

HALFEN HEK PRECAST COUPLER

TECHNICAL PRODUCT INFORMATION



HALFEN HEK PRECAST COUPLER

HEK 15-E

CONCRETE



HALFEN
YOUR BEST CONNECTIONS

HALFEN HEK PRECAST COUPLER

Introduction

The HALFEN HEK Precast coupler is an innovative and versatile solution for fast and easy connection of concrete precast elements to each other or to other adjacent elements.

The HALFEN HEK is suitable for tension and transverse friction-locked joints of concrete precast elements; especially for precast walls or precast slabs.

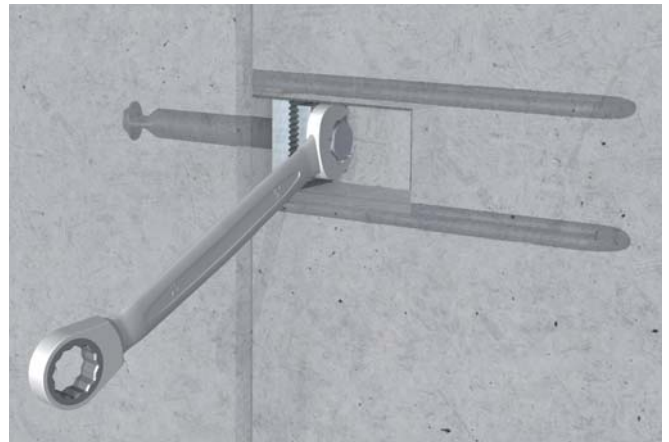
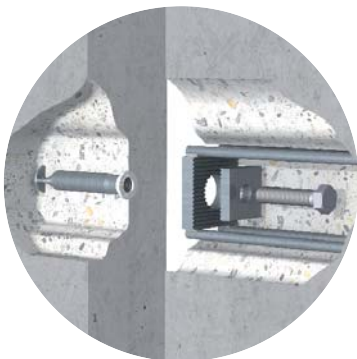
Because of the load characteristics HALFEN HEK is ideally suited for all kinds of connections between precast walls e.g. butt joints, corner joints or connections with precast columns.

Cast-in DEMU Fixing anchors i.e. T-FIXX®, bolt or bar anchors transfer the tension and shear force into the precast element.

The main advantage of the system is the fast and efficient positioning of precast elements. The connection can be subjected to load immediately after installation. This results in a substantial improvement in construction time.

Advantages:

- transmission of tensile and transverse forces
- for wall thickness from 120 mm
- connection of precast or semi-precast elements; also for composite joints
- full adjustability of precast elements; also compensates for any imperfections in components
- screw connection allows easy, safe and fast on-site installation
- no special tools are required
- all applications feasible with one precast coupler type
- short construction time and therefore lower costs
- tried and tested DEMU Fixing anchors as components with European technical approvals; free HALFEN calculation software available



System description

The HALFEN HEK Precast coupler is constructed using a base plate with welded-on steel anchoring reinforcement stirrups and a separate counter plate. The contact surfaces of the base and counter plate are serrated to ensure friction-locked transverse-load transfer.

The HEK Precast coupler is installed in the precast element with an installation access hole open to one wall side. For on-site assembly the counter plate is inserted first, and then the fixing bolt is inserted through the counter and base plate into the fixing anchor of the adjacent component and then sufficiently tightened. After the concrete components are assembled, the access is filled with low-shrink grout mortar, which is levelled flush with the concrete surface.

The screw connection is capable of transferring normal forces immediately after installation. After the mortar has reached its characteristic strength, safe shear load force transfer is also ensured.

We recommend using building authority approved, production controlled anchors from the extensive DEMU product range in combination with this system.

