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**European Technical
Assessment**

**ETA-19/0858
of 17/02/2020**

English translation prepared by CSTB - Original version in French language

General Part

Nom commercial
Trade name

Hilti HSL4

Famille de produit
Product family

***Torque-controlled expansion anchor, made of galvanised steel, in
concrete under fatigue cyclic loading: sizes M16 and M20***

Titulaire
Manufacturer

Hilti Corporation
Feldkircherstrasse 100
FL-9494 Schaan
Principality of Liechtenstein

Usine de fabrication
Manufacturing plants

Hilti plants

Cette évaluation contient:
This assessment contains

14 pages incluant 11 pages d'annexes qui font partie intégrante de
cette évaluation
*14 pages including 11 pages of annexes which form an integral part
of this assessment*

Base de l'ETE
Basis of ETA

***EAD 330250-00-0601 "Post-installed fasteners in concrete under fatigue
cyclic loading"***

Cette évaluation remplace:
This assessment replaces

-
-

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Specific Part

Technical description of the product

The Hilti heavy duty anchor HSL4 in the range of M16 and M20 in concrete is a torque-controlled expansion anchor made of galvanised steel, consists of a threaded rod version HSL4-G (with cone, expansion sleeve, collapsible element, distance sleeve, hexagon nut and threaded rod), a Hilti filling set (with filling washer, spherical washer and lock nut) and an injection mortar (Hilti HIT-HY 200-A or Hilti HIT-HY 200-R).

It is placed into a drilled hole and anchored by torque-controlled expansion.

The illustration and the description of the product are given in Annexes A.

Specification of the intended use

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annexes B.

The provisions made in this European technical assessment are based on an assumed working life of the anchor of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

Performance of the product

1.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic fatigue resistance under fatigue cyclic tension loading (Assessment method B)	See Annex C1 to C2
Characteristic fatigue resistance under fatigue cyclic shear loading (Assessment method B)	
Characteristic fatigue resistance under fatigue cyclic combined tension and shear loading (Assessment method B)	
Load transfer factor for cyclic tension and shear loading	
Load transfer factor	See Annex C1 to C2
Durability	See Annex B1

Assessment and verification of constancy of performance (AVCP)

According to the Decision 96/582/EC of the European Commission¹, as amended, the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table apply.

Product	Intended use	Level or Class	System
Metal anchors for use in concrete	For fixing and/or supporting to concrete, structural elements (which contributes to the stability of the works) or heavy units	—	1

¹ Official Journal of the European Communities L 254 of 08.10.1996

Technical details necessary for the implementation of the AVCP system

Technical details necessary for the implementation of the Assessment and verification of constancy of performance (AVCP) system are laid down in the control plan deposited at Centre Scientifique et Technique du Bâtiment.

The manufacturer shall, on the basis of a contract, involve a notified body approved in the field of anchors for issuing the certificate of conformity CE based on the control plan.

