

Technical Documentation

Sika AnchorFix®-3030

Product Information

Sika Limited



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CHEMICAL RESISTANCE

Chemical adhesive has undergone extensive chemical resistance testing. The results are summarised in the table below:

Chemical Environment	Concentration	Result
Aqueous Solution Acetic Acid	10%	C
Acetone	100%	✗
Aqueous Solution Aluminium Chloride	Saturated	✓
Aqueous Solution Aluminium Nitrate	10%	✓
Ammonia Solution	5%	✓
Jet Fuel	100%	C
Benzene	100%	C
Benzoic Acid	Saturated	✓
Benzyl Alcohol	100%	✗
Sodium Hypochlorite Solution	5 - 15%	✓
Butyl Alcohol	100%	C
Calcium Sulphate Aqueous Solution	Saturated	✓
Carbon Monoxide	Gas	✓
Carbon Tetrachloride	100%	C
Chlorine Water	Saturated	✗
Chloro Benzene	100%	✗
Citric Acid Aqueous Solution	Saturated	✓
Cyclohexanol	100%	✓
Diesel Fuel	100%	C
Diethylene Glycol	100%	✓
Ethanol	95%	✗
Ethanol Aqueous Solution	20%	C
Heptane	100%	C
Hexane	100%	C
Hydrochloric Acid	10%	✓
	15%	✓
	25%	C
Hydrogen Sulphide Gas	100%	✓
Isopropyl Alcohol	100%	✗
Linseed Oil	100%	✓

Lubricating Oil	100%	✓
Mineral Oil	100%	✓
Paraffin / Kerosene (Domestic)	100%	C
Phenol Aqueous Solution	1%	C
Phosphoric Acid	50%	✓
Potassium Hydroxide	10% / pH13	✓
Sea Water	100%	C
Styrene	100%	C
Sulphur Dioxide Solution	10%	✓
Sulphur Dioxide (40°C)	5%	✓
Sulphuric Acid	10%	✓
	50%	✓
Turpentine	100%	C
White Spirit	100%	✓
Xylene	100%	C

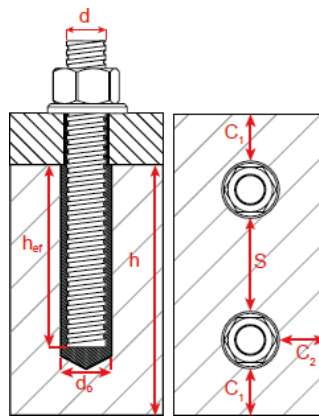
✓ = Resistant to 75°C with at least 80% of physical properties retained.

C = Contact only to a maximum of +25°C.

✗ = Not resistant.

INSTALLATION PARAMETERS - THREADED RODS

Property			Anchor Diameter							
			M8	M10	M12	M16	M20	M24	M27	M30
Nominal Drill Hole Diameter	d ₀	mm	10	12	14	18	22	26	30	35
Cleaning Brush Diameter	d _b	mm	S11HF	S14HF	S14/15HF	S22HF	S24HF	S31HF	S31HF	S38HF
Torque Moment	T _{inst}	Nm	10	20	40	80	120	160	180	200
Minimum Embedment Depth										
Effective Embedment Depth	h _{ef}	mm	60	60	70	80	90	96	108	120
Minimum Edge Distance	c _{min}	mm	40	40	40	40	50	50	50	50
Minimum Anchor Spacing	s _{min}	mm	40	40	40	40	50	50	50	50
Minimum Member Thickness	h _{min}	mm	h _{ef} + 30 mm ≥ 100 mm			h _{ef} + 2d ₀				
Maximum Embedment Depth										
Effective Embedment Depth	h _{ef}	mm	160	200	240	320	400	480	540	600
Minimum Edge Distance	c _{min}	mm	80	100	120	160	200	240	270	300
Minimum Anchor Spacing	s _{min}	mm	80	100	120	160	200	240	270	300
Minimum Member Thickness	h _{min}	mm	h _{ef} + 30 mm ≥ 100 mm			h _{ef} + 2d ₀				



