

Technical data sheet

SIMPSON

Strong-Tie®

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 galvanized 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
- Optimized bolt utilisation

Applications

Header member

Supporting member:

- Concrete, steel

Supported member:

- Timber, engineered wood

Applications

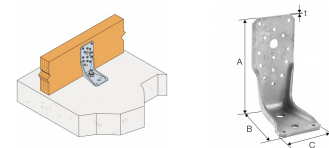
- The AKR angle brackets enable optimised connections between timber and other materials, like concrete, steel, etc.
- According to their overall galvanization the AKR angle brackets could be used in outdoor areas



AKR Reinforced Angle Bracket

Technical Data

Product Dimensions

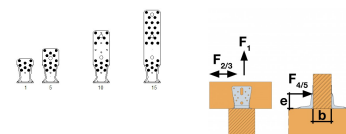


References	Product Dimensions [mm]				Holes Flange A		Holes Flange B			
	A	B	C	t	Ø5.2 [mm]	Ø13.5 [mm]	Ø5 [mm]	Ø11 [mm]	Ø13.5 [mm]	Ø13.5x25 [mm]
AKR95G	95	85	65	4	9	-	2	1	1	-
AKR95LG	95	85	65	4	9	-	2	1	-	1
AKR135G	135	85	65	4	14	1	2	1	1	-
AKR135LG	135	85	65	4	14	1	2	1	-	1
AKR165G	165	85	65	4	15	1	2	1	1	-
AKR165LG	165	85	65	4	15	1	2	1	-	1
AKR205G	205	85	65	4	20	2	2	1	1	-
AKR205LG	205	85	65	4	20	2	2	1	-	1
AKR245G	245	85	65	4	22	2	2	1	1	-
AKR245LG	245	85	65	4	22	2	2	1	-	1
AKR285G	285	85	65	4	26	3	2	1	1	-
AKR285LG	285	85	65	4	26	3	2	1	-	1

Further below you will find the load values for these nail patterns: 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

References	Product capacities - Timber to concrete - Full nailing											
	Number of Fasteners					Characteristic capacities - Timber C24 - 2 angle brackets per connection [kN]						
	Joist		Flange B		nail pattern	R _{1,k}			R _{2,k} = R _{3,k}			R _{4/5,k}
	Qty	Type	Qty	Type		CNA4.0x40	CNA4.0x50	CNA4.0x60	CNA4.0x40	CNA4.0x50	CNA4.0x60	CNA4.0x40 / 50 / 60
AKR95G	8	CNA*	1	Ø12*	1	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	26.5 / kmod
AKR95LG	8	CNA*	1	Ø12**	1	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	13	CNA*	1	Ø12**	5	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	26.5 / kmod
AKR135LG	13	CNA*	1	Ø12**	5	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	-
AKR165G	-	-	-	-	-	-	-	-	-	-	-	-
AKR165LG	-	-	-	-	-	-	-	-	-	-	-	-
AKR205G	14	CNA*	1	Ø12**	10	min (33.42 ; 42.8/kmod + 8.68)	min (42.86 ; 42.8/kmod + 11.58)	min (49.6 ; 42.8/kmod + 14.48)	7.8	10.1	11.8	26.5 / kmod
AKR205LG	14	CNA*	1	Ø12**	10	min (25.96 ; 42.8/kmod + 5.86)	min (33.78 ; 42.8/kmod + 7.82)	min (40.2 ; 42.8/kmod + 9.78)	6.1	8	9.6	-
AKR245G	-	-	-	-	-	-	-	-	-	-	-	-
AKR245LG	-	-	-	-	-	-	-	-	-	-	-	-
AKR285G	25	CNA*	1	Ø12**	15	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	26.5 / kmod
AKR285LG	25	CNA*	1	Ø12**	15	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:

$$F_{1,d}^* = \frac{F_{4/5,d} \times (e - 16,5mm)}{b + 83mm}$$

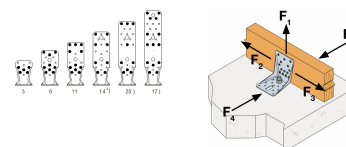
Eftervisning

Ved kombineret last skal der eftervises:

$$\left(\frac{F_{1,d}}{R_{1,d}} + \frac{F_{4/5,d}}{R_{4/5,d}} \right)^2 + \left(\frac{F_{2/3,d}}{R_{2/3,d}} \right) \leq 1$$

