

TECHNICAL MANUAL



STEEL BOND COMMERCIAL EST.
CR : 1012102854

STEEL BOND COMMERCIAL EST.

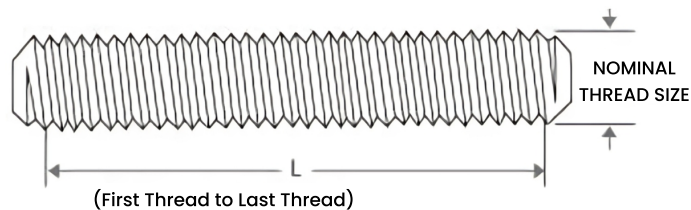
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STUD BOLTS-ASTM A 193 GR. B7 & B16

INCH SERIES: UNC/UN – DIMENSIONS

NOTES:

1. The stud bolt will generally conform to ASTM A 193, Gr: B7 & B16.
2. Threads will conform to class 24 of unified coarse thread and per ANSI B1.1
3. Material: Medium Carbon Chromium Molybdenum Alloy Steel (Cr-Mo Alloy Steel) for B7 and chromium molybdenum, & vanadium (Cr-Mo-Va) for B16.
4. Heat Treatment as per A 193, Gr: B7 & Gr: B16.
5. All dimensions are in inches.



Nominal Thread Size 'D'	TPI		Length Range 'L' Meter	Nominal thread Size	TPI	Length Range 'L' Meter
	UNC	UN				
1/2"	13	-	Up to 6	1-7/8"	8	Up to 6
5/8"	11	-	Up to 6	2"	8	Up to 6
3/4"	10	-	Up to 6	2-1/4"	8	Up to 6
7/8"	9	-	Up to 6	2-1/2"	8	Up to 6
1"	8	-	Up to 6	2-3/4"	8	Up to 6
1-1/8"	-	8	Up to 6	3"	8	Up to 6
1-1/4"	-	8	Up to 6	3-1/4"	8	Up to 6
1-3/8"	-	8	Up to 6	3-1/2"	8	Up to 6
1-1/2"	-	8	Up to 6	3-3/4"	8	Up to 6
1-5/8"	-	8	Up to 6	4"	8	Up to 6
1-3/4"	-	8	Up to 6			

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STUD BOLTS – ASTM A 193 GR. B7M

INCH SERIES. UNC/UN

PHYSICAL PROPERTIES

Physical Properties		Diameter Range	Grade ' B7M'
Tensile Strength (Min)	Psi (N/mm ²)	7" and Under	100,000 (690)
		4" and Under	80,000 (550)
Yield Strength (Min)	Psi (N/mm ²)	Over 4" to 7"	75,000 (518)
Elongation on GL=4D (Min)	{%}	7" and Under	18%
Reduction of Area (Min)	{%}	7" and Under	50%
Hardness	(HRC)	ALL SIZEZ	B93 – B99

RECOMMENDED TIGHTENING TORQUES AND INDUCED LOADS

Nominal Thread Size		Stress Area	GRADE 'B7M'		Nominal Thread Size	Stress Area	GRADE 'B7M'	
			Unlubricated Finish	Induced Load			Unlubricated Finish	Induced Load
UNC	8UN	in ²	Ft-lb	K-lbf	8UN	in ²	Ft-lb	K-lbf
1/2"-13 UNC		0.142	66.27	7.952	1-7/8"	2.410	4,217.50	134.960
5/8"-11 UNC		0.226	131.83	12.656	2"	2.770	5,170.66	155.120
3/4"-10 UNC		0.334	233.80	18.704	2-1/4"	3.560	7,476.00	199.360
7/8"-9 UNC		0.462	377.30	25.872	2-1/2"	4.440	10,360.00	248.640
1" – 8 UNC		0.606	565.160	33.936	2-3/4"	5.430	13,937.00	304.080
	1-1/8"	0.790	829.50	44.240	3"	6.510	18,228.00	364.560
	1-1/4"	1.000	1,166.66	56.000	3-1/4"	7.690	23,326.00	430.640
	1-3/8"	1.233	1,582.35	69.048	3-1/2"	8.960	29,269.33	501.760
	1-1/2"	1.492	2,088.80	83.552	3-3/4"	10.340	36,190.00	579.040
	1-5/8"	1.760	2,699.66	99.680	4"	11.810	44,090.67	661.360
	1-3/4"	2.080	3,397.33	116.480				

NOTE:

- © The tightening torques are calculated to induce stress equal to approximately 70% of Yield Stress.
- © The tightening torques of lubricated finished is 75% of the values stated Unlubricated

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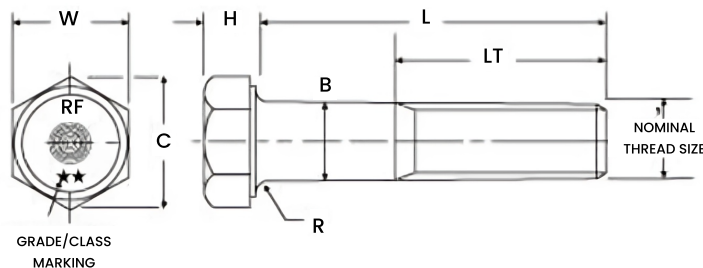
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HEX. BOLTS / SCREWS – ASTM A 307,GR. A

INCH SERIES: UNC/UN – DIMENSIONS

NOTES:

1. The Bolt will generally conform to ANSI/ASME B 18.2.1 Hex. Bolts
2. Threads will conform to class 2A of ANSI B 1.1 Coarse Series
3. Material: Low Carbon Steel
4. Bolt lengths equal to or shorter than those listed in LFT column will be fully threaded (ie. screw)
5. All dimensions are in inches.


