

ICFSS 
INDO CONSTRUCTION FASTENING SYSTEMS

A brand of Indo Spark Group Since 1978

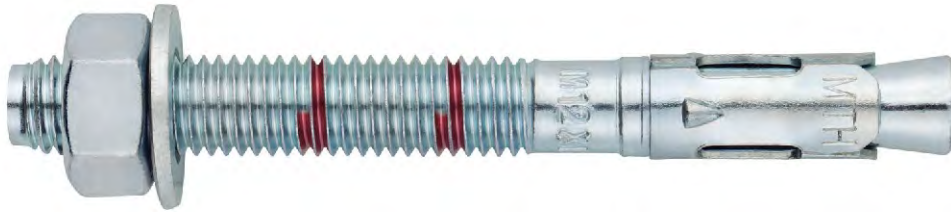


IWA

Indo Wedge Anchor

Through-bolt expansion anchor with controlled torque, for use in non cracked concrete

ETA Assessed Option 7. Zinc-plated shaft. Zinc-plated clip.



PRODUCT INFORMATION

DESCRIPTION

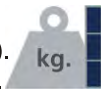
Metallic anchor, with male thread, expansion by controlled torque.

SIZES

M6x60 to M20x270.

DESIGN LOAD RANGE

From 5,3 to 34,3 kN (standard depth).
From 6,7 to 21,3 kN (reduced depth).



BASE MATERIAL

Concrete class from C20/25 to C50/60 non-cracked.



Stone



Concrete



Reinforced Concrete

ASSESSMENTS

- Option 7 (Non-cracked concrete).



ETA 16/0502

CHARACTERISTICS AND BENEFITS

- Easy installation.
- Use in non-cracked concrete.
- Use for medium-heavy duty loads.
- Pre-installation or through the drill-hole of the fixture.
- Variety of lengths and diameters: flexibility in assembly.
- For static and quasi-static loads.
- Two installation depths in M8, M10, M12, M16 and M20, allowing the use in thick anchor plates or in low thickness base materials.
- Available at

MATERIALS

Shaft: Cold-formed carbon steel, zinc-plated = 5 µm.

Washer: DIN 125 or DIN 9021, zinc-plated = 5 µm.

Nut: DIN 934, zinc-plated = 5 µm.

Clip: Cold-formed carbon steel, zinc-plated = 40 µm



APPLICATIONS

- Anchor Plates
- Structures
- Shelving
- Urban Fixments
- Protective Fence
- Catenaries
- Elevators
- Scaffolding Fix

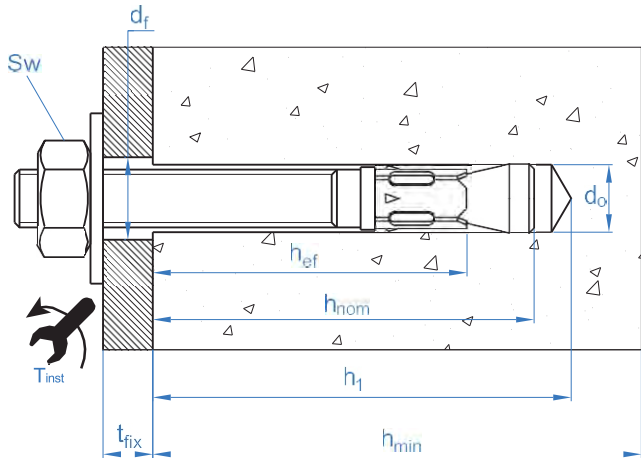


Anchor Fasteners - Indo Construction Fastening Systems

MECHANICAL PROPERTIES									
			M6	M8	M10	M12	M14	M16	M20
Cone area section									
A _s	(mm ²)	Cone area section	14,5	25,5	46,5	68,0	100,2	122,6	216,3
f _{u,s}	(N/mm ²)	Characteristic tension resistance	510	510	510	490	490	490	460
f _{y,s}	(N/mm ²)	Yield strength	440	440	440	410	410	410	375
Threaded area section									
A _s	(mm ²)	Cone area section	20,1	36,6	58,0	84,3	115,0	157,0	245,0
f _{u,s}	(N/mm ²)	Characteristic tension resistance	510	510	510	490	490	490	490
f _{y,s}	(N/mm ²)	Yield strength	440	440	440	410	410	410	410

INSTALLATION DATA										
SIZE				M6	M8	M10	M12	M14	M16	M20
Code				IWA06	IWA08	IWA10	IWA12	IWA14	IWA16	IWA20
Standard depth	d ₀	Nominal diameter of drill bit	[mm]	6	8	10	12	14	16	20
	T _{ins}	Installation torque moment	[Nm]	7	20	35	60	90	120	240
	d _i =	Diameter of clearance hole in the fixture	[mm]	7	9	12	14	16	18	22
	h ₁	Minimum drill hole depth	[mm]	55	65	75	85	100	110	135
	h _{nom}	Installation depth	[mm]	49,5	59,5	66,5	77	91	103,5	125
	h _{ef}	Effective embedment depth	[mm]	40	48	55	65	75	84	103
	h _{min}	Minimum base material thickness	[mm]	100	100	110	130	150	168	206
	t _{fix}	Maximum thickness of fixture*	[mm]	L-58	L-70	L-80	L-92	L-108	L-122	L-147
	s _{cr,N}	Critical spacing	[mm]	120	144	165	195	225	252	309
	c _{cr,N}	Critical edge distance	[mm]	60	72	83	98	113	126	155
Reduced depth	s _{cr,sp}	Critical distance (splitting)	[mm]	160	192	220	260	300	280	360
	c _{cr,sp}	Critical edge distance (splitting)	[mm]	80	96	110	130	150	140	180
	h ₁	Minimum drill hole depth	[mm]	-	50	60	70	-	90	107
	h _{nom}	Installation depth	[mm]	-	46,5	53,5	62	-	84,5	97
	h _{ef}	Effective embedment depth	[mm]	-	35	42	50	-	65	75
	h _{min}	Minimum base material thickness	[mm]	-	100	100	100	-	130	150
	t _{fix}	Maximum thickness of fixture*	[mm]	-	L-57	L-67	L-77	-	L-103	L-121
	s _{cr,N}	Critical spacing	[mm]	-	105	126	150	-	195	225
	c _{cr,N}	Critical edge distance	[mm]	-	53	63	75	-	98	113
	s _{cr,sp}	Critical distance (splitting)	[mm]	-	140	168	200	-	260	300
	c _{cr,sp}	Critical edge distance (splitting)	[mm]	-	70	84	100	-	130	150
	s _{min}	Minimum spacing	[mm]	35	40	50	70	80	90	135
	c _{min}	Minimum edge distance	[mm]	35	40	50	70	80	90	135
	SW	Installation wrench		10	13	17	19	22	24	30

*L= Total anchor length

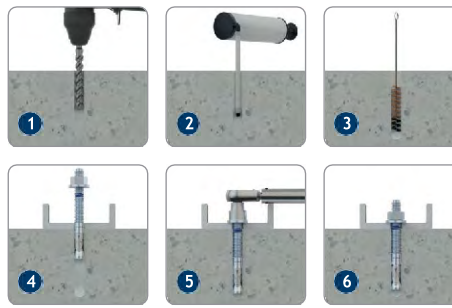


Anchor Fasteners - Indo Construction Fastening Systems

INSTALLATION PRODUCTS

Hammer drill
Concrete Drill bits
Blow pump
Cleaning Brush
Installation hammering tool
Torque wrench
Hexagonal socket

INSTALLATION



Resistances in C20/25 concrete for an isolated anchor, without effects of edge distance or spacing

Characteristic Resistance N_{rk} y V_{Rk}

TENSION										SHEAR									
Size			M6	M8	M10	M12	M14	M16	M20	Size			M6	M8	M10	M12	M14	M16	M20
N _{Rk}	Standard depth	[kN]	7,4	13,0	19,0	25,8	32,0	37,9	51,4	V _{Rk}	Standard depth	[kN]	5,1	9,3	14,7	20,6	28,1	38,4	56,3
N _{Rk}	Reduced depth	[kN]	-	10,0	13,4	17,4	-	25,8	32,0	V _{Rk}	Reduced depth	[kN]	-	10,2	13,4	17,4	-	38,4	63,9

Design Resistance N_{rd} y V_{Rd}

TENSION										SHEAR									
Size			M6	M8	M10	M12	M14	M16	M20	Size			M6	M8	M10	M12	M14	M16	M20
N _{rd}	Standard depth	[kN]	5,3	9,3	12,7	17,2	21,3	25,2	34,3	V _{Rd}	Standard depth	[kN]	4,1	7,4	11,8	16,5	22,5	30,7	45,0
N _{rd}	Reduced depth	[kN]	-	6,7	8,9	11,6	-	17,2	21,3	V _{Rd}	Reduced depth	[kN]	-	6,8	8,9	11,6	-	30,7	42,6

Maximum Loads Recommended N_{rec} y V_{rec}

TENSION										SHEAR									
Size			M6	M8	M10	M12	M14	M16	M20	Size			M6	M8	M10	M12	M14	M16	M20
N _{rec}	Standard depth	[kN]	3,8	6,6	9,0	12,3	15,2	18,0	24,5	V _{rec}	Standard depth	[kN]	2,9	5,3	8,4	11,8	16,1	21,9	32,2
N _{rec}	Reduced depth	[kN]	-	4,8	6,4	8,3	-	12,3	15,2	V _{rec}	Reduced depth	[kN]	-	4,9	6,4	8,3	-	21,9	30,4

Simplified calculation method

European Technical Assessment

Simplified version of the calculation method according to Eurocode 2 EN 1992-4. Resistance is calculated according to the data shown in assessment

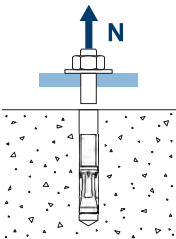
The calculation method is based on the following simplification:
Different loads do not act on individual anchors,
without eccentricity.

- Influence of concrete strength.
- Influence of edge distance.
- Influence of spacing between anchors.
- Influence of reinforcements.
- Influence of base material thickness.
- Influence of load application angle.
- Valid for a group of two anchors.

