Materials Services
Infrastructure

Instructions for use

Single slide-rail shoring
Emunds+Staudinger

Single slide-rail linear shoring

Single slide-rail innercity shoring

thyssenkrupp

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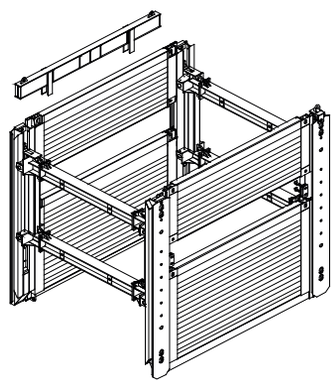
System overview

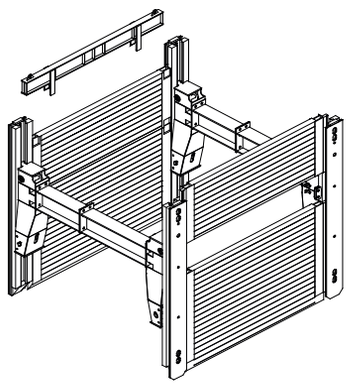
1. Single slide rail linear shoring (RS)



Module length	2,13 m - 6,38 m
Length slide rail	4,13 m
Panel height	1,32 m / 2,32 m
Pipe culvert height	variable

Designation for slide-rail system X conforming to EN 13331-1:
e. g.: RS - X - FR - F - 4,13 - 0,90 / max. - 0,90 / max.

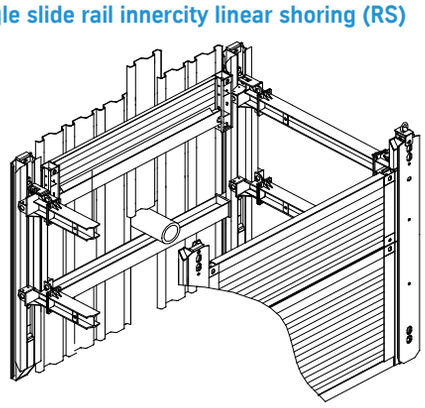
2. Single slide rail linear shoring U-type roller unit (RS)



Module length	2,13 m - 6,38 m
Length slide rail	4,13 m
Panel height	1,32 m / 2,32 m
Pipe culvert height	variable

Designation for slide-rail system X conforming to EN 13331-1:
e. g.: RS - X - FR - F - 4,13 - 0,90 / max. - 0,90 / max.

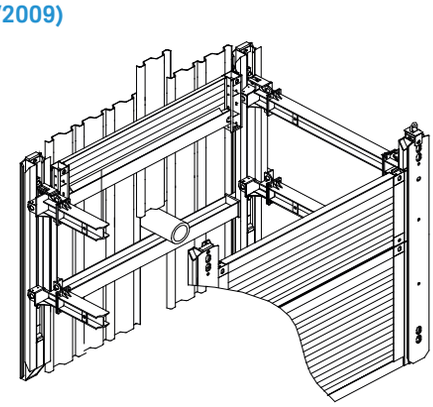
3. Single slide rail innercity linear shoring (RS)



Module length	2,84 m - 4,38 m
Length slide rail	4,13 m
Height sheet pile element	1,00 m
Length sheet piles (KD VI / 8)	variable

Designation for slide-rail system X conforming to EN 13331-1:
e. g.: RS - X - FR - F - 4,13 - 0,90 / max. - 0,90 / max.

4. Single slide rail innercity linear shoring (RS) (before 09/2009)



Module length	3,88 m - 4,13 m
Length slide rail	4,13 m
Height sheet pile element	1,00 m
Length sheet piles (KD VI / 8)	variable

Designation for slide-rail system X conforming to EN 13331-1:
e. g.: RS - X - FR - F - 4,13 - 0,90 / max. - 0,90 / max.

Occupational safety and general remarks according to DIN EN 13331-1/2

1. Lifting, handling, pulling, dragging

Handling should be carried out as close to the ground as possible.

Slings (chain type and thickness, load hooks) must be chosen to suit the weight being handled (e.g. trench box or slide rail).

To prevent the accidental detachment of the load during lifting, pulling or handling, only load hooks with safety catches may be used.

Particularly when pulling loads, the pulling forces defined in section 7.4.16 in DIN EN 13331/1 must be observed.

The load must be slung in such a way that the shoring is in a horizontal position and swinging during handling is reduced to a minimum.

The shoring must be lowered onto level and firm ground.

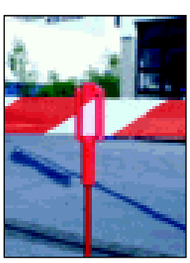
It is prohibited to stand within the pivoting range of the excavator/crane and beneath suspended loads.

A load operator may only stand to the front left of the excavator, in constant eye contact with the machine operator.

It is always prohibited to stand within the danger zone.

Observe the industrial safety ordinance and the accident prevention regulations for lifting gear.

2. Measures to reduce hazards



The safety of vehicles and persons on site must be ensured with the aid of cones, warning tape or safety staff specially deployed for this purpose.

The construction site should be sufficiently marked as such with the aid of warning signs, for instance.

The risk of instability as a consequence of wind loads when setting up the shoring on the edge of the trench must be considered.

The shoring should be secured against accidental impacts and set up in a sufficiently stable position (sufficient width and firm ground).

When handling, installing and removing shoring, watch out for overhead power cables.

On sloping or uneven ground, the shoring should be set up if possible at right angles to the slope.

3. Reasons for taking parts out of service and instructions for repair

Before use, all shoring components must be checked for their correct function.

Reasons for taking worn or damaged parts out of service include:

- Missing parts, such as nuts, screws, posts, pins and stabilizers.
- Broken parts such as spindles, pins and spreader systems in general.
- If parts are severely deformed or misshapen or if there are holes in panel bodies, for instance, the manufacturer should be consulted in cases of doubt.
- In all cases of doubt, always consult the manufacturer.

Faulty parts must be replaced or repaired.

Minor repairs can be carried out by the user, after consultation with the manufacturer.

Only original replacement parts from the manufacturer may be used.

There is no warranty on incorrectly performed repairs and the use of non-original parts.

The requirements of the industrial safety ordinance apply.

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4. Procedure in the event of an accident

In the event of an accident, casualties must be given first aid immediately.

The scene of the accident must be cordoned off and left unchanged.

If the injured person is expected to be unfit for work, an accident insurance doctor must be consulted.

All accidents must be reported immediately to the superior or his deputy.

The accident must be entered in the accident record book.

The currently valid versions of the following documents apply:

- Provisions of the Civil Engineering Committee of the Accident Insurance Institution
- DIN 4124 "Baugruben und Gräben" (pits and trenches)
- DIN EN 13331, Part 1: Product Specifications, Part 2: Assessment by Calculation or Test
- General safety instructions and the relevant industrial safety ordinances

Our products bear the "Geprüfte Sicherheit" (GS) quality seal.

During installation, the instructions contained in the manufacturer's manual must be referred to and observed.

Single slide rail system Linear shoring

Linear shoring is suitable for casting concrete in-situ place and can be flexibly adapted to any construction project. The ground outside the trench remains largely unaffected, and buildings and traffic flow are not impaired – a level of performance that was long-considered unattainable.

On linear shoring, rigid boogie cars that are height-adjusted to match the increasing depth keep the beams and shoring panels at the same distance apart at all times; the trench width remains unchanged at all stages of the project. The width of the rigid frame is adapted with spreaders to the desired trench width. The boogie car maintains precise right angles – everything stays linearly aligned, always at the same distance from the opposite side. This ensures more efficient, faster, better-quality, and noticeably more cost-effective operations, with a major advantage of the system being derived from the design of the beam. For only on the linear shoring system is it possible to pivot in the shoring panels from the side.

Basic data

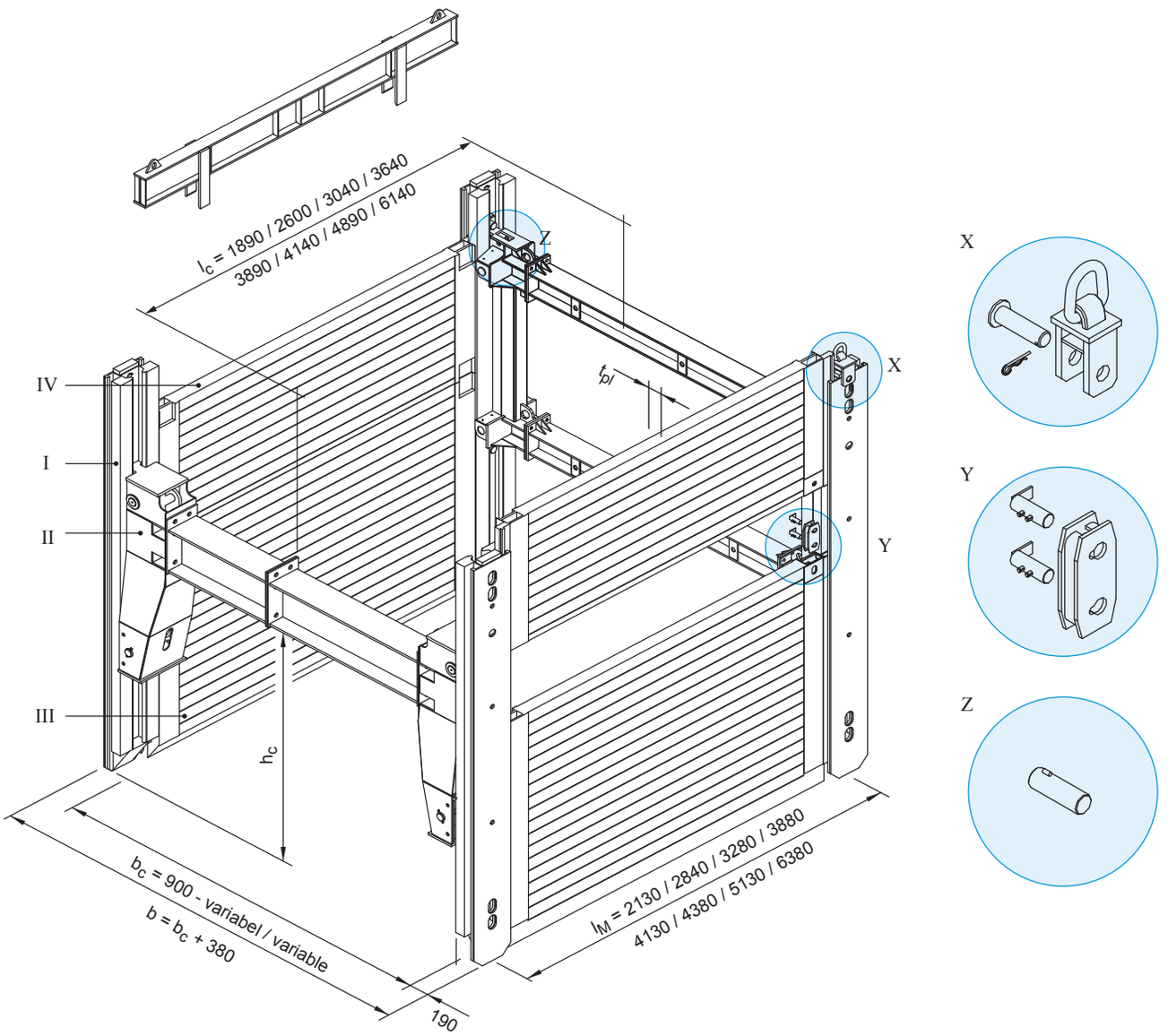
Module length	2,13 m - 6,38 m
Length slide rail	4,13 m
Panel height	1,32 m / 2,32 m
Pipe culvert height	variable
Trench width	variable, see page 32-33

Advantages

- Cost-effective shoring
- No adverse impact on building development or traffic
- Suitable for in-situ concrete

Technical contents are subject to change. Publishing date 08/11/2016

Single slide rail Linear shoring with U-type or rectangular boogie car



(All dimensions in mm. The details of length of pipe opening l_c refer to the rectangular boogie car.)

I	Linear shoring support	l_c	Pipe culvert length	X	Pull adapter
II	Boogie car	b	Shoring / trench width	Y	Connector
III	Base panel	b_c	Inner width	Z	Pin
IV	Top panel	h_c	Pipe culvert height		
l_M	Module length	t_{pl}	Thickness		

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Linear shoring support

Art. No.	Short description	l [m]	G [kg]
820 935	Linear shoring support, single slide rail	**4,13**	710,0

Base panels -inside- (height 2.32 m), Single slide rail and double slide rail linear shoring

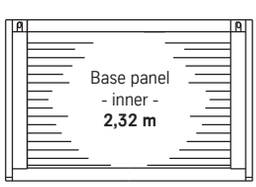
Art. No.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
821 120	**1,89**	2,13	0,11	1,89	519,0	4,38	176,00
821 160	**2,60**	2,84	0,11	2,60	650,0	6,03	90,00
821 250	**3,04**	3,28	0,11	3,04	733,0	7,05	65,50
821 610	**3,64**	3,88	0,11	3,64	845,0	8,44	45,20
821 850	**3,89**	4,13	0,11	3,89	968,0	9,02	39,40
821 855	**4,14**	4,38	0,15	4,14	1.300,0	9,58	81,00
821 860	**4,89**	5,13	0,15	4,89	1.505,0	11,34	58,10
821 861	**6,13**	6,38	0,15	6,13	1.880,0	14,22	36,60

Top panels -inside- (height 1.32 m), Single slide rail and double slide rail linear shoring

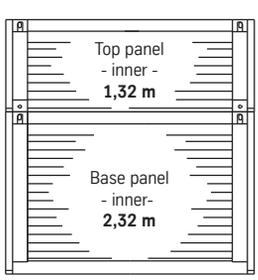
Art. No.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
822 060	**1,89**	2,13	0,11	1,89	356,0	2,49	176,00
821 180	**2,60**	2,84	0,11	2,60	450,0	3,43	90,00
822 120	**3,04**	3,28	0,11	3,04	519,0	4,01	65,50
822 620	**3,64**	3,88	0,11	3,64	620,0	4,80	45,20
822 760	**3,89**	4,13	0,11	3,89	649,0	5,13	39,40
822 783	**4,14**	4,38	0,15	4,14	873,0	5,45	81,00
822 800	**4,89**	5,13	0,15	4,89	1.098,0	6,45	58,10
822 801	**6,13**	6,38	0,15	6,13	1.370,0	8,09	36,60

The details of length of pipe opening l_c refer to the rectangular boogie car.