DIMENSIONS

Nominal Thread Size	TPI UNC	W Max.	C Max.	B Max.	H Nom.	R Min	Length of Thread LT		L.F.T	Length Range
							L≤6"	L>6"		
3/8"	16	0.562	0.650	0.388	1/4"	0.01	1.00	1.25	1.250	1/2"-4"
1/2"	13	0.750	0.866	0.515	11/32"	0.01	1.25	1.50	1.500	3/4"-8"
5/8"	11	0.938	1.083	0.642	27/64"	0.02	1.50	1.75	1.750	1"-8
3/4"	10	1.125	1.299	0.768	1/2"	0.02	1.75	2.00	2.000	1-1/2"-8"
7/8"	9	3.312	1.516	0.895	37/64"	0.02	2.00	2.25	2.250	1-1/2"-8"
1"	8	1.500	1.732	1.022	43/64"	0.03	2.25	2.50	2.500	1-1/2"-8"
1-1/8"	8UN	1.688	1.949	1.149	3/4"	0.03	2.50	2.75	2.750	2"-8"
1-1/4"	8UN	1.875	2.165	1.277	27/32"	0.03	2.75	3.00	3.000	2"-8"
1-3/8"	8UN	2.062	2.380	1.404	29/92"	0.03	3.00	3.25	3.250	2-1/2"-8"
1-1/2"	8UN	2.250	2.598	1.531	1"	0.03	3.25	3.50	3.500	2-1/2"-8"

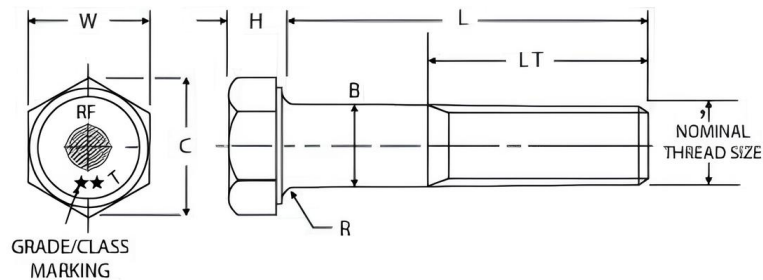
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HEAVY HEX BOLTS/SCREWS-ASTM A 307, GR. B

NOTES:

1. The Bolt will generally conform to ANSI/ASME B 18.2.1 Heavy Hex. Series
2. Threads will conform to class 2A of ANSI B 1.1 Coarse Series
3. Material: Low Carbon Steel
4. Bolt lengths equal to or shorter than those listed in LFT column will be fully threaded (ie. screw)
5. All dimensions are in inches.



DIMENSIONS

Nominal Thread Size	TPI UNC	W Max.	C Max.	B Max.	H Nom.	R Min	Length of Thread LT		L.F.T	Length Range
							L≤6"	L>6"		
1/2"	13	0.875	1.010	0.515	11/32"	0.01	1.25	1.50	1.500	3/4"-8"
5/8"	11	0.062	1.227	0.642	27/64"	0.02	1.50	1.75	1.750	1"-8"
3/4"	10	1.250	1.443	0.768	1/2"	0.02	1.75	2.00	2.000	1-1/2"-8"
7/8"	9	1.438	1.660	0.895	37/64"	0.02	2.00	2.25	2.250	1-1/2"-8"
1"	8	1.625	1.876	1.022	43/64"	0.03	2.25	2.50	2.500	1-1/2"-8"
1-1.8"	8UN	1.812	2.093	1.149	3/4"	0.03	2.50	2.75	2.750	2"-8"
1-1/4"	8UN	2.000	2.309	1.277	27/32"	0.03	2.75	3.00	3.000	2"-8"
1-3/8"	8UN	2.188	2.526	1.404	29/92"	0.03	3.00	3.25	3.250	2-1/2"-8"
1-1/2"	8UN	2.375	2.742	1.531	1"	0.03	3.25	350	3.500	2-1/2"-8"

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ANCHOR BOLTS - TYPE 1, 1S, 2, 2S, 3S

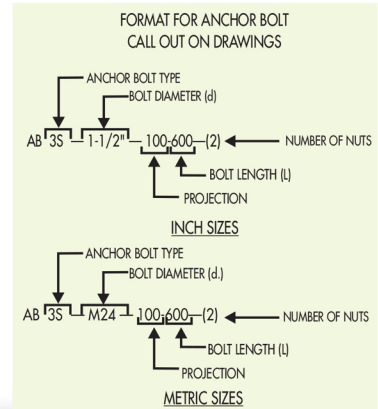
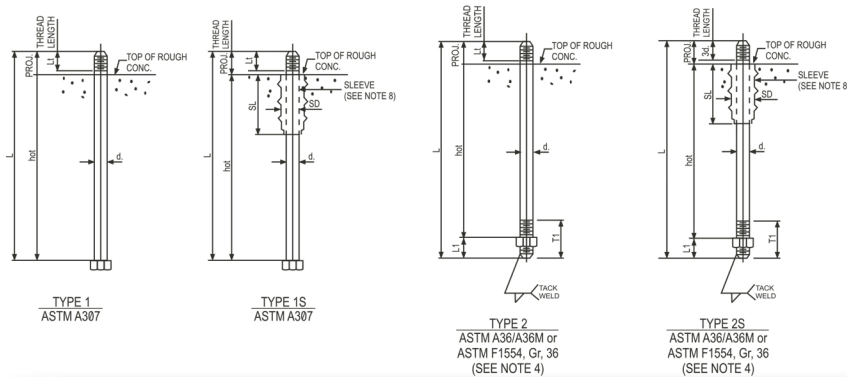