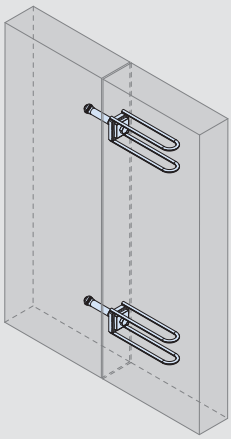
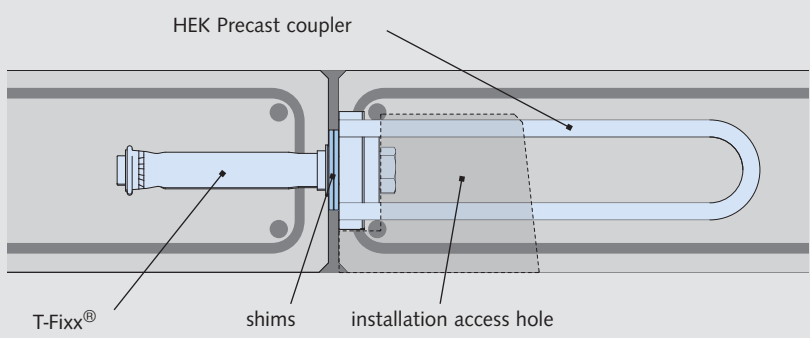
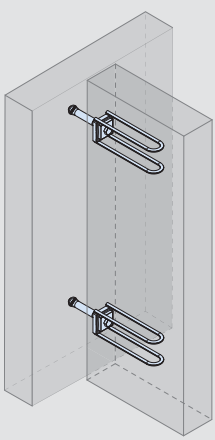
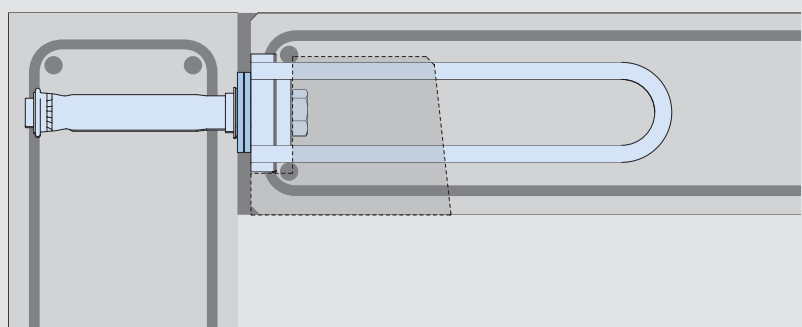
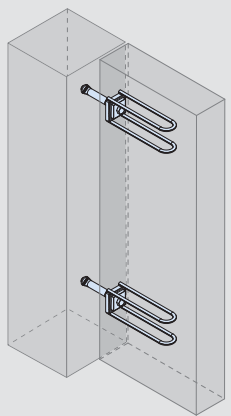
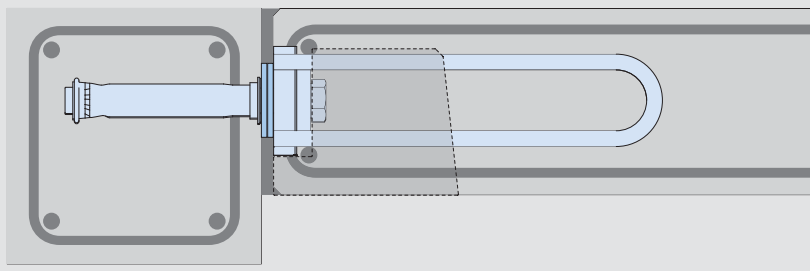


In addition to your design documents we recommend the Technical Product Information "DEMU Fixing Anchors". Free download at: www.halfen.com



HALFEN HEK PRECAST COUPLER

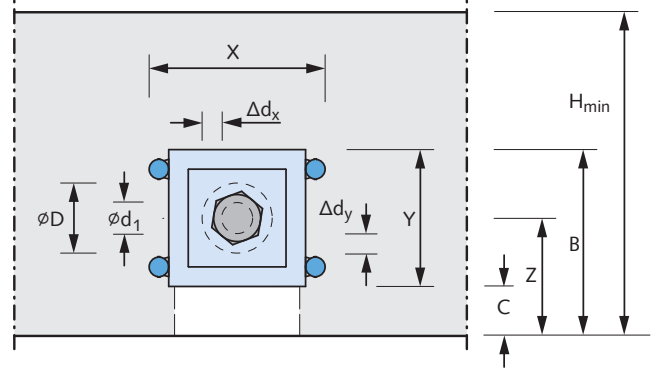
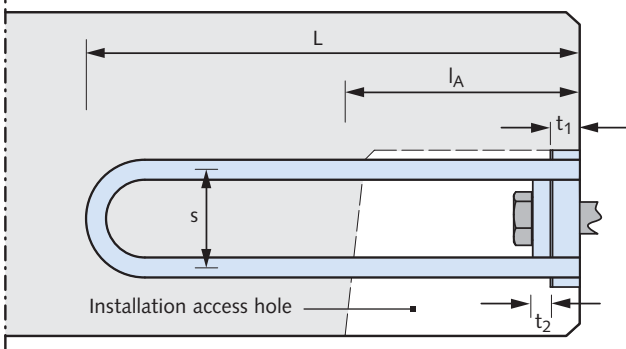
Application examples