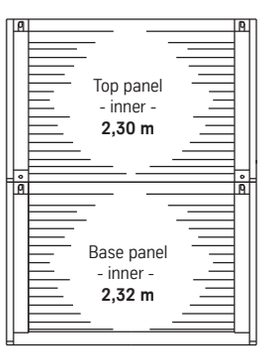
Combinations of height Single slide rail Linear shoring



Trench depth approx. 2,30 m



Trench depth approx. 3,60 m



Trench depth approx. 4,60 m

Linear shoring boogie car

Art. No.	Short description	l [m]	G [kg]
832 200	Rectangular boogie car	**2,00**	420,0
832 215	Linear shoring rectangular boogie car	**2,20**	490,0
832 205	Linear shoring U-type boogie car	**2,00**	550,0

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Extension bars for rectangular boogie car

Art. No.	Short description	l [m]	G [kg]
830 005	Extension bar HEB 220	**0,140**	38,0
830 010	Extension bar HEB 220	**0,275**	50,0
830 011	Extension bar HEB 220	**0,350**	55,0
830 012	Extension bar HEB 220	**0,375**	57,0
830 015	Extension bar HEB 220	**0,412**	60,0
830 020	Extension bar HEB 220	**0,550**	70,0
830 030	Extension bar HEB 220	**1,100**	110,0
830 075	Extension bar HEB 220	**1,650**	152,0
830 125	Extension bar HEB 220	**2,200**	192,0
830 300	Extension bar HEB 220	**3,300**	278,0
830 305	Extension bar HEB 220	**4,400**	358,0

Extension bars for U-type boogie car

Art. No.	Short description	l [m]	G [kg]
831 503	Extension bar HEA 450	**0,140**	77,0
831 500	Extension bar HEA 450	**0,275**	107,0
831 507	Extension bar HEA 450	**0,375**	115,0
831 510	Extension bar HEA 450	**0,550**	140,0
831 520	Extension bar HEA 450	**1,100**	220,0
831 530	Extension bar HEA 450	**1,650**	300,0
831 540	Extension bar HEA 450	**2,200**	375,0

Trench widths, Single slide rail shoring

Length extension bar [m]	b_c [m]	b [m]
without extension bar	0,900	1,280
0,140	1,040	1,420
0,275	1,175	1,555
0,350	1,250	1,630
0,375	1,275	1,655
0,412	1,312	1,692
0,550	1,450	1,830
1,100	2,000	2,380
1,650	2,550	2,930
2,200	3,100	3,480
3,300	4,200	4,580
4,400	5,300	5,680

Other trench widths possible by combining different extension bar lengths.
Larger trench widths available on request.

Technical contents are subject to change. Publishing date 08/11/2016

l	Length	b_c	Inner width	G / VP	Weight per shoring panel
l_M	Module length	t_{pl}	Thickness	d	Diameter
l_c	Pipe culvert length	A	Area	eh	Earth pressure max.
b	Shoring / trench width	G	Weight		

Accessories / Spares

Art. No.	Short description	l [m]	d [m]	G [kg]
842 758	Adapter for DKU piling frame, corner shoring, h = 0.50 m KDIV			47,0
842 752	Adapter for DKU piling frame, corner shoring, h = 0.50 m KDVI			55,0
842 753	Adapter for DKU piling frame, corner shoring, h = 1.00 m KDVI			94,0
842 759	Adapter for DKU piling frame, h = 0.50 m KDIV (single slide rail, E+S)			40,0
842 749	Adapter for DKU piling frame, h = 0.50 m KDVI (single slide rail, E+S)			45,0
842 751	Adapter for DKU piling frame, h = 1.00 m KDVI (single slide rail)			75,5
834 080	Adapter for EGS / DGS (LV)			105,0
862 200	Connector			5,5
834 100	Cover panel for in-situ concrete DG -base panel-	0,750		7,9
834 110	Cover plate for in-situ concrete DG -top plate-	1,000		9,9
842 099	DKU piling frame guide frame	2,27		105,0
842 100	DKU piling frame guide frame	3,81		175,0
IA 0150F	Nut M 24			0,1
IA 0210F	Nut M 36			0,4
862 100	Pin (for connector)	0,110	0,035	1,0
832 246	Pin for boogie car (deep Linear shoring)	0,300	0,05	4,6
832 230	Pin for Pressure Plate Rectangular Boogie Car	0,150	0,035	1,4
832 245	Pin, Linear shoring (double slide rail)	0,300	0,04	3,2
850 720	Pin, Linear shoring (single slide rail)	0,150	0,05	2,5
861 075	Pressure beam (boxes, slide rail)	4,60		425,0
861 085	Pressure beam (boxes, slide rail)	5,80		525,0
861 074	Pressure beam (Medium, Magnum shoring, KS 100, GLS)	2,35		236,0
861 070	Pressure beam (Medium, Magnum shoring, KS 100, GLS)	2,80		271,0
861 071	Pressure beam (Medium, Magnum shoring, KS 100, GLS)	3,40		318,0
861 076	Pressure beam (Medium, Magnum shoring, KS 100, GLS)	1,60		176,0
834 015	Pressure plate for boogie car			12,4
834 060	Pull adapter double slide rail			43,6
834 057	Pull adapter single slide rail			33,0
IB 0470F	Screw M 24 x 80			0,4
IB 0614F	Screw M 36 x 80			1,0
HE 0050 F	Spring cotter 6 mm		0,006	0,03
HE 0060F	Spring cotter 8 mm		0,008	0,1
336 960	Support bracket for DKU piling frame element			40,0
821 100	Suspension chain KL-13-8	5,000		25,7
842 704	Waling for DKU piling frame, module length 2.84 m (single slide rail, E+S)	2,60		300,0
842 705	Waling for DKU piling frame, module length 3.88 m (single slide rail, E+S)	3,64		402,0
842 710	Waling for DKU piling frame, module length 4.13 m (single slide rail, E+S)	3,89		420,0
842 711	Waling for DKU piling frame, module length 4.38 m (single slide rail, E+S)	4,13		445,0

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Single slide rail inner-city shoring

In urban areas, trench sections crossed by numerous pipes and cables are commonplace. Using large-area shoring systems is then out of the question. The solution is inner-city linear shoring that combines the piling frame element for guiding sheet piles with the components of the linear shoring system.

By using piling frame elements, linear shoring with single or double slide-rails provides a solution even in those areas where gas or water mains or other service pipes cross the trench. The shoring modules and the piles themselves are lowered largely low-vibration – an important precondition for digging work in towns which usually involves traffic routes and building structures close to the trench.

Basic data

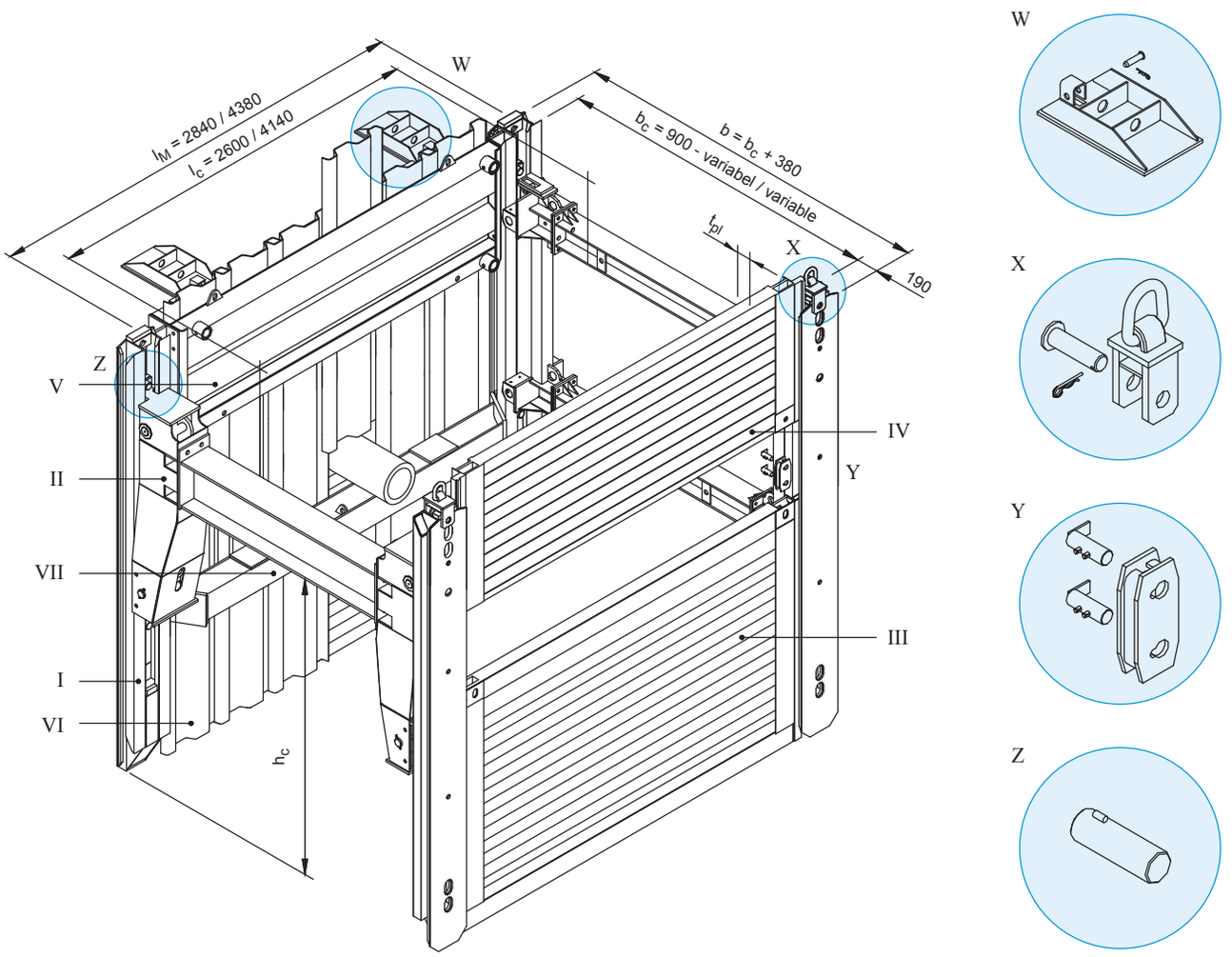
Module length	2,84 m / 4,38 m
Length slide rail	4,13 m
Height sheet pile element	1,00 m
Length sheet piles (KD VI/8)	variable
Trench width	variable, see page 32-33

Advantages

- Cost-effective shoring wherever transverse electrical lines and house connections exist
- No vibrational or impact forces

Technical contents are subject to change. Publishing date 08/11/2016

Single slide rail inner-city shoring with U-type or rectangular boogie car



(All dimensions in mm. The details of length of pipe opening l_c refer to the rectangular boogie car.)

I	Linear shoring support	VII	Waling	t_{pl}	Thickness
II	Boogie car	l_M	Module length	W	Bearing claw
III	Base panel	l_c	Pipe culvert length	X	Pull adapter
IV	Top panel	b	Shoring / trench width	Y	Connector
V	Sheet pile element DKU	b_c	Inner width	Z	Pin
VI	Sheet pile	h_c	Pipe culvert height		

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Linear shoring support

Art. No.	Short description	l [m]	G [kg]
820 935	Linear shoring support, single slide rail	**4,13**	710,0

Universal DKU piling frame element (height 1.00 m)

Art. No.	Short description	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]
842 671	Universal DKU piling frame element	**2,27**	2,84	0,31	1,75	510,0
842 674	Universal DKU piling frame element	**3,81**	4,38	0,31	3,29	785,0

You can find further piling frame elements at our website www.es-verbau.com

Base panel (Height 2,32 m)

Art. No.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
821 160	**2,60**	2,84	0,11	2,60	650,0	6,03	90,00
821 855	**4,14**	4,38	0,15	4,14	1.300,0	9,58	81,00

Top panel (Height 1,32 m)

Art. No.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
821 180	**2,60**	2,84	0,11	2,60	450,0	3,43	90,00
822 783	**4,14**	4,38	0,15	4,14	873,0	5,45	81,00

Top panel (Height 2,30 m)

Art. No.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
822 155	**2,60**	2,84	0,11	2,60	660,0	5,98	90,00
822 785	**4,14**	4,38	0,15	4,14	1.409,0	9,50	81,00

The details of length of pipe opening l_c refer to the rectangular boogie car.

