ИНСТРУКЦИЯ
УКРЕПЛЕНИЯ ГРУНТА

Современные технологии укрепления
грунта для всех проектов строительства.

2020

SHORING MANUAL

First edition 2020

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SHORING MANUAL

Modern trench shoring technology
for all civil engineering projects

FIRST EDITION

TABLE OF CONTENTS

REGULATIONS
AND LABELLING

There is a range of standards and regulations that manufacturers, consultants, suppliers and those carrying out works must observe. The most important of these are listed below:

- ArbStättV: German Workplaces Ordinance (Arbeitsstättenverordnung – ArbStättV)
- UVV: German Accident Prevention
- Regulations DIN 4124: Excavations and trenches – Slopes, planking and strutting
- DIN EN 13331: Trench lining systems
- Euro Code 7: Foundation engineering
- Euro Code 3: Constructional steelwork
- EAB: Recommendations of the German 'Excavations' working group

These govern shoring systems, requirements for their design and use, plus load effects and how these are calculated. How shoring systems are manufactured and used is constantly changing. In 2013, the approval requirements changed. At the moment, the DGUV (German Social Accident Insurance) issues Euro Test certificates.

It is not permitted to label shoring equipment with the CE mark. CE conformity is based on the application of harmonised standards. But DIN EN 13331 and DIN 4124 have not been harmonised for the European Economic Area.

LOADS
ON AND IN THE GROUND

Shoring systems must withstand a combination of different loads, in order to be able to guarantee the safety of workers and buildings in the immediate vicinity of the construction works.

- Ground loads
- Groundwater
- Buildings in the immediate vicinity
- Traffic loads (diggers, roads, railways, mobile cranes etc)

Fig 1: Loads on and in the ground

Correct assessment of the loads is decisive for the selection of the shoring system.

In figure 1, you can clearly see that the shoring system must be able to withstand the loads from the nearby roads and also groundwater. The buildings, on the other hand, are far enough away to not introduce additional loads to the shoring.

SBH will always provide you with expert advice.

The ground is an inhomogeneous material. But with the building material steel, on the other hand, series of tests have been carried out, in order to clearly determine its properties. These are guaranteed on the basis of regulated manufacturing, finishing and testing processes. Ground conditions are however determined on the basis of field examinations or on-site information.
For example, samples are sent to an earthworks laboratory for examination. The ground surveyor is then able to use the test results to extrapolate the relevant characteristics.

Blasted cavity classes provide information on the solubility of soils, but do not provide any direct conclusions on the effects of loads.

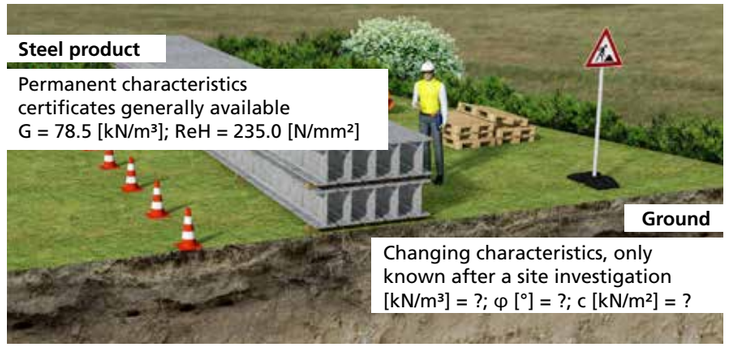


Fig 2: The characteristics of soil and steel products compared

Soils can be divided into four types:
- Non-cohesive soils – sand, gravel, stones
- Mixed soils – argillaceous sand, loam, marl
- Cohesive soils – clay, silt
- Rock – basalt, gneiss, greywacke, dolomite

The most important soil properties are described by the following values.
- γ (gamma) unit: [kN/m³] Density – the ground's bulk density
- φ (phi) unit: [°] Friction angle – the angle of internal friction
- c unit: [kN/m²] Cohesion – cohesive strength (cohesive soils)

INFLUENCING FACTORS
EARTH PRESSURE

The shoring system must be able to safely absorb all loads borne by the ground. In this respect, the value φ (phi) is of great importance. The smaller this value, the greater the proportion of the load that is spread horizontally. This increases the load that the shoring system must be able to withstand. The following illustrations demonstrate how the earth pressure increases if, in addition to the ground's own weight, additional loads from a slope, groundwater or a building also have an effect on the shoring system.

Earth pressure – loads from slopes, groundwater or building development

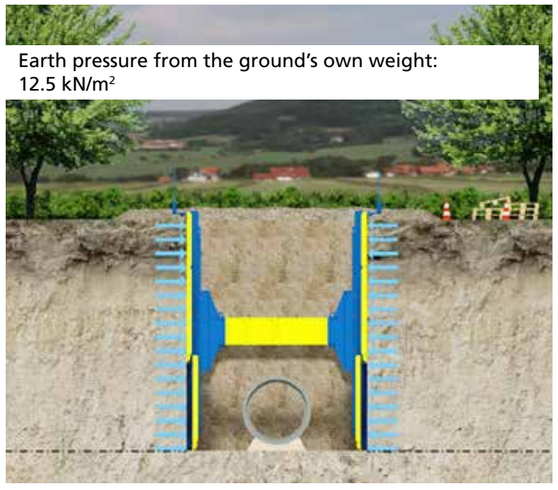


Fig 3: Earth pressure from the ground

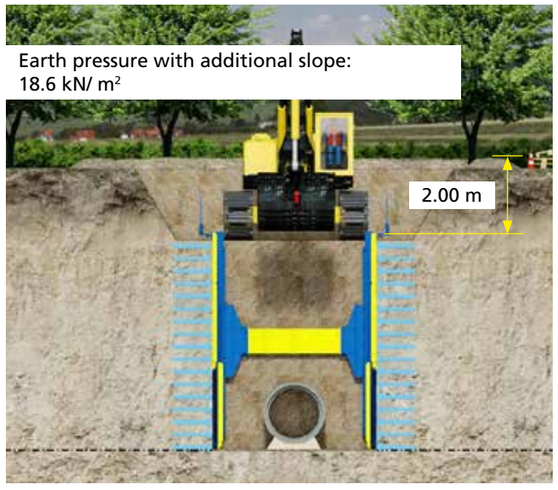


Fig 4: Earth pressure with additional slope

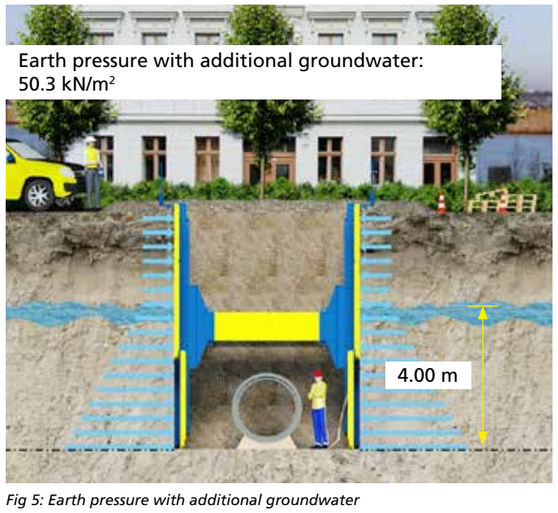


Fig 5: Earth pressure with additional groundwater

Fig 6: Earth pressure with additional building development

GROUND BALANCE

As a result of excavation, the remaining earth loses the supporting effects of the soil that was removed. If the inner friction φ (phi) is exceeded, the ground breaks away unpredictably and uncontrollably. Any construction workers in the trench could be buried, and nearby buildings could suffer significant damage. Any railway lines nearby, or the use of mobile cranes, make separate analyses necessary.

To guarantee the structural stability of a trench, it can be implemented without shoring but sloped, in accordance with DIN 4124, or it can be reliably secured using an SBH shoring system.

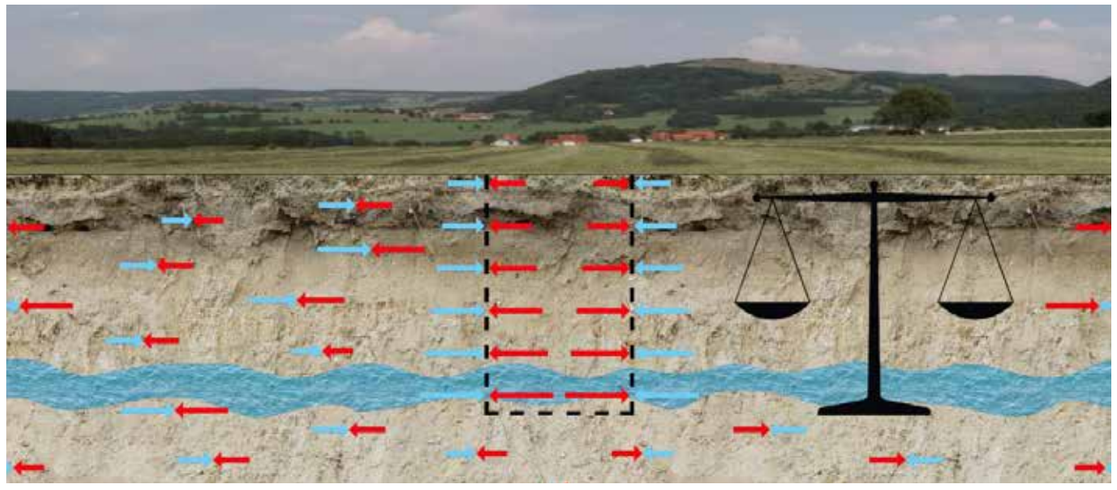


Fig 7: Before excavation: the ground is in equilibrium

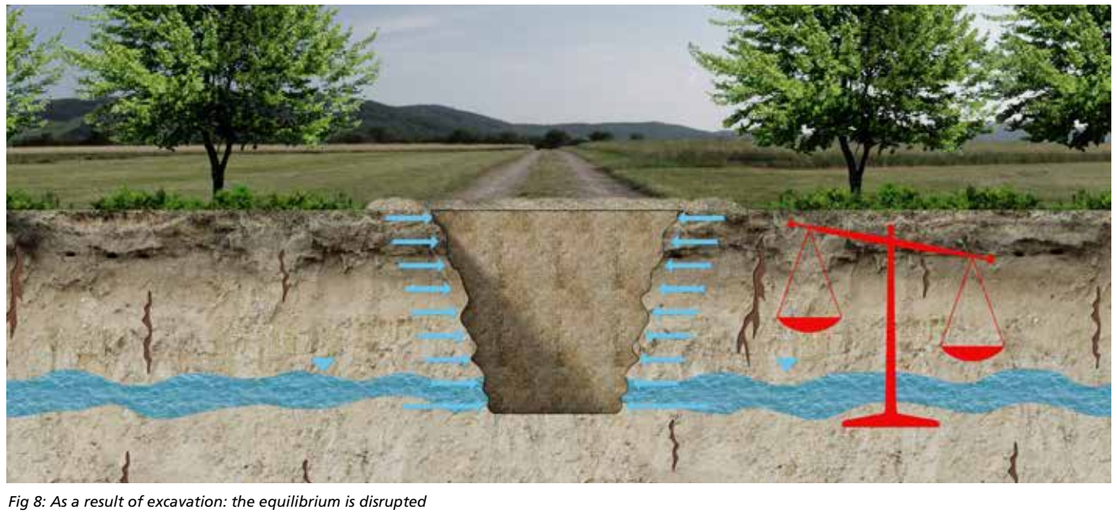


Fig 8: As a result of excavation: the equilibrium is disrupted

STABILITY OF
UNSECURED TRENCHES

The structural stability of unsecured trenches is influenced by the local on-site conditions.

For example, breakups occur more easily as a result of high levels of fissure formation and loosening, vibrations, stress redistribution, seepages or drying out.

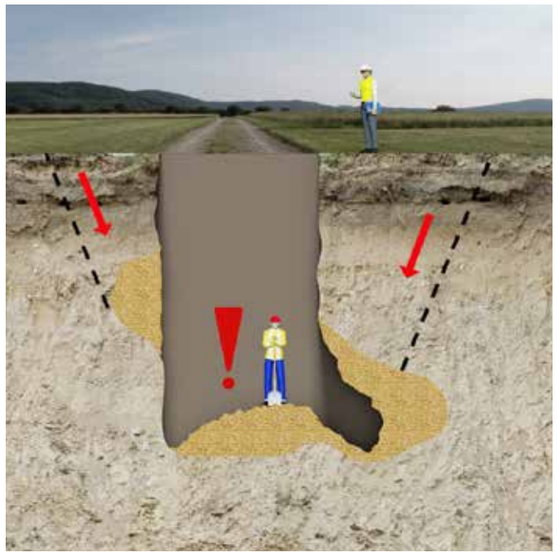


Fig 9: Sand inclusion

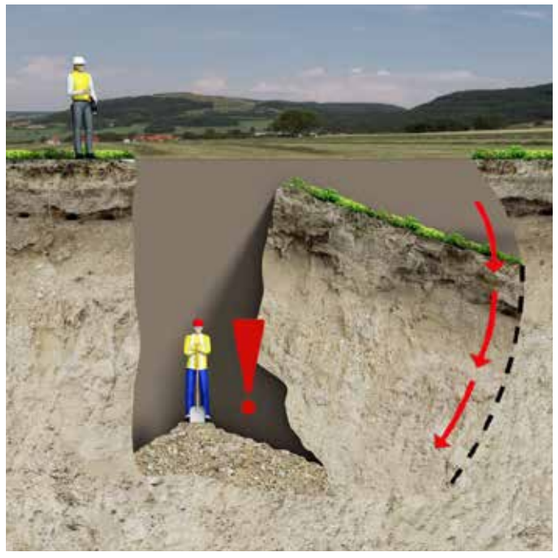


Fig 10: Profound slippage

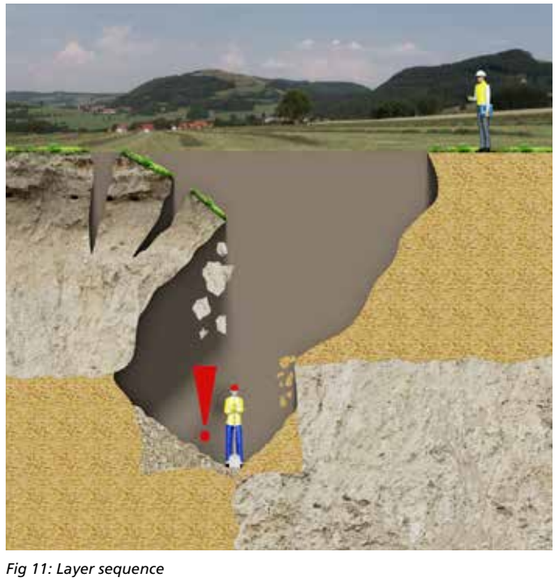


Fig 11: Layer sequence

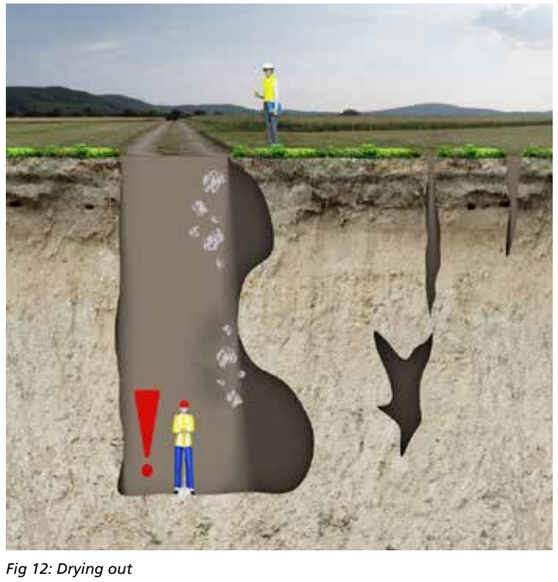


Fig 12: Drying out

SHORING OR SLOPING
UNSHORED, SLOPED TRENCHES AND PITS

The following pages show the slope variants permitted by DIN 4124. By using shoring, this presents an opportunity to create the face sides.

