 12-85-105/180	85	12x90	80	70	105	12x70	60	50	180	M12x121	25	3,84
BA 12-105-125/200	105	12x90	80	70	125	12x70	60	50	200	M12x135	25	4,21
BA 12-125/220	125	12x90	80	70	-	-	-	-	220	M12x80	25	4,93
BA 12-145/240	145	12x90	80	70	-	-	-	-	240	M12x80	20	4,32
BA 12-160/255	160	12x90	80	70	-	-	-	-	255	M12x80	20	4,59
BA 12-190/285	190	12x90	80	70	-	-	-	-	285	M12x80	20	4,99
BA 16-5/105 s	-	-	-	-	5	16x90	77	65	105	M16x26	20	3,48
BA 16-15/115 s	-	-	-	-	15	16x90	77	65	115	M16x36	20	3,76
BA 16-15-35/135	15	16x110	97	85	35	16x90	77	65	135	M16x56	20	4,32
BA 16-25-45/145	25	16x110	97	85	45	16x90	77	65	145	M16x66	20	4,60
BA 16-50-70/170	50	16x110	97	85	70	16x90	77	65	170	M16x91	20	5,26
BA 16-80-100/200	80	16x110	97	85	100	16x90	77	65	200	M16x121	10	3,20
BA 16-100/220	100	16x110	97	85	-	-	-	-	220	M16x80	10	3,50
BA 16-140/260	140	16x110	97	85	-	-	-	-	260	M16x80	10	4,12
BA 16-180/300	180	16x110	97	85	-	-	-	-	300	M16x80	10	4,74
BA 20-30/165	30	20x125	114	100	-	-	-	-	165	M20x50	10	4,41
BA 20-60/195	60	20x125	114	100	-	-	-	-	195	M20x70	10	5,05



Description	Standard anchorage depth				Reduced anchorage depth				Anchorage length	Thread	pieces per pkg.	weight per pkg.
	max. Fixture thickness	Drill hole Ø x depth	Setting depth h_{nom}	Anchorage depth h_{ef}	max. Fixture thickness $t_{fix,red}$	Drill hole Ø x depth	Setting depth $h_{nom,red}$	Anchorage depth $h_{ef,red}$				
[-]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[pcs]	[kg]
BA 20-100/235	100	20x125	114	100	-	-	-	-	235	M20x80	5	3,04
BA 20-130/265	130	20x125	114	100	-	-	-	-	265	M20x80	5	3,43
BA 20-150/285	150	20x125	114	100	-	-	-	-	285	M20x80	5	3,66
BA 24-30/190	30	24x145	133	115	-	-	-	-	190	M24x55	10	6,85
BA 24-60/220	60	24x145	133	115	-	-	-	-	220	M24x85	5	3,93
BA 24-75/235	75	24x145	133	115	-	-	-	-	235	M24x100	5	4,15
BA 24-100/260	100	24x145	133	115	-	-	-	-	260	M24x125	5	4,52
BA 27-30/210	30	28x160	146	125	-	-	-	-	210	M27x62	5	5,10
BA 27-60/240	60	28x160	146	125	-	-	-	-	240	M27x92	5	5,60
BA 27-100/280	100	28x160	146	125	-	-	-	-	280	M27x132	5	6,40

Recommended loads

Recommended loads for single anchor for a roughly design without influence of spacing and edge distance.

Total safety factor as per EAD 330232-00-0601. The partial safety factor γ_M of the ETA and a partial safety factor for actions of $\gamma_f=1.4$ is included.

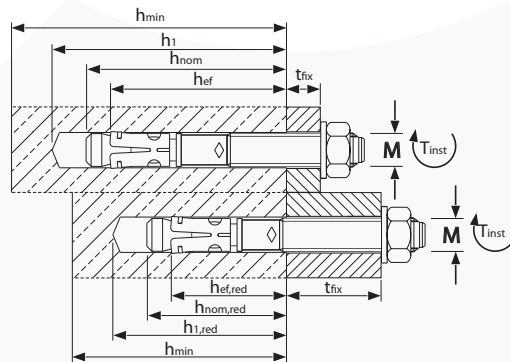
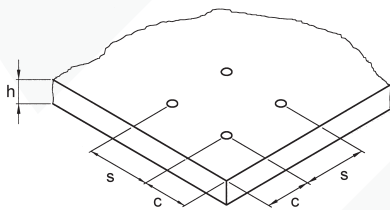
If the conditions are not fulfilled the loads must be calculated acc. to EN 1992-4.