Table 1 : ASTM A307, Grade Sizes Inch

Size d Inch	Type	Bolt Properties		Type 1							Type 1S				
		IT (in)	TPI	Stress Area (in ²)	Max. Proj. (Bolt o) (mm)	Min. 12d (mm)	Length (L) Proj. (in)	Edge Dist 4d-3L+da/2 (mm)	Spacing 6d. (mm)	Min. SL+150 (mm)	Length (L) Proj. (in)	Edge Dist (Note dl) (mm)	Spacing (note s) (mm)	Sleeve	
														SD (mm)	SL (mm)
1/2"	Hex	1.50	13	0.142	107	152	10	100	76	275	15	127	114	50	125
5/8"	Hex	1.75	11	0.226	115	191	12	110	95	325	17-1/2	127	129	50	175
3/4"	Hex	2.00	10	0.334	123	229	14	111	114	325	17-1/2	127	145	50	175
2/8"	Hex	2.25	9	0.462	131	267	15-1/4	113	133	325	18	127	161	50	175
1"	Hex	2.50	8	0.606	139	305	17-1/2	114	152	400	21	139	202	75	250
1-1/8"	Hex	2.75	7	0.763	146	343	19-1/2	116	171	421	22-1/2	139	218	75	250
1-1/4"	Hex	3.00	7	0.969	154	381	21	127	197	441	23-1/2	149	234	75	250
1-3/8"	Hex	3.25	6	1.155	162	419	23	140	210	460	24-1/2	160	250	75	250
1-1/2"	Hex	3.50	6	1.495	170	457	24-1/2	152	229	604	30-1/2	183	291	100	375
1-3/4"	Heavy Hex	4.00	5	1.899	186	533	28-1/2	178	267	642	32-1/2	206	322	100	375
2"	Heavy Hex	4.50	4.5	2.498	202	610	32	203	305	755	37-1/2	228	354	100	450
2-1/4"	Heavy Hex	5.00	4.5	3.248	218	686	35-1/2	229	343	793	40	258	386	100	450
2-1/2"	Heavy Hex	5.50	4	3.999	234	762	39	254	381	981	48	297	468	150	600
2-3/4"	Heavy Hex	6.00	4	4.934	250	838	43	279	419	1019	50	319	499	150	600
3"	Heavy Hex	6.50	4	5.967	266	914	46-1/2	305	457	1057	52	342	531	150	600

Notes: Table-1

- Minimum Edge distance is measured from the centerline of the Anchor Bolt to the EDGE of the Concrete.
- ASTM A307 Bolt lengths may not be available for the larger diameter type Bolts.
- If the required projection exceed the maximum projection in the table above, use A type 2 Anchor Bolt.
- EDGE distance for bolts with sleeves must be increased by (SD-d), 1/2
- Spacing of Bolts with sleeves must be increased by (SD-d.)
- TPI + threads per inch

Anchor Material Specifications	Sizes	Profile	Thread Profile	Net Material Specification	Coating Type
ASTM A307, Grade A	1/2" thru 1-1/2" Over 1-1/2"	Hex bolt Heavy Hex bolt	ASME B18.21 UNC	ASTM A563, Grade A Heavy Hex	Galvanized to ASTM A153, Class C Or ASTM B695, Class 50
ASTM A36/A36M	1/2" thru 3" M12 thru M72	Rod	ASME B18 2.1, UNC Class 2 ASME B1.13M	ASTM A563, Grade A Heavy Hex	Galvanized to ASTM A153, Class C Or ASTM B695, Class 50
ASTM F1554 M GR., 36	1/2" thru 3"	Rod	ASME B18 2.1, UNC Class 2	ASTM A563, Grade A Heavy Hex	Galvanized to ASTM A153, Class C Or ASTM B695, Class 50
ASTM 193/A 193M GR. B7	3/4" thru 3" M20 thru M72	Bolts / Rods	ASME B1.1, 8 UNC Class 2 ASME B1.13M	ASTM A563, DH Heavy Hex Or ASTM A 194/A 194 M	Painted as per APCS - IC OR APCS - IF PER SAES -H-001
ASTM F1554 Gr. 105	1/2" thru 3" M12 thru M72	Rod	ASME B1.1, UNC Class 2	ASTM A563, DH Heavy Hex Or ASTM A 194/A 194 M	Galvanized to ASTM A153, Class C Or ASTM B695, Class 50

Table 2 : ASTM A193, F1554 Grade 105 Anchor Rods inch Series

Size d Inch	TPI	Bolt Properties		Type 1							Type 1S				
		Stress Area (in ²)	IT d ± 13 (mm)	TI 2d (mm)	Min 12d. (mm)	Edge Dist 4d-3L+da/2 (mm)	Spacing 6d. (mm)	Min. SL+150 (mm)	Edge Dist (Note b) (mm)	Spacing (note o) (mm)	Sleeve				
											SD (mm)	SL (mm)			
1/2"	13	0.142	26	25	152	100	76	275	127	114	50	125			
5/8"	11	0.226	29	32	191	110	95	325	127	129	50	175			
3/4"	10	0.334	32	38	229	111	114	325	127	145	50	175			
7/8"	9	0.462	35	44	267	113	133	325	127	161	50	175			
1"	8	0.606	38	51	305	114	152	400	139	202	75	250			
1-1/8"	7	0.752	42	57	343	116	171	421	139	218	75	250			
1-4/4"	7	0.969	45	64	381	127	191	441	149	234	75	250			
1-3/8"	6	1.155	48	70	419	140	210	460	160	250	75	250			
1-1/2"	6	1.405	51	76	457	152	229	604	183	291	100	375			
1-3/4"	5	1.899	57	89	533	178	267	642	206	322	100	375			
2"	4.5	2.498	64	102	610	203	305	755	228	354	100	450			
2-1/4"	4.5	3.248	70	114	686	229	343	793	250	386	100	450			
2-1/2"	4.0	3.999	77	127	762	254	381	981	297	468	150	600			
2-3/4"	4.0	4.934	83	140	833	279	419	1019	319	499	150	600			
3"	4.0	5.967	89	152	914	305	457	1057	342	531	150	600			

Notes: Table-2

- Minimum Edge distance is measured from the centerline of the Anchor Bolt to the EDGE of the Concrete.
- EDGE distance for bolts with sleeves must be increased by (SD-d)/2
- Spacing of Bolts with Sleeves must ne increased by (SD-d.)
- TPI + thread per Inch.