Butt junction – wall to wall	
System	Horizontal cross-section
	
T-junction – wall to wall	
System	Horizontal cross-section
	
Junction – wall to column	
System	Horizontal cross-section
	

HALFEN HEK PRECAST COUPLER

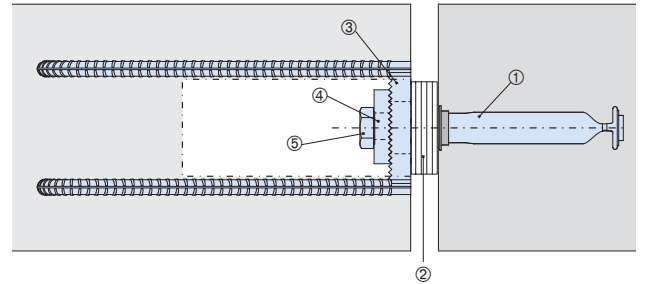
Application

Technical data



Technical data [mm]		
Element length	L	265
Height of installation opening	l_A	145
Bar spacing (anchor stirrup)	s	50
Thickness base plate	t_1	14
Thickness of the counter-plate	t_2	11
Element dimension	X	100
	Y	70
Installation depth	B	95
Concrete cover	C	25
Clearance hole diameter	$\varnothing D$	35
Thread size of the fixing bolt	$\varnothing d_1$	M 16
Adjustment range	Δdx	10
	Δdy	10
Spacing from concrete edge to axis of the fixing bolt (ready installed)	Z	60
Minimum wall thickness	H_{min}	≥ 120

Components of the HEK Precast connection (example)

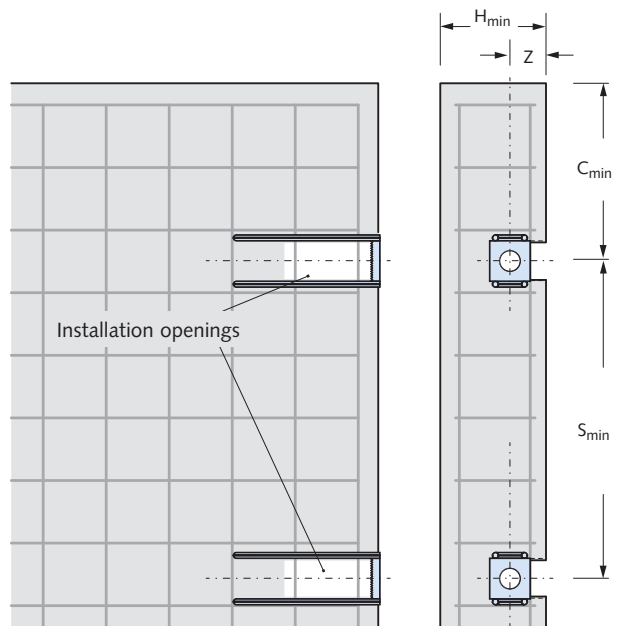


- ① Fixing anchor DEMU T-FIXX® M16
- ② Steel plates or washers, if required
- ③ HALFEN HEK Precast coupler
- ④ HALFEN HEK Counter-plate
- ⑤ Hexagonal bolt (full thread) M16 according to EN ISO 4017

Minimum wall thickness, edge and axial clearances

The HEK Precast coupler elements are installed with the installation opening towards one wall side. The minimum spacing given in the table have to be observed.

Edge and axial spacings [mm]		
Spacing from concrete edge to axis of the fixing bolt (ready installed)	Z	60
Minimum wall thickness	H_{min}	≥ 120
Minimum edge distance	C_{min}	≥ 350
Minimum axial spacing	S_{min}	≥ 700
Thread size (fixing bolt)		M 16



HALFEN HEK PRECAST COUPLER

Application/Dimensioning

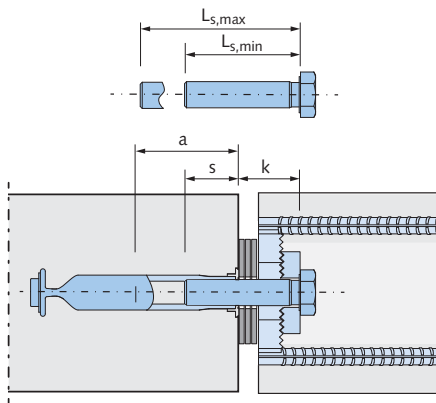
Required bolt length

General

The HEK Precast coupler is fixed to a cast-in, fixing anchor with a bolt or with a threaded rod with locking-nut. The fasteners are not scope of delivery and must be ordered separately. Only bolts or threaded rods specified by the responsible engineer are permitted.

Admissible screw depth

Observe the minimum and maximum values for screw depth as specified in the Technical Product Information for DEMU fixing anchors.



