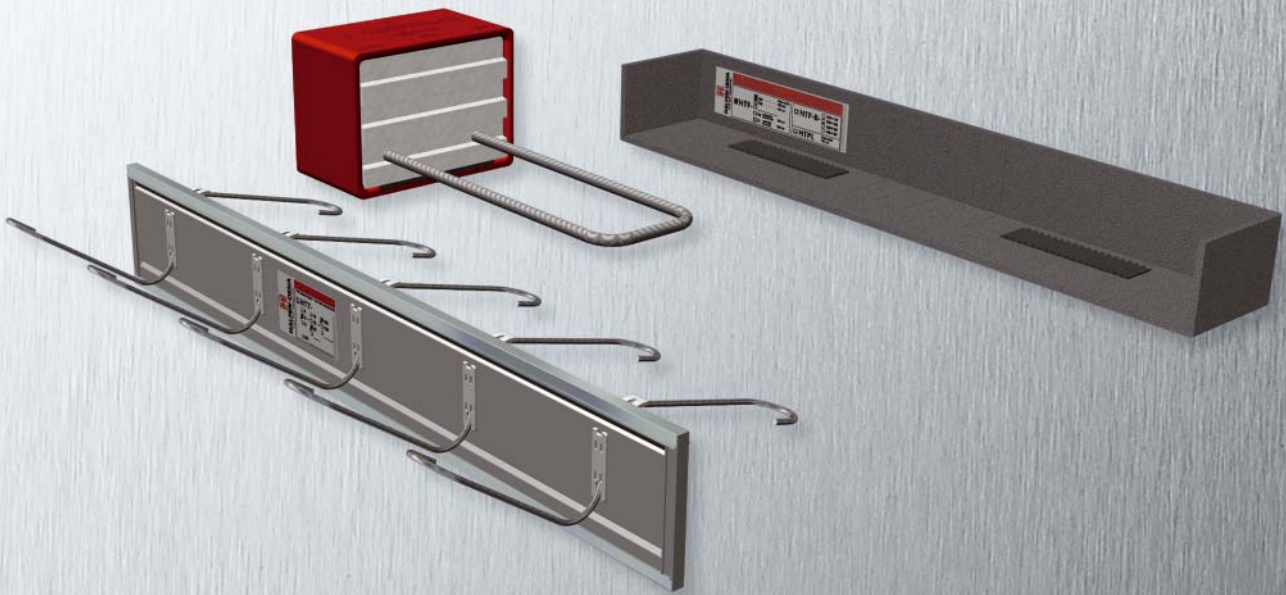


# HALFEN IMPACT SOUND INSULATION

## TECHNICAL PRODUCT INFORMATION



*HALFEN SOUND INSULATION PRODUCTS*

ISI 09-E

CONCRETE



**HALFEN**  
YOUR BEST CONNECTIONS

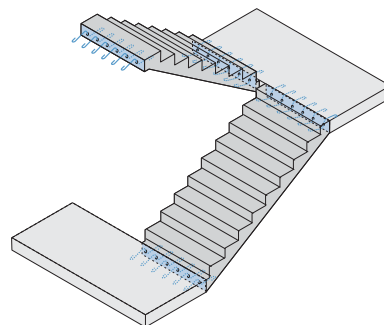
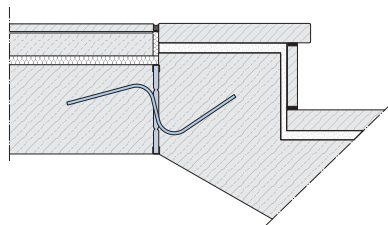
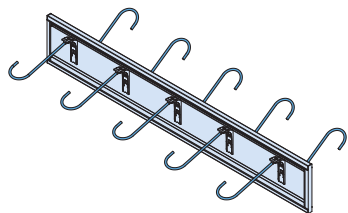
# HALFEN IMPACT SOUND INSULATION

## Product overview

**HTT** impact sound insulation unit for assembling between in-situ concrete- or prefabricated staircase, and in-situ concrete staircase landings (p. 6-7)

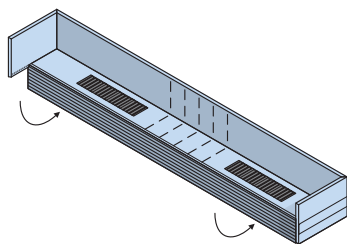
Typical detail I

Example for application

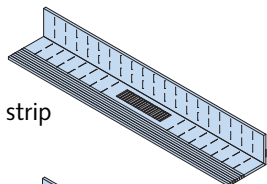


Type tested

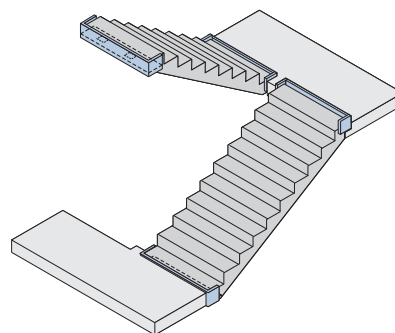
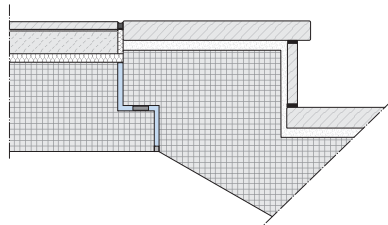
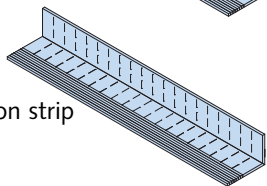
**HTF** impact sound insulation for assembling between prefabricated stairs and staircase landings (p. 8-10)



HTF-LS bearing strip

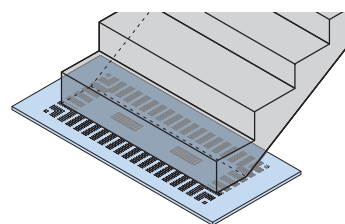
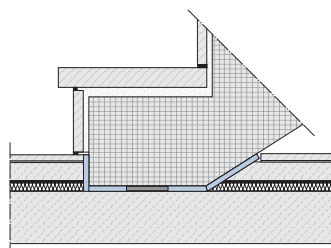
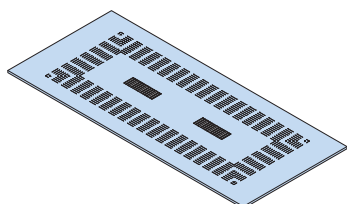


