



REFURBISHMENT

Sika AnchorFix[®] DESIGN GUIDE

ALLOWABLE STRESS DESIGN

BUILDING TRUST
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Sika AnchorFix® RANGE OVERVIEW

Product	Cartridge Sizes (mL)	Approvals	Uncracked Concrete	Cracked Concrete	Seismic	Threaded Rod	Rebar	Dowels	Dry	Water Saturated	Water Filled	No Service Temperature Reduction Factor
AnchorFix®-3001	250 600 1500	ICC, IAPMO, NSF 61, MTQ, TRA (MTO), Pick-proof	✓	✓	✓	✓	✓	✓	✓	✓	✓	
AnchorFix®-2001	300 850	IAPMO, NSF 61, MTQ, TRA (MTO)	✓		✓	✓		✓	✓	✓		✓
AnchorFix®-2 Arctic	300 850	ETAG, MTQ, TRA (MTO)	✓			✓	✓	✓	✓	✓	✓	✓

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ALLOWABLE STRESS DESIGN (ASD) METHOD

In allowable stress design (ASD), the designer determines the appropriate anchorage by insuring that the services loads do not exceed the allowable loads placed on the anchorage. The allowable load is determined by application of a safety factor to the mean results of laboratory testing. The safety factor is intended to account for reasonably expected variations in the materials and loading conditions. The designer must also apply appropriate reduction factors to the allowable loads such as those for anchor spacing, edge distance or in-service temperature.

The recommended allowable load for an anchor or group of anchors is determined as follows:

$$\begin{aligned} \text{Tension: } T_{rec} &= T_{all} \cdot f_{spa} \cdot f_{edg} \cdot f_{temp} \geq T_{service} \\ \text{Shear: } V_{rec} &= V_{all} \cdot f_{spa} \cdot f_{edg} \cdot f_{temp} \geq V_{service} \end{aligned}$$

Where:

T_{rec} = recommended allowable tension load after application of appropriate reduction factors

T_{all} = allowable tension load (based on mean value of laboratory tests and safety factor)

V_{rec} = recommended allowable shear load after application of appropriate reduction factors

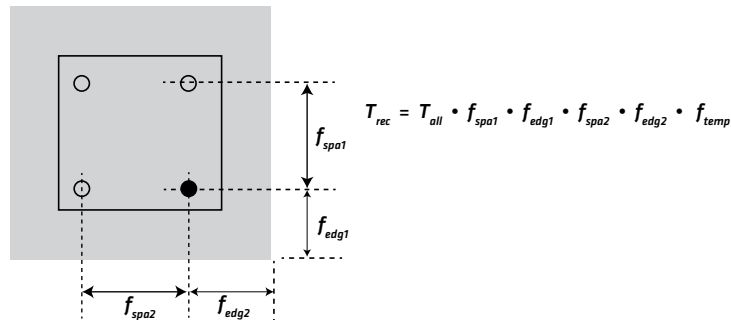
V_{all} = allowable shear load (based on mean value of laboratory tests and safety factor)

f_{spa} = reduction factor for anchor spacing

f_{edg} = reduction factor for edge distances

f_{temp} = reduction factor for in service temperature

The allowable load must be the lesser of the anchor steel strength or the bond/concrete strength. Reduction factors for edge, spacing and temperature are applied simultaneously for all applicable conditions. For example, the recommended tension load corresponding to the anchor indicated should be determined as follows:



For anchors that are simultaneously subjected to both tension and shear loading, the designer must consider the interaction of these forces on the anchorage. The typical interaction equation that must be satisfied is:

$$\left(\frac{T_{service}}{T_{rec}} \right)^n + \left(\frac{V_{service}}{V_{rec}} \right)^n \leq 1.0$$

Where :

$T_{service}$ = design tension load (ASD)

$V_{service}$ = design shear load (ASD)

n = exponent between 1 and 2 depending on failure mode and loading conditions. For cases of steel failure an exponent of 2 may be appropriate. Conservatively, a value of 1 is often selected by designers.

Sika AnchorFix®-3001

PRODUCT DESCRIPTION

Sika AnchorFix®-3001 is a high performance two component, pure epoxy anchoring adhesive. Using a high quality, low-VOC and styrene free technology, Sika AnchorFix®-3001 has been specifically formulated to provide a high-strength, user-friendly and versatile adhesive for use in dry, wet or flooded conditions. Sika AnchorFix®-3001 is easy to use in a wide variety of structural and non-structural applications. It is designed for anchoring of threaded rod and rebar in solid base materials such as concrete and solid masonry.

FEATURES:

- Extended working time, high load capacity epoxy adhesive.
- Easy to use: easy to dispense and available in 250 mL, 600 mL or 1500 mL cartridges.
- Suitable for dry, wet or flooded conditions.
- Resistant to wide range of chemicals.
- Low-VOC (5g/L per ASTM D2369)

APPROVALS:

- AC-308 approval for cracked and uncracked concrete by IAPMO (ER-0292)
- MTQ
- TRA (the Road Authority) listed as meeting Ministry of Transportation of Ontario (MTO) Specification MI-120: Evaluation of Pull-out Testing of Epoxy Coated Dowels in Concrete Using Grouts and Epoxies. ISBN 0-7729-4236-6
- ANSI / NSF 61 approved for contact with potable water

SHELF LIFE:

Cartridges should be stored in original, unopened packaging, the correct way up, in cool conditions (5°C to 20°C) out of direct sunlight. When stored correctly, the shelf life will be 24 months from the date of manufacture. Material should be pre-conditioned to above 10°C to ease application when using hand dispensers at lower temperatures.

HEALTH AND SAFETY:

For information and advice on the safe handling, storage and disposal of chemical products, users should refer to the most recent Material Safety Data Sheet (MSDS) containing physical, ecological, toxicological and other safety-related data.

