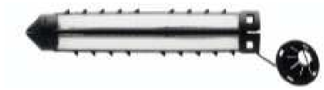
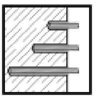
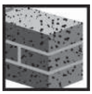
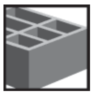
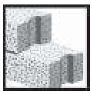
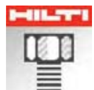
Hilti HIT-HY 70 injection mortar for masonry

Injection mortar system		Benefits
	Hilti HIT-HY 70 330 ml foil pack (also available as 500 ml and 1400 ml foil pack)	- chemical injection fastening for all type of base materials: - hollow and solid - clay bricks, sand-lime bricks, normal and light weight concrete blocks, aerated light weight concrete, natural stones - two-component hybrid mortar - rapid curing - versatile and convenient handling - flexible setting depth and fastening thickness - small edge distance and anchor spacing - mortar filling control with HIT-SC sleeves - suitable for overhead fastenings - in-service temperatures: short term: max.120°C long term: max 72°C
	Mixer	
	HIT-V rod	
	HAS-E rod	
	HIS-RN sleeve	
	HIT-SC composite sleeve	

								
Concrete	Variable embedment depth	Solid brick	Hollow brick	Autoclaved aerated concrete	Fire resistance	Corrosion resistance	High corrosion resistant	PROFIS Anchor design software

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
Allgemeine bauaufsichtliche Zulassung (national German approval)	DIBt, Berlin	Z-21.3-1830 / 2009-01-20
Fiche technique SOCOTEC [a)]	SOCOTEC, Paris	YX 0047 08.2006
Fire test report	MFPA, Leipzig	PB III/B-07-157 / 2007-06-04
Assessment report (fire)	warringtonfire	WF 166402 / 2007-10-26

Basic loading data (for a single anchor)

All data in the table below applies to

- Load values valid for holes drilled with TE rotary hammers in hammering mode
- Correct anchor setting (see instruction for use, setting details)
- Steel quality of fastening elements: see data below
- Steel quality for screws for HIT-IG, HIT-IC and HIS-N: min. grade 5.8 / HIS-RN: A4-70
- Threaded rods of appropriate size (diameter and length) and a minimum steel quality of 5.6 can be used
- Base material temperature during installation and curing must be between -5°C through +40°C
  (Exception: solid clay bricks (e.g. Mz12): +5°C till 40°C**)**

Recommended loads F_{rec} for brick breakout and pull out in [kN]:

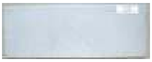
Solid masonry: HIT-HY 70 with HIT-V, HAS, HAS-E

			HIT-V, HAS, HAS-E			
Anchor size			**M6**	**M8**	**M10**	**M12**
Base material	**Setting depth** [mm]					
Solid clay brick Mz12/2,0 DIN 105/ EN 771-1 f_b [b)] ≥ 12 N/mm²  Germany, Austria, Switzerland	80	N_{rec} [kN]	-	1,0	1,7	1,7
		V_{rec} [kN]	-	1,0	1,7	1,7
		N_{rec} [kN]	-	3,0 [c)]	3,0 [c)]	3,0 [c)]
		V_{rec} [kN]	-	3,0 [c)]	3,0 [c)]	3,0 [c)]
Solid sand-lime brick KS 12/2,0 DIN 106/ EN 771-2 f_b [b)] ≥12 N/mm²  Germany, Austria, Switzerland	80	N_{rec} [kN]	-	1,0	1,7	1,7
		V_{rec} [kN]	-	1,0	1,7	1,7
		N_{rec} [kN]	-	3,0 [d)]	3,0 [d)]	3,0 [d)]

a) Recommended load values for German base materials are based on national regulations.
b) f_b = brick strength
c) Values only valid for Mz (DIN 105) with brick strength ≥ 29 N/mm², density 2,0 kg/dm³, minimum brick size NF (24,0cm x 11,5cm x 7,1cm), not covered by national German approval Z-21.3-1830 / 2009-01-20
d) Values only valid for KS (DIN 106) with brick strength ≥ 23 N/mm², density 2,0 kg/dm³, minimum brick size NF (24,0cm x 11,5cm x 7,1cm), not covered by national German approval Z-21.3-1830 / 2009-01-20