Linear shoring boogie car

Art. No.	Short description	l [m]	G [kg]
832 200	Rectangular boogie car	**2,00**	420,0
832 205	Linear shoring U-type boogie car	**2,00**	550,0
832 215	Linear shoring rectangular boogie car	**2,20**	490,0

Extension bars for rectangular boogie car

Art. No.	Short description	l [m]	G [kg]
830 005	Extension bar HEB 220	**0,140**	38,0
830 010	Extension bar HEB 220	**0,275**	50,0
830 011	Extension bar HEB 220	**0,350**	55,0
830 012	Extension bar HEB 220	**0,375**	57,0
830 015	Extension bar HEB 220	**0,412**	60,0
830 020	Extension bar HEB 220	**0,550**	70,0
830 030	Extension bar HEB 220	**1,100**	110,0
830 075	Extension bar HEB 220	**1,650**	152,0
830 125	Extension bar HEB 220	**2,200**	192,0
830 300	Extension bar HEB 220	**3,300**	278,0
830 305	Extension bar HEB 220	**4,400**	358,0

Extension bars for U-type boogie car

Art. No.	Short description	l [m]	G [kg]
831 503	Extension bar HEA 450	**0,140**	77,0
831 500	Extension bar HEA 450	**0,275**	107,0
831 507	Extension bar HEA 450	**0,375**	115,0
831 510	Extension bar HEA 450	**0,550**	140,0
831 520	Extension bar HEA 450	**1,100**	220,0
831 530	Extension bar HEA 450	**1,650**	300,0
831 540	Extension bar HEA 450	**2,200**	375,0

Technical contents are subject to change. Publishing date 08/11/2016

Trench widths, Single slide rail shoring

Length extension bar [m]	b_c [m]	b [m]
without extension bar	0,900	1,280
0,140	1,040	1,420
0,275	1,175	1,555
0,350	1,250	1,630
0,375	1,275	1,655
0,412	1,312	1,692
0,550	1,450	1,830
1,100	2,000	2,380
1,650	2,550	2,930
2,200	3,100	3,480
3,300	4,200	4,580
4,400	5,300	5,680

Other trench widths possible by combining different extension bar lengths.
Larger trench widths available on request.

Waling

Art. No.	Short description	l [m]	l_M [m]	G [kg]
842 704	Waling for DKU piling frame, module length 2.84 m (single slide rail, E+S)	**2,60**	2,84	300,0
842 711	Waling for DKU piling frame, module length 4.38 m (single slide rail, E+S)	**4,13**	4,38	445,0

Accessories / Spares

Art. No.	Short description	l [m]	G [kg]	d [m]
842 753	Adapter for DKU piling frame, corner shoring, h = 1.00 m KDVI		94,0	
842 751	Adapter for DKU piling frame, h = 1.00 m KDVI (single slide rail)		75,5	
862 200	Connector		5,5	
842 099	DKU piling frame guide frame	**2,27**	105,0	
842 100	DKU piling frame guide frame	**3,81**	175,0	
IA 0150F	Nut M 24		0,1	
IA 0210F	Nut M 36		0,4	
862 100	Pin (for connector)	**0,110**	1,0	0,035
861 074	Pressure beam (Medium, Magnum shoring, KS 100, GLS)	**2,35**	236,0	
834 057	Pull adapter single slide rail		33,0	
IB 0470F	Screw M 24 x 80		0,4	
IB 0614F	Screw M 36 x 80		1,0	
336 960	Support bracket for DKU piling frame element		40,0	

l	Length	t_{pl}	Thickness	G / VP	Weight per shoring panel
l_M	Module length	A	Area		
l_c	Pipe culvert length	G	Weight		

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Single slide rail inner-city shoring (before 09/2009)

Pipelines inside, traffic outside

During inner-city trenching operations, attention has to be paid to the numerous supply lines crossing the trench. At the same time it is essential that no vibrations are transmitted to the soil outside the trench because of buildings close by and roads and rails often running alongside the trench.

Large-area support prevented by small supply lines

Large-area support systems are out of the question - in spite of their other advantages - for use in trench sections crossed by numerous supply lines, if only for functional reasons.

Unlimited combinations

Inner-city Linear Shoring can be combined with the components of the Linear Shoring system from E+S - with soldiers, boogie cars and large shoring panels. Consequently, the advantages of inner-city Linear Shoring can be combined with those of large-area shoring on a single site. This offers you totally new scope in terms of costing and profitability.

Basic data

Module length	2,84 m / 4,38 m
Length slide rail	4,13 m
Height sheet pile element	1,00 m
Length sheet piles (KD VI/8)	variable

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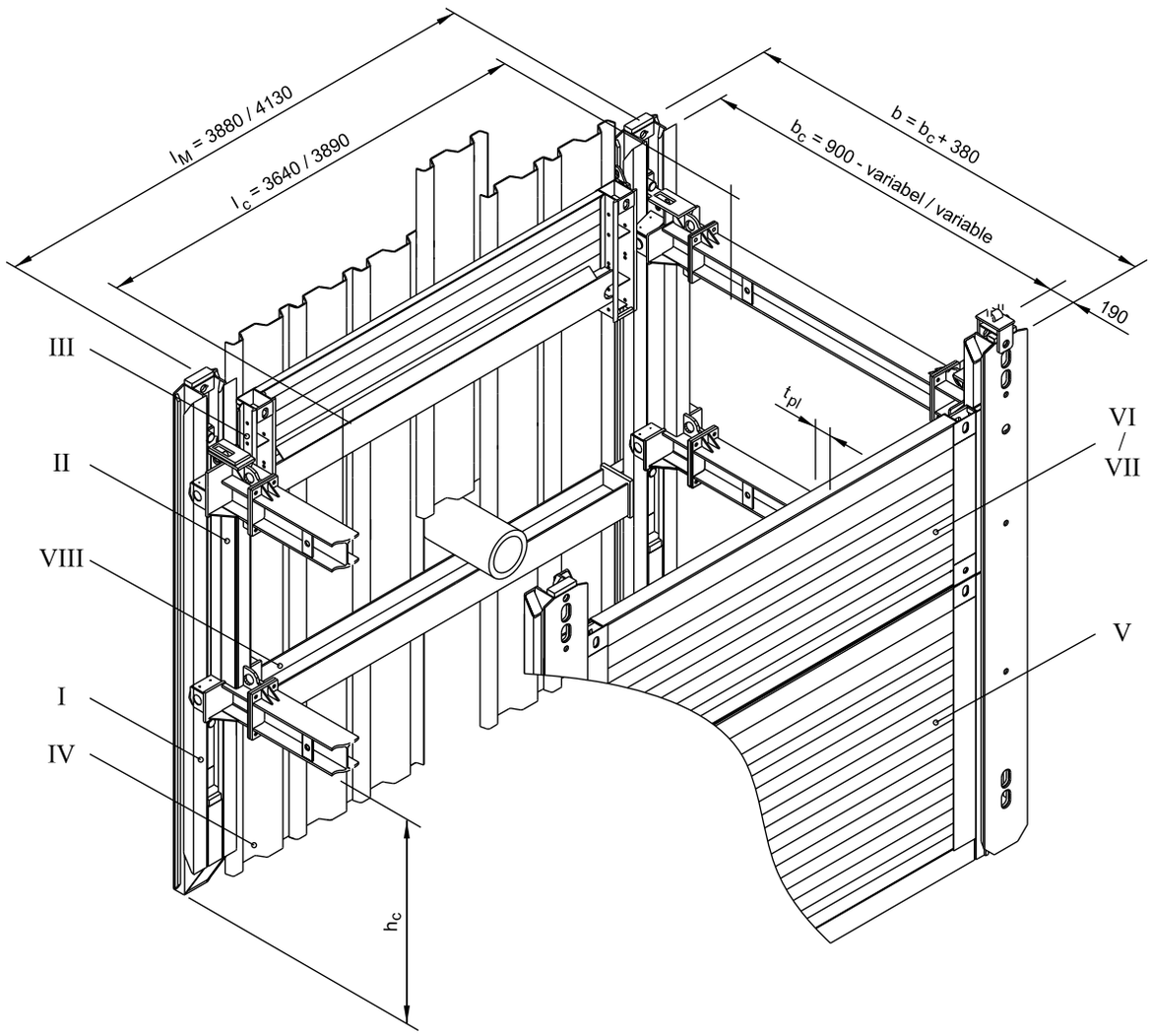

(All dimensions in mm)

I	Linear shoring support	VI	Top panel	b_c	Inner width
II	Boogie car	VII	Waling	h_c	Pipe culvert height
III	Sheet pile element	l_M	Module length	t_{pl}	Thickness
IV	Sheet pile	l_c	Pipe culvert length		
V	Base panel	b	Shoring width		

Linear shoring support

Art. No.	l [m]	G [kg]
820 935	**4,13**	710,0

Linear shoring boogie car

Art. No.	l [m]	G [kg]
832 200	**2,00**	420,0

Sheet pile elements

Art. No.	l [m]	l_M [m]	h [m]	t_{pl} [m]	l_c [m]	G / VP [kg]
842 650	**3,64**	3,88	1,00	0,20	3,64	840,0
842 650	**3,89**	4,13	1,00	0,20	3,89	895,0

Base panel (Height 2,32 m)

Art. No.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]
821 610	**3,64**	3,88	0,11	3,64	845,0	8,44
821 850	**3,89**	4,13	0,11	3,89	968,0	9,02

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Top panel (Height 1,32 m)

Art. No.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]
822 620	**3,64**	3,88	0,11	3,64	620,0	4,80
822 760	**3,89**	4,13	0,11	3,89	649,0	5,13

Top panel (Height 2,30 m)

Art. No.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]
822 680	**3,64**	3,88	0,11	3,64	852,0	8,37
822 780	**3,89**	4,13	0,11	3,89	980,0	8,95

Construction with beams

Art. No.	Short description	l [m]	l_M [m]	G [kg]
842 705	Waling for DKU piling frame, module length 3.88 m (single slide rail, E+S)	**3,64**	3,88	402,0
842 710	Waling for DKU piling frame, module length 4.13 m (single slide rail, E+S)	**3,89**	4,13	420,0

Extension bars

Art. No.	Short description	l [m]	G [kg]
830 005	Extension bar HEB 220	**0,140**	38,0
830 010	Extension bar HEB 220	**0,275**	50,0
830 011	Extension bar HEB 220	**0,350**	55,0
830 012	Extension bar HEB 220	**0,375**	57,0
830 015	Extension bar HEB 220	**0,412**	60,0
830 020	Extension bar HEB 220	**0,550**	70,0
830 030	Extension bar HEB 220	**1,100**	110,0
830 075	Extension bar HEB 220	**1,650**	152,0
830 125	Extension bar HEB 220	**2,200**	192,0

Trench widths

Length HEB	Inner width b_c	Trench width b
[m]	[m]	[m]
0,000	0,900	1,280
0,140	1,040	1,420
0,275	1,175	1,555
0,350	1,250	1,630
0,375	1,275	1,655
0,412	1,312	1,692
0,550	1,450	1,830
1,100	2,000	2,380
1,650	2,550	2,930
2,200	3,100	3,480

Other trench widths possible by combining different extension bar lengths.
Larger trench widths available on request.

Accessories / Spares

Art. No.	Short description	l [m]	G [kg]	d [m]Standard
861 074	Pressure beam (Medium, Magnum shoring, KS 100, GLS)	**2,35**	236,0	
861 070	Pressure beam (Medium, Magnum shoring, KS 100, GLS)	**2,80**	271,0	
861 071	Pressure beam (Medium, Magnum shoring, KS 100, GLS)	**3,40**	318,0	

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Accessories / Spares (contd.)

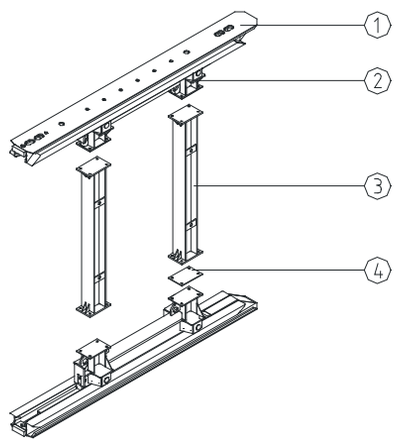
Art. No.	Short description	l [m]	G [kg]	d [m]Standard
861 072	Pressure beam	3,60	335,0	
HE 0050 F	Spring cotter 6 mm		0,03	0,006DIN 11024
HE 0060F	Spring cotter 8 mm		0,1	0,008DIN 11024
862 200	Connector		5,5	
862 100	Pin (for connector)	0,110	1,0	0,035
IB 0470F	Screw M 24 x 80		0,4	DIN 933
IA 0150F	Nut M 24		0,1	DIN 934
834 015	Pressure plate for boogie car		12,4	
832 230	Pin for Pressure Plate Rectangular Boogie Car	0,150	1,4	0,035
832 245	Pin, Linear shoring (double slide rail)	0,300	3,2	0,04
834 100	Cover panel for in-situ concrete DG -base panel-	0,750	7,9	
834 110	Cover plate for in-situ concrete DG -top plate-	1,000	9,9	
834 057	Pull adapter single slide rail		33,0	
410 520	Pin (for pull adapter EG)	0,170	3,9	0,05
861 075	Pressure beam (boxes, slide rail)	4,60	425,0	
IB 0614F	Screw M 36 x 80		1,0	DIN 933
IA 0210F	Nut M 36		0,4	DIN 934

l	Length	b_c	Inner width	A	Area
l_c	Pipe culvert length	h_c	Pipe culvert height	G	Weight
l_M	Module length	t_{pl}	Thickness	G / VP	Weight per shoring panel
b	Trench width	d	Diameter	G / Box	Weight per shoring box

Technical contents are subject to change. Publishing date 08/11/2016

Assembly instructions for the guide frame for single-rail linear shoring and single-rail inner-city linear shoring

1. System overview for the guide frame



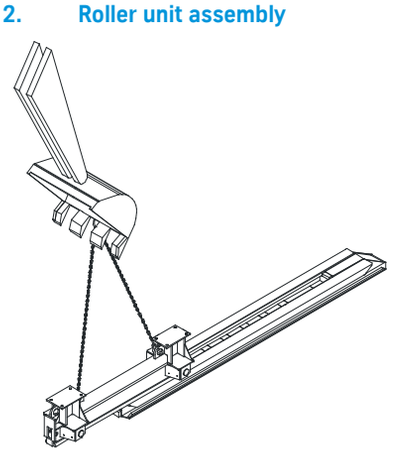
(1) Two linear shoring soldiers

(2) Two roller units

(3) Two spacer bars

(4) One spacer plate

2. Roller unit assembly



Slide a roller unit into the linear shoring soldier with the aid of lifting gear and a suitable sling (GS-approved). The roller unit's impact plate points towards the top of the soldier.

