



HIT-HY 200-A V3 HIT-HY 200-R V3 INJECTION MORTAR

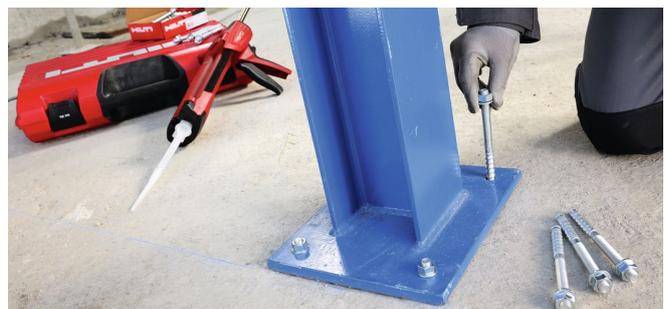
Product Technical Datasheet
Steel-to-concrete
Update: Jan 25



HIT-HY 200-A V3 and HIT-HY 200-R V3 injection mortars

Anchor design (EN 1992-4, EOTA TR 082) / Rods, Sleeves and Rebar / Concrete

| Injection mortar system | Benefits |
|---|--|
|  | <p>Hilti HIT-HY 200-A V3</p> <ul style="list-style-type: none"> -  technology: Makes installation steps faster, simpler and safer. Automatic borehole cleaning with hollow drill bits, accurate dosing with HDE and fast and safe torquing with the adaptive torque (AT) system. |
|  | <p>Hilti HIT-HY 200-R V3</p> <p>500 ml foil pack (also available as 330 ml foil pack)</p> |
|  | <p>Anchor rod (M8-M30): HAS, HAS HDG, HAS A4, HAS-U, HAS-U HDG, HAS-U A4, HAS-U HCR</p> |
|  | <p>Internally threaded sleeve (M8-M20): HIS-N HIS-RN</p> |
|  | <p>Anchor rod (M8-M20): HIT-Z(-D TP) HIT-Z-F HIT-Z-R(-D TP)</p> |
|  | <p>Anchor rod (M12-M20): HAS-D</p> |
|  | <p>Rebar (φ8 - φ32)</p> |



Application condition

| Base material | | | Load conditions | | | | |
|-----------------------------|---------------------|--------------------------------|-----------------------------------|--------------------------|-------------------------------|-----------------------------|----------------------------|
| | | | | | | | |
| Concrete (uncracked) | Concrete (cracked) | Concrete (SFRC) | Static/ quasi-static | Seismic ETA-C1, C2 | Fatigue ETA | Fire resistance | |
| Drilling, cleaning, setting | | | Other information | | | | |
| | | | | | | | |
| Hammer drilled holes | Diamond cored holes | Hollow Drill Bit drilled holes | Water-filled borehole in concrete | Variable embedment depth | ETA 100 Years Working Life | PROFIS Engineering Software | Steel to concrete Handbook |

Linked Approvals/Certificates and Instructions for use.

Approvals/certificates

| Approval no | Application / loading condition | Authority / Laboratory | Date of issue |
|--|--|------------------------|---------------|
| ETA-19/0601 (HAS, HIS-N, rebar) | Static and quasi-static / Seismic / Fire | DIBt, Berlin | 29-01-2024 |
| ETA-19/0632 (HIT-Z) | Static and quasi-static / Seismic | DIBt, Berlin | 08-06-2023 |
| ETA-18/0972 (HAS-D) | Static and quasi-static | DIBt, Berlin | 26-09-2024 |
| ETA-15/0296 (HIT-Z-D-TP) | Static and quasi-static / Seismic | DIBt, Berlin | 18-07-2023 |
| ETA-18/0978 (HAS-D) | Static and quasi-static / Fatigue | DIBt, Berlin | 26-09-2024 |
| ETA-19/0802 (HIT-Z-D-TP) | Static and quasi-static / Fatigue | DIBt, Berlin | 18-09-2024 |
| No.: 01/2024 (HAS, HIS-N, rebar) | 120-years working life based on ETA-19/0601 | BERGMEISTER, Vienna | 18-03-2024 |

Approvals/certificates for normal weight concrete with maximum steel fibre content of 80 kg/m³

| Approval no | Application / loading condition | Authority / Laboratory | Date of issue | Date of expiry |
|--|--|------------------------|---------------|----------------|
| Z-21.3-2155 (HAS-D) | Fatigue applications in Steel Fibre Reinforced Concrete (SFRC) | DIBt, Berlin | 19-03-2024 | 19-03-2029 |

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

Link to Instructions for use(IFU)

| Material | | | |
|------------------|---|---|---------------------------------|
| Injection mortar | IFU Hilti HIT-HY 200 A V3 | IFU Hilti HIT-HY 200-R V3 | - |
| Accessory | IFU Filling set | | |
| Dispenser | IFU HDM | IFU HDE 500-22 | IFU HDE 500-A12 |

Links to Hilti Webpage

| Injection mortars / Dispenser / Accessories | | | | | |
|---|---------------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|
| HIT-HY 200-A V3 | HIT-HY 200-R V3 | HDE 500-22 | HDE 500-A12 | HDM 500 | Filling set |
| | | | | | |
| Fastener: Threaded rod | | | | | |
| HAS-U 8.8 | HAS 8.8 | HIS-N | HIT-Z | HIT-Z-D-TP | HAS-D |
| | | | | | |

Fastener special dimensions

Mechanical properties and dimensions HAS and HAS-U

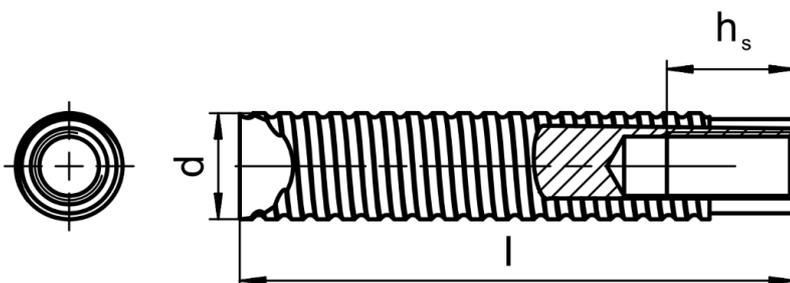
Mechanical properties and dimensions of the threaded rods are standardized and can be taken from the ETA listed in the table Approvals / Certificates.

Mechanical properties and dimensions HIS-N

Mechanical properties of the internal threaded sleeve can be taken from the ETA listed in the table Approvals / Certificates.

Dimensions for HIS-N and HIS-RN

| Anchor size | | M8 | M10 | M12 | M16 | M20 |
|-------------------------------------|------------|------|-------|-------|-------|-------|
| Diameter of element | d [mm] | 12,5 | 16,5 | 20,5 | 25,4 | 27,6 |
| Length of element | L [mm] | 90 | 110 | 125 | 170 | 205 |
| Thread engagement length; min - max | h_s [mm] | 8-20 | 10-25 | 12-30 | 16-40 | 20-50 |



Mechanical properties and dimensions rebar

Mechanical properties and dimensions of the rebars are standardized and can be taken from the ETA.

Material quality

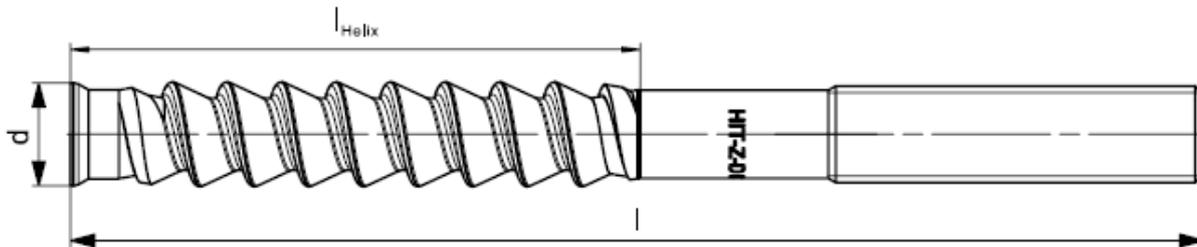
| Part | Material |
|---------------------------|--|
| Rebar EN 1992-1-1:2004 | Bars and de-coiled rods class B or C according to NDP or NCL of EN 1992-1-1/NA |

Mechanical properties and dimensions HIT-Z

Mechanical properties of the anchor rod HIT-Z can be taken from the ETA listed in the table Approvals/ Certificates.

Anchor dimension for HIT-Z^{a)}

| Anchor size | | M8 | M10 | M12 | M16 | M20 |
|---------------------|-------------------------|-----|-----|-----|-----|-----|
| Diameter of element | d [mm] | 8 | 10 | 12 | 16 | 20 |
| Length of anchor | min l [mm] | 80 | 95 | 105 | 155 | 215 |
| | max l [mm] | 120 | 160 | 196 | 420 | 450 |
| Helix length | l _{Helix} [mm] | 30 | 50 | 60 | 96 | 100 |

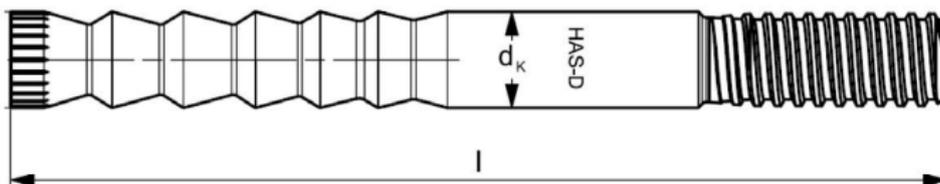


Mechanical properties and dimensions HAS-D

Mechanical properties of the anchor rod HAS-D can be taken from the ETA listed in the table Approvals / Certificates.