Product	Cartridge Sizes (mL)	Approvals	Uncracked Concrete	Cracked Concrete	Seismic	Threaded Rod	Rebar	Dowels	Dry	Water Saturated	Water Filled	No Service Temperature Reduction Factor
AnchorFix®-3001	250 600 1500	ICC, IAPMO, NSF 61, MTQ, TRA (MTO), Pick-proof	✓	✓	✓	✓	✓	✓	✓	✓	✓	

INSTALLATION SPECIFICATIONS

WORKING AND LOADING TIMES		
Base Material Temperature	Working (Gel) Time	Cure (Loading) Time
0 to 5°C	-	72 h
5 to 10°C	30 min	30 h
10 to 15°C	20 min	12 h
15 to 20°C	15 min	8 h
20 to 25°C	11 min	7 h
25 to 30°C	8 min	6 h
30 to 35°C	6 min	5 h
35 to 40°C	4 min	4 h
40°C	3 min	3 h

Notes:

- 1) Maintain adhesive temperature to a minimum of 5°C. For ease of application and dispensing a minimum of 10°C is recommended.
- 2) Reasonable variations can be expected due to local environmental factors (humidity, wind conditions, etc.).

FRACTIONAL THREADED BARS AND REINFORCING STEEL								
Threaded Rod Diameter (in)		3/8	1/2	5/8	3/4	7/8	1	1-1/4
Bit Diameter (in)	d_o	1/2	9/16	3/4	7/8	1	1-1/8	1-3/8
US Rebar Size		#3	#4	#5	#6	#7	#8	#10
Bit Diameter (in)	d_o	9/16	5/8	3/4	7/8	1	1-1/8	1-1/2
Metric Rebar Size		10M	-	15M	20M	-	25M	30M
Bit Diameter	d_o	14 mm	-	3/4 in	24 mm	-	1-1/8 in	37 mm
Cleaning Brush Size*		16 mm	18 mm	22 mm	27 mm	31 mm	35 mm	43 mm
Effective Embedment Depth (in)	$h_{ef,min}$	2-3/8	2-3/4	3-1/8	3-3/4	4	4	5
	$h_{ef,max}$	7-1/2	10	12-1/2	15	17-1/2	20	25
Min Slab Thickness (in)	h_{min}	2 h_{ef}						
Min Edge Distance (in)	c_{min}	1-1/2	1-1/2	1-3/4	1-7/8	2	2	2-1/2
Min Anchor Spacing (in)	s_{min}	1-1/2	1-1/2	1-3/4	1-7/8	2	2	2-1/2
Max Tightening Torque (ft.lb)	T_{inst}	15	30	60	100	125	150	200

Notes: *Cleaning brush must have steel bristles.

ESTIMATING GUIDE - NUMBER OF FIXINGS PER CARTRIDGE										
Anchor Size (in)	5/16	3/8	1/2	5/8	5/8	3/4	3/4	1	1	1-1/4
Hole Diameter (in)	3/8	1/2	9/16	3/4	11/16	7/8	13/16	1-1/8	1-1/16	1-3/8
Embedment Depth (in)	2-3/8	2-3/8	2-3/4	3-1/8	3-1/8	3-3/4	3-3/4	4	4	5
Fixings* per Cartridge	250 mL	68	38	26	12	15	7	9	4	5
	600 mL	176	99	67	33	39	20	23	11	13
	1500 mL	455	256	175	86	103	53	61	30	33
Embedment Depth (in)	3-1/8	3-3/4	5	6-1/4	6-1/4	7-1/2	7-1/2	10	10	12-1/2
Fixings* per Cartridge	250 mL	51	24	14	6	7	3	4	1	2
	600 mL	134	62	37	16	19	10	11	4	5
	1500 mL	346	162	96	43	51	26	30	12	13

* Number of fixings assumes 30 mL wastage in initial extrusion and holes filled to 3/4 full.

ALLOWABLE CONCRETE CAPACITY / BOND STRENGTH

Anchor Diameter in (mm)	Tension			Shear			
	Embed Depth	$f'_c = 2500$ psi (17.3 MPa)	$f'_c = 4000$ psi (27.6 MPa)	$f'_c = 8000$ psi (55.2 MPa)	$f'_c = 2500$ psi (17.3 MPa)	$f'_c = 4000$ psi (27.6 MPa)	$f'_c = 8000$ psi (55.2 MPa)
	in (mm)	lb (kN)	lb (kN)	lb (kN)	lb (kN)	lb (kN)	lb (kN)
3/8 (9.5) or #3 or 10M	2-3/8	1939	2032	2178	2585	2710	2904
	60	8.62	9.04	9.69	11.50	12.05	12.92
	5	4031	4225	4528	5375	5633	6038
	127	17.93	18.79	20.14	23.91	25.06	26.86
	7-1/2	6123	6418	6878	8164	8557	9171
	191	27.24	28.55	30.59	36.31	38.06	40.79
1/2 (12.7) or #4	2-3/4	2527	2649	2839	3369	3531	3785
	70	11.24	11.78	12.63	14.99	15.71	16.84
	6-3/8	5858	6140	6581	7811	8187	8774
	162	26.06	27.31	29.27	34.74	36.42	39.03
	10	9186	9631	10 323	12 252	12 842	13 764
	254	40.86	42.84	45.92	54.50	57.12	61.22
5/8 (15.9) or #5 or 15M	3-1/8	3889	4076	4368	5185	5434	5824
	79	17.30	18.13	19.43	23.06	24.17	25.91
	7-7/8	9722	10 189	10 921	12 962	13 586	14 561
	200	43.24	45.32	48.58	57.65	60.43	64.77
	12-1/2	15 555	16 303	17 473	20 739	21 737	23 298
	318	69.19	72.52	77.72	92.25	96.69	103.63
3/4 (19.1) or #6 or 20M	3-3/4	5200	5450	5841	6933	7267	7788
	95	23.13	24.24	25.98	30.84	32.32	34.64
	9-3/8	13 000	13 625	14 603	17 333	18 167	19 471
	238	57.82	60.60	64.95	77.10	80.81	86.61
	15	20 799	21 800	23 365	27 732	29 067	31 153
	381	92.51	96.97	103.93	123.35	129.29	138.57
1 (25.4) or #8 or 25M	4	8407	8811	9444	11 209	11 749	12 592
	102	37.39	39.19	42.01	49.86	52.26	56.01
	12	25 221	26 434	28 332	33 628	35 246	37 776
	305	112.18	117.58	126.02	149.58	156.77	168.03
	20	42 035	44 057	47 219	56 046	58 743	62 959
	508	186.97	195.97	210.03	249.29	261.29	280.04
1-1/4 (31.75) or #10 or 30M	5	10 529	11 036	11 828	14 039	14 715	15 771
	127	46.83	49.09	52.61	62.45	65.45	70.15
	15	31 588	33 108	35 484	42 117	44 144	47 312
	381	140.50	147.26	157.83	187.34	196.35	210.44
	25	52 646	55 180	59 140	70 195	73 573	78 853
	635	234.17	245.44	263.05	312.23	327.25	350.74