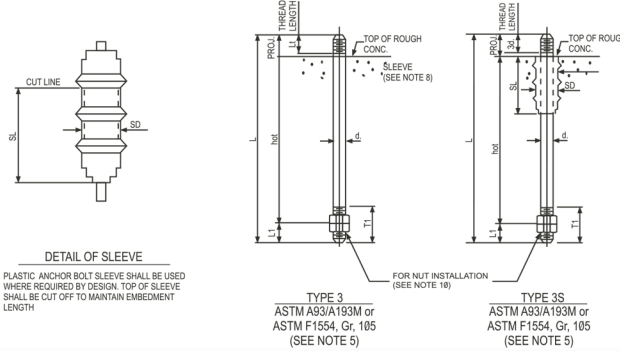
Coating : Mill Finish, Electro Galv. & Hotdip Galv. and Painted

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Size d inch	TPI	Bolt Properties			Type 3				Type 3S			Sleeve	
		Stress Area (in ²)	Lt d + 13 (mm)	Tl 2d (mm)	Min. 12d. (mm)	Edge Dist 4d>M+da/2 (mm)	Spacing 6d. (mm)	Min. SL+150 (mm)	Edge Dist (Note b) (mm)	Spacing (note o) (mm)	SD (mm)	SL (mm)	
3/4"	10	0.334	51	57	229	114	114	325	130	145	50	175	
7/8"	9	0.462	57	67	267	133	133	325	147	161	50	175	
1"	8	0.606	64	76	305	152	152	400	177	202	75	250	
1-1/8"	8	0.790	70	86	343	171	171	421	195	218	75	250	
1-1/4"	8	1.000	77	95	381	191	191	441	252	234	75	250	
1-3/8"	8	1.234	83	105	419	210	210	460	230	250	75	250	
1-1/2"	8	1.492	89	114	457	229	229	604	260	291	100	375	
1-3/4"	8	2.882	102	133	533	267	267	642	294	322	100	375	
2"	8	3.125	118	155	575	301	301	690	325	360	100	450	
2-1/4"	8	3.557	127	171	610	343	343	793	364	386	100	450	
2-1/2"	8	4.442	140	191	762	381	381	981	424	468	150	600	
2-3/4"	8	5.425	153	218	838	419	419	1019	459	499	150	600	
3"	8	6.506	165	229	914	457	457	1057	494	531	150	600	

Notes : Table-3
 1. Minimum EDGE distance is measured from the centerline of the Anchor Bolt to the EDGE of the Concrete, 2. EDGE distance for bolts with sleeves must be increased by (SD-d).
 3. Spacing of Bolts with sleeves must be increased by (SD-d), 4. TPI + thread per Inch

Size d inch	Stress Area (in ²)	Bolt Properties			Type 2			Type 2S			Sleeve	
		Lt d + 13 (mm)	Tl 2d (mm)	Min. 12d. (mm)	Edge Dist 4d>M+da/2 (mm)	Spacing 6d. (mm)	Min. SL+150 (mm)	Edge Dist (Note b) (mm)	Spacing (note o) (mm)	SD (mm)	SL (mm)	
M12X1.75	84.3	25	24	144	106	72	275	125	110	50	125	
M16X2	157	29	32	192	108	96	275	125	130	50	125	
M20X2.5	245	33	40	240	110	120	325	125	150	50	175	
M24X3	353	37	40	280	112	144	400	138	195	75	250	
M27X3	459	40	54	324	114	162	400	138	210	75	250	
M30X3.5	561	43	60	360	120	180	400	143	225	75	250	
M36X4	817	49	72	432	144	216	525	176	280	100	375	
M42X4.5	1120	55	84	504	168	252	525	197	318	100	375	
M48X5	1470	61	96	576	192	288	600	218	340	100	450	
M56X5.5	2030	69	112	672	224	336	672	246	380	100	450	
M64X6	2680	77	126	768	256	384	768	299	470	150	600	
M72X6	3460	85	144	864	288	432	864	327	510	150	600	

Notes : Table-2M
 1. Minimum EDGE distance is measured from the centerline of the Anchor Bolt to the EDGE of the Concrete, 2. EDGE distance for bolts with sleeves must be increased by (SD-d).
 3. Spacing of Bolts with sleeves must be increased by (SD-d), 4. TPI + thread per Inch

Size d inch	Stress Area (in ²)	Bolt Properties			Type 2			Type 2S			Sleeve	
		Lt d + 13 (mm)	Tl 2d (mm)	Min. 12d. (mm)	Edge Dist 4d>M+da/2 (mm)	Spacing 6d. (mm)	Min. SL+150 (mm)	Edge Dist (Note b) (mm)	Spacing (note o) (mm)	SD (mm)	SL (mm)	
M12X1.75	84.3	25	24	144	106	72	275	125	110	50	125	
M16X2	157	29	32	192	108	96	275	125	130	50	125	
M20X2.5	245	33	40	240	110	120	325	125	150	50	175	
M24X3	353	37	40	280	112	144	400	138	195	75	250	
M27X3	459	40	54	324	114	162	400	138	210	75	250	
M30X3.5	561	43	60	360	120	180	400	143	225	75	250	
M36X4	817	49	72	432	144	216	525	176	280	100	375	
M42X4.5	1120	55	84	504	168	252	525	197	318	100	375	
M48X5	1470	61	96	576	192	288	600	218	340	100	450	
M56X5.5	2030	69	112	672	224	336	672	246	380	100	450	
M64X6	2680	77	126	768	256	384	768	299	470	150	600	
M72X6	3460	85	144	864	288	432	864	327	510	150	600	

Notes : Table-2M
 1. Minimum EDGE distance is measured from the centerline of the Anchor Bolt to the EDGE of the Concrete, 2. EDGE distance for bolts with sleeves must be increased by (SD-d).
 3. Spacing of Bolts with sleeves must be increased by (SD-d), 4. TPI + thread per Inch