Anchor dimension for HAS-D

| Anchor size | | M12 | M16 | M20 |
|-------------------|---------------------|------|------|------|
| Shaft diameter | d _k [mm] | 12,5 | 16,5 | 22,0 |
| Fastener length l | min l [mm] | 143 | 180 | 242 |
| | max L [mm] | 531 | 565 | 623 |

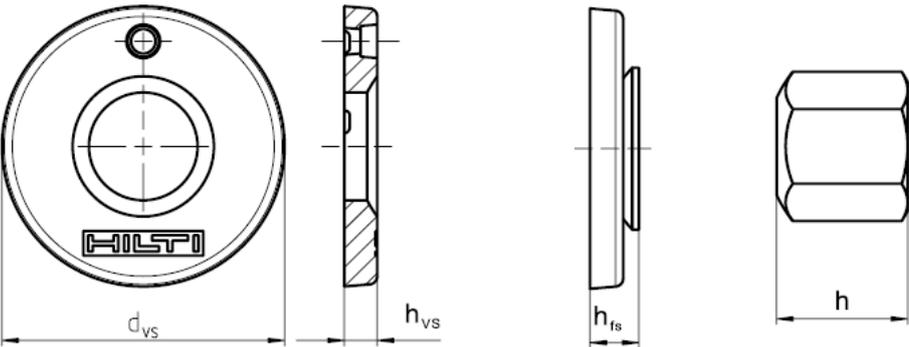


Mechanical properties and dimensions filling washer for use with standard nut and 1,5 d nut

Mechanical properties of filling washer can be taken from the ETA listed in the table Approvals / Certificates.

Dimensions filling washer and 1,5 d nut

| Anchor size | | | M10 | M12 | M16 | M20 | M24 |
|---|----------|------|-----|-----|-----|-----|-----|
| Diameter | d_{vs} | [mm] | 42 | 44 | 52 | 60 | 70 |
| Height of filling washer | h_{vs} | [mm] | 5 | 5 | 6 | 6 | 6 |
| Height of filling washer and spherical washer | h_{fs} | [mm] | 9 | 10 | 11 | 13 | 15 |
| Height of 1,5 d nut | h | [mm] | 15 | 18 | 24 | 30 | 36 |





**Static and quasi-static loading based on ETA-19/0601, ETA-19/0632 and ETA-18/0972.
Design according to EN 1992-4**

All data in this section applies to:

- Correct setting (see setting instruction)
- For a single anchor
- Hammer drilled holes, hammer drilled holes with Hilti hollow drill bit
- No edge distance and spacing influence (see setting detail tables with characteristic distances)
- Minimum base material thickness, as specified in the table of this section
- Embedment depth, as specified in the table of this section
- Anchor material, as specified in the tables of this section (HIS-N with screw grade 8.8 and HIS-RN with screw grade 70)
- Concrete C20/25 with and without steel fibre for HAS-D.
- Concrete C20/25 without steel fibre for all anchor types.
- Data given below are for 50 Years Working Life
- In-service temperature range I
(min. base material temp. -40°C, max. long/short term base material temp.: +24°C/40°C)
- Short term loading. For long term loading apply ψ_{sUS} acc. to EN 1992-4
Hammer drilled holes, hammer drilled holes with hollow drill bit $\psi_{sUS}^0 = 0,88$
- Recommended loads: With overall partial safety factor for action $\gamma = 1,4$.

For specific design cases refer to [PROFIS Engineering](#).

Embedment depth ¹⁾ and base material thickness

| Anchor size | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|-------------------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|
| HAS, HAS-U | | | | | | | | | |
| Embedment depth | h_{ef} [mm] | 80 | 90 | 110 | 125 | 170 | 210 | 240 | 270 |
| Base material thickness | h [mm] | 110 | 120 | 140 | 160 | 220 | 270 | 300 | 340 |
| HIS-N | | | | | | | | | |
| Embedment depth | h_{ef} [mm] | 90 | 110 | 125 | 170 | 205 | - | - | - |
| Base material thickness | h [mm] | 120 | 150 | 170 | 230 | 270 | - | - | - |
| HIT-Z(-D TP) | | | | | | | | | |
| Embedment depth | h_{ef} [mm] | 70 | 90 | 110 | 145 | 180 | - | - | - |
| Base material thickness | h [mm] | 130 | 150 | 170 | 245 | 280 | - | - | - |
| HAS-D | | | | | | | | | |
| Embedment depth | h_{ef} [mm] | - | - | 100 | 125 | 170 | - | - | - |
| Base material thickness | h [mm] | - | - | 130 | 160 | 220 | - | - | - |

| Rebar size | | φ8 | φ10 | φ12 | φ14 | φ16 | φ20 | φ25 | φ26 | φ28 | φ30 | φ32 |
|-------------------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Rebar B500 B | | | | | | | | | | | | |
| Embedment depth | h_{ef} [mm] | 80 | 90 | 110 | 125 | 125 | 170 | 210 | 240 | 270 | 270 | 300 |
| Base material thickness | h [mm] | 110 | 120 | 145 | 165 | 165 | 220 | 275 | 305 | 340 | 345 | 380 |

1) The allowed range of embedment depth is shown in the setting details.

Design resistance

| Anchor size | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 | |
|---------------------------|--------------------|----------------------|------|------|------|------|-------|-------|-------|-------|
| Uncracked concrete | | | | | | | | | | |
| Tension | HAS 5.8, HAS-U 5.8 | N _{Rd} [kN] | 12,2 | 19,3 | 28,1 | 45,8 | 72,7 | 99,8 | 121,9 | 145,5 |
| | HAS 8.8, HAS-U 8.8 | | 19,5 | 28,0 | 37,8 | 45,8 | 72,7 | 99,8 | 121,9 | 145,5 |
| | HAS A4, HAS-U A4 | | 13,7 | 21,7 | 31,6 | 45,8 | 72,7 | 99,8 | 80,2 | 98,1 |
| | HAS-U HCR | | 19,5 | 28,0 | 37,8 | 45,8 | 72,7 | 99,8 | 121,9 | 145,5 |
| | HIS-N 8.8 | | 16,7 | 30,7 | 44,7 | 72,7 | 77,3 | - | - | - |
| | HIS-RN 70 | | 13,9 | 21,9 | 31,6 | 58,8 | 69,2 | - | - | - |
| | HIT-Z(-D TP) | | 16,0 | 25,3 | 33,3 | 57,3 | 79,2 | - | - | - |
| | HAS-D | | - | - | 32,8 | 45,8 | 72,7 | - | - | - |
| Shear | HAS 5.8, HAS-U 5.8 | V _{Rd} [kN] | 8,8 | 13,9 | 20,2 | 37,7 | 58,8 | 84,7 | 110,2 | 134,6 |
| | HAS 8.8, HAS-U 8.8 | | 11,7 | 18,6 | 27,0 | 50,2 | 78,4 | 113,0 | 146,9 | 179,5 |
| | HAS A4, HAS-U A4 | | 8,2 | 13,0 | 18,9 | 35,2 | 55,0 | 79,2 | 48,2 | 58,9 |
| | HAS-U HCR | | 11,7 | 18,6 | 27,0 | 50,2 | 78,4 | 70,6 | 91,8 | 112,2 |
| | HIS-N 8.8 | | 10,4 | 18,4 | 27,2 | 50,4 | 46,4 | - | - | - |
| | HIS-RN 70 | | 8,3 | 12,8 | 19,2 | 35,3 | 41,5 | - | - | - |
| | HIT-Z(-D TP) | | 9,6 | 15,2 | 21,6 | 38,4 | 58,4 | - | - | - |
| | HAS-D | | - | - | 27,2 | 50,4 | 119,2 | - | - | - |
| Cracked concrete | | | | | | | | | | |
| Tension | HAS 5.8, HAS-U 5.8 | N _{Rd} [kN] | 10,0 | 17,7 | 26,3 | 32,1 | 50,9 | 69,9 | 85,4 | 101,8 |
| | HAS 8.8, HAS-U 8.8 | | 10,0 | 17,7 | 26,3 | 32,1 | 50,9 | 69,9 | 85,4 | 101,8 |
| | HAS A4, HAS-U A4 | | 10,0 | 17,7 | 26,3 | 32,1 | 50,9 | 69,9 | 80,2 | 98,1 |
| | HAS-U HCR | | 10,0 | 17,7 | 26,3 | 32,1 | 50,9 | 69,9 | 85,4 | 101,8 |
| | HIS-N 8.8 | | 16,5 | 26,5 | 32,1 | 50,9 | 67,4 | - | - | - |
| | HIS-RN 70 | | 13,9 | 21,9 | 31,6 | 50,9 | 67,4 | - | - | - |
| | HIT-Z(-D TP) | | 13,4 | 19,6 | 26,5 | 40,1 | 55,4 | - | - | - |
| | HAS-D | | - | - | 22,9 | 32,1 | 50,9 | - | - | - |
| Shear | HAS 5.8, HAS-U 5.8 | V _{Rd} [kN] | 8,8 | 13,9 | 20,2 | 37,7 | 58,8 | 84,7 | 110,2 | 134,6 |
| | HAS 8.8, HAS-U 8.8 | | 11,7 | 18,6 | 27,0 | 50,2 | 78,4 | 113,0 | 146,9 | 179,5 |
| | HAS A4, HAS-U A4 | | 8,2 | 13,0 | 18,9 | 35,2 | 55,0 | 79,2 | 48,2 | 58,9 |
| | HAS-U HCR | | 11,7 | 18,6 | 27,0 | 50,2 | 78,4 | 70,6 | 91,8 | 112,2 |
| | HIS-N 8.8 | | 10,4 | 18,4 | 27,2 | 50,4 | 46,4 | - | - | - |
| | HIS-RN 70 | | 8,3 | 12,8 | 19,2 | 35,3 | 41,5 | - | - | - |
| | HIT-Z(-D TP) | | 9,6 | 15,2 | 21,6 | 38,4 | 58,4 | - | - | - |
| | HAS-D | | - | - | 27,2 | 50,4 | 101,8 | - | - | - |

