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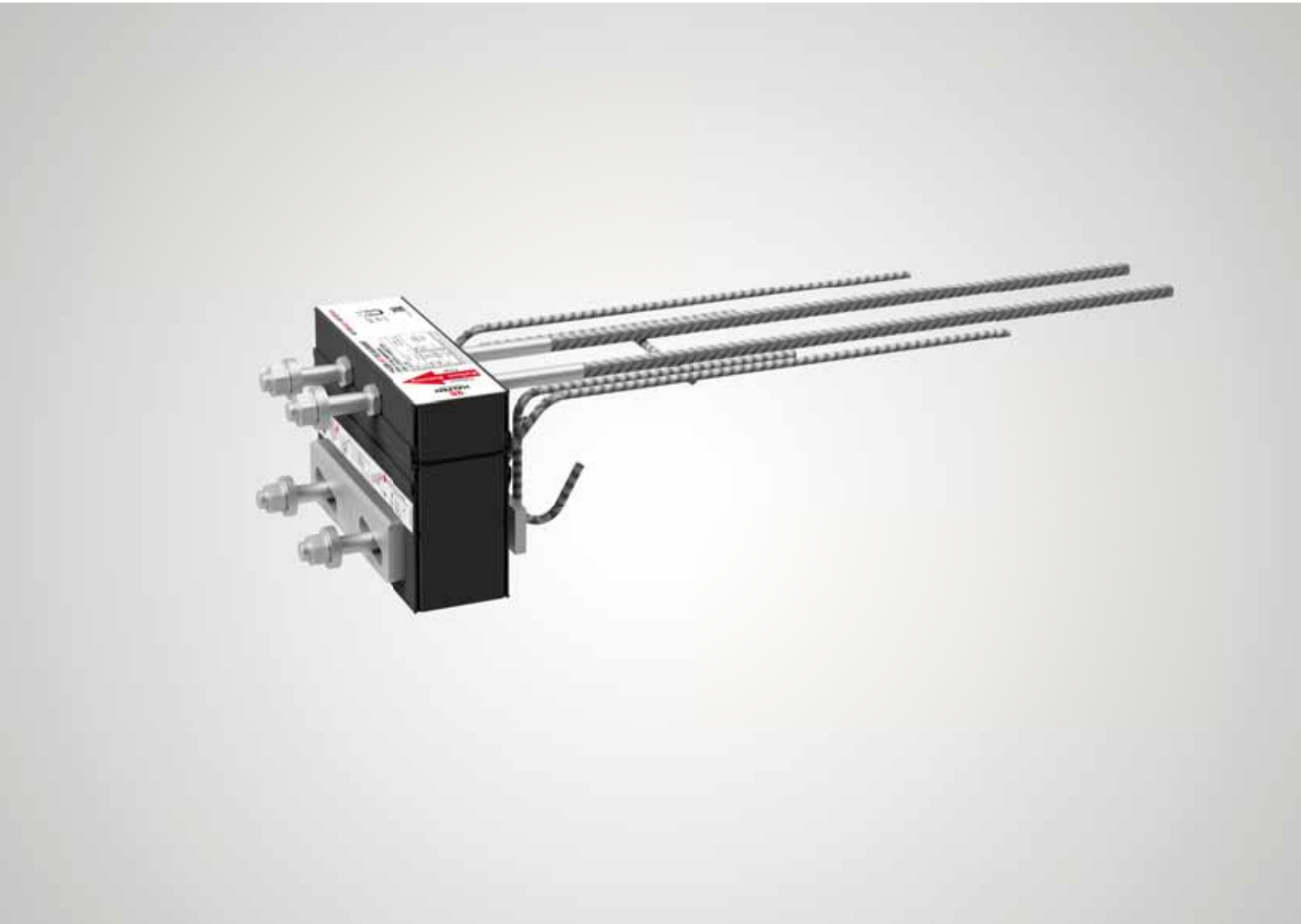
HALFEN

# HALFEN HIT INSULATED CONNECTION STEEL TO CONCRETE CONNECTOR

## Technical Product Information



HIT-SC 20.1-E

Leviat®
A CRH COMPANY

# We are one team.
# We are Leviat.

## Leviat is the new name of CRH's construction accessories companies worldwide.

**Under the Leviat brand, we are uniting the expertise, skills and resources of HALFEN and its sister companies to create a world leader in fixing, connecting and anchoring technology.**

The products you know and trust, including the HALFEN HIT Insulated connections, will remain an integral part of Leviat's comprehensive brand and product portfolio. As Leviat, we can offer you an extended range of specialist products and services, greater technical expertise, a larger and more agile supply chain and better, faster innovation.

By bringing together CRH's construction accessories family as one global organisation, we are better equipped to meet the needs of our customers, and the demands of construction projects, of any scale, anywhere in the world.

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HALFEN

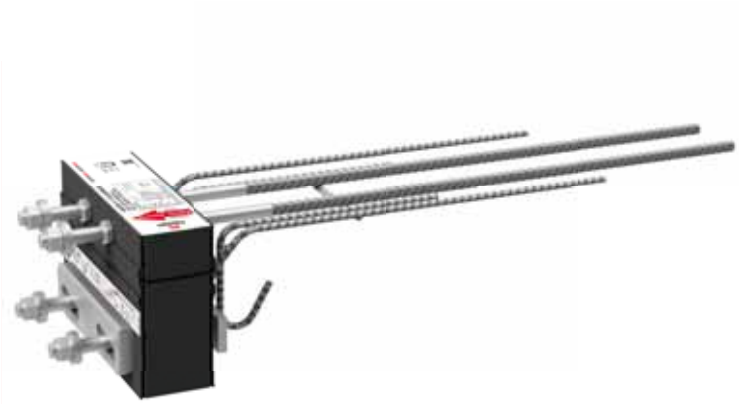
## EXTREMELY ADAPTABLE

Did you know that squids adapt to their environment extremely well? They can pass through the smallest gaps, and thanks to their long tentacles, they can cling to anything, anywhere on the seabed. The HIT Steel to concrete insulated connection prefers to use its long rebars as reliable anchors in concrete. But the HIT is also very adaptable – especially when it involves tolerances in building!

Find out more at
**www.halfen.com!**

# NEW: HIT INSULATED CONNECTIONS
# FOR STEEL TO CONCRETE CONNECTION

The new HALFEN HIT Steel to concrete connector is now available for connection of filigree steel components to concrete structures. This reduces thermal bridges while simultaneously ensuring high load transfer. The insulated connection elements are also freely height adjustable for easy compensation of construction tolerances.



# CONTENTS



NEW

NEW

NEW

# HALFEN HIT Steel to concrete connector

**Steel structures; steel balconies, steel canopies or solar shading systems are generally connected to reinforced concrete components. Because of the high thermal conductivity of steel, an efficient thermal separation in the connection is essential to prevent thermal bridges as these cause higher energy consumption, and to avoid structural damage caused by condensation and mould. HALFEN HIT Steel to concrete connectors reduce thermal bridges to a minimum with simultaneous high load transfer capabilities.**

The core of the elements consists of a statically effective system of compression, tension and shear bars, which are anchored on-site in load-bearing concrete components. Tension and compression rods with metric connection threads are provided on the (exterior) balcony side. The system has an angled slotted bracket for freely height adjustment of connected components.

The load-bearing elements are tightly enclosed in a non-flammable mineral wool insulation; this significantly improves thermal separation. A robust housing encases and protects the insulation material from mechanical damage and the effects of weather. All load relevant elements in the connection and on the (exterior) balcony side are stainless steel to protect from corrosion and to ensure durability.

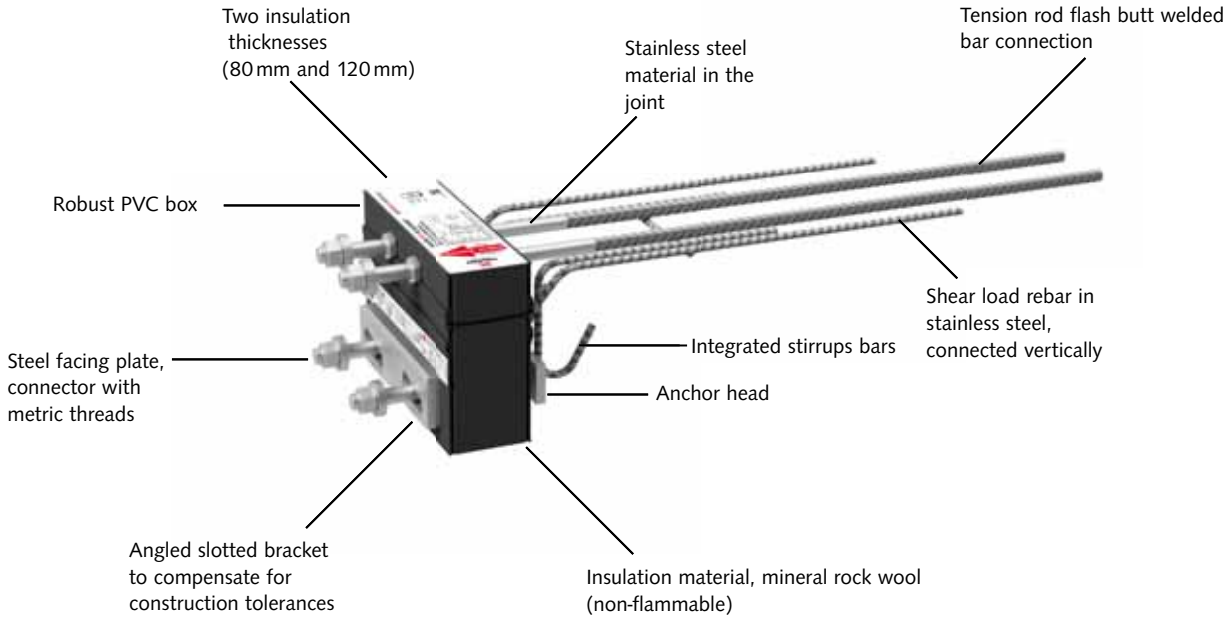
**The following types of insulated connection are available:**

- **HIT-SDV** as connection for freely cantilevered steel elements to transfer positive and negative bending moments and positive shear loads
- **HIT-SMV** as connection for freely cantilevered steel elements to transfer negative bending moments and positive shear loads
- **HIT-SZV** as connection for simply supported elements to reinforced concrete slabs to transfer positive shear loads
- all types are available with 80 mm (HIT-HP) and 120 mm (HIT-SP) thick insulation.

The HIT-SMV and HIT-SZV, with intelligent bar layout, are ideal for use with semi-precast filigree slabs, the short anchor heads do not come into contact with the reinforcement of the semi-precast slabs.

All types are delivered with an pre-fitted installation aid, these allow easy adjustment to facilitate installation in the formwork.

**HIT-HP SMV-2M16**

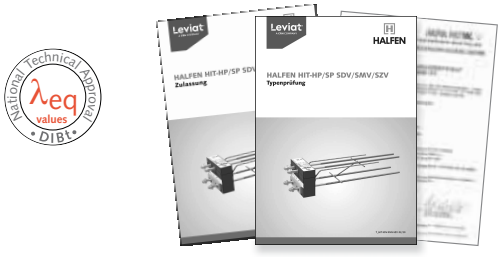


# The benefits at a glance

## Reliable design and planning

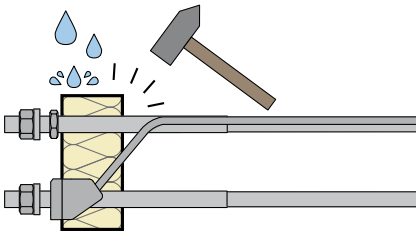
- Building Authority Approval including determination of the equivalent thermal conductivity ($\lambda_{eq}$)
- type tested
- chi-values for masonry with *ETICS available, other values on request

*ETICS External Thermal Insulation Composite System.



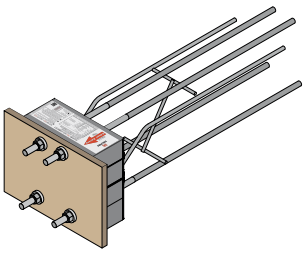

## Robust box

- reliable and sturdy box for installation in construction site conditions
- weather-resistance, reliable protection of the insulation material
- robust box ensures reliable connection of attached steel components



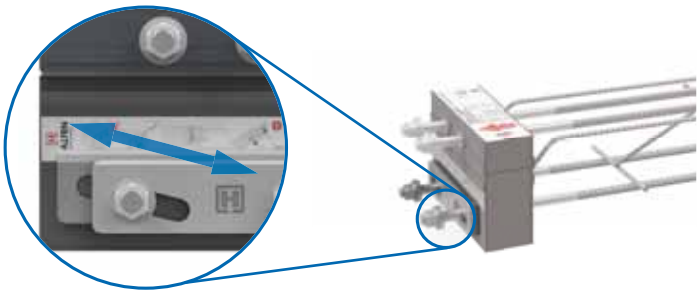
## Pre-fitted installation aid

- installation aid is pre-fitted as standard
- facilitates installation and adjustment in the formwork
- everything required is included in delivery; no additional costs



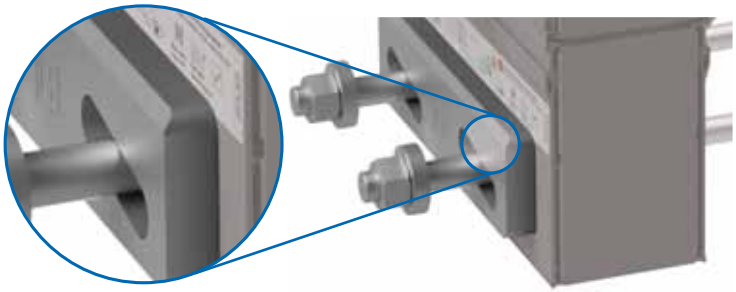
## Vertical adjustment of the steel with an angled slotted bracket

- pre-fitted steel bracket with angled slots, lateral movement provides vertical adjustment
- freely adjustable
- robust design, suitable for building site conditions



## Reliable notched support

- angled slotted bracket with bevelled edge, ensures support surface for the connecting notched is flat.
- no unintentional movement or twisting
- reliable, force-locked transfer of loads



# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Product Overview – Thermally Insulated Connections

### 1 Cantilevered balcony slabs

**HIT-HP SDV / HIT-SP SDV**
Transfer of bi-directional bending moments and positive shear loads
- insulation thickness 80 mm / 120 mm

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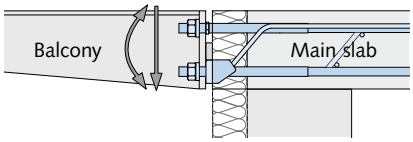
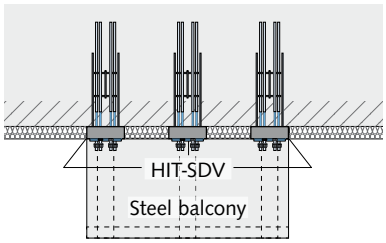
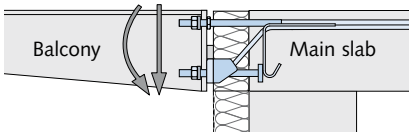


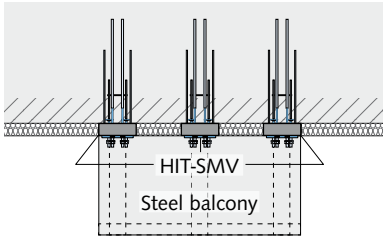




### 2 Cantilevered balcony slabs

**HIT-HP SMV / HIT-SP SMV**
Transfer of negative bending moments and positive shear loads
- insulation thickness 80 mm / 120 mm

→ **page 31**




### 3 Simply supported balcony slabs on columns

**HIT-HP SZV / HIT-SP SZV**
Only for shear load transfer in positive direction
- insulation thickness 80 mm / 120 mm

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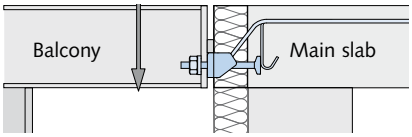
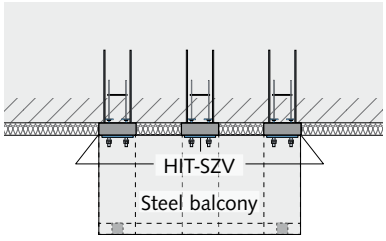



### 4 Construction

**HIT-HP/SP SDV, SMV, SZV**
- Design and installation of connected components

→ **page 52**

### 5 Building physics

**HIT-HP/SP SDV, SMV, SZV**
- Building physics, characteristic values

→ **Page 59**

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Material Specification and Test Certificates



### Materials; HIT Elements

| | |
|---|---|
| **Tension/compression rods** | Flash butt welded bar connection, consisting of a combination of two reinforcing steel bars B500 according to DIN 488, and stainless steel bars of strength class S690 or stainless steel B500NR with partial or full metric threads, for connection of steel components to the (exterior) side of the HIT element. |
| **Load-bearing support** | Stainless steel bars, strength class S 690 with partial or full metric threads on the steel connection side of the element, and anchor heads on the concrete side. |
| **Shear load rebar** | Stainless steel bars in strength class B500NR or flash butt welded bar connection, consisting of a combination of stainless steel bar B500NR and reinforcing steel bars B500 |
| **Installation bracket** | Stainless steel, strength class S460 |
| **Angled slotted bracket** | Stainless steel, strength class S235 |
| **Accessories** | Stainless steel washers in strength class S460,<br>Stainless steel bolt-nuts in strength class A4-80 |
| **Box** | PVC plastic according to EN ISO 1163 |
| **Insulation material** | Mineral wool (WLG 035) Building Material Class A1 – non-flammable insulation according to DIN 4102-14 or Euroclass A1 in accordance with EN 13501-1 |

### Materials; load bearing concrete components

| | |
|---|---|
| **Concrete** | Suitable for concrete strength ≥ C20/25 |
| **On-site reinforcement** | B500 Reinforcement steel |

### Materials; connected steel components

| | |
|---|---|
| **Steel** | Steel according to EN 1993 or stainless steel according to approval Z-30.3-6<br>Required minimum strength class of steel on the balcony side: S 235 |

### Test certificates

| **Building Authority Approvals** | |
|---|---|
| **HIT-HP/SP SDV**<br>**HIT-HP/SP SMV**<br>**HIT-HP/SP SZV** | DIBT* Berlin: Approval no. Z-15.7-336<br><br>*(German Institute of Building Technology) |

| **Type tests** | |
|---|---|
| Type tested by the<br>LGA Landesgewerbeanstalt Bayern | Test no. S-WUE/100358<br>(German certification institute) |

**Approvals and type tests on the internet**
The approvals and type tests can be found at **www.halfen.com/downloads/brochures**.
Or simply scan the code and then select the document to download the PDF file.

## HALFEN HIT STEEL TO CONCRETE CONNECTOR
**Calculation**

# Notes on calculation

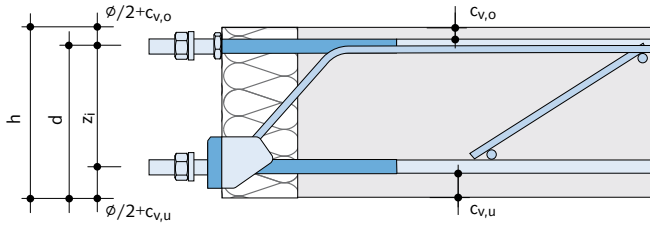
The connection is used as a thermally insulated, load-bearing connection of steel components to load-bearing reinforced concrete components.

The load-bearing structure requires a reinforced concrete element according to EN 1992-1-1 (minimum concrete strength C20/25; density 2,000 kg/m³ – 2,600 kg/m³). Connected steel component must be in accordance with EN 1993 (e.g. balconies, canopies). The element is used for predominantly static loads.

The load-bearing concrete and the connected steel components must be verified by a structural engineer in accordance with current applicable standards. Design and static verification according to EN 1992-1-1 for the load-bearing component, and according to EN 1993 for the connected component. For verification, the loads on the connected structure must be calculated in accordance with EN 1991.

For indirect support of the HIT element, the transfer of loads from the connected element to the load-bearing component must be verified separately by the structural engineer.
The insulation element is not designed for transfer of torsion loads; therefore, torsion-free installation must be ensured. Any torsion interaction between adjacent insulation elements must be prevented.

The load capacities are provided for the standard element height. Slabs thicknesses greater than the specified standard concrete coverings are possible, the element load capacities must always be selected for the possible internal cantilever $z_i$.




Inner cantilever and component height

| HALFEN HIT-HP<br>HALFEN HIT-SP | SDV 2M16<br>SMV 2M16<br>SZV 2M16 | SDV 2M22 |
|---|---|---|
| **HIT Height h [mm]** | Inner cantilever **$z_i$ [mm]** | Inner cantilever **$z_i$ [mm]** |
| **180** | 113 | 108 |
| **200** | 133 | 128 |
| **220** | 153 | 148 |
| **240** | 173 | 168 |
| **260** | 193 | 188 |
| **280** | 213 | 208 |

**Corrosion protection**
The stainless steels used comply with corrosion resistance class III/medium. Using the HALFEN HIT Steel to Concrete connectors in combination with galvanized or facing plates treated with corrosion protection coatings (i.e. paint) is non critical when considering galvanic corrosion, as the area of the facing plate is considerably larger than the surface area of the stainless steel. Consequently, a failure of the connection caused by contact corrosion is prevented.

**Shortening the threaded connections**
The threaded connection rods may be shortened as required; at least two thread must remain visible after final installation of steel components.

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Calculation

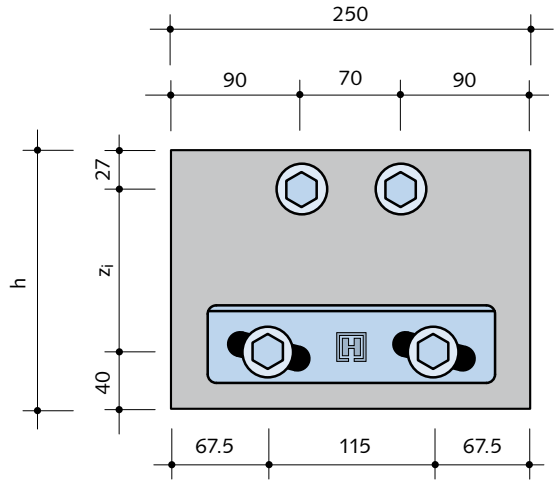
### Connection details HIT-SDV / HIT-SMV

The elements are delivered with a standard width of b = 250 mm.
Smaller widths, from 220 ≤ b ≤ 250 mm are available as custom lengths on request.

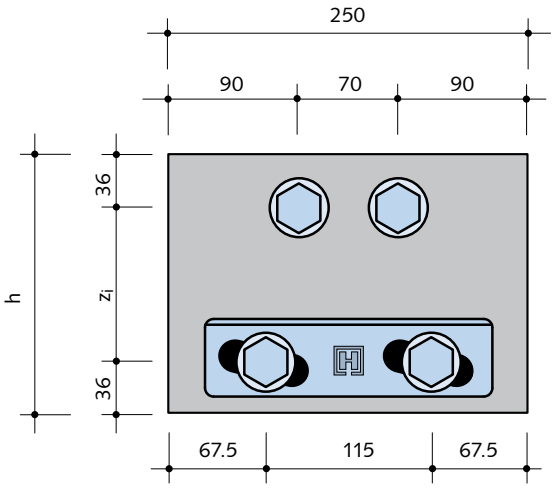
The structural engineer has to verify that the design values of the loads in the selected section do not exceed the specified resistance.

The horizontal and vertical axial spacings of the tension and compression elements are decisive for the design of the connected component. The axial spacing of the tension bars is 70 mm for all elements, for the compression rods 115 mm. The vertical spacing results from the selected element height h:

M16: $z_i = h - 67$
M22: $z_i = h - 72$




Spacings with HIT-SDV and HIT-SMV with M16 thread

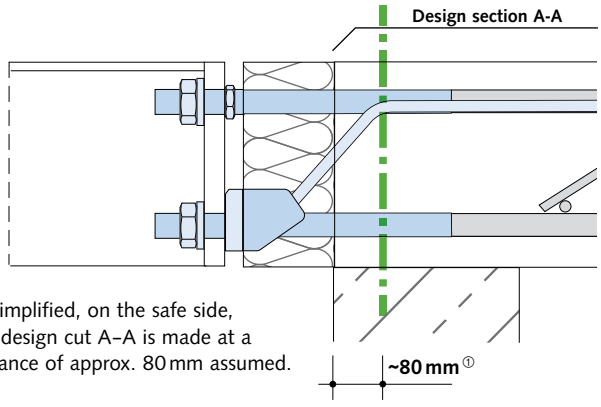



Spacings with HIT-SDV with M22 thread

Dimensions in [mm]

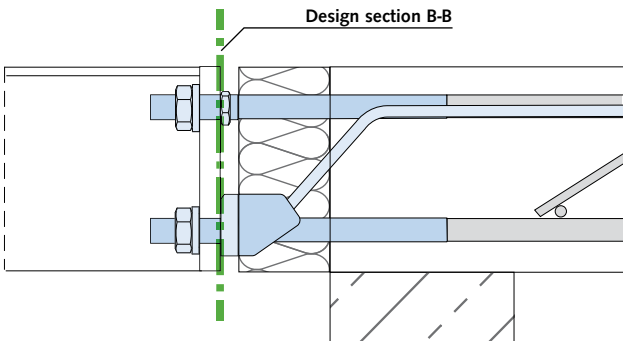
**For HIT-SDV and HIT-SMV elements, the design values for resistance at ultimate load capacity are shown for two sections: The verification can be performed either in section A–A or section B–B. The two sections are mathematically linked, i.e. if the check is performed in one of the two sections (usually B–B), it is automatically fulfilled in the other section.**

**Section A-A** Design section according to Z-15.7-336 (section in axis of tension and shear load bars)




① Simplified, on the safe side, the design cut A–A is made at a distance of approx. 80 mm assumed.

**Section B-B** Design section at connection surface of steel component (surface of the facing plate to the connected component)



# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Calculation

With HIT-SDV and HIT-SMV elements there is a dependency between the moment load capacity and the shear load in section B-B.
Therefore the tables show four value pairs $V_{Rd}$ / $M_{Rd}$.

- Intermediate values may be linearly interpolated.
- Extrapolation for larger shear load values ($V_{Ed} > V_{Rd,4}$) is not possible.

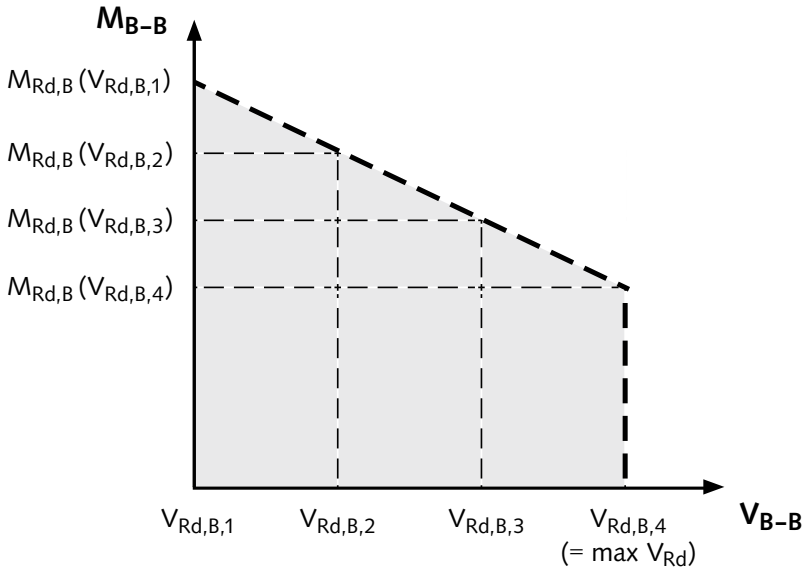



**Figure:** Dependency of moments and shear forces in section B-B

### HIT-SZV Connection details

The HIT-SZV element is delivered with a standard width of b = 250 mm. Smaller widths, 220 ≤ b ≤ 250 mm, are possible on request. Decisive for the design of the connected component are the axial spacings (horizontal and vertical) of the compression elements – the axial spacings of the compression bars is 115 mm for all elements.

