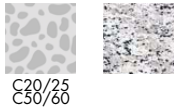


No.	Name	Material	No.	Name	Material
1	Stud	Zinc plated steel / A4	4	Washer DIN 9021	Zinc plated steel
2	Expansion sleeve	A2 / A4	5	Hexagon-nut DIN 934-8	Zinc plated steel / A4
3	Washer DIN 125A	Zinc plated steel / A4			

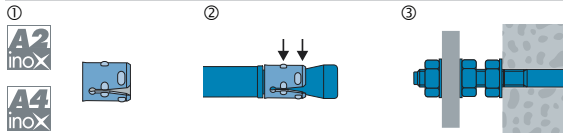
**Building materials**

**Approvals**

**Qualities**

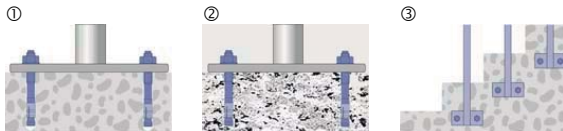


**Characteristics**



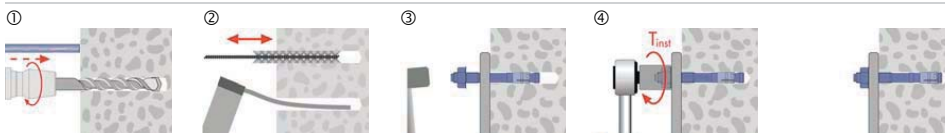
- Efficient and time-saving solution for complex serial assemblies
- ① Expansion sleeve in A2 on zinc plated throughbolt
- ① Expansion sleeve in A4 on chrome plated steel anchor A4
- ② The special design of the expansion sleeve gives a guaranteed hold in the base material
- ③ The long thread makes distance assemblies possible

**Applications**



- ① Heavy duty anchorage in concrete
- ② Heavy duty anchorage in natural stone with dense structure
- ③ Fastening of metal constructions, machines, cable trays, railings, wood constructions (with big washers)

**Installation**



- ① Take drill hole-Ø and drill hole depth from the table
- ② Clean the drill hole with a brush, then blow it out with a purging pump
- ③ Position pre-drilled Building materials, drive in the throughbolt
- ④ Tighten the nut with a torque spanner to the predetermined value  $T_{inst}$

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**Throughbolt anchor grade 8.8 steel zinc plated with stainless steel clip**

Anchor size		M6				M8				M10										
N <sub>Emp</sub>	Recommended tension loads Concrete C20/25 <sup>1)</sup>	kN	1.4	2.2	1.7	2.0	3.8	2.5	2.7	5.8										
V <sub>Emp</sub>	Recommended shear loads	kN	3.1				5.2				6.8									
M <sub>Emp</sub>	Recommended bending moment	Nm	6.4				14.9				29.9									
c	Nom. distance to edge	mm	45	60	41	45	69	50	53	87										
s	Nom. distance betw. anchors	mm	90	120	81	90	138	99	105	174										
h <sub>min</sub>	Min. thickness base material	mm	60	80	54	60	92	66	70	116										
h <sub>ef</sub>	Effective anchorage depth	mm	30	40	27	30	46	33	35	58										
SW	Spanner size	mm	10				13				17									
T <sub>inst</sub>	Torque at anchoring	Nm	3	5	7	8	15	13	14	30										
h <sub>1</sub>	Drill hole depth	mm	50	60	45	50	65	55	60	80										
d <sub>0</sub>	Drill hole-Ø in the building material	mm	6				8				10									
d <sub>f</sub>	Clearance hole in fixture	mm	7				9				12									
d <sub>u</sub>	Washer-Ø	mm	12				16				20									
l <sub>G</sub>	Thread length	mm	19	32	47	62	18	24	43	58	78	120	23	27	52	67	82	97	117	120
l	Plug length	mm	50	65	80	95	50	60	80	95	115	165	60	70	95	110	125	140	160	180
d <sub>nom</sub>	Outside-Ø plug	mm	6				8				10									
t <sub>fix</sub>	Assembling length usable	mm	5	10	25	40	5	10	15	30	50	100	5	10	15	30	45	60	80	100
	Usable length code		A	D	G	J	A	C	E	H	L	T	A	C	E	H	K	N	R	T