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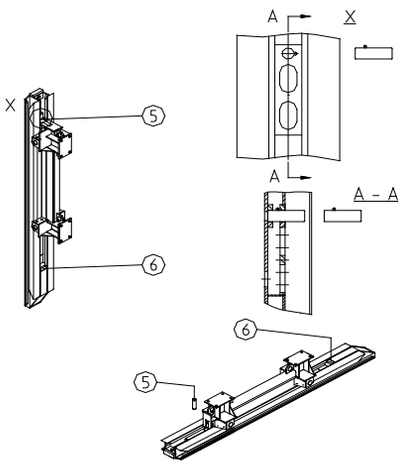
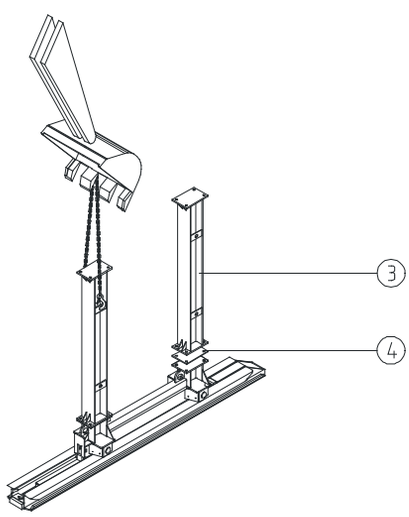
3. Pinning the roller unit



Secure the roller unit in the linear shoring soldier by inserting a pin (5) into the envisaged hole (see detail X) towards the top of the soldier, above the roller unit. After insertion, turn the pin through 180°. At the bottom of the linear shoring soldier there is a fixed stop to limit the roller unit's downward movement (6).

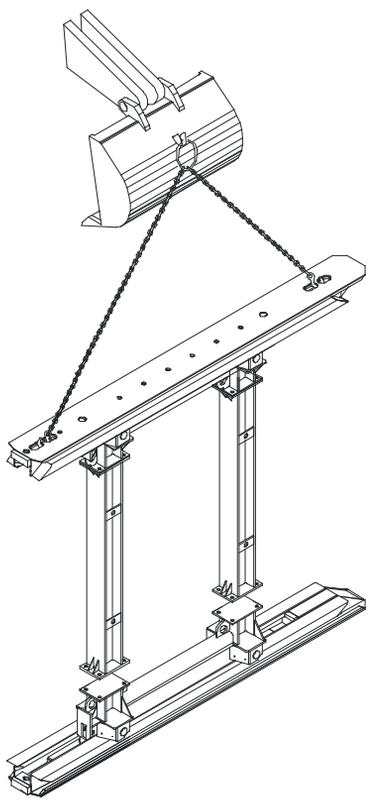
4. Fitting the spacer bars



The preassembled combinations of spacer bars (3) required for the desired trench width are aligned with the bolting plates of the roller units and bolted with the required number of bolts as per piece list. To facilitate alignment of the spacer bars during the next assembly step, the bolts are only loosely fastened.

Insert the spacer plate (4) between the bolting plate and the bottom spacer bar at the pointed end of the soldier.

5. Assembling the complete guide frame



The linear shoring soldier prefitted with the roller units and spacer bars is pivoted over the second soldier so that the roller units and spacer bars can be bolted together.

After assembly, the guide frame is laid flat on the ground.

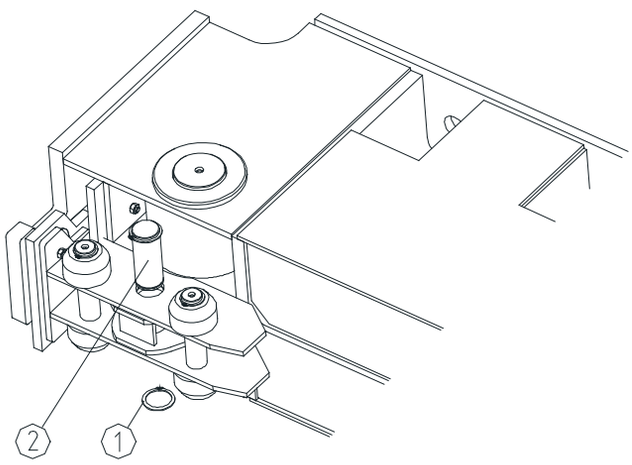
All screw joints must be tightened firmly.

For large trench widths, the complete guide frame should be assembled on its side. To this end, the two roller units inserted into the slide rails must be prefitted with spacer bars of about the same length. After preassembly, the two slide rails are laid side by side on the ground so that the spacer bars can be bolted together.

To create a shoring unit, two fully assembled guide frames are required. For each further shoring unit, an additional guide frame must be provided.

Adapting the U-type roller unit for use in single-rail linear shoring and single-rail inner-city linear shoring

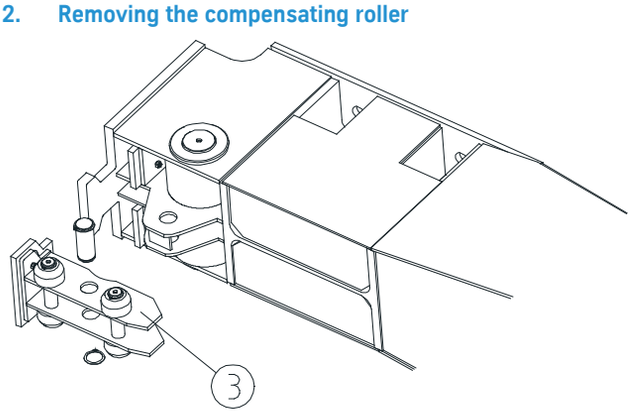
1. Dismantling the locking elements



To adapt the U-type roller unit for use in single-rail linear shoring, it is necessary to dismantle the tension anchor. To this end, remove the locking ring (1) with a suitable tool (pliers or chisel). Then pull out the pin (2).

.

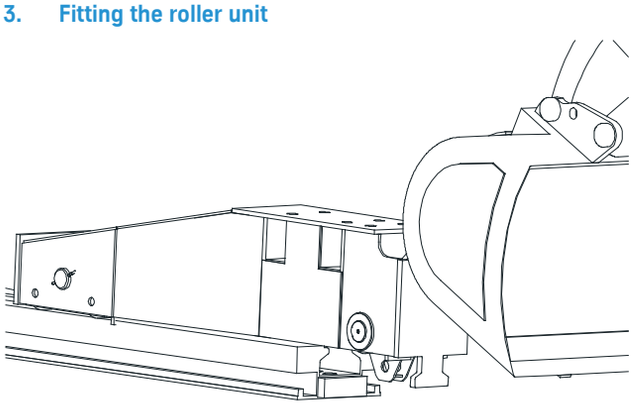
2. Removing the compensating roller



You can remove the compensating roller (3).

Take good care of all the parts as they will be needed if the roller unit is used again in the double slide rail.

3. Fitting the roller unit

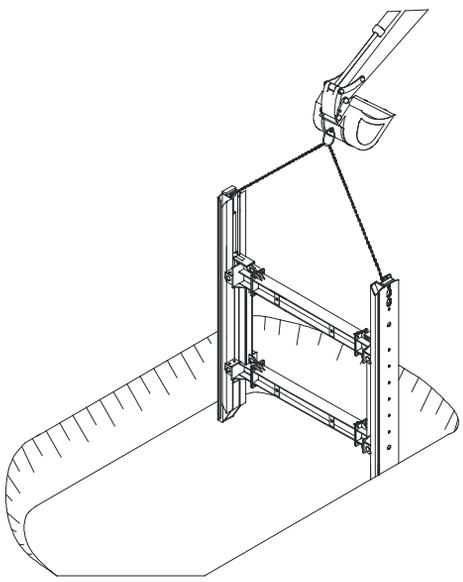


Now slide the roller unit in the manner illustrated into the linear shoring soldier.

All further steps can be found in the relevant installation instructions *(see "Installation instructions for single-rail linear shoring" and "Installation instructions for single-rail inner-city linear shoring").*

Installation instructions for single-rail linear shoring

1. Placing the first guide frame



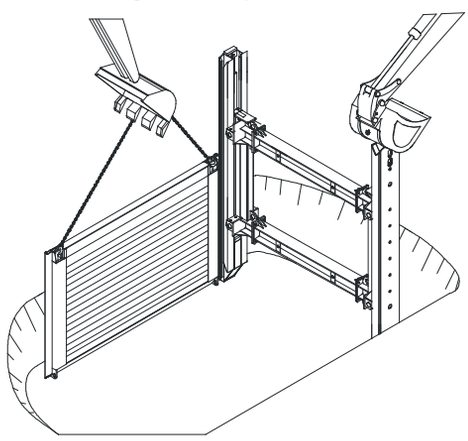
After measurement of the trench line, the initial layer of soil is excavated for the first shoring unit in accordance with the project management's instructions.

Width: Required clear trench width + approx. 0.4 m

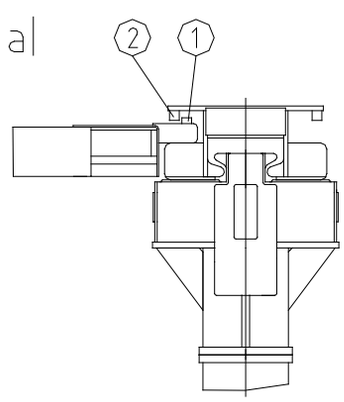
Length: Module length + approx. 0.6 m (or panel length + approx. 1 m)

Using lifting gear and a suitable sling (GS-approved), the first guide frame is placed in the centre of the trench axis and at right angles to the trench line. The bottom end of the roller unit rests on the permanently welded stops and its upward motion is limited by a pin in the guide frame (see assembly instructions). If necessary, the frame can be locked plumb (e.g. with the aid of a second set of lifting gear).

2. Inserting the base panels

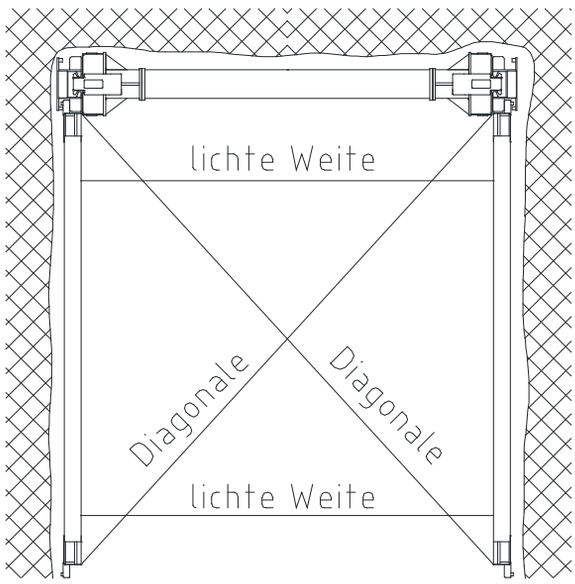


The base panels are inserted from above with lifting gear into the soldier profile (see figure a). Make sure that the rectangular profile (1) on the reverse of the shoring panels catches behind the rectangular profile of the linear shoring soldiers (2). After insertion, the shoring panels are lowered to the bottom of the trench.



Before lowering the linear shoring frame, always remove the bottom pin if it has been fitted to set a different vertical pipe clearance.

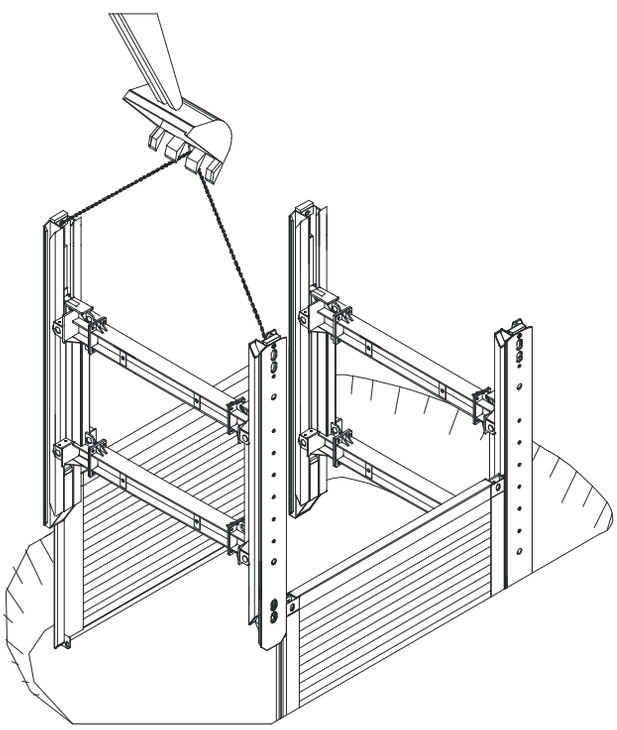
3. Aligning the shoring panels



The first shoring unit has to be precisely aligned so that the shoring runs parallel with the trench axis. It is important here that the horizontal clearance between the shoring panels is the same at both panel ends; and that the two diagonal axes of the shoring unit are the same length.

lichte Weite = Clear width
Diagonale = Diagonal

4. Placing the second guide frame

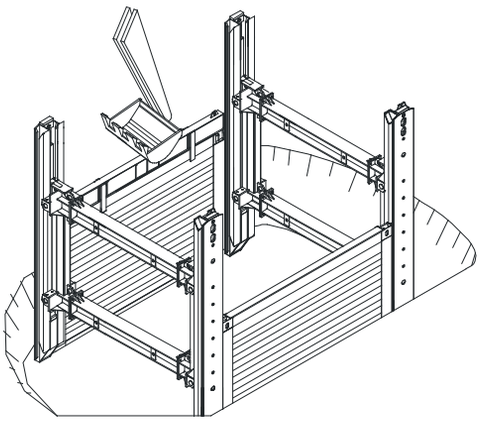


The second frame is guided over the exposed guide profiles of the base panels and pushed down to the bottom of the trench.