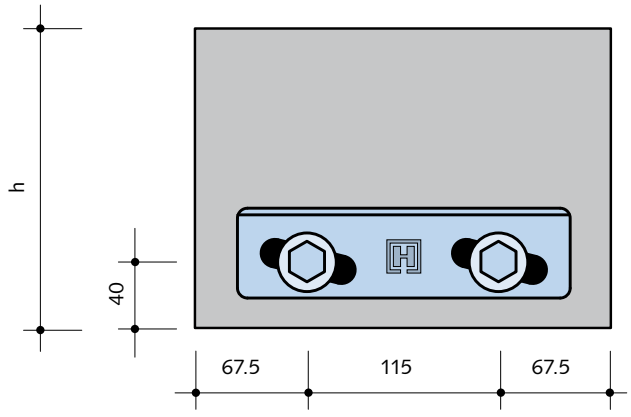
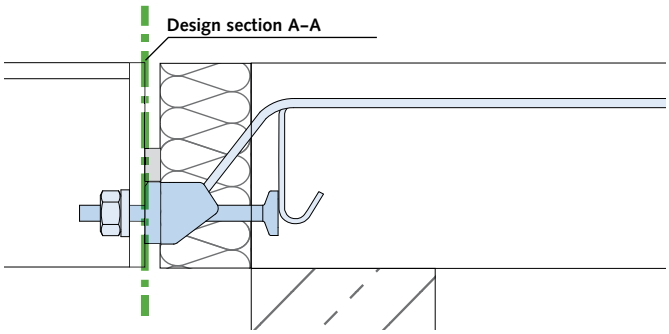


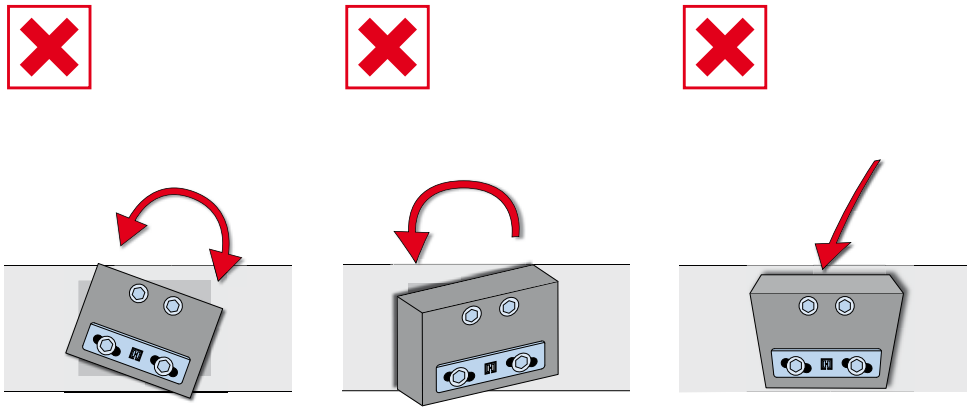

**Figure:** Spacings for HIT-SZV with M16 thread

The provided design values for load carrying capacity apply for the rear-most surface of the facing plate of the connected element. See section A–A.



# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Verifying correct installation

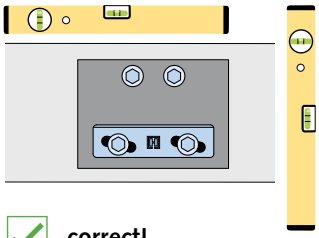
### Verifying correct installation



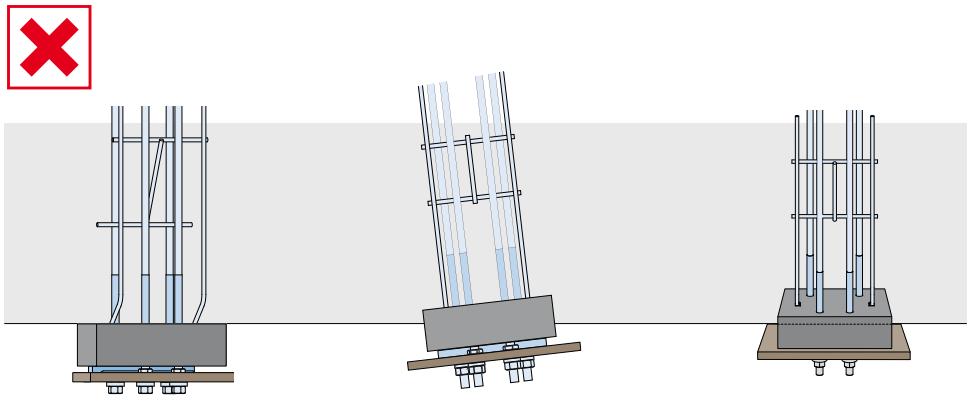
**incorrect** rotated horizontal orientation

**incorrect** twisted horizontal orientation

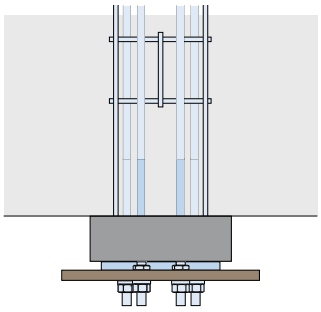
**incorrect** tilted vertically!



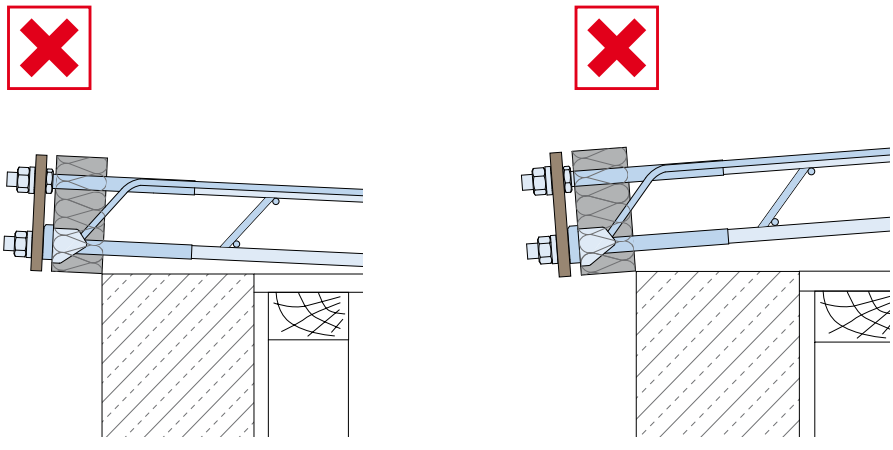
**correct!**



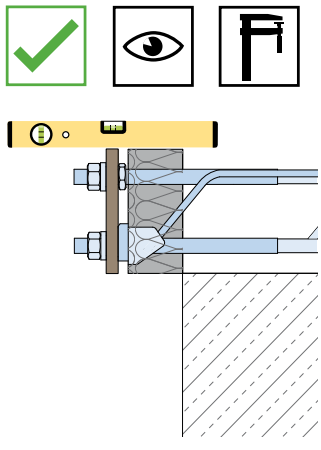
**incorrect**: elements askew, horizontal to the concrete edge, towards the front or back



**correct**: element aligned along axis



**incorrect** tilted vertically



**correct**: vertically aligned

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
# Installation aid

## Using the installation aid

**Transport protection doubles as installation aid**
Each HIT element connection steel to concrete is delivered with a fitted transport protection, which is also used as an installation aid.

Primarily, the transport protection board shields the insulation box and connection bolts from damage; the connection bolts' orientation is also protected. The orientation of the bolts is critical and therefore requires special protection during concreting.

The protection boards should remain in position during concreting or matching holes must be provided in the on-site formwork. If the installation aids are not removed from the elements, they can be used for alignment and connection to the on-site formwork. It must be ensured on-site that the installation aids are aligned vertically.

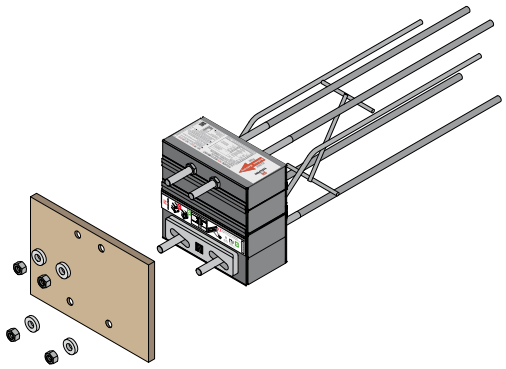
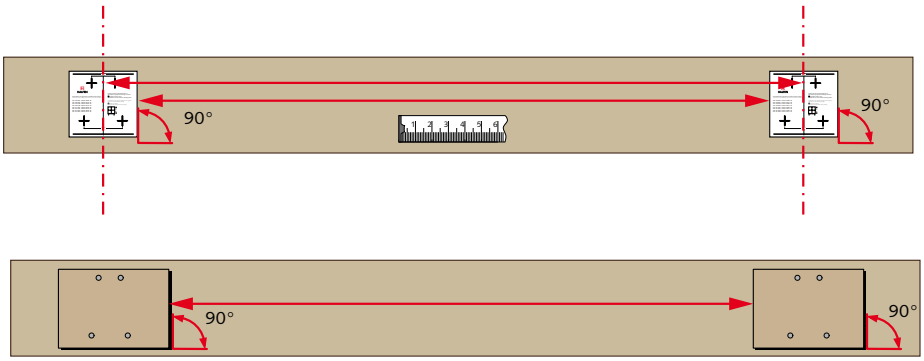


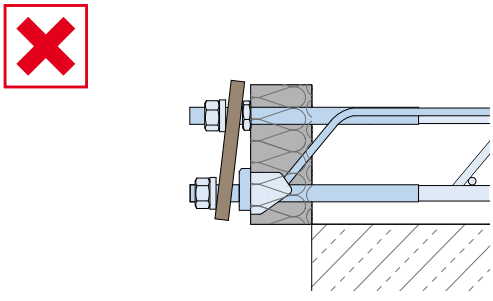
**Figure:** HIT-HP SDV and installation aid

The excess ends of the installation aids can be used as required to fix the element to the formwork. If the elements are to be inserted directly through the formwork or using the installation aids, these can be removed and used as templates to set the drill holes and element spacings.

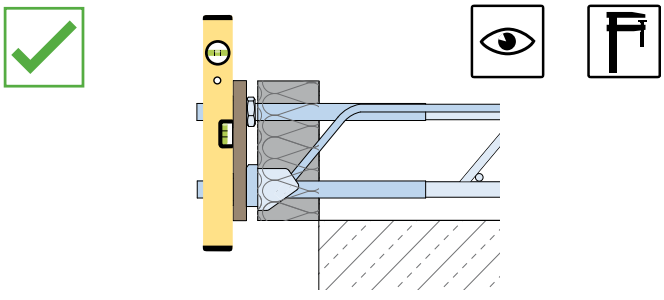



**Figures:** above: Installation aid on formwork using drill templates, below: Installation aid on formwork – aligned

## Vertical orientation of the installation aid



**incorrect** Installation aid tilted vertically



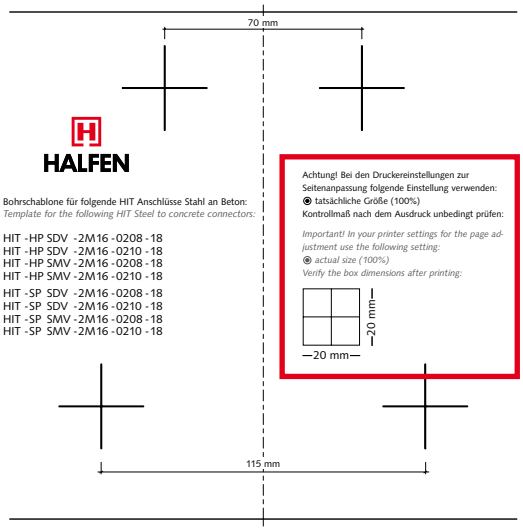
**correct**: Installation aid vertically aligned

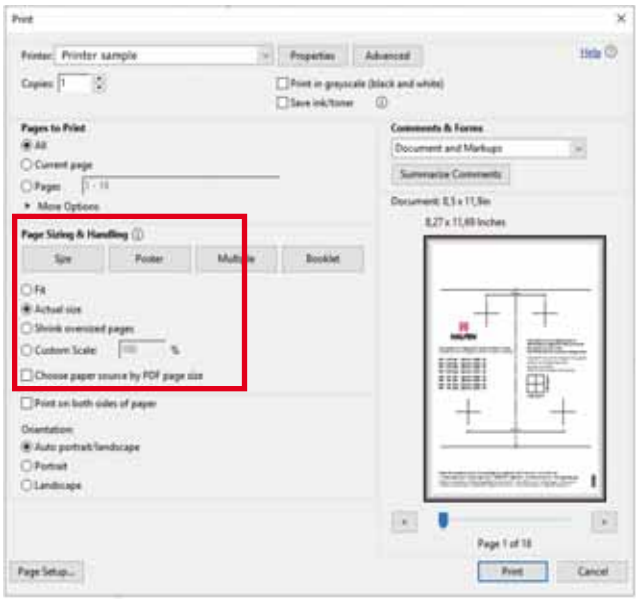
# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Installation aid

### Notes on the installation aids

**HALFEN Drill templates are available for download.**
Alternatively, Drill templates are available as PDF files for free download. The templates can be printed and attached to the formwork for measuring and drilling.

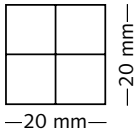
When printing the files, ensure the correct scale is set: Page setting should be "*actual size*" or 100 %.
The control grid (2×2 cm) should also be checked for correct size after printing the template.




Achtung! Bei den Druckereinstellungen zur Seitenanpassung folgende Einstellung verwenden:
◉ tatsächliche Größe (100%)
Kontrollmaß nach dem Ausdruck unbedingt prüfen:

*Important! In your printer settings for the page adjustment use the following setting:*
◉ *actual size (100%)*
*Verify the box dimensions after printing:*




**Page Sizing & Handling**

Size | Poster | Multiple | Booklet

◯ Fit
◉ Actual size
◯ Shrink oversized pages
◯ Custom Scale: 100 %
☐ Choose paper source by PDF page size
☐ Print on both sides of paper
Orientation:

**A free drilling template (.pdf file) is available at:**
► www.halfen.com ► Product Ranges ► Construction ► Reinforcement systems ► HIT Steel to Concrete Connector ► Product Information ► Installation Instructions

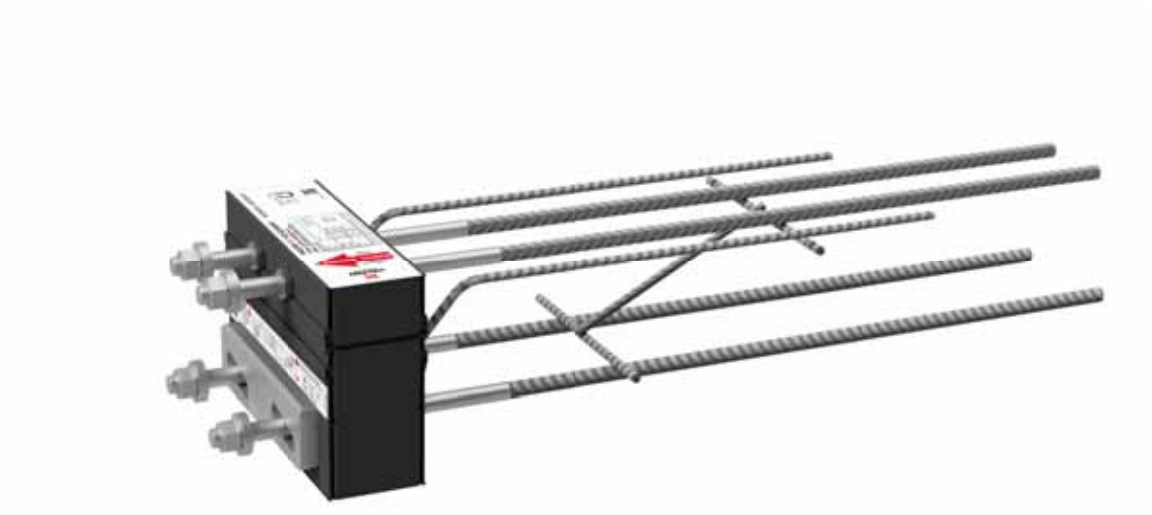
**Please note:** Ensure the *Actual size* option is active in the *Print* menu when printing the drilling templates. Check the printed templates for correct dimensions!

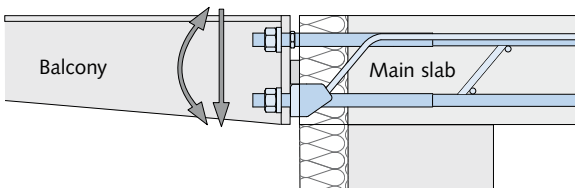
# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SDV, HIT-SP SDV

1

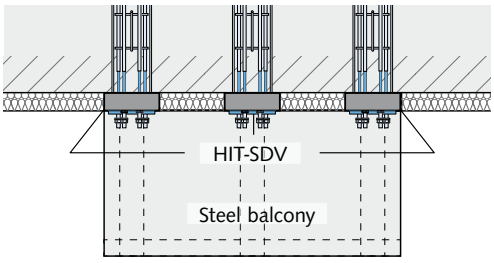
- Connection system for attaching steel elements to reinforced concrete structures
- Transfer of bi-directional bending moments and positive shear loads

**TYPE TESTED**






**HIT-HP SDV – High Performance with 80 mm insulation**
**HIT-SP SDV – Superior Performance with 120 mm insulation**




**Application**: Cantilevered balcony

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
# HIT-HP SDV, HIT-SP SDV



## Load capacity ranges

Combinations of two moment and three shear load capacities are available. The following combinations of tension and shear bars are available for HIT-HP (80 mm thick insulation) and HIT-SP (120 mm thick insulation).

**Element width B = 25 cm**

| Number and diameter of balcony side connection threads | Number and diameter of tension and compression bars on slab side | Number and diameter of the shear load bars | | |
|---|---|---|---|---|
| | | 2 ø8 | 2 ø10 | 2 ø12 |
| 2M16 | 2ø14 | ● | ● | |
| 2M22 | 2ø20 | ● | ● | ● |

Design values for selected elements can be found on the following pages ● = HP and SP

## Basic types – Ordering example

### Ordering example

| | | | | | | |
|---|---|---|---|---|---|---|
| HIT-HP<br>HIT-SP | SDV<br>SDV | - | 2M16<br>2M22 | - | 0208<br>0212 | - 18<br>- 28 |
| ❶ ❷ | ❸ | | ❹ | | ❺ | ❻ |

**CUSTOM SOLUTIONS**

**HALFEN HIT Insulated connections**
Our technical support team is available if a custom solution is required for your project.
**Contact details:** → see back cover of catalogue

**Type designation**
① Product group
② Joint spacing 80 mm (HP) or 120 mm (SP)
③ Connection type
④ Moment load range
⑤ Shear load range
⑥ Element height [cm]

## Technical specifications

| Element designation HIT-HP/HIT-SP | Possible element heights h [cm] | Balcony connection Thread | Main slab | | | min. concrete cover, slab [mm] | |
|---|---|---|---|---|---|---|---|
| | | | Tension rod [mm] | Compression rod [mm] | Shear load rod [mm] | $c_{v,top}$ | $c_{v,bottom}$ |
| SDV-2M16-0208 | 18–28 | 2 M16 | 2 ø14 | 2 ø14 | 2 ø 8 | 20 | 33 |
| SDV-2M16-0210 | | 2 M16 | 2 ø14 | 2 ø14 | 2 ø10 | 20 | 33 |
| SDV-2M22-0208 | | 2 M22 | 2 ø20 | 2 ø20 | 2 ø 8 | 26 | 26 |
| SDV-2M22-0210 | | 2 M22 | 2 ø20 | 2 ø20 | 2 ø10 | 26 | 26 |
| SDV-2M22-0212 | | 2 M22 | 2 ø20 | 2 ø20 | 2 ø12 | 26 | 26 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SDV

### Resistance at ultimate load capacity

M/V **Shear capacity / Moment bearing capacity**

**Concrete strength:** C20/25 ≥C25/30

80

| HIT-HP SDV 2M16-0208 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Rd,B}$ [kN] | | | | | | M16 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Design values** | 33.5 | 33.5 | 10.0 | 10.0 | 20.0 | 20.0 | 30.0 | 30.0 | 33.5 | 33.5 |
| **Element height [mm]** | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | |
| **180** | −13.9 | −15.1 | −12.5 | −13.7 | −11.1 | −12.3 | −9.7 | −10.9 | −9.2 | −10.5 |
| | 12.5 | 14.7 | 12.5 | 14.7 | 12.5 | 14.7 | 12.5 | 14.7 | 12.5 | 14.7 |
| **200** | −16.0 | −17.8 | −14.4 | −16.2 | −12.8 | −14.7 | −11.3 | −13.1 | −10.7 | −12.6 |
| | 14.6 | 17.1 | 14.6 | 17.1 | 14.6 | 17.1 | 14.6 | 17.1 | 14.6 | 17.1 |
| **220** | −18.1 | −20.5 | −16.3 | −18.8 | −14.6 | −17.0 | −12.9 | −15.3 | −12.3 | −14.7 |
| | 16.7 | 19.5 | 16.7 | 19.5 | 16.7 | 19.5 | 16.7 | 19.5 | 16.7 | 19.5 |
| **240** | −20.2 | −23.2 | −18.3 | −21.3 | −16.4 | −19.4 | −14.5 | −17.5 | −13.8 | −16.8 |
| | 18.8 | 22.0 | 18.8 | 22.0 | 18.8 | 22.0 | 18.8 | 22.0 | 18.8 | 22.0 |
| **260** | −22.3 | −25.8 | −20.2 | −23.8 | −18.1 | −21.7 | −16.1 | −19.6 | −15.3 | −18.9 |
| | 20.9 | 24.4 | 20.9 | 24.4 | 20.9 | 24.4 | 20.9 | 24.4 | 20.9 | 24.4 |
| **280** | −24.4 | −28.4 | −22.1 | −26.2 | −19.9 | −24.0 | −17.7 | −21.7 | −16.9 | −21.0 |
| | 23.0 | 26.9 | 23.0 | 26.9 | 23.0 | 26.9 | 23.0 | 26.9 | 23.0 | 26.9 |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

| HIT-HP SDV 2M16-0210 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Rd,B}$ [kN] | | | | | | M16 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Design values** | 52.3 | 52.3 | 30.0 | 30.0 | 40.0 | 40.0 | 50.0 | 50.0 | 52.3 | 52.3 |
| **Element height [mm]** | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | |
| **180** | −13.9 | −15.1 | −9.7 | −10.9 | −8.3 | −9.6 | −6.9 | −8.2 | −6.6 | −7.8 |
| | 12.5 | 14.7 | 12.5 | 14.7 | 12.5 | 14.7 | 12.5 | 14.7 | 12.5 | 14.7 |
| **200** | −16.0 | −17.8 | −11.3 | −13.1 | −9.7 | −11.6 | −8.1 | −10.0 | −7.8 | −9.6 |
| | 14.6 | 17.1 | 14.6 | 17.1 | 14.6 | 17.1 | 14.6 | 17.1 | 14.6 | 17.1 |
| **220** | −18.1 | −20.5 | −12.9 | −15.3 | −11.1 | −13.6 | −9.4 | −11.8 | −9.0 | −11.4 |
| | 16.7 | 19.5 | 16.7 | 19.5 | 16.7 | 19.5 | 16.7 | 19.5 | 16.7 | 19.5 |
| **240** | −20.2 | −23.2 | −14.5 | −17.5 | −12.6 | −15.6 | −10.7 | −13.7 | −10.2 | −13.2 |
| | 18.8 | 22.0 | 18.8 | 22.0 | 18.8 | 22.0 | 18.8 | 22.0 | 18.8 | 22.0 |
| **260** | −22.3 | −25.8 | −16.1 | −19.6 | −14.0 | −17.6 | −11.9 | −15.5 | −11.5 | −15.0 |
| | 20.9 | 24.4 | 20.9 | 24.4 | 20.9 | 24.4 | 20.9 | 24.4 | 20.9 | 24.4 |
| **280** | −24.4 | −28.4 | −17.7 | −21.7 | −15.4 | −19.5 | −13.2 | −17.3 | −12.7 | −16.8 |
| | 23.0 | 26.9 | 23.0 | 26.9 | 23.0 | 26.9 | 23.0 | 26.9 | 23.0 | 26.9 |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

The verification can be performed either in section A-A or in section B-B.

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SDV

### Resistance at ultimate load capacity

M/V **Shear capacity / Moment bearing capacity**

**Concrete strength:** C20/25 ≥C25/30

80

| HIT-HP SDV 2M22-0208 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Rd,B}$ [kN] | | | | | | | | M22 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Design values** | 33.5 | 33.5 | 10.0 | 10.0 | 20.0 | 20.0 | 30.0 | 30.0 | 33.5 | 33.5 | |
| **Element height [mm]** | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | | |
| **180** | −27.4 | −29.5 | −26.0 | −28.1 | −24.7 | −26.8 | −23.3 | −25.4 | −22.9 | −24.9 | |
| | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | |
| **200** | −32.5 | −35.0 | −31.0 | −33.4 | −29.4 | −31.9 | −27.9 | −30.4 | −27.4 | −29.9 | |
| | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | |
| **220** | −37.1 | −40.4 | −35.4 | −38.7 | −33.7 | −37.0 | −32.0 | −35.3 | −31.4 | −34.8 | |
| | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | |
| **240** | −41.4 | −45.7 | −39.5 | −43.9 | −37.7 | −42.0 | −35.8 | −40.1 | −35.2 | −39.5 | |
| | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | |
| **260** | −45.6 | −50.3 | −43.6 | −48.2 | −41.5 | −46.2 | −39.5 | −44.2 | −38.8 | −43.5 | |
| | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | |
| **280** | −49.7 | −54.7 | −47.5 | −52.5 | −45.4 | −50.4 | −43.2 | −48.2 | −42.5 | −47.5 | |
| | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

| HIT-HP SDV 2M22-0210 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Rd,B}$ [kN] | | | | | | | | M22 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Design values** | 52.3 | 52.3 | 30.0 | 30.0 | 40.0 | 40.0 | 50.0 | 50.0 | 52.3 | 52.3 | |
| **Element height [mm]** | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | | |
| **180** | −27.4 | −29.5 | −23.3 | −25.4 | −22.0 | −24.1 | −20.6 | −22.7 | −20.3 | −22.4 | |
| | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | |
| **200** | −32.5 | −35.0 | −27.9 | −30.4 | −26.4 | −28.9 | −24.8 | −27.3 | −24.5 | −27.0 | |
| | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | |
| **220** | −37.1 | −40.4 | −32.0 | −35.3 | −30.3 | −33.6 | −28.6 | −32.0 | −28.2 | −31.6 | |
| | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | |
| **240** | −41.4 | −45.7 | −35.8 | −40.1 | −33.9 | −38.3 | −32.1 | −36.4 | −31.6 | −36.0 | |
| | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | |
| **260** | −45.6 | −50.3 | −39.5 | −44.2 | −37.5 | −42.1 | −35.4 | −40.1 | −35.0 | −39.6 | |
| | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | |
| **280** | −49.7 | −54.7 | −43.2 | −48.2 | −41.0 | −46.1 | −38.9 | −43.9 | −38.4 | −43.4 | |
| | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

The verification can be performed either in section A-A or in section B-B.