Notes:

- 1) The allowable working loads have been reduced using a safety factor of 4.0 for tension and 3.0 for shear. however, in some cases, such as life safety, safety factors of 10.0 or higher may be necessary.
- 2) Allowable Concrete Capacity / Bond Strength values must be checked against steel capacity. The allowable load is the lesser of these value multiplied by the appropriate reduction factors (temperature, hole condition, spacing and edge)
- 3) Tabulated data is applicable to single anchors in normal weight concrete unaffected by temperature, hole condition, edge or spacing reduction factors.
- 4) Allowable Concrete Capacity / Bond Strength values in the tables are for anchors installed into dry concrete in holes drilled with a hammer drill and ANSI carbide drill bit.
- 5) Linear interpolation of the Allowable Concrete Capacity / Bond Strength values is permitted.

REDUCTION FACTORS

Anchor Diameter in (mm)	Spacing				Edge Distance			
	Embed Depth	Spacing at 100% load (no reduction), S_{cr}	Minimum Spacing, S_{min}	Spacing Reduction Factor at S_{min}	Edge Distance at 100% load (no reduction), C_{cr}	Minimum Edge Distance, C_{min}	Edge Reduction Factor at C_{min} (Perpendicular to edge)	
	in (mm)	in (mm)	in (mm)		in (mm)	in (mm)		
3/8 (9.5) or #3 or 10M	$h_{ef,min}$	2-3/8 60	11-3/4 298	1-1/2 38	0.55	6 152	1-1/2 38	0.46
	$h_{ef,max}$	7-1/2 191	36-3/4 933	1-1/2 38	0.45	18-3/8 467	1-1/2 38	0.40
1/2 (12.7) or #4	$h_{ef,min}$	2-3/4 70	13-1/2 343	1-1/2 38	0.55	6-3/4 171	1-1/2 38	0.46
	$h_{ef,max}$	10 254	49 1245	1-1/2 38	0.40	24-1/2 622	1-1/2 38	0.35
5/8 (15.9) or #5 or 15M	$h_{ef,min}$	3-1/8 79	15-3/8 391	1-3/4 45	0.55	7-3/8 187	1-3/4 45	0.46
	$h_{ef,max}$	12-1/2 318	61-1/4 1556	1-3/4 45	0.35	30-5/8 778	1-3/4 45	0.35
3/4 (19.1) or #6 or 20M	$h_{ef,min}$	3-3/4 95	18-3/8 467	1-7/8 48	0.55	9-1/4 235	1-7/8 48	0.46
	$h_{ef,max}$	15 381	73-1/2 1867	1-7/8 48	0.35	36-3/4 933	1-7/8 48	0.30
7/8 (22.2) or #7	$h_{ef,min}$	4 102	19-3/4 502	2 50	0.55	9-7/8 251	2 50	0.46
	$h_{ef,max}$	17-1/2 445	85-3/4 2178	2 50	0.35	42-7/8 1089	2 50	0.25
1 (25.4) or #8 or 25M	$h_{ef,min}$	4 102	20 508	2 50	0.55	10 254	2 50	0.46
	$h_{ef,max}$	20 508	98 2489	2 50	0.35	49 1245	2 50	0.20
1-1/4 (31.75) or #10	$h_{ef,min}$	5 127	24-1/2 622	2-1/2 64	0.55	12-1/4 311	2-1/2 64	0.46
	$h_{ef,max}$	25 635	122-1/2 3112	2-1/2 64	0.35	61-1/4 1556	2-1/2 64	0.20

Note: Linear interpolation for intermediate embedment depths is permitted. Extrapolation is not permitted beyond values in the above table.

In-Service Base Material Temperature		
Base Material Temperature		Reduction Factor
4°C	40°F	1.00
20°C	68°F	1.00
43°C	110°F	0.9
54°C	130°F	0.7
66°C	150°F	0.5
76°C	168°F	0.4
80°C	176°F	0.3

Note: Reduction factor may be linearly interpolated for intermediate base material temperatures.

Sika AnchorFix®-2001

PRODUCT DESCRIPTION

Sika AnchorFix®-2001 is a high performance, two component, epoxy acrylate anchoring adhesive. Using advanced styrene-free technology, Sika AnchorFix®-2001 has been specifically formulated to provide a fast setting, high-strength anchoring for a wide range of temperatures. Sika AnchorFix®-2001 is easy to use in a wide variety of structural and non-structural applications. It is designed for anchoring of threaded rod and rebar in solid base materials such as concrete and solid masonry.

FEATURES:

- Fast setting, high load capacity epoxy acrylate adhesive.
- Easy to use: easy to dispense and available in 300 mL and 850 mL single piston cartridges.
- Reduced edge, spacing and concrete thickness requirements allowing for a wide range of applications.
- Resistant to wide range of chemicals.
- Styrene-free, VOC-compliant and odorless

APPROVALS:

- AC-308 approval for uncracked concrete by IAPMO (ER-0306)
- MTQ
- TRA (the Road Authority) listed as meeting Ministry of Transportation of Ontario (MTO) Specification MI-120: Evaluation of Pull-out Testing of Epoxy Coated Dowels in Concrete Using Grouts and Epoxies. ISBN 0-7729-4236-6
- ANSI / NSF 61 approved for contact with potable water

SHELF LIFE:

Cartridges should be stored in original, unopened packaging, the correct way up, in cool conditions (5°C to 20°C) out of direct sunlight. When stored correctly, the shelf life will be 15 months from the date of manufacture. Material should be pre-conditioned to 23°C to ease application when using hand dispensers at lower temperatures.