Notes:

- ANCHOR BOLTS SHALL BE SET ACCURATELY AND HELD IN PLACE BY A TEMPLATE.
- SLEEVES SHALL BE USED WHERE SPECIFIED IN CONSTRUCTION DRAWINGS CENTER SLEEVES AROUND BOLTS.
- ANCHOR BOLTS SHALL BE PLACED INSIDE PIER THE STEEL, BUT SHALL NOT BE TIED TO OR TOUCHING THE REBAR.
- FULLY THREADED ASTM A36/A36M RODS MAY BE USED TO FABRICATE TYPE 2 OR TYPE 2S ANCHOR BOLTS.
- FULLY THREADED ASTM A193/A19M RODS MAY BE USED TO FABRICATE TYPE 3 OR TYPE 3S ANCHOR BOLTS.
- ANCHOR BOLT DESIGN SHALL COMPLY WITH SALES 0-005 AND ACI 318-02, APPENDIX D.
- THE FINAL TIGHTENING OF ANCHOR BOLTS SHALL BE AS FOLLOWS : AFTER GROUTING OF THE BASE PLATE THE ANCHOR BOLTS SHALL BE BROUGHT TO A SNUG TIGHT CONDITION. THIS IS DEFINED AS THE TIGHTNESS THAT EXISTS AFTER A FEW IMPACTS FROM AN IMPACT WRENCH OR THE FULL EFFORT OF A MAN USING A SPUD WRENCH. AT THIS POINT ALL SURFACES SHOULD BE IN FULL CONTACT.
- ANCHOR BOLT SLEEVES SHALL BE FULLY GROUTED IN ACCORDANCE WITH SAES-0-010 AFTER THE BASE PLATE HAS BEEN POSITIONED.
- THE SPACING EMBEDMENT AND EDGE DISTANCE DIMENSIONS SHOWN ON THIS DRAWING ARE VALUED, EVERY ANCHOR BOLT MUST BE DESIGN PER ACI 318-02 AND MINIMUM DIMENSIONS MAY NEED TO BE INCREASED AS REQUIRED BY DESIGN.
- TIGHTEN NUTS TO LOCK, APPLY TORQUE TO BOTTOM NUT, LOCK BOTH NUTS IN POSITION BY COUNTER PUNCHING THE THREADS AT JUNCTURE OF NUTS AND BOLT.

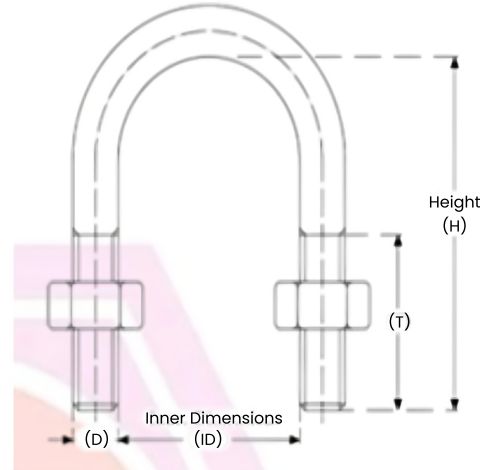
DRAWING NO. : AA 036322

Bldg no. 2408
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U-BOLTS FOR STEEL PIPING

1. The following dimensions are recommended for standard steel piping fitting, custom made to special dimensions also available.
2. Grade of material use can be any of the following:
-Low Carbon Steel, Alloy Steel, Stainless Steel.
3. The product shall be bore finished, special coating is available i.e. Zinc Plating, Fluorocarbon Coating.



Nominal Pipe Size		Pipe Outside Diameter	Thread Size(D)		Inner Dimension (ID)	Height (H)	Thread Length (T)
MM	IN		MM	IN			
15	1/2	21.7	6	1/4	24	42	22
20	3/4	27.2	6	1/4	30	47	22
25	1"	34	6	1/4	36	53	25
32	1-1/4	42.7	6	1/4	46	64	28
40	1-1/2	48.6	10	3/8	52	73	30
50	2"	60.5	10	3/8	64	85	32
65	2-1/2	76.3	10	3/8	80	105	35
80	3"	89.1	10	3/8	92	118	35
90	3-1/2	101.6	12	1/2	104	131	40
100	4"	114.3	12	1/2	118	150	55
125	5"	139.8	12	1/2	144	176	55
150	6"	165.2	16	5/8	170	210	65
200	8"	216.3	16	5/8	222	262	65
250	10"	267.4	20	3/4	274	320	75
300	12"	318.5	22	7/8	326	380	90
350	14"	355.6	22	7/8	362	420	90
400	16"	406.4	22	7/8	414	470	90
450	18"	457.2	24	1"	466	530	110
500	20"	508	24	1"	518	585	110
550	22"	558.8	24	1"	568	640	120
600	24"	609.6	24	1"	620	690	120

CONSTRUCTION TECHNOLOGY

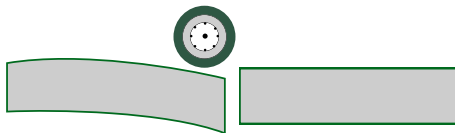
DOWEL BAR

Properties:

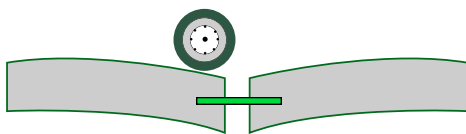
- Significantly improves the performance of road connections.
- Prefabricated leave-in-place cages, for positioning dowels at the correct height and spacing in the slab.
- Reduces the life cycle cost.
- Simple geometry of the formation of the joint without the need of additional measurement or adjustment.
- Simple formwork and time saving installation.
- Stainless Steel, GFRP or Epoxy coated (optional)



0% Load transfer efficiency



100% Load transfer efficiency



Dowel Bars are short steel bars that provide a mechanical connection between slabs without restricting horizontal joint movement. Before passing over the load, they make the release plate take on some of the load and increase the efficiency of load transfer. This reduces joint deviation and stress in the approach and dispersion slabs.

