

## SVM-VSF – Vinylester resin for use in concrete

Bonded anchor with rebar of sizes M8 to M32 for use in concrete



### Basic product information

#### Features

- Styrene free resin (odorless)
- Several embedment depths
- An overlapping joint with existing reinforcement in a building component
- Anchoring of the reinforcement at a slab or beam support
- Anchoring of reinforcement of building components stressed primarily in compression
- Anchoring of reinforcement to cover the line of acting tensile force
- -40°C to +40°C (max. short term temperature +40°C and max long term temperature +24°C)
- -40°C to +80°C (max. short term temperature +80°C and max long term temperature +40°C)

#### Substrate

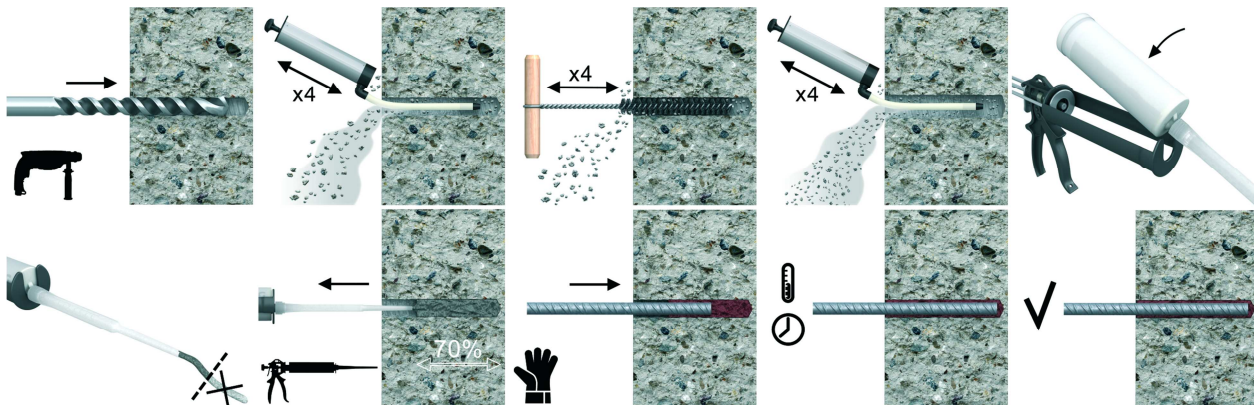
- Non-cracked concrete C20/25 – C50/60
- Reinforced and unreinforced concrete
- Dry or wet concrete (Category 1)
- Flooded holes, except sea water (Category 2)

**STAH** GmbH  
Lutherstraße 54  
73614 Schorndorf

Telefon: +49 7181 97772-0  
Telefax: +49 7181 97772-22  
E-Mail: [info@stahl-chempower.de](mailto:info@stahl-chempower.de)

[www.stahl-chempower.eu](http://www.stahl-chempower.eu)

## Installation guide



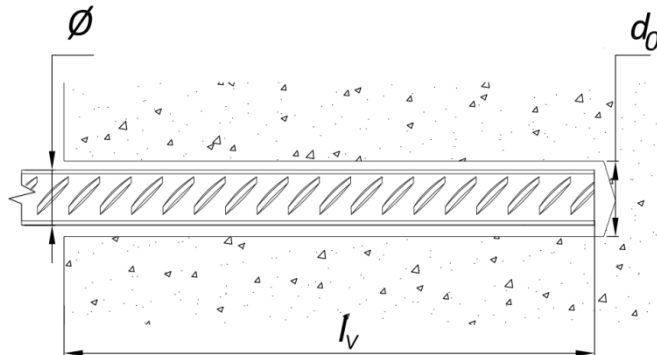
1. Drill hole to the correct diameter and depth for stud size being used.
2. Clean the hole with brush and hand pump at least four times each.
3. Insert cartridge into gun and attach nozzle.
4. Dispense to waste until an even color is obtained. Insert the mixing nozzle to the far end of the hole and inject the resin, slowly withdrawing the nozzle as the hole is filled to 70% of its depth.
5. Immediately insert the rebar, slowly and with a slight twisting motion. Remove any excess resin around the hole before it sets and leave it undisturbed until the curing time elapses.