TENSION LOADS

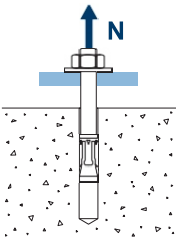
- Steel design resistance: $N_{Rd,s}$
- Pull-out design resistance: $N_{Rd,p} = N_{Rd,p}^o \cdot \psi_c$
- Concrete cone design resistance: $N_{Rd,c} = N_{Rd,c}^o \cdot \psi_b \cdot \psi_{s,N} \cdot \psi_{c,N} \cdot \psi_{re,N}$
- Concrete splitting design resistance: $N_{Rd,sp} = N_{Rd,c}^o \cdot \psi_b \cdot \psi_{s,sp} \cdot \psi_{c,sp} \cdot \psi_{re,N} \cdot \psi_{h,sp}$

Steel Design resistance									
$N_{Rd,s}$									
Size			M6	M8	M10	M12	M14	M16	M20
N_{Rd}^o	Standard depth	[kN]	5,3	9,3	16,9	23,8	35,1	42,9	71,1



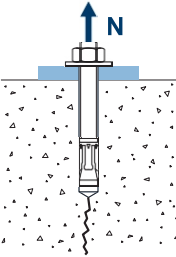
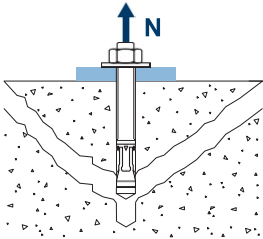
Pull-out design resistance									
$N_{Rd,p} = N_{Rd,p}^o \cdot \psi_c$									
Size			M6	M8	M10	M12	M14	M16	M20
$N_{Rd,p}^o$	Standard depth	[kN]	-*	-*	12,6	-*	-*	-*	-*
$N_{Rd,p}^o$	Reduced depth	[kN]	-	6,6	-*	-*	-	-*	-*

*Pull-out failure is not decisive.



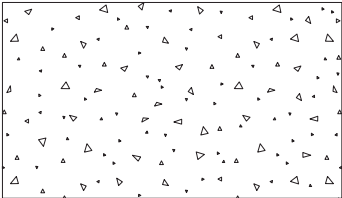
Concrete cone design resistance									
$N_{Rd,c} = N_{Rd,c}^o \cdot \psi_b \cdot \psi_{s,N} \cdot \psi_{c,N} \cdot \psi_{re,N}$									
Concrete splitting design resistance*									
$N_{Rd,sp} = N_{Rd,c}^o \cdot \psi_b \cdot \psi_{s,sp} \cdot \psi_{c,sp} \cdot \psi_{re,N} \cdot \psi_{h,sp}$									
Size			M6	M8	M10	M12	M14	M16	M20
N^o	Standard depth	[kN]	8,3	10,9	13,4	17,2	21,3	25,2	34,3
N^o	Reduced depth	[kN]	-	6,8	8,9	11,6	-	17,2	21,3

*Concrete splitting design resistance must only be considered for non-cracked concrete.

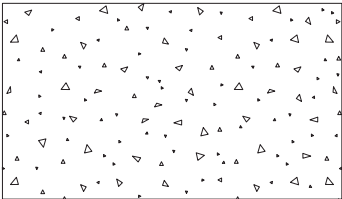


Coefficients of influence

Influence of concrete strength resistance in pul - out failure Ψ_c								
		M6	M8	M10	M12	M14	M16	M20
Ψ_c	C 20/25	1,00						
	C 30/37				1,22			
	C 40/50	1,41						
	C 50/60				1,58			

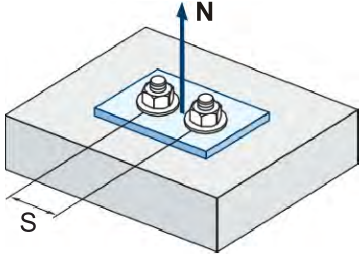


Influence of concrete strength in concret cone and splitting failure Ψ_b								
		M6	M8	M10	M12	M14	M16	M20
Ψ_b	C 20/25	1,00						
	C 30/37				1,22			
	C 40/50	1,41						
	C 50/60				1,58			



$$\Psi_b \sqrt{\frac{f_{ck,cube}}{25}} \geq 1$$

Anchor Fasteners - Indo Construction Fastening Systems



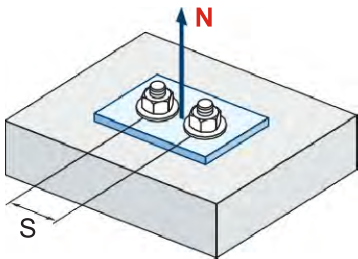
$$\Psi_{s,N} = 0,5 + \frac{s}{2 \cdot s_{cr,N}} \leq 1$$

Influence of spacing (concrete cone) $\Psi_{s,N}$							
s [mm]	IWA Standard depth						
	M6	M8	M10	M12	M14	M16	M20
35	0,65						
40	0,67	0,64					
50	0,71	0,67	0,65				
55	0,73	0,69	0,67				
60	0,75	0,71	0,68				
65	0,77	0,73	0,70				
70	0,79	0,74	0,71	0,68			
80	0,83	0,78	0,74	0,71			
85	0,85	0,80	0,76	0,72	0,69		
90	0,88	0,81	0,77	0,73	0,70		
100	0,92	0,85	0,80	0,76	0,72	0,70	
105	0,94	0,86	0,82	0,77	0,73	0,71	
110	0,96	0,88	0,83	0,78	0,74	0,72	
120	1,00	0,92	0,86	0,81	0,77	0,74	
125		0,93	0,88	0,82	0,78	0,75	
126		0,94	0,88	0,82	0,78	0,75	
128		0,94	0,89	0,83	0,78	0,75	
130		0,95	0,89	0,83	0,79	0,76	
135		0,97	0,91	0,85	0,80	0,77	0,72
144		1,00	0,94	0,87	0,82	0,79	0,73
150			0,95	0,88	0,83	0,80	0,74
165			1,00	0,92	0,87	0,83	0,77
170				0,94	0,88	0,84	0,78
180				0,96	0,90	0,86	0,79
195				1,00	0,93	0,89	0,82
200					0,94	0,90	0,82
210					0,97	0,92	0,84
220					0,99	0,94	0,86
225					1,00	0,95	0,86
252						1,00	0,91
255							0,91
260							0,92
300							0,99
309							1,00

s [mm]	IWA Reduced depth						
	M6	M8	M10	M12	M14	M16	M20
40		0,69		Invalid Value			
50		0,74	0,70				
55		0,76	0,72				
60		0,79	0,74				
65		0,81	0,76				
70		0,83	0,78	0,73			
80		0,88	0,82	0,77			
85		0,90	0,84	0,78			
90		0,93	0,86	0,80		0,73	
100			0,90	0,83		0,76	
105			0,92	0,85		0,77	
110			0,94	0,87		0,78	
120			0,98	0,90		0,81	
125			1,00	0,92		0,82	
126			1,00	0,92		0,82	
128				0,93		0,83	
130				0,93		0,83	
135						0,85	0,80
144				0,98		0,87	0,82
150						0,88	0,83
165						0,92	0,87
170						0,94	0,88
180						0,96	0,90
195						1,00	0,93
200	Value without reduction = 1						0,94
210							0,97
220							0,99
225							1,00

Anchor Fasteners - Indo Construction Fastening Systems

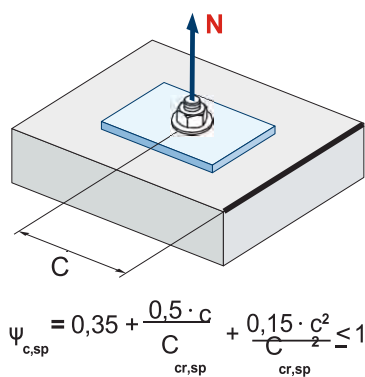
Influence of spacing (concrete splitting) $\Psi_{s,sp}$									
s [mm]	IWA Standard depth								
	M6	M8	M10	M12	M14	M16	M20		
35	0,61	0,60	Invalid Value						
40	0,63	0,63							
50	0,66	0,64						0,63	
55	0,67	0,66						0,64	
60	0,69	0,67						0,65	
65	0,70	0,68	0,66	0,63					
70	0,72	0,71	0,68	0,65				0,63	
80	0,75	0,72	0,69	0,66				0,64	
85	0,77	0,73	0,70	0,67				0,65	0,66
90	0,78	0,76	0,73	0,69				0,67	0,68
100	0,81	0,79	0,75	0,71	0,68	0,70			
110	0,84	0,83	0,78	0,74	0,71	0,72			
125	0,89	0,83	0,79	0,75	0,71	0,73			
128	0,90	0,85	0,81	0,76	0,73	0,74			
135	0,92	0,86	0,82	0,77	0,73	0,75		0,69	
140	0,94	0,89	0,84	0,79	0,75	0,77	0,69		
150	0,97	0,92	0,86	0,81	0,77	0,79	0,71		
160	1,00	0,93	0,88	0,82	0,78	0,79	0,72		
165		0,94	0,88	0,82	0,78	0,80	0,73		
168		0,97	0,91	0,85	0,80	0,82	0,73		
180		1,00	0,94	0,87	0,82	0,84	0,75		
192			0,95	0,88	0,83	0,86	0,77		
200			0,98	0,90	0,85	0,88	0,78		
210			1,00	0,92	0,87	0,89	0,79		
220				1,00	0,93	0,96	0,81		
260					0,97	1,00	0,86		
280					0,98		0,89		
288					1,00		0,90		
300							0,92		
336	Value without reduction = 1						0,97		
350							0,99		
360							1,00		



$$\psi_{s,sp} = 0,5 + \frac{s}{2 \cdot s_{cr,sp}} \leq 1$$

s [mm]	IWA Reduced depth						
	M6	M8	M10	M12	M14	M16	M20
40		0,64					
50		0,68	0,65				
55		0,70	0,66				
60		0,71	0,68				
65		0,73	0,69				
70		0,75	0,71	0,68			
80		0,79	0,74	0,70			
85		0,80	0,75	0,71			
90		0,82	0,77	0,73		0,67	
100		0,86	0,80	0,75		0,69	
110		0,89	0,83	0,78		0,71	
125		0,95	0,87	0,81		0,74	
128		0,96	0,88	0,82		0,75	
135		0,98	0,90	0,84		0,76	0,73
140		1,00	0,92	0,85		0,77	0,73
150			0,95	0,88		0,79	0,75
160			0,98	0,90		0,81	0,77
165			0,99	0,91		0,82	0,78
168			1,00	0,92		0,82	0,78
180				0,95		0,85	0,80
192				0,98		0,87	0,82
200				1,00		0,88	0,83
210						0,90	0,85
220						0,92	0,87
260	Value without reduction = 1					1,00	0,93
280							0,97
288							0,98
300							1,00

