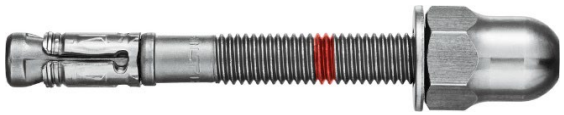
HST4 (-R) Expansion anchor

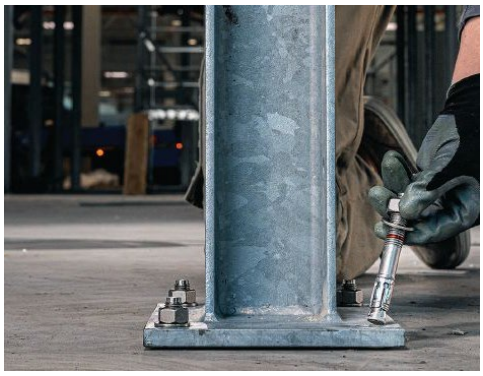
Product Technical Datasheet
Steel-to-concrete
Design according to ACI Standard

Update: Jun 2025

HST4 (-R) Expansion anchor

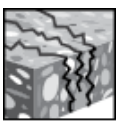
High-performance expansion anchor

Anchor version		Benefits
	HST4 (-R) (M8-M20)	- High-capacity anchor with ability for use in reduced member thickness, small spacing and edge distances - Suitable for uncracked and cracked concrete - Reliable and robust anchor for structural seismic design - Two embedment depth options to provide flexibility for high resistance or closer edge distance and smaller spacing - Faster and approved installation with non-cleaning ventilation method - Dome-nut variant available for more aesthetic application finish - Product and length identification mark facilitates quality control and inspection
	HST4 (-R) DN (M10-M12)	
	HST4 (-R) BW (M8-M16)	



Base material

Concrete (uncracked)



Concrete (cracked)

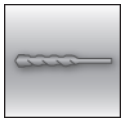
Load conditions

Static/ quasi-static

Seismic

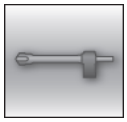
Fire Resistance (ETA)

Drilling, cleaning, setting

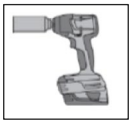


Hammer drilled holes (including with no cleaning)

Diamond drilled holes (ETA)



Hollow drill-bit drilling (ETA)



Impact wrench with adaptative torque module

Other information

PROFIS Engineering software

Uniform Evaluation Service

Linked Approvals/Certificates and Instructions for use

Approvals/certificates

Approval no	Application / loading condition	Authority / Laboratory	Date of issue	Date of expiry
UES ER-815	Static and quasi-static / Seismic	IAPMO UES, USA	13-08-2024	31-08-2025
ETA-21/0878	Static and quasi-static / Seismic / Fire	CSTB, Marne-la-Vallée	10-03-2025	-

The instructions for use can be viewed using the link in the instructions for use table or the QR code/link in the Hilti webpage table

Instructions for use

Anchor size	M8	M10	M12	M16	M20
HST4	IFU HST4-M8	IFU HST4- M10	IFU HST4- M12	IFU HST4- M16	IFU HST4- M20
HST4-R	IFU HST4-R M8	IFU HST4-R M10	IFU HST4-R M12	IFU HST4-R M16	IFU HST4-R M20
Filling set	Filling Set				

Link to Hilti Webpage

HST4	HST4-R	

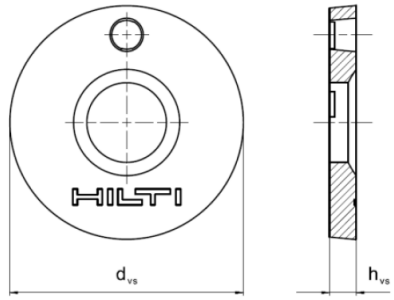
Fastener special dimensions

Note: Hilti filling set is to be used with Injection mortar Hilti HIT-HY…

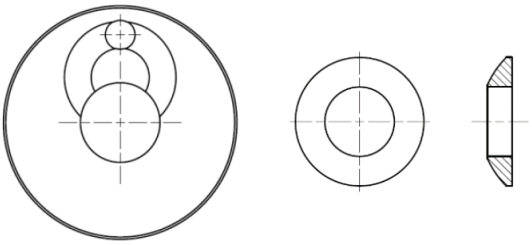
Dimensions filling washer

Anchor size			M8	M10	M12	M16	M20
Diameter	d_{vs}	[mm]	38	42	44	52	60
Height filling washer	h_{vs}	[mm]	5	5	5	6	6
Height filling washer and spherical washer	h_{fs}	[mm]	8	9	10	11	13