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## Installation data



Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Diameter	d	[mm]	8	10	12	14	16	20	25	28	32
Hole diameter in substrate	$d_0$	[mm]	12	14	16	18	20	25	30	35	40
Brush size	-	[mm]	14	16	18	20	22	27	32	37	42
A-II C20/25 min. embedment depth	$l_{b, \text{min.}}$	[mm]	100	101	121	141	161	201	252	282	322
A-II C50/60 min. embedment depth	$l_{b, \text{min.}}$	[mm]	100	100	120	140	160	200	250	280	320
A-III C20/25 min. embedment depth	$l_{b, \text{min.}}$	[mm]	100	116	140	163	186	233	291	326	372
A-III C50/60 min. embedment depth	$l_{b, \text{min.}}$	[mm]	100	100	120	140	160	200	250	280	320
A-III-N C20/25 min. embedment depth	$l_{b, \text{min.}}$	[mm]	113	142	170	198	227	284	354	397	454
A-III-N C50/60 min. embedment depth	$l_{b, \text{min.}}$	[mm]	100	100	120	140	160	200	272	304	386
Min. lap length (overlap splice)	$l_0, \text{min.}$	[mm]	200	200	200	210	240	300	375	420	480
Max. anchorage length	$l_{y, \text{max.}}$	[mm]	400	500	600	700	800	1000	1000	1000	1000

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## Minimum curing and working time

Resin temperature	Concrete temperature	Curing time*	Working time
[°C]	[°C]	[min]	[min]
5	-5	360	60
5	0	180	40
5	5	120	20
10	10	80	12
20	20	45	5
25	30	20	2
25	40	10	0,5

\* For wet concrete the curing time must be doubled.

## Mechanical properties

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32	
Nominal tensile strength	RB500 <sup>1</sup> / BSt500S <sup>2</sup>	$f_{uk}$ [N/mm <sup>2</sup> ]	550	550	550	550	550	550	550	550	550	
	B500SP <sup>1</sup>		575	575	575	575	575	575	575	575	575	
	34GS <sup>1</sup>		500	500	500	500	500	500	500	500	500	
	18G2 <sup>1</sup>		480	480	480	480	480	480	480	480	480	
Nominal yield stress	RB500 <sup>1</sup> / BSt500S <sup>2</sup>	$f_{yk}$ [N/mm <sup>2</sup> ]	500	500	500	500	500	500	500	500	500	
	B500SP <sup>1</sup>		500	500	500	500	500	500	500	500	500	
	34GS <sup>1</sup>		410	410	410	410	410	410	410	410	410	
	18G2 <sup>1</sup>		355	355	355	355	355	355	355	355	355	
Cross-sectional area	$A_s$	[mm <sup>2</sup> ]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2	
Section modulus	$W_{el}$	[mm <sup>3</sup> ]	50.3	98.2	169.6	269.4	402.1	785.4	1534.0	2155.1	3217.0	
Characteristic bending moment	RB500 <sup>1</sup> / BSt500S <sup>2</sup>	$M_{Rk}^0$ [Nm]	33	65	112	178	265	518	1012	1422	2123	
	B500SP <sup>1</sup>		35	68	117	186	277	542	1059	1487	2123	
	34GS <sup>1</sup>		30	59	102	162	241	471	920	1293	1930	
	18G2 <sup>1</sup>		29	57	98	155	232	452	884	1241	1853	
Allowable bending moment	RB500 <sup>1</sup> / BSt500S <sup>2</sup>	M	[Nm]	19	37	64	102	152	296	579	813	1213
	B500SP <sup>1</sup>			20	39	67	106	159	310	605	850	1268
	34GS <sup>1</sup>			17	34	58	92	138	269	526	739	1103
	18G2 <sup>1</sup>			17	32	56	89	132	259	505	709	1059

### ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25. STEEL A-II (18G2) [kN]

$l_{bd}$ [mm] $d_s$ [mm]	100	110	130	150	170	190	210	230	260	280	290	330	360	400	460	530	670	750	800	830	850	900	930	1000	Steel failure
8	5.8	6.4	7.5	8.7	9.8	11.0	12.1	13.3	15.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.5
10	-	7.9	9.4	10.8	12.3	13.7	15.2	16.6	18.8	20.2	20.9	23.8	-	-	-	-	-	-	-	-	-	-	-	-	24.2
12	-	-	11.3	13.0	14.7	16.5	18.2	19.9	22.5	24.3	25.1	28.6	31.2	34.7	-	-	-	-	-	-	-	-	-	-	34.9
14	-	-	-	15.2	17.2	19.2	21.2	23.3	26.3	28.3	29.3	33.4	36.4	40.4	46.5	-	-	-	-	-	-	-	-	-	47.5
16	-	-	-	-	19.6	22.0	24.3	26.6	30.0	32.4	33.5	38.1	41.6	46.2	53.2	61.2	-	-	-	-	-	-	-	-	62.0
20	-	-	-	-	-	-	30.3	33.2	37.6	40.4	41.9	47.7	52.0	57.8	66.4	76.6	96.8	-	-	-	-	-	-	-	96.9
25	-	-	-	-	-	-	-	-	46.9	50.6	52.4	59.6	65.0	72.2	83.1	95.7	121.0	135.4	144.4	149.9	-	-	-	-	151.5
28	-	-	-	-	-	-	-	-	-	-	58.6	66.7	72.8	80.9	93.0	107.2	135.5	151.7	161.8	167.8	171.9	182.0	188.1	-	190.0
32	-	-	-	-	-	-	-	-	-	-	-	76.3	83.2	92.4	106.3	122.5	154.8	173.3	184.9	191.8	196.4	208.0	214.9	231.1	248.1

### ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60. STEEL A-II (18G2) [kN]

$l_{bd}$ [mm] $d_s$ [mm]	100	120	140	160	170	180	200	230	250	280	290	320	330	400	450	500	550	640	700	720	850	910	950	1000	Steel failure
8	9.3	11.2	13.0	14.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.5
10	11.6	13.9	16.3	18.6	19.8	20.9	23.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.2
12	-	16.7	19.5	22.3	23.7	25.1	27.9	32.1	34.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.9
14	-	-	22.8	26.0	27.7	29.3	32.5	37.4	40.7	45.5	47.2	-	-	-	-	-	-	-	-	-	-	-	-	-	47.5
16	-	-	-	29.7	31.6	33.5	37.2	42.8	46.5	52.0	53.9	59.5	61.3	-	-	-	-	-	-	-	-	-	-	-	62.0
20	-	-	-	-	-	-	42.7	49.1	53.4	59.8	61.9	68.3	70.5	85.4	96.1	-	-	-	-	-	-	-	-	-	96.9
25	-	-	-	-	-	-	-	-	58.9	65.9	68.3	75.4	77.7	94.2	106.0	117.8	129.5	150.7	-	-	-	-	-	-	151.5
28	-	-	-	-	-	-	-	-	-	73.9	76.5	84.4	87.0	105.5	118.7	131.9	145.1	168.8	184.6	189.9	-	-	-	-	190.0
32	-	-	-	-	-	-	-	-	-	-	-	86.8	89.5	108.5	122.1	135.6	149.2	173.6	189.9	195.3	230.6	246.9	-	-	248.1

STAHL GmbH  
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73614 Schorndorf

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**OVERLAP SPLICE – DESIGN RESISTANCE\* – CONCRETE C20/25. STEEL A-II (18G2) [kN]**

$l_{bd}$ [mm] $d_s$ [mm]	200	210	240	250	260	300	330	375	400	420	440	460	480	500	530	550	600	670	750	800	830	900	930	1000	Steel failure
8	11.6	12.1	13.9	14.4	15.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.5
10	14.4	15.2	17.3	18.1	18.8	21.7	23.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.2
12	17.3	18.2	20.8	21.7	22.5	26.0	28.6	32.5	34.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.9
14	-	21.2	24.3	25.3	26.3	30.3	33.4	37.9	40.4	42.5	44.5	46.5	-	-	-	-	-	-	-	-	-	-	-	-	47.5
16	-	-	27.7	28.9	30.0	34.7	38.1	43.3	46.2	48.5	50.8	53.2	55.5	57.8	61.2	-	-	-	-	-	-	-	-	-	62.0
20	-	-	-	-	-	43.3	47.7	54.2	57.8	60.7	63.6	66.4	69.3	72.2	76.6	79.4	86.7	96.8	-	-	-	-	-	-	96.9
25	-	-	-	-	-	-	-	67.7	72.2	75.8	79.4	83.1	86.7	90.3	95.7	99.3	108.3	121.0	135.4	144.4	149.9	-	-	-	151.5
28	-	-	-	-	-	-	-	-	-	84.9	89.0	93.0	97.1	101.1	107.2	111.2	121.3	135.5	151.7	161.8	167.8	182.0	188.1	-	190.0
32	-	-	-	-	-	-	-	-	-	-	-	-	110.9	115.6	122.5	127.1	138.7	154.8	173.3	184.9	191.8	208.0	214.9	231.1	248.1