INSTALLATION PARAMETERS - REBARS

Property			Anchor Diameter						
			8mm	10mm	12mm	16mm	20mm	25mm	32mm
Nominal Drill Hole Diameter	d ₀	mm	12	14	16	20	25	32	40
Cleaning Brush Diameter	d _b	mm	S12/13HF	S14/15HF	S18HF	S22HF	S27HF	S35HF	S43HF
Torque Moment	T _{inst}	Nm	10	20	40	80	120	180	200
Minimum Embedment Depth									
Effective Embedment Depth	h _{ef}	mm	60	60	70	80	90	100	128
Minimum Edge Distance	c _{min}	mm	40	40	40	40	50	50	50
Minimum Anchor Spacing	s _{min}	mm	40	40	40	40	50	50	50
Minimum Member Thickness	h _{min}	mm	h _{ef} + 30 mm ≥ 100 mm				h _{ef} + 2d ₀		
Maximum Embedment Depth									
Effective Embedment Depth	h _{ef}	mm	160	200	240	320	400	500	640
Minimum Edge Distance	c _{min}	mm	80	100	120	160	200	250	320
Minimum Anchor Spacing	s _{min}	mm	80	100	120	160	200	250	320
Minimum Member Thickness	h _{min}	mm	h _{ef} + 30 mm ≥ 100 mm				h _{ef} + 2d ₀		

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STEEL FAILURE IN TENSION - THREADED RODS

Characteristic resistance values under tension loading

Steel Grade			Anchor Diameter							
			M8	M10	M12	M16	M20	M24	M27	M30
Steel Grade 4.6	$N_{Rk,s}$	(kN)	15	23	34	63	98	141	184	224
Partial Safety Factor	γ_{Ms}	(-)	2,00							
Steel Grade 5.8	$N_{Rk,s}$	(kN)	18	29	42	79	123	177	230	281
Partial Safety Factor	γ_{Ms}	(-)	1,50							
Steel Grade 8.8	$N_{Rk,s}$	(kN)	29	46	67	126	196	282	367	449
Partial Safety Factor	γ_{Ms}	(-)	1,50							
Steel Grade 10.9*	$N_{Rk,s}$	(kN)	37	58	84	157	245	353	459	561
Partial Safety Factor	γ_{Ms}	(-)	1,33							
Stainless Steel A2-70, A4-70	$N_{Rk,s}$	(kN)	26	41	59	110	172	247	321	393
Partial Safety Factor	γ_{Ms}	(-)	1,87							
Stainless Steel A4-80	$N_{Rk,s}$	(kN)	29	46	67	126	196	282	367	449
Partial Safety Factor	γ_{Ms}	(-)	1,60							
Stainless Steel 1.4529	$N_{Rk,s}$	(kN)	26	41	59	110	172	247	321	393
Partial Safety Factor	γ_{Ms}	(-)	1,50							
Stainless Steel 1.4565	$N_{Rk,s}$	(kN)	26	41	59	110	172	247	321	393
Partial Safety Factor	γ_{Ms}	(-)	1,87							

*Galvanised rod of high strength are sensitive to hydrogen embrittlement

STEEL FAILURE IN TENSION - REINFORCING BARS

Characteristic resistance values under tension loading

Steel Grade			Anchor Diameter						
			8mm	10mm	12mm	16mm	20mm	25mm	32mm
Rebar BSt 500	$N_{Rk,s}$	(kN)	28	43	62	111	173	270	442
Partial Safety Factor	γ_{Ms}	(-)	1,40						

CHARACTERISTIC RESISTANCE - USING THREADED RODS

Working life of 50 and 100 years

Combined Pullout & Concrete Cone Failure | Dry / Wet Concrete | Temperature Range: -40°C to +70°C

Property			Anchor Diameter								
			M8	M10	M12	M16	M20	M24	M27	M30	
Characteristic Bond Strength in Uncracked Concrete		τ_{Rk}	N/mm ²	17,0	15,0	15,0	12,0	12,0	12,0	11,0	9,5
Factor for Uncracked Concrete Strength	C25/30	Ψ_c	-	1,02							
	C30/37			1,04							
	C35/45			1,06							
	C40/50			1,07							
	C45/55			1,08							
	C50/60			1,09							
Partial Safety Factor		γ_{Mp}	-	1,50							
Characteristic Bond Strength in Cracked Concrete		τ_{Rk}	N/mm ²	10,0	10,0	10,0	9,5	9,0	9,0	6,0	6,0
Factor for Cracked Concrete Strength	C25/30	Ψ_c	-	1,02							
	C30/37			1,04							
	C35/45			1,06							
	C40/50			1,07							
	C45/55			1,08							
	C50/60			1,09							
Partial Safety Factor		γ_{Mp}	-	1,50							
Factor for influence of sustained load		Ψ_{sus}	-	0,72							