After placement, the shoring unit should again be aligned (as described in step 3) in order to facilitate the installation and removal of subsequent shoring units.

The cavity between the soil and shoring panel must be backfilled and compacted.

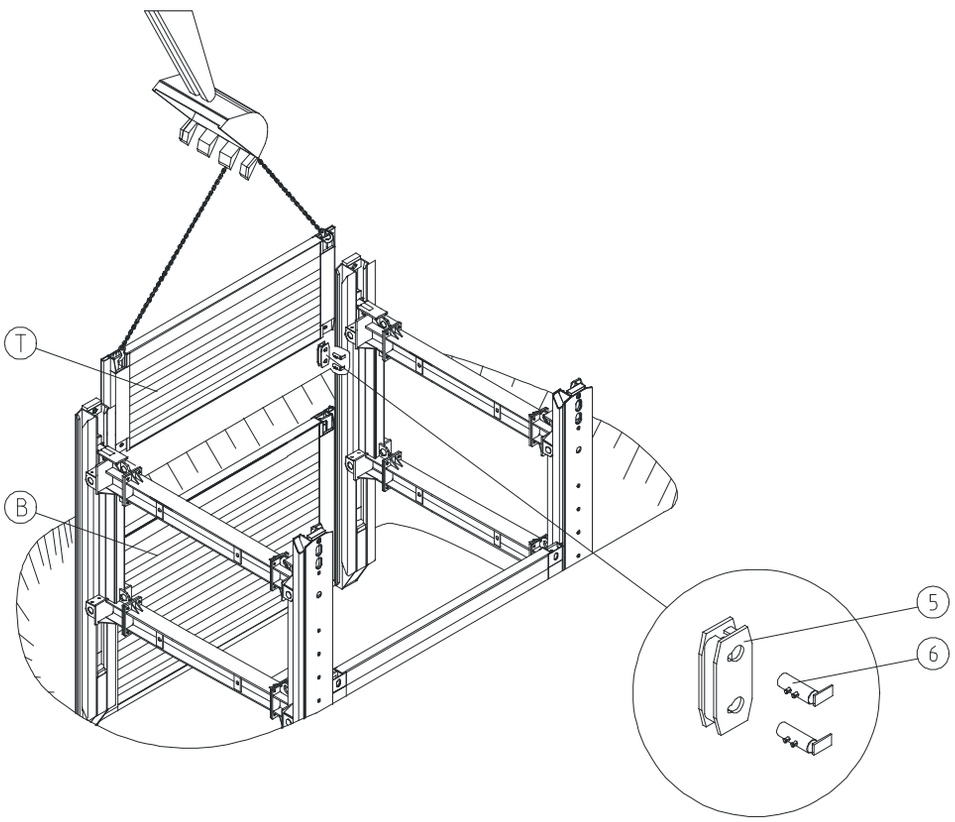
5. Lowering the shoring unit



Before the lowering process proper, the soil beneath the shoring panels is excavated in accordance with the project management's instructions. The soldiers, shoring panels and roller units are pressed down in turn, with special use being made of pressure beams for the shoring panels and pressure plates for the soldiers. The shoring components must be pressed and on no account struck or hammered.

When lowering the unit, make absolutely sure that the roller units are positioned vertically to provide the required structural strength (pay attention to length of cantilever).

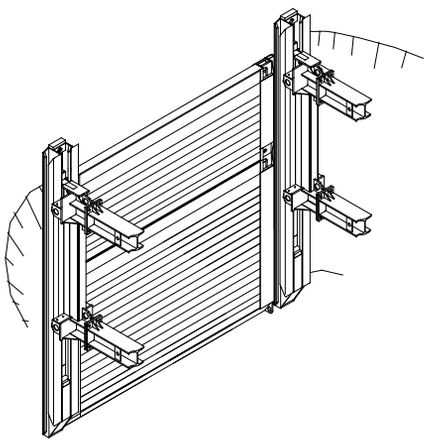
6. Top panels



Depending on the required trench depth, the top panels (T) are inserted in the soldier guides when the base panels (B) have been fully lowered.

The base and top panels must be joined together with connectors (5) and pins (6).

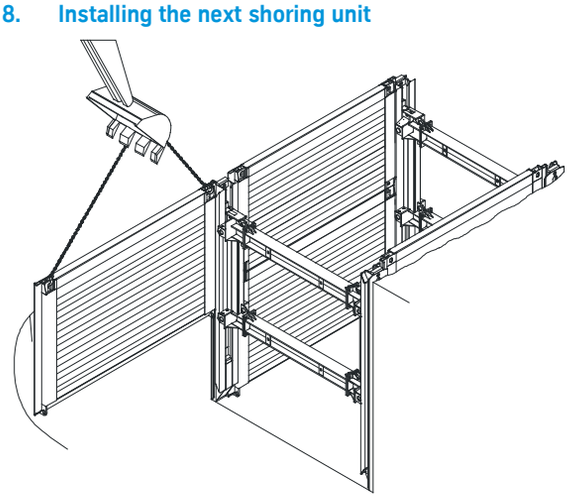
7. Lowering to the final depth



After insertion of the top panels, the shoring unit is lowered with further excavation to the required depth in accordance with the project management's instructions.

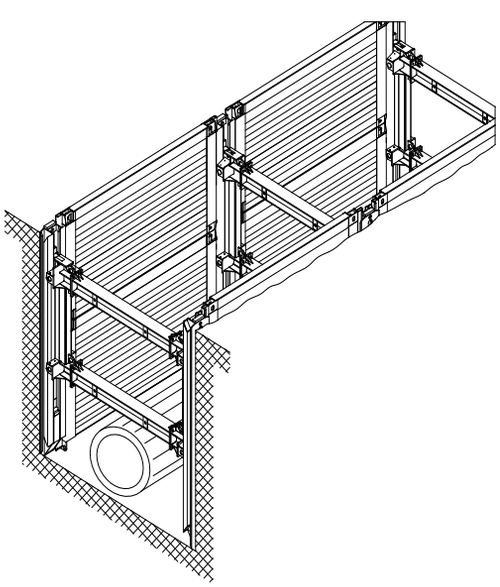
Here, too, make absolutely sure that the roller units are positioned vertically to provide the required structural strength (pay attention to length of cantilever).

8. Installing the next shoring unit



The next shoring unit is installed as soon as the preceding unit has been fully lowered to the bottom of the trench and the roller units are vertically positioned and fixed in order to provide the required structural strength. Installation is carried in the manner described in sections 1 to 7. Subsequent units are aligned with the precisely installed first unit. The clear trench width and length of diagonal (section 3) should be checked for each subsequent unit when inserting the shoring panels.

9. Pipe laying

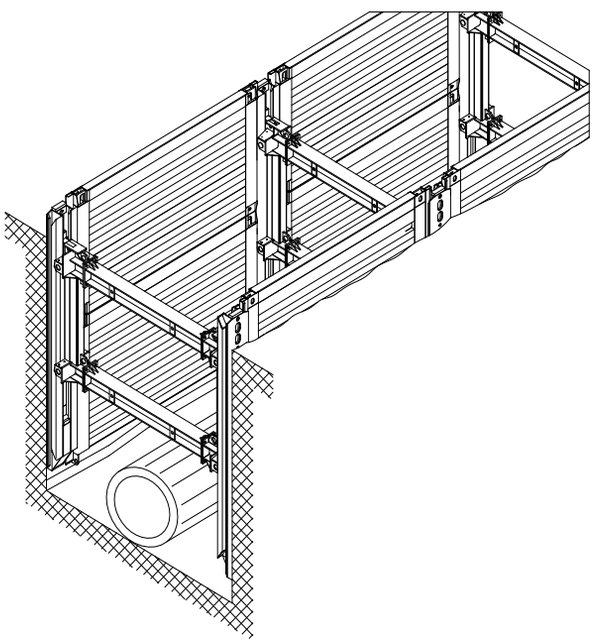


Once the complete desired train of shoring has been fully lowered to the bottom of the trench, pipe laying can start.

The roller units must be vertically positioned and fixed with pins in order to provide the required structural strength.

Instructions for removing single-rail linear shoring

Removal, backfilling and compacting



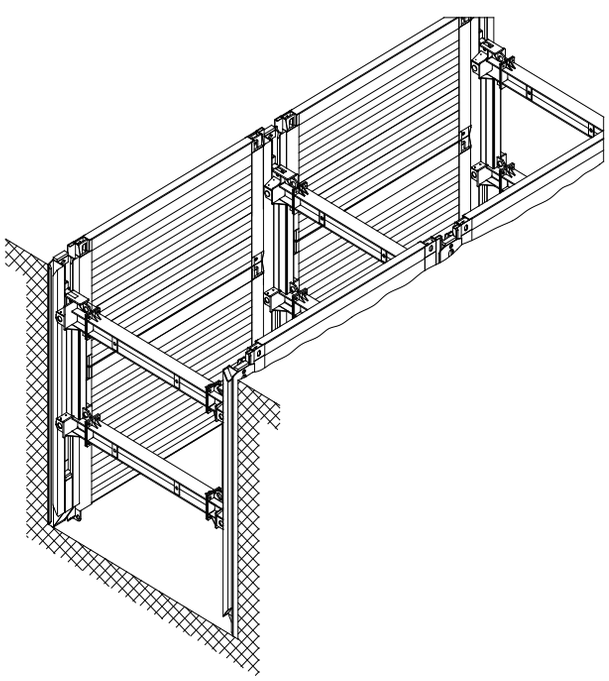
At the end of pipe-laying work, the shoring is removed with layer-by-layer backfilling and compacting. To this end, the shoring is extracted step-by-step in accordance with the instructions of the project manager on site and with the expert's specifications and the backfilling material returned to the trench is compacted against the existing soil.

To extract the shoring, use a double-stranded chain at least 19 mm thick with a load-bearing capacity of 11.2 t at an angle of inclination of ≤ 60°. The lugs at the sling attachment points are dimensioned and designed for the chain's maximum permitted load.

Slings must only be attached to the holes provided.

Support for base of soldier/cast-in-place concrete

1. Inserting the shoring



When laying pipes of large diameter or building cast-in-place concrete drains/sewers, additional support for the guide frames at the base of the soldiers is often needed for reasons of stability.

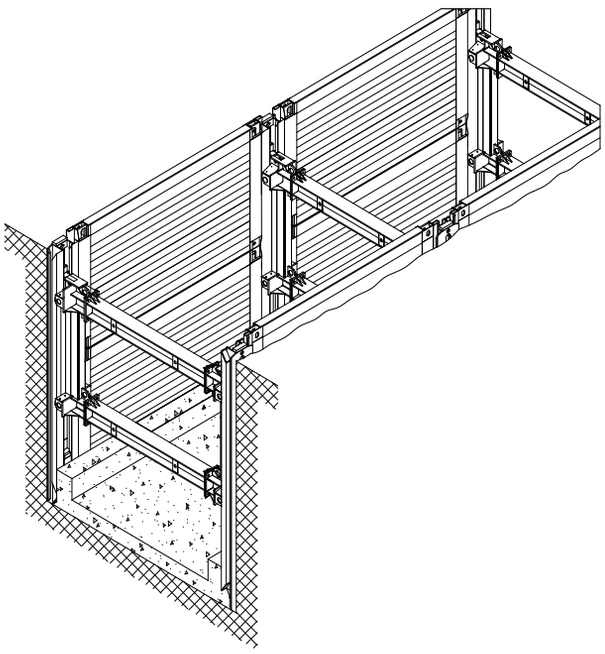
To this end, the shoring is initially installed in accordance with the installation instructions (*see "Installation instructions for single-rail linear shoring", steps 1 to 9*) and the bottom of the trench prepared in accordance with requirements.

Any support for the base of the soldiers depends on the calculations of structural strength and takes the form of a spar of steel or reinforced concrete. In the case of cast-in-place concrete drains/sewers, the bed carrying the drain/sewer can be used as the support for the base of the soldier.

The support for the base of the soldier should have a contact surface sufficiently large for the soldier.

Proof of structural strength should be provided for the load-bearing capacity of the support for the base of the soldier.