**OVERLAP SPLICE – DESIGN RESISTANCE\* – CONCRETE C50/60. STEEL A-II (18G2) [kN]**

$l_{bd}$ [mm] $d_s$ [mm]	200	208	210	240	250	290	300	330	375	400	420	450	480	500	550	600	640	700	720	800	850	900	910	1000	Steel failure
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.5
10	23.2	24.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.2
12	27.9	29.0	29.3	33.5	34.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.9
14	-	-	34.2	39.0	40.7	47.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47.5
16	-	-	-	44.6	46.5	53.9	55.8	61.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62.0
20	-	-	-	-	-	-	64.1	70.5	80.1	85.4	89.7	96.1	-	-	-	-	-	-	-	-	-	-	-	-	96.9
25	-	-	-	-	-	-	-	-	88.3	94.2	98.9	106.0	113.0	117.8	129.5	141.3	150.7	-	-	-	-	-	-	-	151.5
28	-	-	-	-	-	-	-	-	-	-	110.8	118.7	126.6	131.9	145.1	158.3	168.8	184.6	189.9	-	-	-	-	-	190.0
32	-	-	-	-	-	-	-	-	-	-	-	-	130.2	135.6	149.2	162.8	173.6	189.9	195.3	217.0	230.6	244.2	246.9	-	248.1

STAHL GmbH  
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73614 Schorndorf

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**OVERLAP SPLICE – DESIGN RESISTANCE\* – CONCRETE C20/25. STEEL A-II (18G2) [kN]**

$l_{bd}$ [mm] $d_s$ [mm]	200	210	240	250	260	300	330	375	400	420	440	460	480	500	530	550	600	670	750	800	830	900	930	1000	Steel failure
8	11.6	12.1	13.9	14.4	15.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.5
10	14.4	15.2	17.3	18.1	18.8	21.7	23.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.2
12	17.3	18.2	20.8	21.7	22.5	26.0	28.6	32.5	34.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.9
14	-	21.2	24.3	25.3	26.3	30.3	33.4	37.9	40.4	42.5	44.5	46.5	-	-	-	-	-	-	-	-	-	-	-	-	47.5
16	-	-	27.7	28.9	30.0	34.7	38.1	43.3	46.2	48.5	50.8	53.2	55.5	57.8	61.2	-	-	-	-	-	-	-	-	-	62.0
20	-	-	-	-	-	43.3	47.7	54.2	57.8	60.7	63.6	66.4	69.3	72.2	76.6	79.4	86.7	96.8	-	-	-	-	-	-	96.9
25	-	-	-	-	-	-	-	67.7	72.2	75.8	79.4	83.1	86.7	90.3	95.7	99.3	108.3	121.0	135.4	144.4	149.9	-	-	-	151.5
28	-	-	-	-	-	-	-	-	-	84.9	89.0	93.0	97.1	101.1	107.2	111.2	121.3	135.5	151.7	161.8	167.8	182.0	188.1	-	190.0
32	-	-	-	-	-	-	-	-	-	-	-	-	110.9	115.6	122.5	127.1	138.7	154.8	173.3	184.9	191.8	208.0	214.9	231.1	248.1

**OVERLAP SPLICE – DESIGN RESISTANCE\* – CONCRETE C50/60. STEEL A-II (18G2) [kN]**

$l_{bd}$ [mm] $d_s$ [mm]	200	208	210	240	250	290	300	330	375	400	420	450	480	500	550	600	640	700	720	800	850	900	910	1000	Steel failure
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.5
10	23.2	24.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.2
12	27.9	29.0	29.3	33.5	34.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.9
14	-	-	34.2	39.0	40.7	47.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47.5
16	-	-	-	44.6	46.5	53.9	55.8	61.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62.0
20	-	-	-	-	-	-	64.1	70.5	80.1	85.4	89.7	96.1	-	-	-	-	-	-	-	-	-	-	-	-	96.9
25	-	-	-	-	-	-	-	-	88.3	94.2	98.9	106.0	113.0	117.8	129.5	141.3	150.7	-	-	-	-	-	-	-	151.5
28	-	-	-	-	-	-	-	-	-	-	110.8	118.7	126.6	131.9	145.1	158.3	168.8	184.6	189.9	-	-	-	-	-	190.0
32	-	-	-	-	-	-	-	-	-	-	-	-	130.2	135.6	149.2	162.8	173.6	189.9	195.3	217.0	230.6	244.2	246.9	-	248.1