SPLITTING FAILURE

Property			Anchor Diameter						
			M8	M10	M12	M16	M20	M24	M27
Critical Edge Distance	$c_{cr,sp}$	mm	$2h_{ef}$						
Critical Anchor Spacing	$s_{cr,sp}$	mm	$2c_{cr,sp}$						
Partial Safety Factor	γ_{Msp}	-	1,5						

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RESISTANCE VALUES FOR THREADED RODS IN UNCRACKED CONCRETE

Combined Pullout & Concrete Cone Failure and Concrete Cone Failure | Temperature Range: -40°C to +70°C

Property			Anchor Diameter							
			M8	M10	M12	M16	M20	M24	M27	M30
Effective Embedment Depth = MIN	h_{ef}	mm	60	60	70	80	90	96	108	120
Characteristic Resistance	N_{Rk}	kN	22,86	22,86	28,81	35,20	42,00	46,27	55,21	64,67
Design Resistance	N_{Rd}	kN	15,24	15,24	19,21	23,47	28,00	30,85	36,81	43,11
Controlling Resistance			Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone
Effective Embedment Depth = 8d	h_{ef}	mm	64	80	96	128	160	192	216	240
Characteristic Resistance	N_{Rk}	kN	25,19	35,20	46,27	71,24	99,56	130,88	156,17	182,90
Design Resistance	N_{Rd}	kN	16,79	23,47	30,85	47,49	66,37	87,25	104,11	121,94
Controlling Resistance			Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone
Effective Embedment Depth = 12d	h_{ef}	mm	96	120	144	192	240	288	324	360
Characteristic Resistance	N_{Rk}	kN	41,02	56,55	81,43	115,81	180,96	240,43	286,90	322,33
Design Resistance	N_{Rd}	kN	27,34	37,70	54,29	77,21	120,64	160,29	191,26	214,88
Controlling Resistance			Pullout	Pullout	Pullout	Pullout	Pullout	Concrete Cone	Concrete Cone	Pullout
Effective Embedment Depth = 20d	h_{ef}	mm	160	200	240	320	400	480	540	600
Characteristic Resistance	N_{Rk}	kN	68,36	94,25	135,72	193,02	301,59	434,29	503,85	537,21
Design Resistance	N_{Rd}	kN	45,57	62,83	90,48	128,68	201,06	289,53	335,90	358,14
Controlling Resistance			Pullout	Pullout	Pullout	Pullout	Pullout	Pullout	Pullout	Pullout

1. Resistance values are based on combined pullout & concrete cone failure and concrete cone failure according to EC2-4. Resistance for steel failure must also be considered - the lowest value controls.
2. Resistance values are for single anchors without close edges or eccentric loading considerations.
3. Tabulated values correspond to the above stated temperature range and installation conditions only.
4. Long term temperatures are those that remain roughly constant over prolonged periods. Short term temperatures occur over brief intervals, e.g.: diurnal cycling.
5. The compressive strength of the concrete ($f_{ck, cylinder}$) is assumed to be 20 N/mm².
6. Tabulated resistance values assume that the geometry of the anchor(s) and concrete member is sufficient to avoid splitting failure.

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RESISTANCE VALUES FOR THREADED RODS IN CRACKED CONCRETE

Combined Pullout & Concrete Cone Failure and Concrete Cone Failure | Temperature Range: -40°C to +70°C