Half of the length of this bar is embedded in one of the concrete slabs and the rest is adhered to the adjacent slab. One end of the rod is kept free for movement during expansion and contraction of the slab depending on temperature change.

Epoxy-Coated Dowel Bars protect by using various mechanisms. Epoxy-Coated Dowel Bars have shown that the corrosion rates of Steel Reinforcement Rods is 40 to 50 times lower than similar uncoated bars.

Epoxy Coated rebar can be used in any concrete that is exposed to corrosive conditions. These may include exposure to de-icing salts or seawater.



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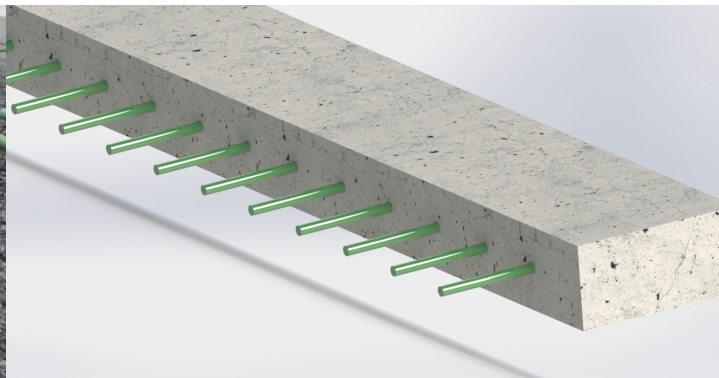
Dowel bar is widely used in constructions such as:

- Marine structures (harbors, airports, tunnels, etc.)
- Sidewalks (highway, airport runway, etc.)
- Park structures
- Buildings (seaside, power plants, etc.)
- Repairing

We offer the best products, services and support that best fit to your needs of Dowel Bar. We produce epoxy coated, galvanized, stainless and GFRP Dowel Bars.

**Simple Installation:**

1. Place Dowel bars on the center line of joint and fix it to ground.
2. Install the slab reinforcement mesh (if specified) as directed by the slab designer.
3. Pour the concrete ensuring that concrete placement and minimum reinforcement coverage is achieved as per slab design.



4. Saw cut the slab over the centerline by diamond saw to a depth of 25 ~ 30% total slab thickness, as soon as it is possible to cut without damaging the arrises (within 24 hours). Control the depth of the cut to make sure the dowels are not cut through.



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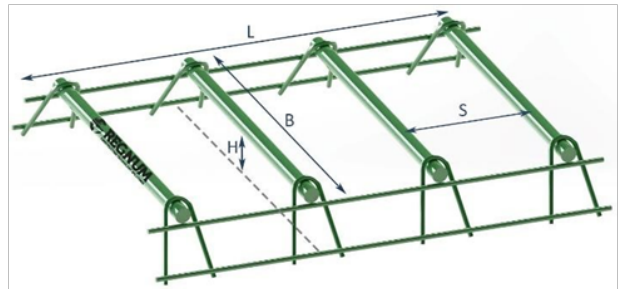
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Dimensions

We produce various types of Dowel Bars according to your needs. Dowel diameters can change from 16mm to 32 mm while dowel lengths can change from 200 mm to 600 mm.

Different types of Dowel Bars are selected according to following criteria:

- **Stab Depth.** Is required to determine the type of the Dowel Bar as the dowels have to be positioned always in the center of the slab. Advisable slab depths are stated in table below.
- **Environment.** For internal floors, basic plain steel Dowel Bars is suggested. For external applications and where corrosion resistance is required, it is recommended to use stainless steel or epoxy coated Dowel Bars.



The table below indicates most used types of dowel bars.

Product Code	Height from Ground (H)		Dowel Type	Dowel Centers Span (S)		Total Length of Unit(L)		Advisable Slab Depth	
	[mm]	["]		[mm]	["]	[mm]	["]	[mm]	["]
RDB63	63	1-3/16	Round Bar Dowel D32 x 450 mm *	450	17-23/32	1000	39-3/8	125	4-59/64
RDB75	75	1-27/64						150	5-29/32
RDB88	88	1-21/32						175	6-57/64
RDB100	100	1-57/64						200	7-7/8
RDB113	113	2-23/64						225	8-55/64
RDB125	125	2-61/64						250	9-27/32

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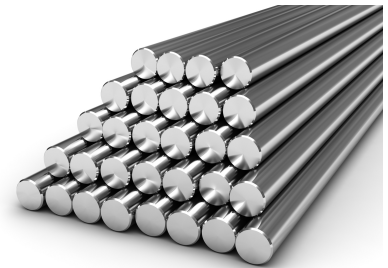
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Dowel Bar – Stainless Steel

Description

The excellent corrosion resistance of stainless-steel dowel bars eliminates the risk of structural damage due to rust and the need for costly refurbishment that can arise as a result.

When compared with the costs associated with the use of carbon steel, stainless steel can reduce total lifetime costs significantly. Dowel bars are normally made from plain round steel. They are cast or drilled into concrete and are used to transfer loads across joints in concrete. In applications where movement is expected, the dowel bar is cast in one side and de-bonded in the other side of the joint.