Finding the required bolt length (L_s)

Bolt length $L_{s,min} \leq L_s \leq L_{s,max}$
 $L_{s,min} = s + k$ (minimum bolt length)
 $L_{s,max} = a + k$ (maximum bolt length)

Legend:

k = clamping thickness (overall thickness of base plate, locking-plate and shims)
 s = minimum screw depth for the fixing anchor
 a = maximum screw depth for the fixing anchor

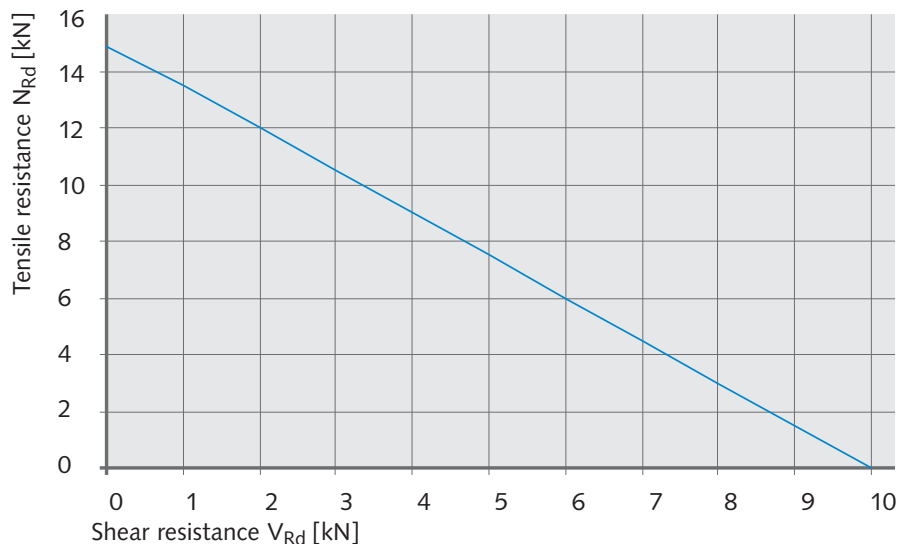
Load capacities – HEK Precast coupler

- N_{Rd} and V_{Rd} are element specific resistances for tension and shear
- For combined shear and tensile forces an approximately linear interaction correlation may be considered (see diagram)

Element specific design resistances		
Concrete strength		$\geq C30/37$
Diameter of the fastening bolt		M16
Tensile resistance	N_{Rd} [kN]	15
Shear resistance	V_{Rd} [kN]	10

The anchoring of the DEMU Fixing anchors acc. to CEN/TS 1992-4-1/2 and the fastenings (bolts with metric ISO standard thread) require separate calculation and verification. Details, specifications and verification must be done by the responsible planner. Calculation examples see page 6.

Interaction diagram for combined shear and tensile forces



HALFEN HEK PRECAST COUPLER

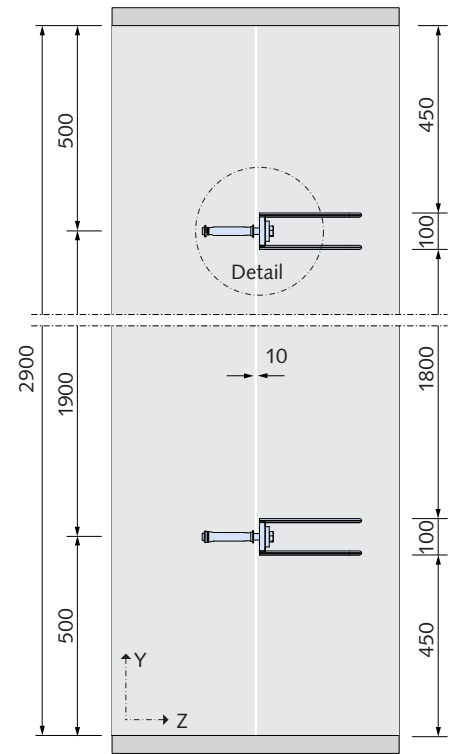
Application/Dimensioning

Calculation example HEK Precast coupler in combination with DEMU Fixing anchors

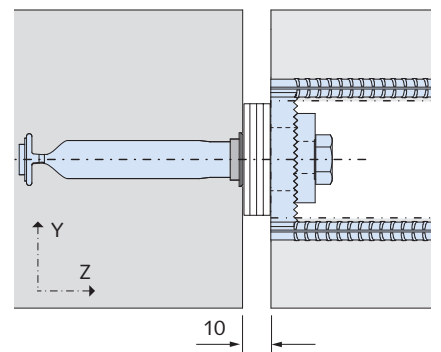
All following load capacities of the various DEMU Fixing anchors are only examples for completed connections, considering the individual conditions for each installation. The values given apply for a single connection.