Property			Anchor Diameter							
			M8	M10	M12	M16	M20	M24	M27	M30
Effective Embedment Depth = MIN	h_{ef}	mm	60	60	70	80	90	96	108	120
Characteristic Resistance	N_{Rk}	kN	15,08	16,00	20,17	24,64	29,40	32,39	38,65	45,27
Design Resistance	N_{Rd}	kN	10,05	10,67	13,45	16,43	19,60	21,59	25,77	30,18
Controlling Resistance			Pullout	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone
Effective Embedment Depth = 8d	h_{ef}	mm	64	80	96	128	160	192	216	240
Characteristic Resistance	N_{Rk}	kN	16,08	24,64	32,39	49,87	69,69	91,61	109,32	128,03
Design Resistance	N_{Rd}	kN	10,72	16,43	21,59	33,25	46,46	61,08	72,88	85,36
Controlling Resistance			Pullout	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone
Effective Embedment Depth = 12d	h_{ef}	mm	96	120	144	192	240	288	324	360
Characteristic Resistance	N_{Rk}	kN	24,13	37,70	54,29	91,61	128,03	168,30	164,90	203,58
Design Resistance	N_{Rd}	kN	16,08	25,13	36,19	61,08	85,36	112,20	109,93	135,72
Controlling Resistance			Pullout	Pullout	Pullout	Concrete Cone	Concrete Cone	Concrete Cone	Pullout	Pullout
Effective Embedment Depth = 20d	h_{ef}	mm	160	200	240	320	400	480	540	600
Characteristic Resistance	N_{Rk}	kN	40,21	62,83	90,48	152,81	226,19	325,72	274,83	339,29
Design Resistance	N_{Rd}	kN	26,81	41,89	60,32	101,87	150,80	217,15	183,22	226,19
Controlling Resistance			Pullout	Pullout	Pullout	Pullout	Pullout	Pullout	Pullout	Pullout

1. Resistance values are based on combined pullout & concrete cone failure and concrete cone failure according to EC2-4. Resistance for steel failure must also be considered - the lowest value controls.
2. Resistance values are for single anchors without close edges or eccentric loading considerations.
3. Tabulated values correspond to the above stated temperature range and installation conditions only.
4. Long term temperatures are those that remain roughly constant over prolonged periods. Short term temperatures occur over brief intervals, e.g.: diurnal cycling.
5. The compressive strength of the concrete ($f_{ck,cylinder}$) is assumed to be 20 N/mm².
6. Tabulated resistance values assume that the geometry of the anchor(s) and concrete member is sufficient to avoid splitting failure.

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CHARACTERISTIC RESISTANCE FOR SEISMIC LOADING CATEGORY C1 –USING THREADED RODS

Working life of 50 and 100 years

Combined Pullout & Concrete Cone Failure | Dry / Wet Concrete | Temperature Range: -40°C to +70°C

Seismic Loading Category C1		Anchor Diameter							
		M8	M10	M12	M16	M20	M24	M27	M30
Characteristic Bond Strength	τ_{Rk} (N/mm ²)	9.4	8.5	10.0	8.7	7.4	7.7	5.7	4.9
Partial Safety Factor	γ_{Mp}	1,5							

RESISTANCE VALUES TO TENSION LOADS FOR THREADED RODS IN CRACKED CONCRETE SEISMIC LOADING CATEGORY C1

Combined Pullout & Concrete Cone Failure and Concrete Cone Failure | Temperature Range: -40°C to +70°C

Property			Anchor Diameter							
			M8	M10	M12	M16	M20	M24	M27	M30
Effective Embedment Depth = MIN	h_{ef}	mm	60	60	70	80	90	96	108	120
Characteristic Resistance	N_{Rk}	kN	14.17	16.00	20.17	24.64	29.40	32.39	38.65	45.27
Design Resistance	N_{Rd}	kN	9.45	10.67	13.45	16.43	19.60	21.59	25.77	30.18
Controlling Resistance			Pullout	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone
Effective Embedment Depth = 8d	h_{ef}	mm	64	80	96	128	160	192	216	240
Characteristic Resistance	N_{Rk}	kN	15.12	21.36	32.39	49.87	69.69	91.61	104.43	110.84
Design Resistance	N_{Rd}	kN	10.08	14.24	21.59	33.25	46.46	61.08	69.62	73.89
Controlling Resistance			Pullout	Pullout	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Pullout	Pullout
Effective Embedment Depth = 12d	h_{ef}	mm	96	120	144	192	240	288	324	360
Characteristic Resistance	N_{Rk}	kN	22.68	32.04	54.29	83.96	111.59	167.20	156.65	166.25
Design Resistance	N_{Rd}	kN	15.12	21.36	36.19	55.98	74.39	111.47	104.43	110.84
Controlling Resistance			Pullout	Pullout	Pullout	Pullout	Pullout	Pullout	Pullout	Pullout
Effective Embedment Depth = 20d	h_{ef}	mm	160	200	240	320	400	480	540	600
Characteristic Resistance	N_{Rk}	kN	37.80	53.41	90.48	139.94	185.98	278.67	261.09	277.09
Design Resistance	N_{Rd}	kN	25.20	35.60	60.32	93.29	123.99	185.78	174.06	184.73
Controlling Resistance			Pullout	Pullout	Pullout	Pullout	Pullout	Pullout	Pullout	Pullout