When doing so, the face sides must not exceed a depth of 1.75 m and a width of 1.25 m. Deeper, wider face sides must also be secured.

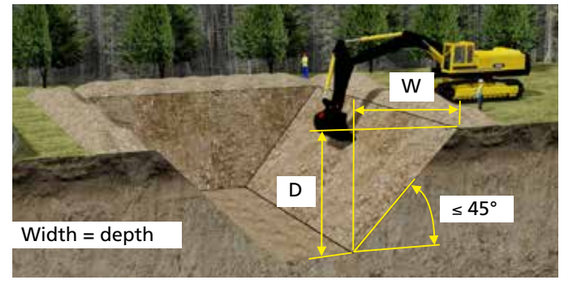


Fig 13: Inward sloping, β ≤ 45° if non-cohesive or soft, cohesive soils

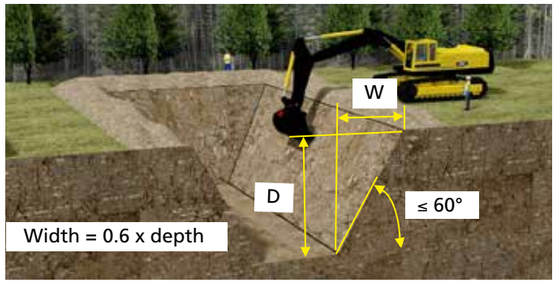


Fig 14: Inward sloping, β ≤ 60° if at least stiff, cohesive soils

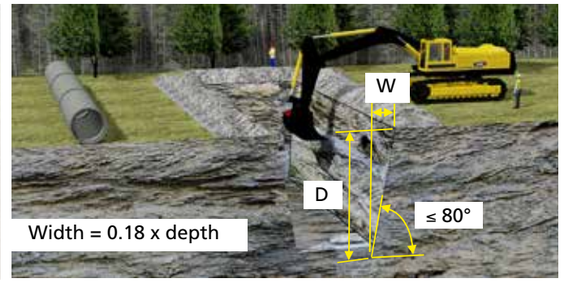


Fig 15: Sloped ≤ 80° if stable, sound rock without layers with inclination towards the miner

When implementing sloped trenches and pits, observe the requirements of DIN 4124. Always ensure that a strip of ≥ 0.60 m to the side of the edge of the trench or pit is not subject to any loads.

Observe construction machinery's minimum clearances. Entering unsecured trenches and sloped edges is prohibited.

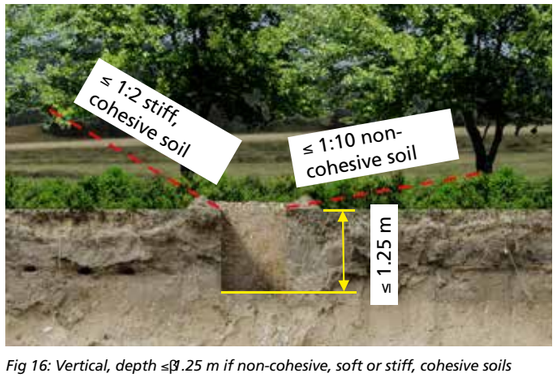


Fig 16: Vertical, depth ≤ 1.25 m if non-cohesive, soft or stiff, cohesive soils

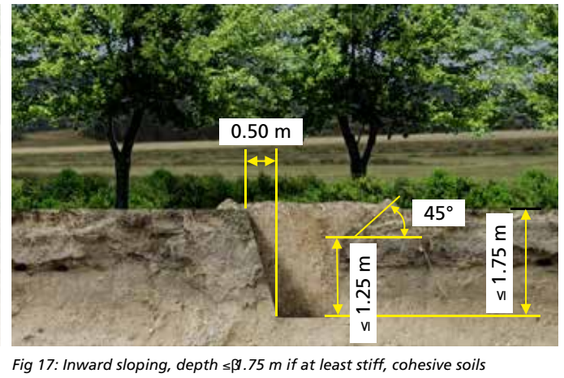


Fig 17: Inward sloping, depth ≤ 1.75 m if at least stiff, cohesive soils

SHORED TRENCHES AND PITS

Fig 18: Place and adjust method (depth according to shoring system), for stable or temporarily stable soils

Fig 19: Cut and lower method (depth according to shoring system), no flowing soils

Fig 20: Pit shoring (depth according to shoring system), no flowing soils

Less excavation
Place and adjust
method to ~ 3.60 m deep

Quicker construction progress
Cut and lower method possible
to ~ 9.00 m deep and greater

Custom solutions
Pits of up to ~ 9.00 m deep and
greater possible

MINIMUM DISTANCES
CONSTRUCTION MACHINERY

Fig 21: Unshored trenches and pits
Construction machinery and vehicles up to 12.0 tonnes. At least 1.00 m between standing area and shoring edge
Construction machinery and vehicles > 12.0 to 40.0 tonnes. At least 2.00 m between standing area and shoring edge

Fig 22: Shored trenches and excavations
Recommended clearance > 0.60 m from the shored edge; possible without clearance

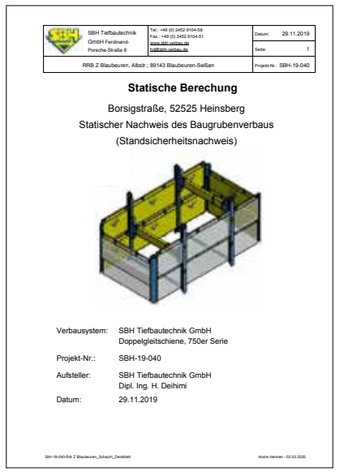
For more detailed information on design loads for other types of construction vehicles, see the recommendations of the EAB (German ‘Excavations’ working group).

STRUCTURAL STABILITY
OF SHORING

The shoring system must be able to safely and reliably support vertical trench and pit walls.
External forces introduced to both shoring sides are mutually supported by means of struts.

In the case of pit shoring (where the excavation is shored on four sides), loads from the opposite shoring plates are mutually supported by the shoring plates positioned at right angles to them.

- Calculated proof of stability is recommended for example for deep trenches or pit shoring, unfavourable ground conditions with or without groundwater, or where buildings, roads or railway lines are found in the area where loads can have an effect. As stated in DIN 4124, it is permitted to carry out excavations without separate proof of stability if


SBH Tiefbautechnik GmbH Ferdinand-Porsche-Straße 8
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www.sbh-verbau.de
kalkert-verbau.de
Datum: 29.11.2019
Seite: 1
RRB Z Blaubeuren, Albstr.; 89143 Blaubeuren-Seißen
Projekt-Nr.: SBH-19-040

Statische Berechnung

Borsigstraße, 52525 Heinsberg
Statischer Nachweis des Baugrubenverbaus
(Standsicherheitsnachweis)

Verbausystem: SBH Tiefbautechnik GmbH Doppelgleitschiene, 750er Serie
Projekt-Nr.: SBH-19-040
Aufsteller: SBH Tiefbautechnik GmbH Dipl. Ing. H. Deihimi
Datum: 29.11.2019

SBH-19-040-RIA-Z Blaubeuren_Schacht_Deckblatt
André Hennen - 02.03.2020

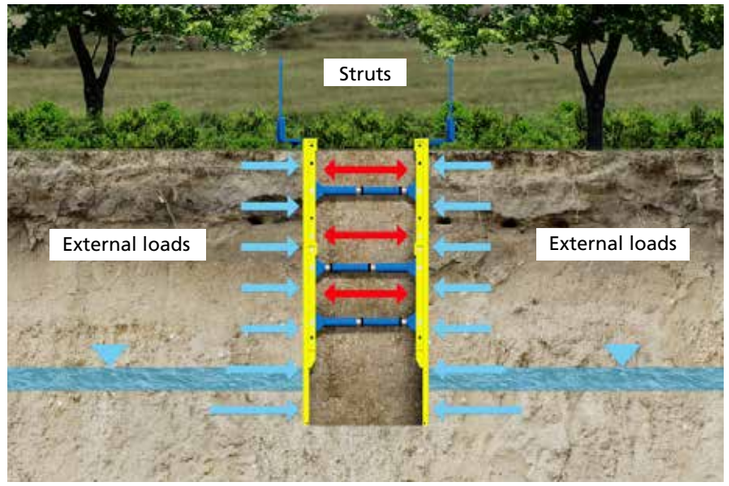


Fig 23: Forces absorbed by struts

- The excavation depth of sloped trenches or excavations is ≤ 5.00 m
- The permitted clearances of the vehicles and construction machinery used are observed.

For SBH shoring systems, the regulations allow for simplified verification processes, in which characteristic loads are compared with permitted load values.
In site specific engineerings, the loads from local conditions and the earth pressure from the ground's own weight are taken into consideration. This enables the characteristic loads of the deployed shoring elements to be determined. Reliable load values can be taken from the respective Euro Test certificates. You can find these on SBH's website, under 'Downloads'. These reliable load values take into account the partial safety factors on the load side as well as the partial safety factors on the resistance side, so that they can be compared directly with the characteristic loads.

The static provides evidence of all application parameters, such as for example plate lengths, working widths and pipe clearance heights etc. The availability of a site specific engineering should be indicated as a separate item in the tendering documents. In the event that loads from buildings, railway lines or the use of mobile cranes or pipe jacking systems have an effect on the shoring, we recommend you have a site specific engineering produced.

Similarly, customers can also have a site specific engineering inspected by a test engineer, if applicable with EBA (German Federal Railway Authority) accreditation.
Upon request, SBH can assistant you in all these matters.

SPECIAL NOTES

Operating manuals and Euro Test certificates for SBH shoring systems are free to download from SBH's website. In the case of unstable soils, the shoring must be inserted at an excavation depth of no greater than 1.25 m. As excavation continues, the shoring must be successively lowered.

Driving shoring plates or rails into the ground ahead of the progress of the excavation works is classed as improper use, and can lead to unnecessary repair costs. The shoring must lie flat against the soil so that it is tight and without gaps. Hollow spaces must be filled.


Fig 24: Special notes

Depending on the depth of the trench, the shoring should protrude 0.05–0.10 m above the ground.
The use of fall protection is recommended.

When using pile chamber elements, sheet piles can only be lowered to the top edge of the supply lines that cross the trench.

The shortfall below is therefore an unshored area, which must nevertheless be secured.


Fig 25: Special notes


Fig 26: Special notes

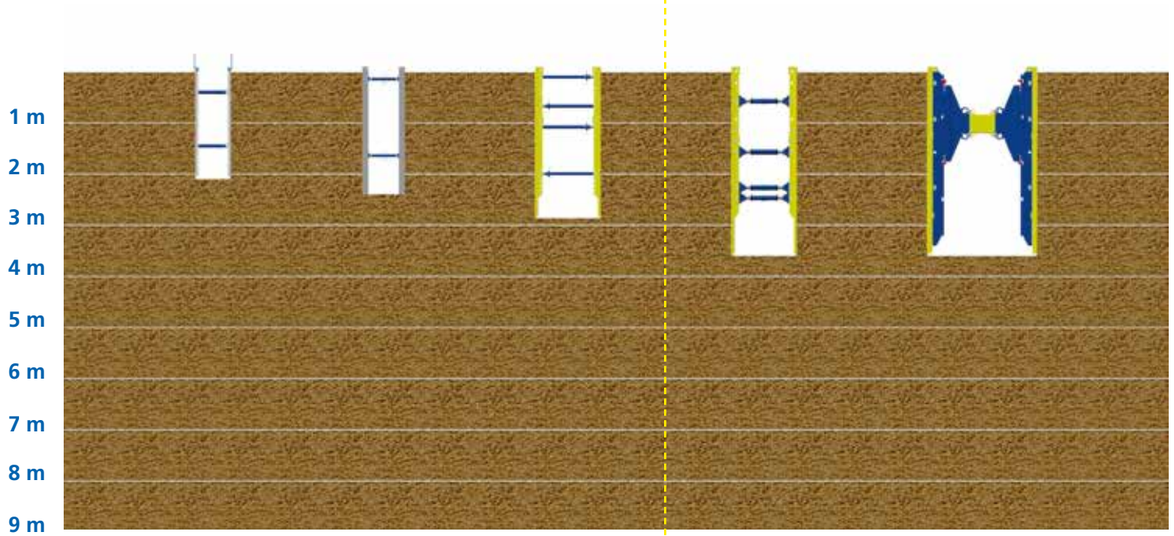
Additional extension of the lower struts is required to bring shoring boxes into A position. In slide rail shoring, the A position is integrated into the rolling strut. Ensure they are assembled and inserted correctly (arrow pointing upwards).