HEALTH AND SAFETY:

For information and advice on the safe handling, storage and disposal of chemical products, users should refer to the most recent Material Safety Data Sheet (MSDS) containing physical, ecological, toxicological and other safety-related data.

Product	Cartridge Sizes (mL)	Approvals	Uncracked Concrete	Cracked Concrete	Seismic	Threaded Rod	Rebar	Dowels	Dry	Water Saturated	Water Filled	No Service Temperature Reduction Factor
AnchorFix®-2001	300 850	IAPMO, NSF 61, MTQ, TRA (MTO)	✓		✓	✓		✓	✓	✓		✓

INSTALLATION SPECIFICATIONS

WORKING AND LOADING TIMES		
Base Material Temperature	Working (Gel) Time	Cure (Loading) Time
-5 to 0°C	12 min	24 h
0 to 5°C	12 min	3 h
5 to 10°C	8 min	100 min
10 to 15°C	6 min	85 min
15 to 20°C	4 min	70 min
20 to 25°C	3 min	40 min
25 to 30°C	2 min	40 min
30°C	1 min	40 min

Notes:

- 1) Maintain adhesive temperature to a minimum of 5°C. For ease of application and dispensing a minimum of 23°C is recommended.
- 2) Reasonable variations can be expected due to local environmental factors (humidity, wind conditions, etc.).

FRACTIONAL THREADED BARS AND REINFORCING STEEL							
Threaded Rod Diameter (in)		5/16	3/8	1/2	5/8	3/4	1
Bit Diameter (in)	d_o	3/8	1/2	9/16	3/4	7/8	1-1/8
US Rebar Size		-	#3	#4	#5	#6	#8
Bit Diameter (in)	d_o	-	9/16	5/8	3/4	7/8	1-1/8
Metric Rebar Size		-	10M	-	15M	20M	25M
Bit Diameter	d_o	-	14 mm	-	3/4 in	24 mm	1-1/8 in
Cleaning Brush Size*		14 mm	14 mm	16 mm	22 mm	24 mm	31 mm
Effective Embedment Depth (in)	$h_{ef,min}$	2-3/8	2-3/8	2-3/4	3-1/8	3-3/4	4
	$h_{ef,max}$	3-3/4	4-1/2	6	7-1/2	9	12
Min Slab Thickness (in)	h_{min}	$h_{min} = h_{ef} + \Delta h$ where $\Delta h = \max(1.25 \text{ in} ; 2 d_o) > 4 \text{ in}$					
Min Edge Distance (in)	c_{min}	1-1/4	1-5/8	1-7/8	2-1/2	3-1/8	3-3/4
Min Anchor Spacing (in)	s_{min}	1-1/4	1-5/8	1-7/8	2-1/2	3-1/8	3-3/4
Max Tightening Torque (ft.lb)	T_{inst}	7.5	15	25	55	80	120

Notes: *Cleaning brush must have steel bristles.

ESTIMATING GUIDE - NUMBER OF FIXINGS PER CARTRIDGE							
Anchor Size (in)		5/16	3/8	1/2	5/8	3/4	1
Hole Diameter (in)		3/8	1/2	9/16	11/16	13/16	1-1/16
Embedment Depth (in)		2-3/8	2-3/8	2-3/4	3-1/8	3-3/4	4
Fixings* per Cartridge	300 mL	83	47	32	18	11	6
	850 mL	254	143	97	57	34	18
Embedment Depth (in)		3-3/4	4-1/2	6	7-1/2	9	12
Fixings* per Cartridge	300 mL	53	24	14	7	4	2
	850 mL	161	162	44	23	14	6

* Number of fixings assumes 30 mL wastage in initial extrusion and holes filled to 3/4 full.

ALLOWABLE CONCRETE CAPACITY / BOND STRENGTH

Anchor Diameter in (mm)	Tension				Shear		
	Embed Depth	$f'_c = 2500$ psi (17.3 MPa)	$f'_c = 4000$ psi (27.6 MPa)	$f'_c = 8000$ psi (55.2 MPa)	$f'_c = 2500$ psi (17.3 MPa)	$f'_c = 4000$ psi (27.6 MPa)	$f'_c = 8000$ psi (55.2 MPa)
	in (mm)	lb (kN)	lb (kN)	lb (kN)	lb (kN)	lb (kN)	lb (kN)
5/16 (8)	2-3/8	1390	1457	1562	1854	1943	2082
	60	6.18	6.48	6.95	8.25	8.64	9.26
	3	1793	1879	2014	2390	2505	2685
	76	7.98	8.36	8.96	10.63	11.14	11.94
	3-3/4	2195	2301	2466	2927	3068	3288
	95	9.76	10.23	10.97	13.02	13.65	14.63
3/8 (9.5) or #3 or 10M	2-3/8	1507	1579	1693	2009	2106	2257
	60	6.70	7.02	7.53	8.94	9.37	10.04
	3-3/8	2181	2286	2450	2908	3048	3266
	86	9.70	10.17	10.90	12.93	13.56	14.53
	4-1/2	2855	2992	3207	3806	3990	4276
	114	12.70	13.31	14.26	16.93	17.75	19.02
1/2 (12.7) or #4	2-3/4	2397	2513	2693	3197	3350	3591
	70	10.66	11.18	11.98	14.22	14.90	15.97
	4-3/8	3814	3998	4285	5085	5330	5713
	111	16.96	17.78	19.06	22.62	23.71	25.41
	6	5231	5482	5876	6974	7310	7835
	152	23.27	24.38	26.14	31.02	32.51	34.85
5/8 (15.9) or #5 or 15M	3-1/8	3065	3212	3443	4087	4283	4591
	79	13.63	14.29	15.31	18.18	19.05	20.42
	5-1/4	5210	5461	5853	6947	7281	7804
	133	23.17	24.29	26.03	30.90	32.39	34.71
	7-1/2	7356	7710	8263	9808	10280	11017
	191	32.72	34.29	36.75	43.63	45.73	49.00
3/4 (19.1) or #6 or 20M	3-3/4	3495	3663	3926	4659	4884	5234
	95	15.55	16.29	17.46	20.72	21.72	23.28
	6-1/4	6240	6541	7010	8320	8721	9347
	159	27.76	29.09	31.18	37.01	38.79	41.58
	9	8986	9418	10094	11981	12558	13459
	229	39.97	41.89	44.90	53.29	55.86	59.87
1 (25.4) or #8 or 25M	4	5378	5637	6042	7171	7516	8056
	102	23.92	25.07	26.87	31.90	33.43	35.83
	8	10757	11274	12084	14342	15033	16112
	203	47.85	50.15	53.75	63.79	66.87	71.67
	12	16135	16912	18125	21514	22549	24167
	305	71.77	75.22	80.62	95.69	100.30	107.49