1. Resistance values are based on combined pullout & concrete cone failure and concrete cone failure according to EC2-4. Resistance for steel failure must also be considered - the lowest value controls.
2. Resistance values are for single anchors without close edges or eccentric loading considerations.
3. Tabulated values correspond to the above stated temperature range and installation conditions only.
4. Long term temperatures are those that remain roughly constant over prolonged periods. Short term temperatures occur over brief intervals, e.g.: diurnal cycling.
5. The compressive strength of the concrete ($f_{ck,cylinder}$) is assumed to be 20 N/mm².
6. Tabulated resistance values assume that the geometry of the anchor(s) and concrete member is sufficient to avoid splitting failure.

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CHARACTERISTIC RESISTANCE FOR SEISMIC LOADING CATEGORY C2 –USING THREADED RODS

Working life of 50 and 100 years

Combined Pullout & Concrete Cone Failure | Dry / Wet Concrete | Temperature Range: -40°C to +70°C

Seismic Loading Category C2			Anchor Diameter		
			M12	M16	M20
Characteristic Bond Strength in Cracked Concrete under Seismic action (Performance Category C2)	τ_{Rk}	N/mm ²	3.5	4.0	4.5
Partial Safety Factor	γ_{Mp}	-	1,5		

RESISTANCE VALUES TO TENSION LOADS FOR THREADED RODS IN CRACKED CONCRETE SEISMIC LOADING CATEGORY C2

Combined Pullout & Concrete Cone Failure and Concrete Cone Failure | Temperature Range: -40°C to +70°C

Property			Anchor Diameter		
			M12	M16	M20
Effective Embedment Depth = MIN	h_{ef}	mm	70	80	90
Characteristic Resistance	N_{Rk}	kN	9.24	16.08	25.45
Design Resistance	N_{Rd}	kN	6.16	10.72	16.96
Controlling Resistance			Pullout	Pullout	Pullout
Effective Embedment Depth = 8d	h_{ef}	mm	96	128	160
Characteristic Resistance	N_{Rk}	kN	12.67	25.74	45.24
Design Resistance	N_{Rd}	kN	8.44	17.16	30.16
Controlling Resistance			Pullout	Pullout	Pullout
Effective Embedment Depth = 12d	h_{ef}	mm	144	192	240
Characteristic Resistance	N_{Rk}	kN	19.00	38.60	67.86
Design Resistance	N_{Rd}	kN	12.67	25.74	45.24
Controlling Resistance			Pullout	Pullout	Pullout
Effective Embedment Depth = 20d	h_{ef}	mm	240	320	400
Characteristic Resistance	N_{Rk}	kN	31.67	64.34	113.10
Design Resistance	N_{Rd}	kN	21.11	42.89	75.40
Controlling Resistance			Pullout	Pullout	Pullout

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1. *Resistance values are based on combined pullout & concrete cone failure and concrete cone failure according to EC2-4. Resistance for steel failure must also be considered - the lowest value controls.*
2. *Resistance values are for single anchors without close edges or eccentric loading considerations.*
3. *Tabulated values correspond to the above stated temperature range and installation conditions only.*
4. *Long term temperatures are those that remain roughly constant over prolonged periods. Short term temperatures occur over brief intervals, e.g.: diurnal cycling.*
5. *The compressive strength of the concrete ($f_{ck, cylinder}$) is assumed to be 20 N/mm².*
6. *Tabulated resistance values assume that the geometry of the anchor(s) and concrete member is sufficient to avoid splitting failure.*