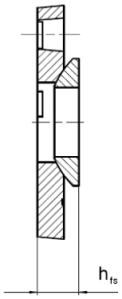
Sealing washer



Spherical washer



Filling Set



Design information based on ER-815 and evaluation according to ACI 355.2 and ICC-ES AC193. Design according to ACI 318 Chapter 17. ($f_{c,cycl}$ = 3,000 psi = 20.7 MPa)

Data source

Technical data in this section is based on evaluation report ER-815 by IAPMO UES according to ACI 355.2 and ICC-ES AC193, except for the following: diamond drilled holes, hollow-drill bit, and Seismic filling set.

Technical data for Diamond drilled holes, Hilti Hollow-drill bit, and Seismic filling set, is based on testing done for ETA-21/0878 and evaluated per ACI 355.2 by Hilti for designs in accordance with ACI 318 chapter 17. Published technical data is not contained in an external evaluation report (i.e. IAPMO-UES) or other approval at this time and can be used as Hilti Technical Data only.

Design tables on the following pages are applicable for Hammer-drilling (HD) or Diamond-drilling (DD) where Hammer-drilling includes the Hilti Hollow-drill bit. HST4 M16 carbon steel anchors have reductions in capacity with the Diamond-drilling when compared to Hammer-drilling, while for the rest of the sizes and the HST4-R stainless steel anchors Hammer-drilling and Diamond-drilling data are the same.

Design information is based on a single anchor that is far enough from the edge so that no reductions due to the influence of the concrete edge are present.

For specific design cases refer to PROFIS Engineering.

Design parameter				Nominal anchor diameter (mm)								
				M8		M10		M12		M16		M20
Anchor O.D.		d_a	[mm]	8		10		12		16		20
Effective min. embedment		h_{ef}	[mm]	30	45	30	60	40	70	65	85	101
Tension (lesser of concrete breakout/pullout or steel failure) - ϕN_n												
Design strength in tension (cracked concrete)	HST4 (HD)	ϕN_n	[kN]	2.6	6.3	2.6	12.1	6.6	15.2	13.6	20.4	26.4
	HST4 (DD)									11.5	17.3	
	HST4-R			2.3	5.4	2.6	9.8	6.6	12.3	11.5	20.4	26.4
Design strength in tension (uncracked concrete)	HST4 (HD)	ϕN_n	[kN]	3.4	8.9	3.3	15.5	9.4	19.6	19.5	29.2	30.0
	HST4 (DD)									13.1	19.6	
	HST4-R			3.0	7.6	3.8	15.5	9.4	19.6	16.5	29.2	30.0
Design strength in tension, seismic	HST4 (HD)	ϕN_n	[kN]	2.0	4.8	2.0	9.1	4.9	11.4	10.2	15.3	19.6
	HST4 (DD)									8.7	12.9	
	HST4-R			1.2	4.0	1.4	7.3	3.3	9.2	6.1	15.3	19.6
Shear (lesser of concrete pryout or steel failure) - ϕV_n												
Design strength in shear (cracked concrete)	HST4	ϕV_n	[kN]	3.0	6.8	3.4	12.3	7.1	20.7	27.6	35.2	41.8
	HST4-R			3.0	6.8	3.0	10.5	7.1	21.5	15.8	42.6	51.5
Design strength in shear (uncracked concrete)	HST4	ϕV_n	[kN]	3.8	9.2	4.2	12.3	10.2	20.7	27.6	35.2	41.8
	HST4-R			3.8	8.9	4.2	14.2	9.8	21.5	15.8	42.6	51.5
Design strength in shear, seismic	HST4	ϕV_n	[kN]	3.0	6.8	3.4	12.3	7.1	20.7	22.0	29.9	41.8
	HST4-R			3.0	6.8	3.0	10.5	7.1	21.5	15.8	39.0	33.5

Tensile design information based on ER-815 and evaluation according to ACI 355.2 and ICC-ES AC193. Design according to ACI 318 Chapter 17.