HTF-DS insulation strip



Agreement certificate

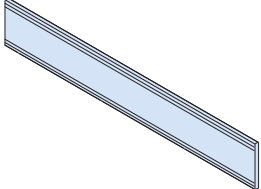
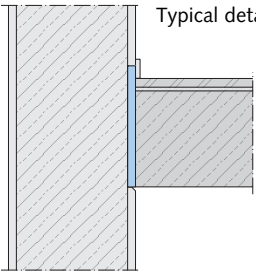
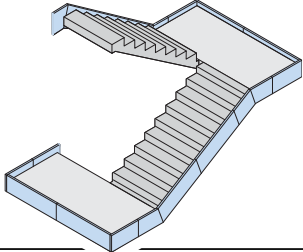
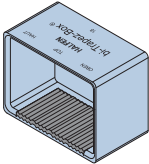
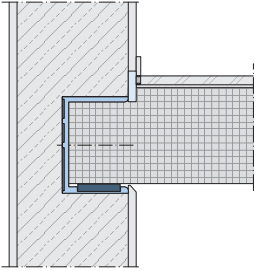
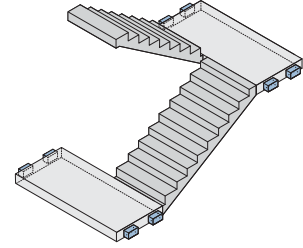
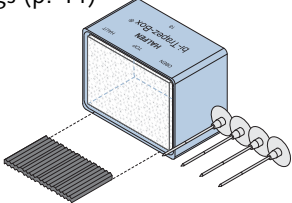
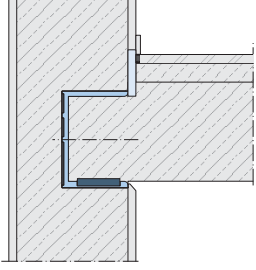
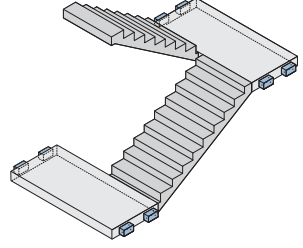
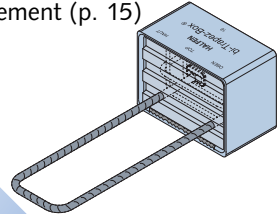
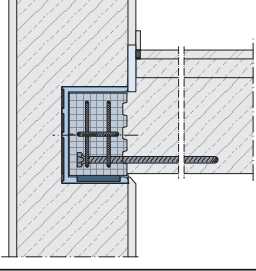
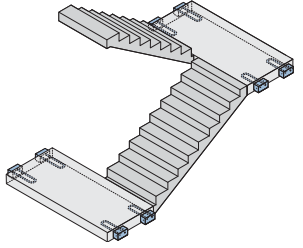
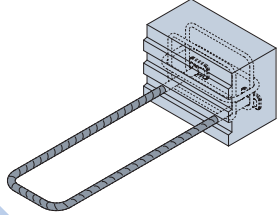
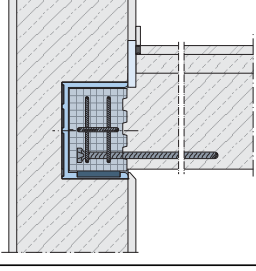
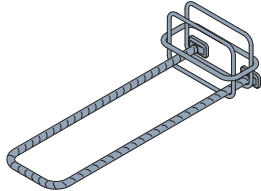
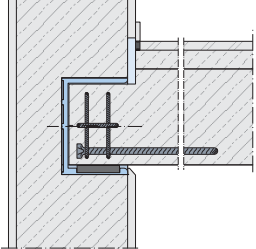
**HTF-B** impact sound insulation unit for assembling between precast staircases and floor slabs (p. 11)



Agreement certificate

# HALFEN IMPACT SOUND INSULATION

## Product overview

<p><b>HTPL</b> perimeter joint insulation (p. 12)</p> 	<p>Typical detail</p> 	<p>Example for application</p> 
<p><b>HBB-F</b> bi-trapez box® for precast landings (p. 13)</p>  <p>Agreement certificate</p>		
<p><b>HBB-O</b> bi-trapez box® for in-situ concrete landings (p. 14)</p>  <p>Agreement certificate</p>		
<p><b>HBB-T</b> bi-trapez box® for in-situ concrete landings with prefabricated corbel element (p. 15)</p>  <p>Type tested</p>		
<p><b>HBB corbel element</b> (p. 15)</p>  <p>Type tested</p>		<p>The prefabricated HBB corbel element in concrete strength class C35/45 adduces full load bearing capacity even if the concrete strength class of the landing is C20/25.</p> <p>For this application a type test report is available.</p>
<p><b>HBB reinforcement cage</b> (p. 15)</p>  <p>Type tested</p>		<p>The HBB reinforcement cage is a fast and rational solution for in-situ fabrication of corbels. It obviates time-consuming and complicated reinforcement work in the constricted corbel formwork.</p> <p>For this application a type test report is available.</p>

## HALFEN IMPACT SOUND INSULATION

---

### Table of contents

	page
Product overview	2 - 3
Relating physics – Impact sound insulation at staircases	5
Proof methods, measurement methods	
Impact sound insulation corresponding to bearing compression	
HTT impact sound insulation unit for in-situ staircases	6 - 7
Product features	
Regulations for reinforcing	
HTF impact sound insulation unit for prefabricated staircases	8 - 10
Product features	
Installation references	
HTF-B impact sound insulation unit for precast staircases onto floor slabs	11
Product features	
Installation references	
HTPL-100 perimeter joint insulation (joint panel)	12
Product features	
Installation references	
HBB-F bi-trapez box® for precast landings	13
Product features	
Installation references	
HBB-O bi-trapez box® for in-situ concrete landings	14
Product features	
Installation references	
Prefabricated corbel elements for HBB bi-trapez box®	15
Product features	
Installation references	
Adresses	catalogue overleaf

---

# HALFEN IMPACT SOUND INSULATION

## Relating physics – Impact sound insulation at staircases

### HALFEN cares for silence

Impact sound is an unpleasant and prevalent kind of sound transmission. Particularly in multifamily housing stairwells insufficient impact sound insulation causes inconvenient disturbances. Elastic supporting by top quality elastomer bearings and the assembly of the HALFEN HTPL joint panel disconnect massive type stairs silencing from the surrounding structural members. HALFEN sound insulation products are optimally suitable for requirements to the impact sound protection.

### Standards

The requirements to the impact sound protection are regulated by DIN 4109 "Sound protection in building construction" (11.89) for the standard case, and for enhanced sound protection in the associated supplementary sheet 2 (11.89). The values of this standard are not corresponding to nowadays requirements. Therefore engineer's planning work of top quality buildings often the VDI guideline 4100 "Sound protection of dwellings" (09.94) is used. The VDI guideline was withdrawn, but the included values give a general view about the actual state of the art. A revision of the DIN 4109 founding on european standard DIN EN 12354 – "Building acoustics" is current.

The table underneath gives a review of the actual requirements to sound protection in the area of staircases.

Area of agreement	DIN 4109	DIN 4109 supplementary sheet	VDI 4100
	(Minimum) requirements	Enhanced sound protection	Sound protection level III
One-family – duplex houses and one-family - rowhouses	53 dB <sup>1)</sup> (10 dB) <sup>1)</sup>	46 dB (17 dB)	39 dB (24 dB)
Multi-family housing	58 dB <sup>1)</sup> (5 dB) <sup>1)</sup>		46 dB <sup>2)</sup> (17 dB) <sup>2)</sup>
Lodging houses			-
Hospital buildings/sanatoriums			

1) The minimum requirements of DIN 4109 are not responding to nowadays requirements in sound protection. ("State of art")  
2) Prospective target: 39 dB (24 dB)

There is still no standardised mode for measurement of impact sound insulation units of staircases. The measurement regulations for other structural members (e.g. floor slabs according to DIN 4109 und DIN 52210 ) can be applied only to a limited extend. For this reason the comparability of different manufacturer indications is difficult. The impact sound insulating features of the products are usually specified by the monadic "maximum attainable impact sound improvement measure" without considering the influence of the bearing pressure.

### Verification procedure

The requirements to impact sound protection of staircases ("state of art") are defined in DIN 4109 and supplementary sheet 2 to DIN 4109. There are three capabilities for the proof of impact sound protection:

1. Analytical proof according to supplementary sheet 1 to DIN 4109 in the step of design

If staircases conform to supplementary sheet 1, the following analytical proof can be applied:

$$L'_{n,w,R} \leq \text{req } L'_{n,w} \quad (TSM_R \geq \text{req } TSM)$$

2. Proof by suitability test

If staircases do not conform to supplementary sheet 1, the proof can be provided by suitability test.