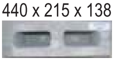
Recommended loads F_{rec} for brick breakout and pull out in [kN]:

Solid masonry: HIT-HY 70 with HIT-V, HAS, HAS-E

			HIT-V, HAS, HAS-E			
Anchor size			**M6**	**M8**	**M10**	**M12**
Base material	**Setting depth** [mm]					
Aerated concrete PPW 2-0,4 DIN 4165/ EN 771-4 f_b [b)] $\geq$ 2 N/mm²  Germany, Austria, Switzerland	80	N_{rec} [kN]	-	0,5	0,6	0,6
		V_{rec} [kN]	-	0,1	0,1	0,2
Lightweight concrete acc. TGL (haufwerks-poriger Leichtbeton), Germany	80	N_{rec} [kN]	-	1,0	1,0	1,5
		V_{rec} [kN]	-	1,0	1,0	1,5

a) Recommended load values for German base materials are based on national regulations.
b) f_b = brick strength

Recommended loads F_{rec} for brick breakout and pull out in [kN]:
Hollow masonry: HIT-HY 70 with HIT-SC and HIT-V, HAS, HAS-E

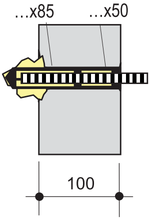
			HIT-V, HAS, HAS-E				
Anchor size			**M6**	**M8**	**M10**	**M12**	
Base material	**Setting depth** [mm]		**HIT-SC 12x…**	**HIT-SC 16x…**	**HIT-SC 16x…**	**HIT-SC 18x…**	**HIT-SC 22x…**
Concrete Block EN 771-3 f_b [b)] ≥ 7,0 N/mm² L x H x B [mm] 440 x 215 x 215  (Shell thickness 48 mm) Great Britain	50	N_{rec} [kN]	0,3	0,8	1,1	2,0	2,0
		V_{rec} [kN]	1,0	1,6	2,0	2,0	2,0
	80	N_{rec} [kN]	0,3	0,8	1,1	2,0	2,0
		V_{rec} [kN]	1,0	1,6	2,0	2,0	2,0
Concrete Block EN 771-3 f_b [b)] ≥ 7 N/mm² L x H x B [mm] 440 x 215 x 138  (Shell thickness 48 mm) Great Britain	50	N_{rec} [kN]	0,4	0,6	0,7	1,5	1,5
		V_{rec} [kN]	0,9	1,7	1,7	1,7	1,7
	80	N_{rec} [kN]	0,4	0,6	0,7	1,5	1,5
		V_{rec} [kN]	0,9	1,7	1,7	1,7	1,7
Concrete Block EN 771-3 f_b [b)] ≥ 7 N/mm² L x H x B [mm] 440 x 215 x 112  (Shell thickness 48 mm) Great Britain	50	N_{rec} [kN]	0,5	0,8	0,9	0,9	0,9
		V_{rec} [kN]	1,1	1,3	1,3	1,3	2,0

a) Recommended load values with consideration of a global safety factor γ_{global} =3,0: $F_{rec} = F_{Rk} / \gamma_{global}$
b) f_b = brick strength
c) HIT-SC 18x … with HIT-IC M10 only! HIT-IG M10 elements do not fit.

Recommended loads F_{rec} for brick breakout and pull out in [kN]:

Hollow masonry: HIT-HY 70 with HIT-SC and HIT-V, HAS, HAS-E and HIT-IG/HIT-IC

Values in brackets: mean ultimate loads $F_{u,m}$ [kN]:

			HIT-V, HAS, HAS-E				
Anchor size			**M6**	**M8**	**M10**	**M12**	
Base material	**Setting depth** [mm]		**HIT-SC 12x…**	**HIT-SC 16x…**	**HIT-SC 16x…**	**HIT-SC 18x…**	**HIT-SC 22x…**
Concrete block f_b [b)] ≥ 23 N/mm² L x H x B [mm] 390 x 190 x 120  (Shell thickness 25 mm) Japan	50	N_{rec} [kN]	1,25 (8,1)	1,5	1,5	2,0	2,0 (10,9)
		V_{rec} [kN]	1,25 (6,7)	1,5 (11,4)	1,5	1,5	2,0 (17,2)
	80	N_{rec} [kN]	1,25 (9,0)	1,5 (10,3)	1,5	2,0	2,0
		V_{rec} [kN]	1,25 (7,1)	1,5	1,5	1,5	2,0
Spancrete (Hollow Core Slab) f_b [b)] ≥ 83 N/mm² L x H x B [mm] 1000 x1000 x125  (Shell thickness 27,5 mm) Japan	50	N_{rec} [kN]	1,25 (8,5)	2,0 (15,0)	2,0	2,5	2,5 (23,7)
		V_{rec} [kN]	1,25 (7,0)	2,5 (12,0)	2,5	2,5	3,0 (24,3)
Aereted concrete block f_b [b)] ≥ 6 N/mm² L x H x B [mm] 1900 x 600 x 100 Special application: through fastening HIT-SC …x85 HIT-SC …x50  Japan	130	N_{rec} [kN]	1,25 (8,1)	1,75 (8,6)	1,75	2,0	2,0 (9,9)
		V_{rec} [kN]	0,75 (6,3)	1,00 (9,2)	1,00	1,00	1,25 (12,8)

a) Recommended load values with consideration of a global safety factor γ_{global} =3,0: $F_{rec} = F_{Rk} / \gamma_{global}$

b) f_b = brick strength

c) HIT-SC 18x … with HIT-IC M10 only! HIT-IG M10 elements do not fit.

Recommended loads a) F_{rec} for brick breakout and pull out in [kN]
Solid masonry: HIT-HY 70 with HIT-V, HAS, HAS-E and HIT-IG / HIT-IC
Values in brackets: mean ultimate loads $F_{u,m}$ [kN]:

			HIT-V, HAS, HAS-E			
Anchor size			**M6**	**M8**	**M10**	**M12**
Base material	**Setting depth** [mm]					
Aereted concrete block f_b b) $\geq$ 6 N/mm² L x H x B [mm] 1900 x 600 x 100  Japan	50	N_{rec} [kN]	-	-	-	0,75
		V_{rec} [kN]	-	-	-	1,0
	80	N_{rec} [kN]	-	-	1,5 (7,3)	1,75
		V_{rec} [kN]	-	-	0,75 (4,2)	1,0 (4,7)

a) Recommended load values with consideration of a global safety factor γ_{global} =3,0: $F_{rec} = F_{Rk} / \gamma_{global}$
b) f_b brick strength

Design

Influence of joints:

If the joints of the masonry <u>are not visible</u> the recommended load N_{rec} has to be reduced with the factor $\alpha_j = 0.75$.

If the joints of the masonry <u>are visible</u> (e.g. unplastered wall) following has to be taken into account:

- The recommended load N_{rec} may be used only, if the wall is designed such that the joints are to be filled with mortar.
- If the wall is designed such that the joints are <u>not</u> to be filled with mortar then the recommended load N_{rec} may be used only, if the minimum edge distance c_{min} to the vertical joints is observed. If this minimum edge distance c_{min} can not be observed then the recommended load N_{rec} has to be reduced with the factor $\alpha_j = 0.75$.

The decisive resistance to tension loads is the lower value of N_{rec} (brick breakout, pull out) and $N_{max,pb}$ (pull out of one brick).