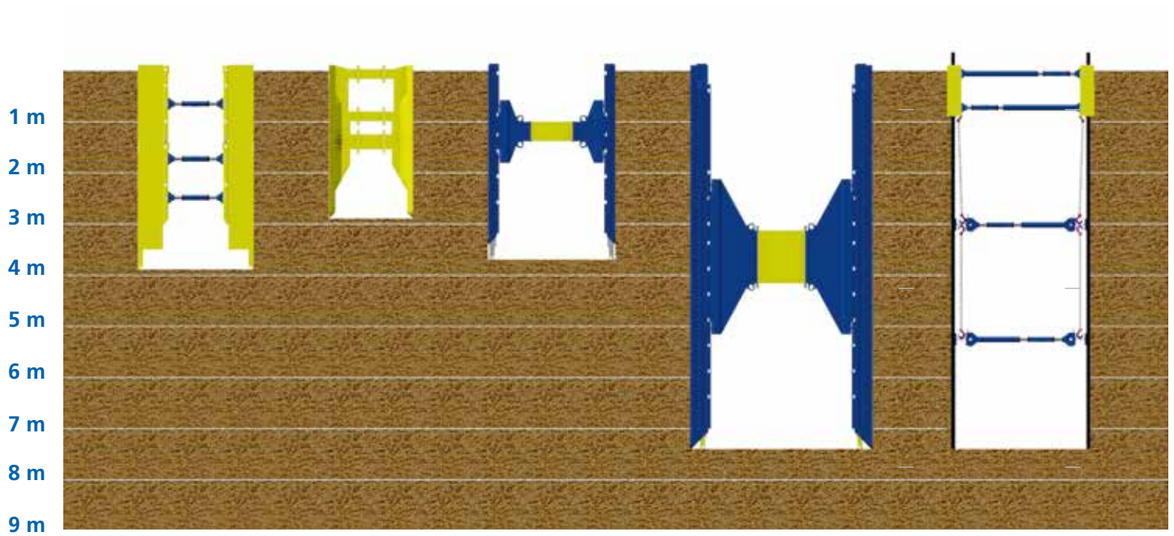
SBH SHORING SYSTEMS
COMPARED

Place and adjust method

Cut and lower method

Quick Shore	Aluminium Shoring	Lightweight Shoring	Shoring Boxes	Boxes for wide pipe diameters	Special Boxes		Rolling Strut Shoring		Where supply lines cross
					Manhole Box	Drag Box	Single Slide Rail	Double Slide Rail	Pile Chamber Shoring
recommended to 2.00 m	recommended to 2.40 m	recommended to 3.00 m	recommended to 4.00 m	recommended to 4.00 m	recommended to 4.00 m	recommended to 3.00 m	recommended to 3.80 m	recommended to 7.60 m	recommended to 6.00 m
			Light Box Standard Box	Transformation profile RS Box	for manholes	in open terrain		in combination with top rail up to 9.00 m	in combination with sheet piles KD6/8
Construction machinery requirements									
not required	mini excavator	mobile excavator	mobile excavator or crawler excavator	mobile excavator or crawler excavator	mobile excavator or crawler excavator	crawler excavator	mobile excavator or crawler excavator	crawler excavator	mobile excavator
	3.0–9.0 tonnes	9.0–13.0 tonnes	12.0–18.0 tonnes with extension box 18.0–30.0 tonnes	18.0–30.0 tonnes	18.0–30.0 tonnes	30.0–50.0 tonnes	18.0–30.0 tonnes	to depth ≤ 6.20 m 24.0–31.0 tonnes if depth > 6.20 m 30.0–50.0 tonnes	9.0–13.0 tonnes





PLACE AND ADJUST METHOD

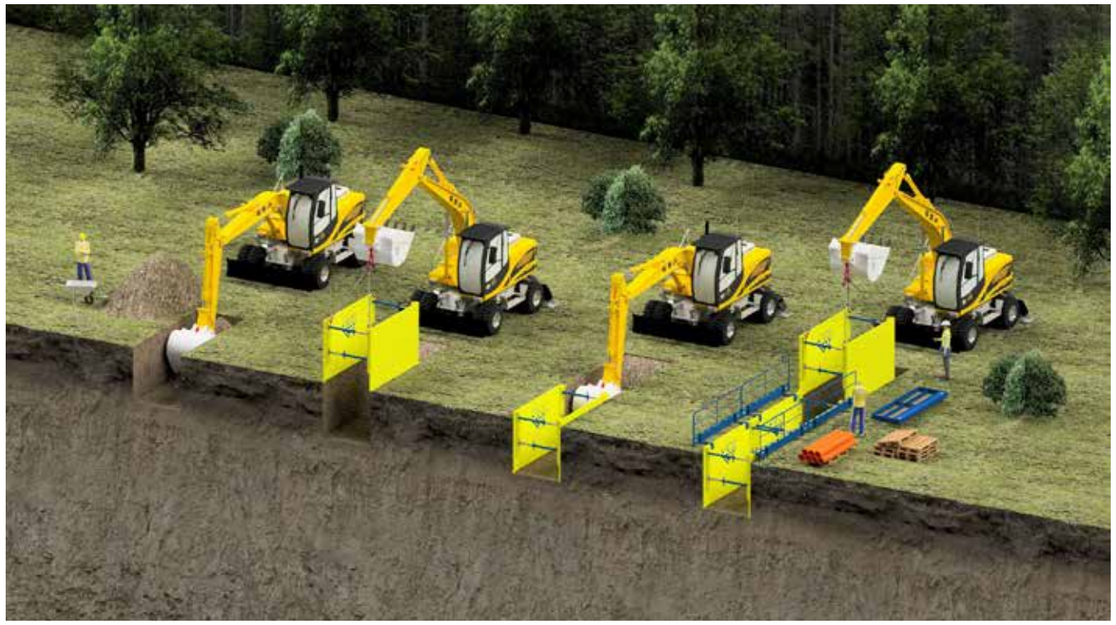


Fig 27: Place and adjust method, using the Lightweight Shoring series 100 as an example

The place and adjust method is only permitted if the following conditions are met:

- Temporarily stable ground
- Outside the area of influence of buildings, physical structures or transport routes
- Subsidence is at an acceptable level

Temporarily stable if no significant crumbling becomes apparent between the start of the excavation works and insertion of the shoring system.
The excavation length must be limited to one box length.
The shoring box is placed into the trench, which has previously been excavated up to the final depth.

For greater depths, a base box is connected to a top box outside the trench by means of pins and clips and then completely lowered into the trench.
The gaps between the shoring and the ground must be filled and compacted.

For lifting or moving the shoring system, generally a 4-fold chain is used. This is attached to the lifting points provided for the purpose. Alternatively, a box lifter can be used.

CUT AND LOWER METHOD

Fig 28: Cut and lower method, using the Standard Box series 600 as an example

The cut and lower method is used where soils are unstable.

Depending on local conditions, the base plates are installed by excavating the length of one shoring unit to a depth of maximum 1.25 m.

Adjust the shoring elements to the trench width using spindles (observe A position!), then lower the shoring unit by means of chains or the box lifter. The gaps between the shoring and the ground must be filled and compacted.

The shoring system is then installed by alternating between excavating in steps of maximum 0.50 m and pushing the plates downwards. The spindles are designed to bend up to ±8° for this purpose.

In the case of deeper trenches, top plates are used. Use the spindles to extend the pre-assembled extension element to the trench width, attach chains or the box lifter and connect to the previously installed base element using box connectors, pins and clips.

Installation is as described above, by alternating between excavation and pressing the shoring plates downwards. The shoring unit's top edge must protrude 0.05–0.10 m above ground level, depending on the trench depth.

STATIC QUESTIONNAIRE

SBH is pleased to help with site specific engineerings. Please contact us. Once we have all the necessary information, we will supply you with a calculation outline for inspection and approval for further processing. Our engineers will supply you with testable or tested site specific engineerings for your construction project.

Checklist

CONTACT DETAILS

Company..... ☐ Implementation ☐ Tendering/Planning

Contact person..... Email .....

Street address..... Mobile .....

Town/city, postcode and country..... Telephone.....

CONSTRUCTION PROJECT

Construction project/cost centre...../.....

Pipe internal diameter, length, material..... Structure (L, W, H).....

DOCUMENTS

Please submit documents 1) and 2) by email, together with the checklist:

1) Ground surveys (geotechnics) ☐ 2) Site plans, sections, details ☐

Submission to a test engineer required. ☐ The static is required by.....

DETAILS OF LOAD EFFECTS

Existing building development ☐ Existing slopes ☐ Use of mobile crane ☐

Existing road ☐ Existing railway line ☐ Pipe jacking ☐

DETAILS OF SHORING AND CONSTRUCTION MACHINERY

Shoring system/Series..... Available ☐ Hire ☐ Buy ☐

Max trench depth..... Permissible total excavator weight .....

Clear working width ..... Excavator only works on face sides ☐

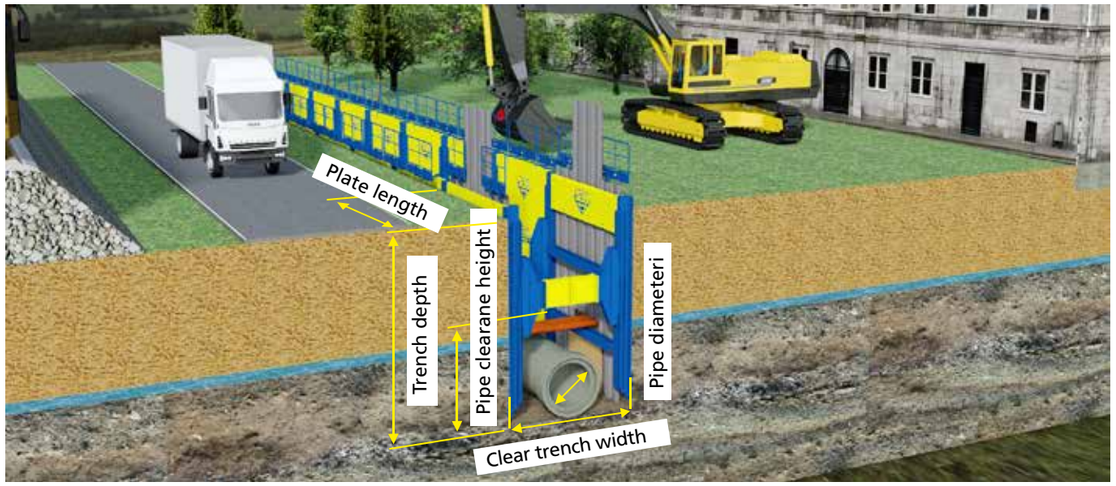
Shoring plates (length)..... Supply lines crossing ☐

Max pipe clearance height ..... Lowering of groundwater ☐

Miscellaneous .....

Please fill out the static questionnaire and if required tick the static questionnaire illustration and send to **info@sbh-shoring.com** or fax to **+49(0)2452/9104-51**. A member of the SBH team will contact you shortly. There is a charge for this service.

STATIC QUESTIONNAIRE-ILLUSTRATION



LIGHTWEIGHT SHORING 100 SERIES ☐

LIGHT BOX 300 SERIES ☐

STANDARD BOX 600 SERIES ☐

PILE CHAMBER SHORING 400 SERIES ☐

ROLLING STRUT BOX 780 SERIES ☐

STANDARD BOX 600 SERIES TRANSFORMATION PROFILE ☐

790 SERIES SINGLE SLIDE RAIL ☐

Rail L = 3.50 m

750 SERIES DOUBLE SLIDE RAIL ☐

Rail L = 4.50 m; 5.50 m

750 SERIES MEGA DOUBLE SLIDE RAIL ☐

Rail L = 6.50 m; 7.50 m

PIT SHORING ☐

TRENCH SHORING ☐

TRENCH CLOSURE SHORING ☐

TRAINING CENTRE
FOR SAFE AND ECONOMICALLY EFFICIENT TRENCH SHORING

Each seminar is enriched by an in-depth look at the manufacture of modern shoring systems, as well as clear presentations of realistic construction site situations at our own large open-air site (Borsigstrasse 35, 52525 Heinsberg, Germany).

They provide participants with further valuable insights into the functioning and operating principles of high quality shoring systems.

TRAINING CENTRE
FOR SAFE AND ECONOMICALLY EFFICIENT TRENCH SHORING

Shoring technology qualification

SBH's modern training and instruction centre offers construction companies and engineering offices lots of space for their personnel to become qualified in the use of shoring systems, in the form of workshops with various different focuses. In the workshops, participants receive professional, practical knowledge about occupational safety relating to trench shoring. With real building site situations and state of the art virtual reality technology, participants acquire theoretical and practical knowledge of installation and removal procedures, as well as special techniques which make working with shoring systems more economical.

Our courses

Workshops for construction companies:

- Large area shoring – technical and technological possibilities
  An introduction to SBH Tiefbautechnik GmbH
  Why trench shoring?
    - Legal requirements
    - Selection criteria for choosing the right shoring system
    - Preparatory works before construction works begin

  Installation method
    - Place and adjust method
    - Cut and lower method

  Steel trench shoring systems
    - Boxes
    - Slide rail systems
    - Special shoring solutions
    - Complementary products

- Practical seminar: Repairing shoring systems

- Training to become a shoring expert

Furthermore, custom-designed workshops with selected modules are also possible for the following groups:

- Construction site managers
- Site overseers, skilled workers, machine operators
- Quantity surveyors

Workshop for engineering offices:

Large area shoring – technical and technological possibilities
An introduction to SBH Tiefbautechnik GmbH

Selection of the right shoring method according to the criteria:

- Laying performance
- Representation of construction time and costs

General common shoring methods
Representation of constraints
Consideration of regulations

- DIN 4124 and DIN EN 1610

Tendering documents
Discussion

All workshops can also be booked as in-house events.

Should you need to talk to us, clarify dates or require information or tips on booking, we would be pleased to assist.

Telephone:
+49 (0) 24 52/ 91 04 0
info@sbh-shoring.com

QUICK SHORE
260 series

Recommended installation depth:	to 2.00 m
Trench width:	0.49–1.64 m
Working width:	0.45–1.60 m
Pipe clearance height (hC): without use of excavator	0.56 m

QUICK SHORE
260 series

The Quick Shore 260 series is specifically intended for shoring depths of up to 2.00 m.

- This system is preferred for laying and repairing house connections, as well as gas and water pipes
- The entire structure weighs between 33.0 and 40.0 kg

ALUMINIUM POST

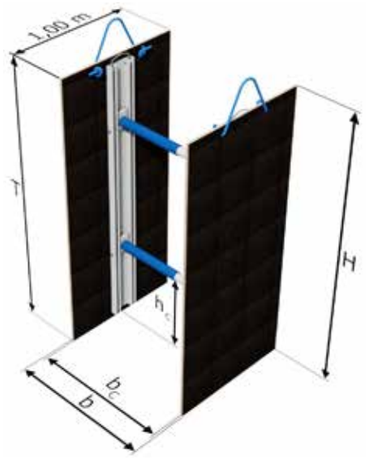
Aluminium post length [m]	Max trench depth T [m]	Pipe clearance height h_{nC} [m]	Permissible boom bracing load [kN/m]	Weight per frame [kg]
1.50	1.50	0.56	23.5	33.0
2.10	2.00	0.56	23.5	40.0

PLATE

Plate Width	Height H	Permissible earth pressure [kN/m²]	Limit state design load e_d / Characteristic system resistance R_k [kN/m²]	Weight per plate [kg]
[m]				
1.00	1.50	12.0	18.0	21.0
1.00	2.10	12.0	18.0	30.0

HYDRAULIC STRUT

Type	Working width b_c [m]		Trench width b [m]		Permitted compressive force [kN]
	min	max	min	max	
1	0.45	0.68	0.49	0.72	53.0
2	0.55	0.88	0.59	0.92	53.0
3	0.65	1.08	0.69	1.12	53.0
4	1.00	1.60	1.04	1.64	53.0



ACCESSORIES

You can find the accessory parts

- **Release hook**
- **Pipe hook**

for the Quick Shore 260 series on pages 88–91.