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SDV

### Resistance at ultimate load capacity

M/V **Shear capacity / Moment bearing capacity** **Concrete strength:** C20/25 ≥C25/30 80

| HIT-HP SDV 2M22-0212 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Rd,B}$ [kN] | | | | | | | | M22 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Design values** | **75.3** | **75.3** | **50.0** | **50.0** | **60.0** | **60.0** | **70.0** | **70.0** | **75.3** | **75.3** | |
| **Element height [mm]** | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | | |
| **180** | −27.4 | −29.5 | −20.6 | −22.7 | −19.2 | −21.3 | −17.9 | −20.0 | −17.2 | −19.3 | |
| | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | |
| **200** | −32.5 | −35.0 | −24.8 | −27.3 | −23.3 | −25.8 | −21.8 | −24.3 | −21.0 | −23.5 | |
| | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | |
| **220** | −37.1 | −40.4 | −28.6 | −32.0 | −26.9 | −30.3 | −25.2 | −28.6 | −24.3 | −27.7 | |
| | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | |
| **240** | −41.4 | −45.7 | −32.1 | −36.4 | −30.2 | −34.5 | −28.3 | −32.7 | −27.4 | −31.7 | |
| | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | |
| **260** | −45.6 | −50.3 | −35.4 | −40.1 | −33.4 | −38.1 | −31.4 | −36.1 | −30.3 | −35.0 | |
| | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | |
| **280** | −49.7 | −54.7 | −38.9 | −43.9 | −36.7 | −41.7 | −34.6 | −39.6 | −33.4 | −38.4 | |
| | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

### Resistance at ultimate load capacity

M/V **Shear capacity / Moment bearing capacity** **Concrete strength:** C20/25 ≥C25/30 120

| HIT-SP SDV 2M16-0208 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Rd,B}$ [kN] | | | | | | | | M16 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Design values** | **28.1** | **28.1** | **10.0** | **10.0** | **20.0** | **20.0** | **25.0** | **25.0** | **28.1** | **28.1** | |
| **Element height [mm]** | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | | |
| **180** | −13.9 | −15.1 | −12.0 | −13.3 | −10.2 | −11.5 | −9.3 | −10.6 | −8.7 | −10.0 | |
| | 12.5 | 14.7 | 12.5 | 14.7 | 12.5 | 14.7 | 12.5 | 14.7 | 12.5 | 14.7 | |
| **200** | −16.0 | −17.8 | −13.9 | −15.7 | −11.8 | −13.7 | −10.8 | −12.6 | −10.2 | −12.0 | |
| | 14.6 | 17.1 | 14.6 | 17.1 | 14.6 | 17.1 | 14.6 | 17.1 | 14.6 | 17.1 | |
| **220** | −18.1 | −20.5 | −15.8 | −18.2 | −13.5 | −15.9 | −12.3 | −14.7 | −11.6 | −14.0 | |
| | 16.7 | 19.5 | 16.7 | 19.5 | 16.7 | 19.5 | 16.7 | 19.5 | 16.7 | 19.5 | |
| **240** | −20.2 | −23.2 | −17.6 | −20.6 | −15.1 | −18.1 | −13.8 | −16.8 | −13.0 | −16.0 | |
| | 18.8 | 22.0 | 18.8 | 22.0 | 18.8 | 22.0 | 18.8 | 22.0 | 18.8 | 22.0 | |
| **260** | −22.3 | −25.8 | −19.5 | −23.1 | −16.7 | −20.3 | −15.3 | −18.9 | −14.5 | −18.0 | |
| | 20.9 | 24.4 | 20.9 | 24.4 | 20.9 | 24.4 | 20.9 | 24.4 | 20.9 | 24.4 | |
| **280** | −24.4 | −28.4 | −21.3 | −25.4 | −18.3 | −22.4 | −16.8 | −20.9 | −15.9 | −20.0 | |
| | 23.0 | 26.9 | 23.0 | 26.9 | 23.0 | 26.9 | 23.0 | 26.9 | 23.0 | 26.9 | |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

The verification can be performed either in section A-A or in section B-B.

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-SP SDV

### Resistance at ultimate load capacity

M/V **Shear capacity / Moment bearing capacity**

**Concrete strength:** C20/25 ≥C25/30 120

| HIT-SP SDV 2M16-0210 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Rd,B}$ [kN] | | | | | | M16 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Design values | 43.9 | 43.9 | 25.0 | 25.0 | 30.0 | 30.0 | 40.0 | 40.0 | 43.9 | 43.9 |
| Element height [mm] | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | |
| 180 | −13.9 | −15.1 | −9.3 | −10.6 | −8.4 | −9.7 | −6.6 | −7.8 | −5.8 | −7.1 |
| | 12.5 | 14.7 | 12.5 | 14.7 | 12.5 | 14.7 | 12.5 | 14.7 | 12.5 | 14.7 |
| 200 | −16.0 | −17.8 | −10.8 | −12.6 | −9.8 | −11.6 | −7.7 | −9.6 | −6.9 | −8.7 |
| | 14.6 | 17.1 | 14.6 | 17.1 | 14.6 | 17.1 | 14.6 | 17.1 | 14.6 | 17.1 |
| 220 | −18.1 | −20.5 | −12.3 | −14.7 | −11.2 | −13.6 | −8.9 | −11.3 | −8.0 | −10.4 |
| | 16.7 | 19.5 | 16.7 | 19.5 | 16.7 | 19.5 | 16.7 | 19.5 | 16.7 | 19.5 |
| 240 | −20.2 | −23.2 | −13.8 | −16.8 | −12.5 | −15.5 | −10.0 | −13.0 | −9.0 | −12.0 |
| | 18.8 | 22.0 | 18.8 | 22.0 | 18.8 | 22.0 | 18.8 | 22.0 | 18.8 | 22.0 |
| 260 | −22.3 | −25.8 | −15.3 | −18.9 | −13.9 | −17.5 | −11.1 | −14.7 | −10.1 | −13.6 |
| | 20.9 | 24.4 | 20.9 | 24.4 | 20.9 | 24.4 | 20.9 | 24.4 | 20.9 | 24.4 |
| 280 | −24.4 | −28.4 | −16.8 | −20.9 | −15.3 | −19.4 | −12.3 | −16.4 | −11.1 | −15.2 |
| | 23.0 | 26.9 | 23.0 | 26.9 | 23.0 | 26.9 | 23.0 | 26.9 | 23.0 | 26.9 |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

| HIT-SP SDV 2M22-0208 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Ed,B}$ [kN] | | | | | | M22 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Design values | 28.1 | 28.1 | 10.0 | 10.0 | 20.0 | 20.0 | 25.0 | 25.0 | 28.1 | 28.1 |
| Element height [mm] | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | |
| 180 | −27.4 | −29.5 | −25.6 | −27.7 | −23.9 | −26.0 | −23.0 | −25.1 | −22.4 | −24.5 |
| | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 |
| 200 | −32.5 | −35.0 | −30.5 | −33.0 | −28.4 | −30.9 | −27.4 | −29.9 | −26.8 | −29.3 |
| | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 |
| 220 | −37.1 | −40.4 | −34.8 | −38.2 | −32.6 | −35.9 | −31.4 | −34.8 | −30.7 | −34.1 |
| | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 |
| 240 | −41.4 | −45.7 | −38.9 | −43.2 | −36.4 | −40.7 | −35.2 | −39.5 | −34.4 | −38.7 |
| | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 |
| 260 | −45.6 | −50.3 | −42.9 | −47.5 | −40.1 | −44.8 | −38.8 | −43.4 | −37.9 | −42.6 |
| | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 |
| 280 | −49.7 | −54.7 | −46.8 | −51.8 | −43.9 | −48.9 | −42.4 | −47.4 | −41.5 | −46.5 |
| | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

The verification can be performed either in section A-A or in section B-B.

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
# HIT-SP SDV

## Resistance at ultimate load capacity

M/V **Shear capacity / Moment bearing capacity**

**Concrete strength:** C20/25 ≥C25/30

120

| HIT-SP SDV 2M22-0210 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Rd,B}$ [kN] | | | | | | M22 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Design values** | 43.9 | 43.9 | 25.0 | 25.0 | 30.0 | 30.0 | 40.0 | 40.0 | 43.9 | 43.9 |
| **Element height [mm]** | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | |
| **180** | −27.4 | −29.5 | −23.0 | −25.1 | −22.1 | −24.2 | −20.3 | −22.4 | −19.6 | −21.7 |
| | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 |
| **200** | −32.5 | −35.0 | −27.4 | −29.9 | −26.4 | −28.9 | −24.4 | −26.9 | −23.6 | −26.1 |
| | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 |
| **220** | −37.1 | −40.4 | −31.4 | −34.8 | −30.3 | −33.7 | −28.0 | −31.4 | −27.2 | −30.5 |
| | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 |
| **240** | −41.4 | −45.7 | −35.2 | −39.5 | −33.9 | −38.3 | −31.4 | −35.8 | −30.5 | −34.8 |
| | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 |
| **260** | −45.6 | −50.3 | −38.8 | −43.4 | −37.4 | −42.1 | −34.7 | −39.4 | −33.6 | −38.3 |
| | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 |
| **280** | −49.7 | −54.7 | −42.4 | −47.4 | −41.0 | −46.0 | −38.0 | −43.1 | −36.9 | −41.9 |
| | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

| HIT-SP SDV 2M22-0212 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Rd,B}$ [kN] | | | | | | M22 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Design values** | 59.0 | 59.0 | 40.0 | 40.0 | 50.0 | 50.0 | 55.0 | 55.0 | 59.0 | 59.0 |
| **Element height [mm]** | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | |
| **180** | −27.4 | −29.5 | −20.3 | −22.4 | −18.5 | −20.6 | −17.6 | −19.7 | −16.9 | −19.0 |
| | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 | 16.1 | 18.8 |
| **200** | −32.5 | −35.0 | −24.4 | −26.9 | −22.4 | −24.9 | −21.4 | −23.9 | −20.6 | −23.1 |
| | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 | 18.7 | 22.0 |
| **220** | −37.1 | −40.4 | −28.0 | −31.4 | −25.8 | −29.2 | −24.7 | −28.0 | −23.8 | −27.1 |
| | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 | 21.5 | 25.2 |
| **240** | −41.4 | −45.7 | −31.4 | −35.8 | −28.9 | −33.3 | −27.7 | −32.0 | −26.7 | −31.0 |
| | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 | 24.2 | 28.4 |
| **260** | −45.6 | −50.3 | −34.7 | −39.4 | −32.0 | −36.6 | −30.6 | −35.3 | −29.5 | −34.2 |
| | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 | 26.9 | 31.6 |
| **280** | −49.7 | −54.7 | −38.0 | −43.1 | −35.1 | −40.1 | −33.7 | −38.7 | −32.5 | −37.5 |
| | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 | 29.7 | 34.8 |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

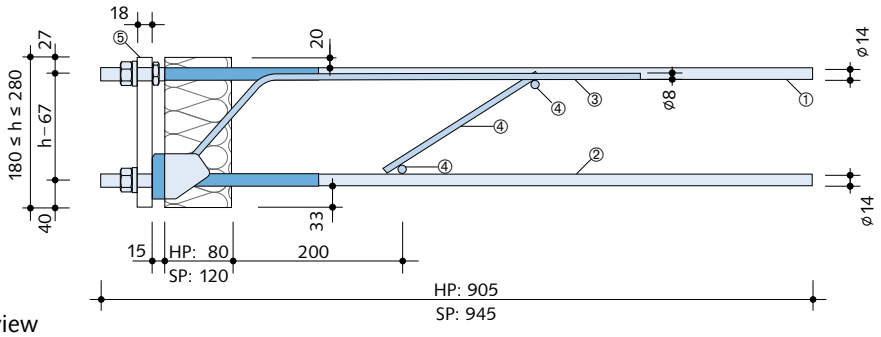
The verification can be performed either in section A-A or in section B-B.

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
# HIT-HP SDV, HIT-SP SDV

## Product specifications HIT-HP/SP SDV-2M16

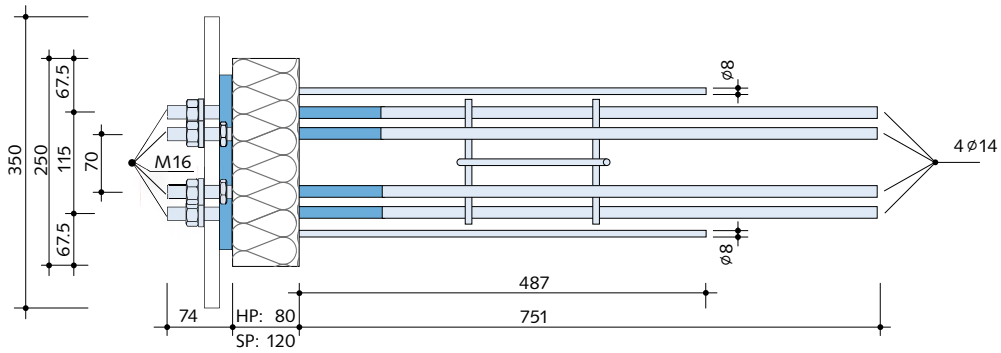
### HIT-HP/SP SDV-2M16-0208 with installation aid

Section




① Tension bar
② Compression bar
③ Shear bar
④ Constructive installation rebar
⑤ Installation aid

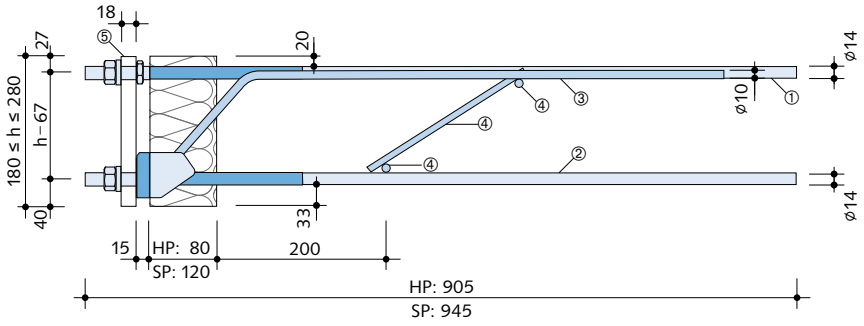
Plan view




Dimensions in [mm]

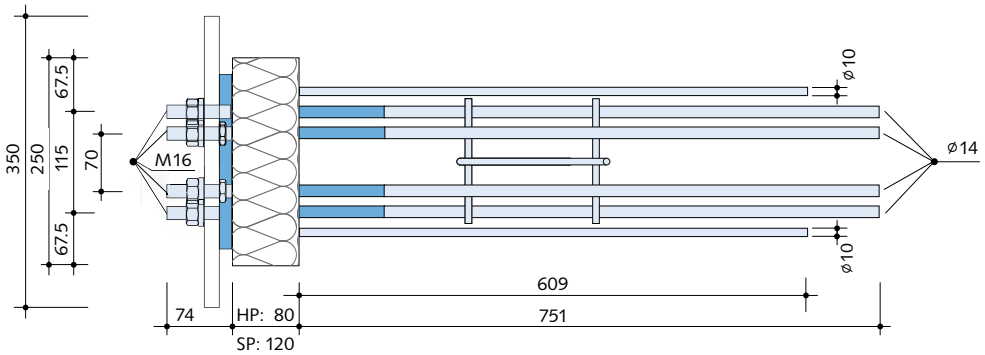
### HIT-HP/SP SDV-2M16-0210 with installation aid

Section




① Tension bar
② Compression bar
③ Shear bar
④ Constructive installation rebar
⑤ Installation aid

Plan view



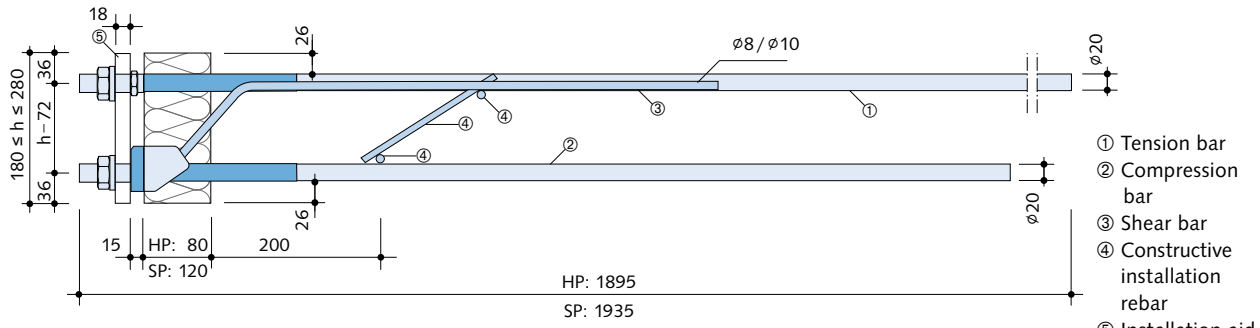

Dimensions in [mm]

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
# HIT-HP SDV, HIT-SP SDV

## Product specifications HIT-HP/SP SDV-2M22

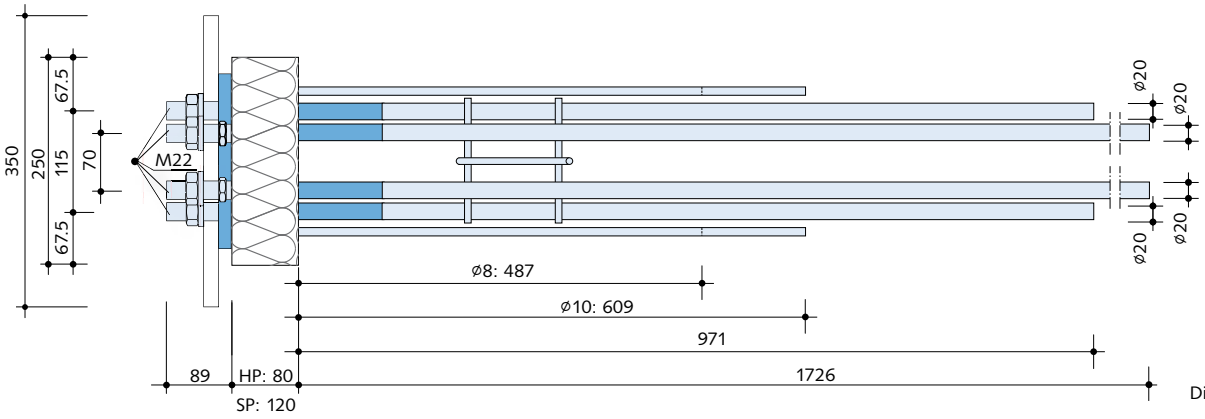
### HIT-HP/SP SDV-2M22-0208 and HIT-HP/SP SDV-2M22-0210 with installation aid

Section




① Tension bar
② Compression bar
③ Shear bar
④ Constructive installation rebar
⑤ Installation aid

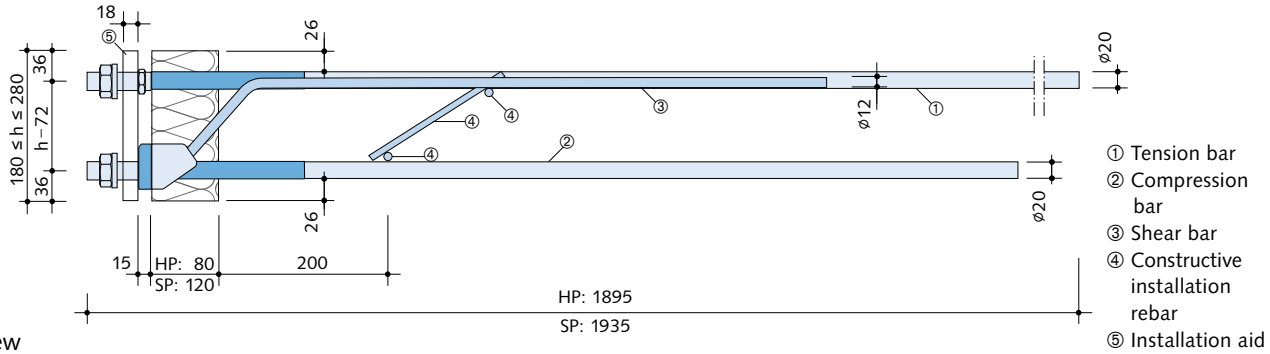
Plan view




Dimensions in [mm]

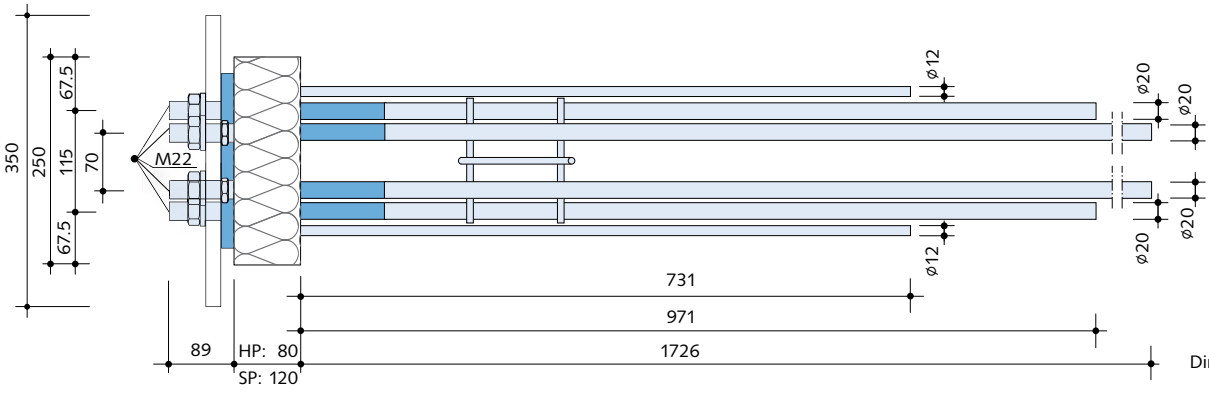
### HIT-HP/SP SDV-2M22-0212 with installation aid

Section




① Tension bar
② Compression bar
③ Shear bar
④ Constructive installation rebar
⑤ Installation aid

Plan view

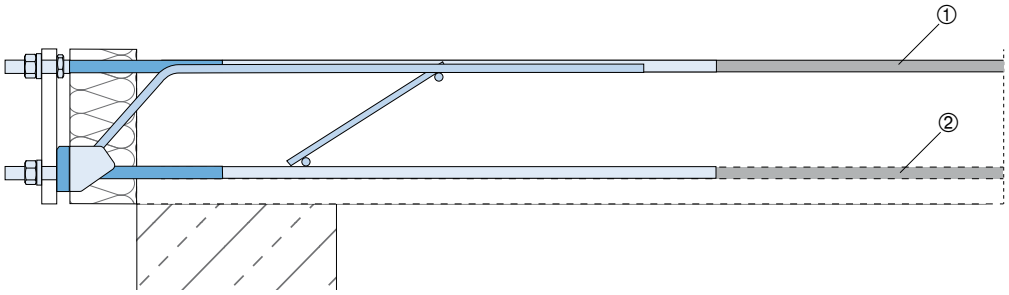



Dimensions in [mm]

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SDV, HIT-SP SDV

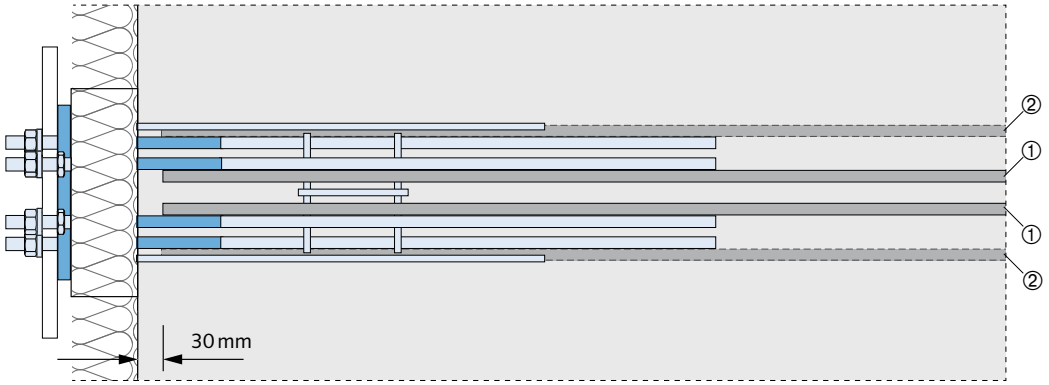
### On-site reinforcement HIT-HP/SP SDV-2M16

**Section**




**Plan view**

Figure: Overlap with on-site reinforcement




**Position ①:** ≥ 2Ø14; The length of the bars is derived from the tension bar overlap according to the structural design plans.
**Position ②:** ≥ 2Ø14; Only required for lifting moments.
The length of the bars is derived from the tension bar overlap according to the structural design plans.

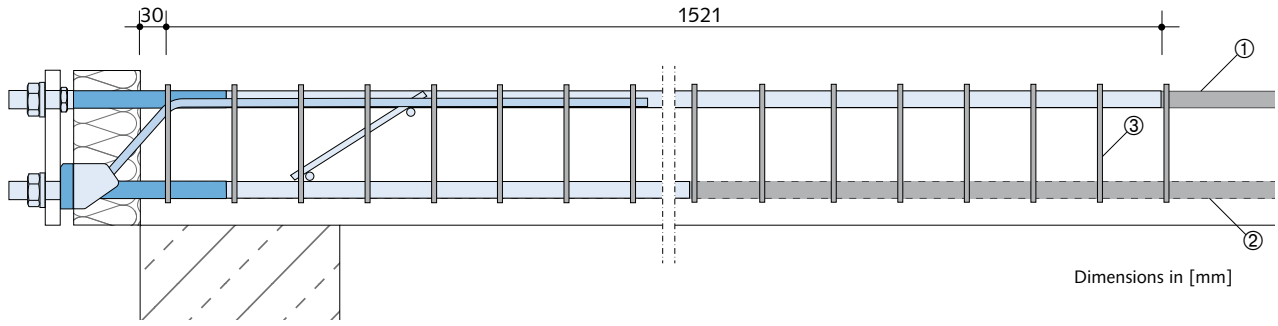
On-site reinforcement according to the structural engineer's specifications.

Constructive reinforcement for the free slab edge in accordance with EN 1992-1-1

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
# HIT-HP SDV, HIT-SP SDV

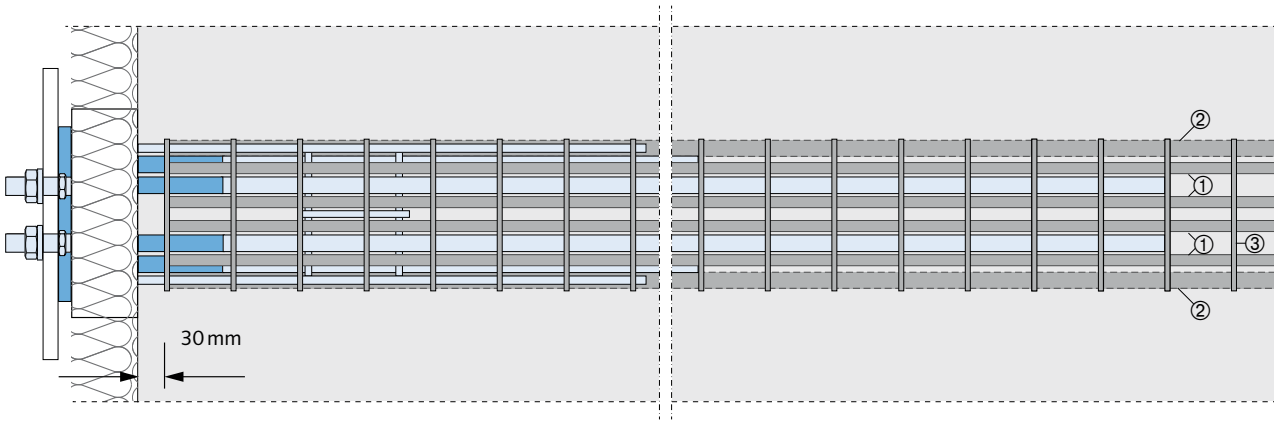
## On-site reinforcement HIT-HP/SP SDV-2M22

**Section**

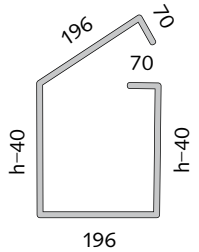



**Plan view**

Figure: Overlap with on-site reinforcement




**Position ①:** ≥ 4Ø14; The length of the bars is derived from the tension bar overlap according to the structural design plans.
**Position ②:** ≥ 4Ø14; Only required for lifting moments.
Number, diameter and length of the bars according to the structural design plans.
**Position ③:** Stirrups ≥ 20Ø6; spacing s = 80 mm




**Dimensions, stirrups** (20 at Ø6 mm)
Dimensions in [mm]

Stirrup layout according to EN 1992-1-1; 8.7.4.2

Constructive reinforcement for the free slab edge in accordance with EN 1992-1-1

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SDV, HIT-SP SDV

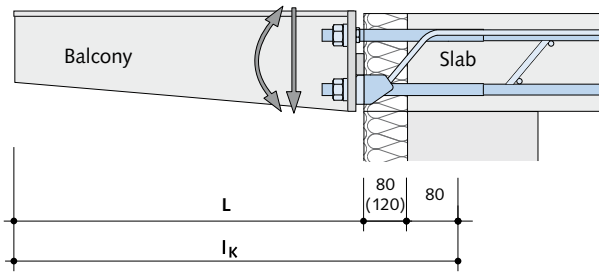
### Deformation

For the HIT-HP/SP SDV elements, the torsional deformations resulting from elastic formwork deformation in the insulation/load inducement joint area $\alpha_M$ are assumed due to a standard effective moment of $M_{Ed}$ = 1 kNm.