Design resistance

| Rebar B500B size | | φ8 | φ10 | φ12 | φ14 | φ16 | φ20 | φ25 | φ26 | φ28 | φ30 | φ32 |
|---------------------------|----------------------|------|------|------|------|------|------|------|-------|-------|-------|-------|
| Uncracked concrete | | | | | | | | | | | | |
| Tension | N _{Rd} [kN] | 16,1 | 22,6 | 33,2 | 44,0 | 45,8 | 72,7 | 99,8 | 121,9 | 145,5 | 145,5 | 170,4 |
| Shear | V _{Rd} [kN] | 9,3 | 14,7 | 20,7 | 28,0 | 36,7 | 57,3 | 90,0 | 97,3 | 112,7 | 129,3 | 147,3 |
| Cracked concrete | | | | | | | | | | | | |
| Tension | N _{Rd} [kN] | - | 9,4 | 19,4 | 25,7 | 29,3 | 49,8 | 69,9 | 85,4 | 101,8 | 101,8 | 119,3 |
| Shear | V _{Rd} [kN] | - | 14,7 | 20,7 | 28,0 | 36,7 | 57,3 | 90,0 | 97,3 | 112,7 | 129,3 | 147,3 |



Recommended load

| Anchor size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---------------------------|--------------------|----------------|------|------|------|------|------|------|-------|-------|
| Uncracked concrete | | | | | | | | | | |
| Tension | HAS 5.8, HAS-U 5.8 | N_{rec} [kN] | 8,7 | 13,8 | 20,1 | 32,7 | 51,9 | 71,3 | 87,1 | 103,9 |
| | HAS 8.8, HAS-U 8.8 | | 13,9 | 20,0 | 27,0 | 32,7 | 51,9 | 71,3 | 87,1 | 103,9 |
| | HAS A4, HAS-U A4 | | 9,8 | 15,5 | 22,5 | 32,7 | 51,9 | 71,3 | 57,3 | 70,1 |
| | HAS-U HCR | | 13,9 | 20,0 | 27,0 | 32,7 | 51,9 | 71,3 | 87,1 | 103,9 |
| | HIS-N 8.8 | | 11,9 | 21,9 | 31,9 | 51,9 | 55,2 | - | - | - |
| | HIS-RN 70 | | 9,9 | 15,7 | 22,5 | 42,0 | 49,4 | - | - | - |
| | HIT-Z(-D TP) | | 11,4 | 18,1 | 23,8 | 40,9 | 56,6 | - | - | - |
| | HAS-D | | - | - | 23,4 | 32,7 | 51,9 | - | - | - |
| Shear | HAS 5.8, HAS-U 5.8 | V_{rec} [kN] | 6,3 | 9,9 | 14,5 | 26,9 | 42,0 | 60,5 | 78,7 | 96,2 |
| | HAS 8.8, HAS-U 8.8 | | 8,4 | 13,3 | 19,3 | 35,9 | 56,0 | 80,7 | 104,9 | 128,2 |
| | HAS A4, HAS-U A4 | | 5,9 | 9,3 | 13,5 | 25,2 | 39,3 | 56,6 | 34,4 | 42,1 |
| | HAS-U HCR | | 8,4 | 13,3 | 19,3 | 35,9 | 56,0 | 50,4 | 65,6 | 80,1 |
| | HIS-N 8.8 | | 7,4 | 13,1 | 19,4 | 36,0 | 33,1 | - | - | - |
| | HIS-RN 70 | | 6,0 | 9,2 | 13,7 | 25,2 | 29,6 | - | - | - |
| | HIT-Z(-D TP) | | 6,9 | 10,9 | 15,4 | 27,4 | 41,7 | - | - | - |
| | HAS-D | | - | - | 19,4 | 36,0 | 85,1 | - | - | - |
| Cracked concrete | | | | | | | | | | |
| Tension | HAS 5.8, HAS-U 5.8 | N_{rec} [kN] | 7,2 | 12,6 | 18,8 | 22,9 | 36,3 | 49,9 | 61,0 | 72,7 |
| | HAS 8.8, HAS-U 8.8 | | 7,2 | 12,6 | 18,8 | 22,9 | 36,3 | 49,9 | 61,0 | 72,7 |
| | HAS A4, HAS-U A4 | | 7,2 | 12,6 | 18,8 | 22,9 | 36,3 | 49,9 | 57,3 | 70,1 |
| | HAS-U HCR | | 7,2 | 12,6 | 18,8 | 22,9 | 36,3 | 49,9 | 61,0 | 72,7 |
| | HIS-N 8.8 | | 11,8 | 18,9 | 22,9 | 36,3 | 48,1 | - | - | - |
| | HIS-RN 70 | | 9,9 | 15,7 | 22,5 | 36,3 | 48,1 | - | - | - |
| | HIT-Z(-D TP) | | 9,6 | 14,0 | 18,9 | 28,6 | 39,6 | - | - | - |
| | HAS-D | | - | - | 16,4 | 22,9 | 36,3 | - | - | - |
| Shear | HAS 5.8, HAS-U 5.8 | V_{rec} [kN] | 6,3 | 9,9 | 14,5 | 26,9 | 42,0 | 60,5 | 78,7 | 96,2 |
| | HAS 8.8, HAS-U 8.8 | | 8,4 | 13,3 | 19,3 | 35,9 | 56,0 | 80,7 | 104,9 | 128,2 |
| | HAS A4, HAS-U A4 | | 5,9 | 9,3 | 13,5 | 25,2 | 39,3 | 56,6 | 34,4 | 42,1 |
| | HAS-U HCR | | 8,4 | 13,3 | 19,3 | 35,9 | 56,0 | 50,4 | 65,6 | 80,1 |
| | HIS-N 8.8 | | 7,4 | 13,1 | 19,4 | 36,0 | 33,1 | - | - | - |
| | HIS-RN 70 | | 6,0 | 9,2 | 13,7 | 25,2 | 29,6 | - | - | - |
| | HIT-Z(-D TP) | | 6,9 | 10,9 | 15,4 | 27,4 | 41,7 | - | - | - |
| | HAS-D | | - | - | 19,4 | 36,0 | 72,7 | - | - | - |

Recommended load

| Rebar B500B size | | | φ8 | φ10 | φ12 | φ14 | φ16 | φ20 | φ25 | φ26 | φ28 | φ30 | φ32 |
|---------------------------|-----------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| Uncracked concrete | | | | | | | | | | | | | |
| Tension | N_{rec} | [kN] | 11,5 | 16,2 | 23,7 | 31,4 | 32,7 | 51,9 | 71,3 | 87,1 | 103,9 | 103,9 | 121,7 |
| Shear | V_{rec} | [kN] | 6,7 | 10,5 | 14,8 | 20,0 | 26,2 | 41,0 | 64,3 | 69,5 | 80,5 | 92,4 | 105,2 |
| Cracked concrete | | | | | | | | | | | | | |
| Tension | N_{rec} | [kN] | - | 6,7 | 13,8 | 18,3 | 20,9 | 35,6 | 49,9 | 61,0 | 72,7 | 72,7 | 85,2 |
| Shear | V_{rec} | [kN] | - | 10,5 | 14,8 | 20,0 | 26,2 | 41,0 | 64,3 | 69,5 | 80,5 | 92,4 | 105,2 |

Seismic loading based on ETA-19/0601 and ETA-19/0632. Design according to EN 1992-4

All data in this section applies to:

- Correct setting (see setting instruction)
- For a single anchor
- Hammer drilled holes, hammer drilled holes with Hilti hollow drill bit
- No edge distance and spacing influence (see setting detail tables with characteristic distances)
- Minimum base material thickness, as specified in the table of this section
- Embedment depth, as specified in the table of this section
- Anchor material, as specified in the tables of this section
- Concrete C20/25
- Temperature range I (min. base material temp. -40°C, max. long/short term base material temp.: +24°C/40°C)
- $\alpha_{\text{gap}} = 1,0$ (using Hilti seismic filling set) or $\alpha_{\text{gap}} = 0,5$ (without using Hilti seismic filling set) accordingly

For specific design cases refer to [PROFIS Engineering](#).