The requirements are:

$$L'_{n,w,B} \leq \text{req } L'_{n,w} \quad (TSM_B \geq \text{req } TSM)$$

3. Proof by quality test

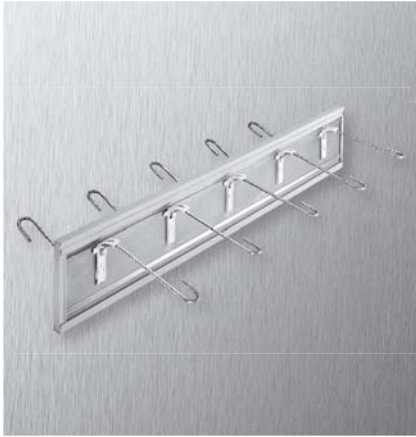
The following requirement has to be proved by measurement at the completed building:

$$L'_{n,w} \leq \text{req } L'_{n,w} \quad (TSM \geq \text{req } TSM)$$

# HALFEN IMPACT SOUND INSULATION

HALFEN HTT impact sound insulation unit for assembling between in-situ concrete or prefabricated staircases, and in-situ concrete staircase landings

## Product features



- Staircase landing: in-situ concrete or primary product
- Staircase: in-situ concrete or prefabricated
- Acoustic verified: difference in impact sound pressure level  $\Delta L = 12$  dB according to inquiry report 2027/7205-1-Re, IBMB Braunschweig
- Fire protection proof: F90/F120 according to report 3660/5554, IBMB Braunschweig
- Type tested: S-WUE 040519, LGA Würzburg
- Availability: three load increments for staircase width 90 up to 200 cm and landing thickness from 16 to 25 cm
- Materials: galvanised steel sheet, mineral fibre insulating material, non-reinforced elastomer bearings with general constructional authority approval, BST 500 NR concrete steel

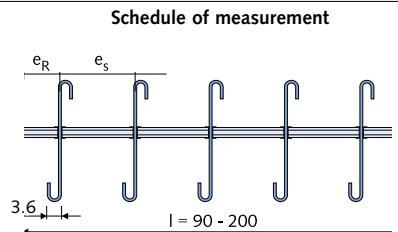
HALFEN HTT impact sound insulation units are suitable for bearing in-situ concrete- and prefabricated staircases onto in-situ concrete staircase landings with prevalent stationary loads.

The HTT units transfer lateral- and horizontal forces solely. Those can result from short term impinging loads from indirect action or impact stress, or from on schedule external loads. A static proof for the staircase and the landing has to be provided.

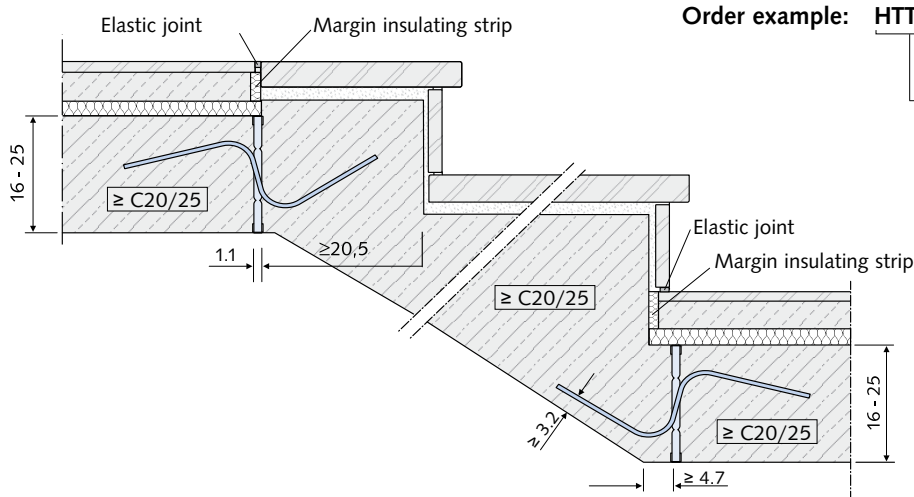
The proof of lateral load capacity is provided by on site attached additional reinforcement stirrups according to the draft on page 7. HTT enables in addition to its sound insulating features in conformity with the market, with its fire grading F90/F120 – depending on the concrete cover inside the staircase – an exceedingly high security in a case of fire.

Article no.	Height of the element h [cm]	Length of the element l [cm]	Reinforcement	Distances (approx.)		Values for structural analysis	
				Bar distance $e_s$	Edge distance $e_R$	Lateral force $V_{Rd}$ [kN/elem.]	Horizontal force $H_{Rd}$ ① [kN/elem.]
HTT-4	16 - 25	90 - 200	3 Ø 6	l/3	l/6	35.9	± 3.1
HTT-6			5 Ø 6	l/5	l/10	59.9	± 4.2
HTT-8			6 Ø 6	l/6	l/12	71.8	± 4.3

① max. acceptance of horizontal force lengthwise the staircase (valid at full lateral force stress) (Type test report)



Standard lengths l = 100 / 120 cm  
Custom lengths l = 90 - 200 cm



Order example: **HTT-6 - 18 - 100**

- Length of the element (width of staircase)
- Height of the landing
- Product designation/load increment

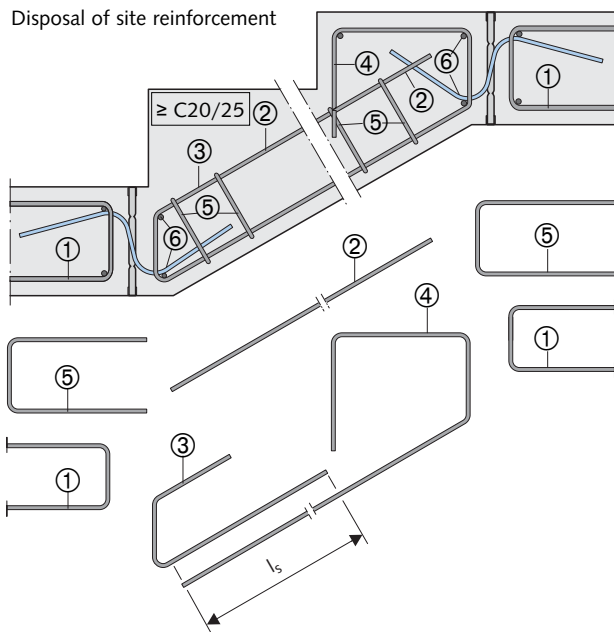
Fig. left:  
Disposal of the HTT sound insulation units (install HTPL insulating panels circumferential, see assembly instructions (p. 7))

# HALFEN IMPACT SOUND INSULATION

HALFEN HTT impact sound insulation unit for assembling between in-situ concrete or prefabricated staircases, and in-situ concrete staircase landings

## Regulations for reinforcing

Disposal of site reinforcement



### Additional reinforcement

(to be analysed by the structural engineer according to type test report):

- ① End stirrups or mesh reinforcement
- ② Top reinforcement layer
- ③ End stirrup, bent up as hang-up reinforcement
- ④ Bottom reinforcement layer, bent up as hang-up reinforcement
- ⑤ End stirrups, 2x diam. 6 each
- ⑥ Bar reinforcement diam. 8 (HTT-4, -6) diam. 10 (HTT-8)

Annotations:

- item 1-4 to be calculated by static requirements
- moments resulting from excentrical connection have to be considered in analysing the staircases

## Installation references

Application with in-situ concrete staircase and in-situ concrete landing

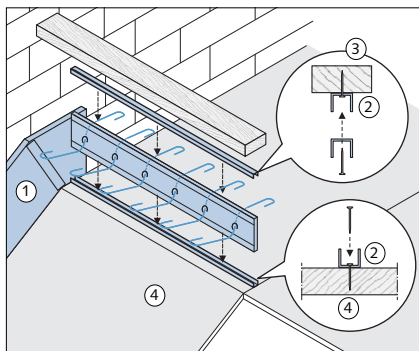


Fig. 2 Assembling at in-situ construction method

### Assembling on site:

- HTPL joint sheets ① to be attached on the side wall, following the stairway, using the integrated self-adhesive tape. The joints must be cleaned and carried out without lack. Afterwards they have to be closed with adhesive tape
- Bottom HTT nailing bar ② to be fixed to the formwork at the exact place
- Insert HTT element
- Top HTT nailing bar ② to be attached using a fixing structure (e.g. timber batten ③) and placed on the HTT impact sound insulation unit from the top

The HTT element must be aligned and fixed vertically at the appropriate position.