For further details observe ETA-19/0853.

Loads and performance data	Wedge Anchor BA Pro			M8		M10		M12		M16		M20	M24	M27
Standard anchorage depth	h_{ef}	[mm]	46	-	60	-	70	-	85	-	100	115	125	
Reduced anchorage depth	$h_{ef,red}$	[mm]	-	35	-	40	-	50	-	65	-	-	-	
cracked concrete														
Mean ultimate loads, tension	C25/30	N_{um}	[kN]	10,5	8,8	14,9	12,4	28,1	17,6	35,5	30,1	54,3	79,8	80,0
Mean ultimate loads, shear	C25/30	V_{um}	[kN]	16,4	14,5	24,2	24,0	38,4	36,1	65,1	60,0	89,0	131,8	181,7
Recommended loads, tension	C20/25	$N_{rec,stat}$	[kN]	2,4	2,4	4,3	3,6	7,6	6,1	11,9	9,0	17,1	21,1	24,0
	C25/30	$N_{rec,stat}$	[kN]	2,6	2,6	4,7	3,9	8,3	6,6	13,0	9,8	18,8	23,2	26,2
	C30/37	$N_{rec,stat}$	[kN]	2,9	2,9	5,2	4,3	9,3	7,4	14,5	10,9	20,9	25,7	29,1
	C40/50	$N_{rec,stat}$	[kN]	3,4	3,4	6,1	5,1	10,8	8,6	16,8	12,7	24,2	29,9	33,9
	C50/60	$N_{rec,stat}$	[kN]	3,7	3,7	6,6	5,5	11,8	9,4	18,4	13,9	26,6	32,8	37,1
non-cracked concrete														
Recommended loads, tension	C20/25	$N_{rec,stat}$	[kN]	5,7	3,6	7,6	4,3	11,9	8,5	16,7	12,6	24,0	29,7	33,6
	C25/30	$N_{rec,stat}$	[kN]	6,3	3,9	8,3	4,7	13,0	9,3	18,3	13,8	26,3	32,5	36,8
	C30/37	$N_{rec,stat}$	[kN]	7,0	4,3	9,3	5,2	14,5	10,3	20,3	15,3	29,3	36,1	40,9
	C40/50	$N_{rec,stat}$	[kN]	7,5	5,1	10,8	6,1	16,8	12,0	23,6	17,8	34,0	41,9	47,5
	C50/60	$N_{rec,stat}$	[kN]	7,5	5,5	11,8	6,6	18,4	13,2	25,8	19,5	37,3	45,9	52,1
cracked / non-cracked concrete														
Recommended loads, shear	C20/25	$V_{rec,stat}$	[kN]	7,0	7,0	11,5	10,4/11,5	17,1	14,5/17,1	31,4	21,6/30,2	37,1	59,2/65,1	67,1/94,1
	> C25/30	$V_{rec,stat}$	[kN]	7,0	7,0	11,5	11,4/11,5	17,1	15,9/17,1	31,4	23,6/31,4	37,1	64,8/65,1	73,5/96,8
Recommended bending moments		$M_{rec,stat}$	[Nm]	13,1	13,1	26,9	26,9	46,9	46,9	123,4	123,4	195,0	513,1	760,9