Embedment depth ¹⁾ and base material thickness for seismic performance category C2

| Anchor size | | | M12 | M16 | M20 | M24 |
|-------------------------|-----------------|------|-----|-----|-----|-----|
| HAS, HAS-U | | | | | | |
| Embedment depth | h_{ef} | [mm] | 110 | 125 | 170 | 210 |
| Base material thickness | h | [mm] | 140 | 160 | 220 | 270 |
| HIT-Z | | | | | | |
| Embedment depth | h_{ef} | [mm] | 110 | 145 | 180 | - |
| Base material thickness | h | [mm] | 170 | 245 | 280 | - |

Design resistance in case of seismic performance category C2

| Anchor size | | | M12 | M16 | M20 | M24 |
|---|--------------------|-------------------------|------|------|------|------|
| Tension | HAS 8.8, HAS-U 8.8 | $N_{\text{Rd,C2}}$ [kN] | 7,5 | 19,3 | 32,8 | 36,9 |
| | HIT-Z | | 14,7 | 34,1 | 47,1 | - |
| with Hilti filling set ($\alpha_{\text{gap}} = 1,0$) | | | | | | |
| Shear | HAS 8.8, HAS-U 8.8 | $V_{\text{Rd,C2}}$ [kN] | 22,4 | 36,8 | 61,6 | 82,4 |
| | HIT-Z | | 18,4 | 32,8 | 48,8 | - |
| without Hilti filling set ($\alpha_{\text{gap}} = 0,5$) | | | | | | |
| Shear | HAS 8.8, HAS-U 8.8 | $V_{\text{Rd,C2}}$ [kN] | 9,6 | 16,0 | 28,4 | 36,0 |
| | HIT-Z | | 8,4 | 14,4 | 22,0 | - |



Embedment depth and base material thickness for seismic performance category C1

| Anchor size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|-------------------------|----------|------|-----|-----|-----|-----|-----|-----|-----|-----|
| HAS, HAS-U | | | | | | | | | | |
| Embedment depth | h_{ef} | [mm] | - | 90 | 110 | 125 | 170 | 210 | 240 | 270 |
| Base material thickness | h | [mm] | - | 120 | 140 | 160 | 220 | 270 | 300 | 340 |
| HIT-Z | | | | | | | | | | |
| Embedment depth | h_{ef} | [mm] | 70 | 90 | 110 | 145 | 180 | - | - | - |
| Base material thickness | h | [mm] | 130 | 150 | 170 | 245 | 280 | - | - | - |

Design resistance in case of seismic performance category C1

| Anchor size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|--|--------------------|------------------|------|------|------|------|------|-------|------|------|
| Tension | HAS 8.8, HAS-U 8.8 | $N_{Rd,C1}$ [kN] | - | 9,8 | 19,4 | 27,3 | 43,3 | 59,4 | 72,6 | 86,6 |
| | HIT-Z; HIT-Z-R | | 11,4 | 16,7 | 22,5 | 34,1 | 47,1 | - | - | - |
| with Hilti filling set ($\alpha_{gap} = 1,0$) | | | | | | | | | | |
| Shear | HAS 8.8, HAS-U 8.8 | $V_{Rd,C1}$ [kN] | - | 18,6 | 27,0 | 50,2 | 78,4 | 113,0 | - | - |
| | HIT-Z | | 6,8 | 9,6 | 12,8 | 22,4 | 36,0 | - | - | - |
| | HIT-Z-R | | 7,8 | 12,0 | 17,6 | 24,8 | 38,4 | - | - | - |
| without Hilti filling set ($\alpha_{gap} = 0,5$) | | | | | | | | | | |
| Shear | HAS 8.8, HAS-U 8.8 | $V_{Rd,C1}$ [kN] | - | 9,3 | 13,5 | 25,1 | 39,2 | 56,5 | 73,4 | 89,8 |
| | HIT-Z | | 3,4 | 4,8 | 6,4 | 11,2 | 18,0 | - | - | - |
| | HIT-Z-R | | 3,9 | 6,0 | 8,8 | 12,4 | 19,2 | - | - | - |

Fatigue loading based on ETA-18/0978 and ETA-19/0802
Design according to EN 1992-4

All data in this section applies to:

- Correct setting (see setting instruction)
- For a single anchor
- Hammer drilled holes, hammer drilled holes with Hilti hollow drill bit
- No edge distance and spacing influence (see setting detail tables with characteristic distances)
- Minimum base material thickness, as specified in the table of this section
- Embedment depth, as specified in the table of this section
- Anchor material, as specified in the tables of this section
- Concrete C20/25
- FOR HAS-D: In-service temperature range I
(min. base material temp. -40°C, max. long/short term base material temp.: +50°C/80°C)
- FOR HIT-Z(-R)-D TP: In-service temperature range I
(min. base material temp. -40°C, max. long/short term base material temp.: +24°C/40°C)

For specific design cases refer to [PROFIS Engineering](#).

Anchorage depth

| Anchor size | | | M12 | M16 | M20 |
|--|----------|------|-----|-----------------------|-----------------------|
| HAS-D | | | | | |
| Embedment depth | h_{ef} | [mm] | 100 | 125 | 170 |
| Base material thickness | h | [mm] | 130 | 160 | 220 |
| HIT-Z-D TP, HIT-Z-R-D TP, HIT-Z | | | | | |
| Embedment depth | h_{ef} | [mm] | - | 125 | 140 |
| Base material thickness ^{a)} | h | [mm] | - | 160/225 ^{a)} | 185/240 ^{a)} |

a) Values show for Drill hole condition (1) and (2) respectively. See setting details

Design resistance

| Anchor size | | | M12 | M16 | M20 | |
|---------------------------------------|--------------|--------------------------|------|------|------|------|
| Concrete cracked and uncracked | | | | | | |
| Tension | HAS-D | $\Delta N_{Rd,0,\infty}$ | [kN] | 14,9 | 25,2 | 32,2 |
| | HIT-Z-D TP | | | - | 13,9 | - |
| | HIT-Z-R-D TP | | | - | 9,2 | - |
| | HIT-Z | | | - | - | 13,9 |
| Shear | HAS-D | $\Delta V_{Rd,0,\infty}$ | [kN] | 6,1 | 11,1 | 15,6 |
| | HIT-Z-D TP | | | - | 5,9 | - |
| | HIT-Z-R-D TP | | | - | 5,9 | - |
| | HIT-Z | | | - | - | 5,9 |



Fire loading based on ETA-19/0601. Design according to EOTA TR 082

All data in this section applies to:

- In case of fire a partial safety factor $\gamma_{M,fi} = 1,0$ is taken (in absence of other national recommendations)
- Correct setting (see setting instructions)
- For a single anchor
- Hammer drilled holes, hammer drilled holes with Hilti hollow drill bit
- No edge distance and spacing influence (see setting detail tables with characteristic distances)
- Fire attack from side only
- Minimum base material thickness, as specified in the table of this section
- Embedment depth, as specified in the table of this section
- Anchor material, as specified in the tables of this section
- Concrete C20/25

For specific design cases refer to [PROFIS Engineering](#).

Anchorage depth in case of fire

| Anchor size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|--------------|------|-----|-----|-----|-----|-----|-----|-----|-----|
| HAS 5.8, HAS-U 5.8, HAS A4, HAS-U A4 | | | | | | | | | | |
| Embedment depth (minimum) | $h_{ef,min}$ | [mm] | 60 | 60 | 72 | 80 | 90 | 96 | 108 | 120 |
| Base material thickness for $h_{ef,min}$ | $h \geq$ | [mm] | 100 | 100 | 105 | 120 | 135 | 155 | 170 | 190 |
| Embedment depth (intermediate) | $h_{ef,med}$ | [mm] | 80 | 90 | 96 | 112 | 120 | 120 | 135 | 150 |
| Base material thickness for $h_{ef,med}$ | $h \geq$ | [mm] | 110 | 120 | 125 | 150 | 165 | 180 | 195 | 220 |
| Embedment depth (maximum) | $h_{ef,max}$ | [mm] | 160 | 200 | 240 | 320 | 400 | 480 | 540 | 600 |
| Base material thickness for $h_{ef,max}$ | $h \geq$ | [mm] | 190 | 230 | 270 | 360 | 445 | 540 | 600 | 670 |