- precast wall thickness $h = 120 \text{ mm}$
- concrete strength C30/37 and C40/50
- vertical joint width $f = 10 \text{ mm}$, joint section is shimmed using steel shims
- HALFEN HEK Precast coupler with $N_{Rd} = 15 \text{ kN}$, $V_{Rd} = 10 \text{ kN}$ spacing from concrete edge to the axis of the fixing bolt $Z = 60 \text{ mm}$
- DEMU Fixing Anchor T-FIXX® M16 and DEMU Bolt anchor 1988 M16 for various anchor lengths, spacing edge to anchor 60 mm
- calculation of shear force with cantilever $l = 24 \text{ mm}$, resulting from joint width and base plate thickness
- full thread hexagonal head bolts M16 8.8, according to EN ISO 4017

Vertical section (system) [mm]




Detail connection [mm]




We recommend using HALFEN calculation software to calculate DEMU Fixing anchors according to CEN/TS 1992-4-1/2.

The free software can be downloaded at: www.halfen.com



Design loads HEK Precast connection with DEMU T-FIXX®					
Concrete strength		C30/37		C40/50	
Design loads ①		$N_{d,z}$ [kN]	$V_{d,x}$ [kN]	$N_{d,z}$ [kN]	$V_{d,x}$ [kN]
	DEMU T-FIXX® GV M16x60	-	7.2	-	7.6
		4.6	4.7	5.4	4.5
		6.0	3.6	6.5	3.8
		9.2	-	10.7	-
	DEMU T-FIXX® GV M16x100	-	7.6	-	7.6
		5.5	4.5	6.4	4.3
		6.6	3.8	7.3	3.8
		11.0	-	12.7	-
	DEMU T-FIXX® GV M16x125	-	7.6	-	7.6
		6.0	4.4	6.9	4.2
		7.0	3.8	7.7	3.8
		11.9	-	13.9	-

Design loads HEK Precast connection with DEMU Bolt anchor 1988					
Concrete strength		C30/37		C40/50	
Design loads ①		$N_{d,z}$ [kN]	$V_{d,x}$ [kN]	$N_{d,z}$ [kN]	$V_{d,x}$ [kN]
	DEMU Bolt anchor 1988 GV M16x75	-	8.1	-	8.9
		5.0	6.0	5.8	6.0
		7.2	4.1	7.9	4.4
		9.9	-	11.5	-
	DEMU Bolt anchor 1988 GV M16x140	-	8.9	-	8.9
		6.3	5.8	7.3	5.1
		8.5	4.3	9.7	3.5
		12.5	-	14.6	-

Generally each application case should be separately verified by the responsible engineer, considering the necessary boundary conditions.

① Basics for calculation are the specific values for DEMU T-FIXX®, DEMU Bolt anchor 1988 and HALFEN HEK Precast coupler. Design loads are for cracked concrete (standard edge reinforcement and stirrups with standard spacing); bursting forces are considered (cf. CEN/TS 1992-4-2, section 6.2.6.2 b).

HALFEN HEK PRECAST COUPLER

Application/Notes

Corrosion protection and exposure

Corrosion protection of steel elements must be designed considering the expected exposure to possible corrosion during construction and expected working life. Installed elements completely covered by concrete are permanently protected by the passivation effect if a sufficient concrete cover according to DIN EN 1992-1-1 section 4 is ensured. As an alternative a metallic based corrosion protection coating is recommended.

Metallic based corrosion protection

Zinc galvanising

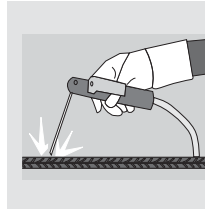
An electro-chemical method producing a protective zinc coating according to EN ISO 2081. The layer thickness has a minimum of 8 µm. Post-treatment by dipping the products into a chromatic solution provides a colourless chrome coating. The corrosion protection is limited and depends strongly on the environmental conditions.

Protection	Quality	Application and exposure
Metallic coating	Zinc galvanising	Categorie: C1 - insignificant corrosion exposure / dry interior rooms Elements may only be used in insulated buildings with dry conditions with ≤ 60 % relative air humidity, e.g. residential, office buildings, schools, hospitals or shops.