Loads and performance data			Wedge Anchor BA Pro		M8		M10		M12		M16		M20		M24		M27	
Spacing and edge distance																		
Effective anchorage depth	h_{ef}	[mm]	46	35	60	40	70	50	85	65	100	115	125					
Characteristic spacing	$s_{cr,N}$	[mm]	138	105	180	120	210	150	255	195	300	345	375					
Characteristic edge distance	$c_{cr,N}$	[mm]	69	52,5	90	60	105	75	127,5	97,5	150	172,5	187,5					
Minimum spacing and edge distance for standard thickness of concrete member																		
cracked concrete																		
Standard thickness of concrete slab	$h_{min,1}$	[mm]	100	-	120	-	140	-	170	-	200	230	250					
Minimum spacing	s_{min}	[mm]	40	-	45	-	60	-	60	-	95	100	125					
Minimum edge distance	c_{min}	[mm]	40	70	45	70	60	100	60	100	95	150	180	300				
			80	-	90	-	140	-	180	-	200	220	540					
non-cracked concrete																		
Minimum spacing	s_{min}	[mm]	40	-	45	-	60	-	65	-	90	100	125					
Minimum edge distance	c_{min}	[mm]	50	80	50	70	75	120	80	120	130	180	180	300				
			100	-	100	-	150	-	150	-	240	220	540					
Minimum spacing and edge distance for minimum thickness of concrete member																		
cracked concrete																		
Minimum thickness of concrete slab	$h_{min,2}$	[mm]	80	80	100	80	120	100	140	140	-	-	-					
Minimum spacing	s_{min}	[mm]	40	50	45	50	60	50	70	65	-	-	-					
Minimum edge distance	c_{min}	[mm]	40	70	60	90	60	100	65	160	80	160	170	-	-	-	-	-
			80	40	50	65	60	65	80	100	180	250	250	-	-	-	-	-
non-cracked concrete																		
Minimum spacing	s_{min}	[mm]	40	50	60	50	60	50	80	65	-	-	-					
Minimum edge distance	c_{min}	[mm]	50	80	60	140	60	120	90	180	170	170	170	-	-	-	-	-
			100	40	90	65	75	100	100	160	90	180	65	-	-	-	-	-
Installation parameters																		
Drill hole diameter	d_o	[mm]	8	8	10	10	12	12	16	16	20	24	28					
Diameter of clearance hole in the fixture	d_f	[mm]	9	9	12	12	14	14	18	18	22	26	30					
Depth of drill hole	h_1	[mm]	60	49	75	55	90	70	110	90	125	145	160					
Installation torque, steel galvanized	T_{inst}	[Nm]	20	20	25	25	45	45	90	90	160	200	300					
Installation torque, steel sherardized	T_{inst}	[Nm]	16	16	22	22	40	40	90	90	160	260	300					
Width across nut	SW	[mm]	13	13	17	17	19	19	24	24	30	36	41					