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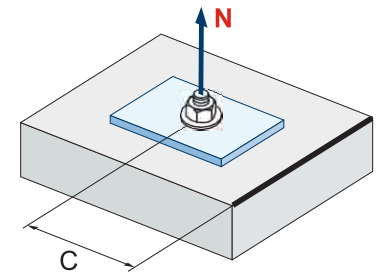


Influence of concrete edge distance (splitting) c,sp							
c [mm]	IWA Standard depth						
	M6	M8	M10	M12	M14	M16	M20
35							
40	0,64	0,58					
50	0,72	0,65	0,61				
60	0,81	0,72	0,67				
65	0,86	0,76	0,70				
70	0,90	0,79	0,73	0,66			
75	0,95	0,83	0,76	0,69			
80	1,00	0,87	0,79	0,71	0,66		
83		0,89	0,81	0,73	0,67		
84		0,90	0,82	0,74	0,68		
85		0,91	0,83	0,74	0,68		
90		0,95	0,86	0,77	0,70	0,73	
96		1,00	0,90	0,80	0,73	0,76	
100			0,93	0,82	0,75	0,78	
105			0,96	0,85	0,77	0,81	
110			1,00	0,88	0,80	0,84	
125				0,97	0,87	0,92	
128				0,99	0,89	0,93	
130				1,00	0,90	0,94	
135					0,92	0,97	0,81
140					0,95	1,00	0,83
144					0,97		0,85
150					1,00		0,87
168							0,95
175							0,98
180							1,00

c [mm]	IWA Standard depth						
	M6	M8	M10	M12	M14	M16	M20
40		0,68					
50		0,78	0,70				
60		0,89	0,78				
65		0,94	0,83				
70		1,00	0,87	0,77			
75			0,92	0,81			
80			0,96	0,85			
83			0,99	0,87			
84			1,00	0,88			
85				0,88			
90				0,92		0,77	
96				0,97		0,80	
100				1,00		0,82	
105						0,85	
110						0,88	
125						0,97	
128						0,99	
130						1,00	
135							0,92
144							0,97
150							1,00

Anchor Fasteners - Indo Construction Fastening Systems

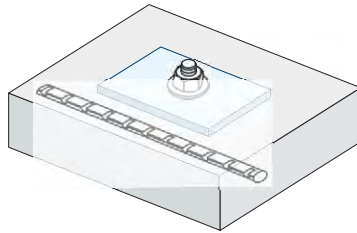
Influence of concrete edge distance (concrete cone) $\psi_{c,N}$							
c [mm]	IWA Standard depth						
	M6	M8	M10	M12	M14	M16	M20
35	0,69						
40	0,75	0,69					
50	0,87	0,77	0,71				
53	0,91	0,80	0,73				
60	1,00	0,87	0,79				
63		0,90	0,82				
65		0,92	0,83				
70		0,98	0,88	0,78			
72		1,00	0,90	0,80			
75			0,92	0,82			
80			0,97	0,86	0,78		
83			1,00	0,88	0,80		
85				0,90	0,81		
90				0,94	0,84	0,78	
98				1,00	0,90	0,83	
100					0,91	0,84	
105					0,94	0,87	
110					0,98	0,90	
113					1,00	0,92	
125						0,99	
126						1,00	
128							
135							0,90
150							0,97
155							1,00



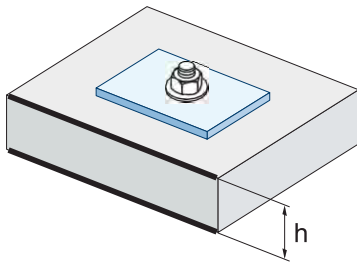
$$\psi_{c,N} = 0,35 + \frac{0,5 \cdot c}{c_{cr,N}} + \frac{0,15 \cdot c^2}{c_{cr,N}^2} \leq 1$$

IWA Standard depth							
c [mm]	M6	M8	M10	M12	M14	M16	M20
40		0,81					
50		0,96	0,84				
53		1,00	0,88				
60			0,96				
63			1,00				
65							
70				0,95			
72				0,97			
75				1,00			
80							
83							
85							
90						0,94	
98						1,00	
100							
105							
110							
113							
125							
126							
128							
135							1,00

Anchor Fasteners - Indo Construction Fastening Systems



$$\Psi_{re,N} = 0,5 + \frac{h_{ef}}{200} \leq 1$$



Influence of reinforcements $\Psi_{re,N}$							
$\Psi_{re,N}$	IWA Standard depth						
	M6	M8	M10	M12	M14	M16	M20
	0,70	0,74	0,77	0,82	0,87	0,92	1,00
	Reduced depth						
$\Psi_{re,N}$	M6	M8	M10	M12	M14	M16	M20
	-	0,67	0,71	0,75	-	0,83	0,88

*This factor only applies for a high density of reinforcements. If in the area of the anchor there are reinforcements with a distancing of = 150 mm (any diameter) or with a diameter = 10 mm and a distancing of = 100 mm, a $\Psi_{re,N} = 1$ factor may be applied

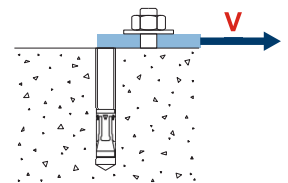
Influence of base material thickness											
$\Psi_{h,sp}$	IWA										
	h/h _{ef}	2,00	2,20	2,40	2,60	2,80	3,00	3,20	3,40	3,60	=3,68
	$\Psi_{h,sp}$	1,00	1,07	1,13	1,19	1,25	1,31	1,37	1,42	1,48	1,50

$$\Psi_{h,sp} = \left(\frac{h}{2 \cdot h_{ef}} \right)^{2/3} \leq 1,5$$

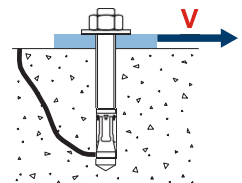
SHEAR LOADS

- Steel design resistance without lever arm : $V_{Rd,s}$
- Pry-out design resistance: $V_{Rd,cp} = k \cdot N_{Rd,c}^o$
- Concrete edge design resistance: $V_{Rd,c} = V_{Rd,c}^o \cdot \Psi_b \cdot \Psi_{se,V} \cdot \Psi_{c,V} \cdot \Psi_{re,V} \cdot \Psi_{\alpha,V} \cdot \Psi_{h,V}$

Steel design resistance									
$V_{Rd,s}$									
Size			M6	M8	M10	M12	M14	M16	M20
$V_{Rd,s}$	Standard depth	[kN]	4,1	7,4	11,8	16,5	22,5	30,7	45,0
$V_{Rd,s}$	Reduced depth	[kN]		7,4	11,8	16,5		30,7	45,0

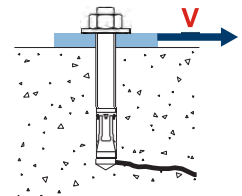


Pry-out design resistance*									
$V_{Rd,cp} = k \cdot N^o_{Rd,c}$									
Size			M6	M8	M10	M12	M14	M16	M20
	k (Standard depth)	[kN]	1	1	1	2	2	2	2
	k (Reduced depth)	[kN]	-	1	1	2	-	2	2



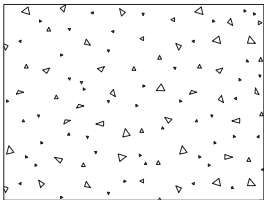
* $N_{Rd,c}^o$ Concrete cone design resistance for tension loads

Concrete edge resistance									
$V_{Rd,c} = V_{Rd,c}^o \cdot \psi_b \cdot \psi_{se,V} \cdot \psi_{c,V} \cdot \psi_{re,V} \cdot \psi_{\alpha,V} \cdot \psi_{h,V}$									
Size			M6	M8	M10	M12	M14	M16	M20
$V_{Rd,c}^o$	Standard depth	[kN]	4,6	6,2	7,7	10,2	12,9	15,6	21,8
$V_{Rd,c}^o$	Reduced depth	[kN]	-	3,6	4,9	6,5	-	10,1	12,8



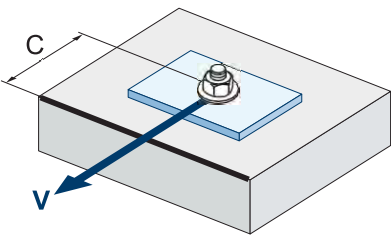
Coefficients of influence

Influence of concrete strength in concrete edge failure Ψ_b								
		M6	M8	M10	M12	M14	M16	M20
Ψ_b	C 20/25	1,00						
	C 30/37				1,22			
	C 40/50	1,41						
	C 50/60				1,55			

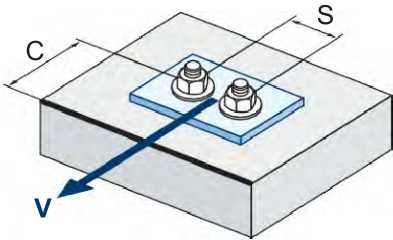


$\Psi \sqrt{\frac{f_{ck,cube}}{25}} \geq 1$

Influence of edge distance and spacing $\Psi_{se,V}$ FOR ONE ANCHOR ONLY																	
c/h _{ef}	0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00	4,50	5,00
Isolated	0,35	0,65	1,00	1,40	1,84	2,32	2,83	3,38	3,95	4,56	5,20	5,86	6,55	7,26	8,00	9,55	11,18
FOR TWO ANCHORS																	
c/h _{ef}	0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00	4,50	5,00
1,0	0,24	0,43	0,67	0,93	1,22	1,54	1,89	2,25	2,64	3,04	3,46	3,91	4,37	4,84	5,33	6,36	7,45
1,5	0,27	0,49	0,75	1,05	1,38	1,74	2,12	2,53	2,96	3,42	3,90	4,39	4,91	5,45	6,00	7,16	8,39
2,0	0,29	0,54	0,83	1,16	1,53	1,93	2,36	2,81	3,29	3,80	4,33	4,88	5,46	6,05	6,67	7,95	9,32
2,5	0,32	0,60	0,92	1,28	1,68	2,12	2,59	3,09	3,62	4,18	4,76	5,37	6,00	6,66	7,33	8,75	10,25
=3,0	0,35	0,65	1,00	1,40	1,84	2,32	2,83	3,38	3,95	4,56	5,20	5,86	6,55	7,26	8,00	9,55	11,18