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Capacities - Partial nailing

References	Product capacities - Timber to concrete - Partial nailing											
	Number of Fasteners					Characteristic capacities - Timber C24 - 2 angle brackets per connection [kN]						
	Joist		Flange B		Joist	R _{1,k}			R _{2,k} = R _{3,k}			R _{4/5,k}
	Qty	Type	Qty	Type		CNA4.0x40	CNA4.0x50	CNA4.0x60	CNA4.0x40	CNA4.0x50	CNA4.0x60	CNA4.0x40 / 50 / 60
AKR95G	5	CNA*	1	Ø12**	3	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	26.5 / kmod
AKR95LG	5	CNA*	1	Ø12**	3	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	9	CNA*	1	Ø12**	6	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	26.5 / kmod
AKR135LG	9	CNA*	1	Ø12**	6	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	-
AKR165G	11	CNA*	1	Ø12**	11	min (29.22 ; 42.8/kmod + 8.68)	min (37.14 ; 42.8/kmod + 11.58)	min (42.32 ; 42.8/kmod + 14.48)	7.1	9	10.4	26.5 / kmod
AKR165LG	11	CNA*	1	Ø12**	11	min (23.62 ; 42.8/kmod + 5.86)	min (30.5 ; 42.8/kmod + 7.82)	min (35.76 ; 42.8/kmod + 9.78)	5.8	7.5	8.8	-
AKR205G	8	CNA*	1	Ø12**	14	min (17.08 ; 42.8/kmod + 1.6)	min (22.08 ; 42.8/kmod + 2.14)	min (25.9 ; 42.8/kmod + 2.68)	5.5	7	8	26.5 / kmod
AKR205LG	8	CNA*	1	Ø12**	14	min (12.86 ; 42.8/kmod + 1.08)	min (16.84 ; 42.8/kmod + 1.44)	min (20.28 ; 42.8/kmod + 1.82)	4.6	5.9	6.9	-
AKR245G	9	CNA*	1	Ø12**	20	min (14.28 ; 42.8/kmod + 3.14)	min (18.7 ; 42.8/kmod + 4.18)	min (22.54 ; 42.8/kmod + 5.22)	5.7	7.4	8.8	26.5 / kmod
AKR245LG	9	CNA*	1	Ø12**	20	min (10.22 ; 42.8/kmod + 2.12)	min (13.5 ; 42.8/kmod + 2.82)	min (16.54 ; 42.8/kmod + 3.52)	4.5	5.9	7.1	-
AKR285G	14	CNA*	1	Ø12**	17	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	26.5 / kmod
AKR285LG	14	CNA*	1	Ø12**	17	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	-

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References	Product capacities - Timber to concrete - Partial nailing										
	Number of Fasteners				Joist	Characteristic capacities - Timber C24 - 2 angle brackets per connection [kN]					
	Joist		Flange B			R _{1,k}			R _{2,k} = R _{3,k}		R _{4/5,k}
	Qty	Type	Qty	Type		CNA4.0x40	CNA4.0x50	CNA4.0x60	CNA4.0x40	CNA4.0x50	CNA4.0x60

*) 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

Für die Lastrichtung F_{4/5}, bei beidseitigem Anschluss gilt:

Eine zusätzliche Zuglast (F^{*}_{1,d}) muss aufgenommen und für den linken AKR, sowie für beide Bolzen nachgewiesen werden - siehe auch ETA-07/0285.