4. BA Pro - Stainless-steel A4

Installation and packaging data

Description	Standard anchorage depth				Reduced anchorage depth				Anchorage length	Thread	pieces per pkg.	weight per pkg.
	max. Fixture thickness	Drill hole Ø x depth	Setting depth h _{nom}	Anchorage depth h _{ef}	max. Fixture thickness t _{fix,red}	Drill hole Ø x depth	Setting depth h _{nom,red}	Anchorage depth h _{ef,red}				
[]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[pcs]	[kg]
BA 8-6/60 s A4	-	-	-	-	6	8x49	41	35	60	M8x16	100	2,54
BA 8-11/65 s A4	-	-	-	-	11	8x49	41	35	65	M8x22	100	2,69
BA 8-10-21/75 A4	10	8x60	52	46	21	8x49	41	35	75	M8x32	100	2,99
BA 8-15-26/80 A4	15	8x60	52	46	26	8x49	41	35	80	M8x37	100	3,14
BA 8-30-41/95 A4	30	8x60	52	46	41	8x49	41	35	95	M8x52	100	3,60
BA 8-50-61/115 A4	50	8x60	52	46	61	8x49	41	35	115	M8x72	100	4,24
BA 8-100-111/165 A4	100	8x60	52	46	111	8x49	41	35	165	M8x122	50	2,94
BA 10-10/70 s A4	-	-	-	-	10	10x55	48	40	70	M10x22	50	2,44
BA 10-20/80 s A4	-	-	-	-	20	10x55	48	40	80	M10x32	50	2,69
BA 10-10-30/90 A4	10	10x75	68	60	30	10x55	48	40	90	M10x42	50	2,94
BA 10-15-35/95 A4	15	10x75	68	60	35	10x55	48	40	95	M10x47	50	3,06
BA 10-20-40/100 A4	20	10x75	68	60	40	10x55	48	40	100	M10x52	50	3,18
BA 10-30-50/110 A4	30	10x75	68	60	50	10x55	48	40	110	M10x62	50	3,44
BA 10-50-70/130 A4	50	10x75	68	60	70	10x55	48	40	130	M10x82	50	3,95
BA 10-75-95/155 A4	75	10x75	68	60	95	10x55	48	40	155	M10x107	50	4,55
BA 10-100-120/180 A4	100	10x75	68	60	120	10x55	48	40	180	M10x132	50	5,16
BA 10-150/230 A4	150	10x75	68	60	-	-	-	-	230	M10x80	25	3,49
BA 12-10/85 s A4	-	-	-	-	10	12x70	60	50	85	M12x26	25	2,10
BA 12-20/95 s A4	-	-	-	-	20	12x70	60	50	95	M12x36	25	2,28
BA 12-10-30/105 A4	10	12x90	80	70	30	12x70	60	50	105	M12x46	25	3,48
BA 12-15-35/110 A4	15	12x90	80	70	35	12x70	60	50	110	M12x51	25	2,55
BA 12-20-40/115 A4	20	12x90	80	70	40	12x70	60	50	115	M12x56	25	2,66
BA 12-30-50/125 A4	30	12x90	80	70	50	12x70	60	50	125	M12x66	25	2,84
BA 12-50-70/145 A4	50	12x90	80	70	70	12x70	60	50	145	M12x86	25	3,23
BA 12-65-85/160 A4	65	12x90	80	70	85	12x70	60	50	160	M12x101	25	3,48
BA 12-85-105/180 A4	85	12x90	80	70	105	12x70	60	50	180	M12x121	25	3,84
BA 12-105-125/200 A4	105	12x90	80	70	125	12x70	60	50	200	M12x135	25	4,21
BA 12-125/220 A4	125	12x90	80	70	-	-	-	-	220	M12x80	25	4,93
BA 12-160/255 A4	160	12x90	80	70	-	-	-	-	255	M12x80	20	4,59
BA 12-190/285 A4	190	12x90	80	70	-	-	-	-	285	M12x80	20	4,99
BA 12-230/325 A4	230	12x90	80	70	-	-	-	-	325	M12x80	20	5,84
BA 16-15/115 s A4	-	-	-	-	15	16x90	77	65	115	M16x36	20	3,76
BA 16-5-25/125 A4	5	16x110	97	85	25	16x90	77	65	125	M16x46	20	4,15
BA 16-15-35/135 A4	15	16x110	97	85	35	16x90	77	65	135	M16x56	20	4,32
BA 16-25-45/145 A4	25	16x110	97	85	45	16x90	77	65	145	M16x66	20	4,68
BA 16-50-70/170 A4	50	16x110	97	85	70	16x90	77	65	170	M16x91	20	5,36
BA 16-80-100/200 A4	80	16x110	97	85	100	16x90	77	65	200	M16x121	10	3,20
BA 16-100/220 A4	100	16x110	97	85	-	-	-	-	220	M16x80	10	3,59
BA 16-160/280 A4	160	16x110	97	85	-	-	-	-	280	M16x80	10	4,50
BA 20-30/165 A4	30	20x125	114	100	-	-	-	-	165	M20x50	10	4,51
BA 20-60/195 A4	60	20x125	114	100	-	-	-	-	195	M20x70	10	5,14
BA 20-100/235 A4	100	20x125	114	100	-	-	-	-	235	M20x80	5	3,09
BA 20-130/265 A4	130	20x125	114	100	-	-	-	-	265	M20x80	5	3,48
BA 20-150/285 A4	150	20x125	114	100	-	-	-	-	285	M20x80	5	3,73
BA 24-30/200 A4	30	24x155	140	125	-	-	-	-	200	M24x58	10	7,25
BA 24-60/230 A4	60	24x155	140	125	-	-	-	-	230	M24x88	5	4,12
BA 24-75/245 A4	75	24x155	140	125	-	-	-	-	245	M24x103	5	4,34



Recommended loads

Recommended loads for single anchor for a roughly design without influence of spacing and edge distance.