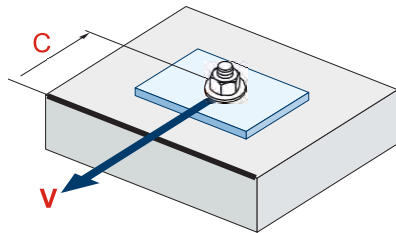


$\Psi_{se,V} = \left(\frac{C}{h_{ef}}\right)^{1,5}$



$\Psi_{se,V} = \left(\frac{C}{h_{ef}}\right)^{1,5} \cdot \left(1 + \frac{S}{3 \cdot C}\right) \cdot 0,5 = \left(\frac{C}{h_{ef}}\right)^{1,5}$

Anchor Fasteners - Indo Construction Fastening Systems

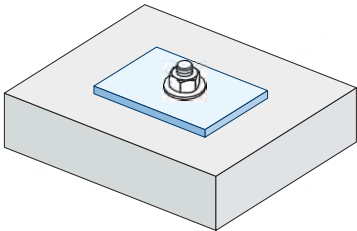


$$\Psi_{c,V} = \left(\frac{d}{c} \right)^{0,20}$$

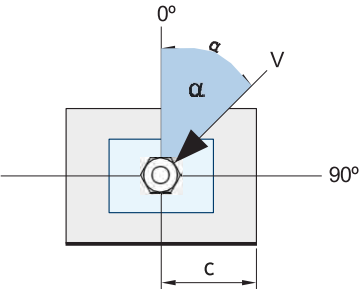
Influence of concrete edge distance $\Psi_{c,V}$							
c [mm]	IWA						
	M6	M10	M10	M12	M14	M16	M20
35	0,70						
40	0,68	0,70					
45	0,67	0,71					
50	0,65	0,69					
55	0,64	0,68	0,71				
60	0,63	0,67	0,70				
70	0,61	0,65	0,68	0,70			
80	0,60	0,63	0,66	0,68	0,71		
85	0,59	0,62	0,65	0,68	0,70		
90	0,58	0,62	0,64	0,67	0,69	0,71	
100	0,57	0,60	0,63	0,65	0,67	0,69	
105	0,56	0,60	0,62	0,65	0,67	0,69	
110	0,56	0,56	0,62	0,64	0,66	0,68	
120	0,55	0,58	0,61	0,63	0,65	0,67	
125	0,54	0,58	0,60	0,63	0,65	0,66	
128	0,54	0,57	0,60	0,62	0,64	0,66	
130	0,54	0,57	0,60	0,62	0,64	0,66	
135	0,54	0,57	0,59	0,62	0,64	0,65	
140	0,53	0,56	0,59	0,61	0,63	0,65	
150	0,53	0,56	0,58	0,60	0,62	0,64	
160	0,52	0,55	0,57	0,60	0,61	0,63	
170	0,51	0,54	0,57	0,59	0,61	0,62	0,65
175	0,51	0,54	0,56	0,59	0,60	0,62	0,65
180	0,51	0,54	0,56	0,58	0,60	0,62	0,64
190	0,50	0,53	0,55	0,58	0,59	0,61	0,64
200	0,50	0,53	0,55	0,57	0,59	0,60	0,63
210	0,49	0,52	0,54	0,56	0,58	0,60	0,62
220	0,49	0,52	0,54	0,56	0,58	0,59	0,62
230	0,48	0,51	0,53	0,55	0,57	0,59	0,61
240	0,48	0,51	0,53	0,55	0,57	0,58	0,61
250	0,47	0,50	0,53	0,54	0,56	0,58	0,60
260	0,47	0,50	0,52	0,54	0,56	0,57	0,60
270	0,47	0,49	0,52	0,54	0,55	0,57	0,59
280	0,46	0,49	0,51	0,53	0,55	0,56	0,59
290	0,46	0,49	0,51	0,53	0,55	0,56	0,59
300	0,46	0,48	0,51	0,53	0,54	0,56	0,58

Anchor Fasteners - Indo Construction Fastening Systems

Influence of reinforcements $\psi_{re,V}$			
	Without perimetral reinforcements	Perimetral reinforcements = Ø12mm	Perimetral reinforcements with brackets = 100mm
Non-cracked concrete	1	1	1

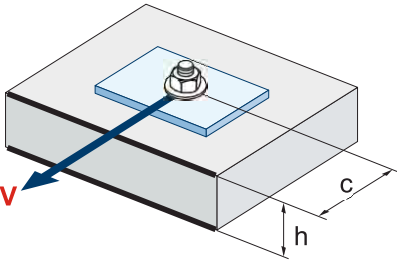


Influence of load application angle $\psi_{\alpha,V}$										
Angle, $\alpha(^{\circ})$	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
$\psi_{\alpha,V}$	1,00	1,01	1,05	1,13	1,24	1,40	1,64	1,97	2,32	2,50



$$\psi_{\alpha,V} = \sqrt{\frac{1}{(\cos \alpha_v)^2 + \left(\frac{\sin \alpha}{2,5_v}\right)^2}} \geq 1$$

Influence of base material thickness $\psi_{h,V}$										
IWA										
h/c	0,15	0,30	0,45	0,60	0,75	0,90	1,05	1,20	1,35	=1,5
$\psi_{h,V}$	0,32	0,45	0,55	0,63	0,71	0,77	0,84	0,89	0,95	1,00



$$\psi_{h,V} = \left(\frac{h}{c}\right)^{0,5} \geq 1,0$$

Anchor Fasteners - Indo Construction Fastening Systems



IWA



IWA



IWA-A2



IWA-A4



ETA 16/0502

CHARACTERISTICS

- Roughness working principle; installation by controlled torque.
- Use for high loads.
- Assessed for two installation depths.
- Easy installation.
- Use in non-cracked concrete.
- Previous installation, or through the Fixture.
- Use for static or quasi-static loads.
- Three versions zinc plated, stainless steel A2 and A4.
- Variety of lengths and sizes, assembly Flexibility.
- DIN 440 for fixing wood structures to concrete.
- Available in ICFS Anchor Design Software

BASE MATERIAL



SIZE RANGE

M6 - M20

DRILL HOLE CONDITION



DRY



WELL



FLOODED

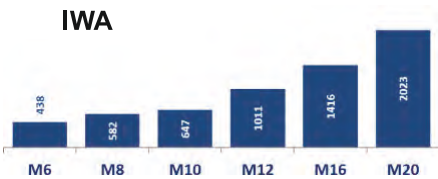
APPLICATION

- Structural applications in non-cracked concrete.
- Safety barriers.
- Billboards, machinery, boilers, signals, steel beams, etc.
- Fixings wood structures in concrete.

MAXIMUM LOADS RECOMMENDED IN NON-CRACKED CONCRETE [kg]



*M14 only for IWA



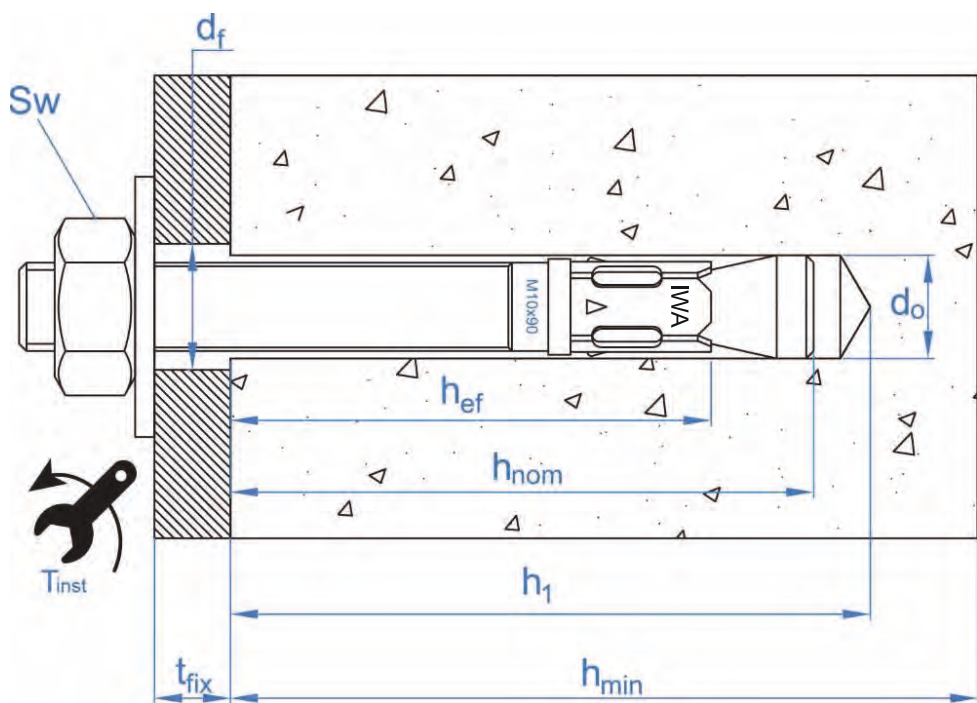
APPLICATION EXAMPLES



1. RANGE					
ITEM	CODE	SIZE	PHOTO	COMPONENT	MATERIAL
1	IWA	M6 to M20		Bolt Clip Nut Washer	Carbon steel cold formed, zinc-plated = 5µm Carbon steel, zinc-plated = 5µm DIN 934 class 6 ISO 898-1 zinc-plated = 5µm DIN 125, DIN 9021 o DIN 440 zinc-plated = 5µm
2	IWA	M6 to M20		Bolt Clip Nut Washer	Carbon steel cold formed, atlantis = 8µm Carbon steel, atlantis = 8µm DIN 934 class 6 ISO 898-1 atlantis = 8µm DIN 125, DIN 9021 o DIN 440 atlantis = 8µm
3	IWA	M6 to M20		Bolt Clip Nut Washer	Stainless steel, grade A2 Stainless steel, grade A2 DIN 934 stainless steel, grade A2 DIN 125, DIN 9021 o DIN 440 stainless steel, grade A2
4	IWA	M6 to M20		Bolt Clip Nut Washer	Stainless steel, grade A4 Stainless steel, grade A4 DIN 934 stainless steel, grade A4 DIN 125, DIN 9021 o DIN 440 stainless steel, grade A4