ALUMINIUM SHORING
250 SERIES

Recommended installation depth:	to 2.40 m
Trench width:	0.78–2.38 m
Working width:	0.63–2.23 m
Pipe clearance height (hC):	0.71 m
Mini-excavator:	3.0–9.0 tonnes

ALUMINIUM SHORING
250 series

Shoring system for minor cable and pipe-laying works and the use of lightweight construction machinery.

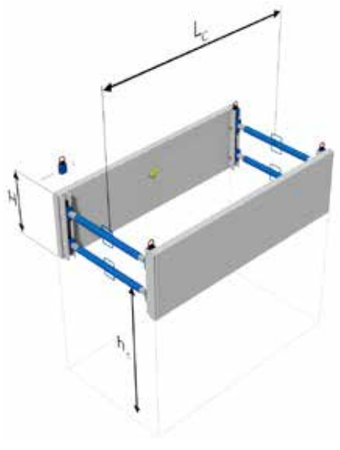
- Can be used as a simple trench box, shoring box or manhole
- 0.60 m high trench boxes can easily be transported manually by two people

ALUMINIUM PLATES t_{PL} = 60.00 mm

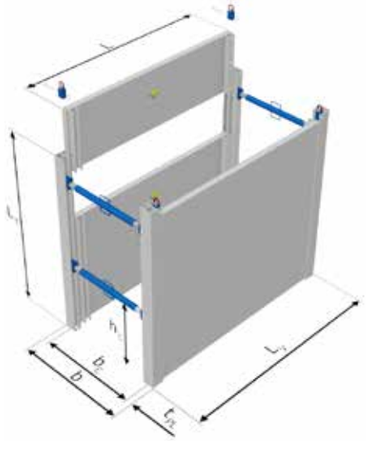
Plate length L [m]	Shoring length L_V [m]	Shoring height H [m]	Pipe clearance length L_C [m]	Pipe clearance height h_C [m]	Permissible earth pressure [kN/m²]	Limit state design load e_d / Characteristic system resistance R_k [kN/m²]	Weight with strut B [kg/box]	Manhole weight [kg/manhole]
1.50	1.50	0.60	1.32	1.32	32.6	48.9	95.0	130.0
	1.72	1.20 / 1.80 / 2.40	1.58	0.71			185.0 / 250.0 / 320.0	250.0 / 370.0 / 485.0
2.00	2.00	0.60	1.82	1.32	26.5	39.8	110.0	160.0
	2.22	1.20 / 1.80 / 2.40	2.08	0.71			215.0 / 295.0 / 380.0	305.0 / 450.0 / 600.0
2.50	2.50	0.60	2.32	1.32	21.6	32.4	120.0	185,0
	2.72	1.20 / 1.80 / 2.40	2.58	0.71			240.0 / 340.0 / 435.0	360.0 / 535.0 / 710.0
3.00	3.00	0.60	2.82	1.32	17.5	26.3	135.0	215.0
	3.22	1.20 / 1.80 / 2.40	3.08	0.71			270.0 / 380.0 / 490.0	420.0 / 620.0 / 825.0

Other lengths or custom variants upon request.

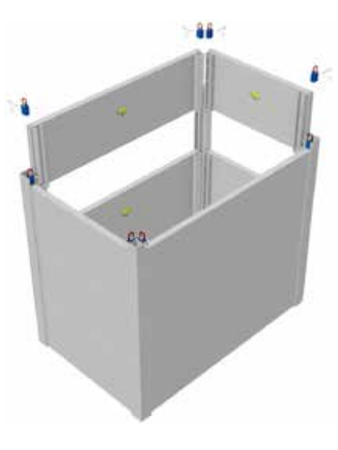
SIMPLE TRENCH BOX



SHORING BOX



MANHOLE BOX



ALUMINIUM SHORING WITH COUPLING
250 series

ALUMINIUM COUPLING

Post length L_T [m]	Weight [kg]
0.90	6.2
1.50	10.3
2.10	14.4

ALUMINIUM PLATES t_{PL} = 60.00 mm

Plate length L [m]	Shoring length L_V [m]	Shoring height H [m]	Pipe clearance length L_C [m]	Pipe clearance height h_C [m]	Permissible earth pressure [kN/m²]	Weight with strut B [kg/Box]
1.50	1.50	1.80	1.32	0.71	36.0	250.0
		2.40				320.0
2.00	2.00	1.80	1.82	0.71	28.0	295.0
		2.40				380.0
2.50	2.50	1.80	2.32	0.71	22.5	340.0
		2.40				435.0
3.00	3.00	1.80	2.82	0.71	18.0	380.0
		2.40				490.0

ALUMINIUM POSTS

Post length L_T [m]	Weight [kg]
0.70	5.4
1.30	10.0
1.90	14.6
2.50	19.2

STRUTS FOR ALUMINIUM SHORING

Strut Type	Working width b_C [m]		Trench width b [m]		Permissible compressive force [kN]	Weight [kg]
	min	max	min	max		
A	0.63	0.85	0.78	1.00	109.0	7.3
B	0.85	1.31	1.00	1.46	92.0	9.4
C	1.32	2.23	1.47	2.38	62.0	13.6

ACCESSORIES

You can find the accessory parts

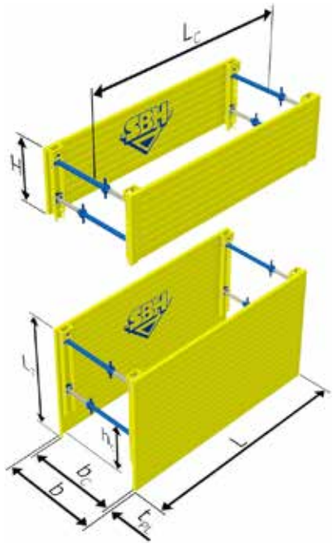
- **Connector**
- **4-fold lifting rope**

for the Aluminium Shoring 250 series on pages 88–91.

LIGHTWEIGHT SHORING
100 series

Recommended installation depth:	to 3.00 m
Trench width:	0.66–3.21 m
Working width:	0.53–3.08 m
Pipe clearance height (hC):	0.94 m
Mobile excavator:	9.0–13 tonnes

LIGHTWEIGHT SHORING
100 series



The Lightweight Shoring 100 series is ideal for small to medium-sized trenches and the use of light construction machinery.

- Ideal for supply lines and house connections
- Smooth-running struts, flexibly mounted in the plate profile, enable quick assembly and easy installation using the place and adjust method, and to a limited extent using the cut and lower method
- Extendable

PLATES t_{PL} = 60.00 mm

Plate length L [m]	Plate height H [m]	Pipe clearance length L_C [m]	Pipe clearance height h_c [m]	Permissible earth pressure [kN/m²]	Limit state design load e_d / Characteristic system resistance R_k [kN/m²]	Weight per box with strut B [kg/Box]
2.00	1.60 / 2.00	1.60	0.94	27.7	41.6	570.0 / 670.0
	0.60 / 1.00					275.0 / 415.0
2.50	1.60 / 2.00	2.10	0.94	22.1	33.2	655.0 / 770.0
	0.60 / 1.00					315.0 / 470.0
3.00	1.60 / 2.00	2.60	0.94	18.5	27.8	745.0 / 875.0
	0.60 / 1.00					355.0 / 525.0
3.50	1.60 / 2.00	3.10	0.94	15.3	23.0	830.0 / 980.0
	0.60 / 1.00					395.0 / 585.0

Other lengths or custom variants upon request

LIGHTWEIGHT STRUT

Strut type [m]	Working width b_c [m]		Trench width b [m]		Permissible compressive force [kN]	Weight [kg]
	min	max	min	max		
A	0.53	0.73	0.66	0.86	160.0	14.2
B	0.71	1.07	0.84	1.20	147.0	16.9
C	1.05	1.65	1.18	1.78	124.0	20.9
D	1.50	2.10	1.63	2.23	107.0	23.6
E	1.88	2.48	2.01	2.61	92.0	25.8
F	2.48	3.08	2.61	3.21	69.0	29.3

ACCESSORIES

You can find the accessory parts

- **4-fold chain with shortening**
- **system Protection rail**

for the Lightweight Shoring 100 series on pages 88–91.

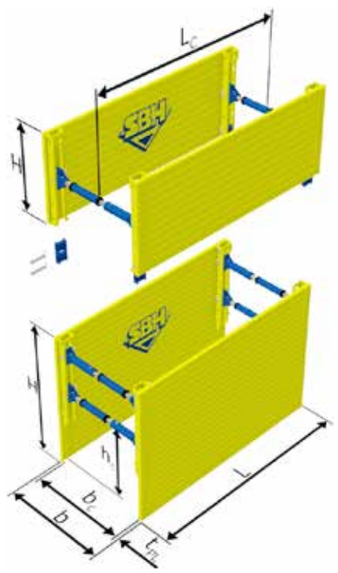
LIGHT BOX
300 series

Recommended installation depth:	to 4.00 m
Trench width:	1.11–4.39 m
Working width:	0.98–4.26 m
Pipe clearance height (hC):	1.27 m (from plate height 2.40 m)
Mobile excavator or crawler excavator:	
Base box only:	9.0–13.0 tonnes
With extension box:	18.0–30.0 tonnes

LIGHT BOX
300 series

The SBH Light Box combines lightweight plates construction with an articulated spindle. This type of shoring is therefore ideal for small to medium-sized trenches and the use of light construction machinery.

- The Light Box can also be used in unstable soils
- Thanks to its articulated spindles, it can also be installed using the cut and lower method
- Ideal for supply lines and house connections
- Compared with the Lightweight Shoring system, a more robust side part construction enables higher pipe clearances, and the SBH spindles with extension pipes enable greater trench widths



PLATES t_{PL} = 60.00 mm

Plate length L [m]	Plate height H [m]	Pipe clearance length L_c [m]	Pipe clearance height h_c [m]	Permissible length pressure [kN/m²]	Limit state design load e_d / Characteristic system resistance R_k [kN/m²]	Weight per box [kg]
2.00	2.00	1.60	1.12	50.4	75.6	920.0
	2.40		1.27	38.5	57.8	1030.0
	2.60		1.27	38.2	57.3	1105.0
	1.40			50.4	75.6	640.0
2.50	2.00	2.10	1.12	32.7	49.1	1025.0
	2.40		1.27	30.8	46.2	1150.0
	2.60		1.27	30.6	45.9	1240.0
	1.40			32.7	49.1	720.0
3.00	2.00	2.60	1.12	31.8	47.7	1385.0
	2.40		1.27	26.0	39.0	1575,0
	2.60		1.27	25.8	38.7	1700.0
	1.40			31.8	47.7	960.0
3.50	2.00	3.10	1.12	22.7	34.1	1535.0
	2.40		1.27	22.3	33.5	1750.0
	2.60		1.27	22.1	33.2	1890.0
	1.40			22.7	34.1	1070.0

Other lengths or custom variants upon request.

ACCESSORIES

You can find the accessory parts

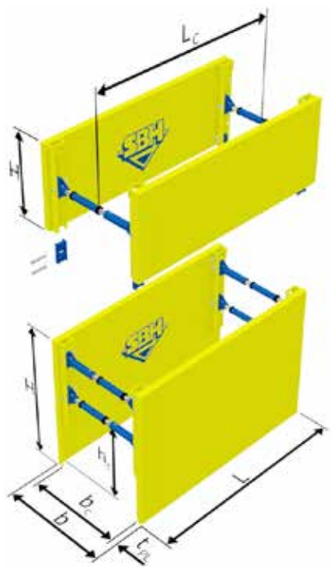
- **Spindle key**
- **Spindle adaptor**
- **Protection rail**
- **4-fold chain with shortening system**
- **Box connectors**
- **Protective driving cap**

for the Light Box 300 series on pages 88–91.

STANDARD BOX
600 series

Recommended installation depth:	to 4.00 m
Trench width:	1.20–4.48 m
Working width:	0.98–4.26 m
Pipe clearance height (hC):	1.50 m
Mobile excavator or crawler excavator:	
Base box only:	9.0–13.0 tonnes
With extension box:	18.0–30.0 tonnes

STANDARD BOX
600 series



The robust, long-lasting Standard Box features a reinforced head, which can resist even the high loads when using the cut and lower method. At the same time, the reinforced cutting edge design enables even firm earth to be stripped away.

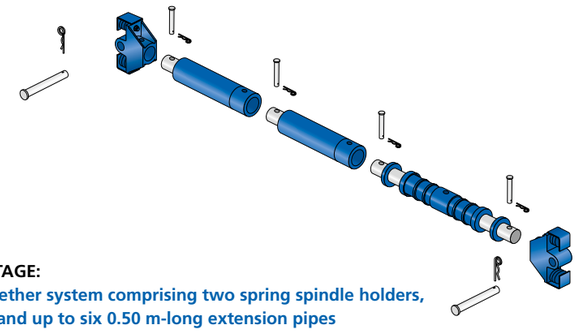
- Side parts with additional supports to minimise deformation
- Articulated spindles enable use with non-stable soils, using the cut and lower method

PLATES t_{PL} = 107.00 / 127.00 mm

Plate length L [m]	Plate height H [m]	Thickness t_{PL} [m]	Pipe clearance length L_C [m]	Pipe clearance height h_C [m]	Permissible earth pressure [kN/m²]	Calculated earth pressure e_d / Characteristic system resistance R_k [kN/m²]	Weight per box [kg]
2.00	2.40 2.60 1.40	107.00	1.60	1.50	71.2	106.8	1495.0 1580.0 915.0
2.50	2.40 2.60 1.40	107.00	2.10	1.50	56.9	85.4	1725.0 1820.0 1060.0
3.00	2.40 2.60 1.40	107.00	2.60	1.50	47.5	71.3	1950.0 2075.0 1025.0
3.50	2.40 2.60 1.40	107.00	3.10	1.50	40.7	61.1	2180.0 2320.0 1350.0
3.70	2.40 2.60 1.40	107.00	3.30	1.50	38.5	57.8	2270.0 2445,0 1410,0
4.00	2.40 2.60 1.40	107.00	3.60	1.50	35.6	53.4	2400.0 2560.0 1495.0
4.50	2.40 2.60 1.40	127.00	4.10	1.50	33.7	50.6	2910.0 3090.0 1880.0
5.00	2.40 2.60 1.40	127.00	4.60	1.50	30.3	45.5	3160.0 3360.0 2050.0
5.50	2.40 2.60 1.40	127.00	5.10	1.50	27.6	41.4	3415.0 3635.0 2220.0
6.00	2.40 2.60 1.40	127.00	5.60	1.50	24.5	36.8	3670.0 3910.0 2390.0

Other lengths or custom variants upon request.

