Technical Sheet

AKR
Reinforced Angle Bracket

The AKR bracket is reinforced around the bend, which significantly increases the rigidity and strength of the bracket.

- *One-piece connector.*
- *Reinforced corners provide enhanced performance.*
- *CNA nails must be used to achieve the published loads.*



Features

Material

Steel:
S 235JR acc. EN 10025
Corrosion protection:
Hot dip galvanised after fabrication acc. to EN ISO 1461 - zinc layer thickness approx.55 µm

Benefits

- Load capacity in all directions
- Full and partial nailing
- Single or double sided connections
- Optional mounting with a distance to the support, only for tension connections
- Optimised bolt utilisation

Applications

Header member

Supporting member:
Concrete, steel
Supported member:
Timber, engineered wood

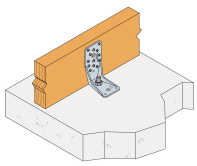
Applications

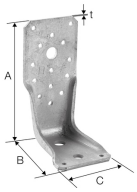
- The AKR angle brackets enable optmised connections between timber and other materials, like concrete, steel, etc.
- According to their overall galvanisation the AKR angle brackets could be used in outdoor areas

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Technical Data





Product Dimensions

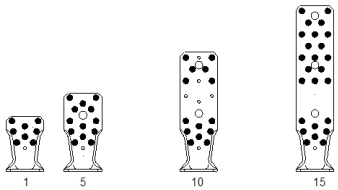
Reference	Connector Dimensions										
	Product Dimensions[mm]				Joist		Flange B				Other
	A[mm]	B[mm]	C[mm]	t[mm]	Round		Round			Obround	Weight[kg]
					Ø5.2[mm]	Ø13.5[mm]	Ø5[mm]	Ø11[mm]	Ø13.5[mm]	Ø13.5x25[mm]	
AKR95G	95	85	65	4	9	-	2	1	1	-	0.32
AKR95LG	95	85	65	4	9	-	2	1	-	1	0.32
AKR135G	135	85	65	4	14	1	2	1	1	-	0.44
AKR135LG	135	85	65	4	14	1	2	1	-	1	0.44
AKR285G	285	85	65	4	26	3	2	1	1	-	0.75
AKR285LG	285	85	65	4	26	3	2	1	-	1	0.72

Further below you will find the load valuesfor these nail pattern: Full nailing, Partial nailing and nailing to a column.
Further connection options are given in the according ETA.

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Capacities - Full nailing



Reference	nail pattern	Number of Fasteners				Holdowns capacity Product characteristic capacities - Full nailing - 2 brackets per connection Characteristic capacity - 2 angle brackets per connection - full nailing[kN]						
		Flange B		Joist		R4/5,k	$R_{1,k}$			$R_{2,k}=R_{3,k}$		
		Qty	Type	Qty	Type	CNA4.0x40/50/60	CNA4.0x40	CNA4.0x50	CNA4.0x60	CNA4.0x40	CNA4.0x50	CNA4.0x60
AKR95G	1	1.0	Ø12*	8.0	CNA*	26.5 / kmod	min (17.55 ; 42.8/kmod + 13.2)	min (22.64 ; 42.8/kmod + 17.6)	min (26.48 ; 42.8/kmod + 22)	5	6.2	6.9
AKR95LG	1	1.0	Ø12**	8.0	CNA*	-	min (13.31 ; 42.8/kmod + 8.92)	min (17.4 ; 42.8/kmod + 11.89)	min (20.89 ; 42.8/kmod + 14.87)	4.4	5.6	6.4
AKR135G	5	1.0	Ø12**	13.0	CNA*	26.5 / kmod	min (31.78 ; 42.8/kmod + 8.69)	min (40.69 ; 42.8/kmod + 11.58)	min (46.92 ; 42.8/kmod + 14.48)	8	10.1	11.2
AKR135LG	5	1.0	Ø12**	13.0	CNA*	-	min (24.88 ; 42.8/kmod + 5.87)	min (32.34 ; 42.8/kmod + 7.83)	min (38.36 ; 42.8/kmod + 9.78)	7.2	9.1	10.4
AKR285G	15	1.0	Ø12**	25.0	CNA*	26.5 / kmod	min (45.25 ; 42.8/kmod + 8.69)	min (58.98 ; 42.8/kmod + 11.58)	min (70.31 ; 42.8/kmod + 14.48)	8.9	11.6	14.1
AKR285LG	15	1.0	Ø12**	25.0	CNA*	-	min (32.96 ; 42.8/kmod + 5.87)	min (43.42 ; 42.8/kmod + 7.83)	min (52.87 ; 42.8/kmod + 9.78)	6.6	8.7	10.7