2. ACCESSORIES			
ITEM	CODE	PHOTO	DESCRIPTION
1	DOMTA		Accessory for anchor installation with hammer drill

3. INSTALLATION DATA	
3.1. INSTALLATION DRAWING	



3.2. INSTALLATION PARAMETERS																											
General installation parameters								Standard installation depth										Reduced installation depth									
Family	Code	Size / Bolt letter	Assessed	Drill bit diameter	Fixture clearance hole	Torque	Minimum allowable spacing	Minimum allowable edge distance	Minimum concrete Thickness	Depth of drill hole ≥	Installation depth	Effective anchorage depth	Thickness of fixtures ≤	Critical spacing (concrete cone)	Critical edge distance (concrete cone)	Critical spacing (splitting)	Critical edge (splitting)	Minimum concrete thickness	Depth of drill hole ≥	Installation depth	Effective anchorage depth	Thickness of fixtures ≤	Critical spacing (concrete cone)	Critical edge distance (concrete cone)	Critical spacing (splitting)	Critical edge distance (splitting)	
			ETA	d _b [mm]	d _f [mm]	T _{inst} [Nm]	S _{min} [mm]	C _{min} [mm]	h _{min} [mm]	h ₁ [mm]	h _{nom} [mm]	h _{ef} [mm]	t _{fix} [mm]	S _{cr,N} [mm]	C _{cr,N} [mm]	S _{cr,sp} [mm]	C _{cr,sp} [mm]	h _{min} [mm]	h ₁ [mm]	h _{nom} [mm]	h _{ef} [mm]	t _{fix} [mm]	S _{cr,N} [mm]	C _{cr,N} [mm]	S _{cr,sp} [mm]	C _{cr,sp} [mm]	
IWA	IWA06060	M6x60 (B)	✓										2										--				
	IWA06070	M6x70 (C)	✓										12										--				
	IWA06080	M6x80 (D)	✓										22										--				
	IWA06090	M6x90 (E)	✓										32										--				
	IWA06100	M6x100(E)	✓										42										--				
	IWA06110	M6x110(F)	✓										52										--				
	IWA06120	M6x120(G)	✓	6	7	7	35	35	100	55	49,5	40	62	120	60	160	80	—	--	--	—	--	--	--	—	--	
	IWA06130	M6x130(H)	✓										72										--				
	IWA06140	M6x140(I)	✓										82										--				
	IWA06150	M6x150(I)	✓										92										--				
	IWA06160	M6x160(J)	✓										102										--				
	IWA06170	M6x170(K)	✓										112										--				
	IWA06180	M6x180(L)	✓										122										--				
	IWA08060	M8x60 (B)	✓						--	—	--	--	--	—	--	--	--						3				
	IWA08075	M8x75 (C)	✓										5										18				
	IWA08090	M8x90 (E)	✓										20										33				
	IWA08100	M8x100(E)	✓										30										43	105	53	140	70
	IWA08115	M8x115(G)	✓	8	9	20	40	40	100	65	59,5	48	45	144	72	192	96	100	50	46,5	35	58					
	IWA08120	M8x120(G)	✓										50										63				
	IWA08130	M8x130(H)	✓										60										73				
	IWA08155	M8x155(J)	✓										85										98				
	IWA10070	M10x70(C)	✓						—	—	--	--	--	—	--	--	--						3				
	IWA10080	M10x80(D)	✓						--	—	--	--	--	—	--	--	--						13				
	IWA10090	M10x90(E)	✓	10	12	35	50	50					10					100	60	53,5	42	23	126	63	168	84	
	IWA10100	M10x100(E)	✓						110	75	66,5	55	20	165	83	220	110						33				
	IWA10120	M10x120(G)	✓										40										53				

Anchor Fasteners - Indo Construction Fastening Systems

3.2. INSTALLATION PARAMETERS																												
General installation parameters								Standard installation depth										Reduced installation depth										
Family	Code	Size / Bolt letter	Assessed	Drill bit diameter	Fixture clearance hole	Torque	Minimum allowable spacing	Minimum allowable edge distance	Minimum concrete Thickness	Depth of drill hole ≥	Installation depth	Effective anchorage depth	Thickness of fixtures ≤	Critical spacing (concrete cone)	Critical edge distance (concrete cone)	Critical spacing (splitting)	Critical edge (splitting)	Minimum concrete thickness	Depth of drill hole ≥	Installation depth	Effective anchorage depth	Thickness of fixtures ≤	Critical spacing (concrete cone)	Critical edge distance (concrete cone)	Critical spacing (splitting)	Critical edge distance (splitting)		
[]	[]	[]	ETA	d _i [mm]	d _f [mm]	T _{inst} [Nm]	S _{min} [mm]	C _{min} [mm]	h _{min} [mm]	h ₁ [mm]	h _{nom} [mm]	h _{ef} [mm]	t _{fix} [mm]	S _{cr,N} [mm]	C _{cr,N} [mm]	S _{cr,sp} [mm]	C _{cr,sp} [mm]	h _{min} [mm]	h ₁ [mm]	h _{nom} [mm]	h _{ef} [mm]	t _{fix} [mm]	S _{cr,N} [mm]	C _{cr,N} [mm]	S _{cr,sp} [mm]	C _{cr,sp} [mm]		
IWA	IWA10140	M10x140(I)	✓										60										73					
	IWA10150	M10x150(I)	✓										70										83					
	IWA10160	M10x160(J)	✓	10	12	35	50	50	110	75	66.5	55	80	165	83	220	110	100	60	53.5	42		93	126	63	168	84	
	IWA10170	M10x170(K)	✓										90										103					
	IWA10210	M10x210(N)	✓										130										143					
	IWA10230	M10x230(P)	✓										150										163					
	IWA12090	M12x90(E)	✓						--	--	--	--	--	--	--	--	--	--						13				
	IWA12100	M12x100(E)	✓										8										23					
	IWA12110	M12x110(F)	✓										18										33					
	IWA12120	M12x120(G)	✓										28										43					
	IWA12130	M12x130(H)	✓	12	14	60	70	70	130	85	77	65	38	195	98	260	130	100	70	62	50		53	150	75	200	100	
	IWA12140	M12x140(I)	✓										48										63					
	IWA12160	M12x160(J)	✓										68										83					
	IWA12180	M12x180(L)	✓										88										103					
	IWA12200	M12x200(M)	✓										108										123					
	IWA12220	M12x220(O)	✓										128										143					
	IWA12250	M12x250(Q)	✓										158										173					
	IWA14120	M14x120(G)	✓										12										--					
	IWA14145	M14x145(I)	✓										37										--					
	IWA14170	M14x170(K)	✓	14	16	90	80	80	150	100	91	75	62	225	113	300	150	--	--	--	--	--	--	--	--	--	--	
	IWA14220	M14x220(O)	✓										112										--					
	IWA14250	M14x250(Q)	✓										142										--					

Anchor Fasteners - Indo Construction Fastening Systems

3.2. INSTALLATION PARAMETERS																											
General installation parameters								Standard installation depth										Reduced installation depth									
Family	Code	Size / Bolt letter	Assessed	Drill bit diameter	Fixture clearance hole	Torque	Minimum allowable spacing	Minimum allowable edge distance	Minimum concrete Thickness	Depth of drill hole ≥	Installation depth	Effective anchorage depth	Thickness of fixtures ≤	Critical spacing (concrete cone)	Critical edge distance (concrete cone)	Critical spacing (splitting)	Critical edge (splitting)	Minimum concrete thickness	Depth of drill hole ≥	Installation depth	Effective anchorage depth	Thickness of fixtures ≤	Critical spacing (concrete cone)	Critical edge distance (concrete cone)	Critical spacing (splitting)	Critical edge distance (splitting)	
[T]	[T]	[T]	ETA	d ₀ [mm]	d _f [mm]	T _{inst} [Nm]	S _{min} [mm]	C _{min} [mm]	h _{min} [mm]	h ₁ [mm]	h _{nom} [mm]	h _{ef} [mm]	t _{fix} [mm]	S _{cr,N} [mm]	C _{cr,N} [mm]	S _{cr,sp} [mm]	C _{cr,sp} [mm]	h _{min} [mm]	h ₁ [mm]	h _{nom} [mm]	h _{ef} [mm]	t _{fix} [mm]	S _{cr,N} [mm]	C _{cr,N} [mm]	S _{cr,sp} [mm]	C _{cr,sp} [mm]	
IWA	IWA16125	M16 x 125(G)	✓										3										22				
	IWA16145	M16 x 145(I)	✓										23										42				
	IWA16170	M16 x 170(K)	✓	16	18	120	90	90	168	110	103,5	84	48	252	126	280	140	130	90	84,5	65	67	195	98	260	130	
	IWA16220	M16 x 220(O)	✓										98										117				
	IWA16250	M16 x 250(Q)	✓										128										147				
	IWA16280	M16 x 280(S)	✓										158										177				
	IWA20170	M20 x 170(K)	✓										23										49				
	IWA20220	M20 x 220(O)	✓	20	22	240	135	135	206	135	125	103	73	309	155	360	180	150	107	97	75	99	225	113	300	150	
IWA20270	M20 x 270(S)	✓										123										149					
IWA - A2	IWA06045	M6 x 45 (A)	✗						--	--	--	--	--	--	--	--	--	10	40	35	25	1	75	38	160	80	
	IWA06060	M6 x 60 (B)	✓										2										--				
	IWA06080	M6 x 80 (D)	✓										22										--				
	IWA06120	M6 x 120(G)	✓	6	7	7	50	50					62										--				
	IWA06140	M6 x 140(I)	✓						100	55	49,5	40	82	120	60	160	80	--	--	--	--	--	--	--	--	--	
	IWA06160	M6 x 160(J)	✓										102										--				
	IWA06170	M6 x 170(K)	✓										112										--				
	IWA06180	M6 x 180(L)	✓										122										--				
IWA - A2	IWA08050	M8 x 50 (A)	✗						--	--	--	--	--	--	--	--	--	100	40	35	23	4	69	35	140	70	
	IWA08075	M8 x 75 (C)	✓	8	9	20	65	65					5										18				
	IWA08090	M8 x 90 (E)	✓						100	65	59,5	48	20	144	72	192	96	100	50	46,5	35	33	105	53	140	70	
	IWA08115	M8 x 115(G)	✓										45										58				
	IWA10070	M10 x 70 (C)	✓						--	--	--	--	--	--	--	--	--						3				
	IWA10090	M10 x 90 (E)	✓	10	12	35	70	70					10					100	60	53,5	42	23	126	63	168	84	
	IWA10120	M10 x 120(G)	✓						110	75	66,5	55	40	165	83	220	110						53				
	IWA10150	M10 x 150(I)	✓										70										83				