- > Grade 304 (14301) suitable for most atmospheric and concrete covered environments.
- > Grade 316 (14401) the recommended grade for marine and corrosive environments.
- > The strength physical characteristics for stainless steel dowel bar are Proof Strength - 250 N/mm², Ultimate Tensile Strength - 550 N/mm².
- > Standard stainless steel dowel bar diameters range from 6mm to 50mm.
- > Stock lengths are up to 6m and bars can be supplied cut to any length.
- > Threaded ends with ISO metric threads to BS 3643 can be supplied for fixing applications.
- > A full range of accessory products are available including square backing plates, nuts, washers, tying wire, end caps and de-bonding sleeves

GRADES OF DOWEL BAR READILY AVAILABLE
Key:

1. Appropriate choice for corrosion resistance and cost.
2. Over specification of corrosion resistance for the application.
3. May be suitable in some instances: specialist advice should be obtained.
4. Grades suitable for specialist applications which should only be specified after consultation with corrosion specialists.
5. Unsuitable for the application

Grades in accordance with BS EN 10088-1	Readily Available Rebar Grade	For structures or components with either a long design life, or which are inaccessible for future maintenance	For structures or components exposed to chloride contamination with no relaxation in durability design [e.g. concrete cover or water proofing treatment requirements]	Reinforcement bridging joints, or penetrating the concrete surface and also subject to chloride contamination [e.g. dowel bars or holding down bolts.]	Structures subject to chloridre contamination where reductions in normal durability requirements are proposed [e.g. reduced cover, concrete quality or ommission of water proofing treatment]
1.4301 [304]	x	1	1	5	3
1.4307 [304L]		1	1	5	3
1.4401 [316]	x	2	2	1	1
1.4404 [316L]		2	2	1	1
1.4362 F51	x	2	2	1	1
1.4501 F55		2	2	1	1
1.4529		4	4	4	4
1.4501 F55		4	4	4	4

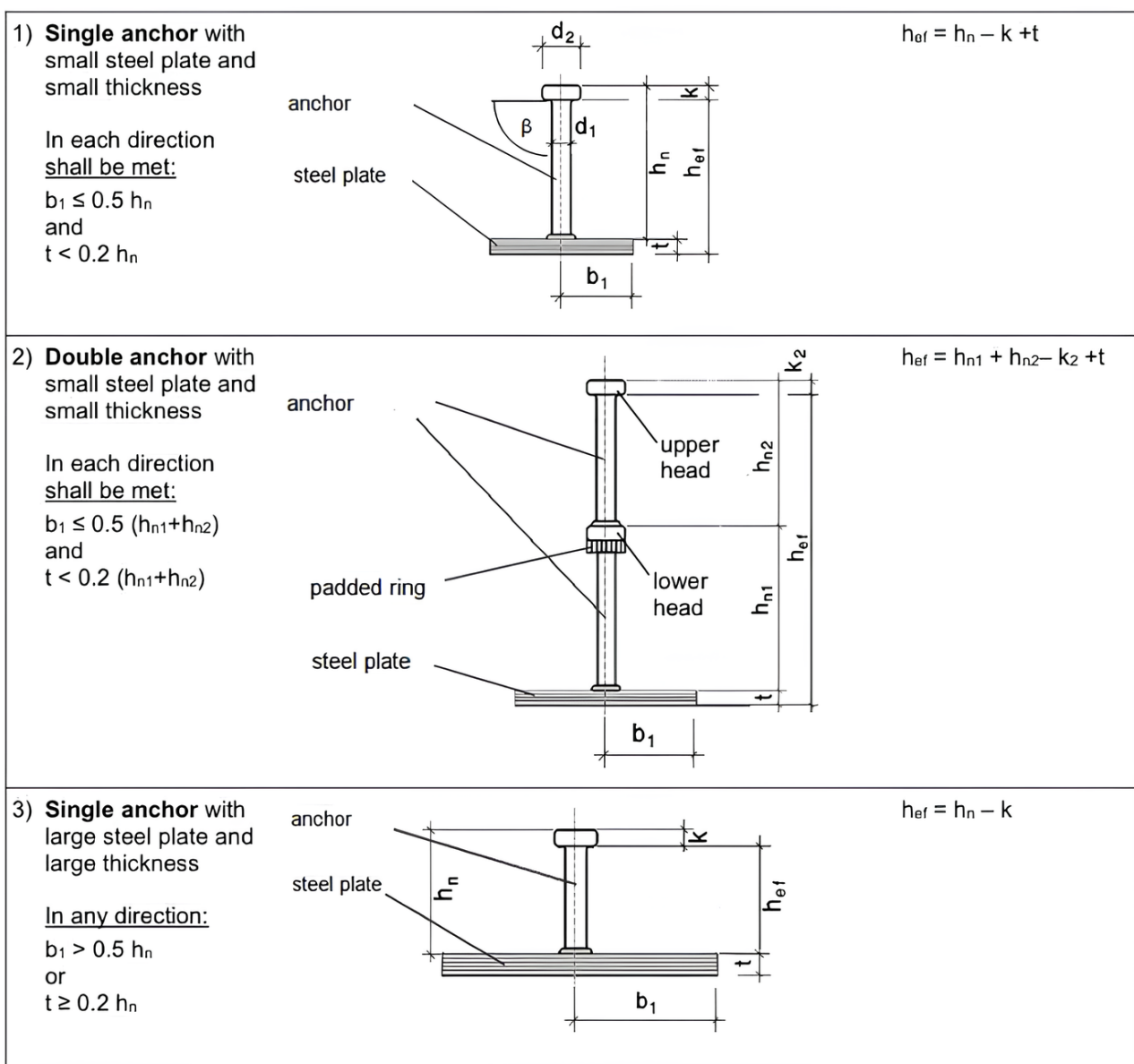
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Description of the construction product

The construction product consists of one or several anchors(groups)welded to a steel plate. Depending on the welding procedure the anchors are welded to the steel plate either in the manufacturing plant or on the construction site (see "Welded joint"). The steel plate with welded-on anchors is embedded surface-flush in the concrete.

The details of the construction product are shown in Figure1.1.



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The anchor bolts with smooth shaft or of ribbed reinforcing steel shall be welded to the steel plate via the metal active gas welding (MAG welding with solid wire electrode – process 135 and MAG welding with flux cored electrode – process 136 and MAG welding with metal cored electrode – process 138) according to EN ISO 4063:2010[10]. The anchor bolts shall be butt-welded to the steel plate with fillet welds. Alternatively the anchor bolt may be inserted in a hole in the steel plate and welded with fillet welds.