The required camber to compensate for elastic deformations of the connected steel structure can be approximated as follows:

$$\ddot{u} = \alpha_M \cdot l_k \cdot M_{Ed}$$

with $\ddot{u}$ = Camber [mm]
$\alpha_M$ = Torque resulting from $M_{Ed}$ = 1 kNm; Table values in [‰/kNm]
$l_k$ = Span distance, cantilever beam [m]
$M_{Ed}$ = Design value of the effective moments [kNm] at serviceability limit state (SLS)




L = Cantilever length [m]
$l_k$ = Span distance, cantilever beam [m]

Other deformation factors resulting from deformation of the connected steel structure must be considered by the structural engineer when determining the overall camber. The $\alpha_M$ values [‰/kNm] in the following table are in accordance with approval no. Z-15.7-336

**HIT-HP SDV**

| Element height h [mm] | HP SDV-2M16-0208<br>HP SDV-2M16-0210 | HP SDV-2M22-0208<br>HP SDV-2M22-0210<br>HP SDV-2M22-0212 |
|---|---|---|
| **180** | 0.885 | 0.572 |
| **200** | 0.639 | 0.407 |
| **220** | 0.483 | 0.305 |
| **240** | 0.378 | 0.236 |
| **260** | 0.304 | 0.189 |
| **280** | 0.249 | 0.154 |

**HIT-SP SDV**

| Element height h [mm] | SP SDV-2M16-0208<br>SP SDV-2M16-0210 | SP SDV-2M22-0208<br>SP SDV-2M22-0210<br>SP SDV-2M22-0212 |
|---|---|---|
| **180** | 1.003 | 0.639 |
| **200** | 0.724 | 0.455 |
| **220** | 0.547 | 0.340 |
| **240** | 0.428 | 0.264 |
| **260** | 0.344 | 0.211 |
| **280** | 0.282 | 0.172 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SDV, HIT-SP SDV

### Torsion spring stiffnesses

**HIT-HP SDV**

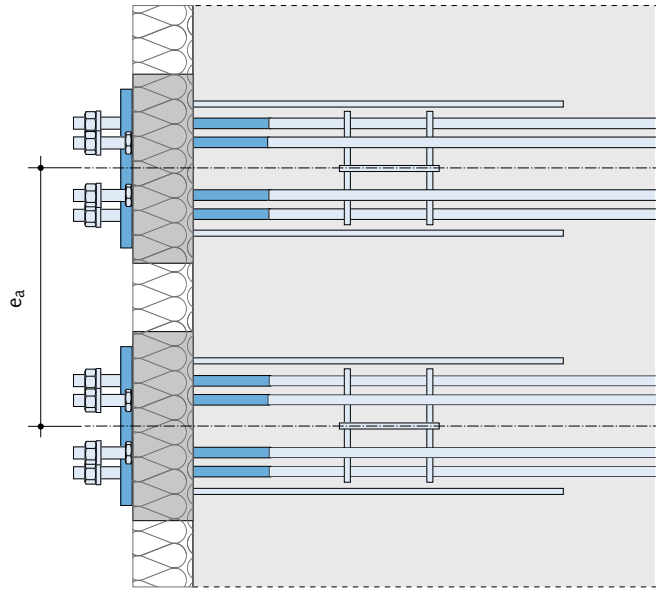
| Torsion spring C [kNm/rad] for element height h [mm] | HP SDV-2M16-0208<br>HP SDV-2M16-0210 | HP SDV-2M22-0208<br>HP SDV-2M22-0210<br>HP SDV-2M22-0212 |
|---|---|---|
| **180** | 1184 | 1814 |
| **200** | 1640 | 2548 |
| **220** | 2170 | 3406 |
| **240** | 2775 | 4389 |
| **260** | 3454 | 5497 |
| **280** | 4207 | 6728 |

**HIT-SP SDV**

| Torsion spring C [kNm/rad] for element height h [mm] | SP SDV-2M16-0208<br>SP SDV-2M16-0210 | SP SDV-2M22-0208<br>SP SDV-2M22-0210<br>SP SDV-2M22-0212 |
|---|---|---|
| **180** | 1049 | 1631 |
| **200** | 1453 | 2291 |
| **220** | 1923 | 3063 |
| **240** | 2459 | 3946 |
| **260** | 3060 | 4942 |
| **280** | 3728 | 6049 |

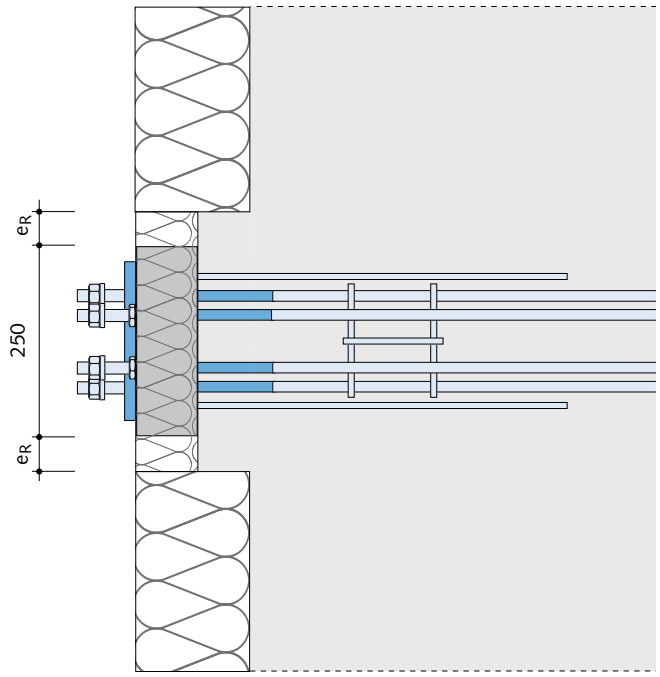
# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SDV, HIT-SP SDV

### Axial spacing




| HIT Type | axial spacing $e_a \geq$ [mm] |
|---|---|
| HIT-HP SDV | 250* |
| HIT-SP SDV | 250* |
| *Custom elements with smaller spacings on request | |

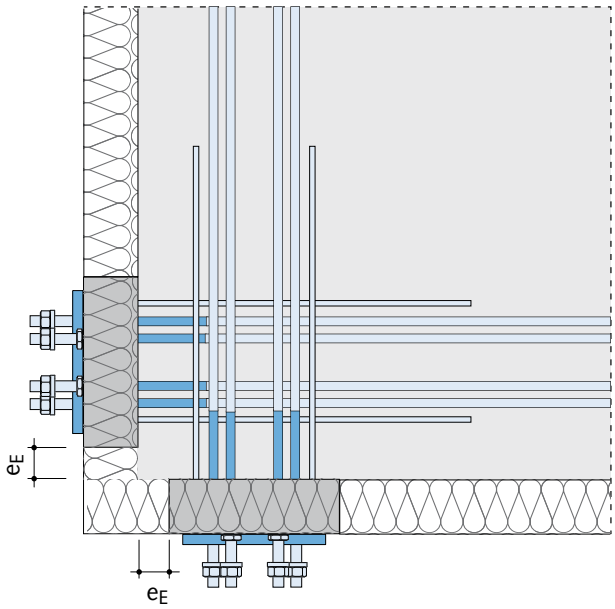
### Edge distance




| HIT Type | Distance $e_R$ [mm] |
|---|---|
| HIT-HP SDV-2M16-0208 | 11 |
| HIT-HP SDV-2M16-0210 | 22 |
| HIT-HP SDV-2M22-0208 | 11 |
| HIT-HP SDV-2M22-0210 | 22 |
| HIT-HP SDV-2M22-0212 | 33 |
| HIT-SP SDV-2M16-0208 | 11 |
| HIT-SP SDV-2M16-0210 | 22 |
| HIT-SP SDV-2M22-0208 | 11 |
| HIT-SP SDV-2M22-0210 | 22 |
| HIT-SP SDV-2M22-0212 | 33 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SDV, HIT-SP SDV

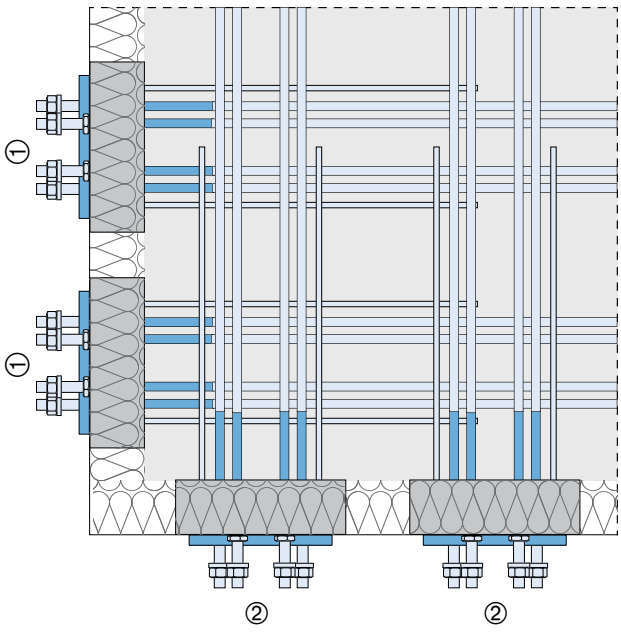
### Distance from an outer corner

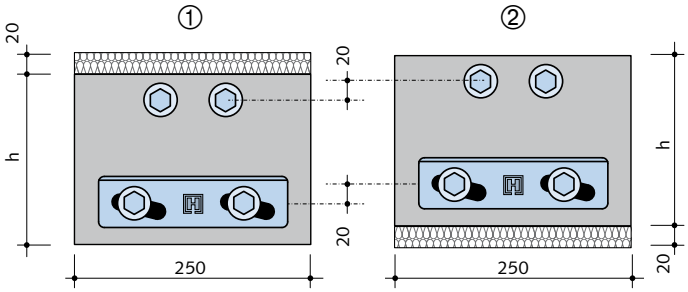



| HIT Type | Distance $e_E$ [mm] |
|---|---|
| HIT-HP SDV-2M16-0208 | 11 |
| HIT-HP SDV-2M16-0210 | 22 |
| HIT-HP SDV-2M22-0208 | 11 |
| HIT-HP SDV-2M22-0210 | 22 |
| HIT-HP SDV-2M22-0212 | 33 |
| HIT-SP SDV-2M16-0208 | 11 |
| HIT-SP SDV-2M16-0210 | 22 |
| HIT-SP SDV-2M22-0208 | 11 |
| HIT-SP SDV-2M22-0210 | 22 |
| HIT-SP SDV-2M22-0212 | 33 |

### Height-offset for an outer corner

To install the HIT-SDV elements at an external corner, it is necessary to offset the installation height of the elements. The required height offset is achieved using 20 mm insulation strips (not included).

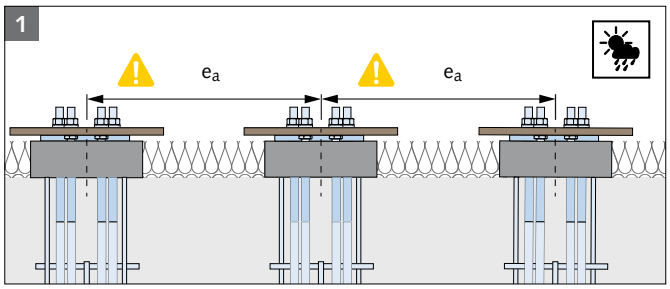



**HIT-SDV 2M22:** No tolerances are considered in the 20 mm height offset. We therefore recommend an offset of 25 mm for these types.

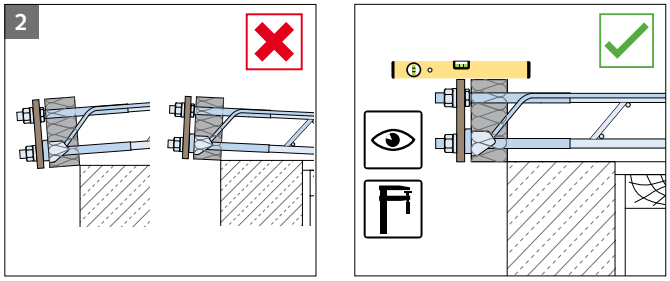
# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SDV, HIT-SP SDV

### Installation instructions concrete




**1 Installing the bottom reinforcement layer (example, mesh reinforcement).**
Installing the HIT Element from above.

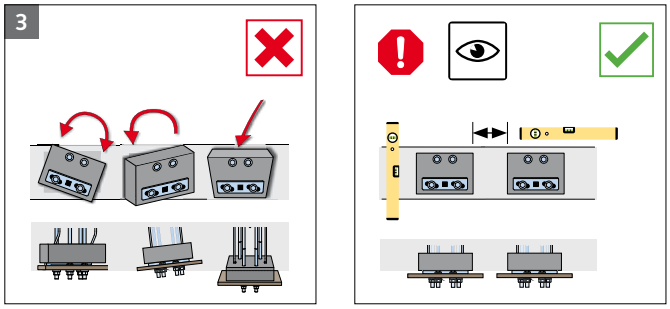
⚠ Install the HIT Element with increased accuracy as the steel construction is post-installed!




**2 Accurate installation**

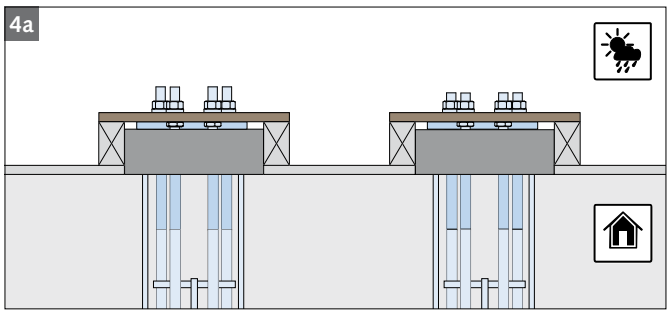
⚠ Ensure installation is exactly horizontal and vertical!

⚠ Ensure the formwork is installed at the correct height!

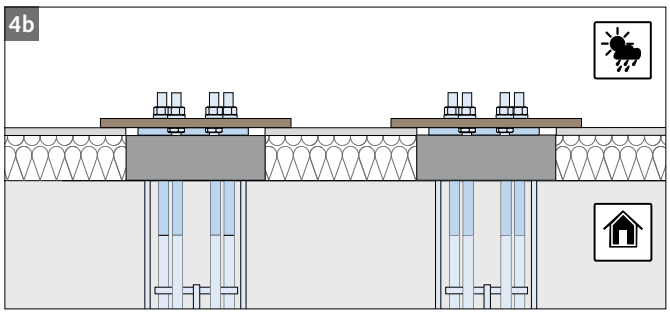



**3 Checking horizontal and vertical alignment**
The included (wood) installation aids are used to precisely align the elements; the overhanging edges can be used to fix to the on-site formwork as required.

**Alternative:** Make installation aids on-site (for example, in wood or U-profiles). Use the supplied installation aids or alternatively the HALFEN drilling templates to transfer the drill hole sizes and element distances to the on-site made installation aids.




**4 Installing the formwork**
a Concreting directly against the formwork



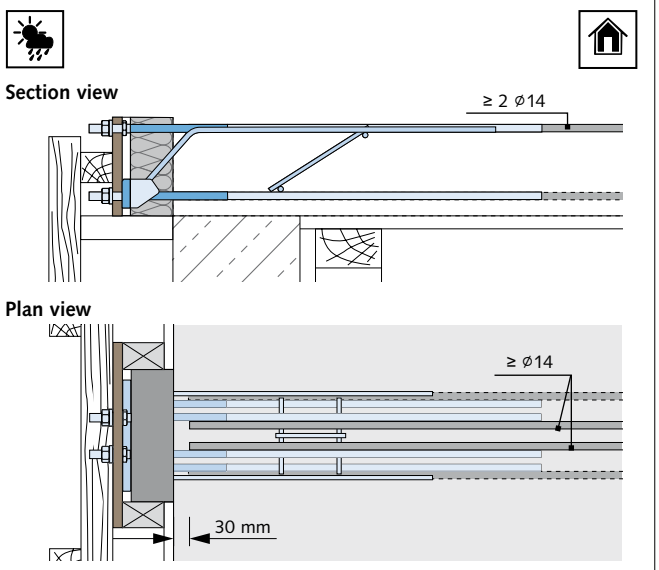

b Concreting directly against the insulation

**A free drilling template (.pdf file) is available at:**
► www.halfen.com ► Product Ranges ► Construction
► Reinforcement systems ► HIT Steel to Concrete Connector
► Product Information ► Installation Instructions

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SDV, HIT-SP SDV

### Installation in concrete

**5a** HIT-HP/SP SDV-2M16



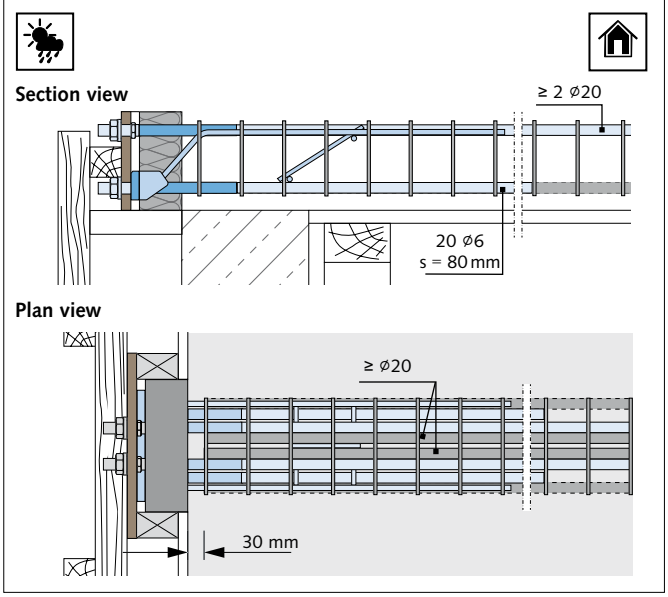

**5 Installing the on-site reinforcement**

a Installing the on-site reinforcement for **HIT-HP/SP SDV-2M16**

On-site reinforcement must be placed as specified by the structural engineer.

Structural reinforcement of the slab free edge according to EN 1992-1-1

**5b** HIT-HP/SP SDV-2M22



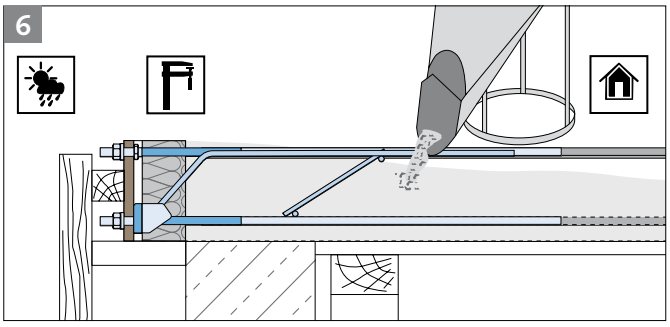

b Installing the on-site reinforcement for **HIT-HP/SP SDV-2M22**

On-site reinforcement must be placed as specified by the structural engineer.

Structural reinforcement of the slab free edge according to EN 1992-1-1

Stirrup layout in accordance with EN 1992-1-1; 8.7.4.2

**6**



**6 Pouring the concrete**

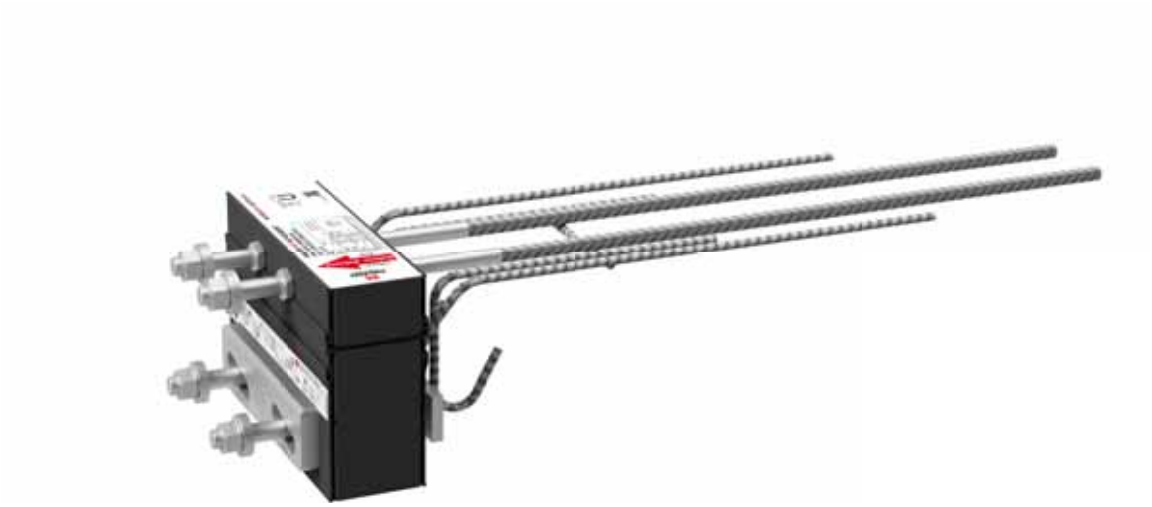
To ensure the HIT units are not displaced, ensure the concrete is poured and compacted evenly.

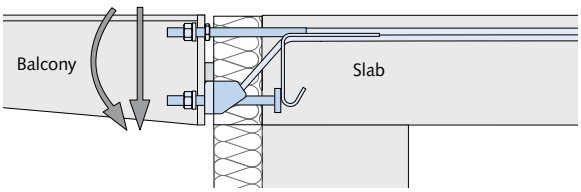
# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SMV, HIT-SP SMV

2

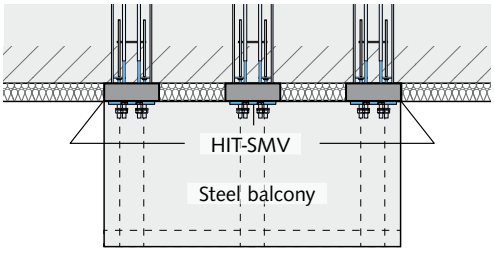
- Element for connecting steel constructions to reinforced concrete structures
- Transfer of negative bending moments and positive shear loads

**TYPE TESTED**






**HIT-HP SMV – High Performance with 80 mm insulation**
**HIT-SP SMV – Superior Performance with 120 mm insulation**




**Application**: Cantilever balcony

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
# HIT-HP SMV, HIT-SP SMV

## Load capacity range

Combinations of one moment and two shear load ranges are available. The following combinations of tension bars, anchor head compression bars and shear load bars are available for HIT-HP 80 mm and HIT-SP 120 mm insulation thickness.

**Element width B = 25 cm**

| Number and diameter of the connection bolts; balcony side | Number and diameter of the tension bars; main slab | Number and diameter of the shear load bars | |
|---|---|---|---|
| | | 2 ø8 | 2 ø10 |
| 2M16 | 2ø14 | ● | ● |

See the following pages for load capacity values for selected elements

● = HP and SP

## Basic types – ordering examples

### Ordering example

| | | | | | | |
|---|---|---|---|---|---|---|
| HIT-HP | SMV | - | 2M16 | - | 0208 | - 18 |
| HIT-SP | SMV | - | 2M16 | - | 0210 | - 28 |
| ❶ ❷ | ❸ | | ❹ | | ❺ | ❻ |

**Type designation**
① Product group
② Joint spacing 80 mm (HP) or 120 mm (SP)
③ Connection type
④ Moment load range
⑤ Shear load range
⑥ Element height [cm]

**CUSTOM SOLUTIONS**

**HALFEN HIT Insulated connections**
Our technical support team is available if a custom solution is required for your project.
**Contact details:** → see back cover of catalogue

## Technical data

| Element description HIT-HP/HIT-SP | Possible Element height h [mm] | Balcony side | Main slab side | | | | min. concrete cover slab side [mm] | |
|---|---|---|---|---|---|---|---|---|
| | | Thread | Tension rods [mm] | Compression rods | Shear load rods [mm] | Stirrups [mm] | $c_{v,top}$ | $c_{v,bottom}$ |
| SMV-2M16-0208 | 180–280 | 2 M16 | 2 ø14 | Anchor head | 2 ø 8 | 2 ø 8 | 20 | 33 |
| SMV-2M16-0210 | | 2 M16 | 2 ø14 | Anchor head | 2 ø10 | 2 ø 8 | 20 | 33 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SMV, HIT-SP SMV

### Resistance at ultimate load capacity

M/V **Shear capacity / Moment bearing capacity**

**Concrete strength:** C20/25 ≥C25/30 80

| HIT-HP SMV 2M16-0208 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Rd,B}$ [kN] | | | | | | M16 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Design values | 33.5 | 33.5 | 10.0 | 10.0 | 20.0 | 20.0 | 30.0 | 30.0 | 33.5 | 33.5 |
| Element height [mm] | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | |
| 180 | −13.6 | −15.1 | −12.2 | −13.7 | −10.8 | −12.3 | −9.4 | −10.9 | −9.0 | −10.5 |
| 200 | −16.0 | −17.8 | −14.4 | −16.2 | −12.8 | −14.7 | −11.3 | −13.1 | −10.7 | −12.6 |
| 220 | −18.1 | −20.5 | −16.3 | −18.8 | −14.6 | −17.0 | −12.9 | −15.3 | −12.3 | −14.7 |
| 240 | −20.2 | −23.2 | −18.3 | −21.3 | −16.4 | −19.4 | −14.5 | −17.5 | −13.8 | −16.8 |
| 260 | −22.3 | −25.8 | −20.2 | −23.8 | −18.1 | −21.7 | −16.1 | −19.6 | −15.3 | −18.9 |
| 280 | −24.4 | −28.4 | −22.1 | −26.2 | −19.9 | −24.0 | −17.7 | −21.7 | −16.9 | −21.0 |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

| HIT-HP SMV 2M16-0210 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Rd,B}$ [kN] | | | | | | M16 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Design values | 52.3 | 52.3 | 30.0 | 30.0 | 40.0 | 40.0 | 50.0 | 50.0 | 52.3 | 52.3 |
| Element height [mm] | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | |
| 180 | −13.6 | −15.1 | −9.4 | −10.9 | −8.1 | −9.6 | −6.7 | −8.2 | −6.3 | −7.8 |
| 200 | −16.0 | −17.8 | −11.3 | −13.1 | −9.7 | −11.6 | −8.1 | −10.0 | −7.8 | −9.6 |
| 220 | −18.1 | −20.5 | −12.9 | −15.3 | −11.1 | −13.6 | −9.4 | −11.8 | −9.0 | −11.4 |
| 240 | −20.2 | −23.2 | −14.5 | −17.5 | −12.6 | −15.6 | −10.7 | −13.7 | −10.2 | −13.2 |
| 260 | −22.3 | −25.8 | −16.1 | −19.6 | −14.0 | −17.6 | −11.9 | −15.5 | −11.5 | −15.0 |
| 280 | −24.4 | −28.4 | −17.7 | −21.7 | −15.4 | −19.5 | −13.2 | −17.3 | −12.7 | −16.8 |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

The verification can be performed either in section A-A or in section B-B.