CHARACTERISTIC RESISTANCE - COMBINED PULLOUT & CONCRETE CONE FAILURE USING REINFORCING BARS

Working life of 50 and 100 years

Dry / Wet Concrete | Temperature Range: -40°C to +70°C

Property			Anchor Diameter							
			8mm	10mm	12mm	16mm	20mm	25mm	32mm	
Characteristic Bond Strength in Uncracked Concrete		τ_{Rk}	N/mm ²	13,0	13,0	13,0	12,0	12,0	12,0	8,0
Factor for Uncracked Concrete Strength	C25/30	ψ_c	-	1,02						
	C30/37			1,04						
	C35/45			1,06						
	C40/50			1,07						
	C45/55			1,08						
	C50/60			1,09						
Partial Safety Factor (Dry & Wet)		γ_{Mp}	-	1,50						
Partial Safety Factor (Flooded)		γ_{Mp}		1,50						
Characteristic Bond Strength in Cracked Concrete		τ_{Rk}	N/mm ²	8,0	11,0	10,0	10,0	10,0	8,5	6,5
Factor for Cracked Concrete Strength	C25/30	ψ_c	-	1,02						
	C30/37			1,04						
	C35/45			1,06						
	C40/50			1,07						
	C45/55			1,08						
	C50/60			1,09						
Partial Safety Factor (Dry & Wet)		γ_{Mp}	-	1,50						
Partial Safety Factor (Flooded)		γ_{Mp}		1,80						
Factor for influence of sustained load		ψ_{sus}		0,72						

SPLITTING FAILURE

Property			Anchor Diameter						
			8mm	10mm	12mm	16mm	20mm	25mm	32mm
Characteristic Edge Distance	$c_{cr,sp}$	mm	$2h_{ef}$						
Characteristic Anchor Spacing	$s_{cr,sp}$	mm	$2c_{cr,sp}$						
Partial Safety Factor	γ_{Msp}	-	1,5						

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RESISTANCE VALUES FOR REINFORCING BARS IN UNCRACKED CONCRETE

Combined Pullout & Concrete Cone Failure and Concrete Cone Failure | Temperature Range: -40°C to +70°C

Property			Anchor Diameter						
			8mm	10mm	12mm	16mm	20mm	25mm	32mm
Effective Embedment Depth = MIN	h_{ef}	mm	60	60	70	80	90	100	128
Characteristic Resistance	N_{Rk}	kN	19,60	22,86	28,81	35,20	42,00	49,19	71,24
Design Resistance	N_{Rd}	kN	13,07	15,24	19,21	23,47	28,00	32,80	47,49
Controlling Resistance			Pullout	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone
Effective Embedment Depth = 8d	h_{ef}	mm	64	80	96	128	160	200	256
Characteristic Resistance	N_{Rk}	kN	20,91	32,67	46,27	71,24	99,56	139,14	173,72
Design Resistance	N_{Rd}	kN	13,94	21,78	30,85	47,49	66,37	92,76	115,81
Controlling Resistance			Pullout	Pullout	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Pullout
Effective Embedment Depth = 12d	h_{ef}	mm	96	120	144	192	240	300	384
Characteristic Resistance	N_{Rk}	kN	31,37	49,01	70,57	115,81	180,96	255,62	260,58
Design Resistance	N_{Rd}	kN	20,91	32,67	47,05	77,21	120,64	170,41	173,72
Controlling Resistance			Pullout	Pullout	Pullout	Pullout	Pullout	Concrete Cone	Pullout
Effective Embedment Depth = 20d	h_{ef}	mm	160	200	240	320	400	500	640
Characteristic Resistance	N_{Rk}	kN	52,28	81,68	117,62	193,02	301,59	452,39	434,29
Design Resistance	N_{Rd}	kN	34,85	54,45	78,41	128,68	201,06	301,59	289,53
Controlling Resistance			Pullout	Pullout	Pullout	Pullout	Pullout	Pullout	Pullout

1. Resistance values are based on combined pullout & concrete cone failure and concrete cone failure according to EC2-4. Resistance for steel failure must also be considered - the lowest value controls.
2. Resistance values are for single anchors without close edges or eccentric loading considerations
3. Tabulated values correspond to the above stated temperature range and installation conditions only.
4. Long term temperatures are those that remain roughly constant over prolonged periods. Short term temperatures occur over brief intervals, e.g.: diurnal cycling.
5. The compressive strength of the concrete ($f_{ck, cylinder}$) is assumed to be 20 N/mm².
6. Tabulated resistance values assume that the geometry of the anchor(s) and concrete member is sufficient to avoid splitting failure.