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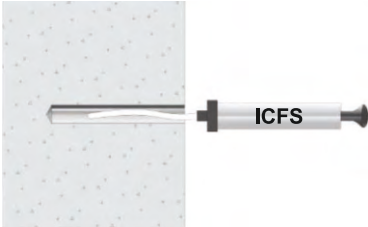
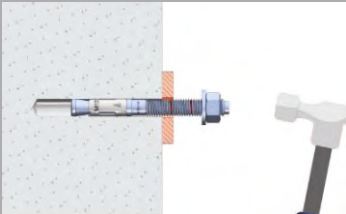
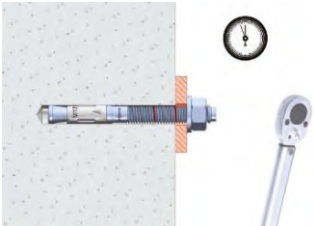
3.2. INSTALLATION PARAMETERS																										
General installation parameters								Standard installation depth										Reduced installation depth								
[] Family	[] Code	[] Size / Bolt letter	Assessed ETA	Drill bit diameter d _b [mm]	Fixture clearance hole d _f [mm]	Torque T _{inst} [Nm]	Minimum allowable spacing S _{min} [mm]	Minimum allowable edge distance C _{min} [mm]	Minimum concrete Thickness h _{min} [mm]	Depth of drill hole ≥ h ₁ [mm]	Installation depth h _{nom} [mm]	Effective anchorage depth h _{ef} [mm]	Thickness of fixtures ≤ t _{fix} [mm]	Critical spacing (concrete cone) S _{cr,N} [mm]	Critical edge distance (concrete cone) C _{cr,N} [mm]	Critical spacing (splitting) S _{cr,sp} [mm]	Critical edge (splitting) C _{cr,sp} [mm]	Minimum concrete thickness h _{min} [mm]	Depth of drill hole ≥ h ₁ [mm]	Installation depth h _{nom} [mm]	Effective anchorage depth h _{ef} [mm]	Thickness of fixtures ≤ t _{fix} [mm]	Critical spacing (concrete cone) S _{cr,N} [mm]	Critical edge distance (concrete cone) C _{cr,N} [mm]	Critical spacing (splitting) S _{cr,sp} [mm]	Critical edge distance (splitting) C _{cr,sp} [mm]
IWA - A2	IWA12075	M12 x 75(C)	✗						--	--	--	--	--	--	--	--	--	100	60	55	43	5	129	65	200	100
	IWA12090	M12 x 90 (D)	✓						--	--	--	--	--	--	--	--	--					13				
	IWA12110	M12 x 110(F)	✓	12	14	60	85	85					18					100	70	62	50	33	150	75	200	100
	IWA12140	M12 x 140 (I)	✓						130	85	77	65	48	195	98	260	130					63				
	IWA16090	M16 x 90 (D)	✗						--	--	--	--	--	--	--	--	--	100	75	69	49	4	147	74	280	140
	IWA16145	M16 x 145 (I)	✓	16	18	120	110	110					23										--			
	IWA16170	M16 x 170(K)	✓						168	110	103,5	84	48	252	126	336	168	--	--	--	--	--	--	--	--	--
	IWA20120	M20 x 120(G)	✗						--	--	--	--	--	--	--	--	--	145	105	93	71	5	213	107	360	180
	IWA20170	M20 x 170(K)	✓	20	22	240	135	135					23										--	--	--	--
IWA20220	M20 x 220(O)	✓						206	135	125	103	73	309	155	412	200	--	--	--	--	--	--	--	--	--	
IWA - A4	IWA06045	M6 x 45(A)	✗						--	--	--	--	--	--	--	--	--	100	40	35	25	1	75	38	160	80
	IWA06060	M6 x 60(B)	✓	6	7	7	50	50					2	120	60	160	80									
	IWA06080	M6 x 80 (D)	✓						100	55	49,5	40	22					--	--	--	--	--	--	--	--	--
	IWA08050	M8 x 50(A)	✗						--	--	--	--	--	--	--	--	--	100	40	35	23	4	69	35	140	70
	IWA08075	M8 x 75 (C)	✓	8	9	20	65	65					5									8				
	IWA08090	M8 x 90 (E)	✓						100	65	59,5	48	20	144	72	192	96	100	50	46,5	35	23	105	53	140	70
	IWA08115	M8 x 115(G)	✓										45									58				
	IWA10070	M10 x 70 (C)	✓						--	--	--	--	--	--	--	--	--					3				
	IWA10090	M10 x 90 (E)	✓	10	12	35	70	70					10					100	60	53,5	42	23	126	63	168	84
	IWA10120	M10 x 120(G)	✓						110	75	66,5	55	40	165	83	220	110					53				
	IWA10150	M10 x 150(I)	✓										70									83				
	IWA412075	M12 x 75 (C)	✗						--	--	--	--	--	--	--	--	--	100	60	55	43	5	129	65	200	100
	IWA12090	M12 x 90 (D)	✓	12	14	60	85	85	--	--	--	--	--	--	--	--	--					13				
	IWA12110	M12 x 110(F)	✓						130	85	77	65	18	195	98	260	130	100	70	62	50	33	150	75	200	100
	IWA12140	M12 x 140(I)	✓										48									63				

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[illegible]

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3.2. INSTALLATION PARAMETERS																												
General installation parameters								Standard installation depth										Reduced installation depth										
Family [—]	Code [—]	Size / Bolt letter [—]	Assessed ETA	Drill bit diameter d ₀ [mm]	Fixture clearance hole d _f [mm]	Torque T _{inst} [Nm]	Minimum allowable spacing S _{min} [mm]	Minimum allowable edge distance C _{min} [mm]	Minimum concrete Thickness h _{min} [mm]	Depth of drill hole ≥ h ₁ [mm]	Installation depth h _{nom} [mm]	Effective anchorage depth h _{ef} [mm]	Thickness of fixtures ≤ t _{fix} [mm]	Critical spacing (concrete cone) S _{cr,N} [mm]	Critical edge distance (concrete cone) C _{cr,N} [mm]	Critical spacing (splitting) S _{cr,sp} [mm]	Critical edge (splitting) C _{cr,sp} [mm]	Minimum concrete thickness h _{min} [mm]	Depth of drill hole ≥ h ₁ [mm]	Installation depth h _{nom} [mm]	Effective anchorage depth h _{ef} [mm]	Thickness of fixtures ≤ t _{fix} [mm]	Critical spacing (concrete cone) S _{cr,N} [mm]	Critical edge distance (concrete cone) C _{cr,N} [mm]	Critical spacing (splitting) S _{cr,sp} [mm]	Critical edge distance (splitting) C _{cr,sp} [mm]		
IWA	IWA06060	M6x60 (B)	✓										2											--				
	IWA06080	M6x80 (D)	✓	6	7	7	35	35	100	55	49,5	40	22	120	60	160	80		—	--	--	—	--	--	--	—	--	
	IWA06100	M6x100(E)	✓										42										--					
IWA	IWA08060	M8x60 (B)	✓						--	—	--	--	--	—	--	--	--							3				
	IWA08075	M8x75 (C)	✓										5										18					
	IWA08090	M8x90 (E)	✓										20										33					
	IWA08115	M8x115(G)	✓	8	9	20	40	40					45					100	50	46,5	35	58	105	53	140	70		
	IWA08120	M8x120(G)	✓						100	65	59,5	48	50	144	72	192	96						63					
	IWA08130	M8x130(H)	✓										60										73					
	IWA08155	M8x155(J)	✓										85										98					
IWA	IWA10070	M10x70(C)	✓						--	—	--	--	--	—	--	--	--						3					
	IWA10080	M10x80(D)	✓						--	—	--	--	--	—	--	--	--						13					
	IWA10090	M10x90(E)	✓										10									23						
	IWA10100	M10x100(E)	✓										20									33						
	IWA10120	M10x120(G)	✓	10	12	35	50	50					40									53						
	IWA10140	M10x140(I)	✓										60					100	60	53,5	42	73	126	63	168	84		
	IWA10150	M10x150(I)	✓						110	75	66,5	55	70	165	83	220	110					83						
	IWA10160	M10x160(J)	✓										80									93						
	IWA10170	M10x170(K)	✓										90									103						
IWA	IWA10210	M10x210(N)	✓										130									143						
	IWA12090	M12x90(E)	✓						--	—	--	--	--	—	--	--	--					13						
	IWA12100	M12x100(E)	✓										8									23						
	IWA12110	M12x110(F)	✓										18									33						
	IWA12130	M12x130(H)	✓										38									53						
	IWA12140	M12x140(I)	✓	12	14	60	70	70					48					100	70	62	50	63	150	75	200	100		
	IWA12160	M12x160(J)	✓						130	85	77	65	68	195	98	260	130					83						
	IWA12180	M12x180(L)	✓										88									103						
	IWA12200	M12x200(M)	✓										108									123						
	IWA12220	M12x220(O)	✓										128									143						
	IWA12250	M12x250(Q)	✓										158									173						

4. INSTALLATION PROCEDURE	
4.1 CONCRETE INSTALLATION	
	1. DRILLING Check the concrete is well compacted without significant porosity. Suitable for dry, wet and flooded holes. Use drill in hammer mode. Drill according to specified depths in previous tables
	2. BLOW AND CLEAN Clean the hole from dust and concrete remains. Use blow pump and brush.
	3. INSTALL Insert the anchor until the red depth mark is at the same level with the surface of the base material. Use a hammer in case of need. DOMTA tool could be used alternatively. Installation could be performed through the fixture or before setting the fixture.
	4. APPLY THE TOROQUE Apply the nominal torque specified in previous tables. Use torque wrench in order to ensure correct installation.