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-SP SMV

### Resistance at ultimate load capacity

M/V **Shear capacity / Moment bearing capacity** **Concrete strength:** C20/25 ≥C25/30 120

| HIT-SP SMV 2M16-0208 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Rd,B}$ [kN] | | | | | | M16 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Design values** | **28.1** | **28.1** | **10.0** | **10.0** | **20.0** | **20.0** | **25.0** | **25.0** | **28.1** | **28.1** |
| **Element height [mm]** | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | |
| **180** | −13.6 | −15.1 | −11.8 | −13.3 | −10.0 | −11.5 | −9.1 | −10.6 | −8.5 | −10.0 |
| **200** | −16.0 | −17.8 | −13.9 | −15.7 | −11.8 | −13.7 | −10.8 | −12.6 | −10.2 | −12.0 |
| **220** | −18.1 | −20.5 | −15.8 | −18.2 | −13.5 | −15.9 | −12.3 | −14.7 | −11.6 | −14.0 |
| **240** | −20.2 | −23.2 | −17.6 | −20.6 | −15.1 | −18.1 | −13.8 | −16.8 | −13.0 | −16.0 |
| **260** | −22.3 | −25.8 | −19.5 | −23.1 | −16.7 | −20.3 | −15.3 | −18.9 | −14.5 | −18.0 |
| **280** | −24.4 | −28.4 | −21.3 | −25.4 | −18.3 | −22.4 | −16.8 | −20.9 | −15.9 | −20.0 |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

| HIT-SP SMV 2M16-0210 | Section A-A $V_{Rd,A}$ [kN] | | Section B-B for selected shear load $V_{Rd,B}$ [kN] | | | | | | M16 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Design values** | **43.9** | **43.9** | **25.0** | **25.0** | **30.0** | **30.0** | **40.0** | **40.0** | **43.9** | **43.9** |
| **Element height [mm]** | $M_{Rd,A}$ [kNm] | | $M_{Rd,B}$ [kNm] | | | | | | | |
| **180** | −13.6 | −15.1 | −9.1 | −10.6 | −8.2 | −9.7 | −6.3 | −7.8 | −5.6 | −7.1 |
| **200** | −16.0 | −17.8 | −10.8 | −12.6 | −9.8 | −11.6 | −7.7 | −9.6 | −6.9 | −8.7 |
| **220** | −18.1 | −20.5 | −12.3 | −14.7 | −11.2 | −13.6 | −8.9 | −11.3 | −8.0 | −10.4 |
| **240** | −20.2 | −23.2 | −13.8 | −16.8 | −12.5 | −15.5 | −10.0 | −13.0 | −9.0 | −12.0 |
| **260** | −22.3 | −25.8 | −15.3 | −18.9 | −13.9 | −17.5 | −11.1 | −14.7 | −10.1 | −13.6 |
| **280** | −24.4 | −28.4 | −16.8 | −20.9 | −15.3 | −19.4 | −12.3 | −16.4 | −11.1 | −15.2 |

Load bearing capacity values for further types and for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

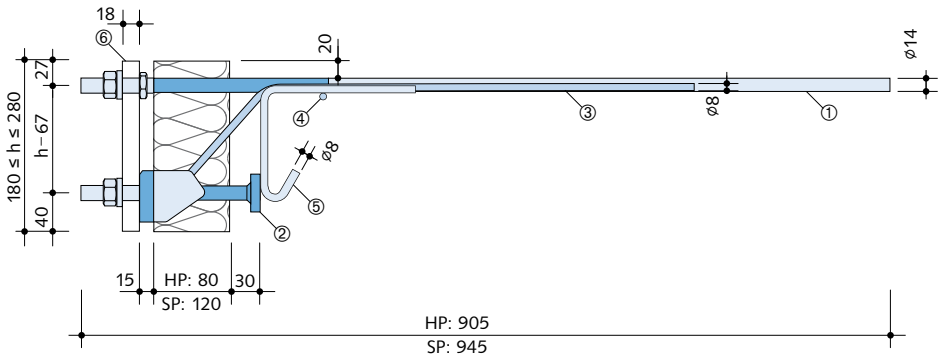
The verification can be performed either in section A-A or in section B-B.

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
# HIT-HP SMV, HIT-SP SMV

## Product description

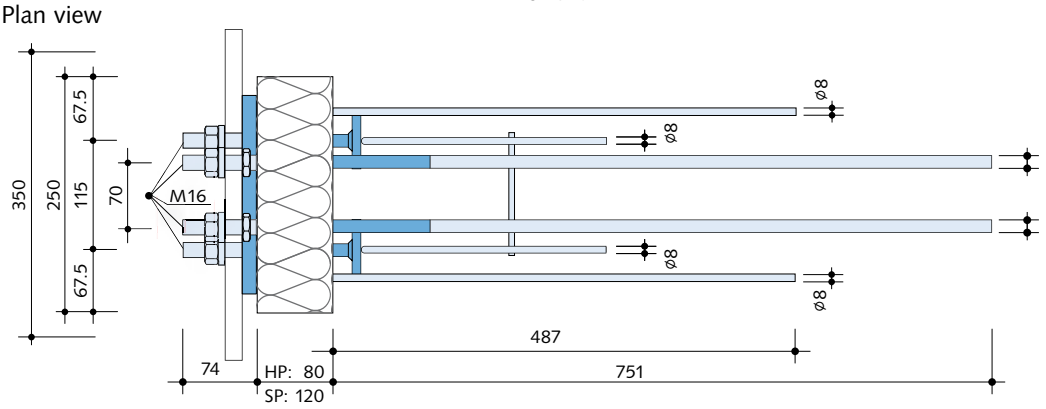
### HIT-HP/SP SMV-2M16-0208 with installation aid

Section




① Tension bar
② Pressure bearing
③ Shear load bar
④ Constructive installation rebar
⑤ Stirrup
⑥ Installation aid

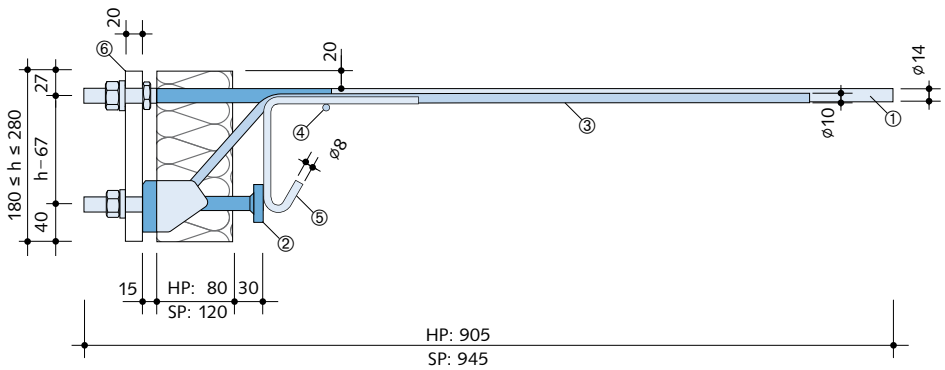
Plan view




Dimensions in [mm]

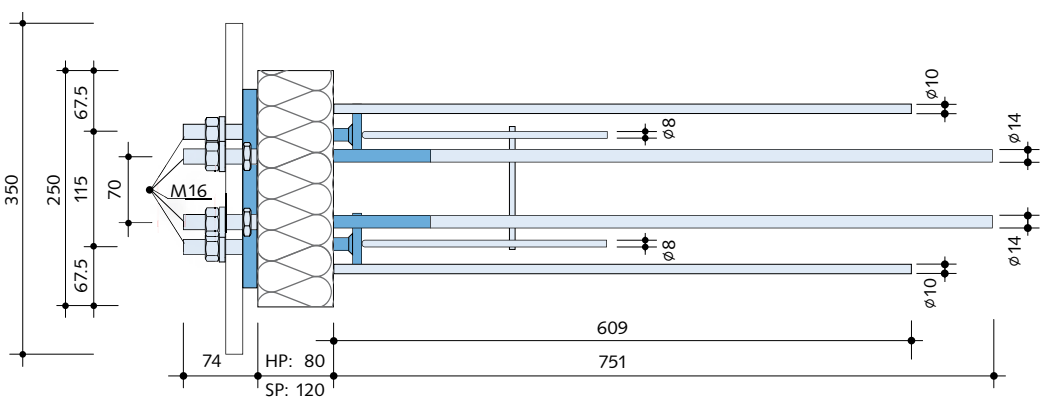
### HIT-HP/SP SMV-2M16-0210 with installation aid

Section




① Tension rods
② Pressure bearing
③ Shear load bar
④ Constructive installation rebar
⑤ Stirrup
⑥ Installation aid

Plan view



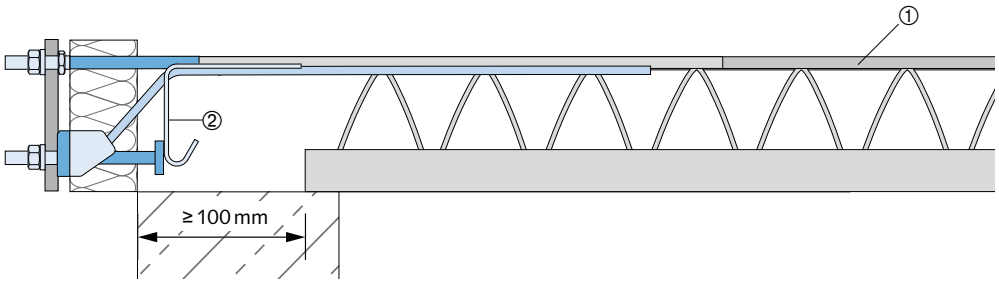

Dimensions in [mm]

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SMV, HIT-SP SMV

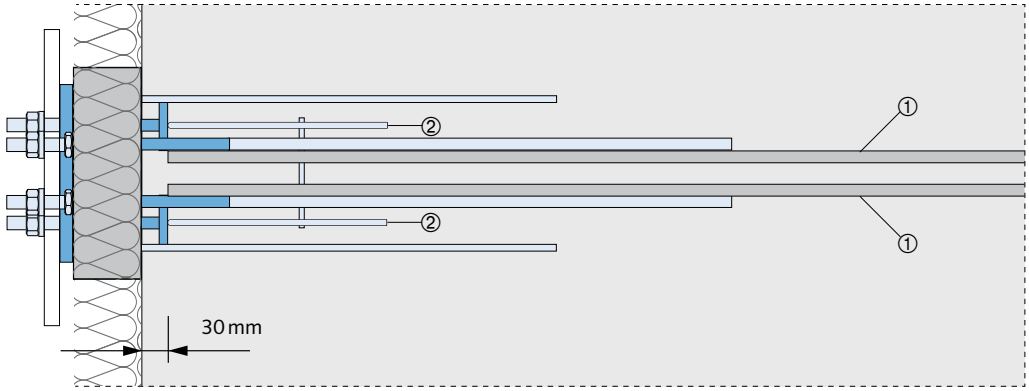
### On-site connecting reinforcement

**Section – On-site cast concrete**


**Section – Semi-precast slab**




**Plan view – On-site cast concrete**




**Position ①:** ≥ 2ø14; The bar lengths are defined by the tension bar overlap as specified in the structural design plans
**Position ②:** 2ø8; included in the element

Figures: Overlap with the on-site connecting reinforcement

On-site reinforcement according to the structural engineer's specifications.

Constructive reinforcement for the free slab edge in accordance with EN 1992-1-1, horizontal min. 1 ø8 mm close to the anchor heads

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SMV, HIT-SP SMV

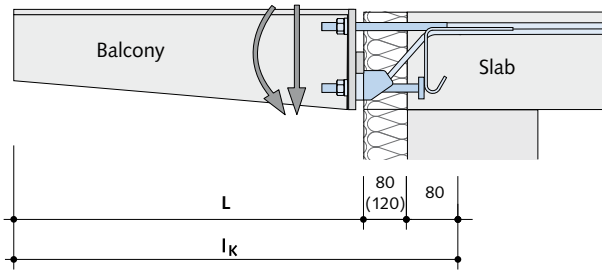
### Deformation

For the HIT-HP/SP SDV elements, the torsional deformations resulting from elastic girder deformation in the insulation/load inducement joint area $\alpha_M$ are assumed due to a standard effective moment $M_{Ed}$ = 1 kNm.

The required camber to compensate for elastic deformations of the connected steel structure can be approximated as follows:

$$\ddot{u} = \alpha_M \cdot l_k \cdot M_{Ed}$$

with $\ddot{u}$ = Camber [mm]
$\alpha_M$ = Torque resulting from $M_{Ed}$ = 1 kNm; Table values in [‰/kNm]
$l_k$ = Span distance of cantilever [m]
$M_{Ed}$ = Design value of the effective moment [kNm] at serviceability limit state (SLS)




L = Cantilever length [m]
$l_k$ = Span distance, cantilever beam [m]

Other deformation factors resulting from deformation of the connected steel structure must be considered by the structural engineer when determining the overall camber. The $\alpha_M$ values [‰/kNm] in the following table are in accordance with approval no. Z-15.7-336.

| HIT-HP SMV | | |
|---|---|---|
| **$\alpha_M$ [‰/kNm] for element height h [mm]** | **HP SDV-2M16-0208** | **HP SDV-2M16-0210** |
| **180** | 0.604 | 0.604 |
| **200** | 0.436 | 0.436 |
| **220** | 0.330 | 0.330 |
| **240** | 0.258 | 0.258 |
| **260** | 0.207 | 0.207 |
| **280** | 0.170 | 0.170 |

| HIT-SP SMV | | |
|---|---|---|
| **$\alpha_M$ [‰/kNm] for element height h [mm]** | **SP SMV-2M16-0208** | **SP SMV-2M16-0210** |
| **180** | 0.722 | 0.722 |
| **200** | 0.521 | 0.521 |
| **220** | 0.394 | 0.394 |
| **240** | 0.308 | 0.308 |
| **260** | 0.248 | 0.248 |
| **280** | 0.203 | 0.203 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SMV, HIT-SP SMV

### Torsion spring stiffnesses

**HIT-HP SMV**

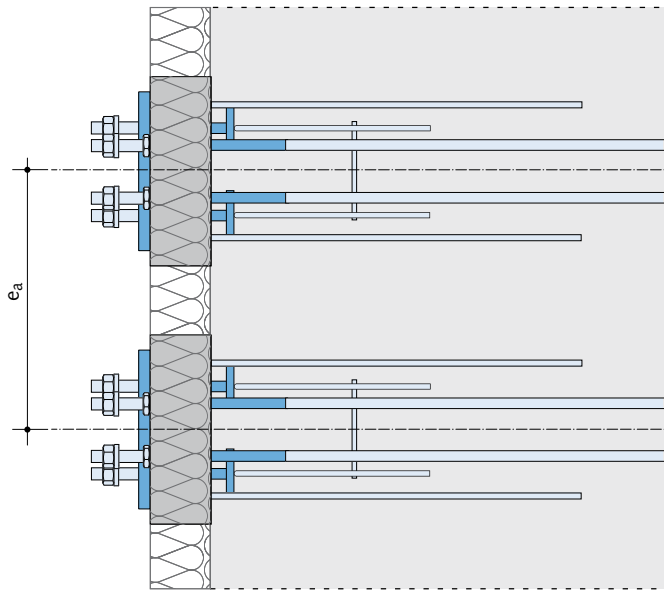
| Torsion spring C [kNm/rad] for element height h [mm] | HP SMV-2M16-0208 HP SMV-2M16-0210 |
|---|---|
| **180** | 1750 |
| **200** | 2424 |
| **220** | 3207 |
| **240** | 4101 |
| **260** | 5104 |
| **280** | 6216 |

**HIT-SP SMV**

| Torsion spring C [kNm/rad] for element height h [mm] | SP SMV-2M16-0208 SP SMV-2M16-0210 |
|---|---|
| **180** | 1470 |
| **200** | 2037 |
| **220** | 2695 |
| **240** | 3446 |
| **260** | 4289 |
| **280** | 5224 |

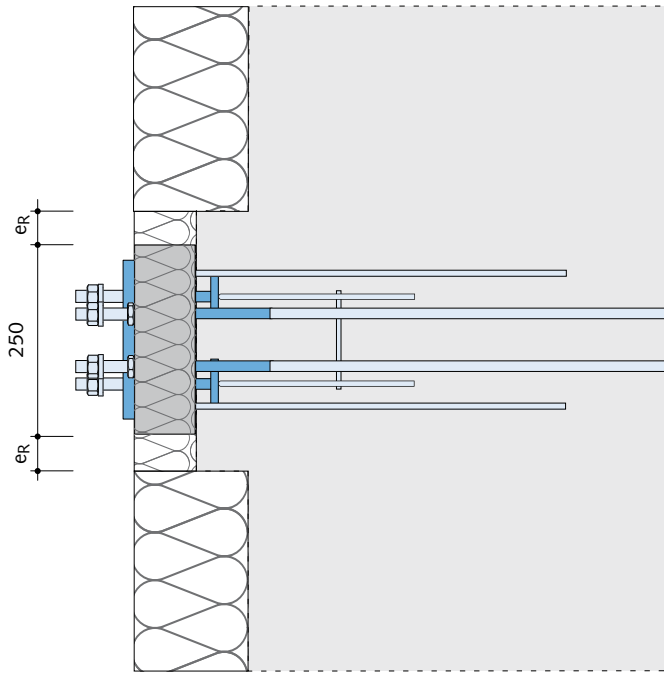
# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SMV, HIT-SP SMV

### Axial spacing




| HIT Type | Axial spacing $e_a \geq$ [mm] |
|---|---|
| HIT-HP SMV-2M16-0208 | 295 |
| HIT-HP SMV-2M16-0210 | 295 |
| HIT-SP SMV-2M16-0208 | 295 |
| HIT-SP SMV-2M16-0210 | 295 |

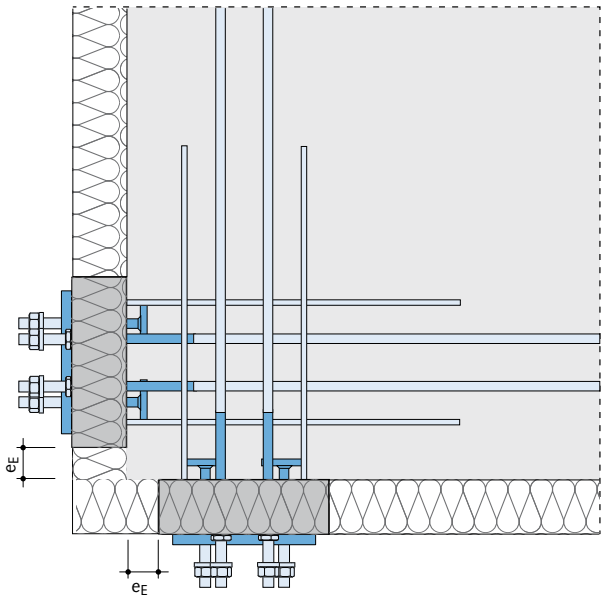
### Edge distance




| HIT Type | Edge distance $e_R$ [mm] |
|---|---|
| HIT-HP SMV-2M16-0208 | 22.5 |
| HIT-HP SMV-2M16-0210 | 22.5 |
| HIT-SP SMV-2M16-0208 | 22.5 |
| HIT-SP SMV-2M16-0210 | 22.5 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SMV, HIT-SP SMV

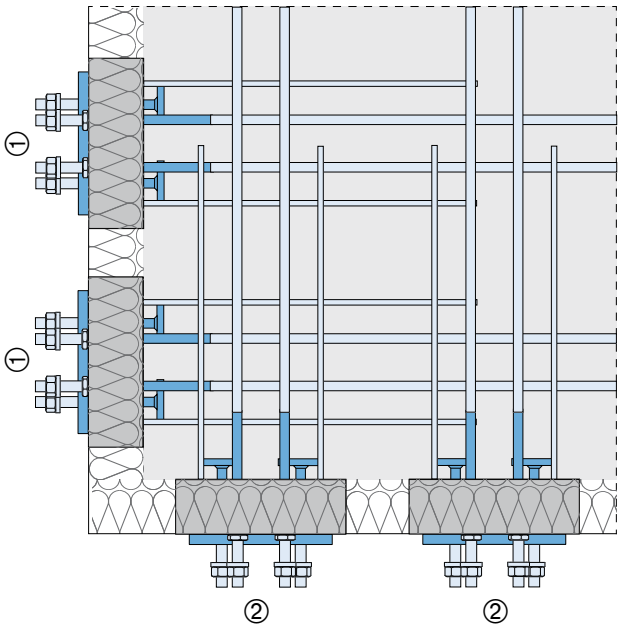
### Distance from an outer corner

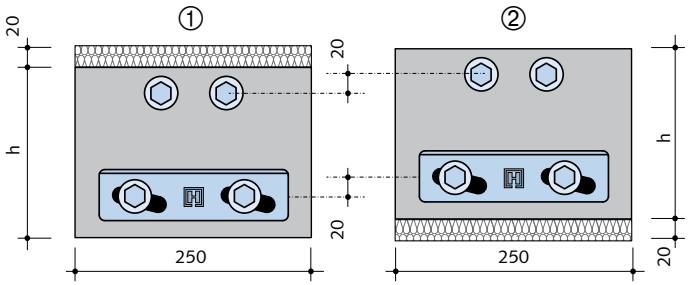



| HIT Type | Axial spacing $e_E$ [mm] |
|---|---|
| HIT-HP SMV-2M16-0208 | 22.5 |
| HIT-HP SMV-2M16-0210 | 22.5 |
| HIT-SP SMV-2M16-0208 | 22.5 |
| HIT-SP SMV-2M16-0210 | 22.5 |

### Height offset for an outer corner

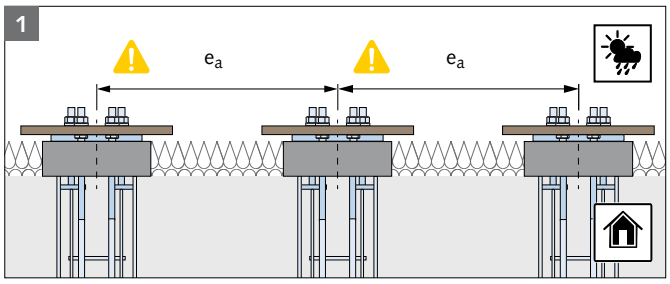
To install the HIT-SMV elements at an external corner, it is necessary to offset the installation height of the elements.
The required height offset is achieved using 20 mm insulation strips (not included).



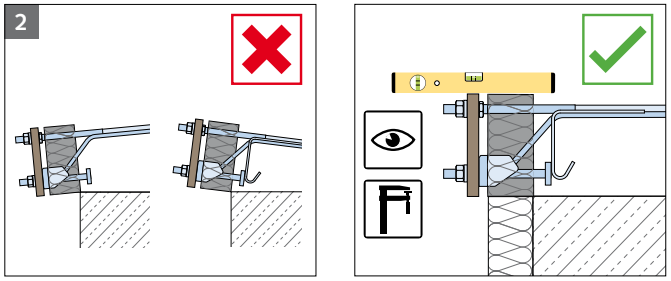
# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SMV, HIT-SP SMV

### Installation in concrete




**1 Installing the bottom reinforcement layer (example, mesh reinforcement).**
Installing the HIT-Element from above.

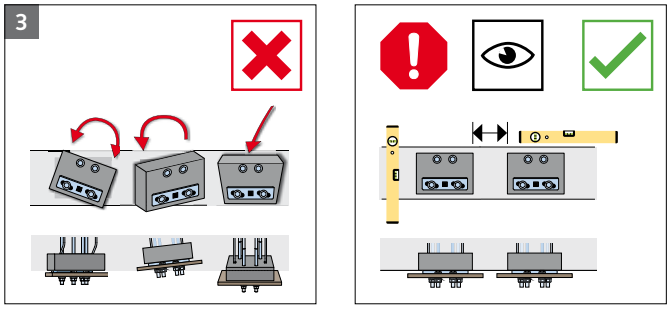
Install the HIT Element with increased accuracy for post-installed steel elements!




**2 Accurate installation**

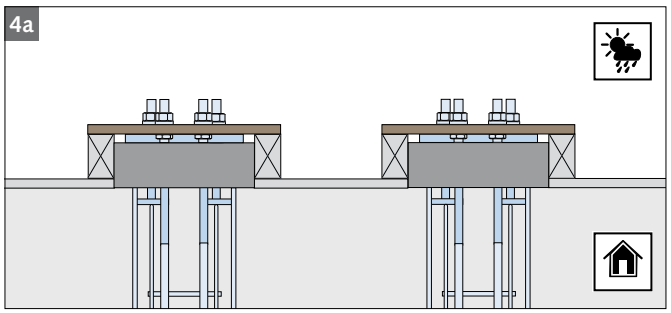
Ensure installation is exactly horizontal and vertical!

Ensure the formwork is installed at the correct height!

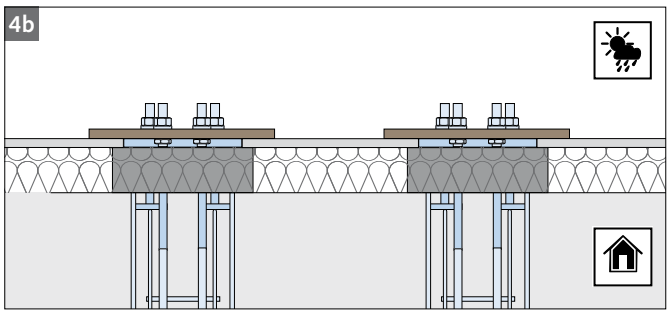



**3 Checking horizontal and vertical alignment**
The included (wood) installation aids are used to precisely align the elements; the overhanging edges can be used to fix to the on-site formwork as required.

**Alternative:** Make installation aids on-site (for example, in wood or U-profiles). Use the supplied installation aids or alternatively the HALFEN drilling templates to transfer the drill hole sizes and element distances to the on-site made installation aids.




**4 Installing the formwork**
a Concreting directly against the formwork




b Concreting directly against the insulation

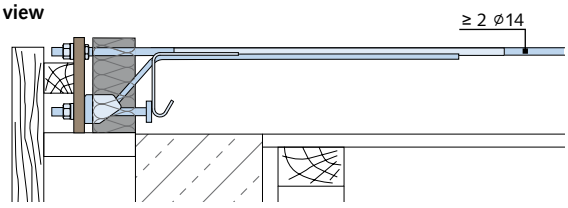
**A free drilling template (.pdf file) is available at:**
► www.halfen.com ► Product Ranges ► Construction
► Reinforcement systems ► HIT Steel to Concrete Connector
► Product Information ► Installation Instructions

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SMV, HIT-SP SMV

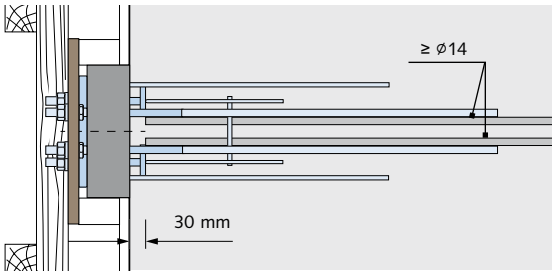
### Installation in concrete

5

Section view




Plan view



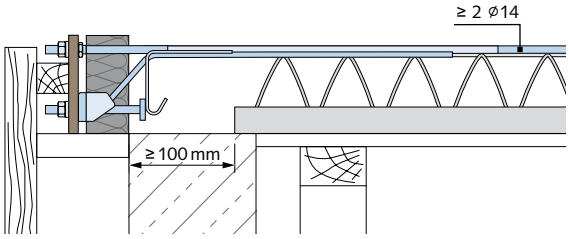

**5 Installing the on-site reinforcement**

On-site reinforcement must be placed as specified by the structural engineer.