Total safety factor as per EAD 330232-00-0601. The partial safety factor γ_M of the ETA and a partial safety factor for actions of $\gamma_f=1.4$ is included.

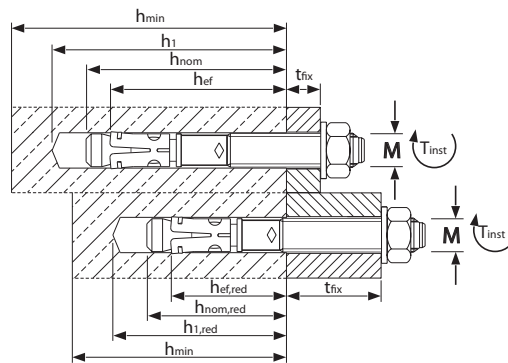
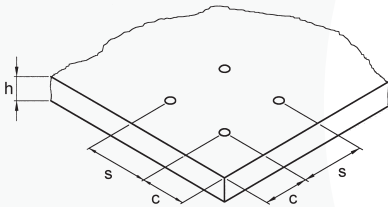
If the conditions are not fulfilled the loads must be calculated acc. to EN 1992-4.

For further details observe ETA-19/0853.

Loads and performance data			Wedge Anchor BA Pro A4		M8		M10		M12		M16		M20	M24
Standard anchorage depth	h_{ef}	[mm]	46	-	60	-	70	-	85	-	100	125		
Reduced anchorage depth	$h_{ef,red}$	[mm]	-	35	-	40	-	50	-	65	-	-		
cracked concrete														
Mean ultimate loads, tension	C25/30	N_{um}	[kN]	10,8	8,8	16,7	12,4	27,5	17,6	40,0	30,1	54,3	79,8	
Mean ultimate loads, shear	C25/30	V_{um}	[kN]	19,0	16,3	28,5	25,5	35,8	40,8	70,3	60,5	108,4	131,8	
Recommended loads, tension	C20/25	$N_{rec,stat}$	[kN]	2,4	2,4	4,3	3,6	7,6	6,1	11,9	9,0	17,1	21,1	
	C25/30	$N_{rec,stat}$	[kN]	2,6	2,6	4,7	3,9	8,3	6,6	13,0	9,8	18,8	23,2	
	C30/37	$N_{rec,stat}$	[kN]	2,9	2,9	5,2	4,3	9,3	7,4	14,5	10,9	20,9	25,7	
	C40/50	$N_{rec,stat}$	[kN]	3,4	3,4	6,1	5,1	10,8	8,6	16,8	12,7	24,2	29,9	
	C50/60	$N_{rec,stat}$	[kN]	3,7	3,7	6,6	5,5	11,8	9,4	18,4	13,9	26,6	32,8	
non-cracked concrete														
Recommended loads, tension	C20/25	$N_{rec,stat}$	[kN]	5,7	3,6	7,6	4,3	11,9	8,5	16,7	12,6	24,0	33,6	
	C25/30	$N_{rec,stat}$	[kN]	6,3	3,9	8,3	4,7	13,0	9,3	18,3	13,8	26,3	36,8	
	C30/37	$N_{rec,stat}$	[kN]	7,0	4,3	9,3	5,2	14,5	10,3	20,3	15,3	29,3	40,9	
	C40/50	$N_{rec,stat}$	[kN]	7,6	5,1	10,8	6,1	16,8	12,0	23,6	17,8	34,0	47,5	
	C50/60	$N_{rec,stat}$	[kN]	7,6	5,5	11,8	6,6	18,4	13,2	25,8	19,5	37,3	52,1	
cracked / non-cracked concrete														
Recommended loads, shear	C20/25	$V_{rec,stat}$	[kN]	7,4	7,4	11,4	10,4/ 11,4	17,1	14,5/ 17,1	31,4	21,6/ 30,2	43,9	67,1 / 70,6	
	> C25/30	$V_{rec,stat}$	[kN]	7,4	7,4	11,4	11,4	17,1	15,9/ 17,1	31,4	23,6/ 31,4	43,9	70,6	
Recommended bending moments		$M_{rec,stat}$	[Nm]	14,9	14,9	29,7	29,7	52,6	52,6	114,3	114,3	231,6	448,8	
Spacing and edge distance														
Effective anchorage depth	h_{ef}	[mm]	46	35	60	40	70	50	85	65	100	125		
Characteristic spacing	$s_{cr,N}$	[mm]	138	105	180	120	210	150	255	195	300	375		
Characteristic edge distance	$c_{cr,N}$	[mm]	69	52,5	90	60	105	75	127,5	97,5	150	187,5		
Minimum spacing and edge distance for standard thickness of concrete member														
cracked concrete														
Standard thickness of concrete slab	$h_{min,1}$	[mm]	100	-	120	-	140	-	170	-	200	230		
Minimum spacing	for edge distance c	s_{min}	[mm]	40	70	50	75	60	100	60	100	95	125	
		c_{min}	[mm]	40	80	55	90	60	140	60	180	95	125	
Minimum edge distance	for spacing s	s_{min}	[mm]	40	80	50	70	60	100	65	120	90	125	
		c_{min}	[mm]	50	100	60	120	75	150	80	150	130	180	
non-cracked concrete														
Minimum spacing	for edge distance c	s_{min}	[mm]	40	80	50	70	60	120	65	120	90	125	
		c_{min}	[mm]	50	100	60	120	75	150	80	150	130	180	
Minimum edge distance	for spacing s	s_{min}	[mm]	40	80	50	70	60	120	65	120	90	125	
		c_{min}	[mm]	50	100	60	120	75	150	80	150	130	180	
Minimum spacing and edge distance for minimum thickness of concrete member														
cracked concrete														
Minimum thickness of concrete slab	$h_{min,2}$	[mm]	80	80	100	80	120	100	140	140	-	-		
Minimum spacing	for edge distance c	s_{min}	[mm]	40	70	50	45	50	60	50	70	65	-	
		c_{min}	[mm]	40	60	45	90	100	100	100	160	160	170	-