Application with prefabricated staircase and in-situ concrete- or primary product landing

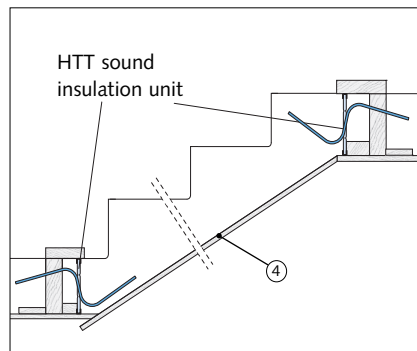


Fig. 3 Shuttering in the pre-cast plant

### Assembling at the precast plant:

- Shuttering according to figure 3
- Fix the HTT element with the accompanying nailing bars as shown in figure 2
- The HTT element must be aligned and fixed vertically at the appropriate position

- ① HALFEN HTPL joint panel
- ② Nailing bar supplied with the product
- ③ Fixing structure
- ④ On site formwork

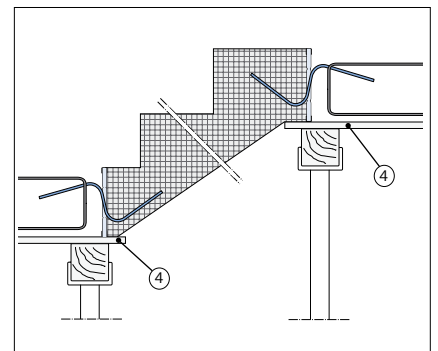


Fig. 4 Assembling the prefabricated staircase on site

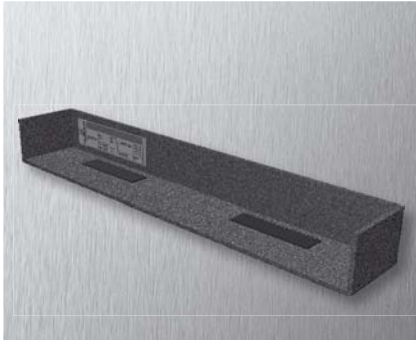
### Assembling the prefabricated staircase on site:

- Installation according to fig. 4
- The use of in-situ concrete and primary product landings is possible
- Attach HALFEN HTPL joint sheets into the meetings of staircase and staircase wall

# HALFEN IMPACT SOUND INSULATION

## HTF impact sound insulation unit for prefabricated staircases

### Product features



- Staircase landing: in-situ concrete or prefabricated
- Staircase: prefabricated
- Availability: width 100 cm and 120 cm (stairflight width)
- Accessories: HTF insulation- or bearing strip for on site width adaption

### bi-trapez bearing®

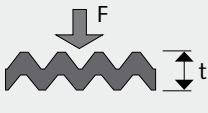


- Agreement certificate: general constructional authority approval P-849.0554/1, MPA Hannover
- Sound protection: impact sound improvement measure: max. 23 dB
- Acoustic verified: report 2029/1054, IBMB Braunschweig
- Fire protection: building material class 2 according to DIN 4102

At the planning work of sound insulation attention should be paid to the fact, that sound insulating properties depend essentially to compressive stress in the bearing.

For this reason HALFEN implements high quality bi-trapez bearings® made of fatigue elastic ethylene propylene diene M-class rubber EPDM for the HALFEN HTF impact sound insulation units. These bearings have excellent sound insulating properties in a wide range of bearing pressures instead of a high peak with one particular bearing pressure level.

The adjacent chart shows the applied bearing insulation properties. To facilitate the maximum sound protection for your building project HALFEN specifies in addition to the admissible compression stress but also the compression stress for optimal exploitation of the impact sound insulation. Consideration has to be shown to the payloads in the area of staircases. According to DIN 1055-3 the payload values have to be assumed with 3.0 resp. 5.0 kN/m<sup>2</sup> (depending on occupancy). In reality these high values are rather the exceptional case. HALFEN recommends to consider a distinct lower value (0.5 to 1.0 kN/m<sup>2</sup>) for the payload, as the common load values are in this range.

Bearing thickness t [mm]		10	15	20
Admissible average compression stress req $\sigma$ [N/mm <sup>2</sup> ]		10.00	7.00	5.00

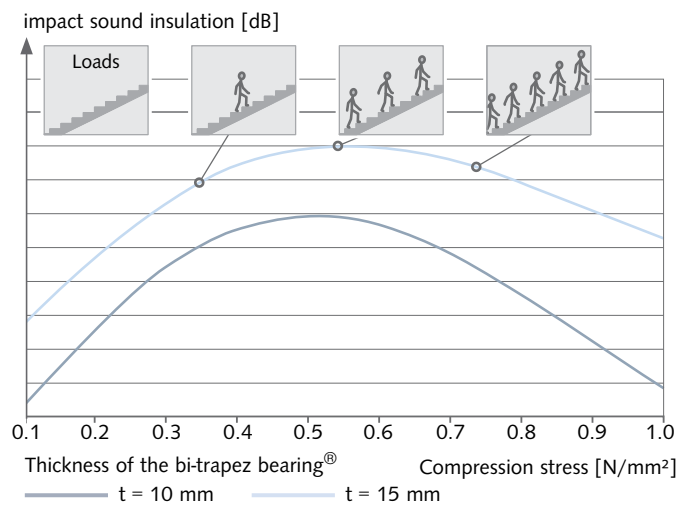


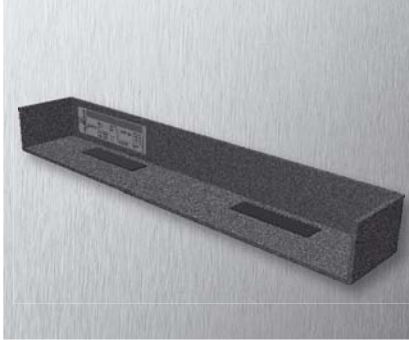
Chart: insulating properties of the bi-trapez bearings®



# HALFEN IMPACT SOUND INSULATION

## HTF impact sound insulation unit for prefabricated staircases

### Product features



- Maximum load:  $V_{Ed} = 200 \text{ kN}$  (+100 kN per additional bearing)
- Recommended load for optimal sound insulation:  $V_{Ed} = 10 \text{ kN}$  (+5 kN per additional bearing)
- Bearing: bi-trapez bearing® 200 x 50 x 10 mm (details on page 8)
- Materials: plastic foam building material class B2 according to DIN 4102

HALFEN HTF impact sound insulation units have been developed for supporting prefabricated staircases on in-situ prepared bearings of staircase landings. They transfer solely lateral forces. The statics proof has to be provided within the structural analysis of the building. The bi-trapez bearings® are assigned to building material class B2 according to DIN 4102.

Designation	Article no.	For staircase width[cm]	Thickness $t = 10 \text{ mm}$ for all elements HTF, -DS, -LS	Dimensions [mm]
HTF - 100	0972.010-00001	70-100	 Prefabricated insulating element	
HTF - 120	0972.010-00002	101-120		
HTF - DS - 100	0972.020-00001	$\geq 120$	 Insulating strip	
HTF - LS - 100	0972.020-00002	$\geq 120$	 Bearing strip	

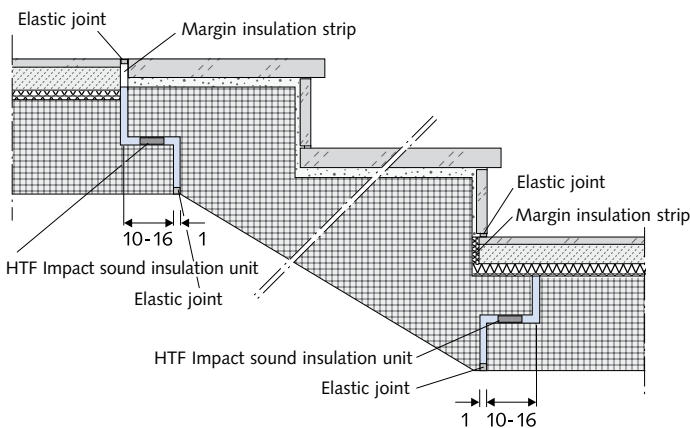


Fig. left:  
Disposal of the HTT sound insulation units (install HTPL insulating panels all around, see assembling instructions p. 7)

# HALFEN IMPACT SOUND INSULATION

## HTF impact sound insulation unit for prefabricated staircases

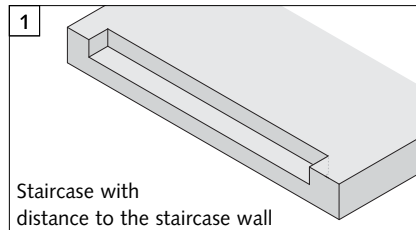
### Assembling instructions

#### Design of bearings (fig. 1-4)

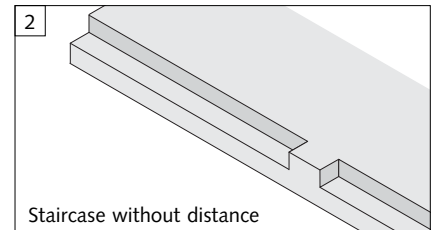
Landing bearings can be constructed as shown in fig. 1 or fig. 2.