2. Creating support for the base of the soldier

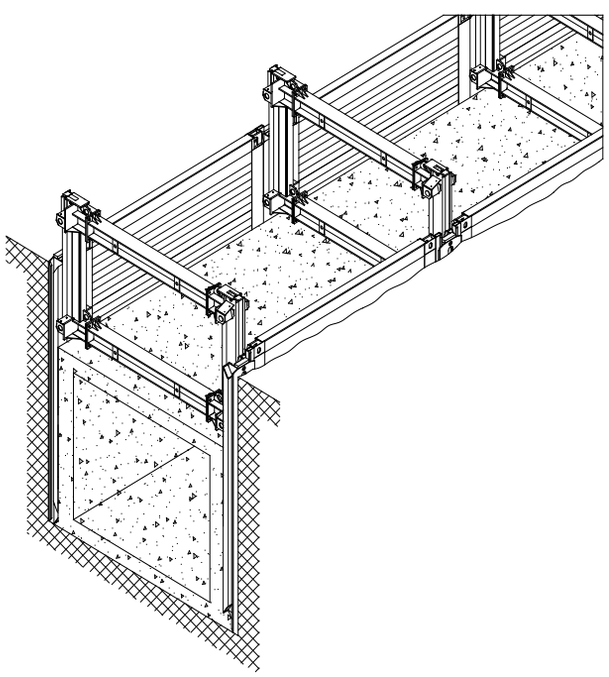


When support for the base of the soldier has been provided, the roller unit can be raised to the maximum permitted vertical pipe clearance for completion of the cast-in-place concrete structure. In this position, the roller unit must be secured with chains or pins.

During raising, the roller unit must always be prevented from sliding out of the top of the soldier *(for pin, see step 3 of "Assembly instructions for the guide frame")***.**

If the shoring is also to serve as formwork for a cast-in-place concrete structure, the open guides of the roller units in the soldiers must be sealed with sealing panels. In this way, a continuous smooth surface is created together with the shoring panels. An intermediate layer (e.g. rigid foam panels, plastic sheeting) must always be inserted between the shoring and the cast-in-place wall in order to ensure smooth removal.

3. Removing the shoring unit



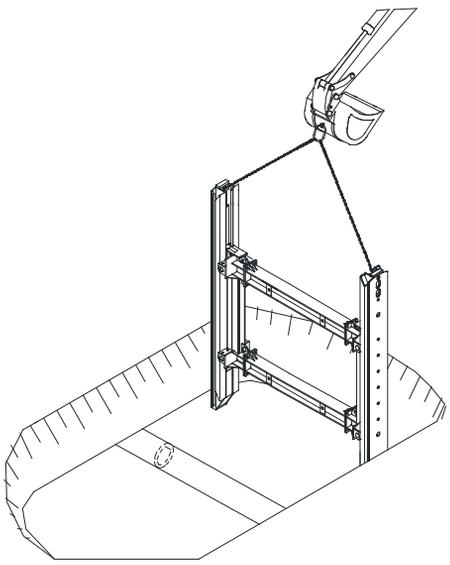
When the concrete walls have set, the shoring is removed in the way described in step 1 in these instructions. If the remaining cavity between the cast-in-place concrete and the soil has to be backfilled, it is essential to use shoring panels and soldiers with integrated injection holes through which a sand-water-cement mix can be injected into the cavities.

Installation instructions for single-rail inner-city linear shoring

1. General remarks

For single-rail inner-city linear shoring, sheet piles are guided in piling frame elements. To make allowance for pipes/cables crossing the trench, particularly in densely built-up inner-city areas, openings can thus be flexibly provided in the supported and secured trench walls.

2. Placing the first guide frame



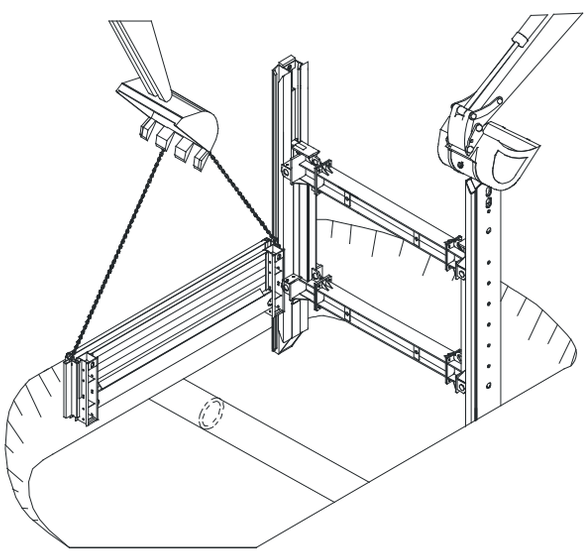
After measurement of the trench line, the initial layer of soil is excavated for the first shoring unit in accordance with the project management's instructions.

Width: Required clear trench width + approx. 0.4 m

Length: Module length + approx. 0.6 m (or inner panel length + approx. 1 m)

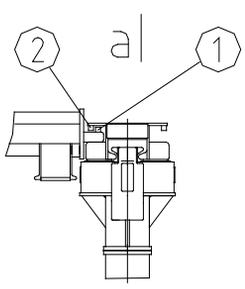
Using lifting gear and a suitable sling (GS-approved), the first guide frame is placed in the centre of the trench axis and at right angles to the trench line. The bottom end of the roller unit rests on the permanently welded stops and its upward motion is limited by a pin in the guide frame (see assembly instructions). If necessary, the frame can be locked plumb (e.g. with the aid of a second set of lifting gear).

3. Placing the piling frame element

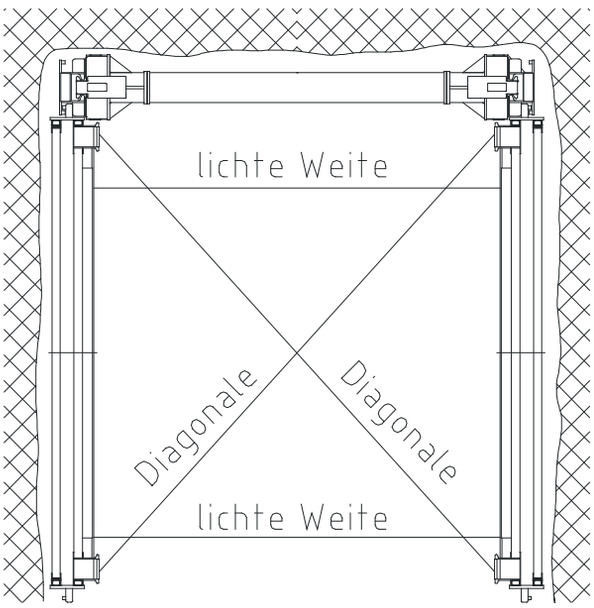


The piling frame element is pivoted from above into the soldier profile (see figure a). Make sure that the rectangular profile (1) on the reverse of the piling frame element catches behind the rectangular profile of the linear shoring soldiers (2).

Before lowering the linear shoring frame, always remove the bottom pin if it has been fitted to set a different vertical pipe clearance.



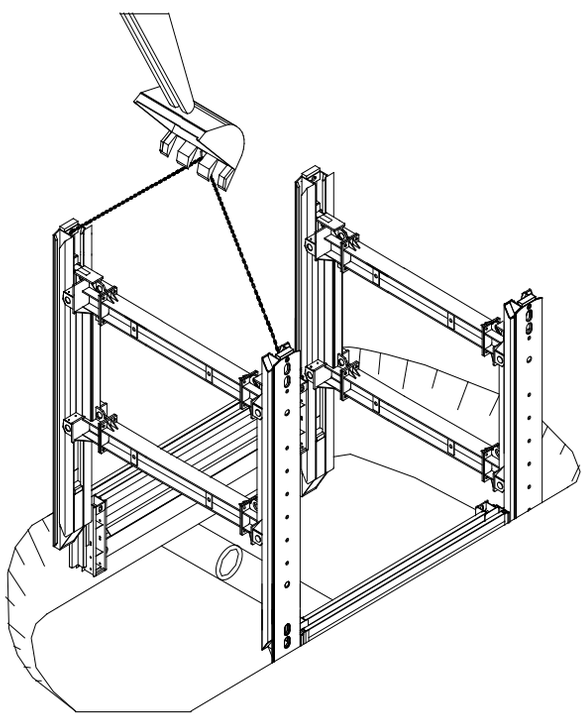
4. Aligning the piling frame element



The first shoring unit has to be precisely aligned so that the shoring runs parallel with the trench axis. It is important here that the horizontal clearance between the piling frame element is the same at both ends; and that the two diagonal axes of the shoring unit are the same length.

lichte Weite = Clear width
Diagonale = Diagonal

5. Placing the second guide frame

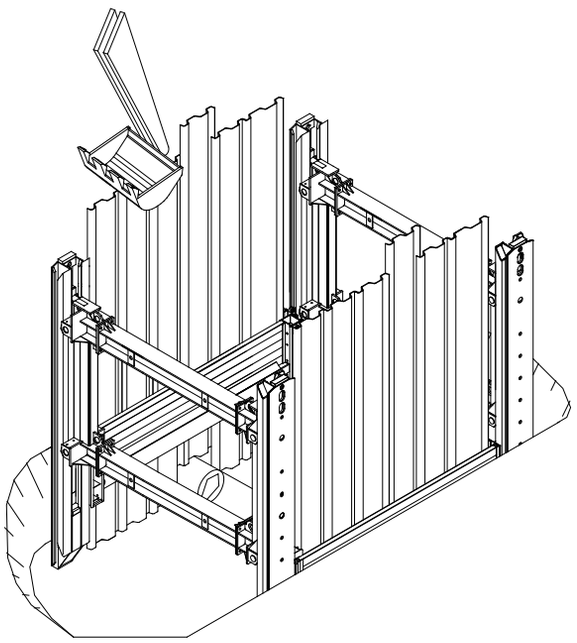


Using lifting gear, the second frame is guided over the exposed guide profiles of the piling frame element and pushed down to the bottom of the trench. On unstable soils in particular, chains must be used to prevent the piling frame elements from sinking.

After placement, the shoring unit should again be aligned in order to facilitate the installation and removal of subsequent shoring units.

The cavity between the soil and piling frame element must be backfilled and compacted.

6. Inserting the sheet piles and lowering the shoring unit



When the sheet piles have been inserted in the two opposite piling frame elements, further soil can be excavated beneath the linear shoring soldiers and sheet piles in accordance with the instructions of project management on site. The sheet piles and linear shoring soldiers are pushed or pressed down in turn. The shoring components must be pressed and on no account struck or hammered.

The piling frame elements must be fixed in position.

When lowering the system, make absolutely sure that the roller units are positioned vertically to provide the required structural strength (pay attention to length of cantilever).

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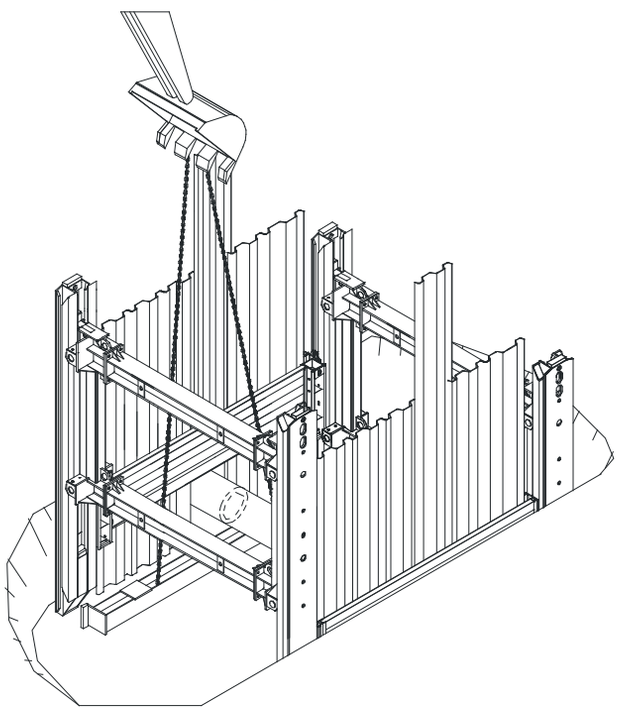
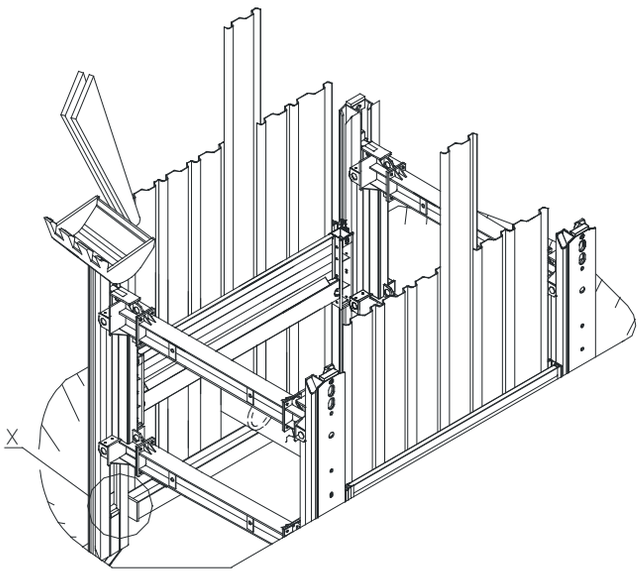
7. Inserting E+S waling girders



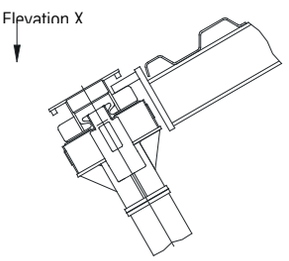
After exposure of the pipe/cable crossing the trench, E+S waling girders must be attached on either side of the shoring in order to provide the required structural strength. One end of the waling girders is pushed into the open guide of a linear shoring soldier. The pair of linear shoring soldiers at the other end of the waling girders must not be lowered to the bottom of the trench (see adjacent figure). Only at the next stage (step 8) is this pair of linear shoring soldiers pushed via the guide profile of the waling girders resting on the bottom of the trench.