For welding of reinforcing steel EN ISO 17660:2006 + AC[9] applies.

The welding-on of the anchor bolts via MAG-welding may only be carried out in the manufacturing plant.

Table 1.1: Designation and materials

Part	Designation	Materials	Mechanical properties
1	Headed stud according to EN ISO 13918: 2008, geometry acc. Typ: SD	Steel S235J2+C450 acc. to EN 10025 with C ≤ 0.18% and Al ≥ 0.02%	$f_{uk} \geq 450 \text{ N/mm}^2$, $f_{yk} \geq 350 \text{ N/mm}^2$
		Stainless steel 1.4301, 1.4303, 1.4306, 1.4307 or 1.4401, 1.4404, 1.4571, 1.4432, 1.4436, 1.4439 acc. to EN 10088-1	$f_{uk} \geq 500-780 \text{ N/mm}^2$, $f_{yk} \geq 350 \text{ N/mm}^2$
	Anchor bolts with smooth shaft provided with an anchor head	Steel S235J2; S355J2 acc. to EN 10025	$f_{uk} \geq 450 \text{ N/mm}^2$, $f_{yk} \geq 350 \text{ N/mm}^2$
Stainless steel 1.4301, 1.4303, 1.4306, 1.4307 or 1.4401, 1.4404, 1.4571, 1.4432, 1.4436, 1.4439 acc. to EN 10088-1		$f_{uk} \geq 450 \text{ N/mm}^2$, $f_{yk} \geq 350 \text{ N/mm}^2$	
	Anchor bolts of ribbed reinforcing steel provided with an anchor head	Reinforcing steel B500B acc. to EN 1992-1-1, Annex C	$f_{uk} \geq 550 \text{ N/mm}^2$, $f_{yk} \geq 500 \text{ N/mm}^2$
2	Steel plate	Steel S235JR; S235JO; S235J2; S355JR; S355JO, S355J2, S355K2 acc. to EN 10025-2	acc. to EN 10025-2
		Stainless steel 1.4301, 1.4303, 1.4306, 1.4307 or 1.4401, 1.4404, 1.4571, 1.4432, 1.4436 or 1.4439 acc. to EN 10088-1	acc. to EN 10088-1

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Different versions of steel plate with welded-on anchors with respect to material, strength or dimensions are marked such that the relevant product characteristic is allocated to the corresponding anchor type.

The product is not covered by a Harmonised European Standard (HEN).

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer's stipulations having influence on the performance of the product covered by this European Assessment Document shall be considered for the determination of the performance and detailed in the ETA.

Information on the intended use of the construction product

Intended use

The steel plate with welded-on anchors shall be anchored in reinforced normal weight concrete of a minimum strength class of C20/25 according to EN 206-1 [12]. They may be used in cracked and in non-cracked concrete subject to static or quasi static actions.

The construction product can be acted upon by tension load, shear load or a combination of tension and shear loads. The minimum thickness of the concrete member for the anchorage of the steel plate with welded-on anchors results from the sum of the anchorage depth of the anchors, the height of the anchor's head and the required concrete cover.

The steel plate with welded-on anchors is surface-flush embedded in the concrete. Further steel components may be welded to the steel plate. When welding the steel members to the steel plate the occurring thermal stress shall be considered. The installation conditions are shown in Figure 1.2.

Depending on the materials used for the steel plate with welded-on anchors it may be used in structures subjected to the following categories (see for details section 2.2.11.2):

- Dry internal conditions,
- External atmospheric exposure or exposure in permanently damp internal conditions.



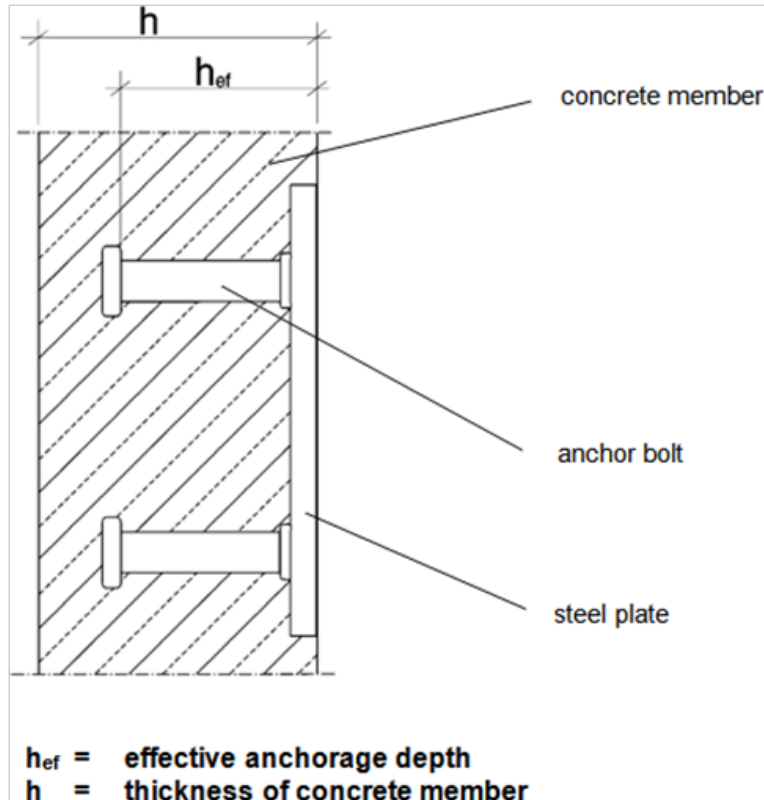


Figure 1.2 –Example for installed product

The steel plate with welded-on anchors is anchored in concrete by mechanical inter lock between the anchor and the concrete member.

The steel plate with welded-on anchors is intended to be used for anchorages which are designed according to the design method given in CEN/TS 1992-4:2009 "Design of fastenings for use in concrete", part 1 and 2 [14].



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