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RESISTANCE VALUES FOR REINFORCING BARS IN CRACKED CONCRETE

Combined Pullout & Concrete Cone Failure and Concrete Cone Failure | Temperature Range: -40°C to +70°C

Property			Anchor Diameter						
			8mm	10mm	12mm	16mm	20mm	25mm	32mm
Effective Embedment Depth = MIN	h_{ef}	mm	60	60	70	80	90	100	128
Characteristic Resistance	N_{Rk}	kN	12,06	16,00	20,17	24,64	29,40	34,44	49,87
Design Resistance	N_{Rd}	kN	8,04	10,67	13,45	16,43	19,60	22,96	33,25
Controlling Resistance			Pullout	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone
Effective Embedment Depth = 8d	h_{ef}	mm	64	80	96	128	160	200	256
Characteristic Resistance	N_{Rk}	kN	12,87	24,64	32,39	49,87	69,69	97,40	141,05
Design Resistance	N_{Rd}	kN	8,58	16,43	21,59	33,25	46,46	64,93	94,03
Controlling Resistance			Pullout	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone
Effective Embedment Depth = 12d	h_{ef}	mm	96	120	144	192	240	300	384
Characteristic Resistance	N_{Rk}	kN	19,30	41,47	54,29	91,61	128,03	178,93	211,72
Design Resistance	N_{Rd}	kN	12,87	27,65	36,19	61,08	85,36	119,29	141,15
Controlling Resistance			Pullout	Pullout	Pullout	Concrete Cone	Concrete Cone	Concrete Cone	Pullout
Effective Embedment Depth = 20d	h_{ef}	mm	160	200	240	320	400	500	640
Characteristic Resistance	N_{Rk}	kN	32,17	69,12	90,48	160,85	251,33	320,44	352,86
Design Resistance	N_{Rd}	kN	21,45	46,08	60,32	107,23	167,55	213,63	235,24
Controlling Resistance			Pullout	Pullout	Pullout	Pullout	Pullout	Pullout	Pullout

1. Resistance values are based on combined pullout & concrete cone failure and concrete cone failure according to EC2-4. Resistance for steel failure must also be considered - the lowest value controls.
2. Resistance values are for single anchors without close edges or eccentric loading considerations.
3. Tabulated values correspond to the above stated temperature range and installation conditions only.
4. Long term temperatures are those that remain roughly constant over prolonged periods. Short term temperatures occur over brief intervals, e.g.: diurnal cycling.
5. The compressive strength of the concrete ($f_{ck, cylinder}$) is assumed to be 20 N/mm².
6. Tabulated resistance values assume that the geometry of the anchor(s) and concrete member is sufficient to avoid splitting failure.

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CHARACTERISTIC RESISTANCE FOR SEISMIC LOADING CATEGORY C1 –USING REBAR

Working life of 50 and 100 years

Combined Pullout & Concrete Cone Failure | Dry / Wet Concrete | Temperature Range: -40°C to +70°C

Seismic Loading Category C1		Anchor Diameter					
		10mm	12mm	16mm	20mm	25mm	32mm
Characteristic Bond Strength in Cracked Concrete under Seismic action (Performance Category C1)	τ_{Rk} (N/mm ²)	9.4	9.8	9.5	8.8	8.0	5.3
Partial Safety Factor (Dry & Wet)	γ_{Mp}	1,5	1,5	1,5	1,5	1,5	1,5

RESISTANCE VALUES TO TENSION LOADS FOR REINFORCING BARS IN CRACKED CONCRETE SEISMIC LOADING CATEGORY C1

Combined Pullout & Concrete Cone Failure and Concrete Cone Failure | Temperature Range: -40°C to +70°C