Additional information:

a) Strength reduction factor for steel in tension:
The HST4 (-R) expansion anchor is considered a ductile steel element.

b) Strength reduction factor for concrete failure & Pullout in tension for Condition A and B:
For use with the load combinations of ACI 318 section 5.3. Condition B applies where supplementary reinforcement in conformance with ACI 318 section 17.5.3 is not provided, or where pullout or pryout strength governs. For cases where the presence of supplementary reinforcement can be verified, the resistance modification factors associated with Condition A may be used.

c) Modification factor for anchor resistance, tension, uncracked concrete:
For all design cases, $\psi_{c,N} = 1.0$. The appropriate effectiveness factor for cracked concrete (k_{cr}) or uncracked (k_{uncr}) concrete must be used.

d) Pullout strength uncracked, cracked and seismic:
For all design cases, $\psi_{c,P} = 1.0$. Tabular value for pullout strength is for a concrete compressive strength of 17.2 MPa (2500 psi). Pullout strength for concrete compressive strength greater than 17.2 MPa may be increased by multiplying the tabular pullout strength by $(f'_c / 17.2)^{0.5}$ except for HST4 M8 which will increase tabular pullout strength by $(f'_c / 17.2)^{0.48}$.
N/A (not applicable) denotes that pullout strength does not need to be considered for design.

For specific design cases refer to PROFIS Engineering.

Design parameter				Nominal anchor diameter (mm)								
				M8		M10		M12		M16		M20
Anchor O.D.		d_a	[mm]	8		10		12		16		20
Effective min. embedment		h_{ef}	[mm]	30	45	30	60	40	70	65	85	101
Tension, steel failure modes												
Strength reduction factor for steel in tension [a]	HST4 / HST4-R	$\phi_{sa,N}$	-	0.75								
Nominal steel strength in tension	HST4	N_{sa}	[kN]	22.2		32.5		46.0		75.0		124.2
	HST4-R			22.0		32.5		48.0		75.0		115.8
Tension, concrete failure modes												
Anchor category	HST4 (HD)	-	-	1		2	1	1		1		1
	HST4 (DD)									2		
	HST4-R			2		1		1		2	1	1
Strength reduction factor for concrete failure in tension, Condition A [b]	HST4 (HD)	$\phi_{c,N}$	-	0.4	0.75	0.35	0.75	0.75	0.75	0.75	0.75	0.75
	HST4 (DD)									0.65	0.65	
	HST4-R			0.35	0.65	0.40	0.75	0.75	0.75	0.65	0.75	0.75
Strength reduction factor for concrete failure in tension, Condition B [b]	HST4 (HD)	$\phi_{c,N}$	-	0.4	0.65	0.35	0.65	0.65	0.65	0.65	0.65	0.65
	HST4 (DD)									0.55	0.55	
	HST4-R			0.35	0.55	0.40	0.65	0.65	0.65	0.55	0.65	0.65
Strength reduction factor for pullout failure in tension, Condition A and B [b]	HST4 (HD)	$\phi_{p,N}$	-	0.4	0.65	0.35	0.65	0.65	0.65	0.65	0.65	0.65
	HST4 (DD)									0.55	0.55	
	HST4-R			0.35	0.55	0.40	0.65	0.65	0.65	0.55	0.65	0.65