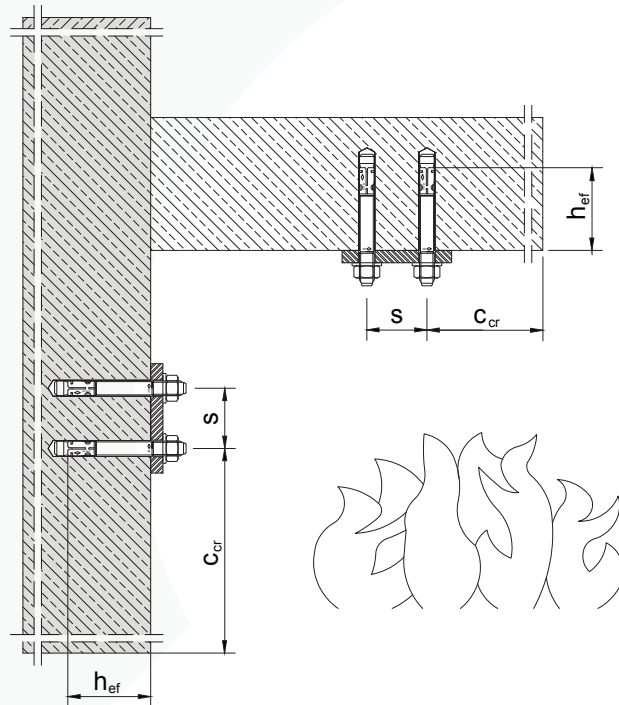
Loads and performance data	Wedge Anchor BA Pro A4		M8		M10		M12		M16		M20	M24
Minimum edge distance for spacing s	c_{min}	s [mm]	40	40	50	65	60	65	80	100	-	-
			80	185	115	180	140	250	180	250	-	-
non-cracked concrete												
Minimum spacing for edge distance c	s_{min}	c [mm]	40	50	60	50	60	50	80	65	-	-
Minimum edge distance for spacing s	c_{min}	s [mm]	50	40	60	65	100	75	120	100	160	170
			100	185	140	180	150	185	200	65	-	-
Installation parameters												
Drill hole diameter	d_o	[mm]	8	8	10	10	12	12	16	16	20	24
Diameter of clearance hole in the fixture	d_f	[mm]	9	9	12	12	14	14	18	18	22	26
Depth of drill hole	h_1	[mm]	60	49	75	55	90	70	110	90	125	155
Installation torque, steel galvanized	T_{inst}	[Nm]	20	20	35	35	50	50	110	110	200	290
Installation torque, steel sherardized	T_{inst}	[Nm]	13	13	17	17	19	19	24	24	30	36
Width across nut	SW	[mm]	13	13	17	17	19	19	24	24	30	36