5. RESISTANCES

Resistance in concrete class C20/25 for an isolated anchor without spacing or concrete edge distance effects are indicated in the following table:

5.1 CHARACTERISTICS RESISTANCE [kN]

General Parameter				Standard installation depth			
Family	Code	Size	Assessed	Tension N_{Rk}	Shear V_{Rk}	Tension N_{Rk}	Shear V_{Rk}
IWA	IWA06060	M6x60	✓				
	IWA06070	M6x70	✓				
	IWA06080	M6x80	✓				
	IWA06090	M6x90	✓				
	IWA06100	M6x100	✓				
	IWA06110	M6x110	✓				
	IWA06120	M6x120	✓	7,40	5,10	--	--
	IWA06130	M6x130	✓				
	IWA06140	M6x140	✓				
	IWA06150	M6x150	✓				
	IWA06160	M6x160	✓				
	IWA06170	M6x170	✓				
	IWA06180	M6x180	✓				
	IWA08060	M8x60	✓	--	--	10,00	10,19
	IWA08075	M8x75	✓				
	IWA08090	M8x90	✓				
	IWA08100	M8x100	✓				
	IWA08115	M8x115	✓	13,00	9,30	10,00	10,19
	IWA08120	M8x120	✓				
	IWA08130	M8x130	✓				
	IWA08155	M8x155	✓				
	IWA10070	M10 x 70	✓				
	IWA10080	M10 x 80	✓	--	--	13,39	13,39
	IWA10090	M10 x 90	✓				
	IWA10100	M10 x 100	✓				
	IWA10120	M10 x 120	✓				
	IWA10140	M10 x 140	✓				
	IWA10150	M10 x 150	✓	19,00	14,70	13,39	13,39
	IWA10160	M10 x 160	✓				
	IWA10170	M10 x 170	✓				
	IWA10210	M10 x 210	✓				
	IWA10230	M10 x 230	✓				
	IWA12090	M12 x 90	✓	--	--	17,39	17,39
	IWA12100	M12 x100	✓				
	IWA12110	M12 x110	✓				
	IWA12120	M12 x120	✓				
	IWA12130	M12 x130	✓				
	IWA12140	M12 x140	✓				
	IWA12160	M12 x160	✓	25,78	20,60	17,39	17,39
	IWA12180	M12 x180	✓				
	IWA12200	M12 x200	✓				
	IWA12220	M12 x220	✓				
	IWA12250	M12 x250	✓				
	IWA14120	M14 x120	✓				
	IWA14145	M14 x145	✓				
	IWA14170	M14 x170	✓	31,95	28,10	--	--
	IWA14220	M14 x220	✓				
	IWA14250	M14 x250	✓				

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General Parameter				Standard installation depth		Reduced installation depth	
Family	Code	Size	Assessed	Tension N _{Rk}	Shear V _{Rk}	Tension N _{Rk}	Shear V _{Rk}
IWA	IWA16125	M16x125	✓	37,87	38,40	25,78	38,40
	IWA16145	M16x145	✓				
	IWA16170	M16x170	✓				
	IWA16220	M16x220	✓				
	IWA16250	M16x250	✓	51,42	56,30	31,95	63,90
	IWA16280	M16x280	✓				
	IWA20170	M20x170	✓				
	IWA20220	M20x220	✓				
IWA20270	M20x270	✓					
IWA - A2	IWA06045	M6x 45	✗	--	--	6,15	6,00
	IWA06060	M6x 60	✓	10,10	6,00	--	--
	IWA06080	M6x 80	✓				
	IWA06120	M6x 120	✓				
	IWA06140	M6x 140	✓				
	IWA06160	M6x 160	✓				
	IWA06170	M6x 170	✓				
	IWA06180	M6x 180	✓				
	IWA08050	M8x 50	✗	--	--	5,43	5,43
	IWA08075	M8x 75	✓	12,00	10,90	9,00	10,19
	IWA08090	M8x 90	✓				
	IWA08115	M8x115	✓	--	--	12,00	13,39
	IWA10070	M10 x70	✓				
	IWA10090	M10 x90	✓	16,00	17,40	12,00	13,39
	IWA10120	M10 x120	✓				
	IWA10150	M10 x150	✓	--	--	13,87	13,87
	IWA12075	M12 x75	✗				
	IWA12090	M12 x90	✓	--	--	16,00	17,39
	IWA12110	M12 x110	✓	25,00	25,20		
	IWA12140	M12 x140	✓		16,87	16,87	
	IWA16090	M16 x90	✗	35,00		47,10	--
	IWA16145	M16 x145	✓				
	IWA16170	M16 x170	✓	--	--	29,43	58,86
	IWA20120	M20 x120	✗				
	IWA20170	M20 x170	✓	50,00	73,50	--	--
	IWA20220	M20 x220	✓				
IWA - A4	IWA06045	M6x45	✗	--	--	6,15	6,00
	IWA06060	M6x60	✓	10,10	6,00	--	--
	IWA06080	M6x80	✓				
	IWA08050	M8x50	✗	--	--	5,43	5,43
	IWA08075	M8x75	✓	12,00	10,90	9,00	10,19
	IWA08090	M8x90	✓				
	IWA08115	M8x115	✓	--	--	12,00	13,39
	IWA10070	M10 x70	✓				
	IWA10090	M10 x90	✓	16,00	17,40	12,00	13,39
	IWA10120	M10 x120	✓				
	IWA10150	M10 x150	✓	--	--	13,87	13,87
	IWA12075	M12 x75	✗				
	IWA12090	M12 x90	✓	--	--	16,00	17,39
	IWA12110	M12 x110	✓	25,00	25,20		
	IWA12140	M12 x140	✓		16,87	16,87	
	IWA16090	M16 x90	✗	--		--	16,87
	IWA16145	M16 x145	✓	35,00	47,10	--	--
	IWA16170	M16 x170	✓				
	IWA20120	M20 x120	✗	--	--	29,43	58,86
	IWA20170	M20 x170	✓	50,00	73,50	--	--
	IWA20220	M20 x220	✓				

5.2 DESIGN RESISTANCE [kN]							
General Parameter				Standard installation depth		Reduced installation depth	
Family	Code	Size	Assessed	Tension N_{Rk}	Shear V_{Rk}	Tension N_{Rk}	Shear V_{Rk}
IWA	IWA06060	M6 x 60	✓	<u>5,29</u>	<u>4,08</u>	--	--
	IWA06070	M6 x 70	✓				
	IWA06080	M6 x 80	✓				
	IWA06090	M6 x 90	✓				
	IWA06100	M6 x 100	✓				
	IWA06110	M6 x 110	✓				
	IWA06120	M6 x 120	✓				
	IWA06130	M6 x 130	✓				
	IWA06140	M6 x 140	✓				
	IWA06150	M6 x 150	✓				
	IWA06160	M6 x 160	✓				
	IWA06170	M6 x 170	✓				
	IWA06180	M6 x 180	✓				
	IWA08060	M8 x 60	✓	--	--	6,67	6,79
	IWA08075	M8 x 75	✓	<u>9,29</u>	<u>7,44</u>	6,67	6,79
	IWA08090	M8 x 90	✓				
	IWA08100	M8 x 100	✓				
	IWA08115	M8 x 115	✓				
	IWA08120	M8 x 120	✓				
	IWA08130	M8 x 130	✓				
	IWA08155	M8 x 155	✓				
	IWA10070	M10 x 70	✓	--	--	8,93	8,93
	IWA10080	M10 x 80	✓	12,67	<u>11,76</u>	8,93	8,93
	IWA10090	M10 x 90	✓				
	IWA10100	M10 x 100	✓				
	IWA10120	M10 x 120	✓				
	IWA10140	M10 x 140	✓				
	IWA10150	M10 x 150	✓				
	IWA10160	M10 x 160	✓				
	IWA10170	M10 x 170	✓				
	IWA10210	M10 x 210	✓				
	IWA10230	M10 x 230	✓				
	IWA12090	M12 x 90	✓	--	--	11,60	11,60
	IWA12100	M12 x 100	✓	<u>17,19</u>	<u>16,48</u>	11,60	11,60
	IWA12110	M12 x 110	✓				
	IWA12120	M12 x 120	✓				
	IWA12130	M12 x 130	✓				
	IWA12140	M12 x 140	✓				
	IWA12160	M12 x 160	✓				
	IWA12180	M12 x 180	✓				
	IWA12200	M12 x 200	✓				
	IWA12220	M12 x 220	✓				
	IWA12250	M12 x 250	✓				
	IWA14120	M14 x 120	✓	21,30	<u>22,48</u>	--	--
	IWA14145	M14 x 145	✓				
	IWA14170	M14 x 170	✓				
	IWA14220	M14 x 220	✓				
	IWA14250	M14 x 250	✓				