1) Without influence of anchor and edge distance / Safety factor 3

**Throughbolt anchor grade 8.8 steel zinc plated with stainless steel clip**

Anchor size		M12						M16				M20				
N <sub>Emp</sub>	Recommended tension loads Concrete C20/25 <sup>1)</sup>	kN	6	9.8						6.7	11	13.5	13.3	20		
V <sub>Emp</sub>	Recommended shear loads	kN	12.2						16.2				32			
M <sub>Emp</sub>	Recommended bending moment	Nm	52.6						136.7				148.7			
c	Nom. distance to edge	mm	74	102						75	105	120	114	150		
s	Nom. distance betw. anchors	mm	147	204						150	210	240	228	300		
h <sub>min</sub>	Min. thickness base material	mm	98	136						100	140	160	152	200		
h <sub>ef</sub>	Effective anchorage depth	mm	49	68						50	70	80	76	100		
SW	Spanner size	mm	19						24				30			
T <sub>inst</sub>	Torque at anchoring	Nm	31	50						49	82	100	133	200		
h <sub>1</sub>	Drill hole depth	mm	75	90						80	100	110	110	130		
d <sub>0</sub>	Drill hole-Ø in the building material	mm	12						16				20			
d <sub>f</sub>	Clearance hole in fixture	mm	14						18				22			
d <sub>u</sub>	Washer-Ø	mm	24						30				37			
l <sub>G</sub>	Thread length	mm	32	62	77	97	117	120	33	58	73	88	103	120	70	100
l	Plug length	mm	80	110	125	145	165	185	90	115	130	145	160	180	130	160
d <sub>nom</sub>	Outside-Ø plug	mm	12						16				20			
t <sub>fix</sub>	Assembling length usable	mm	5	15	30	50	70	90	5	10	15	30	45	65	10	30
	Usable length code		A	E	H	L	P	S	A	C	E	H	K	O	-	-



1) Without influence of anchor and edge distance / Safety factor 3

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**Throughbolt anchor stainless steel grade A4 - 316**

Anchor size		M6				M8				M10										
N <sub>Emp</sub>	Recommended tension loads Concrete C20/25 <sup>1)</sup>	kN	1.4	2.2	1.7	2.0	3.8		2.5	2.7	5.8									
V <sub>Emp</sub>	Recommended shear loads	kN	3.1				5.2				6.8									
M <sub>Emp</sub>	Recommended bending moment	Nm	7				14.7				29.4									
c	Nom. distance to edge	mm	45	60	41	45	69		50	53	87									
s	Nom. distance betw. anchors	mm	90	120	81	90	138		99	105	174									
h <sub>min</sub>	Min. thickness base material	mm	60	80	54	60	92		66	70	116									
h <sub>ef</sub>	Effective anchorage depth	mm	30	40	27	30	46		33	35	58									
SW	Spanner size	mm	10				13				17									
T <sub>inst</sub>	Torque at anchoring	Nm	3	5	7	8	15		13	14	30									
h <sub>1</sub>	Drill hole depth	mm	50	60	45	50	65		55	60	80									
d <sub>0</sub>	Drill hole-Ø in the building material	mm	6				8				10									
d <sub>f</sub>	Clearance hole in fixture	mm	7				9				12									
d <sub>u</sub>	Washer-Ø	mm	12				16				20									
l <sub>G</sub>	Thread length	mm	19	32	47	62	18	24	43	58	78	120	23	27	52	67	82	97	117	120
l	Plug length	mm	50	65	80	95	50	60	80	95	115	165	60	70	95	110	125	140	160	180
d <sub>nom</sub>	Outside-Ø plug	mm	6				8				10									
t <sub>fix</sub>	Assembling length usable	mm	5	10	25	40	5	10	15	30	50	100	5	10	15	30	45	60	80	100
	Usable length code		A	D	G	J	A	C	E	H	L	T	A	C	E	H	K	N	R	T



1) Without influence of anchor and edge distance / Safety factor 3

**Throughbolt anchor stainless steel grade A4 - 316**

Anchor size		M12						M16				M20		
N <sub>Emp</sub>	Recommended tension loads Concrete C20/25 <sup>1)</sup>	kN	6	9.8				6.7	11	13.5		20		
V <sub>Emp</sub>	Recommended shear loads	kN	12.2						16.2				32	
M <sub>Emp</sub>	Recommended bending moment	Nm	51.8						126.9				267	
c	Nom. distance to edge	mm	74	102				75	105	120		150		
s	Nom. distance betw. anchors	mm	147	204				150	210	240		300		
h <sub>min</sub>	Min. thickness base material	mm	98	136				100	140	160		200		
h <sub>ef</sub>	Effective anchorage depth	mm	49	68				50	70	80		100		
SW	Spanner size	mm	19						24				30	
T <sub>inst</sub>	Torque at anchoring	Nm	31	50				49	82	100		200		
h <sub>1</sub>	Drill hole depth	mm	75	90				80	100	110		130		
d <sub>0</sub>	Drill hole-Ø in the building material	mm	12						16				20	
d <sub>f</sub>	Clearance hole in fixture	mm	14						18				22	
d <sub>u</sub>	Washer-Ø	mm	24						30				37	
l <sub>G</sub>	Thread length	mm	32	62	77	97	117	120	33	58	73	88	103	120
l	Plug length	mm	80	110	125	145	165	185	90	115	130	145	160	180
d <sub>nom</sub>	Outside-Ø plug	mm	12						16				20	
t <sub>fix</sub>	Assembling length usable	mm	5	15	30	50	70	90	5	10	15	30	45	65
	Usable length code		A	E	H	L	P	S	A	C	E	H	K	O