Notes:

- 1) The allowable working loads have been reduced using a safety factor of 4.0 for tension and 3.0 for shear, however, in some cases, such as life safety, safety factors of 10.0 or higher may be necessary.
- 2) Allowable Concrete Capacity / Bond Strength values must be checked against steel capacity. The allowable load is the lesser of these value multiplied by the appropriate reduction factors (temperature, hole condition, spacing and edge)
- 3) Tabulated data is applicable to single anchors in normal weight concrete unaffected by temperature, hole condition, edge or spacing reduction factors.
- 4) Allowable Concrete Capacity / Bond Strength values in the tables are for anchors installed into dry concrete in holes drilled with a hammer drill and ANSI carbide drill bit.
- 5) Linear interpolation of the Allowable Concrete Capacity / Bond Strength values is permitted.

REDUCTION FACTORS

Anchor Diameter in (mm)	Spacing				Edge Distance			
	Embed Depth	Spacing at 100% load (no reduction), s_{cr}	Minimum Spacing, s_{min}	Spacing Reduction Factor at s_{min}	Edge Distance at 100% load (no reduction), c_{cr}	Minimum Edge Distance, c_{min}	Edge Reduction Factor at c_{min} (Perpendicular to edge)	
	in (mm)	in (mm)	in (mm)		in (mm)	in (mm)		
5/16 (8)	$h_{ef,min}$	2-3/8 60	9-1/2 241	1-1/4 32	0.57	4-3/4 121	1-1/4 32	0.46
	$h_{ef,max}$	3-3/4 95	15 381	1-1/4 32	0.53	7-1/2 191	1-1/4 32	0.43
3/8 (9.5) or #3 or 10M	$h_{ef,min}$	2-3/4 70	10-3/8 264	1-5/8 41	0.58	5-1/4 133	1-5/8 41	0.51
	$h_{ef,max}$	4-1/2 114	17 432	1-5/8 41	0.54	8-1/2 216	1-5/8 41	0.45
1/2 (12.7) or #4	$h_{ef,min}$	3-1/8 79	12 305	1-7/8 48	0.58	6 152	1-7/8 48	0.51
	$h_{ef,max}$	6 152	22-1/2 572	1-7/8 48	0.53	11-1/4 286	1-7/8 48	0.43
5/8 (15.9) or #5 or 15M	$h_{ef,min}$	3-3/4 95	14 356	2-1/2 64	0.59	7 178	2-1/2 64	0.54
	$h_{ef,max}$	7-1/2 191	28 711	2-1/2 64	0.53	14 356	2-1/2 64	0.43
3/4 (19.1) or #6 or 20M	$h_{ef,min}$	4 102	14-1/2 368	3-1/8 79	0.60	7-1/4 184	3-1/8 79	0.60
	$h_{ef,max}$	9 229	32-5/8 829	3-1/8 79	0.54	16-3/8 416	3-1/8 79	0.45
1 (25.4) or #8 or 25M	$h_{ef,min}$	4 102	14 356	3-3/4 95	0.63	7 178	3-3/4 95	0.67
	$h_{ef,max}$	12 305	41 1041	3-3/4 95	0.54	20-1/2 521	3-3/4 95	0.44

Notes: Linear interpolation for intermediate embedment depths is permitted. Extrapolation is not permitted beyond values in the above table.

Sika AnchorFix®-2 Arctic

PRODUCT DESCRIPTION

Sika AnchorFix®-2 Arctic is a two-component hybrid adhesive based on an epoxy acrylate resin. Incorporating specially formulated technology, Sika AnchorFix®-2 Arctic has been designed to operate in cold conditions, set up quickly and achieve high early strengths in numerous base materials. The anchoring gel is suitable for medium and heavy loads in both structural and non-structural applications.

FEATURES:

- Cures down to -26°C when material is pre-conditioned to at least 0°C.
- Easy to use: easy to dispense and available in 300 mL or 850 mL cartridges.
- Suitable for dry, wet and flooded holes.
- Fixings close to free edges.
- Reduced drilling diameters i.e. 2 mm anchor clearance results in economic installation.
- Flexible embedment depths.
- Resistant to wide range of chemicals.
- Low-VOC (22 g/L per ASTM D2369).
- Styrene-free.

APPROVALS:

- ETAG 001: Part 5, Option 7 approval for M8-M30 galvanised and stainless steel threaded bars (4.6, 5.8, 8.8 & 10.9 galvanised steel & A4-70 and A4-80 stainless steel & 1.4529 HCR threaded bars in C20/25 to C50/60 non-cracked concrete)
- MTQ
- TRA (the Road Authority) listed as meeting Ministry of Transportation of Ontario (MTO) Specification MI-120: Evaluation of Pull-out Testing of Epoxy Coated Dowels in Concrete Using Grouts and Epoxies. ISBN 0-7729-4236-6.

SHELF LIFE:

Cartridges should be stored in original, unopened packaging, the correct way up, in cool conditions (0°C to 20°C) out of direct sunlight. When stored correctly, the shelf life will be 12 months from the date of manufacture. Material should be pre-conditioned to above 0°C to ease application when using hand dispensers at lower temperatures.