*) Bolte, f.eks. WA, BoAX II eller lignende, disse skal undersøges separat.

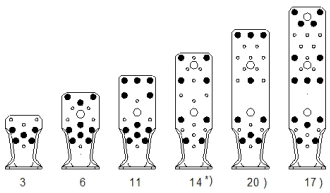
Faktor til at beregne / check boltene, for forbindelser med 2 AKR		
Retning belastning	k_{ax}	k_{lat}
F_1 bolt 1 og bolt 2	0,5	0
$F_{2/3}$ bolt 1 og bolt 2	0,2	0,5
$F_{4/5}$ bolt 1 for $F_{1,d}$	1	0
$F_{4/5}$ bolt 2	0,5	1

Den AKR hvor lasten $F_{4/5}$ virker ind mod beslaget (bolt 1 på vist eksempel) skal checkes for:
F^*_{1,d} = \frac{F_{4/5,d}\times(e-16,5mm)} {b+83mm}

Eftervisning
Ved kombineret last skal der eftervises:
\left (\frac {F_{1,d}} {R_{1,d}} + \frac {F_{4/5,d}}{R_{4/5,d}} \right)^2 + \left (\frac{F_{2/3,d}}{R_{2/3,d}} \right) \le 1

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Capacities - Partial nailing

Reference	Nail pattern	Number of Fasteners				Holdowns capacity						
		Product characteristic capacities - Partial nailing - 2 brackets per connection										
		Number of Fasteners				Characteristic capacity - 2 angle brackets per connection - full nailing[kN]						
		Joist		Flange B		R4/5,k	$R_{1,k}$			$R_{2,k}=R_{3,k}$		
		Qty	Type	Qty	Type	CNA4.0x40/50/60	CNA4.0x40	CNA4.0x50	CNA4.0x60	CNA4.0x40	CNA4.0x50	CNA4.0x60
AKR95G	3	5.0	CNA*	1.0	Ø12**	26.5 / kmod	min (10.3 ; 42.8/kmod + 12.62)	min (13.34 ; 42.8/kmod + 16.82)	min (15.72 ; 42.8/kmod + 21.04)	3.2	4	4.5
AKR95LG	3	5.0	CNA*	1.0	Ø12**	-	min (7.7 ; 42.8/kmod + 8.52)	min (10.1 ; 42.8/kmod + 11.36)	min (12.18 ; 42.8/kmod + 14.22)	2.9	3.6	4.1
AKR135G	6	9.0	CNA*	1.0	Ø12**	26.5 / kmod	min (21.19 ; 42.8/kmod + 8.69)	min (27.21 ; 42.8/kmod + 11.58)	min (31.54 ; 42.8/kmod + 11.58)	5.9	7.5	8.4
AKR135LG	6	9.0	CNA*	1.0	Ø12**	-	min (16.39 ; 42.8/kmod + 5.87)	min (21.35 ; 42.8/kmod + 7.83)	min (25.45 ; 42.8/kmod + 9.78)	5.2	6.6	7.6
AKR285G	17	14.0	CNA*	1.0	Ø12**	26.5 / kmod	min (27.93 ; (42.8/kmod + 3.93)	min (36.23 ; 42.8/kmod + 5.24)	min (42.8 ; 42.8/kmod + 6.55)	5.5	7.3	8.8
AKR285LG	17	14.0	CNA*	1.0	Ø12**	-	min (20.71 ; (42.8/kmod + 2.66)	min (27.2 ; 42.8/kmod + 3.54)	min (32.91 ; 42.8/kmod + 4.43)	4.1	5.5	6.7

*) Bolzenanker z.B. BoAX II oder gleichwertig sind separat nachzuweisen.