Issued in Marne La Vallée on 17/02/2020 by

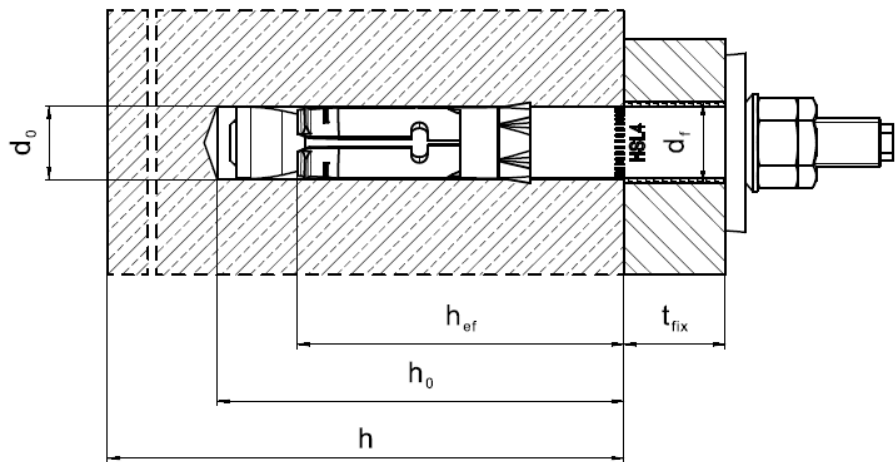
The original French version is signed

La cheffe de division

Anca CRONOPOL

Installed condition

Hilti HSL4-G installed with Hilti filling set



Hilti heavy duty anchor HSL4	Annex A1
Product description Installed condition	

Product description

Figure A1:

Hilti torque controlled expansion anchor HSL4-G

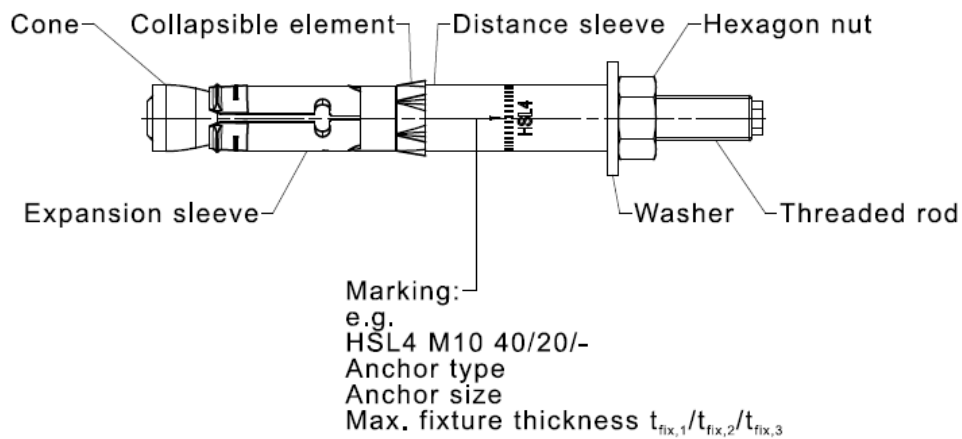
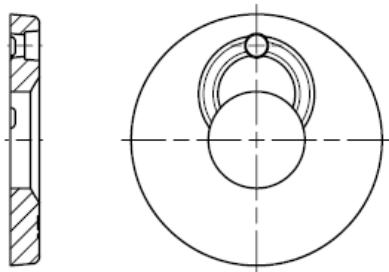


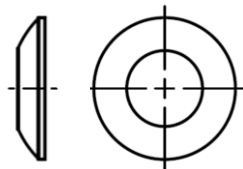
Figure A2:

Hilti filling set

Sealing washer



Spherical washer



Lock nut

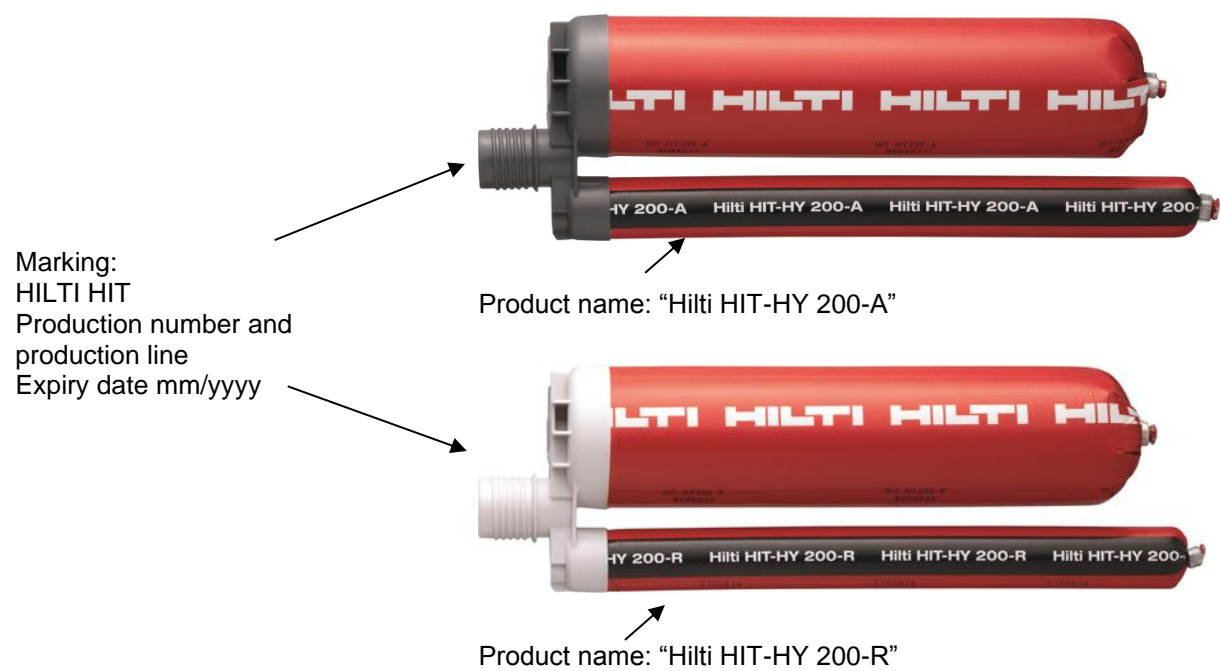


Hilti heavy duty anchor HSL4

Product description
 Product types and parts

Annex A2

Injection mortar Hilti HIT-HY 200-A and Hilti HIT-HY 200-R: hybrid system with aggregate
Foil pack 330 ml and 500 ml



Static mixer Hilti HIT-RE-M



Hilti heavy duty anchor HSL4	Annex A3
Product description Product types and parts	

Table A1: Materials

Designation	Material
HSL4-G	
Cone	Carbon steel, electroplated zinc coated $\geq 5\mu\text{m}$
Expansion sleeve	Carbon steel, electroplated zinc coated $\geq 5\mu\text{m}$
Collapsible element	Plastic element
Distance sleeve	Carbon steel, electroplated zinc coated $\geq 5\mu\text{m}$
Hexagon nut	Carbon steel, electroplated zinc coated $\geq 5\mu\text{m}$
Threaded rod	Carbon steel, electroplated zinc coated $\geq 5\mu\text{m}$, rupture elongation $\geq 12\%$
Hilti filling set	
Filling washer	Carbon steel, electroplated zinc coated $\geq 5\mu\text{m}$
Spherical washer	Carbon steel, electroplated zinc coated $\geq 5\mu\text{m}$
Lock nut	Carbon steel, electroplated zinc coated $\geq 5\mu\text{m}$

Hilti heavy duty anchor HSL4

Product description
Materials

Annex A4

Specifications of intended use

Anchorage subject to:

- Fatigue cyclic loading.

Note: static and quasi-static loading according to ETA-19/0556.

Base material:

- Reinforced or unreinforced normal weight concrete according to EN 206:2013 + A1:2016.
- Strength classes C20/25 to C50/60 according to EN 206:2013 + A1:2016.
- Cracked and uncracked concrete.

Use conditions (environmental conditions):

- Structures subject to dry internal conditions.

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e. g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages under fatigue cyclic loading are designed in accordance with:
EN 1992-4:2018.

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- The anchor may only be set once.
- Drilling technique: hammer drilling.
- Cleaning the hole of drilling dust.
- In case of aborted hole, drilling of new hole at a minimum distance of twice the depth of the aborted hole, or smaller distance provided the aborted drill hole is filled with high strength mortar and no shear or oblique tension loads in the direction of aborted hole.