SBH SPINDLE
with slot-together extension pipes – for changing trench widths



ADVANTAGE:
Slot-together system comprising two spring spindle holders, spindle and up to six 0.50 m-long extension pipes

SBH spindles are set to the required trench width by simply slotting and pinning together the extension pipes. Up to six extension pipes, each 0.50 m long, or extension pipes up to a total length of 3.00 m can be used as extensions. The extension pipes are available in lengths from 0.30 m to 2.00 m, and so can be combined to achieve your desired working width.

In traditional systems, the extension pipes have to be pinned together. That takes time and requires lots of bolts. But with SBH, you just slot the extension pipes together and pin them – and you are done. The articulated spring spindle holder creates the connection between the plates and the spindles. This makes it possible to alternately press the plates down using the cut and lower method.

ACCESSORIES

You can find the accessory parts

- **Spindle key**
- **Spindle adaptor**
- **Protective rail**
- **4-fold chain with shortening system**
- **Connecting posts**
- **Protective driving cap**

for the Standard Box 600 series on pages 88–91.

SPINDLE TYPE 031/085 BLUE

Number of extension pipes each 0.50 m	Spindle length Working width b_C [m]	Trench width b [m]	Trench width b [m]	Trench width b [m]	Permitted compressive force F [kN]	Weight total G [kg]
		Light Box	Standard Box	Manhole Box		
0	0.98 – 1.26	1.11 – 1.39	1.20 – 1.48	2.00 – 2.28	468.0	65.0
1	1.48 – 1.76	1.61 – 1.89	1.70 – 1.98	2.50 – 2.78	403.0	84.8
2	1.98 – 2.26	2.11 – 2.39	2.20 – 2.48	3.00 – 3.28	348.0	104.6
3	2.48 – 2.76	2.61 – 2.89	2.70 – 2.98	3.50 – 3.78	299.0	124.4
4	2.98 – 3.26	3.11 – 3.39	3.20 – 3.48	4.00 – 4.28	254.0	144.2
5	3.48 – 3.76	3.61 – 3.89	3.70 – 3.98	4.50 – 4.78	210.0	164.0
6	3.98 – 4.26	4.11 – 4.39	4.20 – 4.48	5.00 – 5.28	165.0	183.8

STANDARD BOX WITH TRANSFORMATION PROFILE

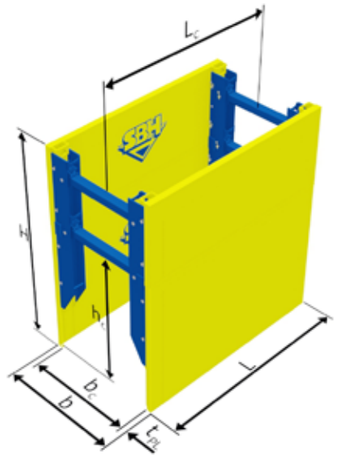
600er Serie

Recommended installation depth:	to 4.00 m
Mobile excavator or crawler excavator:	18.0–30.0 tonnes
Trench width with rigid strut:	2.55–6.55 m
Working width between plates:	2.33–6.33 m
Pipe clearance height (hC):	2.30/2.51 m – plate height 2.40 m/2.60 m
Trench width with rolling struts:	1.67–6.67 m
Working width between plates:	1.45–6.45 m
Pipe clearance height (hC):	2.32/2.53 m – plate height 2.40 m/2.60 m

STANDARD BOX WITH TRANSFORMATION PROFILE
RIGID STRUT

SBH's transformation profile combines base and top plates to form a shoring box whose pipe clearance height is roughly the same as the base plate height.

- Achieve greater pipe clearance heights without having to switch to other types of shoring
- No special transport required, as the box is only assembled to a finished shoring box at the construction site
- Support achieved by means of sturdy 4-squared struts
- Integrated spring spindle holders enable the shoring box to be lowered at alternating sides



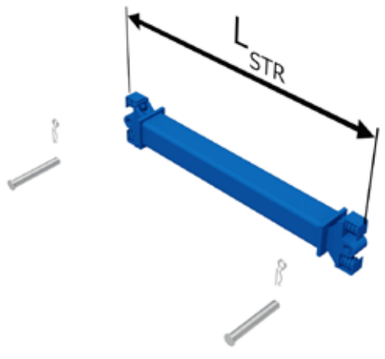
PLATES

Plate length L	Plate height H	Thick-ness t_{PI}	Pipe clearance length L_C	Pipe clearance height h_C	Permissible earth pressure	Limit state design load e_d / Characteristic system resistance R_k	Weight b_C = 2.33 m
[m]	[m]	[mm]	[m]	[m]	[kN/m²]	[kN/m²]	[kg/box]
3.00	2.40 + 1.40 / 2.60 + 1.40	107.00	2.60	2.30 / 2.51	57.0 / 47.6	85.5 / 71.4	5220.0 / 5350.0
3.50	2.40 + 1.40 / 2.60 + 1.40		3.10	2.30 / 2.51	48.9 / 40.8	73.4 / 61.2	5590.0 / 5730.0
4.00	2.40 + 1.40 / 2.60 + 1.40		3.60	2.30 / 2.51	42.8 / 35.7	64.2 / 53.6	5960.0 / 6120.0
4.50	2.40 + 1.40 / 2.60 + 1.40	127.00	4.10	2.30 / 2.51	38.0 / 31.8	57.0 / 47.7	6850.0 / 7040.0
5.00	2.40 + 1.40 / 2.60 + 1.40		4.60	2.30 / 2.51	34.2 / 28.6	51.3 / 42.9	7280.0 / 7480.0
5.50	2.40 + 1.40 / 2.60 + 1.40		5.10	2.30 / 2.51	29.4 / 26.0	44.1 / 39.0	7700.0 / 7920.0
6.00	2.40 + 1.40 / 2.60 + 1.40		5.60	2.30 / 2.51	24.5 / 23.8	36.8 / 35.7	8120.0 / 8360.0

Other lengths or custom variants upon request.

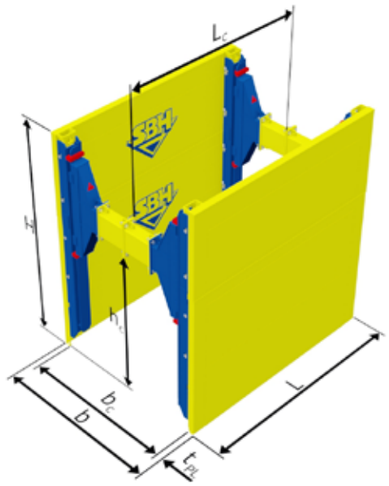
RIGID STRUTS pipes 150.00 x 150.00 mm

Strut length L_{STR}	Working width between Plates Transformation profiles		Permitted compressive force	Weight
[m]	[m]	[m]	[kN]	[kg]
2.00	2.33	1.72	600.0	129.0
2.50	2.83	2.22	600.0	153.0
3.00	3.33	2.72	600.0	176.0
3.50	3.83	3.22	550.0	200.0
4.00	4.33	3.72	500.0	223.0
4.50	4.83	4.22	450.0	247.0
5.00	5.33	4.72	400.0	270.0
5.50	5.83	5.22	350.0	294.0
6.00	633	5.72	300.0	317.0



STANDARD BOX WITH TRANSFORMATION PROFILE
ROLLING STRUTS

- The rolling struts enable simultaneous lowering and lifting of the individual shoring plates
- Reduces tractive forces when removing
- Easy expansion thanks to distance pieces
- Uses the rolling struts from the 780 series Rolling Strut Box
- Flexible pipe clearance positioning



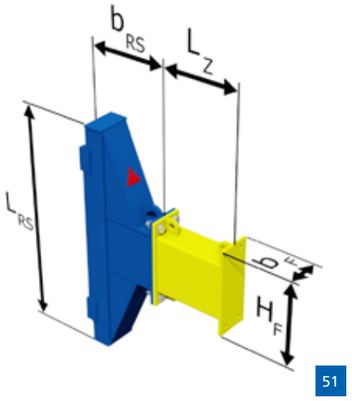
PLATES

Plate length L	Plate height H	Thick-ness t_{PI}	Pipe clearance length L_C	Pipe clearance height h_C	Permissible earth pressure	Limit state design load e_d / Characteristic system resistance R_k	Weight b_C = 2.45 m
[m]	[m]	[mm]	[m]	[m]	[kN/m²]	[kN/m²]	[kg/box]
3.00	2.40 + 1.40 / 2.60 + 1.40	107.00	2.50	2.32 / 2.53	40.7 / 36.0	61.1 / 54.0	531.,0 / 5430.0
3.50	2.40 + 1.40 / 2.60 + 1.40		3.00	2.32 / 2.53	34.9 / 30.8	52.4 / 46.2	5680.0 / 5820.0
4.00	2.40 + 1.40 / 2.60 + 1.40		3.50	2.32 / 2.53	30.5 / 27.0	45.8 / 40.5	6050.0 / 6210.0
4.50	2.40 + 1.40 / 2.60 + 1.40	127.00	4.00	2.32 / 2.53	27.1 / 24.0	40.7 / 36.0	6940.0 / 7120.0
5.00	2.40 + 1.40 / 2.60 + 1.40		4.50	2.32 / 2.53	24.6 / 21.6	36.9 / 32.4	7360.0 / 7560.0
5.50	2.40 + 1.40 / 2.60 + 1.40		5.00	2.32 / 2.53	22.2 / 19.6	33.3 / 29.4	7780.0 / 8000.0
6.00	2.40 + 1.40 / 2.60 + 1.40		5.50	2.32 / 2.53	20.4 / 18.0	30.6 / 27.0	8210.0 / 8440.0

Other lengths or custom variants upon request.

ROLLING STRUTS (RS)

RS length L_{RS}	RS width b_{RS}	Min working width b_C		Min trench width b	Flange dimensions b_F x h_F	Permissible forces	Weight per RS pair
[m]	[m]	Plate	Rolling plate	[m]	[mm]	[kN]	[kg]
1.50	0.50	1.45	1.00	1.67	220.00 x 560.00	-112.0 bis 242.0	360.0



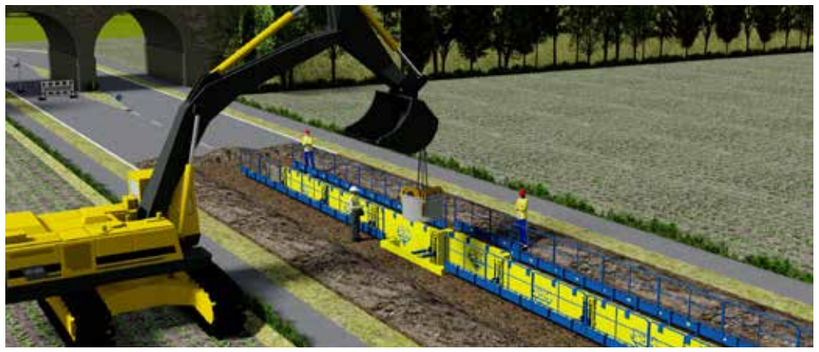
MANHOLE BOX
600 series

Recommended installation depth:	to 4.00 m
Trench width:	2.00–5.28 m
Working width:	1.78–5.06 m
Pipe clearance height (hC):	1.69 m
Mobile excavator or crawler excavator:	18.0–30.0 tonnes

MANHOLE BOX
600 series

The Manhole Box is used when, in continuous pipeline trenches, wider areas for manholes need to be created. The plate body is U-shaped, and forms a recess of 0.40 m at each side of the trench. The result is a working area of up to 0.80 m wide.

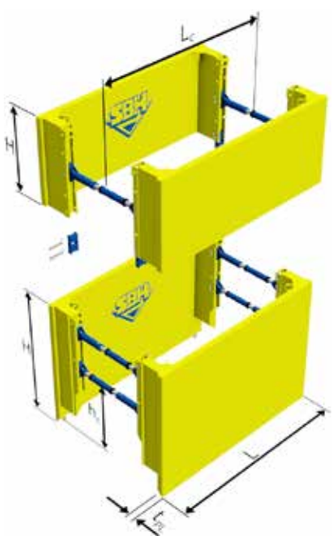
- The areas before and after the manhole are secured using normal shoring boxes
- The spindles and accessories used are the same as those for the shoring boxes



PLATES t_{PL} = 107.00 mm

Plate length L [m]	Plate height H [m]	Pipe clearance length L_c [m]	Pipe clearance height h_c [m]	Permissible earth pressure [kN/m²]	Limit state design load e_d / Characteristic system resistance R_k [kN/m²]	Weight per box [kg]
2.50	2.50	2.10	1.69	5.,1	75.2	2350.0
	1.50					1620.0
3.00	2.50	2.60	1.69	41.8	62.7	2590.0
	1.50					1780.0
3.50	2.50	3.10	1.69	35.8	53.7	2825.0
	1.50					1940.0
4.00	2.50	3.60	1.69	31.3	47.0	3060.0
	1.50					2095.0

lengths or custom variants upon request.



ACCESSORIES

You can find the accessory parts

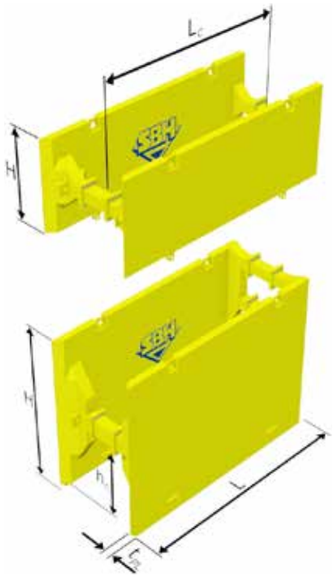
- **Spindle key**
- **Spindle adaptor**
- **Protection rail**
- **4-fold chain with shortening system**
- **Box connectors**

for the Manhole Box 600 series on pages 88–91.

DRAG BOX
650 Series

Recommended installation depth:	to 3.00 m
Trench width:	1.15–6.15 m
Working width:	0.90–2.90 m
Pipe clearance height (hC):	1.82 m
Mobile excavator or crawler excavator:	30.0–50.0 tonnes

DRAG BOX
650 Series



The Drag Box has been designed for trenches in the open air and with stable soils. Further excavation of soil takes place ahead, and the Drag Box is pulled through the excavated trench to the new working position.