Faktor zur Bolzenberechnung bei Anschlüssen mit 2 AKR		
Lastrichtung	k_{ax}	k_{lat}
F_1 Bolzen 1 u. 2	0,5	0
$F_{2/3}$ Bolzen 1 u. 2	0,2	0,5
$F_{4/5}$ Bolzen 1 aus $F_{1,d}$	1	0
$F_{4/5}$ Bolzen 2	0,5	1

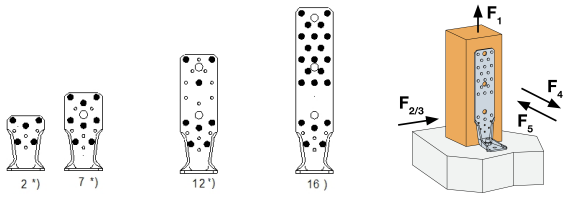
<u>Für die Lastrichtung F4/5, bei beidseitigem Anschluss gilt:</u>
Eine zusätzliche Zuglast (F*1,d) muss aufgenommen und für den linken AKR, sowie für beide Bolzen nachgewiesen werden - siehe auch ETA-07/0285.
F^*_{1,d} = \frac{F_{4/5,d}\times(e-16,5mm)} {b+83mm}
<u>Kombinierte Beanspruchung:</u>
\left (\frac {F_{1,d}} {R_{1,d}} + \frac {F_{4/5,d}}{R_{4/5,d}} \right)^2 + \left (\frac{F_{2/3,d}}{R_{2/3,d}} \right) \le 1

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SIMPSON Strong-Tie

Capacities - nailing to column



Reference	Holdowns capacity											
	Product characteristic capacities - Column nailing - 2 brackets per connection											
	nail pattern	Number of Fasteners				Characteristic Capacities[kN]						
		Joist		Flange B		R4/5,k	R1,k (2)			$R_{2,k}=R_{3,k}$		
		Qty	Type	Qty	Type	CNA4.0x40/50/60	CNA4.0x40	CNA4.0x50	CNA4.0x60	CNA4.0x40	CNA4.0x50	CNA4.0x60
AKR95G	2	5	CNA*	1.0	Ø12**	26.5 / kmod	min (11.5 ; 42.8/kmod + 5.97)	min (14.78 ; 42.8/kmod + 7.97)	min (17.19 ; 42.8/kmod + 9.96)	3.5	4.4	5
AKR95LG	2	5	CNA*	1.0	Ø12**	-	min (8.83 ; 42.8/kmod + 4.04)	min (11.52 ; 42.8/kmod + 5.38)	min (13.76 ; 42.8/kmod + 6.73)	3.1	3.9	4.5
AKR135G	7	8	CNA*	1.0	Ø12**	26.5 / kmod	min (20.49 ; 42.8/kmod + 3.93)	min (26.13 ; 42.8/kmod + 5.24)	min (29.94 ; 42.8/kmod + 6.55)	5.6	7	7.9
AKR135LG	7	8	CNA*	1.0	Ø12**	-	min (16.31 ; 42.8/kmod + 2.66)	min (21.13 ; 42.8/kmod + 3.54)	min (24.91 ; 42.8/kmod + 4.43)	4.9	6.2	7.1
AKR285G	16	22	CNA*	1.0	Ø12**	26.5 / kmod	min (41.66 ; 42.8/kmod + 3.93)	min (54.19 ; 42.8/kmod + 5.24)	min (64.34 ; 42.8/kmod + 6.55)	5.8	7.6	9.3
AKR285LG	16	22	CNA*	1.0	Ø12**	-	min (30.58 ; 42.8/kmod + 2.66)	min (40.23 ; 42.8/kmod + 3.54)	min (48.85 ; 42.8/kmod + 4.43)	4.2	5.6	6.9

*) Bolzenanker z.B. BoAX II oder gleichwertig sind separat nachzuweisen.