HEALTH AND SAFETY:

For information and advice on the safe handling, storage and disposal of chemical products, users should refer to the most recent Material Safety Data Sheet (MSDS) containing physical, ecological, toxicological and other safety-related data.

Product	Cartridge Sizes (mL)	Approvals	Uncracked Concrete	Cracked Concrete	Seismic	Threaded Rod	Rebar	Dowels	Dry	Water Saturated	Water Filled	No Service Temperature Reduction Factor
AnchorFix®-2 Arctic	300 850	ETAG, MTQ, TRA (MTO)	✓			✓	✓	✓	✓	✓	✓	✓

INSTALLATION SPECIFICATIONS

WORKING AND LOADING TIMES

Base Material Temperature	Working (Gel) Time	Cure (Loading) Time
-26°C	-	36 h
-10 to -5°C	-	12 h
-5 to 0°C	15 min	100 min
0 to 5°C	10 min	75 min
5 to 10°C	5 min	50 min
10 to 15°C	3 min 45 sec	40 min
15 to 20°C	2 min 30 sec	30 min
20°C	1 min 40 sec	20 min

Notes:

- 1) Maintain adhesive temperature to a minimum of -5°C. For ease of application and dispensing a minimum of 0°C is recommended.
- 2) Reasonable variations can be expected due to local environmental factors (humidity, wind conditions, etc.).

FRACTIONAL THREADED BARS AND REINFORCING STEEL

Threaded Rod Diameter (in)		5/16	3/8	1/2	5/8	3/4	1	1-1/4
Bit Diameter (in)	d_o	3/8	1/2	9/16	11/16	13/16	1-1/16	1-1/2
US Rebar Size		-	#3	#4	#5	#6	#8	#10
Bit Diameter (in)	d_o	-	9/16	5/8	3/4	7/8	1-1/8	1-1/2
Metric Rebar Size		-	10M	-	15M	20M	25M	30M
Bit Diameter	d_o	-	14 mm	-	3/4 in	24 mm	1-1/8 in	37 mm
Cleaning Brush Size*		14 mm		22 mm		29 mm		43 mm
Effective Embedment Depth (in)	$h_{ef,min}$	2-1/2	3	4	5	6	8	10
	$h_{ef,max}$	6-1/4	7-1/2	10	12-1/2	15	20	25
Min Slab Thickness (in)	h_{min}	$h_{ef} + 1.25 \text{ in} \geq 4 \text{ in}$				$h_{ef} + 2 d_o$		
Min Edge Distance (in)	c_{min}	1.5 h_{ef}						
Min Anchor Spacing (in)	s_{min}	3.0 h_{ef}						
Max Tightening Torque (ft.lb)	T_{inst}	7.5	15	25	55	80	120	200

Notes: *Cleaning brush must have steel bristles.

ESTIMATING GUIDE - NUMBER OF FIXINGS PER CARTRIDGE

Anchor Size (in)	5/16	3/8	1/2	5/8	5/8	3/4	3/4	1	1	1-1/4
Hole Diameter (in)	3/8	1/2	9/16	3/4	11/16	7/8	13/16	1-1/8	1-1/16	1-3/8
Embedment Depth (in)	2-3/8	2-3/8	2-3/4	3-1/8	3-1/8	3-3/4	3-3/4	4	4	5
Fixings per Cartridge	300 mL	83	47	32	15	18	9	11	5	2
	850 mL	254	143	97	48	57	29	34	16	8
Embedment Depth (in)	3-1/8	3-3/4	5	6-1/4	6-1/4	7-1/2	7-1/2	10	10	12-1/2
Fixings per Cartridge	300 mL	63	29	17	7	9	4	5	2	1
	850 mL	193	90	53	24	28	14	17	6	3
Embedment Depth (in)	3-3/4	4-1/2	6	7-1/2	7-1/2	9	9	12	12	15
Fixings per Cartridge	300 mL	53	24	14	6	7	4	4	1	0
	850 mL	161	75	44	60	23	12	14	5	2

* Number of fixings assumes 30 mL wastage in initial extrusion and holes filled to 3/4 full.

ALLOWABLE CONCRETE CAPACITY / BOND STRENGTH

Anchor Diameter in (mm)	Tension				Shear		
	Embed Depth	$f'_c = 2500$ psi (17.3 MPa)	$f'_c = 4000$ psi (27.6 MPa)	$f'_c = 8000$ psi (55.2 MPa)	$f'_c = 2500$ psi (17.3 MPa)	$f'_c = 4000$ psi (27.6 MPa)	$f'_c = 8000$ psi (55.2 MPa)
	in (mm)	lb (kN)	lb (kN)	lb (kN)	lb (kN)	lb (kN)	lb (kN)
5/16 (8)	2-1/2	1538	1612	1728	2051	2150	2304
	64	6.84	7.17	7.69	9.12	9.56	10.25
	4-3/8	2692	2821	3024	3589	3762	4032
	111	11.97	12.55	13.45	15.97	16.73	17.93
	6-1/4	3846	4031	4320	5128	5374	5760
	159	17.11	17.93	19.22	22.81	23.90	25.62
3/8 (9.5) or #3 or 10M	3	2113	2215	2374	2817	2953	3165
	76	9.40	9.85	10.56	12.53	13.13	14.08
	5-1/4	3698	3876	4154	4930	5168	5538
	133	16.45	17.24	18.48	21.93	22.99	24.63
	7-1/2	5282	5537	5934	7043	7382	7912
	191	23.50	24.63	26.39	31.33	32.84	35.19
1/2 (12.7) or #4	4	3489	3657	3919	4652	4876	5226
	102	15.52	16.27	17.43	20.69	21.69	23.24
	7	6106	6400	6859	8141	8533	9145
	178	27.16	28.47	30.51	36.21	37.95	40.68
	10	8723	9142	9799	11 630	12 190	13 065
	254	38.80	40.67	43.58	51.73	54.22	58.11
5/8 (15.9) or #5 or 15M	5	4887	5123	5490	6517	6830	7320
	127	21.74	22.79	24.42	28.99	30.38	32.56
	8-3/4	8553	8965	9608	11 404	11 953	12 811
	222	38.04	39.87	42.74	50.73	53.17	56.98
	12-1/2	12 219	12 807	13 726	16 292	17 076	18 301
	318	54.35	56.96	61.05	72.46	75.95	81.40
3/4 (19.1) or #6 or 20M	6	6214	6513	6981	8286	8684	9308
	152	27.64	28.97	31.05	36.85	38.63	41.40
	10-1/2	10 875	11 398	12 216	14 500	15 198	16 288
	267	48.37	50.70	54.34	64.49	67.60	72.45
	15	15 535	16 283	17 452	20 714	21 711	23 269
	381	69.10	72.43	77.63	92.14	96.57	103.50
1 (25.4) or #8 or 25M	8	8959	9390	10 064	11 945	12 520	13 418
	203	39.85	41.77	44.76	53.13	55.69	59.68
	14	15 678	16 432	17 611	20 903	21 909	23 482
	356	69.73	73.09	78.34	92.98	97.45	104.45
	20	22 396	23 474	25 159	29 982	31 299	33 545
	508	99.62	104.41	111.91	132.83	139.22	149.21
1-1/4 (31.75) or #10 or 30M	10	14 098	14 776	15 837	18 797	19 702	21 116
	254	62.71	65.72	70.44	83.61	87.63	93.92
	17-1/2	24 671	25 858	27 714	32 895	34 478	36 953
	445	109.74	115.02	123.27	146.32	153.36	164.37
	25	35 245	36 941	39 592	46 993	49 254	52 789
	635	156.77	164.31	176.11	209.02	219.08	234.81