Welding

All HALFEN HEK Precast connection (steel) products listed in the "Technical catalogue" can, excluding in the bend areas of the reinforcement, be subjected to welding. Nevertheless each type of welding including tack-welding may negatively affect the products characteristic properties. If in exceptional cases welding is unavoidable, the following must be observed:

- due to heat generation, reduced functionality and reduced load capacities may result
- any coatings or covering must be removed before welding; appropriate measures must be taken to protect against fumes caused by the welding process
- mandatory protective equipment must be worn
- observing any applicable regulations for welding is the responsibility of the customer



HALFEN does not accept any liability for damage to HALFEN products or consequential damage, caused by welding, not within the scope of the HALFEN production-process.

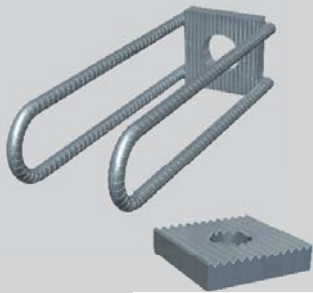
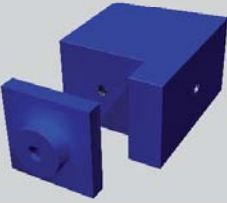
TECHNICAL SUPPORT

HALFEN Technical Support

Engineering services and technical support for your individual projects. Addresses for all HALFEN products can be found on the back cover of this catalogue.

HALFEN HEK PRECAST COUPLER

Order information/Installation instructions

HALFEN HEK Product overview and accessories				
	Article name	Description	Quality	Order no.
	HEK-1	Set, includes HEK Precast coupler and counter-plate Material: steel S355J2 acc. to EN 10025-2, reinforcement steel B500 acc. to DIN 488	Zinc galvanised	0950.100-00011
	HEK-RC	Recess former set, two piece thread size M10 re-usable, lower part made of soft material for an optimised fit to the serrated base-plate	Plastic	0950.100-00001

Fastenings and shimmings are not scope of delivery, see page 4.

For design of the bolt lengths the allowable screw depths of the fixing anchors must be observed, see page 5.



For available range and for assembly of fixing anchors please refer to the documents, Technical Product Information "DEMU Fixing anchors" or assembly instructions „DEMU-FIX“.

Free downloads available at www.halfen.com/products/fixing systems/ DEMU Fixing anchors/ Product information



Installation instructions

For proper functionality of the serrated joint the base plate must be protected against damage and kept free from dirt e.g. concrete or other foreign objects. We recommend using the two-piece, re-usable HEK Recess former for this purpose.

To ensure sufficient bond with the concrete keep reinforcement stirrups free of all contaminants; lubricants etc. Concrete should be poured carefully; any direct contact between the HEK Coupler and the concrete vibrator should be avoided. We also recommend additional wire-tying of the HEK Coupler to the main reinforcement. The elements may be positioned flush or with a recess (to the front-end). Washers or suitable steel shims must be used

between the HEK Base plate and the fixing anchor in case of non-flush installed fixing anchors i.e. in any remaining excessive joints.

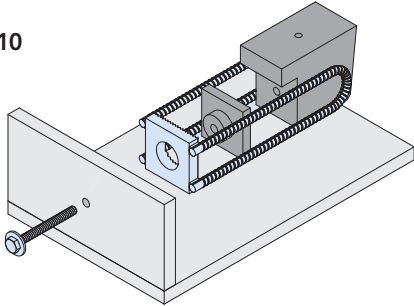
Only use bolts stipulated by the responsible engineer in the respective design specifications in all connections. The HEK Precast couplers can only be subjected to their full load capacity when the specified concrete strength has been reached. The minimum and maximum screw depths in the threaded sleeves and maximum torques (T_{inst}) for the fixing anchors have to be observed.

HALFEN HEK PRECAST COUPLER

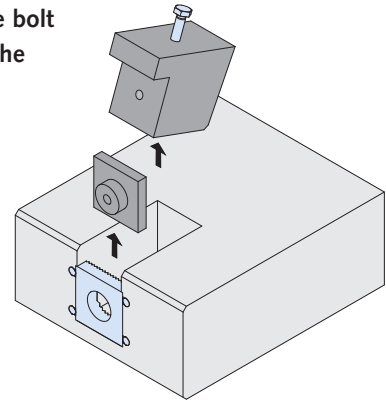
Installation steps

Installation in the precast plant

Place the two-piece recess former and secure to the formwork with a hex-head bolt M10