Design resistance in case of fire

| Anchor size | | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 | | |
|---------------------------|---------|--------------|------------------|-----------------|------|------|------|------|------|-------|-------|-------|-------|
| HAS 5.8, HAS-U 5.8 | | | | | | | | | | | | | |
| Tension | 30 min | $h_{ef,min}$ | $N_{Rd,fi(30)}$ | [kN] | 0,34 | 0,29 | 0,70 | 0,99 | 1,54 | 1,93 | 3,28 | 5,20 | |
| | | $h_{ef,med}$ | | | 1,04 | 1,80 | 2,66 | 4,63 | 5,75 | 5,48 | 8,64 | 12,88 | |
| | | $h_{ef,max}$ | | | 1,04 | 1,80 | 2,80 | 5,22 | 8,15 | 11,74 | 15,27 | 18,67 | |
| | 60 min | $h_{ef,med}$ | $N_{Rd,fi(60)}$ | [kN] | 0,32 | 0,58 | 0,74 | 1,42 | 1,72 | 1,37 | 2,38 | 3,94 | |
| | | $h_{ef,max}$ | | | 0,81 | 1,36 | 2,05 | 3,83 | 5,98 | 8,62 | 11,21 | 13,70 | |
| | 90 min | $h_{ef,med}$ | $N_{Rd,fi(90)}$ | [kN] | 0,10 | 0,19 | 0,26 | 0,53 | 0,65 | 0,47 | 0,87 | 1,55 | |
| | | $h_{ef,max}$ | | | 0,58 | 0,91 | 1,31 | 2,44 | 3,81 | 5,49 | 7,14 | 8,73 | |
| | 120 min | $h_{ef,max}$ | $N_{Rd,fi(120)}$ | [kN] | 0,47 | 0,69 | 0,93 | 1,74 | 2,72 | 3,92 | 5,10 | 6,24 | |
| | Shear | 30 min | $h_{ef,min}$ | $V_{Rd,fi(30)}$ | [kN] | 1,04 | 1,80 | 2,80 | 5,22 | 8,15 | 11,74 | 15,27 | 18,67 |
| | | | $h_{ef,med}$ | | | 1,04 | 1,80 | 2,80 | 5,22 | 8,15 | 11,74 | 15,27 | 18,67 |
| | | | $h_{ef,max}$ | | | 1,04 | 1,80 | 2,80 | 5,22 | 8,15 | 11,74 | 15,27 | 18,67 |
| | | 60 min | $h_{ef,med}$ | $V_{Rd,fi(60)}$ | [kN] | 0,81 | 1,36 | 2,05 | 3,83 | 5,98 | 8,62 | 11,21 | 13,70 |
| $h_{ef,max}$ | | | 0,81 | | | 1,36 | 2,05 | 3,83 | 5,98 | 8,62 | 11,21 | 13,70 | |
| 90 min | | $h_{ef,med}$ | $V_{Rd,fi(90)}$ | [kN] | 0,58 | 0,91 | 1,31 | 2,44 | 3,81 | 5,49 | 7,14 | 8,73 | |
| | | $h_{ef,max}$ | | | 0,58 | 0,91 | 1,31 | 2,44 | 3,81 | 5,49 | 7,14 | 8,73 | |
| 120 min | | $h_{ef,max}$ | $V_{Rd,fi(120)}$ | [kN] | 0,47 | 0,69 | 0,93 | 1,74 | 2,72 | 3,92 | 5,10 | 6,24 | |

Design resistance in case of fire

| Anchor size | | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 | | |
|-------------------------|---------|--------------|------------------|-----------------|------|------|------|-------|-------|-------|-------|-------|-------|
| HAS A4, HAS-U A4 | | | | | | | | | | | | | |
| Tension | 30 min | $h_{ef,min}$ | $N_{Rd,fi(30)}$ | [kN] | 0,68 | 0,68 | 1,57 | 2,53 | 4,23 | 5,67 | 9,31 | 14,12 | |
| | | $h_{ef,med}$ | | | 2,12 | 3,49 | 4,68 | 8,78 | 11,92 | 12,85 | 19,53 | 27,85 | |
| | | $h_{ef,max}$ | | | 2,70 | 4,93 | 7,93 | 14,77 | 23,06 | 33,23 | 43,20 | 52,81 | |
| | 60 min | $h_{ef,min}$ | $N_{Rd,fi(60)}$ | [kN] | 0,09 | 0,08 | 0,26 | 0,43 | 0,79 | 1,03 | 2,05 | 3,61 | |
| | | $h_{ef,med}$ | | | 0,60 | 1,14 | 1,54 | 3,21 | 4,31 | 4,07 | 7,05 | 11,21 | |
| | | $h_{ef,max}$ | | | 1,93 | 3,49 | 5,56 | 10,37 | 16,18 | 23,31 | 30,31 | 37,05 | |
| | 90 min | $h_{ef,med}$ | $N_{Rd,fi(90)}$ | [kN] | 0,19 | 0,42 | 0,58 | 1,36 | 1,81 | 1,50 | 2,97 | 5,17 | |
| | | $h_{ef,max}$ | | | 1,17 | 2,04 | 3,20 | 5,96 | 9,30 | 13,40 | 17,42 | 21,29 | |
| | 120 min | $h_{ef,max}$ | $N_{Rd,fi(120)}$ | [kN] | 0,79 | 1,32 | 2,01 | 3,75 | 5,86 | 8,44 | 10,98 | 13,42 | |
| | Shear | 30 min | $h_{ef,min}$ | $V_{Rd,fi(30)}$ | [kN] | 2,70 | 4,93 | 7,93 | 14,77 | 23,06 | 31,09 | 41,74 | 52,81 |
| | | | $h_{ef,med}$ | | | 2,70 | 4,93 | 7,93 | 14,77 | 23,06 | 33,23 | 43,20 | 52,81 |
| | | | $h_{ef,max}$ | | | 2,70 | 4,93 | 7,93 | 14,77 | 23,06 | 33,23 | 43,20 | 52,81 |
| 60 min | | $h_{ef,min}$ | $V_{Rd,fi(60)}$ | [kN] | 1,93 | 3,49 | 5,56 | 10,37 | 16,18 | 23,31 | 30,31 | 37,05 | |
| | | $h_{ef,med}$ | | | 1,93 | 3,49 | 5,56 | 10,37 | 16,18 | 23,31 | 30,31 | 37,05 | |
| | | $h_{ef,max}$ | | | 1,93 | 3,49 | 5,56 | 10,37 | 16,18 | 23,31 | 30,31 | 37,05 | |
| 90 min | | $h_{ef,med}$ | $V_{Rd,fi(90)}$ | [kN] | 1,17 | 2,04 | 3,20 | 5,96 | 9,30 | 13,40 | 17,42 | 21,29 | |
| | | $h_{ef,max}$ | | | 1,17 | 2,04 | 3,20 | 5,96 | 9,30 | 13,40 | 17,42 | 21,29 | |
| 120 min | | $h_{ef,max}$ | $V_{Rd,fi(120)}$ | [kN] | 0,79 | 1,32 | 2,01 | 3,75 | 5,85 | 8,44 | 10,98 | 13,42 | |

Setting information

Installation temperature:

- -10 °C to +40 °C (for HAS, HAS-U, HAS-D, HIS-N)
- +5 °C to +40 °C (for HIT-Z)

In-service temperature range

Hilti HIT-HY 200-A V3 and HIT-HY 200-R V3 injection mortars with anchor rod HAS / HAS-U / HIS-N / Rebar / HIT-Z / HAS-D may be applied in the temperature ranges given below. For the intended temperature range specified in the design, the respective bond strength values shall be taken from the ETA.

Temperature in the base material

| Temperature range | Base material temperature | Maximum long term base material temperature | Maximum short term base material temperature |
|-----------------------|---------------------------|---|--|
| Temperature range I | -40 °C to +40 °C | +24 °C | +40 °C |
| Temperature range II | -40 °C to +80 °C | +50 °C | +80 °C |
| Temperature range III | -40 °C to +120 °C | +72 °C | +120 °C |

Maximum short term base material temperature

Short-term elevated base material temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling.

Maximum long term base material temperature

Long-term elevated base material temperatures are roughly constant over significant periods of time.

Curing and working time

| Temperature of the base material ^{a)} | HIT-HY 200-A V3 | | HIT-HY 200-R V3 | |
|--|----------------------|---------------------|----------------------|---------------------|
| | Maximum working time | Minimum curing time | Maximum working time | Minimum curing time |
| T | t _{work} | t _{cure} | t _{work} | t _{cure} |
| - 10 °C to - 5 °C | 1,5 h | 7 h | 3 h | 20 h |
| > - 5 °C to 0 °C | 50 min | 4 h | 1,5 h | 8 h |
| > 0 °C to 5 °C | 25 min | 2 h | 45 min | 4 h |
| > 5 °C to 10 °C | 15 min | 75 min | 30 min | 2,5 h |
| > 10 °C to 20 °C | 7 min | 45 min | 15 min | 1,5 h |
| > 20 °C to 30 °C | 4 min | 30 min | 9 min | 1 h |
| > 30 °C to 40 °C | 3 min | 30 min | 6 min | 1 h |

a) Installation of HIT-Z, HIT-Z-D TP only in range +5 °C to +40 °C

Setting details for HAS and HAS-U

| Anchor size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|--|--------------|------|--|-----|----------------------------|------------------|-----|-----|-----|-----|
| Nominal diameter of drill bit | d_0 | [mm] | 10 | 12 | 14 | 18 | 22 | 28 | 30 | 35 |
| Effective embedment depth (= drill hole depth h_0) ^{a)} | $h_{ef,min}$ | [mm] | 60 | 60 | 70 | 80 | 90 | 96 | 108 | 120 |
| | $h_{ef,max}$ | [mm] | 160 | 200 | 240 | 320 | 400 | 480 | 540 | 600 |
| Minimum thickness of concrete member | h_{min} | [mm] | $h_{ef} + 30 \text{ mm} \geq 100 \text{ mm}$ | | | $h_{ef} + 2 d_0$ | | | | |
| Maximum diameter of clearance hole in the fixture | d_f | [mm] | 9 | 12 | 14 | 18 | 22 | 26 | 30 | 33 |
| Maximum torque moment ^{b)} | T_{max} | [Nm] | 10 | 20 | 40 | 80 | 150 | 200 | 270 | 300 |
| Minimum spacing | s_{min} | [mm] | 40 | 50 | 60 | 75 | 90 | 115 | 120 | 140 |
| Minimum edge distance | c_{min} | [mm] | 40 | 45 | 45 | 50 | 55 | 60 | 75 | 80 |
| Characteristic distances | | | | | | | | | | |
| Spacing for splitting failure | $s_{cr,sp}$ | [mm] | $2 C_{cr,sp}$ | | | | | | | |
| Edge distance for splitting failure ^{c)} | $c_{cr,sp}$ | [mm] | $1,0 \cdot h_{ef}$ | | for $h/h_{ef} \geq 2,00$ | | | | | |
| | | | $4,6 \cdot h_{ef} - 1,8 \cdot h$ | | for $2,0 > h/h_{ef} > 1,3$ | | | | | |
| | | | $2,26 \cdot h_{ef}$ | | for $h/h_{ef} \leq 1,3$ | | | | | |
| | | | | | | | | | | |
| Spacing for concrete cone failure ^{d)} | $s_{cr,N}$ | [mm] | $2 C_{cr,N}$ | | | | | | | |
| Edge distance for concrete cone failure ^{d)} | $c_{cr,N}$ | [mm] | $1,5 h_{ef}$ | | | | | | | |