Property			Anchor Diameter					
			10mm	12mm	16mm	20mm	25mm	32mm
Effective Embedment Depth = MIN	h_{ef}	mm	60	70	80	90	96	108
Characteristic Resistance	N_{Rk}	kN	16.00	20.17	24.64	29.40	32.39	38.65
Design Resistance	N_{Rd}	kN	10.67	13.45	16.43	19.60	21.59	25.77
Controlling Resistance			Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone
Effective Embedment Depth = 8d	h_{ef}	mm	80	96	128	160	200	256
Characteristic Resistance	N_{Rk}	kN	23.62	32.39	49.87	69.69	97.40	136.40
Design Resistance	N_{Rd}	kN	15.75	21.59	33.25	46.46	64.93	90.93
Controlling Resistance			Pullout	Concrete Cone	Concrete Cone	Concrete Cone	Concrete Cone	Pullout
Effective Embedment Depth = 10d	h_{ef}	mm	100	120	160	200	250	320
Characteristic Resistance	N_{Rk}	kN	29.53	44.33	69.69	97.40	136.12	170.50
Design Resistance	N_{Rd}	kN	19.69	29.56	46.46	64.93	90.75	113.67
Controlling Resistance			Pullout	Pullout	Concrete Cone	Concrete Cone	Concrete Cone	Pullout
Effective Embedment Depth = 12d	h_{ef}	mm	120	144	192	240	300	384
Characteristic Resistance	N_{Rk}	kN	35.44	53.20	91.61	128.03	178.93	204.60
Design Resistance	N_{Rd}	kN	23.62	35.47	61.08	85.36	119.29	136.40
Controlling Resistance			Pullout	Pullout	Concrete Cone	Concrete Cone	Concrete Cone	Pullout

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Effective Embedment Depth = 20d	h_{ef}	mm	200	240	320	400	500	640
Characteristic Resistance	N_{Rk}	kN	59.06	88.67	152.81	221.17	314.16	341.00
Design Resistance	N_{Rd}	kN	39.37	59.11	101.87	147.45	209.44	227.33
Controlling Resistance			Pullout	Pullout	Pullout	Pullout	Pullout	Pullout

1. Resistance values are based on combined pullout & concrete cone failure and concrete cone failure according to EC2 -4. Resistance for steel failure must also be considered - the lowest value controls.
2. Resistance values are for single anchors without close edges or eccentric loading considerations.
3. Tabulated values correspond to the above stated temperature range and installation conditions only.
4. Long term temperatures are those that remain roughly constant over prolonged periods. Short term temperatures occur over brief intervals, e.g.: diurnal cycling.
5. The compressive strength of the concrete ($f_{ck, cylinder}$) is assumed to be 20 N/mm².
6. Tabulated resistance values assume that the geometry of the anchor(s) and concrete member is sufficient to avoid splitting failure.

INSTALLATION PARAMETERS FOR POST-INSTALLED REBAR CONNECTIONS

Rebar Diameter[mm]	f_{yk} [N/mm ²]	Drill Hole Diameter [mm]	Cleaning Brush [mm]	Minimum Anchorage Length [mm]	Minimum Lap/Splice Length [mm]	Maximum Embedment Depth [mm]
8	500	12	S12HF S13HF	113	200	400
10	500	14	S14HF S15HF	142	213	500
12	500	16	S18HF	170	256	600
14	500	18	S22HF	198	298	700
16	500	20	S22HF	227	341	800
20	500	25	S27HF	284	426	1000
25	500	32	S35HF	354	532	1000
28	500	35	S38HF	397	596	1000
32	500	40	S43HF	454	681	1000
40	500	55	S58HF	851	932	1000

Tabulated values are valid for good bond conditions according to EN 1992-1-1.

C20/25 concrete is assumed

DESIGN BOND STRENGTH VALUES - HAMMER DRILLED OR COMPRESSED AIR DRILLED HOLES

Design values of the ultimate bond resistance f_{bd} in N/mm² for rotary hammer drilling and compressed air drilling for good bond conditions.

Rebar Ø [mm]	Concrete Class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
10	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
12	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
14	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
16	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
20	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
25	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
28	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
32	1,6	2,0	2,3	2,7	3,0	3,4	3,7	3,7	3,7
40	1,5	1,8	2,1	2,1	2,1	2,1	2,1	2,1	2,1

Tabulated values are valid for good bond conditions according to EN 1992-1-1. For all other bond conditions multiply the values of f_{bd} by 0.7.

DESIGN BOND STRENGTH VALUES - DIAMOND CORE DRILLED HOLES

Design values of the ultimate bond resistance f_{bd} in N/mm² for diamond core drilling for good bond conditions

Rebar Ø [mm]	Concrete Class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
10	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
12	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
14	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
16	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
20	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
25	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
28	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,0
32	1,6	2,0	2,3	2,7	3,0	3,4	3,4	3,4	3,4
40	1,5	1,8	2,1	2,1	2,1	2,1	2,1	2,1	2,1

Tabulated values are valid for good bond conditions according to EN 1992-1-1. For all other bond conditions multiply the values of f_{bd} by 0.7

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