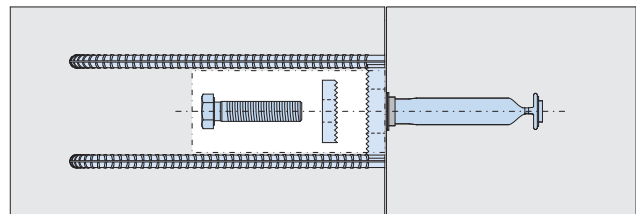


After concreting, remove the bolt and the formwork, remove the recess former



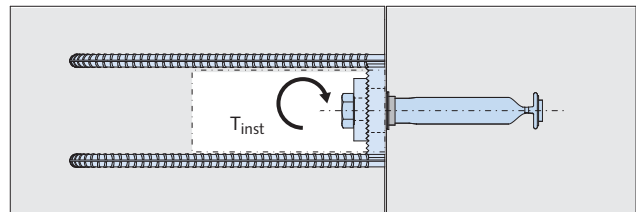
On-site assembly

Align the precast element.
 Insert the serrated counterplate in the installation opening and screw in the bolt through the counterplate.
 Check serration has correctly engaged. (Bolt is not included in scope of delivery)



Insert and tighten the bolt

Observe the allowable screw depth and torque for the fixing anchor T_{inst}

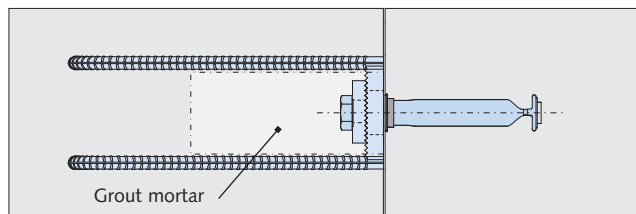


! Check the orientation of the serrated counterplate!
 The serrations must engage correctly.

! Torque values and screw-depths can be found in the dedicated installation instructions for DEMU Fixing anchors.

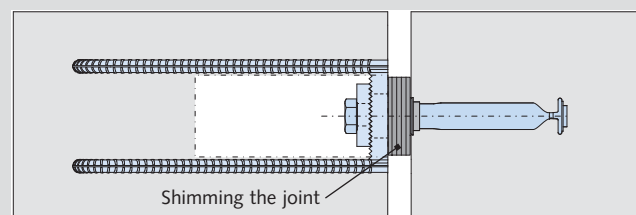
Installation opening must be completely filled with grout mortar

The installation recess must be completely filled with a free-flowing, high-strength and low-shrinkage grout mortar. Manufacturer's specifications must be observed.



Recessed fixing anchors or excessive joint gaps

! Suitable shims or washers must be used to fill gaps between the HEK base plate and fixing anchor for recessed fixing anchors or if constructive excessive joints are unavoidable.
 The increased bending moment of the bolts must be considered and verified. Allowable screw depth and the torque value T_{inst} for the fixing anchor must be observed.



Systematic Fixing Solutions













The advantages at a glance

D EMU Fixing anchors with internal thread are intended to be used for permanent anchorages under predominantly static actions

or quasi-static actions in reinforced and unreinforced normal weight concrete from strength class C20/25 to C50/60.

They may be used in cracked or non-cracked concrete for transmission of tensile loads, shear loads or a combination of both.



	T-FIX®	Bolt anchor	Bar anchor	Socket anchor
Loads	Medium load capacity	High load capacity	High load capacity	Low load capacity
Application	<ul style="list-style-type: none"> high/medium loads near edges applications (up to high strength concrete) thin elements load capacity of concrete decisive normal strength concrete 	<ul style="list-style-type: none"> high loads use in full concrete (without influence of edges) high steel strength required up to high strength concrete 	<ul style="list-style-type: none"> high tension loads (pullout) use in frontside of thin elements (deep embedment required) high steel strength required up to high strength concrete 	<ul style="list-style-type: none"> low loads temporary fixings fixings without structural significance
Examples for typical use	<ul style="list-style-type: none"> fixing of railings for balconies, bridges fixing of utility equipment or power lines, installation brackets fixing of stadium seats fixing of steel stairs or ladders fixing of connection between precast elements 	<ul style="list-style-type: none"> fixing of railings for balconies, bridges fixing of utility equipment, power lines, installation brackets fixing of stadium seats fixing of steel stairs or ladders 	<ul style="list-style-type: none"> fixing of railings for balconies, bridges fixing of utility equipment, power lines, installation brackets fixing of stadium seats fixing of steel stairs or ladders 	<ul style="list-style-type: none"> fixing of push pull props on precast elements fixing of windows fixing of machines on foundation (without dynamic loading) temporary bracing of precast elements
Design concept / Calculation	 according to CEN/TS 1992-4-1/2	 according to CEN/TS 1992-4-1/2	 according to EN 1992-1-1 (chapter 8.4) / NEN 6720 art. 9.6 and 9.16	
Calculation Software				
ETA approval				