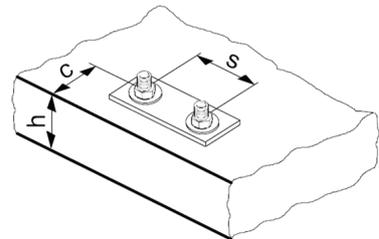
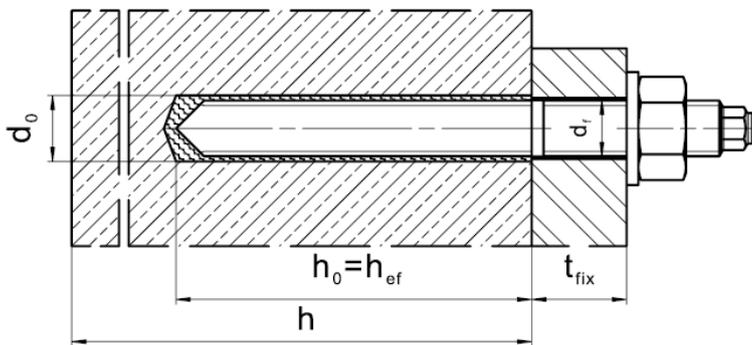
For spacing (edge distance) smaller than characteristic spacing (characteristic edge distance) the design loads must be reduced.

a) $h_{ef,min} \leq h_{ef} \leq h_{ef,max}$ (h_{ef} : embedment depth)

b) Maximum torque moment to avoid splitting failure during installation with minimum spacing and edge distance

c) h : base material thickness ($h \geq h_{min}$)

d) The characteristic edge distance for concrete cone failure depends on the embedment depth h_{ef} and the design bond resistance. The simplified formula given in this table is on the safe side.



Setting details for HIS-N

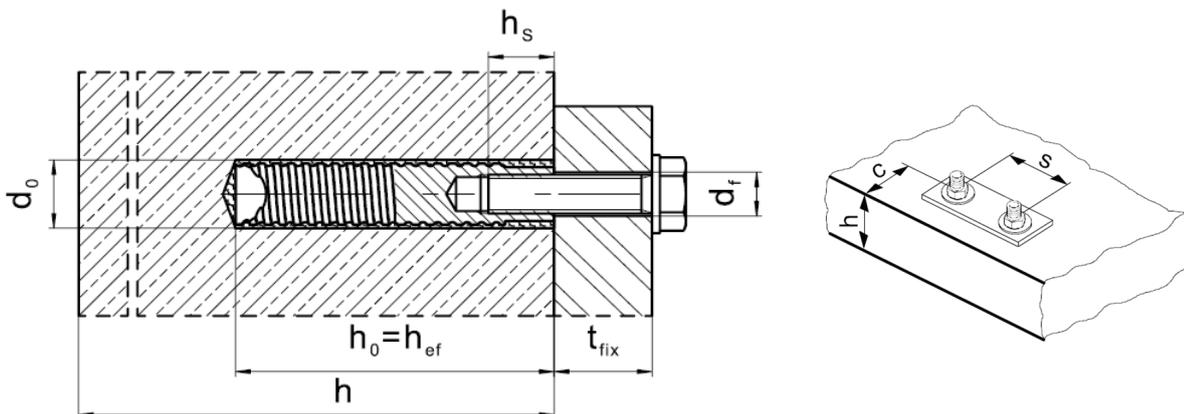
| Anchor size | | M8 | M10 | M12 | M16 | M20 |
|---|---------------------|---|-------|-------|-------|-------|
| Nominal diameter of drill bit | d_0 [mm] | 14 | 18 | 22 | 28 | 32 |
| Diameter of element | d [mm] | 12,5 | 16,5 | 20,5 | 25,4 | 27,6 |
| Effective embedment depth (=drill hole depth) | $h_{ef} = h_0$ [mm] | 90 | 110 | 125 | 170 | 205 |
| Minimum thickness of concrete member | h_{min} [mm] | 120 | 150 | 170 | 230 | 270 |
| Diameter of clearance hole in the fixture | d_f [mm] | 9 | 12 | 14 | 18 | 22 |
| Thread engagement length; min - max | h_s [mm] | 8-20 | 10-25 | 12-30 | 16-40 | 20-50 |
| Maximum torque moment ^{a)} | T_{max} [Nm] | 10 | 20 | 40 | 80 | 150 |
| Minimum spacing | s_{min} [mm] | 60 | 75 | 90 | 115 | 130 |
| Minimum edge distance | c_{min} [mm] | 40 | 45 | 55 | 65 | 90 |
| Characteristic distances | | | | | | |
| Spacing for splitting failure | $s_{cr,sp}$ [mm] | $2 c_{cr,sp}$ | | | | |
| Edge distance for splitting failure ^{b)} | $c_{cr,sp}$ [mm] | $1,0 \cdot h_{ef}$ for $h/h_{ef} \geq 2,00$ | | | | |
| | | $4,6 \cdot h_{ef} - 1,8 \cdot h$ for $2,0 > h/h_{ef} > 1,3$ | | | | |
| | | $2,26 \cdot h_{ef}$ for $h/h_{ef} \leq 1,3$ | | | | |
| Spacing for concrete cone failure ^{c)} | $s_{cr,N}$ [mm] | $2 c_{cr,N}$ | | | | |
| Edge distance for concrete cone failure ^{c)} | $c_{cr,N}$ [mm] | $1,5 h_{ef}$ | | | | |

For spacing (edge distance) smaller than characteristic spacing (characteristic edge distance) the design loads must be reduced.

a) Max. recommended torque moment to avoid splitting failure during Installation with minimum spacing and edge distance

b) h : base material thickness ($h \geq h_{min}$)

c) The characteristic edge distance for concrete cone failure depends on the embedment depth h_{ef} and the design bond resistance. The simplified formula given in this table is on the safe side.

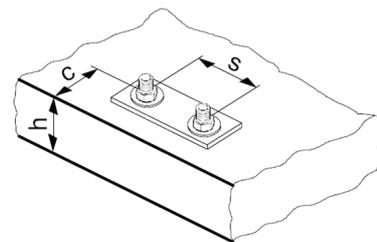
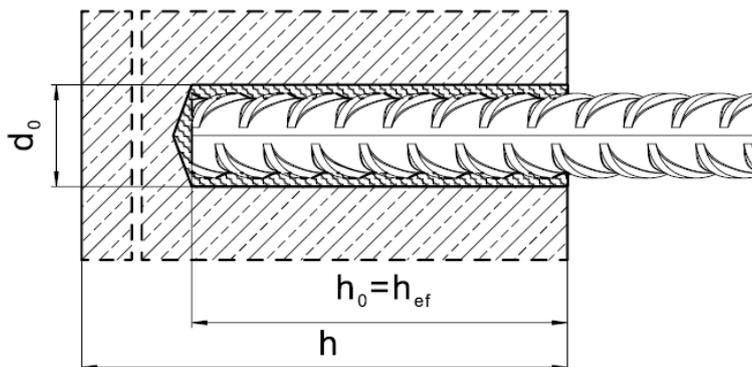