Continued from the previous table

Design parameter				Nominal anchor diameter (mm)								
Anchor O.D.		**d_a**	**[mm]**	**8**		**10**		**12**		**16**		**20**
Effective min. embedment		h_{ef}	[mm]	30	45	30	60	40	70	65	85	101
Effectiveness factor for uncracked concrete	HST4 (HD)	k_{uncr}	-	11.3	10.0	12.6	11.3	12.6	11.3	12.6		10.0
	HST4 (DD)									10.0		
	HST4-R			11.3	10.0	12.6	11.3	12.6	11.3	12.6		10
Effectiveness factor for cracked concrete	HST4	k_{cr}	-	8.8	7.1	10.0	8.8	8.8		8.8		8.8
	HST4-R			8.8	7.1	8.8	7.1	8.8	7.1	8.8		8.8
Modification factor for anchor resistance, tension, uncracked concrete [c]	HST4	$\psi_{c,N}$	-	1.0								
	HST4-R											
Critical edge distance	HST4	c_{ac}	[mm]	51	67	72	101	85	115	122	148	192
	HST4-R											
Pullout strength in uncracked concrete [d]	HST4	$N_{p,uncr}$	[kN]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	HST4-R											
Pullout strength in cracked concrete [d]	HST4	$N_{p,cr}$	[kN]	5.96	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	HST4-R			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pullout strength in cracked concrete, seismic [d]	HST4	$N_{p,eq}$	[kN]	5.96	N/A	N/A	N/A	N/A	N/A	N/A	N/A	36.6
	HST4-R			4.1	N/A	4.3	N/A	6.2	N/A	13.5	N/A	36.6

Shear design information based on ER-815 and evaluation according to ACI 355.2 and ICC-ES AC193. Design according to ACI 318 Chapter 17

Additional information:

a) Strength reduction factor for steel in shear:
The HST4 (-R) expansion anchor is considered a ductile steel element.

b) Strength reduction factor for concrete breakout failure & pryout failure in shear, Condition A and B:
For use with the load combinations of ACI 318 section 5.3. Condition B applies where supplementary reinforcement in conformance with ACI 318 section 17.5.3 is not provided, or where pullout or pryout strength governs. For cases where the presence of supplementary reinforcement can be verified, the resistance modification factors associated with Condition A may be used.

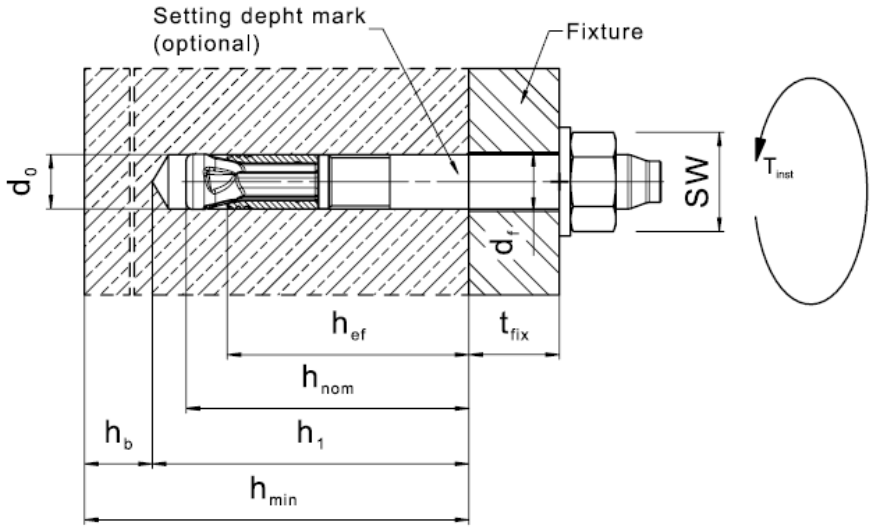
For specific design cases refer to PROFIS Engineering.