Fig. 3 shows the disposal of the HTF impact sound insulation unit. The self adhesive tape on the reverse is fixing the insulation element to the landing during assembly.

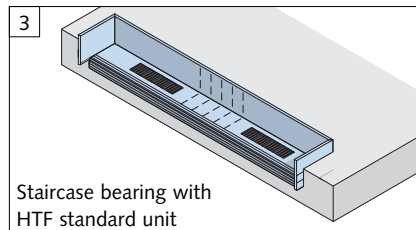
Landing bearings as shown in fig. 2 require additional installation of the HTPL perimeter joint insulation panel (p. 12).



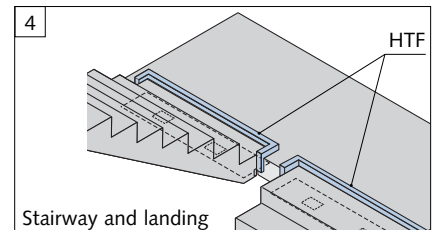
1 Staircase with distance to the staircase wall



2 Staircase without distance



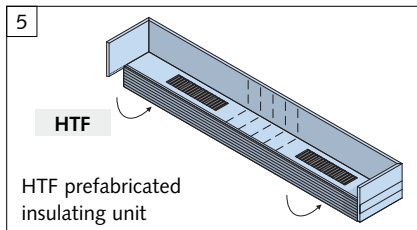
3 Staircase bearing with HTF standard unit



4 Stairway and landing

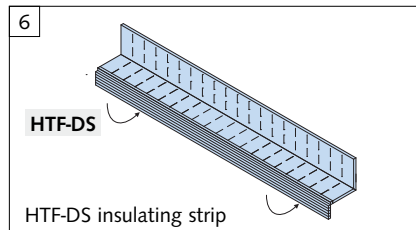
#### Adjustment to the bearing depth (fig. 5-7)

The adjustment of the bearing depth can be set easily by folding the element at the factory made perforated curves. A remaining excess length can be cut off on site.



5 HTF

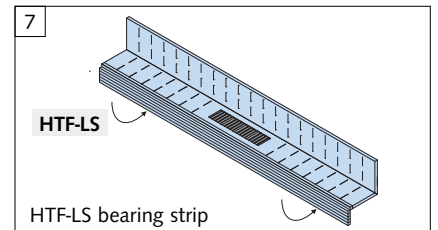
HTF prefabricated insulating unit



6

HTF-DS

HTF-DS insulating strip



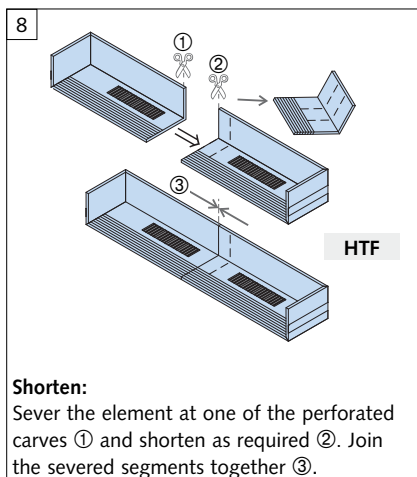
7

HTF-LS

HTF-LS bearing strip

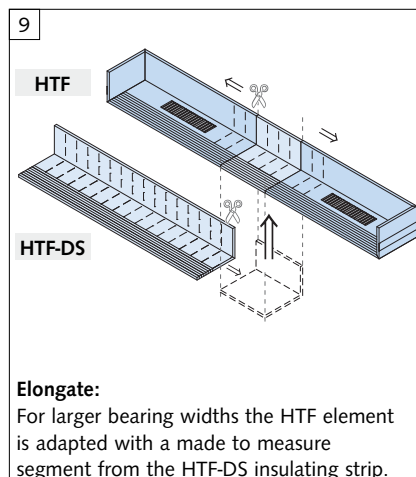
#### Adjustment to the bearing width (fig. 8-10)

- For a slight elongation of the HTF units 5 the use of the HTF-DS insulating strip 6 is recommended (order separately). The insulation strip is cut to length on the construction site, is inserted between the standard HTF element and is fixed - with the adhesive tape on its reverse - to the landing bearing 9.
- For substantial elongation which requires additional static bearing the HTF-LS bearing strip 7 (order separately) is inserted. The bearing strip can be cut to the necessary length and subsequently placed between the standard HTF element 10.
- Seal all joints between the insulation elements with HALFEN adhesive tape to avoid sound bridges.



#### Shorten:

Sever the element at one of the perforated curves ① and shorten as required ②. Join the severed segments together ③.



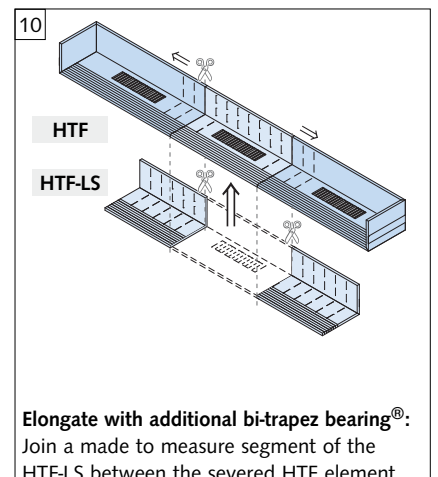
9

HTF

HTF-DS

#### Elongate:

For larger bearing widths the HTF element is adapted with a made to measure segment from the HTF-DS insulating strip.



10

HTF

HTF-LS

**Elongate with additional bi-trapez bearing®:**  
Join a made to measure segment of the HTF-LS between the severed HTF element.

# HALFEN IMPACT SOUND INSULATION

## HTF-B impact sound insulation unit for prefabricated staircases to floor slabs

### Product features

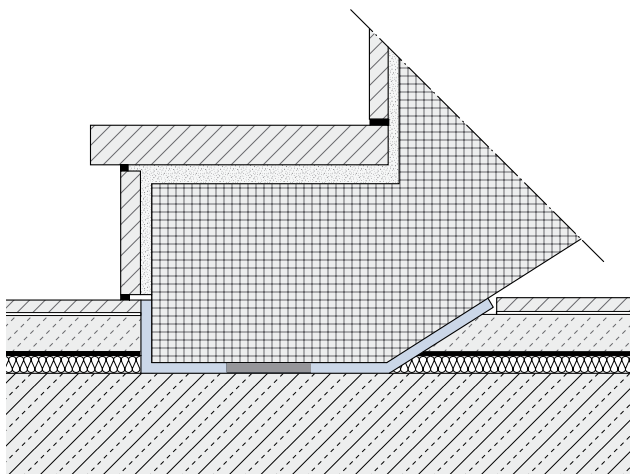


- Staircase: prefabricated
- Maximum load:  $V_{Ed} = 105 \text{ kN}$  (+ 52.5 kN per additional bearing)
- Recommended load for optimal sound insulation:  $V_{Ed} = 7.6 \text{ kN}$  (+ 3.8 kN per additional bearing)
- Bearing: bi-trapez bearing<sup>®</sup> 150 x 50 x 15 mm (details at page 8)
- Materials: plastic foam building material class B2 according to DIN 4102

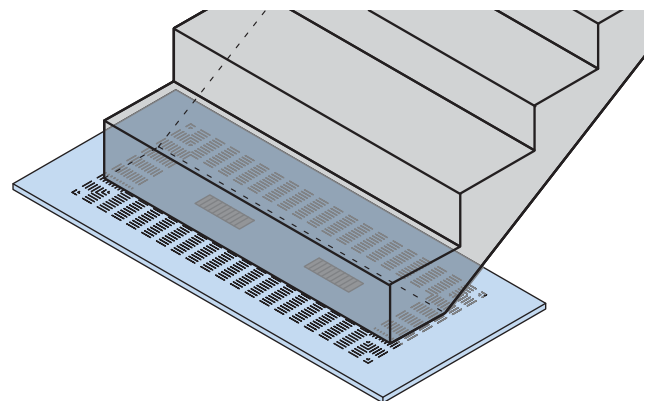
HALFEN HTF-B impact sound insulation unit is appropriated for elastic bearing of prefabricated staircases onto floor slabs in the ground level.