**Throughbolt stainless A4**

1) Without influence of anchor and edge distance / Safety factor 3

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## Reduction factors for centre spacing

Setting depth		Dimensions and setting depth														
		M6			M 8		M 10			M12		M16			M20	
mm	mm	30	40	27	30	46	33	35	58	49	68	50	70	80	76	100
41	mm			0.75												
50	mm	0.78		0.81	0.78		0.78									
55	mm	0.81		0.84	0.81		0.78	0.76								
60	mm	0.83	0.75	0.87	0.83		0.80	0.97								
65	mm	0.86	0.77	0.90	0.86		0.83	0.81								
70	mm	0.89	0.79	0.93	0.89	0.75	0.85	0.93								
75	mm	0.92	0.81	0.96	0.92	0.77	0.88	0.86		0.76		0.75				
81	mm	0.95	0.84	1	0.95	0.79	0.91	0.89		0.78		0.77				
85	mm	0.97	0.85		0.97	0.81	0.93	0.90		0.79		0.78				
90	mm	1	0.88		1	0.83	0.95	0.93	0.76	0.81		0.80				
95	mm		0.90			0.84	0.98	0.95	0.77	0.82		0.82				
100	mm		0.92			0.86	1	0.98	0.79	0.84		0.83				
105	mm		0.94			0.88		1	0.80	0.86	0.76	0.85	0.75			
110	mm		0.96			0.90			0.82	0.87	0.77	0.87	0.76			
115	mm		0.98			0.92			0.83	0.89	0.78	0.88	0.77		0.75	
120	mm		1			0.93			0.84	0.91	0.79	0.90	0.79	0.75	0.76	
125	mm					0.95			0.86	0.93	0.81	0.92	0.80	0.76	0.77	
130	mm					0.97			0.87	0.94	0.82	0.93	0.81	0.77	0.79	
135	mm					0.99			0.89	0.96	0.83	0.95	0.82	0.78	0.80	
140	mm					1			0.90	0.98	0.84	0.97	0.83	0.79	0.81	
145	mm								0.92	0.99	0.86	0.98	0.85	0.80	0.82	
150	mm								0.93	1	0.87	1	0.86	0.81	0.83	0.75
155	mm								0.95		0.88		0.87	0.82	0.84	0.76
160	mm								0.96		0.89		0.88	0.83	0.85	0.77
165	mm								0.97		0.90		0.89	0.84	0.86	0.78
170	mm								0.99		0.92		0.90	0.85	0.87	0.78
174	mm									1	0.93		0.91	0.86	0.88	0.79
180	mm										0.94		0.93	0.88	0.89	0.80
190	mm										0.97		0.95	0.90	0.92	0.82
204	mm										1		0.99	0.93	0.95	0.84
210	mm												1	0.94	0.96	0.85
220	mm													0.96	0.98	0.87
228	mm													0.98	1	0.88
240	mm													1		0.90
260	mm															0.93
280	mm															0.97
300	mm															1

Distance between anchors

**Reduction factors for distance to a remote edge**

Setting depth		Dimensions and Setting depth														
		M6		M 8		M 10			M12		M16			M20		
mm	mm	30	40	27	30	46	33	35	58	49	68	50	70	80	76	100
34	mm			0.87												
38	mm	0.88		0.95	0.88											
41	mm	0.93		1	0.93		0.87									
45	mm	1			1		0.93	0.89								
50	mm		0.87				1	0.96								
53	mm		0.91					1								
58	mm		0.97			0.88										
60	mm		1			0.90										
65	mm					0.95			0.91		0.90					
70	mm					1			0.96		0.95					
75	mm								0.89	1		1				
80	mm								0.94							
87	mm								1		0.89		0.87			
90	mm									0.91		0.89				
95	mm									0.95		0.93			0.87	
100	mm									0.98		0.96	0.87	0.90		
105	mm									1		1	0.90	0.94		
114	mm												0.96	1		
120	mm												1			
125	mm															0.87
130	mm															0.90
140	mm															0.95
150	mm															1

**Increase factors**

If the concrete strength is higher than C20/25 the tension loads can be multiplied by following factors:

Concrete strength	Increase factor
C30/37	1.22
C40/50	1.41
C50/60	1.55