Setting details rebar

| Anchor size | | Ø8 | Ø10 | Ø12 | Ø14 | Ø16 | Ø20 | Ø25 | Ø26 | Ø28 | Ø30 | Ø32 | |
|--|------------------|---|-----------------------|------------------------------|------------------|-----|-----|-----|-----|-----|-----|-----|--|
| Nominal diameter of drill bit | d_0 [mm] | 10 / 12 ^{a)} | 12 / 14 ^{a)} | 14 / 16 ^{a)} | 18 | 20 | 25 | 32 | 32 | 35 | 37 | 40 | |
| Effective embedment depth min. and max. (=drill hole depth h_0) ^{b)} | h_{ef} [mm] | 60 | 60 | 70 | 75 | 80 | 90 | 100 | 104 | 112 | 120 | 128 | |
| | [mm] | 160 | 200 | 240 | 280 | 320 | 400 | 500 | 520 | 560 | 600 | 640 | |
| Minimum thickness of concrete member ^{c)} | h_{min} [mm] | $h_{ef} + 30 \text{ mm}$ $\geq 100 \text{ mm}$ | | | $h_{ef} + 2 d_0$ | | | | | | | | |
| | [mm] | | | | | | | | | | | | |
| Minimum spacing | s_{min} [mm] | 40 | 50 | 60 | 70 | 80 | 100 | 125 | 130 | 140 | 150 | 160 | |
| Minimum edge distance | c_{min} [mm] | 40 | 45 | 45 | 50 | 50 | 65 | 70 | 75 | 75 | 80 | 80 | |
| Characteristic distances | | | | | | | | | | | | | |
| Spacing for splitting failure | $s_{cr,sp}$ [mm] | $2 c_{cr,sp}$ | | | | | | | | | | | |
| Edge distance for splitting failure ^{c)} | $c_{cr,sp}$ [mm] | $1,0 \cdot h_{ef}$ | | for $h / h_{ef} \geq 2,0$ | | | | | | | | | |
| | | $4,6 h_{ef} - 1,8 h$ | | for $2,0 > h / h_{ef} > 1,3$ | | | | | | | | | |
| | | $2,26 h_{ef}$ | | for $h / h_{ef} \leq 1,3$ | | | | | | | | | |
| Spacing for concrete cone failure | $s_{cr,N}$ [mm] | $2 c_{cr,N}$ | | | | | | | | | | | |
| Edge distance for concrete cone failure ^{d)} | $c_{cr,N}$ [mm] | $1,5 h_{ef}$ | | | | | | | | | | | |

For spacing (edge distance) smaller than characteristic spacing (characteristic edge distance) the design loads must be reduced,

- a) Both given values for drill bit diameter can be used
- b) $h_{ef,min} \leq h_{ef} \leq h_{ef,max}$ (h_{ef} : embedment depth)
- c) h : base material thickness ($h \geq h_{min}$)
- d) The characteristic edge distance for concrete cone failure depends on the embedment depth h_{ef} and the design bond resistance, The simplified formula given in this table is on the safe side.



Setting details for HIT-Z, HIT-Z-F and HIT-Z-R

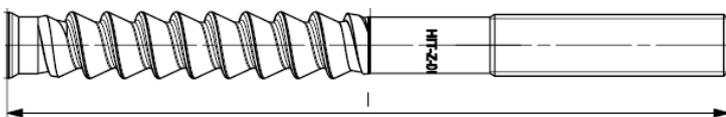
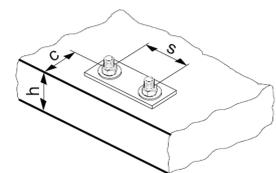
| Anchor size | | | M8 | M10 | M12 | M16 | M20 | |
|--|-----------------|------------|-----------------------------------|-----|--------------------------------|----------------------------------|-----|-----|
| Nominal diameter of drill bit | d_0 | [mm] | 10 | 12 | 14 | 18 | 22 | |
| Length of anchor | min l | [mm] | 80 | 95 | 105 | 155 | 215 | |
| | max l | [mm] | 120 | 160 | 196 | 420 | 450 | |
| Effective embedment depth ^{a)} | $h_{ef,min}$ | [mm] | 60 | 60 | 60 | 96 | 100 | |
| | $h_{ef,max}$ | [mm] | 100 | 120 | 144 | 192 | 220 | |
| Borehole condition 1 Min. base material thickness | h_{min} | [mm] | $h_{ef} + 60$ mm | | | $h_{ef} + 100$ mm | | |
| Borehole condition 2 Min. base material thickness | h_{min} | [mm] | $h_{ef} + 30$ mm ≥ 100 mm | | | $h_{ef} + 45$ mm ≥ 45 mm | | |
| Maximum depth of drill hole | h_0 | [mm] | $h - 30$ mm | | | $h - 2 d_0$ | | |
| Diameter of clearance hole in the fixture | pre setting | d_f | [mm] | 9 | 12 | 14 | 18 | 22 |
| | through setting | d_f | [mm] | 11 | 14 | 16 | 20 | 24 |
| Maximum fixture thickness | t_{fix} | [mm] | 48 | 87 | 120 | 303 | 326 | |
| Maximum fixture thickness with seismic filling set | t_{fix} | [mm] | 41 | 79 | 111 | 292 | 314 | |
| Installation torque moment ^{b)} | HIT-Z, HIT-Z-F | T_{inst} | [Nm] | 10 | 25 | 40 | 80 | 150 |
| | HIT-Z-R | T_{inst} | [Nm] | 30 | 55 | 75 | 155 | 215 |
| Characteristic distances | | | | | | | | |
| Spacing for splitting failure | $S_{cr,sp}$ | [mm] | $2 C_{cr,sp}$ | | | | | |
| Edge distance for splitting failure ^{c)} | $C_{cr,sp}$ | [mm] | $1,5 \cdot h_{ef}$ | | for $h / h_{ef} \geq 2,35$ | | | |
| | | | $6,2 h_{nom} - 2,0 h$ | | for $2,35 > h / h_{ef} > 1,35$ | | | |
| | | | $3,5 h_{ef}$ | | for $h / h_{ef} \leq 1,35$ | | | |
| Spacing for concrete cone failure | $S_{cr,N}$ | [mm] | $2 C_{cr,N}$ | | | | | |
| Edge distance concrete cone failure | $C_{cr,N}$ | [mm] | $1,5 h_{ef}$ | | | | | |

For spacing (edge distance) smaller than characteristic spacing (characteristic edge distance) the design loads must be reduced.

a) $h_{ef,min} \leq h_{ef} \leq h_{ef,max}$ (h_{ef} : effective embedment depth).

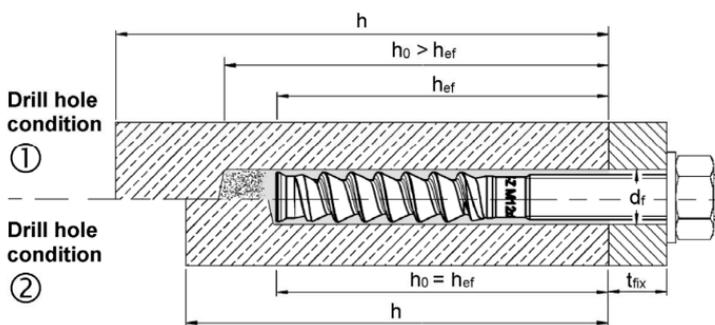
b) Recommended torque moment to avoid splitting failure during installation with minimum spacing and edge distance.

c) h : base material thickness ($h \geq h_{min}$).



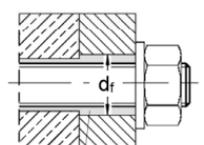
Pre-setting:

Install anchor before positioning fixture



Through-setting:

Install anchor through positioned fixture



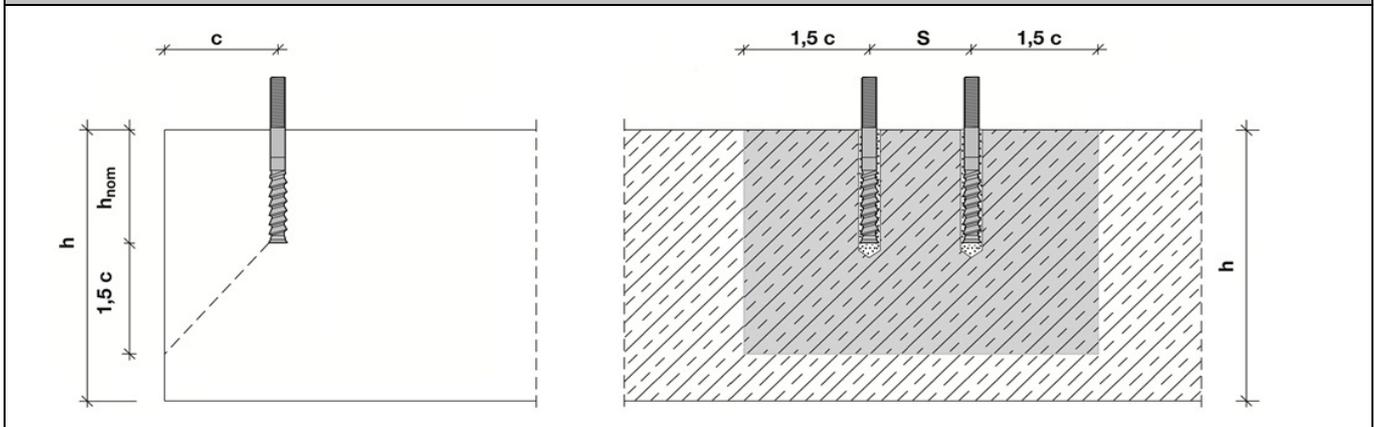
Annular gap filled with Hilti HIT-HY 200-A V3 or HIT-HY 200-R V3

Minimum edge distance and spacing for HIT-Z

Pre-calculated distances are given in the following tables.