Notes:

- 1) The allowable working loads have been reduced using a safety factor of 4.0 for tension and 3.0 for shear, however, in some cases, such as life safety, safety factors of 10.0 or higher may be necessary.
- 2) Allowable Concrete Capacity / Bond Strength values must be checked against steel capacity. The allowable load is the lesser of these value multiplied by the appropriate reduction factors (temperature, hole condition, spacing and edge)
- 3) Tabulated data is applicable to single anchors in normal weight concrete unaffected by temperature, hole condition, edge or spacing reduction factors.
- 4) Allowable Concrete Capacity / Bond Strength values in the tables are for anchors installed into dry concrete in holes drilled with a hammer drill and ANSI carbide drill bit.
- 5) Linear interpolation of the Allowable Concrete Capacity / Bond Strength values is permitted.

REDUCTION FACTORS

Anchor Diameter in (mm)	Spacing				Edge Distance			
	Embed Depth	Spacing at 100% load (no reduction), s_{cr}	Minimum Spacing, s_{min}	Spacing Reduction Factor at s_{min}	Edge Distance at 100% load (no reduction), c_{cr}	Minimum Edge Distance, c_{min}	Edge Reduction Factor at c_{min} (Perpendicular to edge)	
	in (mm)	in (mm)	in (mm)		in (mm)	in (mm)		
5/16 (8)	$h_{ef,min}$	2-1/2 64	7-1/2 191	1-3/8 35	0.59	3-3/4 95	1-3/8 35	0.54
	$h_{ef,max}$	6-1/4 159	18-3/4 476	3-1/4 83	0.57	9-3/8 238	3-1/4 83	0.52
3/8 (9.5) or #3 or 10M	$h_{ef,min}$	3 76	9 229	1-3/4 44	0.58	4-1/2 114	1-3/4 44	0.53
	$h_{ef,max}$	7-1/2 191	22-1/2 572	4 102	0.58	11-1/4 286	4 102	0.53
1/2 (12.7) or #4	$h_{ef,min}$	4 102	12 305	2 51	0.57	6 152	2 51	0.53
	$h_{ef,max}$	10 254	30 762	4-3/4 121	0.56	15 381	4-3/4 121	0.52
5/8 (15.9) or #5 or 15M	$h_{ef,min}$	5 127	15 381	2-3/4 70	0.58	7-1/2 191	2-3/4 70	0.53
	$h_{ef,max}$	12-1/2 318	37-1/2 953	6-3/8 162	0.57	18-3/4 476	6-3/8 162	0.52
3/4 (19.1) or #6 or 20M	$h_{ef,min}$	6 152	18 457	3-1/4 83	0.58	9 229	3-1/4 83	0.54
	$h_{ef,max}$	15 381	45 1143	7-7/8 200	0.58	22-1/2 572	7-7/8 200	0.54
1 (25.4) or #8 or 25M	$h_{ef,min}$	8 203	24 610	3-7/8 98	0.56	12 305	3-7/8 98	0.52
	$h_{ef,max}$	20 508	60 1524	9-1/2 241	0.56	30 762	9-1/2 241	0.52
1-1/4 (31.75) or #10	$h_{ef,min}$	10 254	30 762	4-3/4 121	0.56	15 381	4-3/4 121	0.52
	$h_{ef,max}$	25 635	75 1905	11-7/8 302	0.56	37-1/2 953	11-7/8 302	0.52

Notes: Linear interpolation for intermediate embedment depths is permitted. Extrapolation is not permitted beyond values in the above table.