Designation	Article no.	Element measurements a / b [cm]	Thickness t = 15 mm for all elements HTF-B	Dimensions [mm]
HTF-B - 125×55	0973.010-00001	125 / 55	<p>Ground bearing</p>	
HTF-B - 125×80	0973.010-00002	125 / 80		
HTF-B - 145×55	0973.010-00003	145 / 55		
HTF-B - 145×80	0973.010-00004	145 / 80		

### Installation references



Section through a standard application of the HTF-B



Isometric view. At stairflights without clearance to the stairway wall HTPL perimeter joint insulation has to be installed all around (→ p. 12).

# HALFEN IMPACT SOUND INSULATION

## HTPL 100 Perimeter joint insulation (joint panel)

### Product features



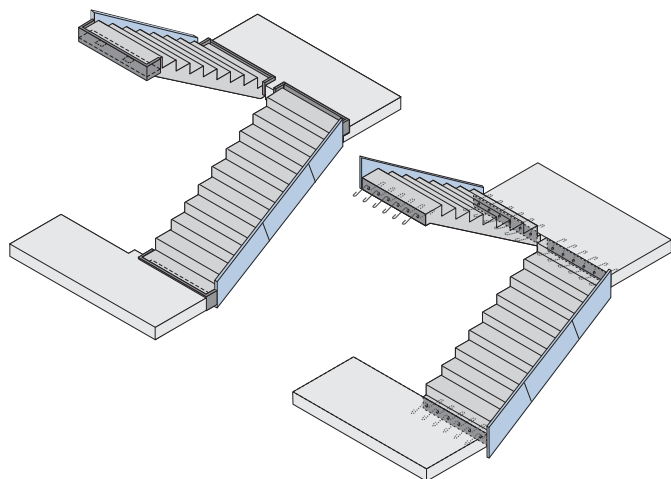
- Staircase: in-situ concrete or prefabricated
- Materials: plastic foam building material class B2 according to DIN 4102

HALFEN HTPL 100 joint panels avoid impact sound transmission reliably. The acoustic decoupling of stairflight and wall is straightforward: arrange joint panel between the structural members and seal all joints with HALFEN adhesive tape – done !

Designation	Article no.	Element measurements a / b [cm]	Thickness t = 10 mm for HTPL elements	Dimensions [mm]
<b>HTPL - 100</b>	0974.010-00001	100 / 35	<p>Joint panel</p>	<p>Double-sided Self adhesive tape</p>
<b>Adhesive tape</b>	9602.040-00054	Coil with 50 mm width adhesive tape		

### Installation references

#### Disposal of the HTPL joint panels



The HTPL 100 perimeter joint insulation is a part of the HALFEN sound insulating system and can be combined with all other HALFEN sound insulating products, to avoid impact noise transition by impurities or ingress of concrete into the joints between staircase flight and staircase wall.



The joint panels require accurately assembling. Sound bridges caused by gappy installation may affect the sound insulation negatively.

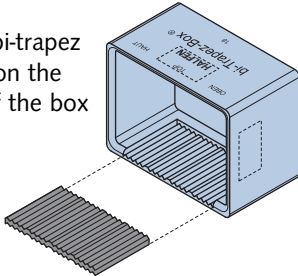
# HALFEN IMPACT SOUND INSULATION

## HBB-F bi-trapez box® for prefabricated landings

### Product features

#### HBB-F

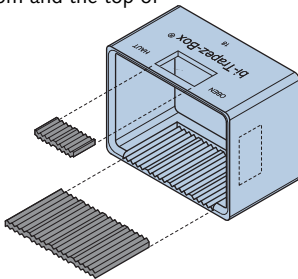
incl. one bi-trapez bearing® on the bottom of the box



#### HBB-FQ

for additional loads in vertical upward direction:

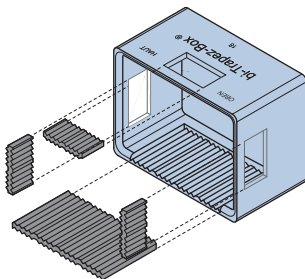
incl. two bi-trapez bearings® on the bottom and the top of the box



#### HBB-FQS

for additional loads in vertical upward direction:

incl. four bi-trapez bearings® at the inner surfaces



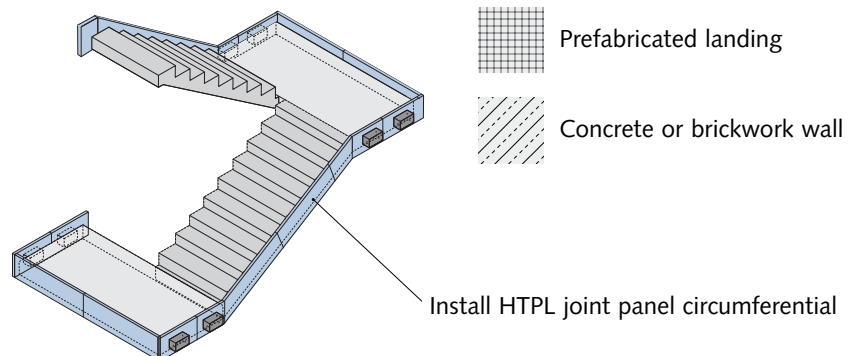
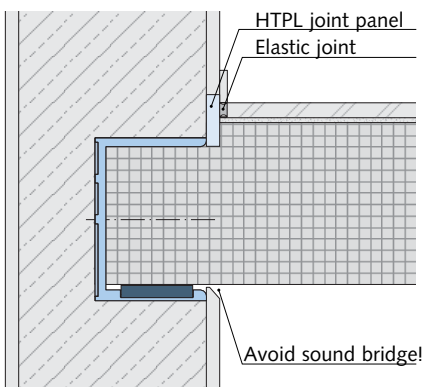
- Staircase landing: prefabricated
- bi-trapez bearing®:
  - general constructional authority approval P-849.0554/1, MPA Hannover
  - acoustic verified: report 2029/1045, IBMB Braunschweig
  - sound protection: impact sound improvement measure: max. 23 dB
  - building material class 2 according to DIN 4102
- Availability:
  - bi-trapez box® for three landing thicknesses (d = 16/18/ 20 cm) available incl. bi-trapez bearings® quantity depending on load case (see adjacent figures)
- Fire protection:
  - fire resistance grading F90 No. 3799/7357-AR by IBMB Braunschweig

HALFEN bi-trapez boxes® HBB-F, FQ and FQS are straightforward slit on the corbel before assembling the precast landing. The corbel is manufactured previously in the precast plant, considering the box's internal dimensions.