Constructive reinforcement for the free slab edge in accordance with EN 1992-1-1, horizontal, min. 1 ø8 mm, close to the anchor heads

6

Section view

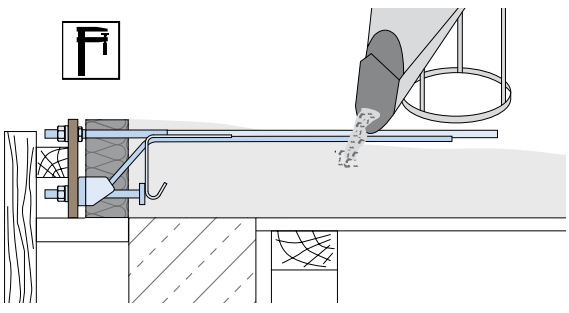



**6 Installing the on-site reinforcement for semi-precast elements**

On-site reinforcement must be placed as specified by the structural engineer.

Constructive reinforcement for the free slab edge in accordance with EN 1992-1-1, horizontal, min. 1 ø8 mm, close to the anchor heads

7



**7 Pouring the concrete**

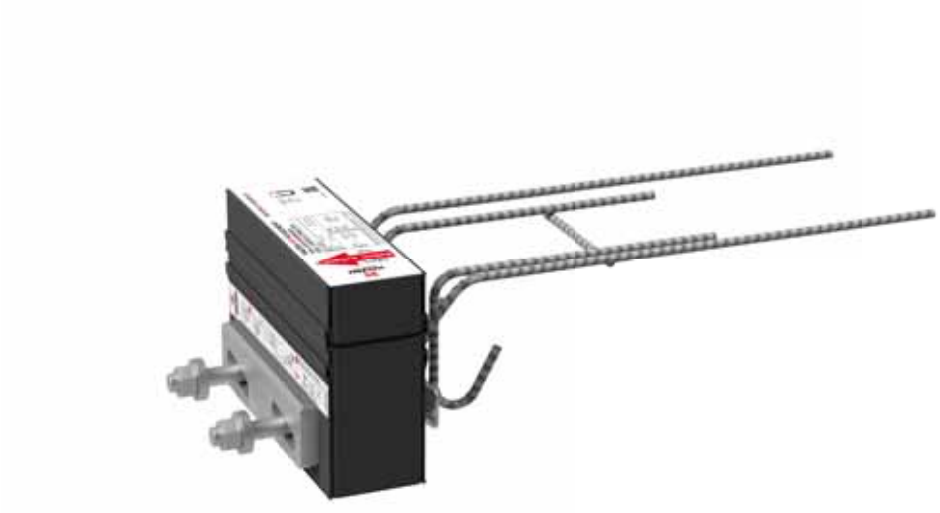
To ensure the HIT units are not displaced, ensure the concrete is poured and compacted evenly.

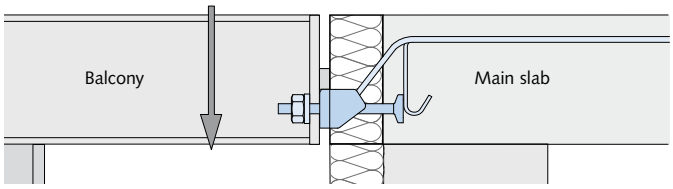
# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SZV, HIT-SP SZV

3

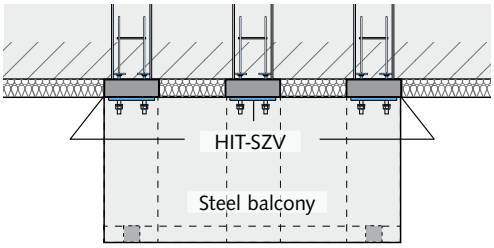
- Element for connecting suported steel constructions to reinforced concrete components
- Transfer of positive shear loads

**TYPE TESTED**






**HIT-HP SZV – High Performance with 80 mm insulation**
**HIT-SP SZV – Superior Performance with 120 mm insulation**




**Application**: Simply supported balcony slabs on columns

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
# HIT-HP SZV, HIT-SP SZV

## Load capacity range

Combinations of three shear load capacities are available. Anchor headed compression elements are used in the concrete slab. Following combinations of shear load bars are possible for insulation thicknesses of HIT-HP 80mm and HIT-SP 120mm.

**Element width B = 25 cm**

| Number and diameter of the connection bolts, balcony side | Number and diameter of the shear load bars | | |
|---|---|---|---|
| | 2 ø8 | 2 ø10 | 2 ø12 |
| 2M16 | ● | ● | ● |

See the following pages for load capacity values for selected elements. ● = HP and SP

## Basic types – Ordering example

### Ordering example

| | | | | | | |
|---|---|---|---|---|---|---|
| HIT-HP<br>HIT-SP | SZV<br>SZV | - | 0208<br>0212 | - | 18<br>28 | |
| ❶ ❷ | ❸ | | ❹ | | ❺ | |

**Type designation**
① Product group
② Joint spacing 80 mm (HP) or 120 mm (SP)
③ Connection type
④ Shear load range
⑤ Element height [cm]

**CUSTOM SOLUTIONS**

**HALFEN HIT Insulated connections**
Our technical support team is available if a custom solution is required for your project.
**Contact details:** → see back cover of catalogue

## Technical data

| Element description HIT-HP/HIT-SP | Possible element height h [mm] | Balcony side | Main slab side | | | min. concrete cover slab side [mm] | |
|---|---|---|---|---|---|---|---|
| | | Thread | Compression bars | Shear load bars [mm] | Stirrups [mm] | $c_{v,top}$ | $c_{v,bottom}$ |
| SZV-0208 | 180–280 | 2M16 | Anchor head | 2 ø 8 | 2 ø8 | ≥20 | 33 |
| SZV-0210 | | 2M16 | Anchor head | 2 ø10 | 2 ø8 | ≥20 | 33 |
| SZV-0212 | | 2M16 | Anchor head | 2 ø12 | 2 ø8 | ≥20 | 33 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SZV, HIT-SP SZV

### Resistance at ultimate load capacity

**Shear load capacity** — **Concrete strength:** C20/25 ≥C25/30 — 80

| HIT-HP SZV | Section A-A $V_{Rd,A}$ [kN] M16 | | | | | |
|---|---|---|---|---|---|---|
| Design values | HP SZV-0208 | | HP SZV-0210 | | HP SZV-0212 | |
| Element height 180–280 mm | 33.5 | 33.5 | 52.3 | 52.3 | 75.3 | 75.3 |

Load bearing capacity values for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

**Shear load capacity** — **Concrete strength:** C20/25 ≥C25/30 — 120

| HIT-SP SZV | Section A-A $V_{Rd,A}$ [kN] M16 | | | | | |
|---|---|---|---|---|---|---|
| Design values | SP SZV-0208 | | SP SZV-0210 | | SP SZV-0212 | |
| Element height 180–280 mm | 28.1 | 28.1 | 43.9 | 43.9 | 56.8 | 56.8 |

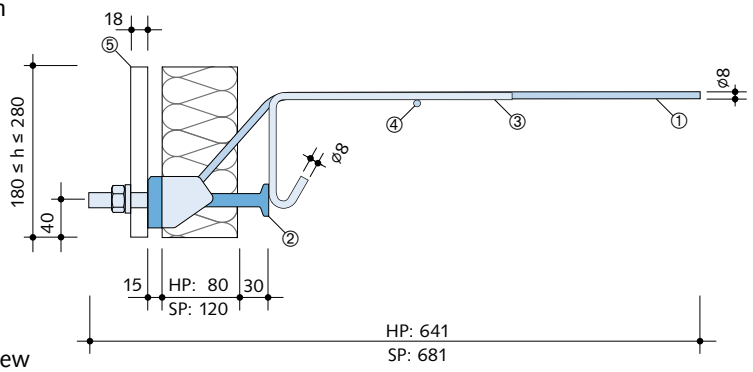
Load bearing capacity values for concrete strength C30/37 can be found in the type tests at **www.halfen.com** or on request. See back cover for contact information.

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
# HIT-HP SZV, HIT-SP SZV

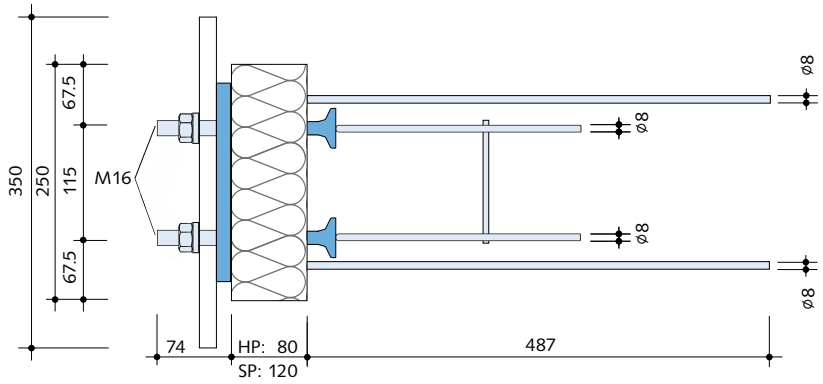
## Product description

### HIT-HP/SP SZV-0208 with installation aid

Section




Plan view

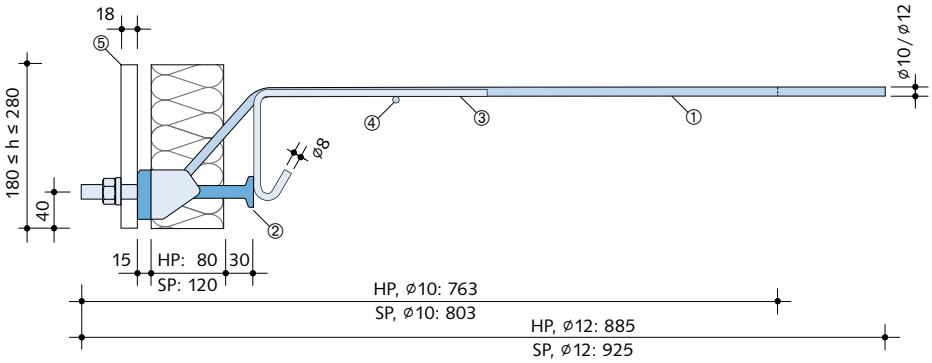



① Shear load bars
② Pressure bearing
③ Stirrups
④ Constructive installation rebar
⑤ Installation aid

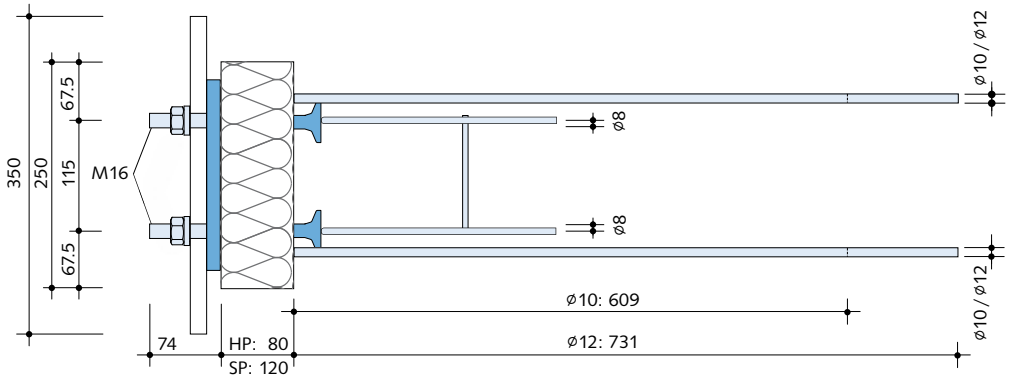
Dimensions in [mm]

### HIT-HP/SP SZV-0210 and HIT-HP/SP SZV-0212 with installation aid

Section




Plan view



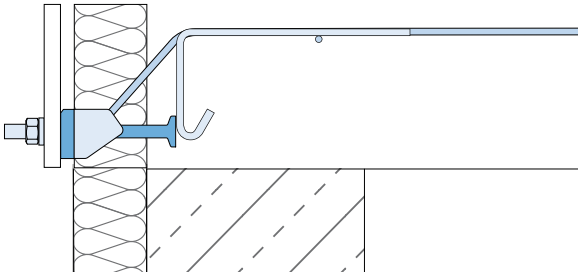

① Shear load bars
② Pressure bearing
③ Stirrups
④ Constructive installation rebar
⑤ Installation aid

Dimensions in [mm]

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
# HIT-HP SZV, HIT-SP SZV

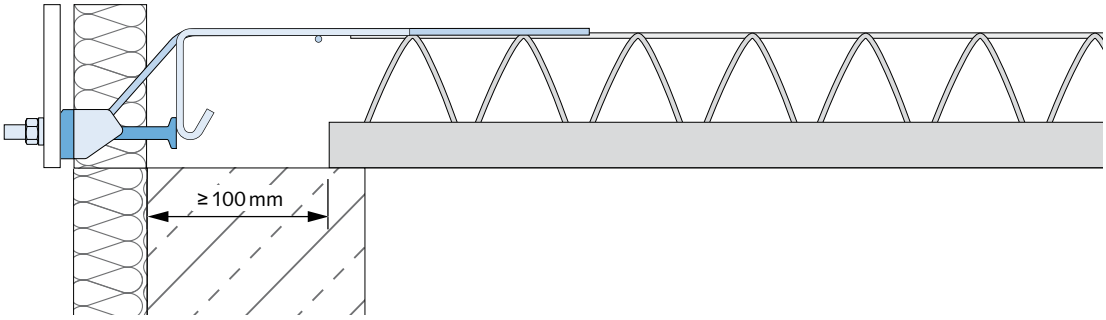
## On-site reinforcement

### Section – On-site cast concrete



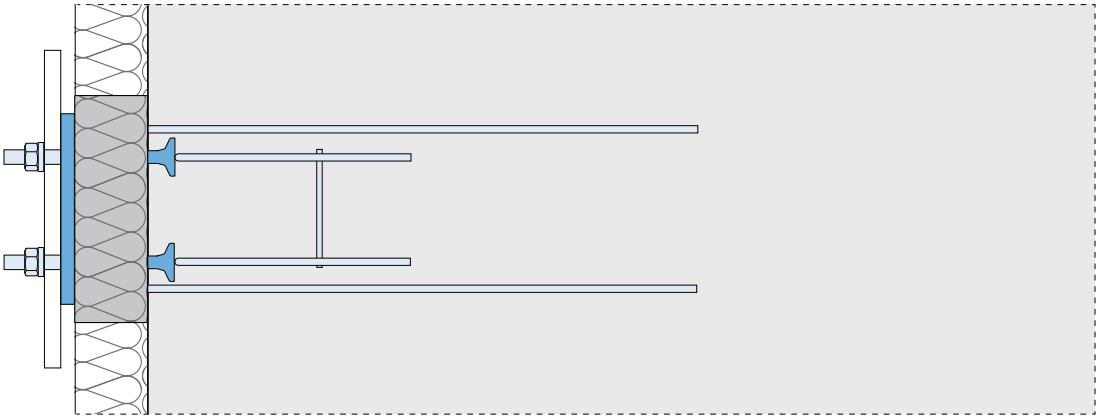
Constructive reinforcement for the free slab edge in accordance with EN 1992-1-1, horizontal, min. 1 ø8 mm, close to the anchor heads

### Section – semi-precast element



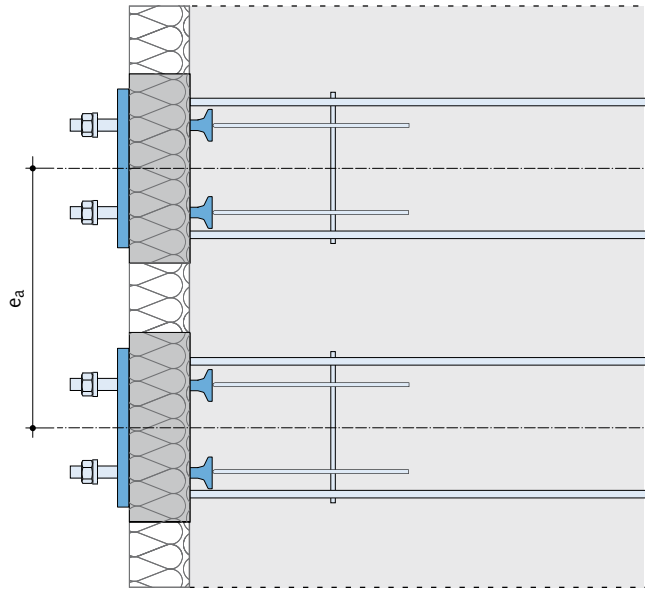

On-site reinforcement according to the structural engineer's specifications.

### Plan view – On-site cast concrete



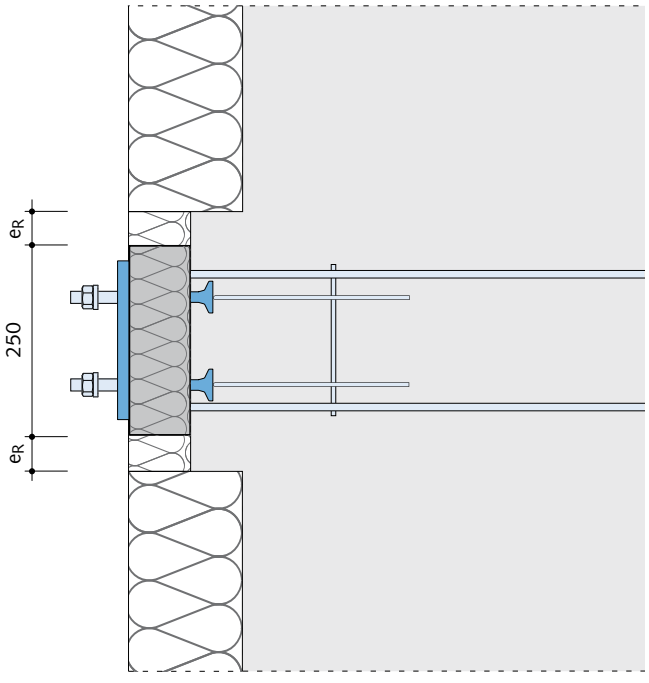
# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SZV, HIT-SP SZV

### Axial spacing




| HIT Type | Axial spacing $e_a$ [mm] |
|---|---|
| HIT-HP SZV-0208 | 250 |
| HIT-HP SZV-0210 | |
| HIT-HP SZV-0212 | |
| HIT-SP SZV-0208 | |
| HIT-SP SZV-0210 | |
| HIT-SP SZV-0212 | |

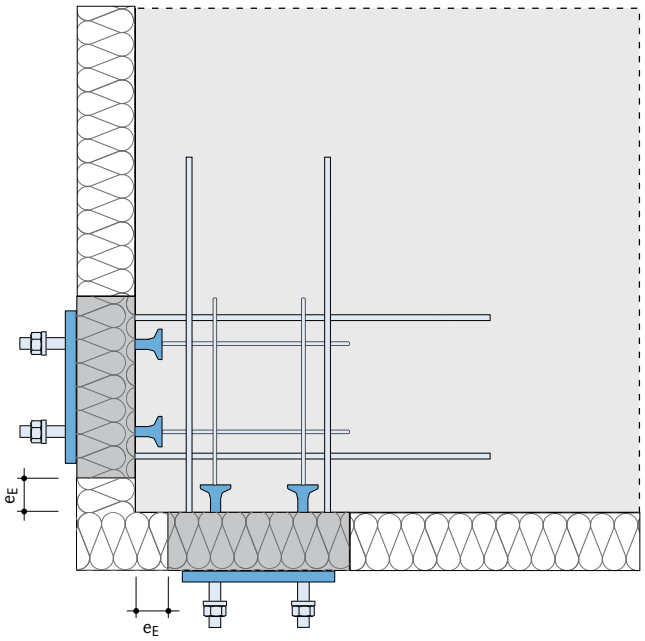
### Edge distance




| HIT Type | Distance $e_R$ [mm] |
|---|---|
| HIT-HP SZV-0208 | 11 |
| HIT-HP SZV-0210 | 22 |
| HIT-HP SZV-0212 | 33 |
| HIT-SP SZV-0208 | 11 |
| HIT-SP SZV-0210 | 22 |
| HIT-SP SZV-0212 | 33 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SZV, HIT-SP SZV

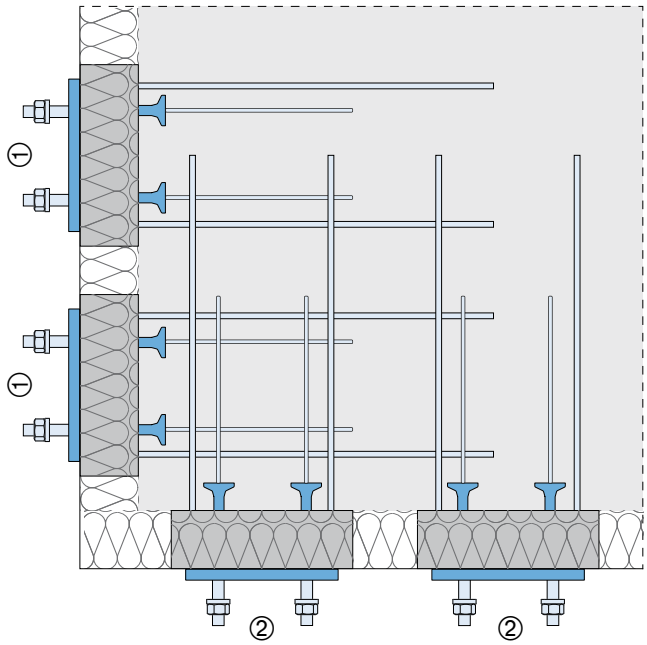
### Distance from a outer corner

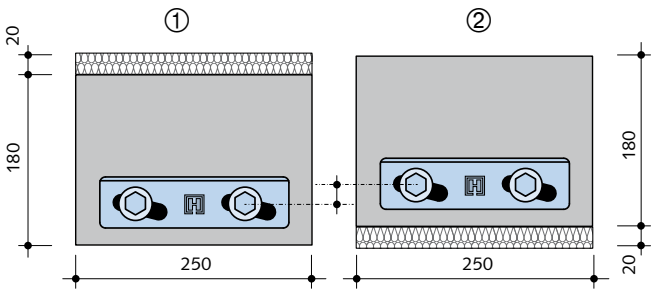



| HIT Type | Distance $e_E \geq$ [mm] |
|---|---|
| HIT-HP SZV-0208 | 11 |
| HIT-HP SZV-0210 | 22 |
| HIT-HP SZV-0212 | 33 |
| HIT-SP SZV-0208 | 11 |
| HIT-SP SZV-0210 | 22 |
| HIT-SP SZV-0212 | 33 |

### Height-offset for an outer corner

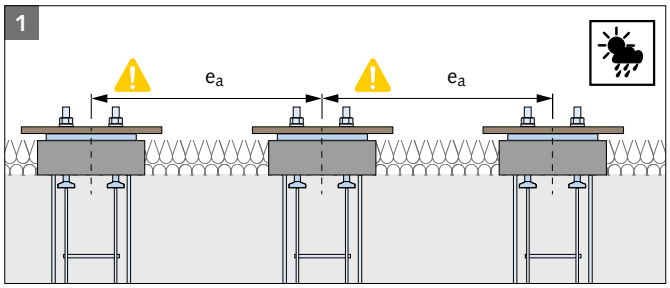
To install the HIT-SZV elements at an external corner, it is necessary to offset the installation height of the elements. The required height offset is achieved using 20 mm insulation strips (not included).



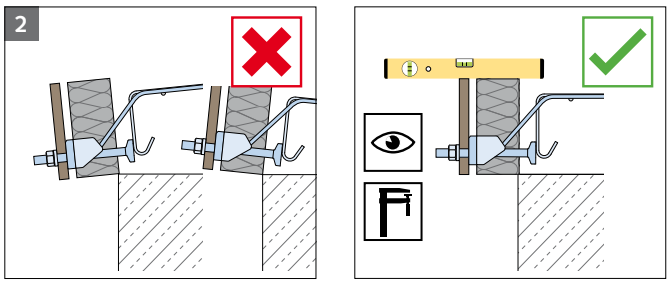
# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## HIT-HP SZV, HIT-SP SZV

### Installation in concrete




**1 Installing the bottom reinforcement layer (example, mesh reinforcement).** Installing the HIT-Element from above.

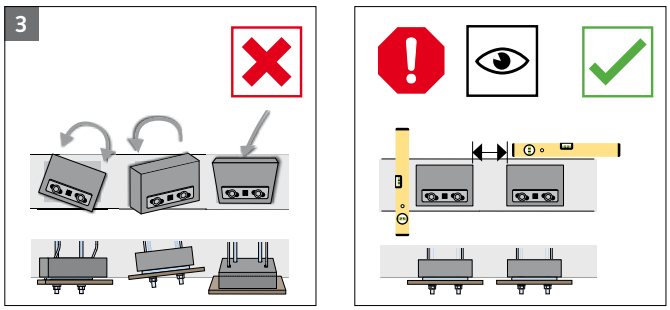
Install the HIT Element with increased accuracy if the steel construction is to be post-installed!




**2 Accurate installation**

Ensure installation is exactly horizontal and vertical!

Ensure the formwork is installed at the correct height!




**3 Checking horizontal and vertical alignment**
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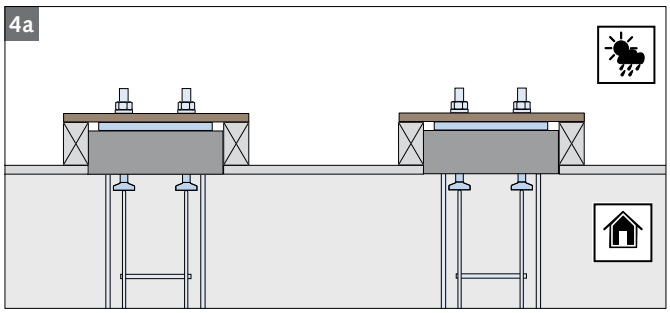
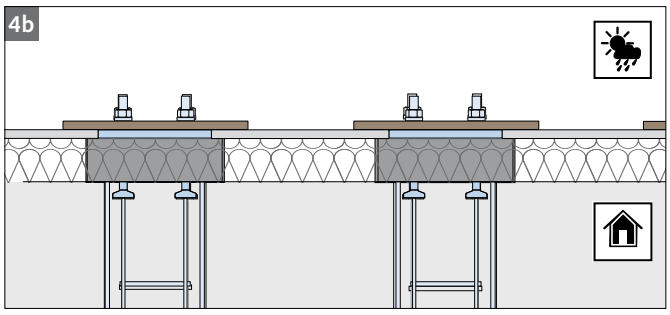
**Alternative:** Make installation aids on-site (for example, in wood or U-profiles). Use the supplied installation aids or alternatively the HALFEN drilling templates to transfer the drill hole sizes and element distances to the on-site made installation aids.




**4 Installing the formwork**
a Concreting directly against the formwork



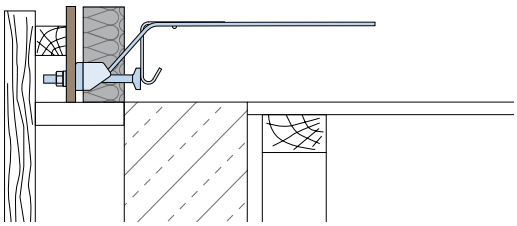

b Concreting directly against the insulation

**A free drilling template (.pdf file) is available at:**
► www.halfen.com ► Product Ranges ► Construction
► Reinforcement systems ► HIT Steel to Concrete Connector
► Product Information ► Installation Instructions

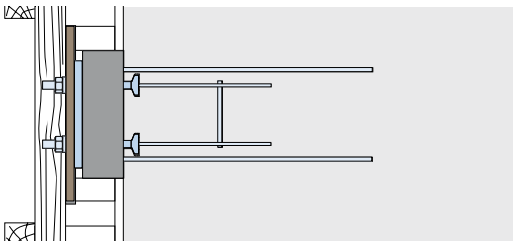
## Installation in concrete

5

Section



Plan view



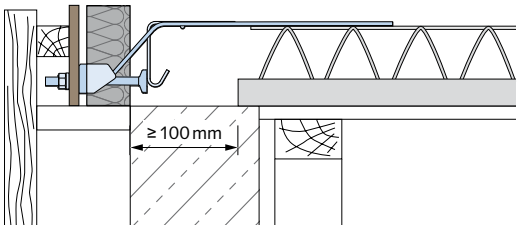
### 5 Installation of the on-site reinforcement

On-site reinforcement according to the structural engineer's specifications.