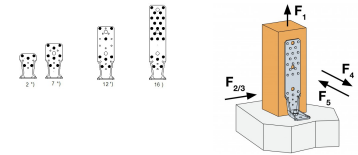
$$F_{1,d}^* = \frac{F_{4/5,d} \times (e - 16,5mm)}{b + 83mm}$$

Kombinierte Beanspruchung:

$$\left(\frac{F_{1,d}}{R_{1,d}} + \frac{F_{4/5,d}}{R_{4/5,d}} \right)^2 + \left(\frac{F_{2/3,d}}{R_{2/3,d}} \right) \leq 1$$

AKR Reinforced Angle Bracket

Capacities - nailing to column



References	Product capacities - Timber C24 - column											
	Number of Fasteners					Characteristic capacities - Timber C24 - 2 angle brackets per connection [kN]						
	Joist		Flange B		nail pattern	R _{1,k}			R _{2,k} = R _{3,k}			R _{4/5,k}
	Qty	Type	Qty	Type		CNA4.0x40	CNA4.0x50	CNA4.0x60	CNA4.0x40	CNA4.0x50	CNA4.0x60	CNA4.0x40 / 50 / 60
AKR95G	5	CNA*	1	Ø12**	2	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	26.5 / kmod
AKR95LG	5	CNA*	1	Ø12**	2	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	8	CNA*	1	Ø12**	7	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	26.5 / kmod
AKR135LG	8	CNA*	1	Ø12**	7	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	-
AKR165G	-	-	-	-	-	-	-	-	-	-	-	-
AKR165LG	-	-	-	-	-	-	-	-	-	-	-	-
AKR205G	8	CNA*	1	Ø12**	12	min (14.3 ; 42.8/kmod + 3.94)	min (18.64 ; 42.8/kmod + 5.24)	min (22.24 ; 42.8/kmod + 6.56)	4.8	6.2	7.2	26.5 / kmod
AKR205LG	8	CNA*	1	Ø12**	12	min (10.4 ; 42.8/kmod + 2.66)	min (13.7 ; 42.8/kmod + 3.54)	min (16.68 ; 42.8/kmod + 4.42)	3.8	5	5.9	-
AKR245G	-	-	-	-	-	-	-	-	-	-	-	-
AKR245LG	-	-	-	-	-	-	-	-	-	-	-	-
AKR285G	22	CNA*	1	Ø12**	16	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	26.5 / kmod
AKR285LG	22	CNA*	1	Ø12**	16	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

Für die Lastrichtung F_{4/5}, bei beidseitigem Anschluss gilt:

Eine zusätzliche Zuglast (F*_{1,d}) muss aufgenommen und für den linken AKR, sowie für beide Bolzen nachgewiesen werden - siehe auch ETA-07/0285.

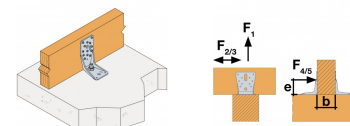
$$F_{1,d}^* = \frac{F_{4/5,d} \times (e - 16,5mm)}{b + 83mm}$$

Kombinierte Beanspruchung:

$$\left(\frac{F_{1,d}}{R_{1,d}} + \frac{F_{4/5,d}}{R_{4/5,d}} \right)^2 + \left(\frac{F_{2/3,d}}{R_{2/3,d}} \right) \leq 1$$