Pull out of one brick:

The allowable load of an anchor or a group of anchors in case of pull out of one brick, $N_{max,pb}$ [kN], is given in the following tables:

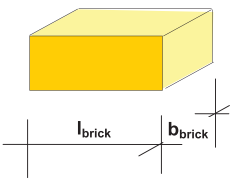
Clay bricks:

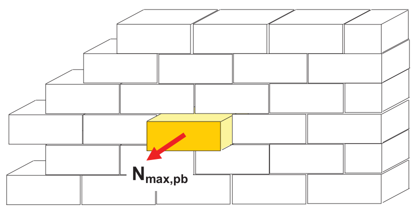
$N_{max,pb}$ [kN]		brick breadth b_{brick} [mm]					
		80	120	200	240	300	360
brick length l_{brick} [mm]	240	1,1	1,6	2,7	3,3	4,1	4,9
	300	1,4	2,1	3,4	4,1	5,1	6,2
	500	2,3	3,4	5,7	6,9	8,6	10,3

All other brick types:

$N_{max,pb}$ [kN]		brick breadth b_{brick} [mm]					
		80	120	200	240	300	360
brick length l_{brick} [mm]	240	0,8	1,2	2,1	2,5	3,1	3,7
	300	1,0	1,5	2,6	3,1	3,9	4,6
	500	1,7	2,6	4,3	5,1	6,4	7,7

$N_{max,pb}$ = resistance for pull out of one brick
l_{brick} = length of the brick
b_{brick} = breadth of the brick





For all applications outside of the above mentioned base materials and / or setting conditions site tests have to be made for the determination of load values.
Due to the wide variety of natural stones site tests have to be made for determine of load values.

Materials

Material quality HAS

Part	Material
Threaded rod HAS-(E)	Strength class 5.8, EN ISO 898-1, A_5 > 8% ductile steel galvanized ≥ 5 µm, EN ISO 4042
Threaded rod HAS-(E)R	Stainless steel grade A4, A_5 > 8% ductile strength class 70,EN ISO 3506-1, EN 10088: 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362
Washer ISO 7089	Steel galvanized, EN ISO 4042;
	Stainless steel, EN 10088: 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362
Nut EN ISO 4032	Strength class 8, ISO 898-2 steel galvanized ≥ 5 µm, EN ISO 4042
	Strength class 70, EN ISO 3506-2, stainless steel grade A4, EN 10088: 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362
	Strength class 70, EN ISO 3506-2, high corrosion resistant steel, EN 10088: 1.4529; 1.4565

Material quality sleeves

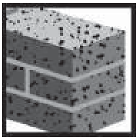
Part	Material
HIT-IG sleeve	Carbon steel 1.0718; galvanized to min. 5 µm
HIT-IC sleeve	Carbon steel; galvanized to min. 5 µm
HIT-SC sleeve	PA/PP

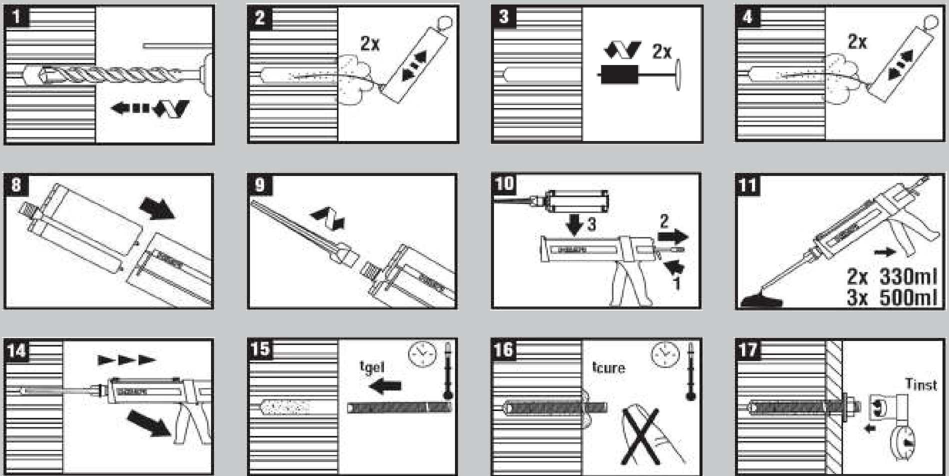
Setting

Installation equipment

Anchor size	M6	M8	M10	M12
Rotary hammer	TE2 – TE16			
Other tools	blow out pump, set of cleaning brushes, dispenser			