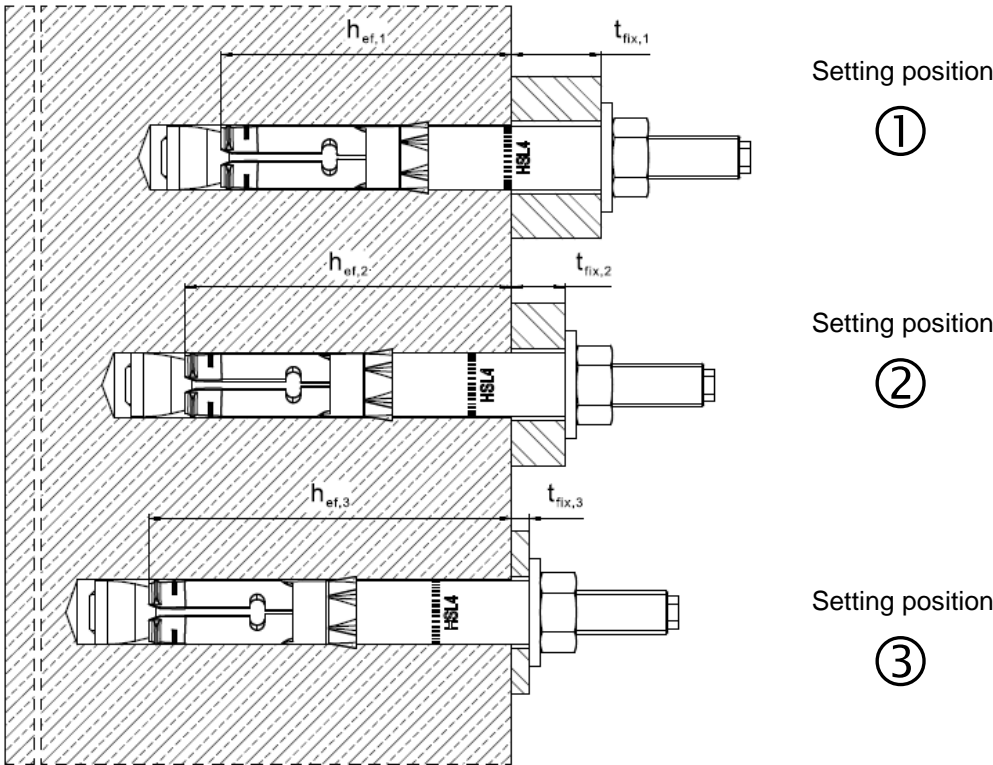
Hilti heavy duty anchor HSL4

Intended use
Specifications

Annex B1

Setting positions for HSL4-G

Constant anchor length with various fixture thicknesses $t_{fix,i}$ and corresponding setting position:



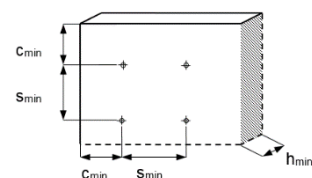
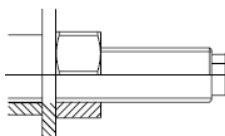
Hilti heavy duty anchor HSL4	Annex B2
Intended use Installation parameters	