MATERIALS SPECIFICATIONS

THREADED BAR – MATERIAL SPECIFICATION

Bar Size (in)	Diameter (mm)	Diameter (in)	Nominal Cross Sectional Area, A_{nom} (mm ²)	Nominal Cross Sectional Area, A_{nom} (in ²)	Effective Cross Sectional Area, A_{se} (mm ²)	Effective Cross Sectional Area, A_{se} (in ²)
3/8	9.525	0.375	71	0.1104	50	0.0775
1/2	12.7	0.5	127	0.1963	92	0.1419
5/8	15.875	0.625	198	0.3068	146	0.2260
3/4	19.05	0.75	285	0.4418	216	0.3340
7/8	22.225	0.875	388	0.6013	298	0.4620
1	25.4	1	507	0.7854	391	0.6060
1 - 1/4	31.75	1.25	792	1.2272	625	0.9690

Steel Type		Min. Specified Yield Strength, f_y	Min. Specified Ultimate Strength, f_u
Carbon Steel ASTM F1554 Grade 36 (A307 Gr.C)	psi	36 000	58 000
	MPa	250	400
Carbon Steel ASTM A 193 B7	psi	105 000	125 000
	MPa	725	860
Stainless Steel ASTM F593 CW1 (3/8" to 5/8")	psi	65 000	100 000
	MPa	450	690
Stainless Steel ASTM F593 CW2 (3/4" to 1-1/4")	psi	45 000	85 000
	MPa	310	585
Stainless Steel ASTM F593 SH1 (3/8" to 5/8")	psi	90 000	115 000
	MPa	620	800
Stainless Steel ASTM F593 SH2 (3/4" to 1")	psi	70 000	105 000
	MPa	480	725
Stainless Steel ASTM F593 SH3 (1-1/4")	psi	55 000	95 000
	MPa	380	655

REINFORCING STEEL – MATERIAL SPECIFICATION

Bar Size	Diameter (mm)	Diameter (in)	Cross Sectional Area, A (mm ²)	Cross Sectional Area, A (in ²)
10M	11.3	0.44	100	0.155
15M	16.0	0.63	200	0.312
20M	19.5	0.77	300	0.463
25M	25.2	0.99	500	0.773
30M	29.9	1.18	700	1.088
35M	35.7	1.41	1000	1.552
#3	9.525	0.375	71	0.11
#4	12.7	0.5	127	0.20
#5	15.875	0.625	198	0.31
#6	19.05	0.75	285	0.44
#7	22.225	0.875	388	0.60
#8	25.4	1	507	0.79
#10	32.26	1.27	817	1.27

Rebar Steel Grade		Min. Specified Yield Strength, f_y	Min. Specified Ultimate Strength, f_u
ASTM A615 Gr. 60	psi	60 000	90 000
	MPa	415	620
CAN/CSA-G30.18 Gr.400	psi	58 000	78 300
	MPa	400	540

ALLOWABLE STEEL CAPACITIES

FRACTIONAL THREADED BARS

Anchor Diameter (in)	Carbon Steel ASTM F1554 Grade 36 (A307 Gr.C)		Carbon Steel ASTM A193 B7		Stainless Steel ASTM F593 CW		Stainless Steel ASTM F593 SH		
	Allowable Tension, T_{all}	Allowable Shear, V_{all}	Allowable Tension, T_{all}	Allowable Shear, V_{all}	Allowable Tension, T_{all}	Allowable Shear, V_{all}	Allowable Tension, T_{all}	Allowable Shear, V_{all}	
3/8	lb	2110	1080	4550	2345	3630	1870	4190	2160
	kN	9.4	4.8	20.2	10.4	16.1	8.3	18.6	9.6
1/2	lb	3750	1930	8100	4170	6470	3330	7450	3840
	kN	16.7	8.6	36.0	18.5	28.8	14.8	33.1	17.1
5/8	lb	5870	3030	12 655	6520	10 130	5220	11 640	6000
	kN	26.1	13.5	56.3	29.0	45.1	23.2	51.8	26.7
3/4	lb	8460	4360	18 220	9390	12 400	6390	15 300	7880
	kN	37.6	19.4	81.0	41.8	55.2	28.4	68.1	35.1
7/8	lb	11 500	5930	24 800	12 780	16 860	8680	20 830	10 730
	kN	51.2	26.4	110.3	56.8	75.0	38.6	92.7	47.7
1	lb	15 020	7740	32 400	16 690	22 020	11 340	27 210	14 020
	kN	66.8	34.4	144.1	74.2	97.9	50.4	121.0	62.4
1-1/4	lb	23 480	12 100	50 610	26 070	34 420	17 730	38 470	19 820
	kN	104.4	53.8	225.1	116.0	153.1	78.9	171.1	88.2

Notes:

- 1) Allowable Tension, $T_{all} = 0.33 \times f_u \times \text{nominal cross sectional area}$
- 2) Allowable Shear, $V_{all} = 0.17 \times f_u \times \text{nominal cross section area}$

REINFORCING STEEL

Carbon Steel ASTM A615 Grade 60			
Rebar Size		Allowable Tension, N_{all}	Allowable Shear, V_{all}
#3	lb	2485	1690
	kN	11.1	7.5
#4	lb	4800	3004
	kN	21.4	13.4
#5	lb	7440	4693
	kN	33.1	20.9
#6	lb	10 560	6759
	kN	47.0	30.1
#7	lb	14 400	9200
	kN	64.1	40.9
#8	lb	18 960	12 016
	kN	84.3	53.4
#10	lb	30 480	19 381
	kN	135.6	86.2

Carbon Steel CAN/CSA-G30.18 Gr.400			
Rebar Size		Allowable Tension, N_{all}	Allowable Shear, V_{all}
10M	lb	3280	2069
	kN	14.6	9.2
15M	lb	6585	4148
	kN	29.3	18.5
20M	lb	9786	6161
	kN	43.5	27.4
25M	lb	16 343	10 290
	kN	72.7	45.8
30M	lb	23 008	14 486
	kN	102.3	64.4
35M	lb	32 800	20 652
	kN	145.9	91.9

Notes:

- 1) Above values for reinforcing steel assume the design method is the same as a post-installed adhesive anchor, under the principles of anchor design (failure modes will be concrete breakout, pryout, steel failure, or adhesive bond) and not under the principles of reinforcing steel design (failure modes are typically splitting failure, inadequate bar development etc.).
- 2) Allowable Tension, $N_{all} = 0.25 \times f_u \times$ nominal cross sectional area
- 3) Allowable Shear, $V_{all} = 0.17 \times f_u \times$ nominal cross section area

NOTES

SIKA SOLUTIONS FROM ROOF TO FOUNDATIONS

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Sika® CarboShear

Floor & Wall Systems



Sikafloor®
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Sikagard® Duroplast

Waterproofing Systems



SikaProof®, SikaFuko®
Sika® Greenstreak®
SikaSwell®, SikaFix®

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Also Available:



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