Setting instruction in solid base materials

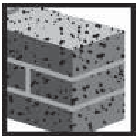


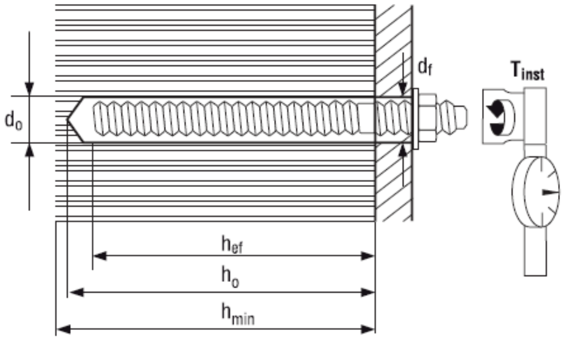


15	°F	°C	t_{gel}
	23	-5	10 min
	32	0	10 min
	41	5	10 min
	50	10	7 min
	68	20	4 min
	86	30	2 min
	104	40	1 min

16	°F	°C	t_{cure}
	23	-5	6 h
	32	0	4 h
	41	5	2.5 h
	50	10	1.5 h
	68	20	45 min
	86	30	30 min
	104	40	20 min

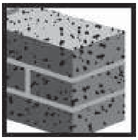
Setting details: hole depth h_0 and effective anchorage depth in solid base materials



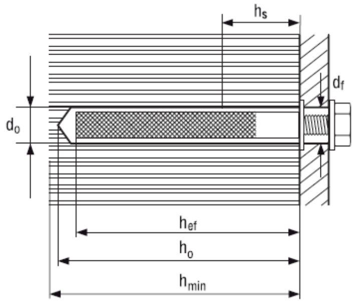


Anchor size			HIT-V, HAS, HAS-E, HAS-R			
			M8	M10	M12	M16
Nominal diameter of drill bit	d_0	[mm]	10	12	14	18
Effective anchorage depth	h_{ef}	[mm]	80	90	110	125
Hole depth	h_0	[mm]	85	95	115	130
Minimum base material thickness	h_{min}	[mm]	110	120	140	170
Diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18
Minimum spacing[a)]	s_{min}	[mm]	100	100	100	100
Minimum edge distance [a)]	c_{min}	[mm]	100	100	100	100
Torque moment	T_{inst}	[Nm]	5	8	10	10
Filling volume		[ml]	4	6	10	15

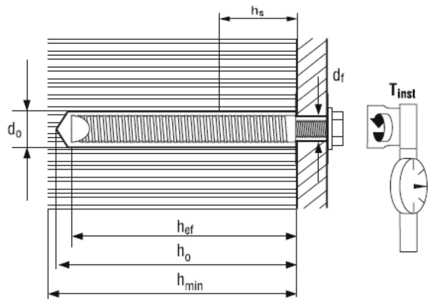
a) In case of **shear loads towards a free edge**: **c_{min} = 200 mm**
A distance from the edge of a broken brick of c_{min} = 200 mm is recommended, e.g. around window or door frames.