6. Fire resistance

The recommended fire resistance loads are evaluated with regard to their fire resistance properties in walls and ceilings exposed to fire on one side. Fire tested according to unit temperature curve taking into account the requirements of ISO 834, DIN EN 1363-1: 1999-10, DIN EN 1363-1:2012, DIN 4102-2: 1977-09 in concrete under direct flame exposure without insulating or protective coatings.



The recommended tension and shear loads under fire exposure of the following table are only valid if the following conditions are met:

- Concrete class min. C20/25
- uncracked or cracked
- $c \geq 2,0 \times h_{ef}$
- $s \geq 4,0 \times h_{ef}$

The recommended loads have been calculated using the partial safety factor for resistances under fire exposure of $\gamma_{M,fi} = 1.0$ and with a partial safety factor for actions of $\gamma_F = 1.0$.

Anchor	Size	Recommended load $N_{rec,fi(t)}$ as function of fire resistance time in minutes							
		R 30 (30 min)		R 60 (60 min)		R 90 (90 min)		R 120 (120 min)	
		$h_{ef,red}$	$h_{ef,std}$	$h_{ef,red}$	$h_{ef,std}$	$h_{ef,red}$	$h_{ef,std}$	$h_{ef,red}$	$h_{ef,std}$
[-]	[-]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
Bolzenanker BA Pro • Stahl verzinkt	M8	1,25	1,25	1,10	1,10	0,80	0,80	0,60	0,70
	M10	1,82	2,25	1,82	1,90	1,30	1,40	1,00	1,20
	M12	3,18	4,00	3,00	3,00	1,90	2,40	1,30	2,20
	M16	4,72	6,25	4,72	5,60	3,50	4,40	2,50	4,00
	M20	-	9,00	-	8,20	-	6,90	-	6,30
	M24	-	11,10	-	11,10	-	10,00	-	8,88
	M27	-	12,58	-	12,58	-	12,58	-	10,06



Anchor	Size	Recommended load $N_{rec,fi(t)}$ as function of fire resistance time in minutes							
		R 30 (30 min)		R 60 (60 min)		R 90 (90 min)		R 120 (120 min)	
		$h_{ef,red}$	$h_{ef,std}$	$h_{ef,red}$	$h_{ef,std}$	$h_{ef,red}$	$h_{ef,std}$	$h_{ef,red}$	$h_{ef,std}$
[-]	[-]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
Bolzenanker BA Plus A4 / HCR	M8	1,25	1,25	1,25	1,25	1,25	1,25	1,00	1,00
	M10	1,82	2,25	1,82	2,25	1,82	2,25	1,46	1,80
• Edelstahl A4/316 • Edelstahl 1.4529	M12	3,18	4,00	3,18	4,00	3,18	4,00	2,55	3,20
	M16	4,72	6,25	4,72	6,25	4,72	6,25	3,77	5,00
	M20	-	9,00	-	9,00	-	9,00	-	7,20
	M24	-	10,00	-	10,00	-	10,00	-	8,00