Designation	Article no. 0970.010-	Internal measurements h × b × t [mm]	max load / optimal load [kN] ①		
			+ V <sub>Rd</sub>	- V <sub>Rd</sub>	+ H <sub>Rd</sub>
HBB 16-F	00001	160 × 250 × 140	+	-	-
HBB 18-F	00002	180 × 250 × 140	+	-	-
HBB 20-F	00003	200 × 250 × 140	+	-	-
HBB 16-FQ	00004	160 × 250 × 140	+	+	-
HBB 18-FQ	00005	180 × 250 × 140	+	+	-
HBB 20-FQ	00006	200 × 250 × 140	+	+	-
HBB 16-FQS	00007	160 × 250 × 140	+	+	+
HBB 18-FQS	00008	180 × 250 × 140	+	+	+
HBB 20-FQS	00009	200 × 250 × 140	+	+	+

① Elastomer bearings are usable up to 10 N/mm<sup>2</sup> (working stress). For positive supporting loads the bearing in dimensions 100 x 200 mm is appropriated, for upward directed loads and lateral loads the dimensions are 50 x 100 mm. The values considering  $\gamma_F = 1.5$  are: +V<sub>Rd</sub> = 300 kN, -V<sub>Rd</sub> = 75 kN, ±H<sub>Rd</sub> = 75 kN. The statics proof for the corbel and the load bearing wall have to be provided within the structural analysis of the building. The optimal sound protection is given with a compression stress of 0.5 N/mm<sup>2</sup> (see chart and explanation on page 8)

### Installation references



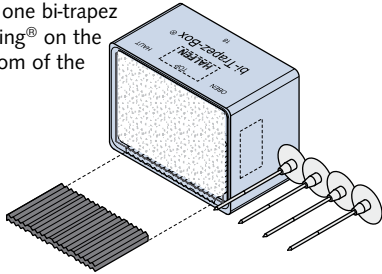
# HALFEN IMPACT SOUND INSULATION

## HBB-O bi-trapez box® for in-situ concrete landings

### Product features

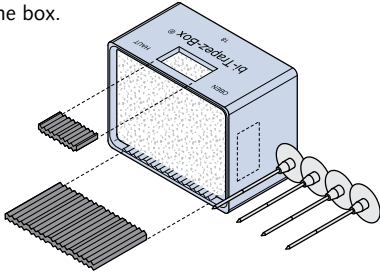
#### HBB-O

incl. one bi-trapez bearing® on the bottom of the box



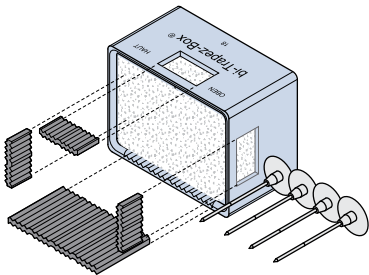
#### HBB-OQ

for additional loads in vertical upward direction: incl. two bi-trapez bearings® on the bottom and the top of the box.



#### HBB-OQS

for additional lateral loads and vertical upward directed loads: incl. four bi-trapez bearings® at the inner surfaces.



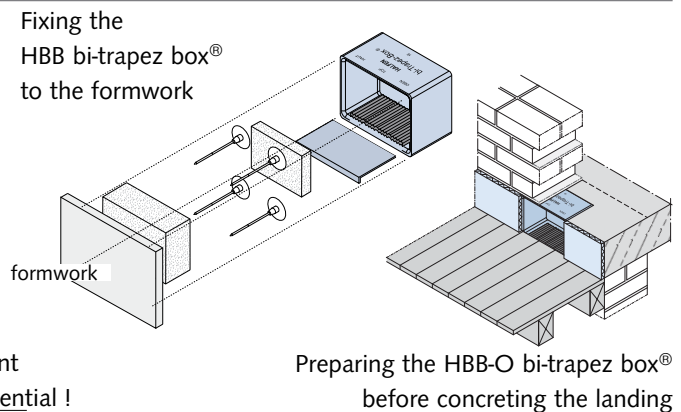
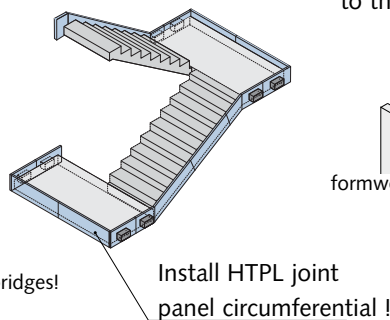
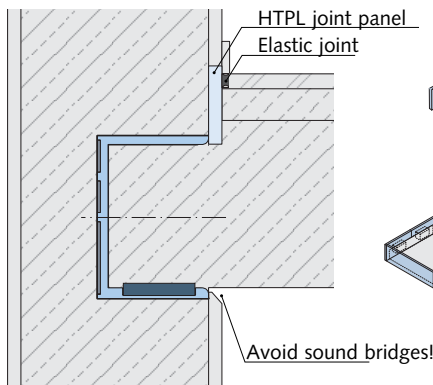
- Staircase landing: prefabricated
- bi-trapez bearing®: (t= 10 mm):
  - general constructional authority approval P-849.0545/1, MPA Hannover
  - acoustic verified: report 2029/1045, IBMB Braunschweig
  - sound protection: impact sound improvement measure: max. 23 dB
  - building material class 2 according to DIN 4102
- Availability: bi-trapez box® for three landing thicknesses (d=16/18/20 cm) available incl. bi-trapez bearings® quantity depending on load case (see adjacent figures), four special nails, polystyrene sparing body, protective strip (cardboard inlay)
- Fire protection: fire resistance grading F90 No. 3799/7357-AR by IBMB Braunschweig

In brickwork the polystyrene sparing body ensures shape retentiveness of the bi-trapez box® during the brick up. For assembly in concrete walls the polystyrene body is fixed to the formwork with the accompanying special nails, afterwards the bi-trapez box® is slit on the polystyrene body flush with the formwork.

Designation	Article no. 0970.020-	Overall measurements h × b × t [mm]	max load / optimal load [kN] ①		
			+ V <sub>Rd</sub>	- V <sub>Rd</sub>	+ H <sub>Rd</sub>
HBB 16-O	00001	187 × 274 × 155	+	-	-
HBB 18-O	00002	207 × 274 × 155	+	-	-
HBB 20-O	00003	227 × 274 × 155	+	-	-
HBB 16-OQ	00004	187 × 274 × 155	+	+	-
HBB 18-OQ	00005	207 × 274 × 155	+	+	-
HBB 20-OQ	00006	227 × 274 × 155	+	+	-
HBB 18-OQS	00008	207 × 274 × 155	+	+	+
HBB 20-OQS	00009	227 × 274 × 155	+	+	+

① Elastomer bearings are usable up to 10 N/mm<sup>2</sup> (working stress). For positive supporting loads the bearing in dimensions 100 x 200 mm is appropriated, for upward directed loads and lateral loads the dimensions are 50 x 100 mm. The values considering  $\gamma_F = 1.5$  are: +V<sub>Rd</sub> = 300 kN, -V<sub>Rd</sub> = 75 kN, ±H<sub>Rd</sub> = 75 kN. The statics proof for the corbel and the load bearing wall have to be provided within the structural analysis of the building. The optimal sound protection is given with a compression stress of 0.5 N/mm<sup>2</sup> (see chart and explanation on page 8)

### Installation references



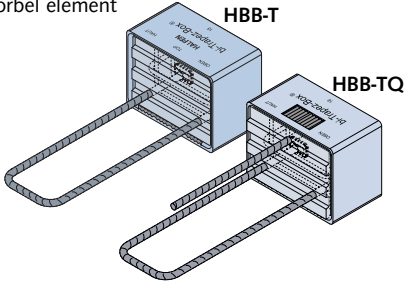
# HALFEN IMPACT SOUND INSULATION

## Prefabricated corbel elements for the HBB bi-trapez box®

### Product features

#### HBB-T / -TQ

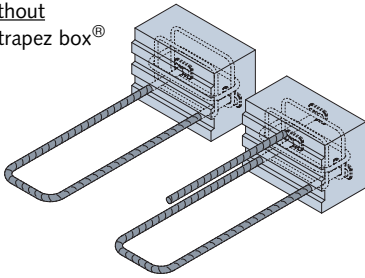
bi-trapez box® incl. corbel element



**HBB-T:** bi-trapez bearing® at the bottom  
**HBB-TQ:** for additional upward directed loads: a second bi-trapez bearing® in the lid of the box

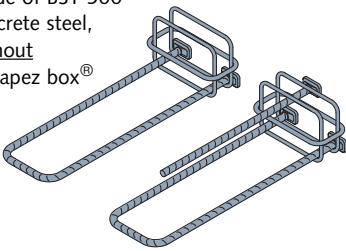
#### HBB corbel element

Made of concrete, class C35/45 without bi-trapez box®



#### HBB reinforcement cage

Made of BST 500 concrete steel, without bi-trapez box®



As an alternative to the swage fitted heads the rebar cage is also available with a welded on steel plate for load transfer.