CONTACT HALFEN WORLDWIDE

HALFEN is represented by subsidiaries in the following 14 countries, please contact us:

Austria	HALFEN Gesellschaft m.b.H. Leonard-Bernstein-Str. 10 1220 Wien	Phone: +43-1-259 6770 E-Mail: office@halfen.at Internet: www.halfen.at	Fax: +43-1-259-6770 99
Belgium/ Luxembourg	HALFEN N.V. Borkelstraat 131 2900 Schoten	Phone: +32-3-658 07 20 E-Mail: info@halfen.be Internet: www.halfen.be	Fax: +32-3-658 15 33
China	HALFEN Construction Accessories Distribution Co.Ltd. Room 601 Tower D, Vantone Centre No. A6 Chao Yang Men Wai Street Chaoyang District Beijing · P.R. China 100020	Phone: +86-10 5907 3200 E-Mail: info@halfen.cn Internet: www.halfen.cn	Fax: +86-10 5907 3218
Czech Republic	HALFEN s.r.o. Business Center Šafránková Šafránková 1238/1 155 00 Praha 5	Phone: +420-311-690 060 E-Mail: info@halfen-deha.cz Internet: www.halfen-deha.cz	Fax: +420-235-314 308
France	HALFEN S.A.S. 18, rue Goubet 75019 Paris	Phone: +33-1- 445231 00 E-Mail: halfen@halfen.fr Internet: www.halfen.fr	Fax: +33-1-445231 52
Germany	HALFEN Vertriebsgesellschaft mbH Liebigstr. 14 40764 Langenfeld	Phone: +49-2173-970-0 E-Mail: info@halfen.de Internet: www.halfen.de	Fax: +49-2173-970 225
Italy	HALFEN S.r.l. Soc. Unipersonale Via F.lli Bronzetti N° 28 24124 Bergamo	Phone: +39-035-0760711 E-Mail: tecnico@halfen.it Internet: www.halfen.it	Fax: +39-035-0760799
Netherlands	HALFEN b.v. Oostermaat 3 7623 CS Borne	Phone: +31-74-267 14 49 E-Mail: info@halfen.nl Internet: www.halfen.nl	Fax: +31-74-267 26 59
Norway	HALFEN AS Postboks 2080 4095 Stavanger	Phone: +47-51 82 34 00 E-Mail: post@halfen.no Internet: www.halfen.no	Fax: +47-51 82 34 01
Poland	HALFEN Sp. z o.o. Ul. Obornicka 287 60-691 Poznan	Phone: +48-61-622 14 14 E-Mail: info@halfen.pl Internet: www.halfen.pl	Fax: +48-61-622 14 15
Sweden	Halfen AB Vädursgatan 5 412 50 Göteborg	Phone: +46-31-98 58 00 E-Mail: info@halfen.se Internet: www.halfen.se	Fax: +46-31-98 58 01
Switzerland	HALFEN Swiss AG Hertistrasse 25 8304 Wallisellen	Phone: +41-44-849 78 78 E-Mail: info@halfen.ch Internet: www.halfen.ch	Fax: +41-44-849 78 79
United Kingdom/ Ireland	HALFEN Ltd. A1/A2 Portland Close Houghton Regis LU5 5AW	Phone: +44-1582-47 03 00 E-Mail: info@halfen.co.uk Internet: www.halfen.co.uk	Fax: +44-1582-47 03 04
United States of America	HALFEN USA Inc. 8521 FM 1976 P.O. Box 547 Converse, TX 78109	Phone: +1 800.423.91 40 E-Mail: info@halfenusa.com Internet: www.halfenusa.com	Fax: +1 877.683.4910
For countries not listed HALFEN International	HALFEN International GmbH Liebigstr. 14 40764 Langenfeld /Germany	Phone: +49-2173-970-0 E-Mail: info@halfen.com Internet: www.halfen.com	Fax: +49-2173-970-849

Furthermore HALFEN is represented with sales offices and distributors worldwide. Please contact us: www.halfen.com

NOTES REGARDING THIS CATALOGUE

Technical and design changes reserved. The information in this publication is based on state-of-the-art technology at the time of publication. We reserve the right to make technical and design changes at any time. HALFEN GmbH shall not accept liability for the accuracy of the information in this publication or for any printing errors.

The Quality Management System of Halfen GmbH is certified for the locations in Germany, France, the Netherlands, Austria, Poland, Switzerland and the Czech Republic according to **DIN EN ISO 9001:2008**, Certificate No. QS-281 HH.





For further information please contact: www.halfen.com