Fitting the waling girders reduces the cantilever length of the sheet piles and prevents the sheet piles being inwardly deflected into the trench.

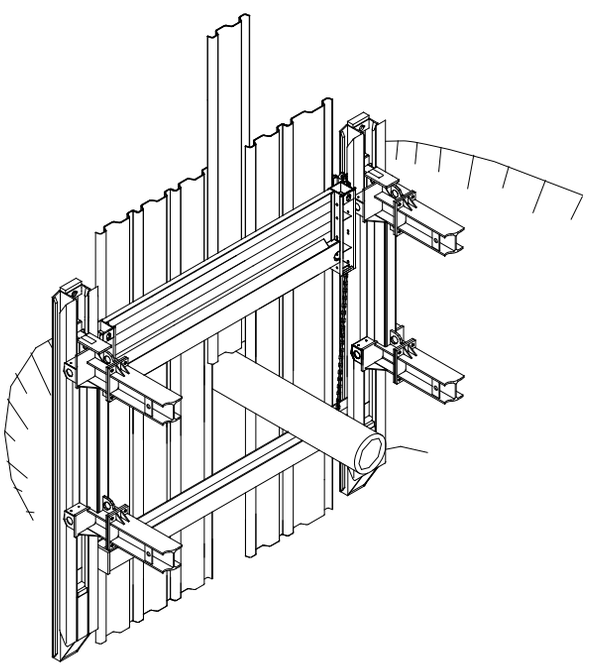
8. Pressing the pair of soldiers and lowering the shoring



When the pair of linear shoring soldiers has been lowered, both ends of the waling girders rest in the guides of the linear shoring soldiers. The sheet piles are now pressed down. Make sure that the waling girders and sheet piles are pressed tightly together. If the waling girders have to be lowered, they must be prevented from accidentally sliding out of the slide-rail soldiers, e.g. with a chain.

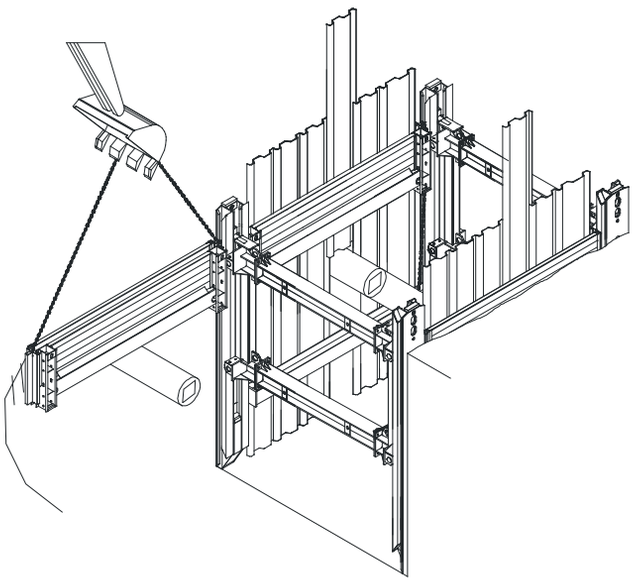


9. Lowering to the final depth



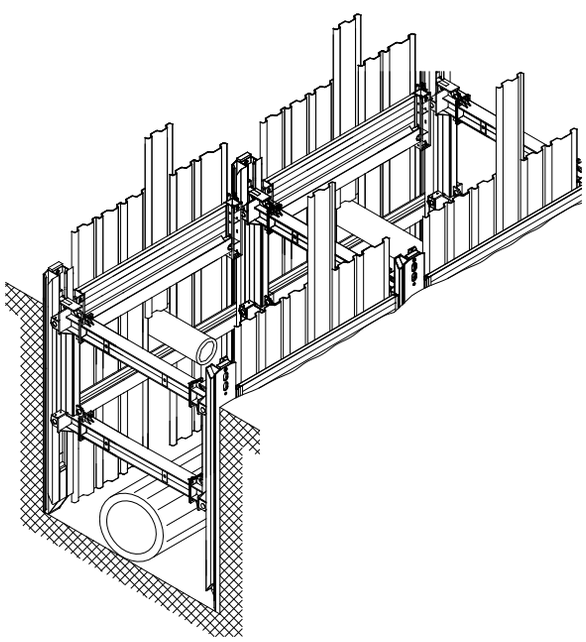
With advance soil excavation in accordance with the instructions of the project management on site, the shoring unit is lowered to its final depth. Chains (GS-approved) are used to lock the waling girders at the horizontal level demanded for reasons of stability. Here, again, the roller unit must be vertically positioned to provide the necessary structural strength (pay attention to length of cantilever).

10. Installing the next shoring unit



The next shoring unit is installed as soon as the preceding unit has been fully lowered to the bottom of the trench and the roller units are vertically positioned and fixed in order to provide the required structural strength. Installation is carried in the manner described in steps 1 to 9. Subsequent units are aligned with the precisely installed first unit. The clear trench width and length of diagonal (step 4) should be checked for each subsequent unit when installing the piling frame elements.

11. Pipe laying

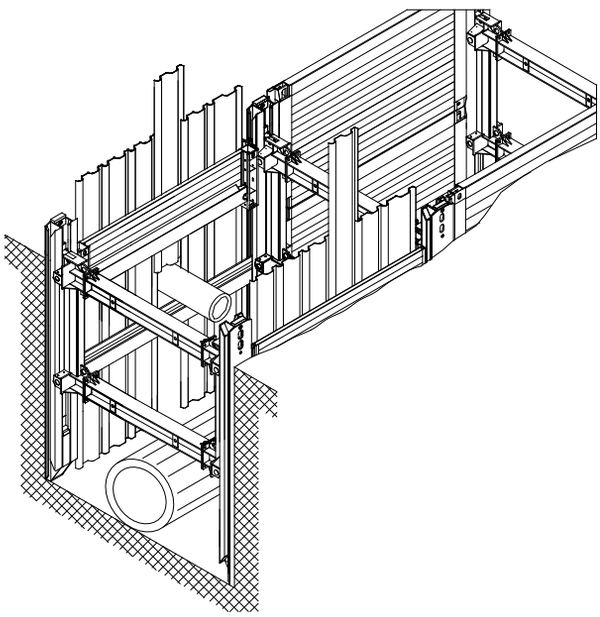


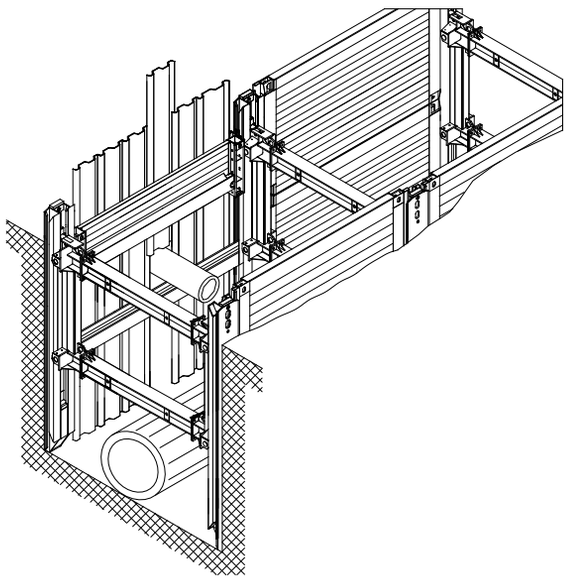
Once the complete desired train of shoring has been fully lowered to the bottom of the trench, pipe laying can start.

The roller units must be vertically positioned in order to provide the required structural strength and fixed with pins or chains.

For removal, see the instructions given *in the "Instructions for removing single-rail linear shoring".*

Installation example





There is no problem combining single-rail linear shoring with single-rail inner-city linear shoring.

If, for example, service lines end in the middle of the trench, it may be more cost-effective to use GLS large-area shoring panels on the opposite side of the trench and only use sheet piling elements and sheet piles on one side.

Single slide rail for corner post

Corner rail shoring is a special shoring solution, suitable among other things for work on manholes. When used as manhole shoring, it usually consists of four slide-rail panels and four corner rail beams.

It does not require special bracing systems, and all forces are retained by the shoring panels. With suitable beams, Corner rail shoring can take the form of single-rail or overlapping shoring. Since the panels of various lengths are used in pairs, rectangular pits of different sizes can be constructed.

Basic data

Module length	2,13 m - 6,38 m
Length slide rail	4,13 m
Panel height	1,32 m / 2,32 m
Shoring width	1,75 m - 6,00 m, see page 14

Advantages

- Economical shoring solution, e.g. for shaft structures
- Right-angled excavations feasible in a wide range of sizes

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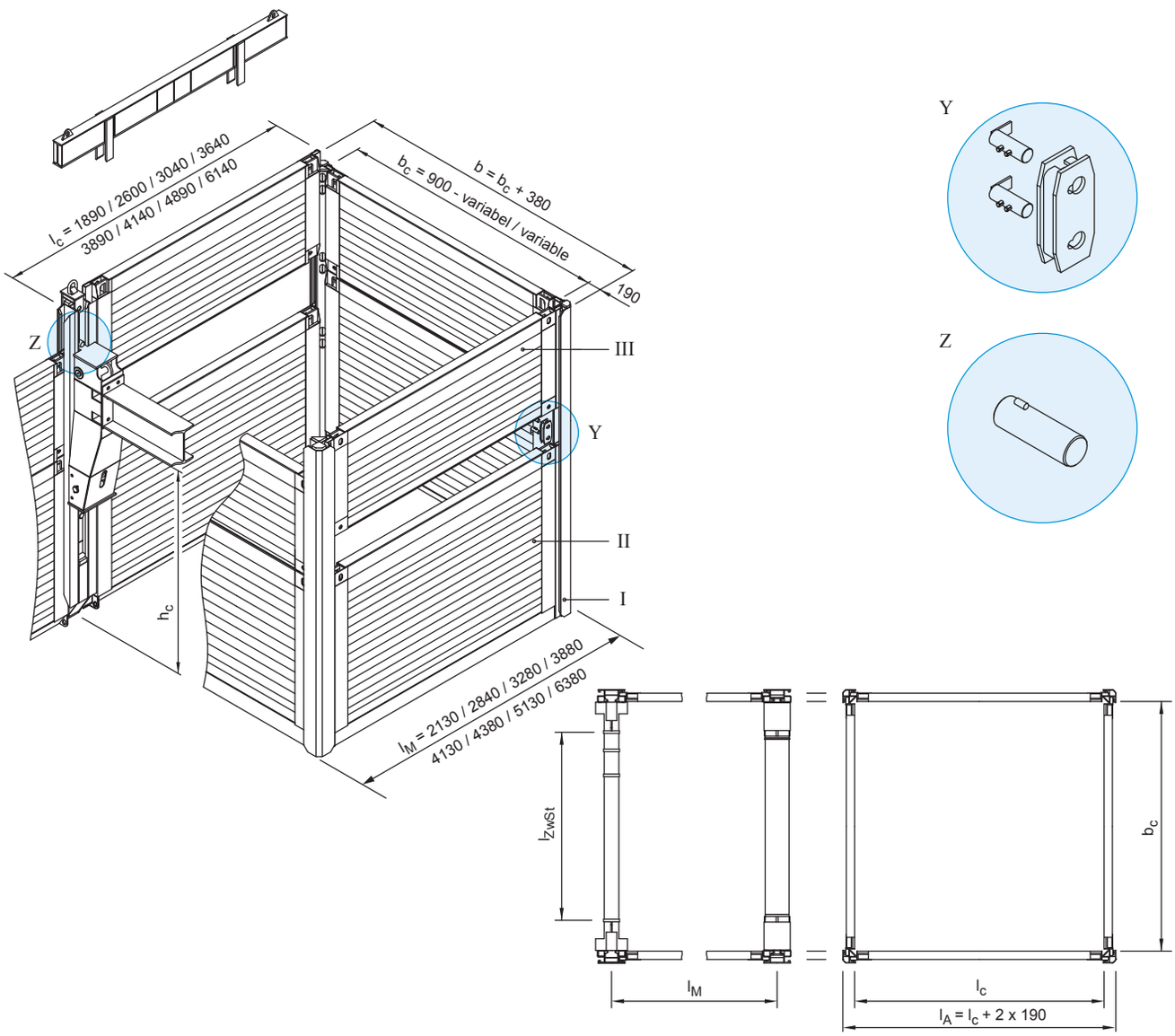
Single slide rail system corner post



(All dimensions in mm)

I	Corner post	l_c	Pipe culvert length	L_{ZwSt}	Length extension bar
II	Base panel	b	Shoring / trench width	Y	Connector
III	Top panel	b_c	Inner width	Z	Pin
l_M	Module length	h_c	Pipe culvert height		

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Corner post

Art. No.	Short description	l [m]	G [kg]
835 129	Corner post - single slide rail	**2,30**	170,0
835 130	Corner post - single slide rail	**4,13**	320,0

Base panels -inside- (height 2.32 m), Single slide rail and double slide rail linear shoring

Art. No.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
821 120	**1,89**	2,13	0,11	1,89	519,0	4,38	176,00
821 160	**2,60**	2,84	0,11	2,60	650,0	6,03	90,00
821 250	**3,04**	3,28	0,11	3,04	733,0	7,05	65,50
821 610	**3,64**	3,88	0,11	3,64	845,0	8,44	45,20
821 850	**3,89**	4,13	0,11	3,89	968,0	9,02	39,40
821 855	**4,14**	4,38	0,15	4,14	1.300,0	9,58	81,00
821 860	**4,89**	5,13	0,15	4,89	1.505,0	11,34	58,10
821 861	**6,13**	6,38	0,15	6,13	1.880,0	14,22	36,60

Top panels -inside- (height 1.32 m), Single slide rail and double slide rail linear shoring

Art. No.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
822 060	**1,89**	2,13	0,11	1,89	356,0	2,49	176,00
821 180	**2,60**	2,84	0,11	2,60	450,0	3,43	90,00
822 120	**3,04**	3,28	0,11	3,04	519,0	4,01	65,50
822 620	**3,64**	3,88	0,11	3,64	620,0	4,80	45,20
822 760	**3,89**	4,13	0,11	3,89	649,0	5,13	39,40
822 783	**4,14**	4,38	0,15	4,14	873,0	5,45	81,00
822 800	**4,89**	5,13	0,15	4,89	1.098,0	6,45	58,10
822 801	**6,13**	6,38	0,15	6,13	1.370,0	8,09	36,60

Top panels -inside- (height 2.30 m), Single slide rail and double slide rail linear shoring

Art. No.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
822 065	**1,89**	2,13	0,11	1,89	532,0	4,35	176,00
822 155	**2,60**	2,84	0,11	2,60	660,0	5,98	90,00
822 180	**3,04**	3,28	0,11	3,04	742,0	6,99	65,50
822 680	**3,64**	3,88	0,11	3,64	852,0	8,37	45,20
822 780	**3,89**	4,13	0,11	3,89	980,0	8,95	39,40
822 785	**4,14**	4,38	0,15	4,14	1.409,0	9,50	81,00

The details of length of pipe opening l_c refer to the rectangular boogie car.