Design parameter				Nominal anchor diameter (mm)								
				M8		M10		M12		M16		M20
Anchor O.D.		d_a	[mm]	8		10		12		16		20
Effective min. embedment		h_{ef}	[mm]	30	45	30	60	40	70	65	85	101
Shear, steel failure modes												
Strength reduction factor for steel in shear [a]	HST4 / HST4-R	$\phi_{sa,V}$	-	0.65								
Nominal steel strength in shear	HST4	V_{sa}	[kN]	8.8	14.1	17.0	18.9	22.8	31.8	42.5	54.2	64.3
	HST4-R			13.7		21.9		15.1	33.1	24.3	65.5	79.2
Nominal steel strength in shear, seismic	HST4	$V_{sa,eq}$	[kN]	7.3	12.6	15.1	18.9	19.6	31.8	33.9	46.0	64.3
	HST4-R			13.7		21.9		14.7	33.1	24.3	60.0	51.5
Shear, concrete failure modes												
Strength reduction factor for concrete breakout failure in shear, Condition A [b]	HST4 / HST4-R	$\phi_{c,V}$	-	0.45	0.75	0.45	0.75	0.75		0.75		0.75
Strength reduction factor for concrete breakout failure in shear, Condition B [b]	HST4 / HST4-R	$\phi_{c,V}$	-	0.45	0.70	0.45	0.70	0.70		0.70		0.70
Strength reduction factor for pryout failure in shear, Condition A and B [b]	HST4 / HST4-R	$\phi_{p,V}$	-	0.45	0.70	0.45	0.70	0.70		0.70		0.70
Load bearing length of anchor in shear	HST4 / HST4-R	ℓ_e	[mm]	30	45	30	60	40	70	65	85	101
Effectiveness factor for pryout	HST4 / HST4-R	k_{cp}	-	1	1	1	1	1	2	2	2	2

Setting information for HST4 and HST4-R

Setting details

Anchor size			M8		M10		M12		M16		M20
Nominal diameter of drill bit	d_o	[mm]	8		10		12		16		20
Maximum diameter of clearance hole in the fixture	d_f	[mm]	9		12		14		18		22
Torque moment	T_{inst}	[Nm]	20		40		60		120		180
Effective anchorage depth	h_{ef}	[mm]	30	45	30	60	40	70	65	85	101
Nominal embedment depth	h_{nom}	[mm]	36	51	38	68	49	79	77	97	116
Drill hole depth											
Minimum hole depth in concrete for non-cleaned hole	$h_{1, NC}$	[mm]	56	71	58	88	69	99	97	117	136
Concrete thickness below bore hole	$h_{b,NC}$	[mm]	30	30	32	30	36	36	38	38	39
Minimum concrete thickness for non-cleaned hole	$h_{min, NC}$	[mm]	86	101	90	118	105	135	135	155	175
Minimum hole depth in concrete for cleaned hole	$h_{1, C}$	[mm]	39	54	42	72	53	83	83	103	124
Concrete thickness below bore hole	$h_{b,C}$	[mm]	41	30	38	30	47	37	37	37	36
Minimum concrete thickness for cleaned hole	$h_{min, C}$	[mm]	80	84	80	102	100	120	120	140	160



Minimum spacing s_{min}, edge distance c_{min} and concrete thickness for HST4 and HST4-R

Setting details

Anchor size	Symbol	Units	M8		M10		M12		M16		M20
Effective minimum embedment	$h_{ef,min}$	[mm]	30	45	30	60	40	70	65	85	101
Non-cleaned hole											
Minimum concrete thickness	$h_{min, NC}$	[mm]	86	101	90	118	105	135	135	155	175
Minimum edge distance	c_{min}	[mm]	40		60		60		65		120
	for s ≥	[mm]	80		100	90	155		185		180
Minimum anchor spacing	s_{min}	[mm]	35		40		50		80		120
	for c >	[mm]	70		100		115		135		180
Minimum concrete thickness	$h_{min, NC}$	[mm]	100	100	100	120	120	140	140	160	200
Minimum edge distance	c_{min}	[mm]	40		50		55		65		80
	for s ≥	[mm]	50		105		110		175		180
Minimum anchor spacing	s_{min}	[mm]	35		40		60		65		90
	for c >	[mm]	50		70		105	70	130	105	130
Cleaned hole											
Minimum concrete thickness	$h_{min, C}$	[mm]	80	84	80	102	100	120	120	140	160
Minimum edge distance	c_{min}	[mm]	40		60		60		65		120
	for s ≥	[mm]	80		100	90	155		185		180
Minimum anchor spacing	s_{min}	[mm]	35		40		50		80		120
	for c >	[mm]	70		100		115		135		180
Minimum concrete thickness	$h_{min, C}$	[mm]	100	100	100	120	120	140	140	160	200
Minimum edge distance	c_{min}	[mm]	40		50		55		65		80
	for s ≥	[mm]	50		105		110		175		180
Minimum anchor spacing	s_{min}	[mm]	35		40		60		65		90
	for c >	[mm]	50		70		105	70	130	105	130

Linear interpolation for c_{min} and s_{min} is permitted. Figure below illustrates the interpolation method.