HIT-IG, HIT-IC



HIS-N/RN

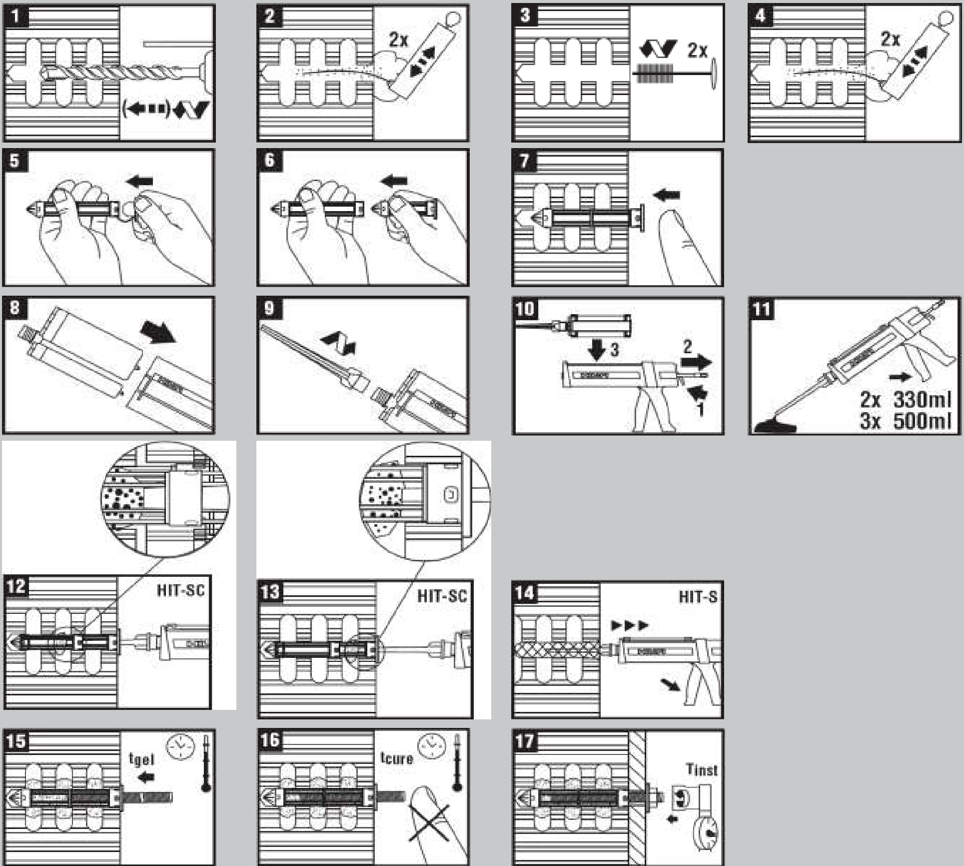


Setting details HIT-IG, HIT-IC

Anchor size			**HIT-IG**			**HIT-IC**			**HIS-N/RN**		
			M8	**M10**	**M12**	**M8**	**M10**	**M12**	**M8**	**M10**	**M12**
Nominal diameter of drill bit	d_0	[mm]	14	18	18	14	16	18	14	18	22
Effective anchorage depth	h_{ef}	[mm]	80	80	80	80	80	80	90	110	125
Hole depth	h_0	[mm]	85	85	85	85	85	85	95	115	130
Minimum base material thickness	h_{min}	[mm]	115	115	115	115	115	115	120	150	170
Diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	9	12	14	9	12	14
Length of bolt engagement	h_S	[mm]	min. 10 – max. 75			min. 10 – max. 75			min. 8 max.20	min. 10 max.25	min 12 max.30
Minimum spacing a)	s_{min}	[mm]	100	100	100	100	100	100	100	100	100
Minimum edge distance a)	c_{min}	[mm]	100	100	100	100	100	100	100	100	100
Torque moment	T_{inst}	[Nm]	5	8	10	5	8	10	5	8	10
Filling volume		[ml]	6	6	6	6	6	6	6	10	16

a) In case of **shear loads towards a free edge**: $\mathbf{c_{min}}$ **= 20 cm**
A distance from the edge of a broken brick of c_{min} = 20 cm is recommended, e.g. around window or door frames.

Setting instruction in hollow base material – using 330 ml foil pack

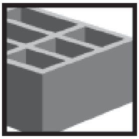


15	°F	°C	t_{gel}
	23	-5	10 min
	32	0	10 min
	41	5	10 min
	50	10	7 min
	68	20	4 min
	86	30	2 min
	104	40	1 min

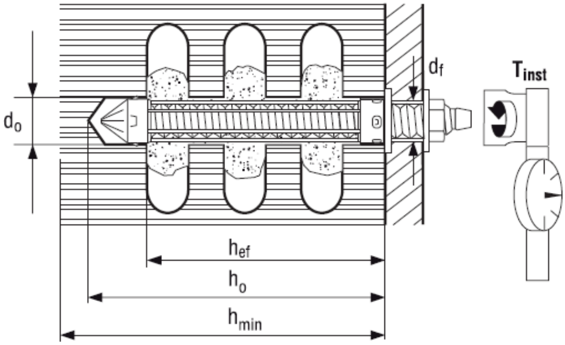
16	°F	°C	t_{cure}
	23	-5	6 h
	32	0	4 h
	41	5	2.5 h
	50	10	1.5 h
	68	20	45 min
	86	30	30 min
	104	40	20 min