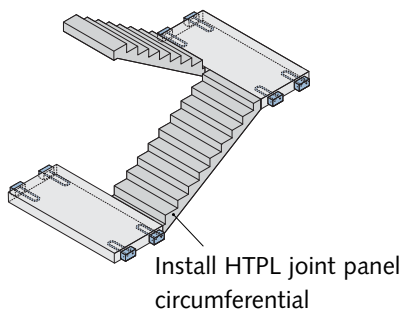
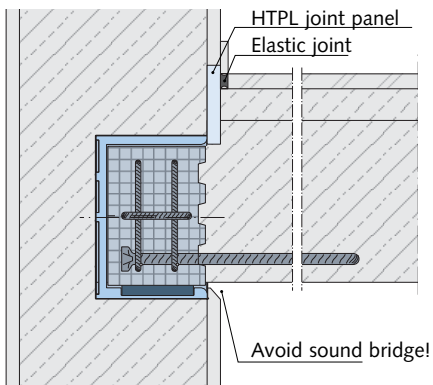
- Corbel element: made of concrete, class C35/45
- Reinforcement cage: BST 500 concrete steel
- bi-trapez bearing®: product features shown on page 8, 13 and 14
- Availability: HBB-T / -TQ: HBB-O incl. corbel element (d = 16 / 18 / 20 cm) or else particular HBB corbel element or particular HBB reinforcement cage (d = 16 / 18 / 20 cm)
- Type tested: type test report for corbel element no. S-WUE 040559, LGA Würzburg

The prefabricated HALFEN HBB corbel element substantially accelerates the sequence of staircase construction. It provides a straightforward handling with its rebar stirrup, and the reinforcement geometry is optimized in both HBB corbel element and HBB reinforcement cage.

Designation	Article no. 0970.030-	for landing thickness d [mm]	max load [kN] ②		
			+ V <sub>Rd</sub>	- V <sub>Rd</sub>	+ H <sub>Rd</sub>
HBB 16-T	00001	≥ 160	52.5	—	—
HBB 18-T	00002	≥ 180	67.5	—	—
HBB 20-T	00003	≥ 200	75.0	—	—
HBB 16-TQ	00004	≥ 160	52.5	15	—
HBB 18-TQ	00005	≥ 180	67.5	15	—
HBB 20-TQ	00006	≥ 200	75.0	15	—
	0970.040-		max load [kN] ②		
HBB-corbel element 16	00001	≥ 160	52.5	—	—
HBB-corbel element 18	00002	≥ 180	67.5	—	—
HBB-corbel element 20	00003	≥ 200	75.0	—	—
HBB-corbel elem. 16 Q	00004	≥ 160	52.5	15	—
HBB-corbel elem. 18 Q	00005	≥ 180	67.5	15	—
HBB-corbel elem. 20 Q	00006	≥ 200	75.0	15	—
	0970.050-		max load [kN] ③		
HBB-rebar cage 16	00001	≥ 160	52.5	—	—
HBB-rebar cage 18	00002	≥ 180	67.5	—	—
HBB-rebar cage 20	00003	≥ 200	75.0	—	—
HBB-rebar cage 16 Q	00004	≥ 160	52.5	15	—
HBB-rebar cage 18 Q	00005	≥ 180	67.5	15	—
HBB-rebar cage 20 Q	00006	≥ 200	75.0	15	—

② Loads according to type test report LGA, Stuttgart S-WUE 040548 for landing concrete, class C20/25  
 ③ Full load bearing capacity according to type test report requires the application of in-situ concrete, class C35/40

### Installation references



Assembly of the bi-trapez box® as described on page 13. Subsequently the HBB corbel element (or HBB reinforcement cage) is fitted into the prepared HBB bi-trapez box®. The regulations of the type test report have to be regarded at assembly and dimensioning.

## CONTACT HALFEN WORLDWIDE

HALFEN is represented by subsidiaries in the following 15 countries, please contact us:

Austria	HALFEN Gesellschaft m.b.H. Leonard-Bernstein-Str. 10 1220 Wien	Phone: +43 - 1 - 259 6770 E-Mail: office@halfen.at Internet: www.halfen.at	Fax: +43 - 1 - 259 - 6770 99
Belgium/Luxembourg	HALFEN N.V. Borkelstraat 131 2900 Schoten	Phone: +32 - 3 - 658 07 20 E-Mail: info@halfen.be Internet: www.halfen.be	Fax: +32 - 3 - 658 15 33
China	HALFEN Construction Accessories Distribution Co.Ltd. Room 601 Tower D, Vantone Centre No.A6 Chao Yang Men Wai Street Chaoyang Distres Beijing · P.R. China 100020	Phone: +86 - 10 5907 3200 E-Mail: info@halfen.com Internet: www.halfen.cn	Fax: +86 - 10 5907 3218
Czech Republic	HALFEN-DEHA s.r.o. Business Center Šafránkova Šafránkova 1238/1 155 00 Praha 5	Phone: +420 - 311 - 690 060 E-Mail: info@halfen-deha.cz Internet: www.halfen-deha.cz	Fax: +420 - 235 - 314 308
France	HALFEN S.A.S. 18, rue Goubet 75019 Paris	Phone: +33 - 1 - 445231 00 E-Mail: halfen@halfen.fr Internet: www.halfen.fr	Fax: +33 - 1 - 445231 52
Germany	HALFEN Vertriebsgesellschaft mbH Katzbergstrasse 3 40764 Langenfeld	Phone: +49 - 2173 - 970 0 E-Mail: info@halfen.de Internet: www.halfen.de	Fax: +49 - 2173 - 970 225
Italy	HALFEN S.r.l. Soc. Unipersonale Via F.lli Bronzetti N° 28 24124 Bergamo	Phone: +39 - 035 - 0760711 E-Mail: info@halfen.it Internet: www.halfen.it	Fax: +39 - 035 - 0760799
Netherlands	HALFEN b.v. Oostermaat 3 7623 CS Borne	Phone: +31 - 742 - 6714 49 E-Mail: info@halfen.nl Internet: www.halfen.nl	Fax: +31 - 742 6726 59
Norway	HALFEN AS Postboks 2080 4095 Stavanger	Phone: +47 - 51 82 34 00 E-Mail: post@halfen.no Internet: www.halfen.no	Fax: +47 - 51 82 34 01
Poland	HALFEN Sp. z o.o. Ul. Obornicka 287 60-691 Poznan	Phone: +48 - 61 - 622 14 14 E-Mail: info@halfen.pl Internet: www.halfen.pl	Fax: +48 - 61 - 622 14 15
Spain	HALFEN S.L. c/ Fuente de la Mora 2, 2° D 28050 Madrid	Phone: +34 - 91 - 632 18 40 E-Mail: info@halfen.es Internet: www.halfen.es	Fax: +34 - 91 - 633 42 57
Sweden	Halfen AB Box 150 435 23 Mölnlycke	Phone: +46 - 31 - 98 58 00 E-Mail: info@halfen.se Internet: www.halfen.se	Fax: +46 - 31 - 98 58 01
Switzerland	HALFEN Swiss AG Hertistrasse 25 8304 Wallisellen	Phone: +41 - 44 - 849 78 78 E-Mail: mail@halfen.ch Internet: www.halfen.ch	Fax: +41 - 44 - 849 78 79
United Kingdom / Ireland	HALFEN Ltd. Humphrys Road · Woodside Estate Dunstable LU5 4TP	Phone: +44 - 1582 - 47 03 00 E-Mail: info@halfen.co.uk Internet: www.halfen.co.uk	Fax: +44 - 1582 - 47 03 04
United States of America	HALFEN USA LLC. 8521 FM 1976 P.O. Box 547 Converse, TX 78109	Phone: +1 800.323.6896 E-Mail: info@halfen.com Internet: www.halfenusa.com	Fax: +1 888 . 227.1695

Furthermore HALFEN is represented with sales offices and distributors worldwide. Please contact us: [www.halfen.com](http://www.halfen.com)

### NOTES REGARDING THIS CATALOGUE

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

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