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**ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25. STEEL A-III (34GS) [kN]**

$l_{b,d}$ [mm] \ $d_s$ [mm]	100	120	140	170	190	210	240	300	310	320	330	380	400	440	460	500	540	620	700	770	850	900	960	1000	Steel failure
8	5.8	6.9	8.1	9.8	11.0	12.1	13.9	17.3	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.9
10	-	8.7	10.1	12.3	13.7	15.2	17.3	21.7	22.4	23.1	23.8	27.4	-	-	-	-	-	-	-	-	-	-	-	-	28.0
12	-	-	12.1	14.7	16.5	18.2	20.8	26.0	26.9	27.7	28.6	32.9	34.7	38.1	39.9	-	-	-	-	-	-	-	-	-	40.3
14	-	-	-	17.2	19.2	21.2	24.3	30.3	31.3	32.4	33.4	38.4	40.4	44.5	46.5	50.6	54.6	-	-	-	-	-	-	-	54.9
16	-	-	-	-	22.0	24.3	27.7	34.7	35.8	37.0	38.1	43.9	46.2	50.8	53.2	57.8	62.4	71.6	-	-	-	-	-	-	71.7
20	-	-	-	-	-	-	34.7	43.3	44.8	46.2	47.7	54.9	57.8	63.6	66.4	72.2	78.0	89.6	101.1	111.2	-	-	-	-	112.0
25	-	-	-	-	-	-	-	54.2	56.0	57.8	59.6	68.6	72.2	79.4	83.1	90.3	97.5	111.9	126.4	139.0	153.5	162.5	173.3	-	174.9
28	-	-	-	-	-	-	-	-	-	-	66.7	76.8	80.9	89.0	93.0	101.1	109.2	125.4	141.6	155.7	171.9	182.0	194.1	202.2	219.4
32	-	-	-	-	-	-	-	-	-	-	-	87.8	92.4	101.7	106.3	115.6	124.8	143.3	161.8	178.0	196.4	208.0	221.9	231.1	286.6

**ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60. STEEL A-III (34GS) [kN]**

$l_{b,d}$ [mm] \ $d_s$ [mm]	100	120	140	160	190	200	240	250	280	290	300	320	330	380	450	520	550	600	700	740	830	900	950	1000	Steel failure
8	9.3	11.2	13.0	14.9	17.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.9
10	11.6	13.9	16.3	18.6	22.1	23.2	27.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28.0
12	-	16.7	19.5	22.3	26.5	27.9	33.5	34.9	39.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40.3
14	-	-	22.8	26.0	30.9	32.5	39.0	40.7	45.5	47.2	48.8	52.0	53.7	-	-	-	-	-	-	-	-	-	-	-	54.9
16	-	-	-	29.7	35.3	37.2	44.6	46.5	52.0	53.9	55.8	59.5	61.3	70.6	-	-	-	-	-	-	-	-	-	-	71.7
20	-	-	-	-	-	42.7	51.2	53.4	59.8	61.9	64.1	68.3	70.5	81.1	96.1	111.0	-	-	-	-	-	-	-	-	112.0
25	-	-	-	-	-	-	58.9	65.9	68.3	70.7	75.4	77.7	89.5	106.0	122.5	129.5	141.3	164.9	174.3	-	-	-	-	-	174.9
28	-	-	-	-	-	-	-	-	73.9	76.5	79.1	84.4	87.0	100.2	118.7	137.2	145.1	158.3	184.6	195.2	218.9	-	-	-	219.4
32	-	-	-	-	-	-	-	-	-	-	-	86.8	89.5	103.1	122.1	141.1	149.2	162.8	189.9	200.8	225.2	244.2	257.7	271.3	286.6

**STAHL GmbH**  
Lutherstraße 54  
73614 Schorndorf

Telefon: +49 7181 97772-0  
Telefax: +49 7181 97772-22  
E-Mail: info@stahl-chempower.de

[www.stahl-chempower.eu](http://www.stahl-chempower.eu)