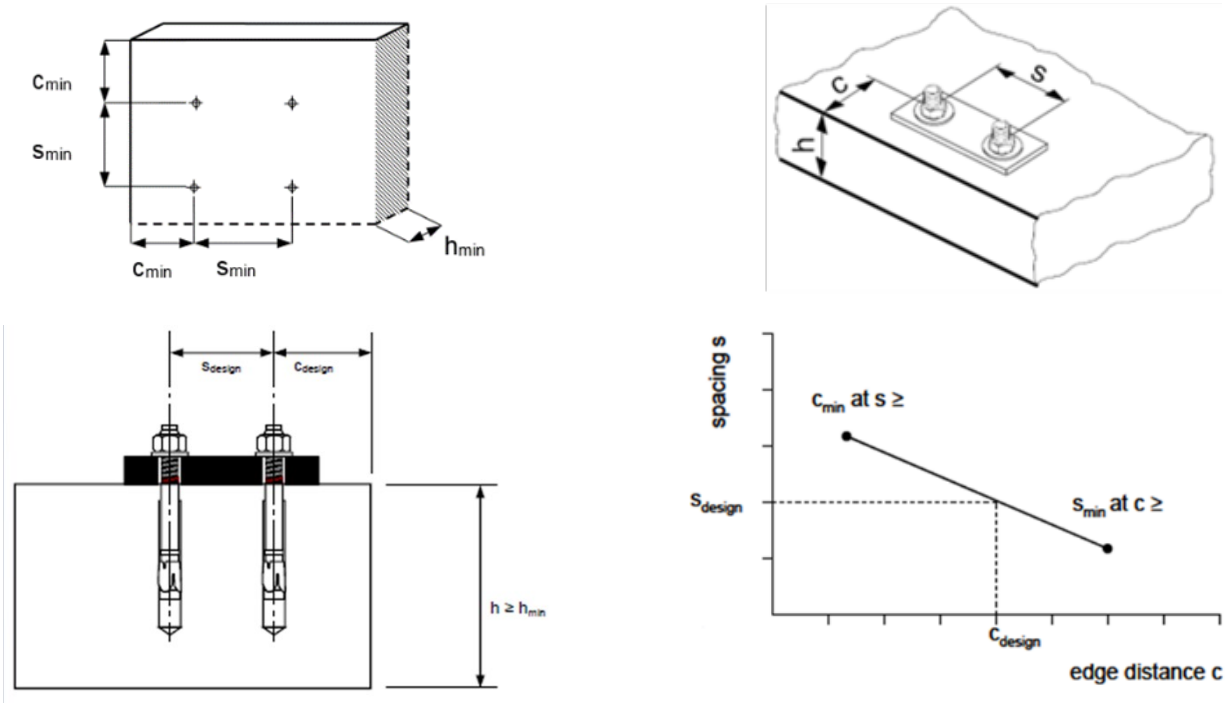


Fig : Interpolation of Minimum edge distance and anchor spacing

Drilling and Installation equipment

For detailed setting information on installation see instructions (IFU) for use given with the product.

Rotary Hammers (Corded and Cordless)		TE 2 - TE 70
Diamond Coring Machines		DD EC-1, DD 30-W, DD 150-U
Other tools		Torque Impact wrench with AT module - SIW 6AT-22 & SI-AT-22 - SIW 4AT-22 & SI-AT-22
		Hammer drill bit TE-CX, TE-YX, TE-C, TE-Y
		Hollow drill bit TE-CD, TE-YD
		Diamond core bit TS, TL, SPX-T, SPX-L
		Setting Tool HS-SC
		Blow out pump