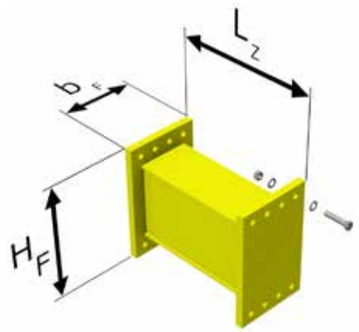
PLATES t_{PL} = 127.00 mm

Plate length L [m]	Plate height H [m]	Pipe clearance length L_c [m]	Pipe clearance height h_c [m]	Permissible earth pressure [kN/m²]	Limit state design load e_d / Characteristic system resist- ance R_k [kN/m²]	Weight without distance piece [kg/box]
4.00	3.00	3.22	1.82	32.5	48.8	343.,0
4.50	3.00	3.72	1.82	28.9	43.4	3740.0
5.00	3.00	4.22	1.82	26.0	39.0	4030.0
5.50	3.00	4.72	1.82	23.7	35.6	4360.0

Other lengths or custom variants upon request.

DISTANCE

Length L_z [m]	Flange weight 290 x 360 mm (2x rear) [kg]	Flange weight 290 x 460 mm (1x front) [kg]
0.25	68.0	86.0
0.50	83.0	105.0
0.75	100.0	127.0
1.00	116.0	147.0



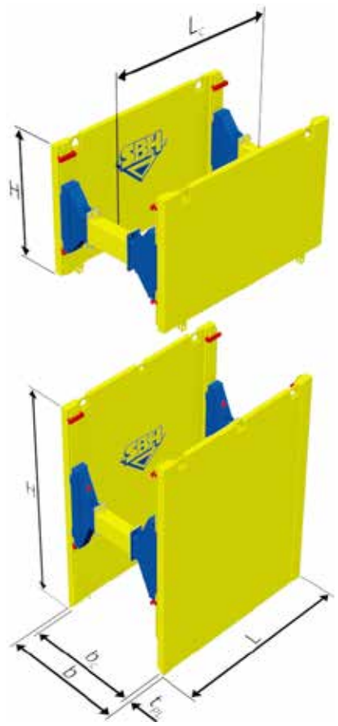
ROLLING STRUT BOX
780 series

Recommended installation depth:	to 6.00 m
Trench width:	1.36–6.38 m
Working width:	1.00–6.00 m
Pipe clearance height (hC):	1.93–2.78 m
Mobile excavator or crawler excavator:	18.0–30.0 tonnes

ROLLING STRUT BOX
780er series

With SBH's Rolling Strut Box, you have a shoring box that also brings with it the advantages of rolling strut shoring.
When laying longer pipes, the rolling struts can be arranged so their heights are offset, enabling the pipes to be fed in.

- Plates supported by means of rolling struts
- Pipe clearance heights infinitely adjustable
- Various working widths thanks to distance pieces
- Plates and rolling struts are pushed together simultaneously
- Also ideal for use with liquid soil
- Low degree of subsidence due to parallel lowering of the shoring system



PLATES t_{PL} = 86.00 mm

Plate length L [m]	Plate height H [m]	Pipe clearance length L_C [m]	Pipe clearance height h_C [m]	Permissible earth pressure [kN / m²]	Limit state design load e_d / Characteristic system resistance R_k [kN/m²]	Weight per box [kg]
3.15	4.00	2.70	2.78	33.9	50.9	3735.0
4.00	3.15	3.55	1.93	33.1	49.7	3535.0

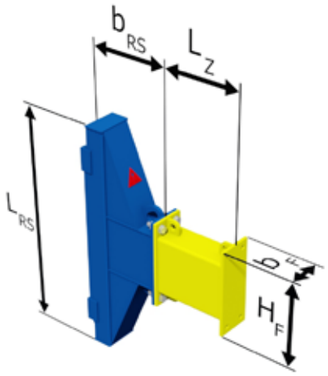
Other lengths or custom variants upon request.

ROLLING STRUTS (RS)

RS length L_{RS} [m]	RS width b_{RS} [m]	Min working width b_C [m]		Min trench width b [m]	Flange dimensions b_F x h_F [mm]	Permissible forces [kN]	Weight per RS pair [kg]
		Plate	Rolling plate				
1.50	0.50	1.17	1.00	1.37	220.00 x 560.00	-112.0 bis 242.0	360.0

DISTANCE PIECE

Length L_Z [m]	Weight [kg]
0.25	62.0
0.50	84.0
0.75	105.0
1.00	126.0
1.50	168.0
2.00	211.0



ACCESSORIES

You can find the accessory parts

- **4-fold chain with shortening system**
- **Protection rail**
- **Spanner**

for the Rolling Strut Box 780 series on pages 88–91.

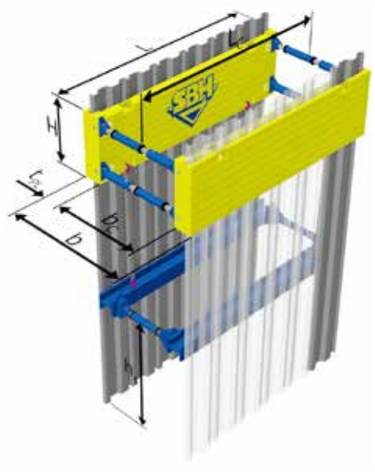
PILE CHAMBER SHORING
400 series

Recommended installation depth:	to 6.00 m
Trench width:	1.30–4.58 m
Working width between inner plates:	0.76–4.04 m
Working width between piles:	1.00–4.28 m
Pipe clearance height (hC):	max 2.00 m
Mobile excavator:	9.0–13 tonnes

PILE CHAMBER SHORING
400 series

This system combines shoring plates and sheet piles.
The pile chamber element creates the guiding frame for the sheet piles, and at the same time serves as the top waler.

- Sheet piles are pressed in by the excavator, ahead of the excavation
- Working width adjusted by means of SBH spindles and extension pipes
- Thanks to welded side parts, the pile chamber plate can also be used in slide rail shoring
- Standard sheet piles KD 6/8, also for other profiles upon request



PILE CHAMBER PLATES h = 1.00 m

Plate length L_{PCE} [m]	L with guide [m]	Pipe clearance length L_c im PCE [m]	Number of KD 6/8	Inner plate thickness t_{PI} [mm]	Permitted boom bracing load q [kN/m]	Weight per plate without/with guide [kg]
1.90	2.00	1.62	3	120.00	261.2	470.0 / 505.0
2.34	2.44	2.06	4		171.6	560.0 / 595.0
2.84	2.94	2.56	5		116.6	660.0 / 695.0
3.42	3.52	3.14	6		80.4	775.0 / 810.0
3.92	4.02	3.64	7		61.2	875.0 / 910.0
4.42	4.52	4.14	7	170.00	116.8	1325.0 / 1360.0
4.92	5.02	4.64	8		94.3	1470.0 / 1505.0
5.42	5.52	5.14	9		77.7	1605.0 / 1640.0
5.92	6.02	5.64	10		65.2	1750.0 / 1785.0

Other lengths or custom variants upon request.

SPINDLE TYPE 031/085 BLUE

Number of extension pipes each 0.50m	Working width b_c between the Piles [m]	Inner plates [m]	Reinforced inner plate [m]	Trench width b [m]	Permissible compressive force [kN]	Weight total [kg]
0	1.00 – 1.28	0.76 – 1.04	0.66 – 0.94	1.30 – 1.58	468.0	65.0
1	1.50 – 1.78	1.26 – 1.54	1.16 – 1.44	1.80 – 2.08	403.0	84.8
2	2.00 – 2.28	1.76 – 2.04	1.66 – 1.94	2.30 – 2.58	348.0	104.6
3	2.50 – 2.78	2.26 – 2.54	2.16 – 2.44	2.80 – 3.08	299.0	124.4
4	3.00 – 3.28	2.76 – 3.04	2.66 – 2.94	3.30 – 3.58	254.0	144.2
5	3.50 – 3.78	3.26 – 3.54	3.16 – 3.44	3.80 – 4.08	210.0	164.0
6	4.00 – 4.28	3.76 – 4.04	3.66 – 3.94	4.30 – 4.58	165.0	183.8

ACCESSORIES

You can find the accessory parts

- **Connector post with slide rail guide**
- **Spindle key**
- **Waler**
- **Spring spindle holder socket**
- **4-fold chain with shortening system**
- **Stopping pad for pile chamber, extendable**

for the Pile Chamber Shoring 400 series on pages 88 – 91.

SINGLE SLIDE RAIL
790 series

Recommended installation depth:	to 3.80 m
Trench width:	1.68–6.68 m
Working width:	1.24–6.24 m
Max pipe clearance height (hC):	2.46 m
Mobile excavator or crawler excavator:	18.0–30.0 tonnes

SINGLE SLIDE RAIL
790 series

SLIDE RAIL PLATES

Plate length L [m]	Plate height H [m]	Thickness t_{Pl} [mm]	Pipe clearance L_C [m]	System length L_S [m]	Permissible earth pressure [kN/m²]	Limit state design load e_d / Characteristic system resistance R_k [kN/m²]	Weight [kg]
2.00	2.40 1.40	107.00	1.80	2.27	158.2	237.3	550.0 355.0
2.50	2.40 1.40		2.30	2.77	101.2	151.8	650.0 420.0
3.00	2.40 1.40		2.80	3.27	70.3	105.5	770.0 495.0
3.50	2.40 1.40		3.30	3.77	51.6	77.4	900.0 580.0
4.00	2.40 1.40		3.80	4.27	39.5	59.3	1010.0 650.0
4.00	2.40 1.40	130.00	3.80	4.27	82.1	123.2	1370.0 880.0
4.50	2.40 1.40		4.30	4.77	64.9	97.4	1530.0 980.0
5.00	2.40 1.40		4.80	5.27	52.6	78.9	1690.0 1070.0
5.50	2.40 1.40		5.30	5.77	43.4	65.1	1850.0 1170.0
6.00	2.40 1.40		5.80	6.27	36.5	54.8	2210.0 1370.0

Other lengths or custom variants upon request.

SLIDE RAILS

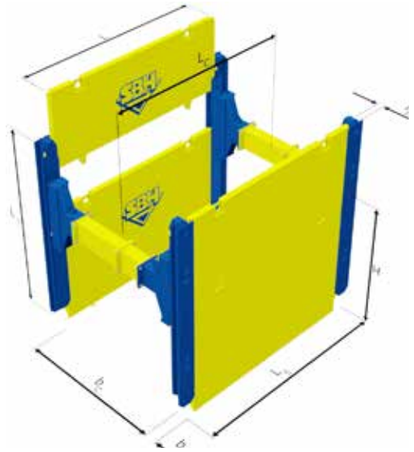
Description	Rail length L_T [m]	Weight per support [kg]	Rail height b_T [mm]	Permissible bending moment [kNm]
Single slide rail	3.50	540.0	220.00	307.0
Corner single slide rail	3.50	390.0	275.00	132.0

ROLLING STRUTS (RS)

Description	RS length L_{RS} [m]	RS width b_{RS} [m]	Min working width b_C [m]	Flange b_F x h_F [mm]	Permissible tractive forces [kN]	Weight per RS pair [kg]
RS	1.24	0.62	1.24	405.00 x 420.00	-100.0 bis 639.0	620.0

DISTANCE PIECE

Length L_Z [m]	RS Flange [mm]	RS Weight [kg]
0.25	405.00 x 420.00	99.0
0.50		128.0
0.75		157.0
1.00		185.0
2.00		303.0
3.00		421.0



These are primarily used for medium trenches with high pipe clearances and in environments where there is the risk of subsidence. With this slide rail system, the shoring plates are only inserted in one guide level.

ACCESSORIES

You can find the accessory parts

- **Assembly helps**
- **Protection rails**
- **Clamping device**
- **Spanner**

for the Single Slide Rail 790 series on pages 88–91.

DOUBLE SLIDE RAIL

750er series

Recommended installation depth:	to 9.00 m
Trench width:	2.64–7.64 m
Working width:	1.24–6.24 m
Pipe clearance height (hC):	up to 3.80 m with DSR 5.50 m
Pipe clearance height (hC):	up to 4.80 m with DSR 6.50 m
Pipe clearance height (hC):	up to 5.10 m with DSR 7.50 m
Crawler excavator to depth = 6.20 m	24.0–31.0 tonnes
Crawler excavator to depth > 6.20 m	30.0–50.0 tonnes

DOUBLE SLIDE RAIL
750er series

SLIDE RAIL PLATES

Plate length L [m]	Plate height H [m]	Thickness t_{PI} [mm]	Pipe clearance L_C [m]	System length L_S [m]	Permissible earth pressure [kN/m²]	Limit state design load e_d / Characteristic system resistance R_k [kN/m²]	Weight [kg]
2.00	2.40 1.40	107.00	1.80	2.27	158.2	237.3	550.0 355.0
2.50	2.40 1.40		2.30	2.77	101.2	151.8	650.0 420.0
3.00	2.40 1.40		2.80	3.27	70.3	105.5	770.0 495.0
3.50	2.40 1.40		3.30	3.77	51.6	77.4	900.0 580.0
4.00	2.40 1.40		3.80	4.27	39.5	59.3	1010.0 650.0
4.00	2.40 1.40	130.00	3.80	4.27	82.1	123.2	1370.0 880.0
4.50	2.40 1.40		4.30	4.77	64.9	97.4	1530.0 980.0
5.00	2.40 1.40		4.80	5.27	52.6	78.9	1690.0 1070.0
5.50	2.40 1.40		5.30	5.77	43.4	65.1	1850.0 1170.0
6.00	2.40 1.40		5.80	6.27	36.5	54.8	2210.0 1370.0

Other lengths or custom variants upon request.

DOUBLE SLIDE RAIL

Description	Rail lengths L_T [m]	Weight per support [kg]	Rail height b_T = type [mm]	Permissible bending moment [kNm]
Standard – 750 series	4.50	960.0	375.00	672.0
Standard – 750 series	5.50	1170.0		
Top rail – 750 series	3.00	650.0		
Mega – 750 series	6.50	1710.0	405.00	927.0
Mega – 750 series	7.50	2000.0		
Mega top rail – 750 series	3.00	760.0		

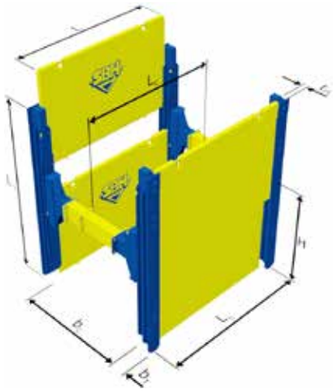
CORNER DOUBLE SLIDE RAILS

Description	Rail length L_T [m]	Weight per support [kg]	Rail height b_T [mm]	Permissible bending moment [kNm]
Standard – 750 series	4.50	810.0	430.00	328.0
Standard – 750 series	5.50	950.0		
Standard – 750 series	6.50	1130.0		
Standard – 750 series	7.50	1305.0		
Corner top rail – 750 series	3.00	530.0		

The double slide rails in the 750 series are used for deep trenches with high pipe clearances and in environments where there is the risk of sub-sidence. Different slide rails can be used, which enables a wide range of applications.