Setting details: hole depth h_0 and effective anchorage depth in hollow base materials

HAS / HIT-AC with HIT-SC



HIT-V, HAS

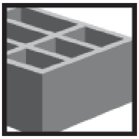


Setting details HIT-V / HAS / HIT-A… with sieve sleeve

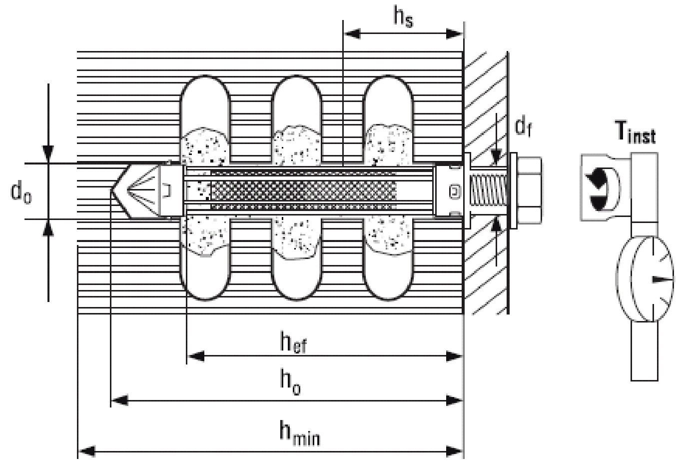
Anchor size			M6		M8		M10		M12			
Sieve sleeve HIT SC			12x50	12x85	16x50	16x85	16x50	16x85	18x50	18x85	22x50	22x85
Nominal diameter of drill bit	d_0	[mm]	12	12	16	16	16	16	18	18	22	22
Effective anchorage depth	h_{ef}	[mm]	50	80	50	80	50	80	50	80	50	80
Hole depth	h_0	[mm]	60	95	60	95	60	95	60	95	60	95
Minimum base material thickness	h_{min}	[mm]	80	115	80	115	80	115	80	115	80	115
Diameter of clearance hole in the fixture	d_f	[mm]	7	7	9	9	12	12	14	14	14	14
Minimum spacing [a)]	s_{min}	[mm]	100	100	100	100	100	100	100	100	100	100
Minimum edge distance [a)]	c_{min}	[mm]	100	100	100	100	100	100	100	100	100	100
Torque moment	T_{inst}	[Nm]	3	3	3	3	4	4	6	6	6	6
Filling volume		[ml]	12	24	18	30	18	30	18	36	30	55

Setting details: hole depth h_0 and effective anchorage depth in hollow base materials

HIT-IG / HIT-IC with HIT-SC



HIT-IG / HIT-IC



Setting details HIT-IG / HIT-IC with sieve sleeve

Anchor size			**HIT-IG**			**HIT-IC**		
			M8	**M10**	**M12**	**M8**	**M10**	**M12**
Sieve sleeve HIT SC			**16x85**	**22x85**	**22x85**	**16x85**	**18x85**	**22x85**
Nominal diameter of drill bit	d_0	[mm]	16	22	22	16	18	22
Effective anchorage depth	h_{ef}	[mm]	80	80	80	80	80	80
Hole depth	h_0	[mm]	95	95	95	95	95	95
Minimum base material thickness	h_{min}	[mm]	115	115	115	115	115	115
Diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	9	12	14
Length of bolt engagement	h_S	[mm]	min. 10 – max. 75			min. 10 – max. 75		
Minimum spacing a)	s_{min}	[mm]	100	100	100	100	100	100
Minimum edge distance a)	c_{min}	[mm]	100	100	100	100	100	100
Torque moment	T_{inst}	[Nm]	3	4	6	3	4	6
Filling volume		[ml]	30	45	45	30	36	45

a) In case of **shear loads towards a free edge**: **c_{min} = 20 cm**
A distance from the edge of a broken brick of c_{min} = 20 cm is recommended, e.g. around window or door frames.