Best case minimum edge distance and spacing with required member thickness and embedment depth

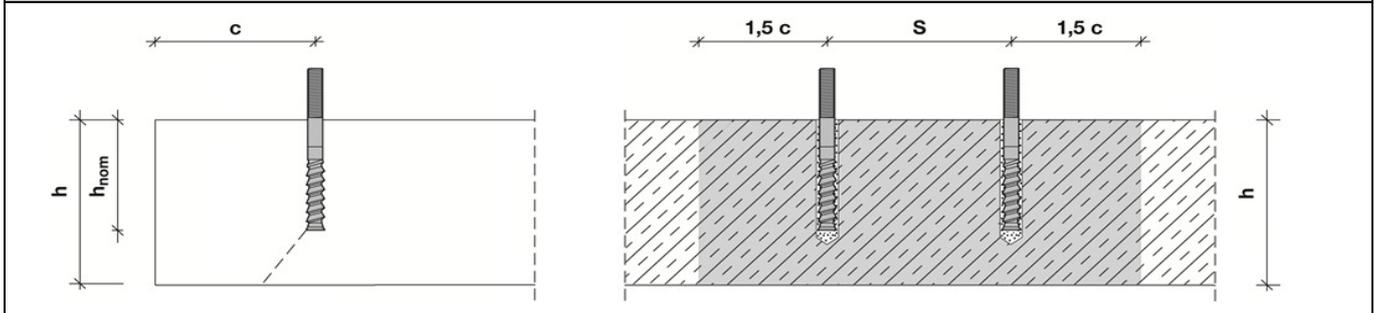
Member thickness $h \geq h_{nom} + 1,5 \cdot c$



| Anchor size | | M8 | M10 | M12 | M16 | M20 |
|---|---------------------|-----|-----|-----|-----|-----|
| Cracked concrete | | | | | | |
| Member thickness | $h \geq$ [mm] | 140 | 200 | 240 | 300 | 370 |
| Embedment depth | $h_{nom} \geq$ [mm] | 80 | 120 | 150 | 200 | 220 |
| Minimum spacing and corresponding edge distance | s_{min} [mm] | 40 | 50 | 60 | 80 | 100 |
| | $c \geq$ [mm] | 40 | 55 | 65 | 80 | 100 |
| Minimum edge distance and corresponding spacing | $c_{min} =$ [mm] | 40 | 50 | 60 | 80 | 100 |
| | $s \geq$ [mm] | 40 | 60 | 65 | 80 | 100 |
| Uncracked concrete | | | | | | |
| Member thickness | $h \geq$ [mm] | 140 | 230 | 270 | 340 | 410 |
| Embedment depth | $h_{nom} \geq$ [mm] | 80 | 120 | 150 | 200 | 220 |
| Minimum spacing and corresponding edge distance | s_{min} [mm] | 40 | 50 | 60 | 80 | 100 |
| | $c \geq$ [mm] | 40 | 70 | 80 | 100 | 130 |
| Minimum edge distance and corresponding spacing | c_{min} [mm] | 40 | 50 | 60 | 80 | 100 |
| | $s \geq$ [mm] | 40 | 145 | 160 | 160 | 235 |

Best case minimum member thickness and embedment depth with required minimum edge distance and spacing (borehole condition 1)

Member thickness $h \leq h_{nom} + 1,5 \cdot c$



| Anchor size | | M8 | M10 | M12 | M16 | M20 |
|---|---------------------|-----|-----|-----|-----|-----|
| Cracked concrete | | | | | | |
| Member thickness | $h \geq$ [mm] | 120 | 120 | 120 | 196 | 200 |
| Embedment depth | $h_{nom} \geq$ [mm] | 60 | 60 | 60 | 96 | 100 |
| Minimum spacing and corresponding edge distance | s_{min} [mm] | 40 | 50 | 60 | 80 | 100 |
| | $c \geq$ [mm] | 40 | 100 | 140 | 135 | 215 |
| Minimum edge distance and corresponding spacing | $c_{min} =$ [mm] | 40 | 60 | 90 | 80 | 125 |
| | $s \geq$ [mm] | 40 | 160 | 220 | 235 | 365 |
| Uncracked concrete | | | | | | |
| Member thickness | $h \geq$ [mm] | 120 | 120 | 120 | 196 | 200 |
| Embedment depth | $h_{nom} \geq$ [mm] | 60 | 60 | 60 | 96 | 100 |
| Minimum spacing and corresponding edge distance | s_{min} [mm] | 40 | 50 | 60 | 80 | 100 |
| | $c \geq$ [mm] | 50 | 145 | 200 | 190 | 300 |
| Minimum edge distance and Corresponding spacing | c_{min} [mm] | 40 | 80 | 115 | 110 | 165 |
| | $s \geq$ [mm] | 65 | 240 | 330 | 310 | 495 |

Minimum edge distance and spacing – Explanation

Minimum edge and spacing geometrical requirements are determined by testing the installation conditions in which two anchors with a given spacing can be set close to an edge without forming a crack in the concrete due to tightening torque.

The HIT-Z boundary conditions for edge and spacing geometry can be found in the tables. If the embedment depth and slab thickness are equal to or greater than the values in the table, then the edge and spacing values may be utilized.

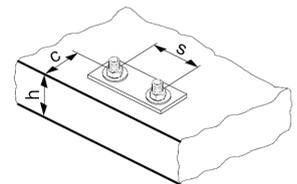
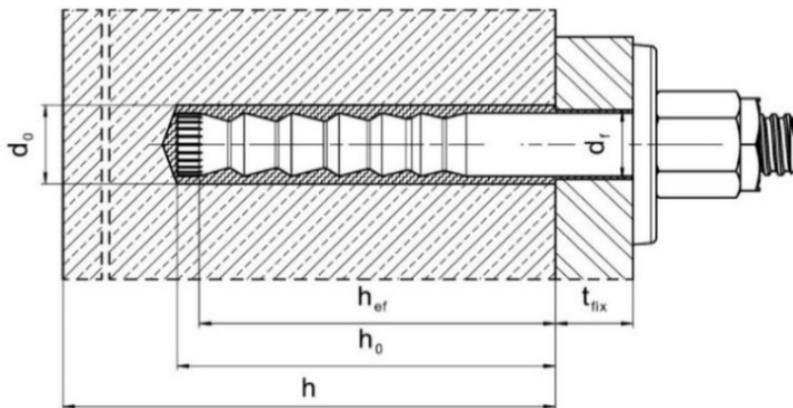
PROFIS Engineering software is programmed to calculate the referenced equations in order to determine the optimized related minimum edge and spacing based on the following variables:

| | |
|---|--|
| Cracked or uncracked concrete | For cracked concrete it is assumed that a reinforcement is present which limits the crack width to 0,3 mm, allowing smaller values for minimum edge distance and minimum spacing |
| Anchor diameter | For smaller anchor diameter a smaller installation torque is required, allowing smaller values for minimum edge distance and minimum spacing |
| Slab thickness and embedment depth | Increasing these values allows smaller values for minimum edge distance and minimum spacing |

Setting details for HAS-D

| Anchor size | | | M12 | M16 | M20 | |
|---|-----------------------|---------------|--------------|-------------------------|-------------------------|----|
| Nominal diameter of drill bit | d_0 | [mm] | 14 | 18 | 24 | |
| Effective anchorage depth | h_{ef} | [mm] | 100 | 125 | 170 | |
| Minimum drill hole depth | h_0 | [mm] | 105 | 133 | 180 | |
| Minimum base material thickness | h_{min} | [mm] | 130 | 160 ¹⁾ / 170 | 220 ¹⁾ / 230 | |
| Diameter of clearance hole in the fixture | pre setting | d_f | [mm] | 14 | 18 | 24 |
| | through setting | d_f | [mm] | 16 | 20 | 26 |
| Fixture thickness under fatigue loading | | $t_{fix,min}$ | [mm] | 12 | 16 | 20 |
| | | $t_{fix,max}$ | [mm] | 200 | | |
| Installation torque moment | T_{inst} | [Nm] | 30 | 50 | 80 | |
| Uncracked concrete | Minimum spacing | s_{min} | [mm] | 80 55 | 60 | 80 |
| | Minimum edge distance | c_{min} | [mm] | 55 80 | 60 | 80 |
| Cracked concrete | Minimum spacing | s_{min} | [mm] | 50 | 60 | 80 |
| | Minimum edge distance | c_{min} | [mm] | 50 | 60 | 80 |
| Characteristic distances | | | | | | |
| Spacing for splitting failure | $s_{cr,sp}$ | [mm] | 600 | 750 | 884 | |
| Edge distance for splitting failure | $c_{cr,sp}$ | [mm] | 300 | 375 | 442 | |
| Spacing for concrete cone failure | $s_{cr,N}$ | [mm] | 2 $c_{cr,N}$ | | | |
| Edge distance concrete cone failure | $c_{cr,N}$ | [mm] | 1,5 h_{ef} | | | |

1) The reverse side of the concrete member shall have no break-through after drilling.





Drilling and Installation equipment

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

| | | |
|---|---|--|
| Rotary Hammers (Corded and Cordless) |  | TE 2 - TE 70 |
| Diamond Coring Machines |  | DD EC-1, DD 100 ... DD 160 |
| Dispenser |  | HDE HDM |
| Other tools |  | Blow out pump, Compressed air gun, Set of cleaning brushes |
| |  | Hammer drill bit TE-CX, TE-YX, TE-C, TE-Y |
| |  | Hollow drill bit TE-CD, TE-YD |
| |  | Diamond core bit SP-L, SP-HX, SP-H, P-U |
| |  | Roughening tools TE-YRT |
| |  | Piston plug |