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General Parameter				Standard installation depth		Reduced installation depth	
Family	Code	Size	Assessed	Tension N _{Rk}	Shear V _{Rk}	Tension N _{Rk}	Shear V _{Rk}
IWA	IWA16125	M16x125	✓	25,25	30,72	17,19	30,72
	IWA16145	M16x145	✓				
	IWA16170	M16x170	✓				
	IWA16220	M16x220	✓				
	IWA16250	M16x250	✓				
	IWA16280	M16x280	✓				
	IWA20170	M20x170	✓				
	IWA20220	M20x220	✓				
IWA - A2	IWA20270	M20x270	✓	34,28	45,04	21,30	42,60
	IWA06045	M6x 45	✗				
	IWA06060	M6x 60	✓				
	IWA06080	M6x 80	✓				
	IWA06120	M6x 120	✓				
	IWA06140	M6x 140	✓				
	IWA06160	M6x 160	✓				
	IWA06170	M6x 170	✓				
	IWA06180	M6x 180	✓				
	IWA08050	M8x 50	✗				
	IWA08075	M8x 75	✓				
	IWA08090	M8x 90	✓				
	IWA08115	M8x115	✓				
	IWA10070	M10 x70	✓				
	IWA10090	M10 x90	✓				
	IWA10120	M10 x120	✓				
	IWA10150	M10 x150	✓				
	IWA12075	M12 x75	✗				
	IWA12090	M12 x90	✓				
	IWA12110	M12 x110	✓				
	IWA12140	M12 x140	✓				
	IWA16090	M16 x90	✗				
	IWA16145	M16 x145	✓				
	IWA16170	M16 x170	✓				
	IWA20120	M20 x120	✗				
	IWA20170	M20 x170	✓				
	IWA20220	M20 x220	✓				
IWA - A4	IWA06045	M6x45	✗	6,01	3,95	--	--
	IWA06060	M6x60	✓				
	IWA06080	M6x80	✓				
	IWA08050	M8x50	✗				
	IWA08075	M8x75	✓				
	IWA08090	M8x90	✓				
	IWA08115	M8x115	✓				
	IWA10070	M10 x70	✓				
	IWA10090	M10 x90	✓				
	IWA10120	M10 x120	✓				
	IWA10150	M10 x150	✓				
	IWA12075	M12 x75	✗				
	IWA12090	M12 x90	✓				
	IWA12110	M12 x110	✓				
	IWA12140	M12 x140	✓				
	IWA16090	M16 x90	✗				
	IWA16145	M16 x145	✓				
	IWA16170	M16 x170	✓				
	IWA20120	M20 x120	✗				
	IWA20170	M20 x170	✓				
	IWA20220	M20 x220	✓				

Anchor Fasteners - Indo Construction Fastening Systems

General Parameter				Standard installation depth		Reduced installation depth	
Family	Code	Size	Assessed	Tension N_{Rk}	Shear V_{Rk}	Tension N_{Rk}	Shear V_{Rk}
IWA	IWA06060	M6 x 60	✓	<u>5,29</u>	<u>4,08</u>	--	--
	IWA06080	M6 x 80	✓				
	IWA06100	M6 x 100	✓				
	IWA08060	M8 x 60	✓	--	--	6,67	6,79
	IWA08075	M8 x 75	✓	<u>9,29</u>	<u>7,44</u>	6,67	6,79
	IWA08090	M8 x 90	✓				
	IWA08100	M8 x 100	✓				
	IWA08115	M8 x 115	✓				
	IWA08130	M8 x 130	✓				
	IWA08155	M8x 155	✓				
	IWA10070	M10 x 70	✓	--	--	8,93	8,93
	IWA10080	M10 x 80	✓	12,67	<u>11,76</u>	8,93	8,93
	IWA10090	M10 x 90	✓				
	IWA10100	M10 x 100	✓				
	IWA10120	M10 x 120	✓				
	IWA10140	M10 x 140	✓				
	IWA10150	M10 x 150	✓				
	IWA10160	M10 x 160	✓				
	IWA10170	M10 x 170	✓				
	IWA10210	M10 x 210	✓				
	IWA12090	M12 x 90	✓	17,19	<u>16,48</u>	11,60	11,60
	IWA12100	M12 x 100	✓				
	IWA12110	M12 x 110	✓				
	IWA12130	M12 x 130	✓				
	IWA12140	M12 x 140	✓				
	IWA12160	M12 x 160	✓				
	IWA12180	M12 x 180	✓				
	IWA12200	M12 x 200	✓				
	IWA12220	M12 x 220	✓				
	IWA12250	M12 x 250	✓				
	IWA16125	M16 x 125	✓	25,25	<u>30,72</u>	17,19	<u>30,72</u>
	IWA16145	M16 x 145	✓				
	IWA16170	M16 x 170	✓				
	IWA16220	M16 x 220	✓				
	IWA16250	M16 x 250	✓				
	IWA16280	M16 x 280	✓	34,28	<u>45,04</u>	21,30	42,60
	IWA20170	M20 x 170	✓				
	IWA20220	M20 x 220	✓				
	IWA20270	M20 x 270	✓				

1KN = 1kg
 Values underlined and in italics show Steel failure, **bold** values concrete failure and other indicate pull out failure.

Anchor Fasteners - Indo Construction Fastening Systems

5.2 MAXIMUM LOADS RECOMMENDED [kN] (with $\gamma_f=1.4$)

General Parameter				Standard installation depth		Reduced installation depth	
Family	Code	Size	Assessed	Tension N _{Rk}	Shear V _{Rk}	Tension N _{Rk}	Shear V _{Rk}
IWA	IWA06060	M6 x 60	✓	3,78	2,91	--	--
	IWA06070	M6 x 70	✓				
	IWA06080	M6 x 80	✓				
	IWA06090	M6 x 90	✓				
	IWA06100	M6 x 100	✓				
	IWA06110	M6 x 110	✓				
	IWA06120	M6x120	✓				
	IWA06130	M6x130	✓				
	IWA06140	M6x140	✓				
	IWA06150	M6x150	✓				
	IWA06160	M6x160	✓				
	IWA06170	M6x170	✓				
	IWA06180	M6x180	✓				
	IWA08060	M8x60	✓	--	--	4,76	4,85
	IWA08075	M8x75	✓	6,63	5,31	4,76	4,85
	IWA08090	M8x90	✓				
	IWA08100	M8x100	✓				
	IWA08115	M8x115	✓				
	IWA08120	M8x120	✓				
	IWA08130	M8x130	✓				
	IWA08155	M8x155	✓				
	IWA10070	M10 x70	✓	--	--	6,38	6,38
	IWA10080	M10 x80	✓	9,05	8,40	6,38	6,38
	IWA10090	M10 x90	✓				
	IWA10100	M10 x100	✓				
	IWA10120	M10 x120	✓				
	IWA10140	M10 x140	✓				
	IWA10150	M10 x150	✓				
	IWA10160	M10 x160	✓				
	IWA10170	M10 x170	✓				
	IWA10210	M10 x210	✓				
	IWA10230	M10 x230	✓	--	--	8,28	8,28
	IWA12090	M12 x90	✓				
	IWA12100	M12 x100	✓				
	IWA12110	M12 x110	✓	12,28	11,77	8,28	8,28
	IWA12120	M12 x120	✓				
	IWA12130	M12 x130	✓				
	IWA12140	M12 x 140	✓				
	IWA12160	M12 x 160	✓				
	IWA12180	M12 x 180	✓				
IWA12200	M12 x 200	✓					
IWA12220	M12 x 220	✓					
IWA12250	M12 x250	✓					
IWA14120	M14 x120	✓	15,22	16,06	--	--	
IWA14145	M14 x145	✓					
IWA14170	M14 x170	✓					
IWA14220	M14 x220	✓					
IWA14250	M14 x250	✓					

Anchor Fasteners - Indo Construction Fastening Systems

General Parameter				Standard installation depth		Reduced installation depth	
Family	Code	Size	Assessed	Tension N _{Rk}	Shear V _{Rk}	Tension N _{Rk}	Shear V _{Rk}
IWA	IWA16125	M16x125	✓	18,03	21,94	12,28	21,94
	IWA16145	M16x145	✓				
	IWA16170	M16x170	✓				
	IWA16220	M16x220	✓				
	IWA16250	M16x250	✓	24,49	32,17	15,22	30,43
	IWA16280	M16x280	✓				
	IWA20170	M20x170	✓				
	IWA20220	M20x220	✓				
IWA20270	M20x270	✓					
IWA - A2	IWA06045	M6x 45	✗	--	--	2,93	2,82
	IWA06060	M6x 60	✓	4,29	2,82	--	--
	IWA06080	M6x 80	✓				
	IWA06120	M6x 120	✓				
	IWA06140	M6x 140	✓				
	IWA06160	M6x 160	✓				
	IWA06170	M6x 170	✓				
	IWA06180	M6x 180	✓	5,71	5,12	3,57	4,85
	IWA08050	M8x 50	✗				
	IWA08075	M8x 75	✓				
	IWA08090	M8x 90	✓	6,35	8,18	4,76	6,38
	IWA08115	M8x115	✓				
	IWA10070	M10 x70	✓				
	IWA10090	M10 x90	✓	9,92	11,84	6,35	8,28
	IWA10120	M10 x120	✓				
	IWA10150	M10 x150	✓				
	IWA12075	M12 x75	✗	--	--	5,50	6,61
	IWA12090	M12 x90	✓	--	--	6,35	8,28
	IWA12110	M12 x110	✓				
	IWA12140	M12 x140	✓	9,92	11,84		
	IWA16090	M16 x90	✗	--	--	6,70	8,03
	IWA16145	M16 x145	✓	13,89	22,13	--	--
	IWA16170	M16 x170	✓				
	IWA20120	M20 x120	✗				
	IWA20170	M20 x170	✓	19,84	34,54	--	--
	IWA20220	M20 x220	✓				
IWA - A4	IWA06045	M6x45	✗	--	--	2,93	2,82
	IWA06060	M6x60	✓	4,29	2,82	--	--
	IWA06080	M6x80	✓	5,71	5,12	3,57	4,85
	IWA08050	M8x50	✗				
	IWA08075	M8x75	✓				
	IWA08090	M8x90	✓	6,35	8,18	4,76	6,38
	IWA08115	M8x115	✓				
	IWA10070	M10 x70	✓				
	IWA10090	M10 x90	✓	9,92	11,84	6,35	8,28
	IWA10120	M10 x120	✓				
	IWA10150	M10 x150	✓				
	IWA12075	M12 x75	✗	--	--	5,50	6,61
	IWA12090	M12 x90	✓	--	--	6,35	8,28
	IWA12110	M12 x110	✓				
	IWA12140	M12 x140	✓	9,92	11,84		
	IWA16090	M16 x90	✗	--	=	6,70	8,03
	IWA16145	M16 x145	✓	13,39	22,13	--	--
	IWA16170	M16 x170	✓				
	IWA20120	M20 x120	✗				
	IWA20170	M20 x170	✓	19,84	34,54	11,68	28,03
	IWA20220	M20 x220	✓				



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