Table B1: Installation parameters HSL4-G

HSL4-G			M16			M20		
Nominal diameter of drill bit	d ₀	[mm]	24			28		
Max. cutting diameter of drill bit	d _{cut}	[mm]	24,55			28,55		
Max. diameter of clearance hole in the fixture	d _f	[mm]	26			31		
Setting position	i		①	②	③	①	②	③
Fixture thickness	t _{fix,1}	[mm]	10 - 200			10 - 200		
Effective fixture thickness	t _{fix,i}		t _{fix,1} ¹⁾ - Δ _i					
Reduction of fixture thickness	Δ _i	[mm]	0	25	50	0	30	60
Effective anchorage depth	h _{ef,i}	[mm]	100	125	150	125	155	185
Min. depth of drill hole	h _{1,i}	[mm]	125	150	175	155	185	215
Min. thickness of concrete member	h _{min,i}	[mm]	200	275	300	250	380	410
Width across flats	SW	[mm]	24			30		
Installation torque	T _{inst}	[Nm]	70			105		
Uncracked concrete								
Minimum spacing	s _{min}	[mm]	100			125		
	c ≥	[mm]	240			300		
Minimum edge distance	c _{min}	[mm]	100			150		
	s ≥	[mm]	240			300		
Cracked concrete								
Minimum spacing	s _{min}	[mm]	80			120		
	c ≥	[mm]	180			220		
Minimum edge distance	c _{min}	[mm]	100			120		
	s ≥	[mm]	200			220		

1) Predefined fixture thickness t_{fix} according to anchor specification, see Figure A1.

HSL4-G Threaded rod version



Hilti heavy duty anchor HSL4

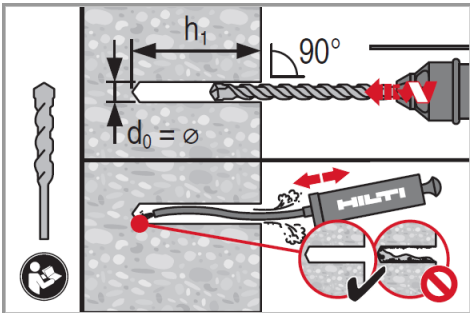
Intended use
Installation parameters

Annex B3

Installation instructions: HSL4-G

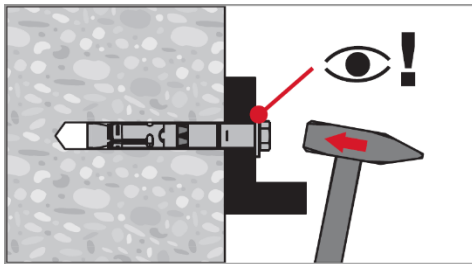
Hole drilling and cleaning

Hammer drilling (HD) with manual
cleaning (MC)



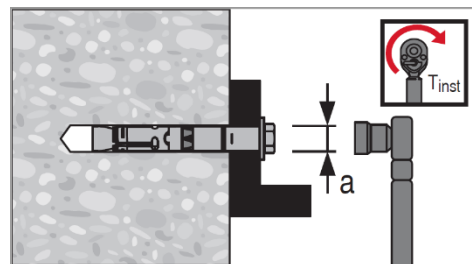
Anchor setting

Hammer setting, check setting



Anchor torqueing

Use torque wrench



Hilti heavy duty anchor HSL4

Intended use
Installation instructions

Annex B4

Installation instructions for the filling set

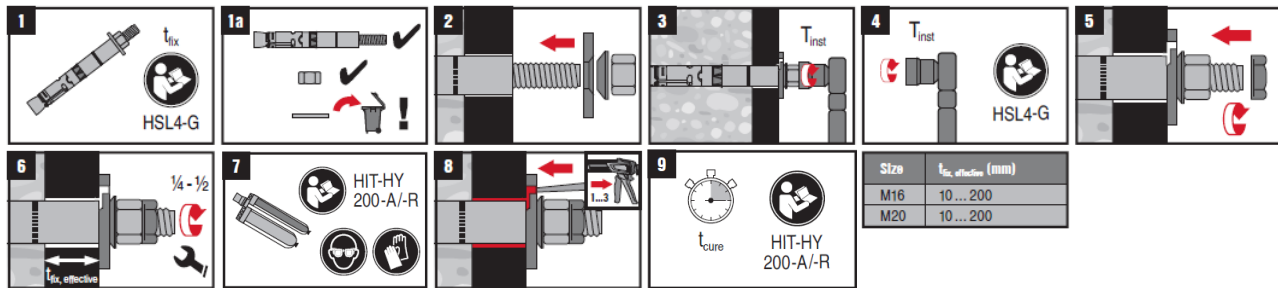


Table B2: Maximum working time and minimum curing time HY 200-A

Temperature in the base material T	Maximum working time t_{work}	Minimum curing time t_{cure}
> 0 °C to 5 °C	25 min	2 hours
> 5 °C to 10 °C	15 min	75 min
> 10 °C to 20 °C	7 min	45 min
> 20 °C to 30 °C	4 min	30 min
> 30 °C to 40 °C	3 min	30 min