- Easy installation and removal thanks to offset guide levels
- Greater depths as a result of two guide levels
- High flexibility thanks to different slide rails
- Using corner rails, plates can be connec-ted all around the corners to form a pit.

DOUBLE SLIDE RAIL MINI
750 SERIES



DOUBLE SLIDE RAIL STANDARD
750 SERIES

DOUBLE SLIDE RAIL MEGA
750 SERIES

ROLLING STRUTS (RS)

Description	RS length L_{RS} [m]	RS width b_{RS} [m]	Min working width b_C [m]	Flange b_F x h_F [mm]	Permissible forces [kN]	Weight per RS pair [kg]
Mini – RS	1.24	0.62	1.24	405.00 x 420.00	-100.0 bis 639.0	620.0
Standard – RS	2.04	0.62	1.00 / 1.24	405.00 x 720.00	-200.0 bis 780.0	980.0
Mega – RS	3.04	0.92	1.83	405.00 x 1220.00	-374.0 bis 973.0	1700.0
RS for top rail	1.24	0.62	1.00 / 1.24	405.00 x 420.00	-100.0 bis 639.0	620.0

DISTANCE PIECES

Length L_Z [m]	Mini/RS for top rail Flange [mm]	Mini/RS for top rail Weight [kg]	Standard – RS Flange [mm]	Standard – RS Weight [kg]	Mega – RS Flange [mm]	Mega – RS Weight [kg]
0.25	405.00 x 420.00	99.0	405.00 x 720.00	163.0	405.00 x 1220.00	306.0
0.50		128.0		201.0		363.0
0.75		157.0		239.0		418.0
1.00	405.00 x 420.00	185.0	405.00 x 720.00	277.0	405.00 x 1220.00	474.0
2.00		303.0		437.0		714.0
3.00		421.0		597.0		960.0

ACCESSORIES

You can find the accessory parts

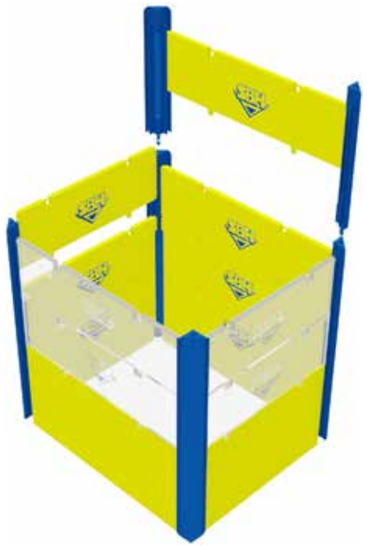
- **Assembly helps**
- **Protection rail**
- **Lowering help**
- **Clamping device**
- **Spanner**

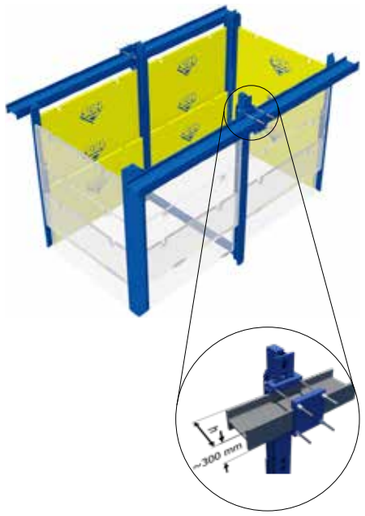
for the Double Slide Rail 750 series on pages 88–91.

SLIDE RAIL SPECIAL SOLUTIONS

SLIDE RAIL SPECIAL SOLUTIONS
PIT SHORING

- By combining the corner rails with rolling strut frames, you can implement the widest range of pit dimensions.
- Strut-free trenches, for example for laying longer pipes, building a structure or for using a pipe jacking machine, can be realized with the clamping device.
- If the trench is deeper than the base rail length, you must extend it using extension rails.



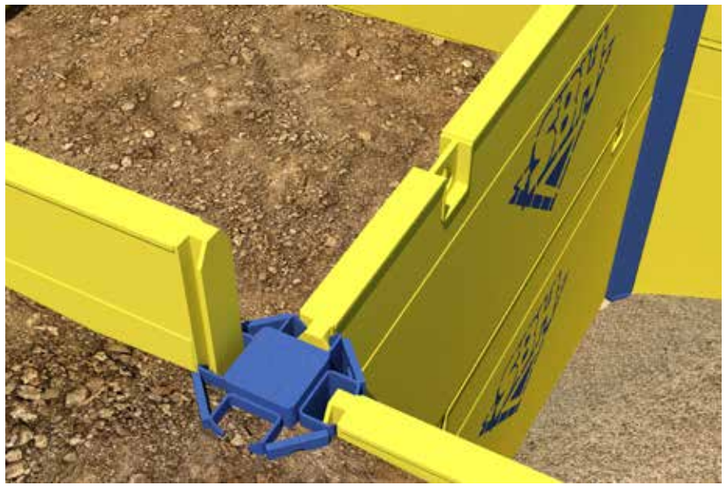


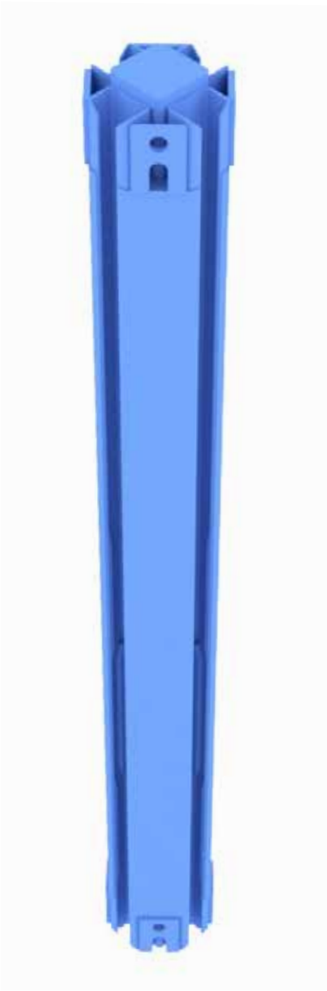
TECHNICAL PARAMETERS

Description	Dimensions [mm]	Weight [kg]
Clamping device for walers Width ~300.00 mm, height variable	550.00 x 520.00 x h	275.0

4-SIDED CORNER SLIDE RAIL

- The 4-sided corner slide rail is predominantly used for soil replacement works. Primarily for trench depths up to 3.80 m.

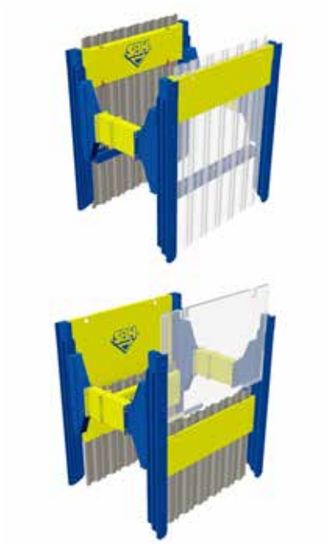




TECHNICAL PARAMETERS

Description	Rail length [mm]	Weight [kg]
4-sided corner slide rail	3500.00	780.0
	4000.00	880.0

SLIDE RAIL SPECIAL SOLUTIONS
PILE CHAMBER SHORING



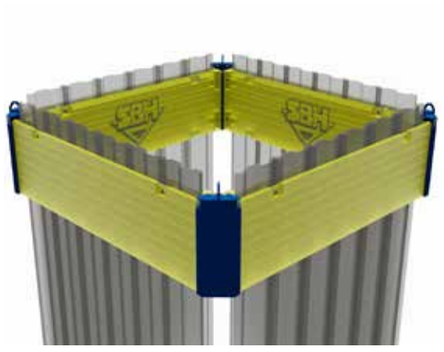
The pile chamber plates, with their guides at the sides, are also used in the rolling strut shoring. Where pipes and cables cross the excavated area, there are two options for using pile chamber plates.

- **Pile chamber with rolling strut shoring and walers**
  The pile chamber plates inserted into the slide rails' outer guides, and so it is level with the ground surface. Depending on static requirements, one or more walers are inserted into the slide rail's inner guides further down.
- **Pile chamber with rolling strut shoring and slide rail plates**
  The pile chamber plate is installed in combination with slide rail plates, whereby the slide rail plates are inserted into the slide rail's outer guides and the pile chamber plates are inserted further down, in the slide rail's inner guides.
- The corner connector provides a friction-locked connection between the pile chamber plate, to form a pit shoring.

PILE CHAMBER PLATES h = 1.00 m

Plate length L_{PCE} L with guide [m]		Pipe clearance length L_C im PCE [m]	Number of KD 6/8	Inner plate thickness t_{PI} [mm]	Permitted boom bracing load q [kN/m]	Weight per plate without/with guide [kg]
1.90	2.00	1.62	3	120.00	261.2	470.0 / 505.0
2.34	2.44	2.06	4		171.6	560.0 / 595.0
2.84	2.94	2.56	5		116.6	660.0 / 695.0
3.42	3.52	3.14	6		80.4	775.0 / 810.0
3.92	4.02	3.64	7		61.2	875.0 / 910.0
4.42	4.52	4.14	7	170.00	116.8	1325.0 / 1360.0
4.92	5.02	4.64	8		94.3	1470.0 / 1505.0
5.42	5.52	5.14	9		77.7	1605.0 / 1640.0
5.92	6.02	5.64	10		65.2	1750.0 / 1785.0

Other lengths or custom variants upon request.



SPECIAL DEVICES

HYDRALIFTER

SBH's Hydralifter is the safe equipment for simply and easily removing shoring plates and rails. The hydraulic system increases the tractive force to 100 tonnes. Even small excavators can therefore remove shoring plates and rails quickly, safely and without damaging the materials.

- 100 tonnes tractive force
- For Oilquick and Likufix quick-coupling systems or for use with external hydraulic units

For large shoring plates of up to 7.00 m in length, it increases the effectiveness of small excavators in particular, thanks to its hydraulic tractive force boosting.

- Safe and easy access recommended to a depth of 5.00 m
- David and fall protection device, for safely entering and exiting the construction trench
- Rescue injured workers
- Easily and safely attach your ladders
- CE-certified
- Suitable for all SBH shoring systems
- Lightweight fall protection, compliant with DIN EN
- Lengths from 0.5 m to 3.00 m with weights from 8.0–38.0 kg. With additional 2.6–3.5 kg per barrier post
- Optimum protection for workers on your construction site
- 2-person assembly

Gap closure for sealing and securing unsecured corners of construction trenches.

FALL PROTECTION

FALL PROTECTION BARRIERS

Description	Length [m]	Dimensions b x h [mm]	Weight [kg]
Barrier	0.50	30.00 x 1060.00	16.0
Barrier	1.50	30.00 x 1060.00	19.0
Barrier	2.00	30.00 x 1060.00	22.0
Barrier	2.50	30.00 x 1060.00	25.0
Barrier	3.00	30.00 x 1060.00	28.0

FALL PROTECTION

Description	Dimensions b x h x t [mm]	Working length Total [m]	Fall arrest Total [kN]	Lifting load Total [kg]	Weight [kg]
David set	~ 261.00 x 855.00 x 2730.00	15.00	6.0	135.0	~ 55.5

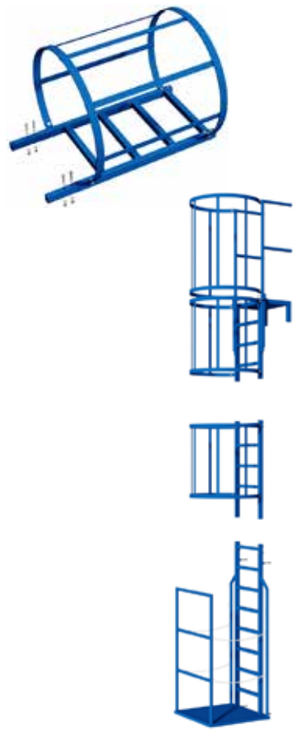
EASY ACCESS

Description	Dimensions b x h x t [mm]	Weight [kg]
Easy access	~ 1620.00 x 1250.00 x 1400.00 (inc ladder latch)	165.0 kg

TRENCH SAFETY LADDER

The trench safety ladder with easy access to secure against falling is the ideal complement for almost all SBH shoring systems, and ensures that workers enter and exit the trench safely. This is a hinged vertical ladder for entering temporary trenches.
Because trenches have different depths, or the trench depth can change during use, the vertical ladder is combined with a connected leaning ladder, in order to provide the required flexibility. The standard design is 4 m (including one connecting piece). However, a modular construction is also possible, using additional connecting pieces. In this way, the length of the additionally required leaning ladder can be kept as short as possible, in order to guarantee the greatest possible safety.