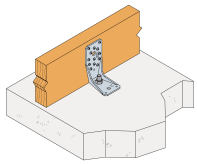
Faktor zur Bolzenberechnung bei Anschlüssen mit 2 AKR		
Lastrichtung	k_{ax}	k_{lat}
F_1 Bolzen 1 u. 2	0,5	0
$F_{2/3}$ Bolzen 1 u. 2	0,2	0,5
$F_{4/5}$ Bolzen 1 aus $F_{1,d}$	1	0
$F_{4/5}$ Bolzen 2	0,5	1

<u>Für die Lastrichtung F4/5, bei beidseitigem Anschluss gilt:</u>
Eine zusätzliche Zuglast (F*1,d) muss aufgenommen und für den linken AKR, sowie für beide Bolzen nachgewiesen werden - siehe auch ETA-07/0285.
F^*_{1,d} = \frac{F_{4/5,d}\times(e-16,5mm)} {b+83mm}
<u>Kombinierte Beanspruchung:</u>
\left (\frac {F_{1,d}} {R_{1,d}} + \frac {F_{4/5,d}}{R_{4/5,d}} \right)^2 + \left (\frac{F_{2/3,d}}{R_{2/3,d}} \right) \le 1

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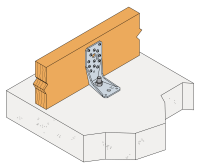
Simplified characteristic capacities - Wood to concrete - Full nailing - 1 bracket per connection



Reference	Holdowns capacity					
	Simplified characteristic capacities - 1 bracket per connection - Full nailing					
	Characteristic Capacities[kN]		Number of Fasteners			
	$R_{1,k}$***	$R_{2,k} = R_{3,k}$	Joist		Flange B	
			Qty	Type	Qty	Type
AKR95G	11.3	3.1	8.0	CNA4.0x50	1.0	Ø12*
AKR95LG	8.7	2.8	8.0	CNA4.0x50	1.0	Ø12**
AKR135G	20.3	5.1	13.0	CNA4.0x50	1.0	Ø12**
AKR135LG	16.2	4.6	13.0	CNA4.0x50	1.0	Ø12**
AKR285G	25.3	5.8	25.0	CNA4.0x50	1.0	Ø12**
AKR285LG	21.7	4.4	25.0	CNA4.0x50	1.0	Ø12**

** The bolt design resistance requirement R#,d is determined from (bolt factor x connection design load F#,d) for the required load direction and fastener. Refer to the Simpson Strong-Tie anchor product range for suitable anchors. Typical anchor solutions are BOAXII, SET-XP, WA, AT-HP, depending on the concrete type, spacing and edge distances.
*** The published characteristic capacity is based on instantaneous load duration and service class 2 according to EC5 (EN 1995) – k_{mod} = 1,1. For other load duration and service class, please refer to the ETA to get more accurate capacities

Simplified characteristic capacities - Wood to concrete - Partial nailing - 1 bracket per connection

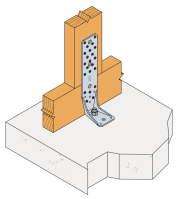


Reference	Holdowns capacity					
	Simplified characteristic capacities - 1 bracket per connection - Partial nailing					
	Number of Fasteners				Characteristic Capacities[kN]	
	Flange B		Joist		$R_{1,k}$***	$R_{2,k} = R_{3,k}$
	Qty	Type	Qty	Type		
AKR95G	1.0	Ø12**	5.0	CNA4.0x50	6.7	4
AKR95LG	1.0	Ø12**	5.0	CNA4.0x50	5.1	3.6
AKR135G	1.0	Ø12**	9.0	CNA4.0x50	13.6	7.5
AKR135LG	1.0	Ø12**	9.0	CNA4.0x50	10.7	6.6
AKR285G	1.0	Ø12**	14.0	CNA4.0x50	18.1	7.3
AKR285LG	1.0	Ø12**	14.0	CNA4.0x50	13.6	5.5