Table B3: Maximum working time and minimum curing time HY 200-R

Temperature in the base material T	Maximum working time t_{work}	Minimum curing time t_{cure}
> 0 °C to 5 °C	1 hour	4 hours
> 5 °C to 10 °C	40 min	2,5 hours
> 10 °C to 20 °C	15 min	1,5 hours
> 20 °C to 30 °C	9 min	1 hour
> 30 °C to 40 °C	6 min	1 hour

Hilti heavy duty anchor HSL4

Intended use

Installation instructions of the filling set

Annex B5

Table C1: Essential characteristics under tension fatigue load in concrete

HSL4-G			M16			M20		
Steel failure								
Characteristic resistance	$\Delta N_{Rk,s,0,\infty}$	[kN]	8,3			12,0		
Partial factor	$\gamma_{Ms,N,fat}$	[-]	1,35					
Concrete failure								
Effective anchorage depth	$h_{ef,i}$	[mm]	100	125	150	125	155	185
Characteristic resistance	$\Delta N_{Rk,c,0,\infty}$	[kN]	0,5 $N_{Rk,c}^{1)}$					
Characteristic resistance	$\Delta N_{Rk,p,0,\infty}$	[kN]	0,4 $N_{Rk,p}^{2)}$					
Characteristic resistance	$\Delta N_{Rk,sp,0,\infty}$	[kN]	0,5 $N_{Rk,sp}^{3)}$					
Characteristic resistance	$\Delta N_{Rk,cb,0,\infty}$	[kN]	0,5 $N_{Rk,cb}^{4)}$					
Partial factor	$\gamma_{Mc,fat}$	[-]	1,5					
Load transfer factor for fastener groups	ψ_{FN}	[-]	0,5					

1) 2) 3) 4) $N_{Rk,c}$, $N_{Rk,p}$, $N_{Rk,sp}$ and $N_{Rk,cb}$ according to ETA-19/0556.

Table C2: Essential characteristics under shear fatigue load in concrete

HSL4-G			M16			M20		
Steel failure								
Characteristic resistance	$\Delta V_{Rk,s,0,\infty}$	[kN]	8,0			10,0		
Partial factor	$\gamma_{Ms,V,fat}$	[-]	1,35					
Concrete failure								
Effective length of fastener	$l_f = h_{ef}$	[mm]	100	125	150	125	155	185
Diameter of anchor	d_{nom}	[mm]	24			28		
Characteristic resistance	$\Delta V_{Rk,c,0,\infty}$	[-]	0,5 $V_{Rk,c}^{1)}$					
Characteristic resistance	$\Delta V_{Rk,cp,0,\infty}$	[-]	0,5 $V_{Rk,cp}^{2)}$					
Partial factor	$\gamma_{Mc,fat}$	[-]	1,5					
Load transfer factor for fastener groups	ψ_{FV}	[-]	0,5					

1) 2) $V_{Rk,c}$ and $V_{Rk,cp}$ according to ETA-19/0556.

Hilti heavy duty anchor HSL4

Performances

Essential characteristics under tension and shear fatigue load in concrete

Annex C1

Table C3: Essential characteristics for combined fatigue load in concrete

HSL4-G			M16	M20
Exponent for combined fatigue load	α_{sn}	[-]	0,7	
	α_c	[-]	1,5	

Hilti heavy duty anchor HSL4	Annex C2
Performances Essential characteristics under combined fatigue load in concrete	