**OVERLAP SPLICE – DESIGN RESISTANCE\* – CONCRETE C20/25. STEEL A-III (34GS) [kN]**

$l_{bd}$ [mm] $d_s$ [mm]	200	210	240	250	300	310	375	380	400	420	460	480	500	540	600	620	700	750	770	800	850	900	960	1000	Steel failure
8	11.6	12.1	13.9	14.4	17.3	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.9
10	14.4	15.2	17.3	18.1	21.7	22.4	27.1	27.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28.0
12	17.3	18.2	20.8	21.7	26.0	26.9	32.5	32.9	34.7	36.4	39.9	-	-	-	-	-	-	-	-	-	-	-	-	-	40.3
14	-	21.2	24.3	25.3	30.3	31.3	37.9	38.4	40.4	42.5	46.5	48.5	50.6	54.6	-	-	-	-	-	-	-	-	-	-	54.9
16	-	-	27.7	28.9	34.7	35.8	43.3	43.9	46.2	48.5	53.2	55.5	57.8	62.4	69.3	71.6	-	-	-	-	-	-	-	-	71.7
20	-	-	-	-	43.3	44.8	54.2	54.9	57.8	60.7	66.4	69.3	72.2	78.0	86.7	89.6	101.1	108.3	111.2	-	-	-	-	-	112.0
25	-	-	-	-	-	-	67.7	68.6	72.2	75.8	83.1	86.7	90.3	97.5	108.3	111.9	126.4	135.4	139.0	144.4	153.5	162.5	173.3	-	174.9
28	-	-	-	-	-	-	-	-	-	84.9	93.0	97.1	101.1	109.2	121.3	125.4	141.6	151.7	155.7	161.8	171.9	182.0	194.1	202.2	219.4
32	-	-	-	-	-	-	-	-	-	-	-	110.9	115.6	124.8	138.7	143.3	161.8	173.3	178.0	184.9	196.4	208.0	221.9	231.1	286.6

**OVERLAP SPLICE – DESIGN RESISTANCE\* – CONCRETE C50/60. STEEL A-III (34GS) [kN]**

$l_{bd}$ [mm] $d_s$ [mm]	200	210	240	260	280	300	330	350	375	380	400	420	480	500	520	600	650	700	740	800	830	900	950	1000	Steel failure
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.9
10	23.2	24.4	27.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28.0
12	27.9	29.3	33.5	36.2	39.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40.3
14	-	34.2	39.0	42.3	45.5	48.8	53.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54.9
16	-	-	44.6	48.3	52.0	55.8	61.3	65.1	69.7	70.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71.7
20	-	-	-	-	-	64.1	70.5	74.7	80.1	81.1	85.4	89.7	102.5	106.8	111.0	-	-	-	-	-	-	-	-	-	112.0
25	-	-	-	-	-	-	-	-	88.3	89.5	94.2	98.9	113.0	117.8	122.5	141.3	153.1	164.9	174.3	-	-	-	-	-	174.9
28	-	-	-	-	-	-	-	-	-	-	-	110.8	126.6	131.9	137.2	158.3	171.4	184.6	195.2	211.0	218.9	-	-	-	219.4
32	-	-	-	-	-	-	-	-	-	-	-	-	130.2	135.6	141.1	162.8	176.3	189.9	200.8	217.0	225.2	244.2	257.7	271.3	286.6

**STAHL GmbH**  
Lutherstraße 54  
73614 Schorndorf

Telefon: +49 7181 97772-0  
Telefax: +49 7181 97772-22  
E-Mail: info@stahl-chempower.de

[www.stahl-chempower.eu](http://www.stahl-chempower.eu)

**ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25. STEEL A-IIIN (RB500/BS500S/BS500SP) [kN]**

$l_{bd}$ [mm] $d_s$ [mm]	120	150	160	180	200	230	250	290	300	360	370	400	460	470	560	600	660	700	750	800	850	900	940	1000	Steel failure
8	6.9	8.7	9.2	10.4	11.6	13.3	14.4	16.8	17.3	20.8	21.4	-	-	-	-	-	-	-	-	-	-	-	-	-	21.8
10	-	10.8	11.6	13.0	14.4	16.6	18.1	20.9	21.7	26.0	26.7	28.9	33.2	33.9	-	-	-	-	-	-	-	-	-	-	34.1
12	-	-	-	15.6	17.3	19.9	21.7	25.1	26.0	31.2	32.1	34.7	39.9	40.7	48.5	-	-	-	-	-	-	-	-	-	49.2
14	-	-	-	-	20.2	23.3	25.3	29.3	30.3	36.4	37.4	40.4	46.5	47.5	56.6	60.7	66.7	-	-	-	-	-	-	-	66.9
16	-	-	-	-	-	26.6	28.9	33.5	34.7	41.6	42.8	46.2	53.2	54.3	64.7	69.3	76.3	80.9	86.7	-	-	-	-	-	87.4
20	-	-	-	-	-	-	-	41.9	43.3	52.0	53.4	57.8	66.4	67.9	80.9	86.7	95.3	101.1	108.3	115.6	122.8	130.0	135.8	-	136.5
25	-	-	-	-	-	-	-	-	-	65.0	66.8	72.2	83.1	84.9	101.1	108.3	119.2	126.4	135.4	144.4	153.5	162.5	169.7	180.6	213.3
28	-	-	-	-	-	-	-	-	-	-	-	80.9	93.0	95.0	113.2	121.3	133.5	141.6	151.7	161.8	171.9	182.0	190.1	202.2	267.6
32	-	-	-	-	-	-	-	-	-	-	-	-	106.3	108.6	129.4	138.7	152.5	161.8	173.3	184.9	196.4	208.0	217.2	231.1	349.5

**ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60. STEEL A-IIIN (RB500/BS500S/BS500SP) [kN]**

$l_{bd}$ [mm] $d_s$ [mm]	100	120	140	160	180	200	220	230	280	290	310	350	390	410	450	470	500	630	750	800	850	900	950	1000	Steel failure
8	9.3	11.2	13.0	14.9	16.7	18.6	20.4	21.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.8
10	11.6	13.9	16.3	18.6	20.9	23.2	25.6	26.7	32.5	33.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.1
12	-	16.7	19.5	22.3	25.1	27.9	30.7	32.1	39.0	40.4	43.2	48.8	-	-	-	-	-	-	-	-	-	-	-	-	49.2
14	-	-	22.8	26.0	29.3	32.5	35.8	37.4	45.5	47.2	50.4	56.9	63.4	66.7	-	-	-	-	-	-	-	-	-	-	66.9
16	-	-	-	29.7	33.5	37.2	40.9	42.8	52.0	53.9	57.6	65.1	72.5	76.2	83.6	87.4	-	-	-	-	-	-	-	-	87.4
20	-	-	-	-	-	42.7	47.0	49.1	59.8	61.9	66.2	74.7	83.3	87.5	96.1	100.4	106.8	134.5	-	-	-	-	-	-	136.5
25	-	-	-	-	-	-	-	-	65.9	68.3	73.0	82.4	91.8	96.6	106.0	110.7	117.8	148.4	176.6	188.4	200.2	212.0	-	-	213.3
28	-	-	-	-	-	-	-	-	-	-	81.8	92.3	102.9	108.1	118.7	124.0	131.9	166.2	197.8	211.0	224.2	237.4	250.6	263.8	267.6
32	-	-	-	-	-	-	-	-	-	-	-	-	105.8	111.2	122.1	127.5	135.6	170.9	203.5	217.0	230.6	244.2	257.7	271.3	349.5

**STAHL GmbH**  
Lutherstraße 54  
73614 Schorndorf

Telefon: +49 7181 97772-0  
Telefax: +49 7181 97772-22  
E-Mail: info@stahl-chempower.de

[www.stahl-chempower.eu](http://www.stahl-chempower.eu)

**OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25. STEEL A-IIIN (RB500/BSI500S/BS500SP) [kN]**

$l_{bd}$ [mm] d <sub>s</sub> [mm]	200	210	240	270	300	330	375	400	420	470	480	500	530	560	600	630	660	700	750	800	850	900	940	1000	Steel failure
8	11.6	12.1	13.9	15.6	17.3	19.1	21.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.8
10	14.4	15.2	17.3	19.5	21.7	23.8	27.1	28.9	30.3	33.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.1
12	17.3	18.2	20.8	23.4	26.0	28.6	32.5	34.7	36.4	40.7	41.6	43.3	45.9	48.5	-	-	-	-	-	-	-	-	-	-	49.2
14	-	21.2	24.3	27.3	30.3	33.4	37.9	40.4	42.5	47.5	48.5	50.6	53.6	56.6	60.7	63.7	66.7	-	-	-	-	-	-	-	66.9
16	-	-	27.7	31.2	34.7	38.1	43.3	46.2	48.5	54.3	55.5	57.8	61.2	64.7	69.3	72.8	76.3	80.9	86.7	-	-	-	-	-	87.4
20	-	-	-	-	43.3	47.7	54.2	57.8	60.7	67.9	69.3	72.2	76.6	80.9	86.7	91.0	95.3	101.1	108.3	115.6	122.8	130.0	135.8	-	136.5
25	-	-	-	-	-	-	67.7	72.2	75.8	84.9	86.7	90.3	95.7	101.1	108.3	113.7	119.2	126.4	135.4	144.4	153.5	162.5	169.7	180.6	213.3
28	-	-	-	-	-	-	-	-	84.9	95.0	97.1	101.1	107.2	113.2	121.3	127.4	133.5	141.6	151.7	161.8	171.9	182.0	190.1	202.2	267.6
32	-	-	-	-	-	-	-	-	-	-	110.9	115.6	122.5	129.4	138.7	145.6	152.5	161.8	173.3	184.9	196.4	208.0	217.2	231.1	349.5

**OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60. STEEL A-IIIN (RB500/BSI500S/BS500SP) [kN]**

$l_{bd}$ [mm] d <sub>s</sub> [mm]	200	210	230	240	290	300	330	350	375	390	410	420	470	480	550	600	630	700	750	800	850	900	950	1000	Steel failure
8	18.6	19.5	21.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.8
10	23.2	24.4	26.7	27.9	33.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.1
12	27.9	29.3	32.1	33.5	40.4	41.8	46.0	48.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	49.2
14	-	34.2	37.4	39.0	47.2	48.8	53.7	56.9	61.0	63.4	66.7	-	-	-	-	-	-	-	-	-	-	-	-	-	66.9
16	-	-	-	44.6	53.9	55.8	61.3	65.1	69.7	72.5	76.2	78.1	87.4	-	-	-	-	-	-	-	-	-	-	-	87.4
20	-	-	-	-	-	64.1	70.5	74.7	80.1	83.3	87.5	89.7	100.4	102.5	117.4	128.1	134.5	-	-	-	-	-	-	-	136.5
25	-	-	-	-	-	-	-	-	88.3	91.8	96.6	98.9	110.7	113.0	129.5	141.3	148.4	164.9	176.6	188.4	200.2	212.0	-	-	213.3
28	-	-	-	-	-	-	-	-	-	-	-	110.8	124.0	126.6	145.1	158.3	166.2	184.6	197.8	211.0	224.2	237.4	250.6	263.8	267.6
32	-	-	-	-	-	-	-	-	-	-	-	-	-	130.2	149.2	162.8	170.9	189.9	203.5	217.0	230.6	244.2	257.7	271.3	349.5

\*Values for  $\alpha_1 - \alpha_5 = 1.0$  and "good bond conditions" according to EN 1992-1-1, for all other bond conditions the values for tension loads must be multiplied by 0.7

**STAHL GmbH**  
Lutherstraße 54  
73614 Schorndorf

Telefon: +49 7181 97772-0  
Telefax: +49 7181 97772-22  
E-Mail: info@stahl-chempower.de

[www.stahl-chempower.eu](http://www.stahl-chempower.eu)

## Design performance data for group of anchors

The mean ultimate bond resistance  $f_{bd}$  for resin connected with concrete according to EN 1992-1-1 (for hammer drill)

Rebar diameter $d_s$ [mm]	MEAN ULTIMATE BOND RESISTANCE $f_{bd}$ * [N/mm <sup>2</sup> ]								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Ø8	1.6	2.0	2.3	2.7	3.0	3.4	3.7	3.7	3.7
Ø10	1.6	2.0	2.3	2.7	3.0	3.4	3.7	3.7	3.7
Ø12	1.6	2.0	2.3	2.7	3.0	3.4	3.7	3.7	3.7
Ø14	1.6	2.0	2.3	2.7	3.0	3.4	3.7	3.7	3.7
Ø16	1.6	2.0	2.3	2.7	3.0	3.4	3.4	3.4	3.7
Ø20	1.6	2.0	2.3	2.7	3.0	3.4	3.4	3.4	3.4
Ø25	1.6	2.0	2.3	2.7	3.0	3.0	3.0	3.0	3.0
Ø28	1.6	2.0	2.3	2.7	2.7	2.7	2.7	3.0	3.0
Ø32	1.6	2.0	2.3	2.3	2.3	2.7	2.7	2.7	2.7

\* Values are valid for "good bond conditions" according to EN 1992-1-1. For all other conditions the values shall be multiplied by 0.7.

Min. concrete cover:  $C_{min} = 30 \text{ mm} + 0.06 \cdot l_v \geq 2d_s$

Min. spacing between post-installed rebars:  $a = 40 \text{ mm} \geq 4d_s$