AKR Reinforced Angle Bracket

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



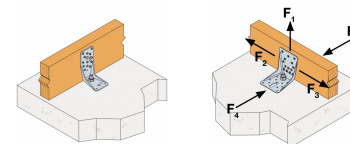
References	Simplified product capacities - Timber to concrete – Full nailing					
	Number of Fasteners				Simplified characteristic capacities - 1 brackets per connection [kN]	
	Joist		Flange B		$R_{1,k}^{***}$	$R_{2,k} = R_{3,k}^{***}$
	Qty	Type	Qty	Type		
AKR95G	8	CNA4.0x50	1	Ø12*	11.3	3.1
AKR95LG	8	CNA4.0x50	1	Ø12**	8.7	2.8
AKR135G	13	CNA4.0x50	1	Ø12**	20.3	5.1
AKR135LG	13	CNA4.0x50	1	Ø12**	16.2	4.6
AKR165G	-	-	-	-	-	-
AKR165LG	-	-	-	-	-	-
AKR205G	14	CNA4.0x50	1	Ø12**	21.4	5.1
AKR205LG	14	CNA4.0x50	1	Ø12**	16.9	4
AKR245G	-	-	-	-	-	-
AKR245LG	-	-	-	-	-	-
AKR285G	25	CNA4.0x50	1	Ø12**	25.3	5.8
AKR285LG	25	CNA4.0x50	1	Ø12**	21.7	4.4

** 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

AKR Reinforced Angle Bracket

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



References	Simplified product capacities - Timber to concrete – Partial nailing					
	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	CNA4.0x50	1	Ø12**	6.7	4
AKR95LG	5	CNA4.0x50	1	Ø12**	5.1	3.6
AKR135G	9	CNA4.0x50	1	Ø12**	13.6	7.5
AKR135LG	9	CNA4.0x50	1	Ø12**	10.7	6.6
AKR165G	11	CNA4.0x50	1	Ø12**	18.6	9
AKR165LG	11	CNA4.0x50	1	Ø12**	15.3	7.5
AKR205G	8	CNA4.0x50	1	Ø12**	11	7
AKR205LG	8	CNA4.0x50	1	Ø12**	8.4	5.9
AKR245G	9	CNA4.0x50	1	Ø12**	9.4	7.4
AKR245LG	9	CNA4.0x50	1	Ø12**	6.8	5.9
AKR285G	14	CNA4.0x50	1	Ø12**	18.1	7.3
AKR285LG	14	CNA4.0x50	1	Ø12**	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.

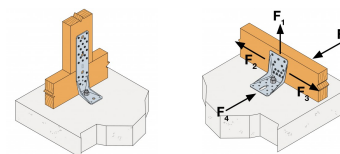
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AKR Reinforced Angle Bracket

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



References	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	CNA4.0x50	1	Ø12**	7.4	4.4
AKR95LG	5	CNA4.0x50	1	Ø12**	5.8	3.9
AKR135G	8	CNA4.0x50	1	Ø12**	13.1	7
AKR135LG	8	CNA4.0x50	1	Ø12**	10.6	6.2
AKR165G	-	-	-	-	-	-
AKR165LG	-	-	-	-	-	-
AKR205G	8	CNA4.0x50	1	Ø12**	9.3	6.2
AKR205LG	8	CNA4.0x50	1	Ø12**	6.9	5
AKR245G	-	-	-	-	-	-
AKR245LG	-	-	-	-	-	-
AKR285G	22	CNA4.0x50	1	Ø12**	22.1	7.6
AKR285LG	22	CNA4.0x50	1	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.

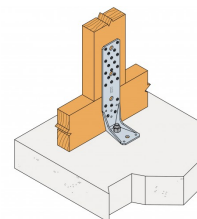
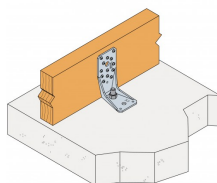
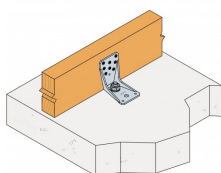
*** The published characteristic capacity is based on instantaneous load duration and service class 2 according to EC5 (EN 1995) – $k_{mod} = 1,1$. For other load duration and service class, please refer to the ETA to get more accurate capacities

AKR Reinforced Angle Bracket

Installation

Fixing

- Fixing on 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.



AKR
Reinforced Angle Bracket