- Recommended from a depth of 5.00–10.00 m
- Standard design 4 m (including one connecting piece)
- Max length 10 m (including seven connecting pieces)
- Own weight at 4.00 m = 220.0 kg
  Weight of connecting piece = 39.0 kg



CONNECTOR 250 SERIES

Connects two shoring plates

RELEASE HOOK 260 SERIES

Releases the hose's quick coupling to the pump on the support

4-FOLD CHAIN WITH SHORTENING SYSTEM

Transporting, inserting and removing shoring boxes

SPINDLE KEY

Adjusting of spindles

4-FOLD ROPE 250 SERIES

Transporting, inserting and pulling out aluminium shoring

PIPE HOOK 260 SERIES

Draining the frame in the trench

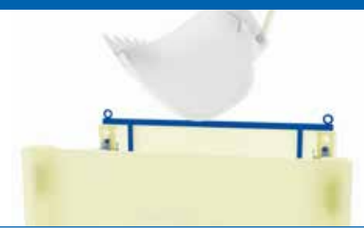
PROTECTION RAIL 600 AND 700 SERIES

Protects shoring plates when pressing them in

BOX CONNECTOR 300 AND 600 SERIES

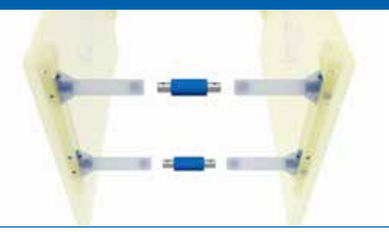
Connects base and extension plates

PROTECTION RAIL 100 AND 300 SERIES



Protects shoring plates when pressing them in

ADAPTOR PIECE FOR SPINDLES 300 AND 600 SERIES



Replacement for spindle element; rigid spindle

STOPPING PAD 400 SERIES

Holds the pile chamber plates securely in place

WALER FOR PILE CHAMBER PLATES WITHOUT SLIDE RAIL GUIDE

HEB240 without guides with attachment points

PROTECTIVE DRIVING CAP 300 AND 600 SERIES

Protects shoring plates when pressing them in

SPINDLE LIFTING ATTACHMENT 300 AND 600 SERIES

Transporting spindles

CONNECTOR POST WITH SLIDE RAIL GUIDE 400 SERIES

Connects pile chamber plates to form a manhole

WALER FOR PILE CHAMBER PLATES WITH SLIDE RAIL GUIDE

Type 1, with guide for external pile chamber plates with attachment points

SPRING SPINDLE HOLDER SOCKET

Mounting and extending the spindles on the walers

WALER FOR PILE CHAMBER PLATES WITH SLIDE RAIL GUIDE

Type 2, with guide for internal pile chamber plates with attachment points

CLAMPING DEVICE 750/790 SERIES

Rear anchoring of the slide rails to the walers

SPANNER 750/790 SERIES

Tightening and loosening screw connections M30

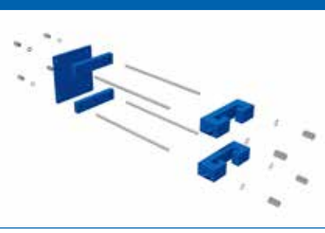
PROTECTION RAIL WITH CONNECTOR 700 SERIES

Protects shoring plates when pressing them in

ASSEMBLY HELP FOR DOUBLE SLIDE RAIL 750 SERIES

Transporting slide rails and fitting to frames

CLAMPING DEVICE



Rear anchoring of the slide rails to the walers

EXPANSION PANEL

Closing off a 90° bend in the course of the trench (district heating lines)

UPLIFT PROTECTION 100 AND 300 SERIES

Fixes the pipes when used with liquid soil

ASSEMBLY HELP FOR SINGLE SLIDE RAIL 790 SERIES

Transporting slide rails and fitting to frames

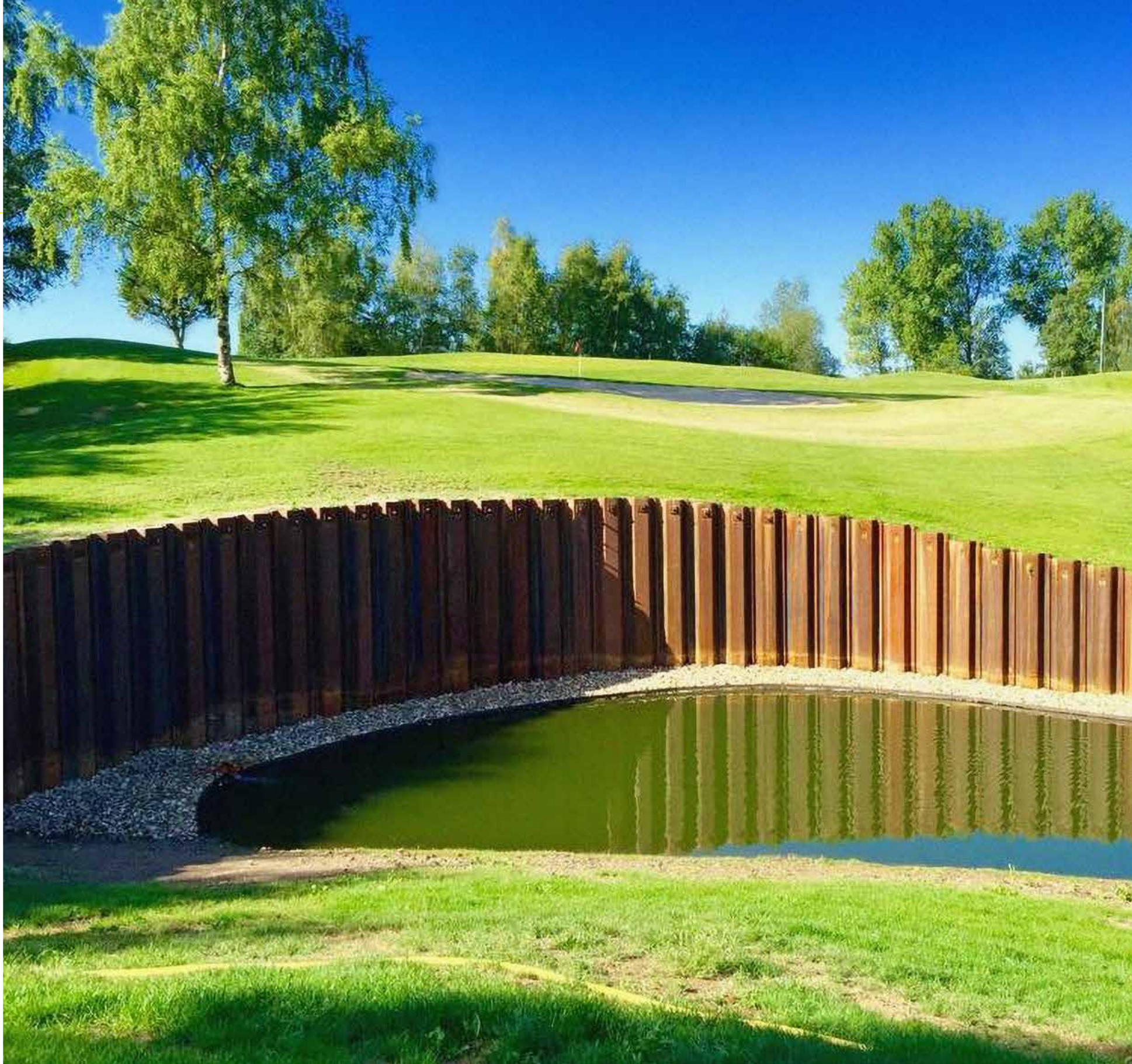
LOWERING HELP 750 SERIES

Lowering aid for slide rail shoring plates, inner guide

INSTALLATION DEVICE

Setting the final corner slide rail of a pit

COLD-ROLLED SHEET PILES

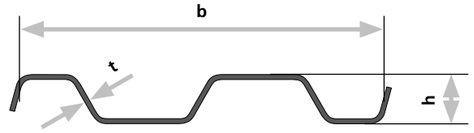


COLD-ROLLED SHEET PILES

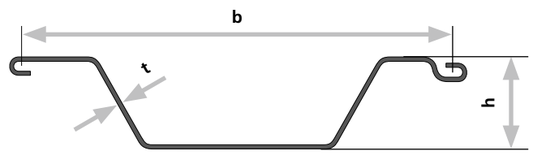
In our factory in Heinsberg, Germany, we roll sheet piles and interlocking profiles of the widest variety of sizes and dimensions in our own cold rolling mill. With a wide range of series-produced rolled profiles, we have the appropriate products for the widest range of different construction projects.

SBH Profile	Width b [mm]	Height h [mm]	Thickness t [mm]	Moment of inertia I [cm⁴/m]	Moment of resistance W [cm³/m]	Weight per m [kg/m]	Weight per m² [kg/m²]	Permissible bending moment S235JRC [kNm/m]	Permissible bending moment S275JRC [kNm/m]
KD 6/8	600.00	80.00	8.00	968.0	242.0	50.0	83.2		51.5
LP 76/7	700.00	150.00	7.00	3.585.0	478.0	53.3	76.0		88.0
LP 88/8	700.00	151.00	8.00	4.133.0	552.0	61.6	88.0		101.6
OMEGA 7	750.00	277.00	7.00	12.778.0	1.065.0	68.0	90.0		195.0
OMEGA 8	750.00	278.00	8.00	14.294.0	1.237.0	76.8	103.0		233.0
OMEGA 9	750.00	279.00	9.00	16.083.0	1.393.0	86.3	115.0		287.0

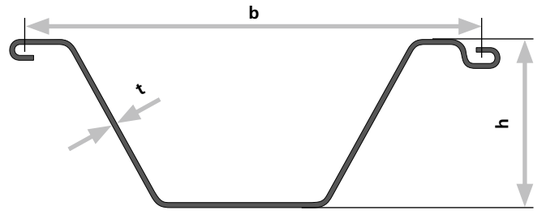
KD 6/8 sheet piles



LP interlocking type



OMEGA profile

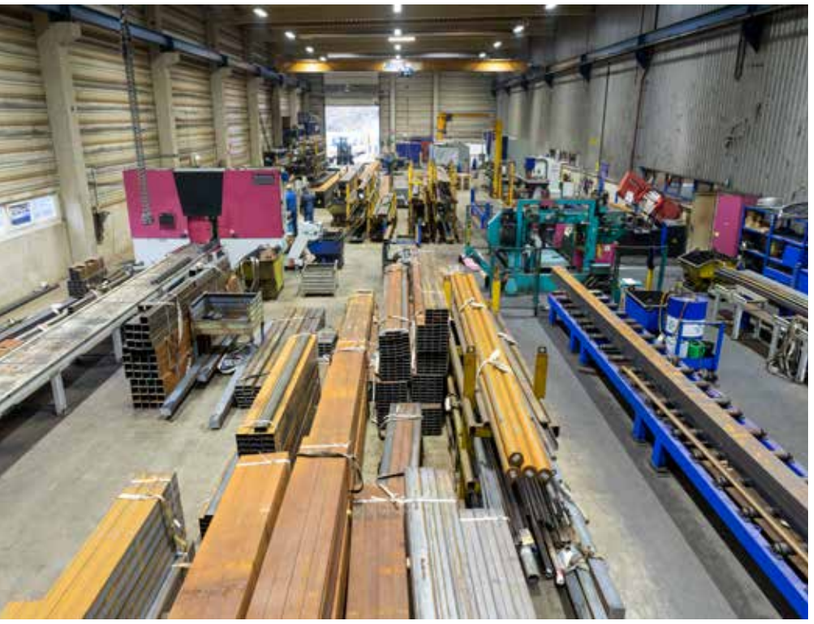


COMPANY PORTRAIT

Since 1986, SBH has been your partner for high quality, powerful civil engineering technology, ‘Made in Germany’. Our practice-orientated solutions are created at two sites, together spanning more than 40,000 square metres, in Heinsberg in the state of North Rhine-Westphalia. From ultra-lightweight aluminium shoring for smaller construction projects using light construction machinery to double slide rail shoring for greater depths. Our production facilities in the heart of Europe ensure all products are available for our customers ‘just in time’. As well as our company headquarters in Heinsberg, SBH also runs sales offices in Dubai, Moscow, Kuala Lumpur, Brisbane and in the USA.

COMPANY PORTRAIT

Smooth production, while at the same time maintaining the consistent high quality of SBH's products, is guaranteed thanks to innovative production lines and extensive automation. All the rolled trench sheets offered by SBH are produced in-house in our own rolling mill. Our lengthy experience in the shoring business forms the foundation for all SBH's services. The reliable load limits are also often underscored by comprehensive bench tests.



Thanks to design optimisation and the use of selected steel grades, SBH's products achieve maximum loads while at the same time using as little material as possible. The company's quality processes have been certified to ISO 9001, and are inspected annually by the TÜV.

With around 70% of our products being exported, SBH's shoring products can be seen at construction sites all over the world.

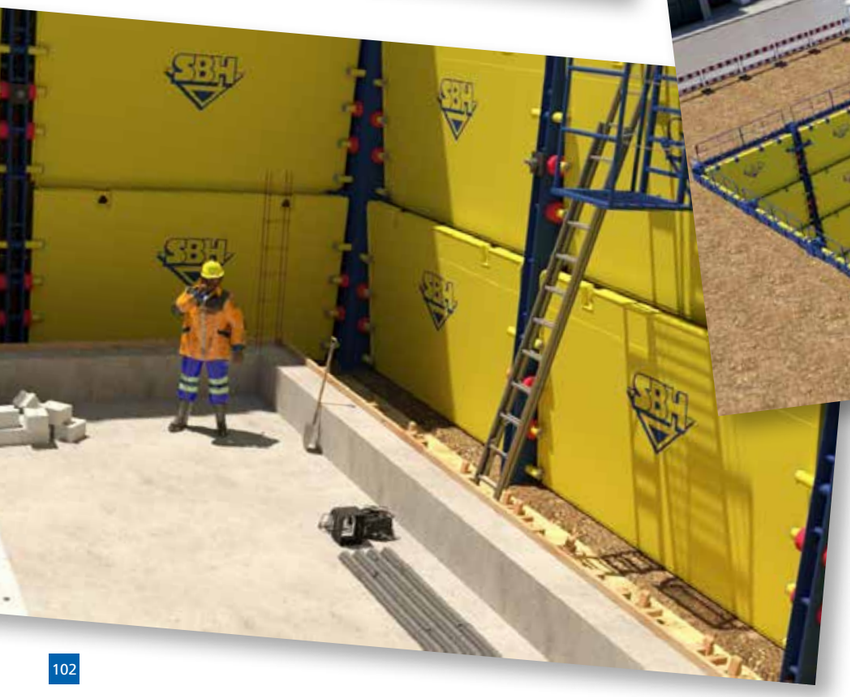
In total, customers in 54 countries benefit from the shoring systems from Heinsberg. SBH Tiefbautechnik's dense worldwide sales network guarantees rapid product availability and excellent local service.

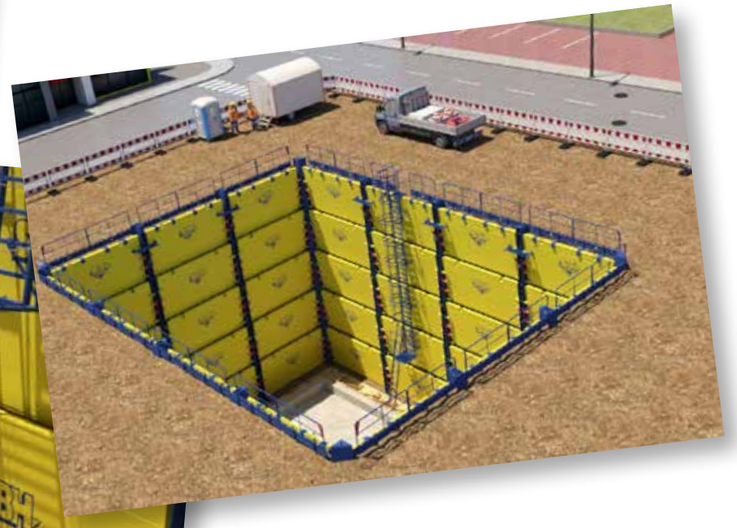
For many authorities, engineering offices and construction companies, SBH is their expert contact right from the start when civil engineering projects need to be planned and implemented. Our own design and static department draws on many years' shoring experience, and so is familiar with the hazards that can occur, averting them by planning use of the correct shoring and other equipment.


ABUS 23 t
ABUS 3,2 t

OTHER INTERESTING
SBH PRODUCTS

SBH BEAM & PLATE
DRIVING BEAM





SBH BEAM & PLATE
AUGER BEAM

PLATE GRIPPER

BOX GRIPPER

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