Constructive reinforcement for the free slab edge in accordance with EN 1992-1-1, horizontal, min. 1 ø8 mm, close to the anchor heads.

6

Section

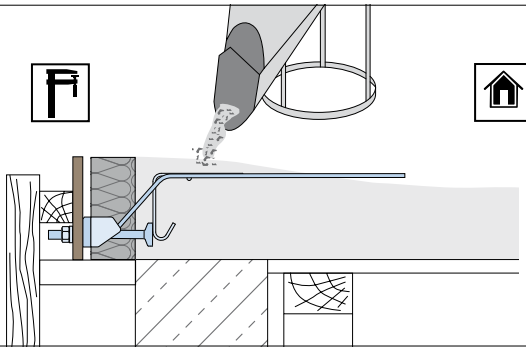



### 6 Installing the on-site reinforcement for a semi-precast slab

On-site reinforcement according to the structural engineer's specifications.

Constructive reinforcement for the free slab edge in accordance with EN 1992-1-1, horizontal, min. 1 ø8 mm, close to the anchor heads.

7



### 7 Pouring the concrete

To ensure the HIT elements are not displaced, ensure the concrete is poured and compacted evenly.

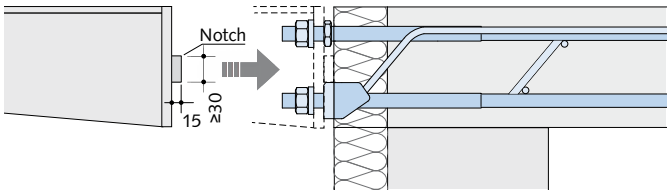
# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Design and installation of the connected elements

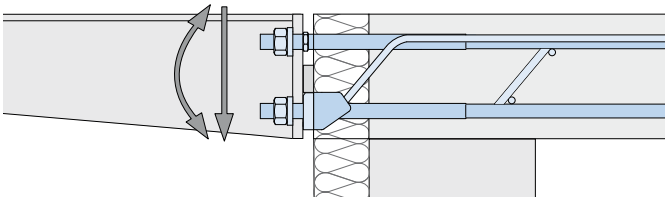
4 › Design and installation of connected elements

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Design and installation of the connected elements

### On-site facing plate with notch

On-site facing plates with notch are required to fasten and support connected elements to the HIT Insulated connection. The facing plates thickness $t_s$ is specified by the structural engineer keeping within the stipulated limits.
The maximum thickness $t_{s,max}$ of the facing plates depends on the available clamping length of the HIT element.



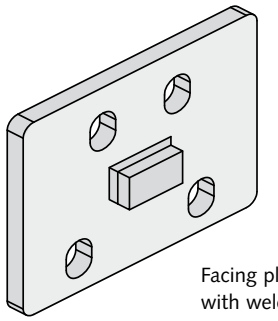
Dimensions in [mm]

| Connection thread | Clamp length | Tightening torques |
|---|---|---|
| **M16** | ≤30 mm | $M_R$ = 100 Nm |
| **M22** | ≤40 mm | $M_R$ = 200 Nm |

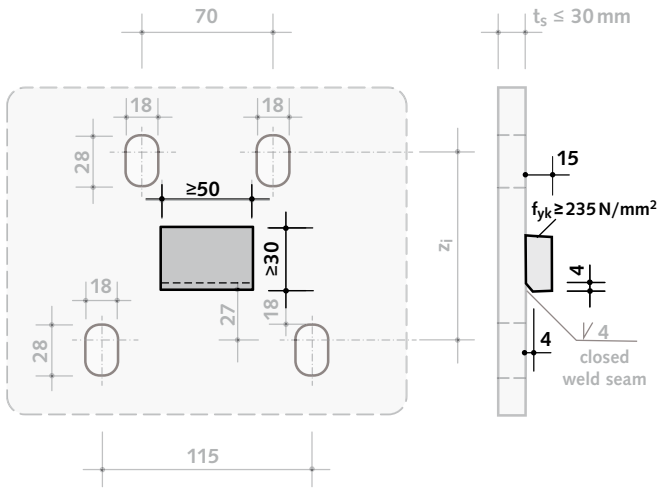
### On-site welded notch

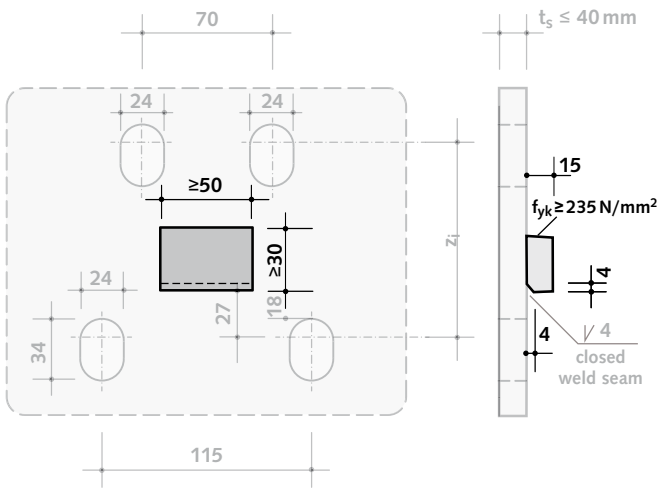
Shear loads are transferred from the on-site facing plate through an on-site welded notch.

Specifications for the notch:
- $h_{min.notch}$ = 30 mm
- $b_{min.notch}$ = 50 mm
- $t_{notch}$ = 15 mm
- Steel grade, minimum strength $f_{yk}$ = 235 N/mm²
- Weld seam $a_{w,min}$ = 4 mm, closed weld seam



Facing plate
with welded notch

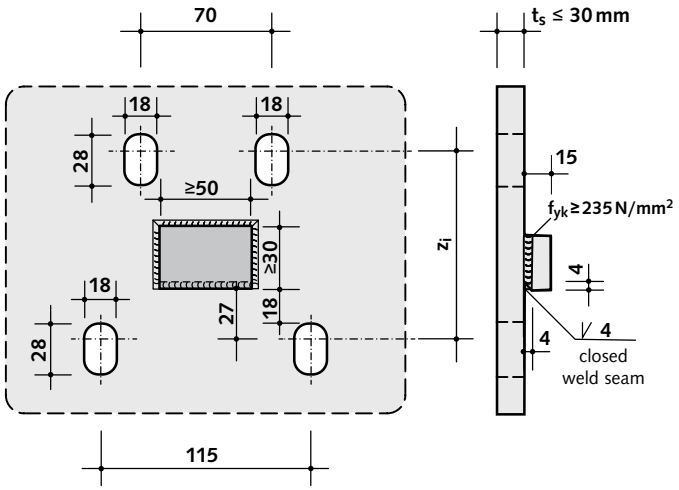


# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Design and installation of the connected elements

### On-site facing plate with notch

**Hole layout for HIT-SDV and HIT-SMV with M16 thread**
(HIT-HP/SP SDV-2M16, HIT-HP/SP SMV-2M16)

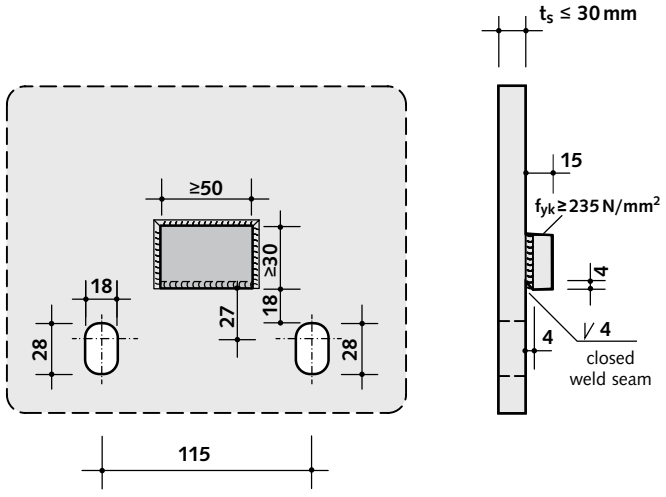



The holes layout in the facing plate depends on the bar diameter and the height of the HIT element.

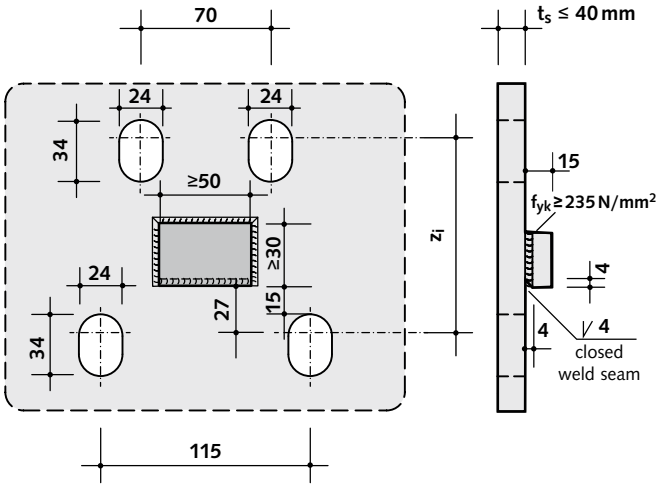
The slots allow the plate to move vertically by up to 10 mm. The facing plate dimensions are specified by the structural engineer, the distances between the slots and the outer edge of the facing plate must be verified.

The facing plate with its central notch is not designed for lifting-loads. The actual dimensions of the embedded HIT elements must be checked before manufacturing the facing plate to ensure a precise fit. On-site corrosion protection is only applied after all welding work has been finished.

**Hole layout for HIT-SZV with M16 thread**
(HIT-HP/SP SZV-2M16)




**Hole layout for HIT-SMV with M22 thread**
(HIT-HP/SP SDV-2M22, HIT-HP/SP SMV-2M22)



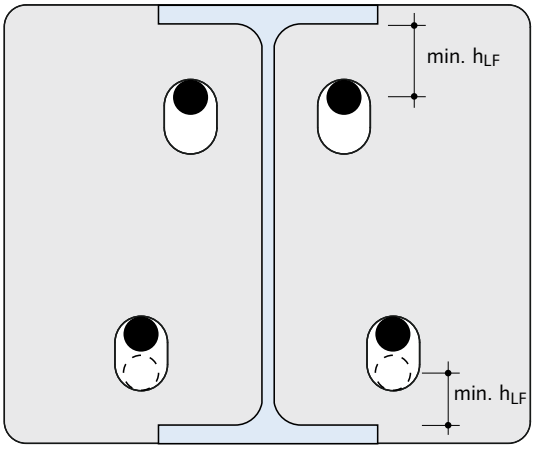

| HIT-HP/SP | Connecting thread M16 | | | | | |
|---|---|---|---|---|---|---|
| HIT Height h [mm] | 180 | 200 | 220 | 240 | 260 | 280 |
| $z_i$ = hole spacing [mm] | 113 | 133 | 153 | 173 | 193 | 213 |

| HIT-HP/SP | Connecting thread M22 | | | | | |
|---|---|---|---|---|---|---|
| HIT Height h [mm] | 180 | 200 | 220 | 240 | 260 | 280 |
| $z_i$ = hole spacing [mm] | 108 | 128 | 148 | 168 | 188 | 208 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Design and installation of the connected elements

### Connected steel components

The shape and dimensions of the connected steel components are specified by the structural engineer. Steel components; a minimum distance $h_{LF}$ must be observed in the facing plate from the top flange to the upper-edge of the upper slotted hole and from the lower-edge of the bottom slotted holes to the bottom flange. The minimum spacing $h_{LF}$ and a height tolerance of 10 mm provide the minimum dimension of the steel profiles.




**Depending on the connection thread, the following min. steel profile sizes are recommended for the various HIT Element heights:**

| HIT-HP/SP | min $h_{LF}$ = 25 mm | | | |
|---|---|---|---|---|
| SDV-2M16<br>SMV-2M16 | IPE | HEA | HEB | HEM |
| 180 | 200 | 220 | 220 | 220 |
| 200 | 220 | 240 | 240 | 240 |
| 220 | 240 | 260 | 260 | 260 |
| 240 | 270 | 280 | 280 | 280 |
| 260 | 300 | 300 | 300 | 300 |
| 280 | 300 | 320 | 320 | 320 |

| HIT-HP/SP | min $h_{LF}$ = 30 mm | | | |
|---|---|---|---|---|
| SDV-2M22 | IPE | HEA | HEB | HEM |
| 180 | 200 | 220 | 220 | 220 |
| 200 | 220 | 240 | 240 | 240 |
| 220 | 240 | 260 | 260 | 280 |
| 240 | 270 | 280 | 280 | 280 |
| 260 | 300 | 300 | 300 | 300 |
| 280 | 300 | 320 | 320 | 320 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Design and installation of the connected elements

### Installation and height adjustment

Check the dimensions and positions of the connection threads (HIT Elements) on-site before attempting to install connected components. Checking the dimensions before manufacture, and before delivery of elements if these were constructed off-site is also recommended.

**The facing plate design as in the figure on page 50 provides a vertical tolerance up to 10 mm in both direction.**

Height adjustment is achieved using the pre-fitted angled slotted bracket; moving the facing plate horizontally (tap lightly with a hammer) causes a vertical movement of the facing plate. To ensure a tolerance in both directions, a central alignment is recommended; see figure B.

**The following should be checked before connecting steel elements to the HIT component:**

- are the sizes and positions of the connection holes as specified?
- is the notch present on the facing plate?
- is the size and position of the notch as specified?

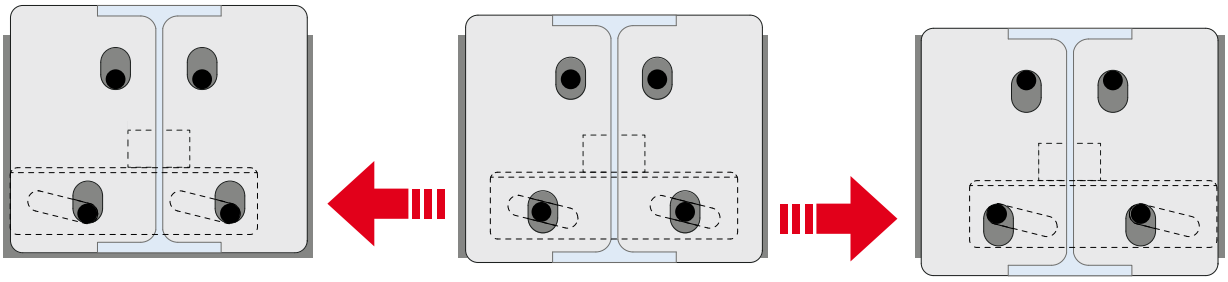
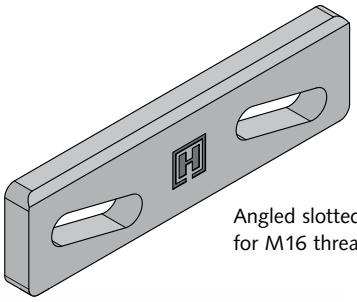


**Figure A:** Threaded bolt positioned at the bottom of the slot

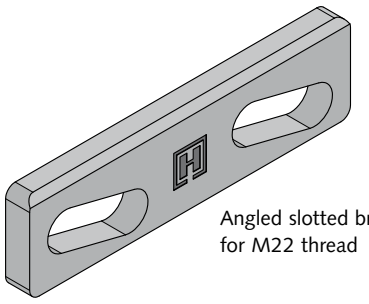
**Figure A:** Threaded bolt positioned at the centre of the slot

**Figure A:** Threaded bolt positioned at the top of the slot

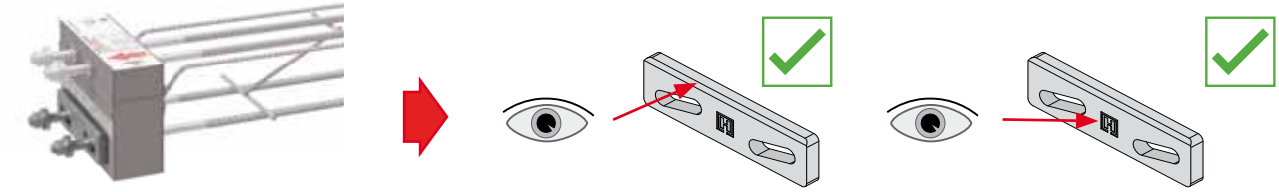
The screw threads may be shortened; a minimum of two turns of the threads must remain visible after fixing any components.



Angled slotted bracket for M16 thread

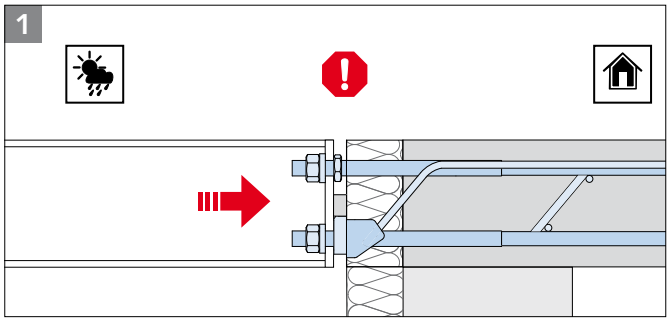


Angled slotted bracket for M22 thread



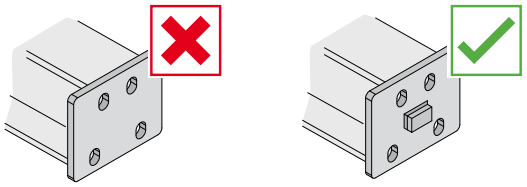
**Please observe the information on the label**
Correct installation of the angled slotted bracket: bevelled edge at the top, HALFEN logo on the front.

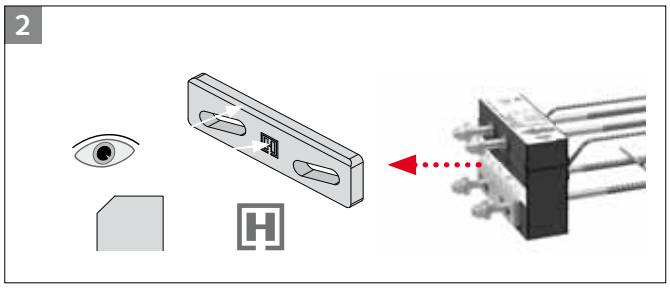
## Installing of steel components




**1 Fixing of steel girders**

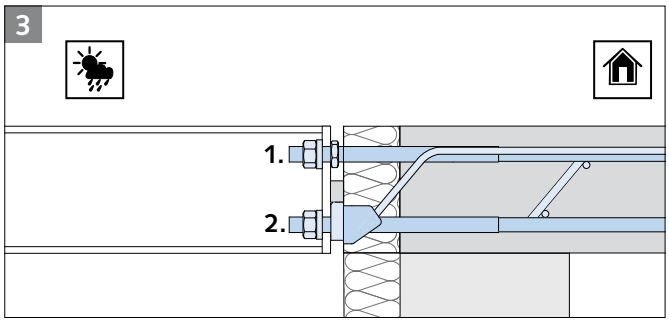
Only use on-site end plates with notch





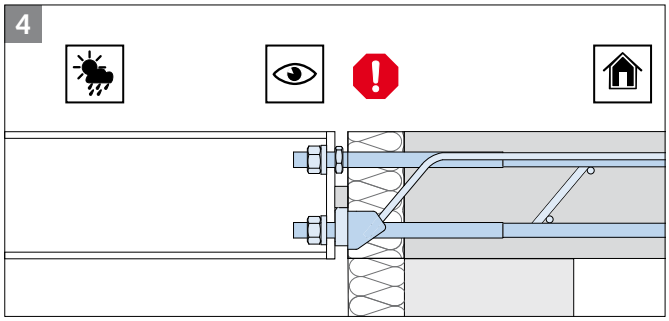

**2 Please observe the information on the label**

Correct orientation of the angled slotted bracket:
HALFEN logo is visible, bevelled edge at the top.




**3 Fixing steel components**

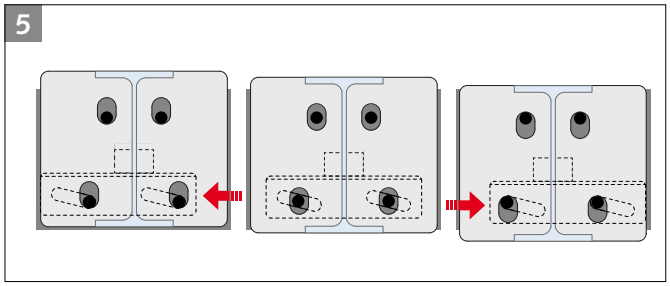
Attach to the top threads first,
then attach to the bottom threads.




**4 Check the steel connection has been installed as planned**

Check the gradient is in accordance with the design specifications! Check if the element is horizontally level or if the camber (where planned) is correct.

On-site reinforcement must be placed as specified by the structural engineer.




**5 Final adjustment, then tighten the nuts**

The thread anchors may be shortened;
ensure **at least two turns** of the threads remain visible after final installation.

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Design and installation of the connected elements

### Expansion joint spacings

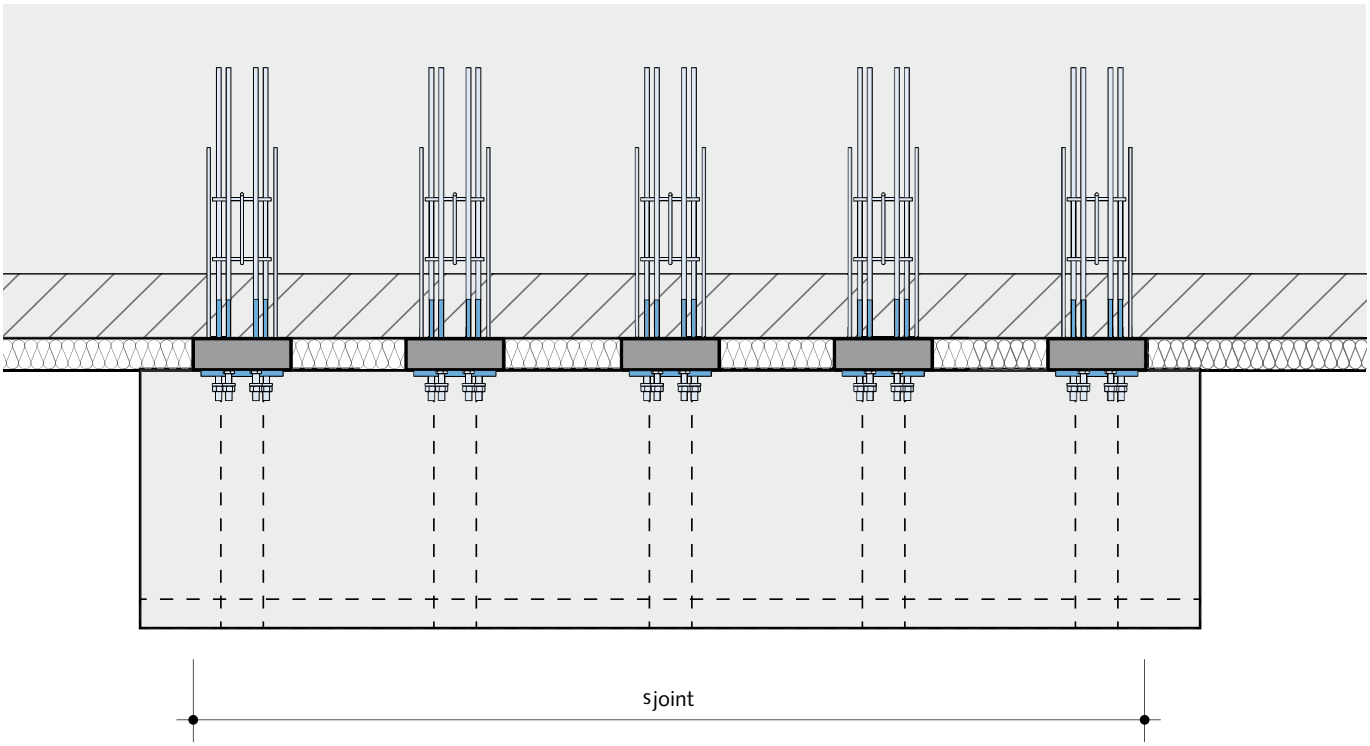
Calculation of the allowable joint spacing is in accordance with Building Authority Approval no. Z-15.7-336 and is based on a balcony slab firmly fixed to steel supports. In this case, expansion joints must be provided in the exterior component.

The distance between the expansion joints must not exceed $s_{joint}$ [m] for linear, cantilevered balcony slabs. Balcony designed for external corners, are limited to a maximum expansion joint spacing of 0.5 $s_{joint}$ for each leg.

A limit of 0.5 $s_{joint}$ per leg also applies for inner corners. $s_{joint}$ refers to outer edge HIT to outer edge HIT. Overhang on the right and left can be included here.

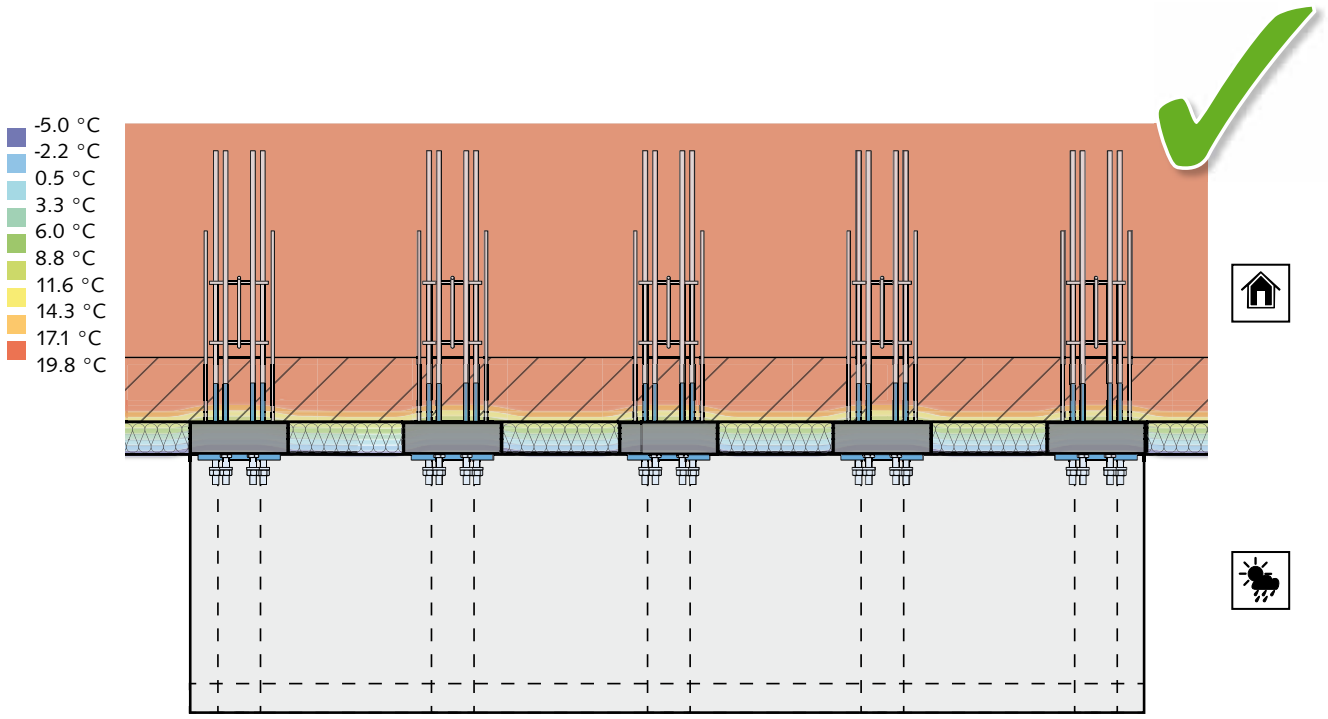
If constructive measures are taken to allow expansion/ contraction between the balcony slab and each steel beam – such as designing slotted holes in the cross beams – then expansion joints are not required.

| Tension bar diameter in the insulation [mm] | $S_{joint}$ max. expansion joint spacing [m] | |
|---|---|---|
| | HIT-HP (80 mm) | HIT-SP (120 mm) |
| M16 | 9.8 | 16.5 |
| M22 | 7.9 | 13.3 |



# 5 › Building physics

The illustration of the temperature field in the horizontal section through a ceiling slab, shown here as an isothermal curve, demonstrates the excellent insulating properties of the HIT Steel to concrete connectors. These connectors form effective thermal separation of the exterior balcony components. The good insulation stops the temperature sinking below the point of condensation preventing water damage. The efficient, building physic design also prevents cracks forming caused by thermal expansion of the metal balcony components.



# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Building physics

### Key values for thermal bridges

**Equivalent thermal conductivity $\lambda_{eq}$**

Composite building elements – including the HIT insulated connection – consist of different building materials with different thermal conductivities.

A detailed analysis of this type of product can be very complex. To simplify the process, a homogeneous, cuboid substitute sample is assumed in the insulation joint, with the same dimensions. An equivalent thermal conductivity $\lambda_{eq}$ is assigned to the substitute sample so that the total heat transfer of both systems is identical. The definition of the $\lambda_{eq}$ values is based on meticulous three-dimensional thermal bridge calculations.

Calculation of the equivalent thermal conductivity is defined in Building Authority approval no. Z-15.7-336 issued by the DiBt (German Institute of Building Technology).

The $\lambda_{eq}$ values cannot be used directly to calculate the primary energy demand of a building. The local thermal transfer coefficient $\chi$ can be determined using thermal bridge software, and therefore, the transmission losses can be calculated. In this case the thermal boundary conditions according to EN ISO 6946 and DIN 4108 annex 2 must be observed.

**Heat transmission coefficient $\chi$**

Local thermal bridges are penetrations in the building envelope that can be referenced to a specific area.
The heat loss resulting from these thermal bridges are defined using a local thermal transfer value $\chi$. The $\chi$ values are therefore important variables for calulating the energy loss of local thermal bridges. The calculated values for a masonry wall using ETICS* can be found on pages 65ff.

*ETICS External Thermal Insulation Composite System.

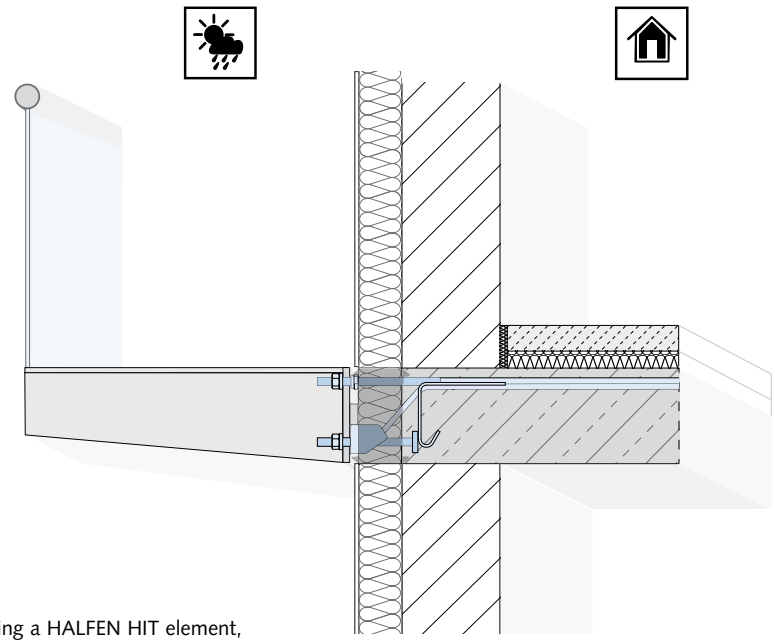


**Figure:** Cross section showing a HALFEN HIT element, connected to a (interior) concrete slab.

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Building physics

### Thermal values according to Building Authority Approval

The thermal characteristic values for equivalent thermal conductivity $\lambda_{eq}$ and equivalent thermal resistance $R_{eq}$ have been calculated based on Building Authority approval no. Z-15.7-336, for all HIT Steel to concrete connections with heights from 18 to 28 cm; see the tables on the following pages.

| HIT Type | Height [mm] | Insulation thickness [mm] | Equivalent thermal conductivity $\lambda_{eq}$ [W/(mK)] | Equivalent thermal resistance $R_{eq}$ [m²K/W] |
|---|---|---|---|---|
| **HIT-HP SDV-2M16-0208** | | | | |
| HIT-HP SDV-2M16-0208-18 | 180 | 80 | 0.314 | 0.255 |
| HIT-HP SDV-2M16-0208-20 | 200 | 80 | 0.286 | 0.280 |
| HIT-HP SDV-2M16-0208-22 | 220 | 80 | 0.263 | 0.304 |
| HIT-HP SDV-2M16-0208-24 | 240 | 80 | 0.244 | 0.327 |
| HIT-HP SDV-2M16-0208-26 | 260 | 80 | 0.228 | 0.350 |
| HIT-HP SDV-2M16-0208-28 | 280 | 80 | 0.215 | 0.373 |
| **HIT-HP SDV-2M16-0210** | | | | |
| HIT-HP SDV-2M16-0210-18 | 180 | 80 | 0.333 | 0.240 |
| HIT-HP SDV-2M16-0210-20 | 200 | 80 | 0.304 | 0.263 |
| HIT-HP SDV-2M16-0210-22 | 220 | 80 | 0.279 | 0.286 |
| HIT-HP SDV-2M16-0210-24 | 240 | 80 | 0.259 | 0.309 |
| HIT-HP SDV-2M16-0210-26 | 260 | 80 | 0.242 | 0.331 |
| HIT-HP SDV-2M16-0210-28 | 280 | 80 | 0.227 | 0.352 |
| **HIT-HP SDV-2M22-0208** | | | | |
| HIT-HP SDV-2M22-0208-18 | 180 | 80 | 0.531 | 0.151 |
| HIT-HP SDV-2M22-0208-20 | 200 | 80 | 0.482 | 0.166 |
| HIT-HP SDV-2M22-0208-22 | 220 | 80 | 0.441 | 0.181 |
| HIT-HP SDV-2M22-0208-24 | 240 | 80 | 0.407 | 0.196 |
| HIT-HP SDV-2M22-0208-26 | 260 | 80 | 0.379 | 0.211 |
| HIT-HP SDV-2M22-0208-28 | 280 | 80 | 0.354 | 0.226 |
| **HIT-HP SDV-2M22-0210** | | | | |
| HIT-HP SDV-2M22-0210-18 | 180 | 80 | 0.551 | 0.145 |
| HIT-HP SDV-2M22-0210-20 | 200 | 80 | 0.499 | 0.160 |
| HIT-HP SDV-2M22-0210-22 | 220 | 80 | 0.457 | 0.175 |
| HIT-HP SDV-2M22-0210-24 | 240 | 80 | 0.422 | 0.190 |
| HIT-HP SDV-2M22-0210-26 | 260 | 80 | 0.392 | 0.204 |
| HIT-HP SDV-2M22-0210-28 | 280 | 80 | 0.367 | 0.218 |
| **HIT-HP SDV-2M22-0212** | | | | |
| HIT-HP SDV-2M22-0212-18 | 180 | 80 | 0.575 | 0.139 |
| HIT-HP SDV-2M22-0212-20 | 200 | 80 | 0.521 | 0.154 |
| HIT-HP SDV-2M22-0212-22 | 220 | 80 | 0.477 | 0.168 |
| HIT-HP SDV-2M22-0212-24 | 240 | 80 | 0.440 | 0.182 |
| HIT-HP SDV-2M22-0212-26 | 260 | 80 | 0.409 | 0.196 |
| HIT-HP SDV-2M22-0212-28 | 280 | 80 | 0.382 | 0.209 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Building physics

### Thermal values according to Building Authority Approval

| HIT Type | Height [mm] | Insulation thickness [mm] | Equivalent thermal conductivity $\lambda_{eq}$ [W/(mK)] | Equivalent thermal resistance $R_{eq}$ [m²K/W] |
|---|---|---|---|---|
| **HIT-HP SMV-2M16-0208** | | | | |
| HIT-HP SMV-2M16-0208-18 | 180 | 80 | 0.314 | 0.255 |
| HIT-HP SMV-2M16-0208-20 | 200 | 80 | 0.286 | 0.280 |
| HIT-HP SMV-2M16-0208-22 | 220 | 80 | 0.263 | 0.304 |
| HIT-HP SMV-2M16-0208-24 | 240 | 80 | 0.244 | 0.327 |
| HIT-HP SMV-2M16-0208-26 | 260 | 80 | 0.228 | 0.350 |
| HIT-HP SMV-2M16-0208-28 | 280 | 80 | 0.215 | 0.373 |
| **HIT-HP SMV-2M16-0210** | | | | |
| HIT-HP SMV-2M16-0210-18 | 180 | 80 | 0.333 | 0.240 |
| HIT-HP SMV-2M16-0210-20 | 200 | 80 | 0.304 | 0.263 |
| HIT-HP SMV-2M16-0210-22 | 220 | 80 | 0.279 | 0.286 |
| HIT-HP SMV-2M16-0210-24 | 240 | 80 | 0.259 | 0.309 |
| HIT-HP SMV-2M16-0210-26 | 260 | 80 | 0.242 | 0.331 |
| HIT-HP SMV-2M16-0210-28 | 280 | 80 | 0.227 | 0.352 |
| **HIT-HP SZV-0208** | | | | |
| HIT-HP SZV-0208-18 | 180 | 80 | 0.202 | 0.396 |
| HIT-HP SZV-0208-20 | 200 | 80 | 0.186 | 0.431 |
| HIT-HP SZV-0208-22 | 220 | 80 | 0.172 | 0.465 |
| HIT-HP SZV-0208-24 | 240 | 80 | 0.161 | 0.497 |
| HIT-HP SZV-0208-26 | 260 | 80 | 0.151 | 0.528 |
| HIT-HP SZV-0208-28 | 280 | 80 | 0.143 | 0.558 |
| **HIT-HP SZV-0210** | | | | |
| HIT-HP SZV-0210-18 | 180 | 80 | 0.222 | 0.360 |
| HIT-HP SZV-0210-20 | 200 | 80 | 0.204 | 0.393 |
| HIT-HP SZV-0210-22 | 220 | 80 | 0.189 | 0.424 |
| HIT-HP SZV-0210-24 | 240 | 80 | 0.176 | 0.455 |
| HIT-HP SZV-0210-26 | 260 | 80 | 0.165 | 0.484 |
| HIT-HP SZV-0210-28 | 280 | 80 | 0.156 | 0.512 |
| **HIT-HP SZV-0212** | | | | |
| HIT-HP SZV-0212-18 | 180 | 80 | 0.247 | 0.324 |
| HIT-HP SZV-0212-20 | 200 | 80 | 0.226 | 0.354 |
| HIT-HP SZV-0212-22 | 220 | 80 | 0.209 | 0.383 |
| HIT-HP SZV-0212-24 | 240 | 80 | 0.194 | 0.411 |
| HIT-HP SZV-0212-26 | 260 | 80 | 0.182 | 0.439 |
| HIT-HP SZV-0212-28 | 280 | 80 | 0.172 | 0.465 |

## Thermal values according to Building Authority Approval

| HIT Type | Height [mm] | Insulation thickness [mm] | Equivalent thermal conductivity $\lambda_{eq}$ [W/(mK)] | Equivalent thermal resistance $R_{eq}$ [m²K/W] |
|---|---|---|---|---|
| **HIT-SP SDV-2M16-0208** | | | | |
| HIT-SP SDV-2M16-0208-18 | 180 | 120 | 0.314 | 0.382 |
| HIT-SP SDV-2M16-0208-20 | 200 | 120 | 0.286 | 0.420 |
| HIT-SP SDV-2M16-0208-22 | 220 | 120 | 0.263 | 0.456 |
| HIT-SP SDV-2M16-0208-24 | 240 | 120 | 0.244 | 0.491 |
| HIT-SP SDV-2M16-0208-26 | 260 | 120 | 0.228 | 0.525 |
| HIT-SP SDV-2M16-0208-28 | 280 | 120 | 0.215 | 0.559 |
| **HIT-SP SDV-2M16-0210** | | | | |
| HIT-SP SDV-2M16-0210-18 | 180 | 120 | 0.333 | 0.360 |
| HIT-SP SDV-2M16-0210-20 | 200 | 120 | 0.304 | 0.395 |
| HIT-SP SDV-2M16-0210-22 | 220 | 120 | 0.279 | 0.430 |
| HIT-SP SDV-2M16-0210-24 | 240 | 120 | 0.259 | 0.463 |
| HIT-SP SDV-2M16-0210-26 | 260 | 120 | 0.242 | 0.496 |
| HIT-SP SDV-2M16-0210-28 | 280 | 120 | 0.227 | 0.528 |
| **HIT-SP SDV-2M22-0208** | | | | |
| HIT-SP SDV-2M22-0208-18 | 180 | 120 | 0.531 | 0.226 |
| HIT-SP SDV-2M22-0208-20 | 200 | 120 | 0.482 | 0.249 |
| HIT-SP SDV-2M22-0208-22 | 220 | 120 | 0.441 | 0.272 |
| HIT-SP SDV-2M22-0208-24 | 240 | 120 | 0.407 | 0.295 |
| HIT-SP SDV-2M22-0208-26 | 260 | 120 | 0.379 | 0.317 |
| HIT-SP SDV-2M22-0208-28 | 280 | 120 | 0.354 | 0.339 |
| **HIT-SP SDV-2M22-0210** | | | | |
| HIT-SP SDV-2M22-0210-18 | 180 | 120 | 0.551 | 0.218 |
| HIT-SP SDV-2M22-0210-20 | 200 | 120 | 0.499 | 0.240 |
| HIT-SP SDV-2M22-0210-22 | 220 | 120 | 0.457 | 0.262 |
| HIT-SP SDV-2M22-0210-24 | 240 | 120 | 0.422 | 0.284 |
| HIT-SP SDV-2M22-0210-26 | 260 | 120 | 0.392 | 0.306 |
| HIT-SP SDV-2M22-0210-28 | 280 | 120 | 0.367 | 0.327 |
| **HIT-SP SDV-2M22-0212** | | | | |
| HIT-SP SDV-2M22-0212-18 | 180 | 120 | 0.575 | 0.209 |
| HIT-SP SDV-2M22-0212-20 | 200 | 120 | 0.521 | 0.230 |
| HIT-SP SDV-2M22-0212-22 | 220 | 120 | 0.477 | 0.252 |
| HIT-SP SDV-2M22-0212-24 | 240 | 120 | 0.440 | 0.273 |
| HIT-SP SDV-2M22-0212-26 | 260 | 120 | 0.409 | 0.293 |
| HIT-SP SDV-2M22-0212-28 | 280 | 120 | 0.382 | 0.314 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Building physics

### Thermal values according to Building Authority Approval

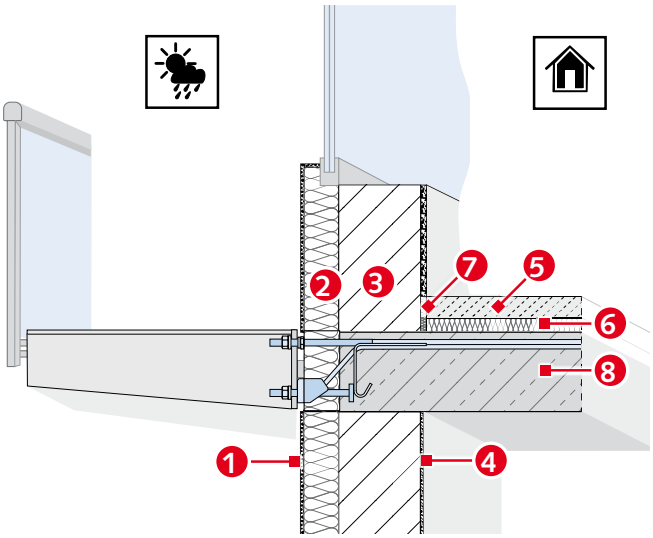
| HIT Type | Height [mm] | Insulation thickness [mm] | Equivalent thermal conductivity $\lambda_{eq}$ [W/(mK)] | Equivalent thermal resistance $R_{eq}$ [m²K/W] |
|---|---|---|---|---|
| **HIT-SP SMV-2M16-0208** | | | | |
| HIT-SP SMV-2M16-0208-18 | 180 | 120 | 0.314 | 0.382 |
| HIT-SP SMV-2M16-0208-20 | 200 | 120 | 0.286 | 0.420 |
| HIT-SP SMV-2M16-0208-22 | 220 | 120 | 0.263 | 0.456 |
| HIT-SP SMV-2M16-0208-24 | 240 | 120 | 0.244 | 0.491 |
| HIT-SP SMV-2M16-0208-26 | 260 | 120 | 0.228 | 0.525 |
| HIT-SP SMV-2M16-0208-28 | 280 | 120 | 0.215 | 0.559 |
| **HIT-SP SMV-2M16-0210** | | | | |
| HIT-SP SMV-2M16-0210-18 | 180 | 120 | 0.333 | 0.360 |
| HIT-SP SMV-2M16-0210-20 | 200 | 120 | 0.304 | 0.395 |
| HIT-SP SMV-2M16-0210-22 | 220 | 120 | 0.279 | 0.430 |
| HIT-SP SMV-2M16-0210-24 | 240 | 120 | 0.259 | 0.463 |
| HIT-SP SMV-2M16-0210-26 | 260 | 120 | 0.242 | 0.496 |
| HIT-SP SMV-2M16-0210-28 | 280 | 120 | 0.227 | 0.528 |
| **HIT-SP SZV-0208** | | | | |
| HIT-SP SZV-0208-18 | 180 | 120 | 0.202 | 0.594 |
| HIT-SP SZV-0208-20 | 200 | 120 | 0.186 | 0.647 |
| HIT-SP SZV-0208-22 | 220 | 120 | 0.172 | 0.697 |
| HIT-SP SZV-0208-24 | 240 | 120 | 0.161 | 0.746 |
| HIT-SP SZV-0208-26 | 260 | 120 | 0.151 | 0.793 |
| HIT-SP SZV-0208-28 | 280 | 120 | 0.143 | 0.838 |
| **HIT-SP SZV-0210** | | | | |
| HIT-SP SZV-0210-18 | 180 | 120 | 0.222 | 0.540 |
| HIT-SP SZV-0210-20 | 200 | 120 | 0.204 | 0.589 |
| HIT-SP SZV-0210-22 | 220 | 120 | 0.189 | 0.636 |
| HIT-SP SZV-0210-24 | 240 | 120 | 0.176 | 0.682 |
| HIT-SP SZV-0210-26 | 260 | 120 | 0.165 | 0.726 |
| HIT-SP SZV-0210-28 | 280 | 120 | 0.156 | 0.768 |
| **HIT-SP SZV-0212** | | | | |
| HIT-SP SZV-0212-18 | 180 | 120 | 0.247 | 0.486 |
| HIT-SP SZV-0212-20 | 200 | 120 | 0.226 | 0.531 |
| HIT-SP SZV-0212-22 | 220 | 120 | 0.209 | 0.575 |
| HIT-SP SZV-0212-24 | 240 | 120 | 0.194 | 0.617 |
| HIT-SP SZV-0212-26 | 260 | 120 | 0.182 | 0.658 |
| HIT-SP SZV-0212-28 | 280 | 120 | 0.172 | 0.698 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Building physics

### Thermal bridge characteristic values for HIT-HP and wall masonry with ETICS*

The thermal bridge coefficients for the local heat transfer coefficients $\chi$ and the minimum surface temperature $\Theta_{si}$ as well as the temperature factor $f_{RSi}$ have been calculated for a wall construction using ETICS* and are available in the table.

*ETICS External Thermal Insulation Composite System.




**Wall detail**
Masonry with ETICS external thermal insulation composite system

**Section details**

| Wall details | Floor details |
|---|---|
| **1** plaster (exterior) | **5** screed |
| **2** insulation | **6** footfall insulation |
| **3** load bearing wall | **7** edge insulation strips |
| **4** plaster (interior) | **8** floor slab |

$U_{uninterrupted}$ = **0,193 W/(m²K)**

| HIT Type | Height [mm] | Insulation thickness [mm] | $\lambda_{eq}$ [W/(mK)] | $R_{eq}$ [m²K/W] | min. $\theta_{si}$ [°C] | $f_{R,Si}$ [-] | $\chi$ [W/K] |
|---|---|---|---|---|---|---|---|
| **HIT-HP SDV-2M16-0208** | | | | | | | |
| HIT-HP SDV-2M16-0208-20 | 200 | 80 | 0.286 | 0.280 | 18.710 | 0.948 | 0.115 |
| HIT-HP SDV-2M16-0208-28 | 280 | 80 | 0.215 | 0.373 | 18.760 | 0.950 | 0.123 |
| **HIT-HP SDV-2M16-0210** | | | | | | | |
| HIT-HP SDV-2M16-0210-20 | 200 | 80 | 0.304 | 0.263 | 18.680 | 0.947 | 0.121 |
| HIT-HP SDV-2M16-0210-28 | 280 | 80 | 0.227 | 0.352 | 18.730 | 0.949 | 0.128 |
| **HIT-HP SDV-2M22-0210** | | | | | | | |
| HIT-HP SDV-2M22-0210-20 | 200 | 80 | 0.499 | 0.160 | 18.400 | 0.936 | 0.168 |
| HIT-HP SDV-2M22-0210-28 | 280 | 80 | 0.367 | 0.218 | 18.470 | 0.939 | 0.179 |
| **HIT-HP SDV-2M22-0212** | | | | | | | |
| HIT-HP SDV-2M22-0212-20 | 200 | 80 | 0.521 | 0.154 | 18.360 | 0.934 | 0.175 |
| HIT-HP SDV-2M22-0212-28 | 280 | 80 | 0.382 | 0.209 | 18.440 | 0.938 | 0.183 |

# HALFEN HIT STEEL TO CONCRETE CONNECTOR
## Building physics

### Thermal bridge characteristic values for HIT-HP and wall masonry with ETICS

| HIT Type | Height [mm] | Insulation thickness [mm] | $\lambda_{eq}$ [W/(mK)] | $R_{eq}$ [m²K/W] | min. $\theta_{si}$ [°C] | $f_{R,Si}$ [-] | $\chi$ [W/K] |
|---|---|---|---|---|---|---|---|
| **HIT-HP SMV-2M16-0208** | | | | | | | |
| HIT-HP SMV-2M16-0208-20 | 200 | 80 | 0.286 | 0.280 | 18.710 | 0.948 | 0.115 |
| HIT-HP SMV-2M16-0208-28 | 280 | 80 | 0.215 | 0.373 | 18.760 | 0.950 | 0.123 |
| **HIT-HP SMV-2M16-0210** | | | | | | | |
| HIT-HP SMV-2M16-0210-20 | 200 | 80 | 0.304 | 0.263 | 18.680 | 0.947 | 0.121 |
| HIT-HP SMV-2M16-0210-28 | 280 | 80 | 0.227 | 0.352 | 18.730 | 0.949 | 0.128 |
| **HIT-HP SZV-0208** | | | | | | | |
| HIT-HP SZV-0208-20 | 200 | 80 | 0.186 | 0.431 | 18.920 | 0.957 | 0.083 |
| HIT-HP SZV-0208-28 | 280 | 80 | 0.143 | 0.558 | 18.930 | 0.957 | 0.090 |
| **HIT-HP SZV-0210** | | | | | | | |
| HIT-HP SZV-0210-20 | 200 | 80 | 0.204 | 0.393 | 18.880 | 0.955 | 0.089 |
| HIT-HP SZV-0210-28 | 280 | 80 | 0.156 | 0.512 | 18.900 | 0.956 | 0.096 |
| **HIT-HP SZV-0212** | | | | | | | |
| HIT-HP SZV-0212-20 | 200 | 80 | 0.226 | 0.354 | 18.840 | 0.954 | 0.095 |
| HIT-HP SZV-0212-28 | 280 | 80 | 0.172 | 0.465 | 18.870 | 0.955 | 0.103 |

## Thermal bridge characteristic values for HIT-SP and wall masonry with ETICS

| HIT Type | Height [mm] | Insulation thickness [mm] | $\lambda_{eq}$ [W/(mK)] | $R_{eq}$ [m²K/W] | min. $\theta_{si}$ [°C] | $f_{R,Si}$ [-] | $\chi$ [W/K] |
|---|---|---|---|---|---|---|---|
| **HIT-SP SDV-2M16-0208** | | | | | | | |
| HIT-SP SDV-2M16-0208-20 | 200 | 120 | 0.286 | 0.420 | 18.910 | 0.956 | 0.806 |
| HIT-SP SDV-2M16-0208-28 | 280 | 120 | 0.215 | 0.559 | 18.950 | 0.958 | 0.084 |
| **HIT-SP SDV-2M16-0210** | | | | | | | |
| HIT-SP SDV-2M16-0210-20 | 200 | 120 | 0.304 | 0.395 | 18.890 | 0.956 | 0.085 |
| HIT-SP SDV-2M16-0210-28 | 280 | 120 | 0.227 | 0.528 | 18.930 | 0.957 | 0.088 |
| **HIT-SP SDV-2M22-0210** | | | | | | | |
| HIT-SP SDV-2M22-0210-20 | 200 | 120 | 0.499 | 0.240 | 18.640 | 0.946 | 0.126 |
| HIT-SP SDV-2M22-0210-28 | 280 | 120 | 0.367 | 0.327 | 18.710 | 0.948 | 0.131 |
| **HIT-SP SDV-2M22-0212** | | | | | | | |
| HIT-SP SDV-2M22-0212-20 | 200 | 120 | 0.521 | 0.230 | 18.620 | 0.945 | 0.130 |
| HIT-SP SDV-2M22-0212-28 | 280 | 120 | 0.382 | 0.314 | 18.680 | 0.947 | 0.135 |
| **HIT-SP SMV-2M16-0208** | | | | | | | |
| HIT-SP SMV-2M16-0208-20 | 200 | 120 | 0.286 | 0.420 | 18.910 | 0.956 | 0.806 |
| HIT-SP SMV-2M16-0208-28 | 280 | 120 | 0.215 | 0.559 | 18.950 | 0.958 | 0.084 |
| **HIT-SP SMV-2M16-0210** | | | | | | | |
| HIT-SP SMV-2M16-0210-20 | 200 | 120 | 0.304 | 0.395 | 18.890 | 0.956 | 0.085 |
| HIT-SP SMV-2M16-0210-28 | 280 | 120 | 0.227 | 0.528 | 18.930 | 0.957 | 0.088 |
| **HIT-SP SZV-0208** | | | | | | | |
| HIT-SP SZV-0208-20 | 200 | 120 | 0.186 | 0.647 | 19.070 | 0.963 | 0.055 |
| HIT-SP SZV-0208-28 | 280 | 120 | 0.143 | 0.838 | 19.090 | 0.964 | 0.058 |
| **HIT-SP SZV-0210** | | | | | | | |
| HIT-SP SZV-0210-20 | 200 | 120 | 0.204 | 0.589 | 19.050 | 0.962 | 0.059 |
| HIT-SP SZV-0210-28 | 280 | 120 | 0.156 | 0.768 | 19.060 | 0.962 | 0.063 |
| **HIT-SP SZV-0212** | | | | | | | |
| HIT-SP SZV-0212-20 | 200 | 120 | 0.226 | 0.531 | 19.010 | 0.960 | 0.065 |
| HIT-SP SZV-0212-28 | 280 | 120 | 0.172 | 0.698 | 19.030 | 0.961 | 0.069 |

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