** The bolt design resistance requirement R#,d is determined from (bolt factor x connection design load F#,d) for the required load direction and fastener. Refer to the Simpson Strong-Tie anchor product range for suitable anchors. Typical anchor solutions are BOAXII, SET-XP, WA, AT-HP, depending on the concrete type, spacing and edge distances.
*** The published characteristic capacity is based on instantaneous load duration and service class 2 according to EC5 (EN 1995) – k_{mod} = 1,1. For other load duration and service class, please refer to the ETA to get more accurate capacities

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Simplified characteristic capacities - Post mounting to concrete - 1 bracket per connection

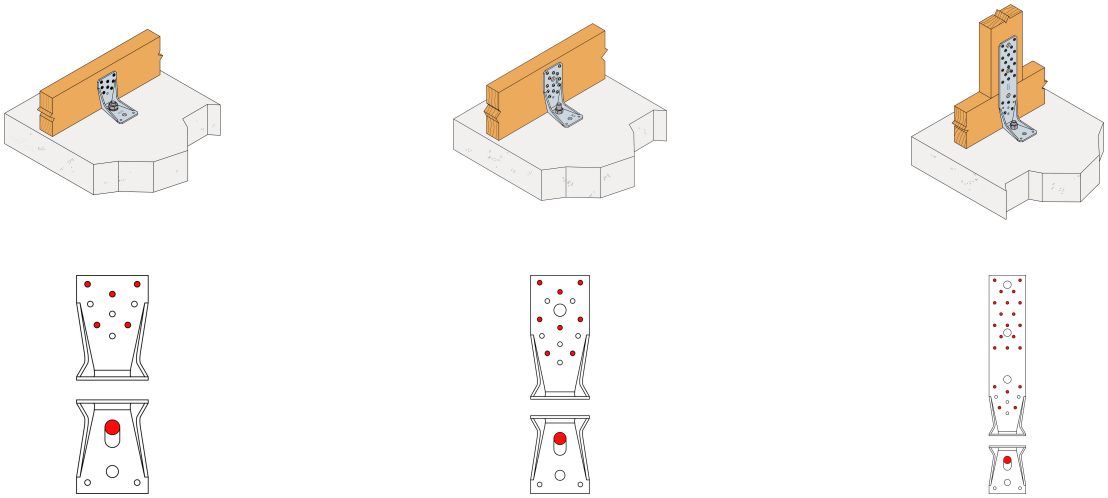
Reference	Holdowns capacity					
	Simplified product capacities - Timber to Concrete					
	Number of Fasteners				Simplified characteristic capacities - 1 brackets per connection[kN]	
	Joist		Flange B		$R_{1,k}$***	$R_{2,k} = R_{3,k}$
	Qty	Type	Qty	Type		
AKR95G	5.0	CNA4.0x50	1.0	Ø12**	7.4	4.4
AKR95LG	5.0	CNA4.0x50	1.0	Ø12**	5.8	3.9
AKR135G	8.0	CNA4.0x50	1.0	Ø12**	13.1	7
AKR135LG	8.0	CNA4.0x50	1.0	Ø12**	10.6	6.2
AKR285G	22.0	CNA4.0x50	1.0	Ø12**	22.1	7.6
AKR285LG	22.0	CNA4.0x50	1.0	Ø12**	20.1	5.6

** The bolt design resistance requirement R#,d is determined from (bolt factor x connection design load F#,d) for the required load direction and fastener. Refer to the Simpson Strong-Tie anchor product range for suitable anchors. Typical anchor solutions are BOAXII, SET-XP, WA, AT-HP, depending on the concrete type, spacing and edge distances.
*** The published characteristic capacity is based on instantaneous load duration and service class 2 according to EC5 (EN 1995) – k_{mod} = 1,1. For other load duration and service class, please refer to the ETA to get more accurate capacities

Installation

Fixing

- Fasten onto timber members with CNA4,0xl threaded nails or optional with CSA5,0xl screws and to concrete / steel with bolts M12 and a washer Ø24.
- Single or double sided connections are possible.



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