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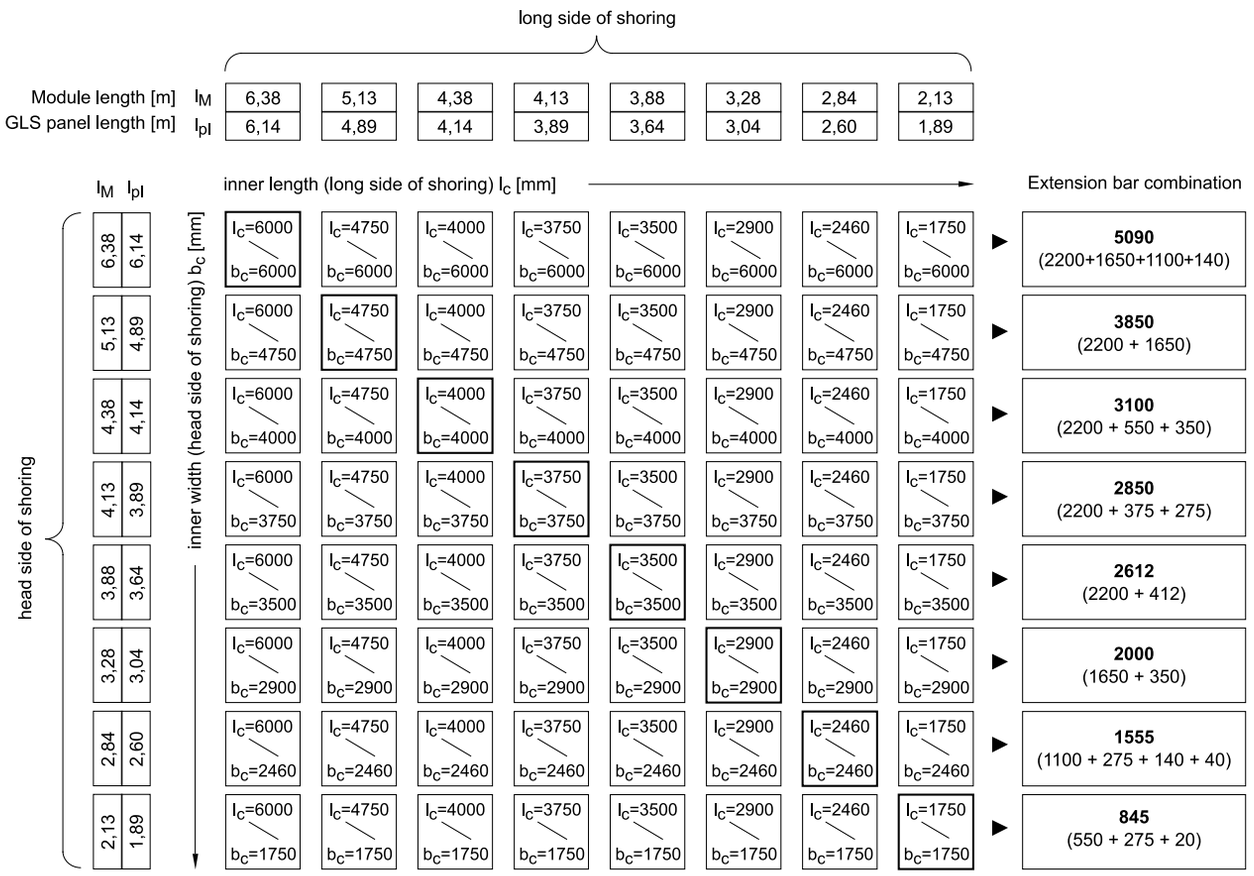
Ways of installation



Example:

Module length for end shoring module l_M = 3.28 m

Required extension bar combination for the boogie car in the Linear shoring bay: 2000 mm

l	Length	l_c	Pipe culvert length	b_c	Inner width
l_M	Module length	l_{pl}	Panel length		

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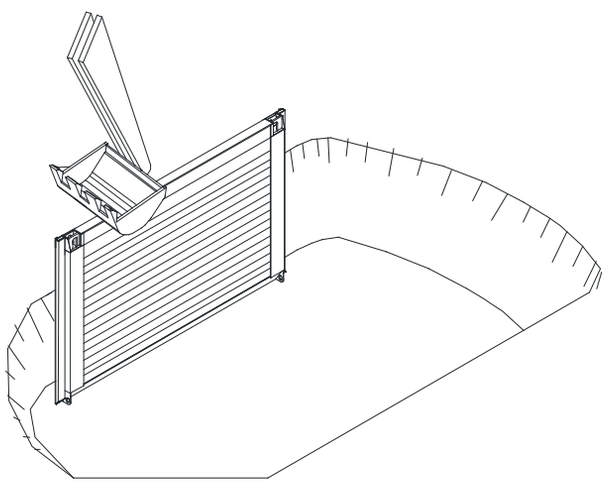
Installation instructions for single-rail corner shoring

1. General remarks

Corner rail shoring is a special shoring method for shaft structures as well as for trench shoring with combined trench-end units. If used for shaft shoring, special bracing systems can be omitted. All the forces are then discharged via the shoring panels. With the appropriate soldiers, it can take the form of single-rail or overlapping shoring.

By using different panel lengths in pairs, it is possible to realize rectangular pits of various sizes.

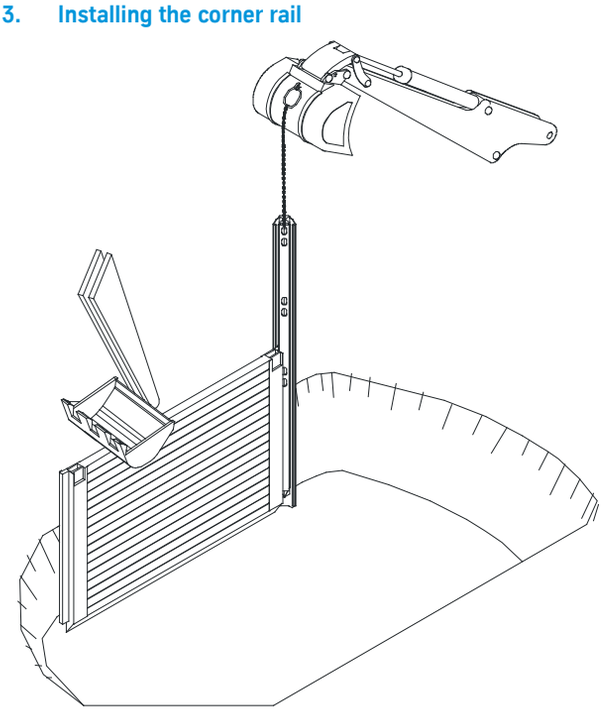
2. Installing the base panels



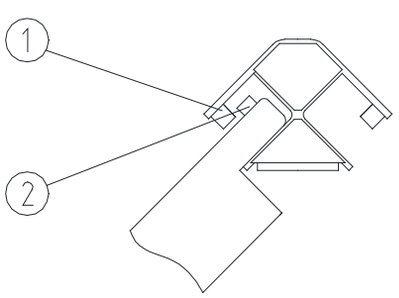
After measurement of the pit, the initial layer of soil is excavated for the shaft to match the panel lengths used. The project management's instructions and the relevant standards must be observed.

The first shoring panel (inner base panel) is lifted with lifting gear and a suitable sling (GS-approved) into the pit and fixed.

3. Installing the corner rail



By using a second set of lifting gear, the corner rail can now be slotted in from above. Make sure that the rectangular profile (1) on the reverse of the corner rail catches behind the rectangular profile (2) of the shoring panel.



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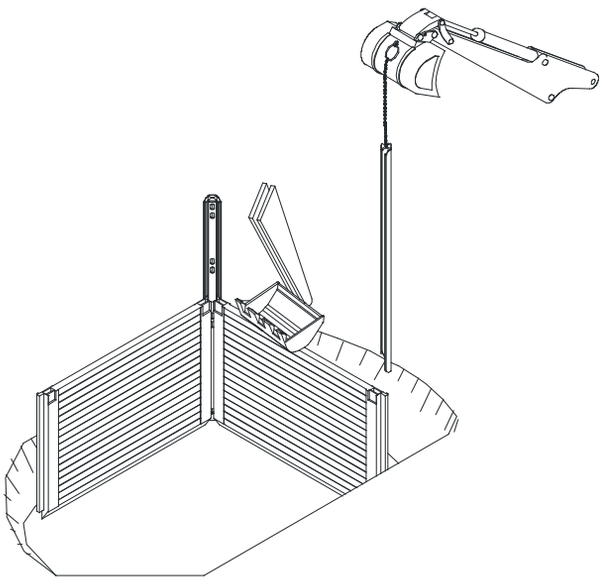
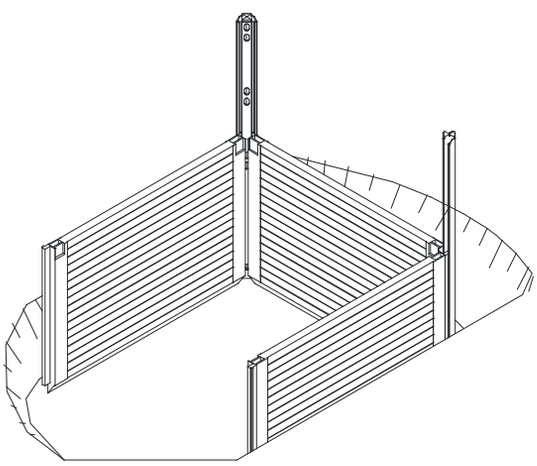
4. Installing further elements



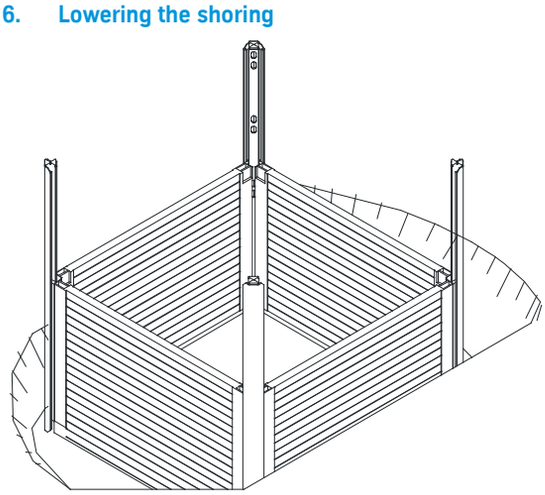
All further elements must be installed in the manner already described.

5. Aligning the shoring



So that the last wall of shoring can also be installed without difficulty, the shoring has to be properly aligned. To this end, it is important here that the horizontal clearance between the shoring panels is the same at both panel ends; and that the two diagonal axes of the shoring unit are the same length.

6. Lowering the shoring

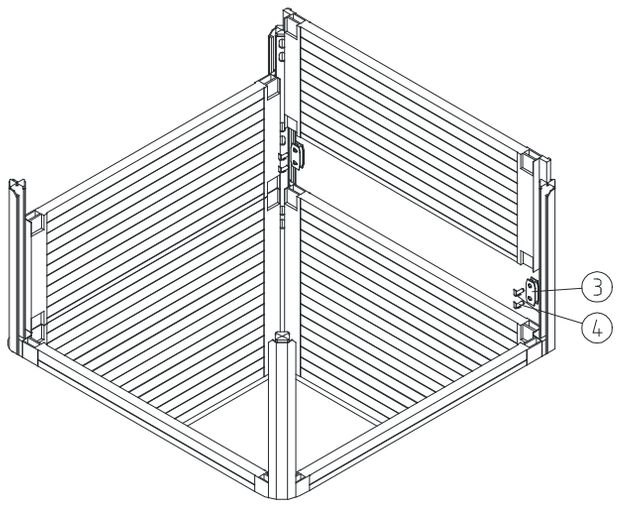


When the fourth base panel has been installed, the rectangularity of the shoring must again be checked. Then the cavity between the soil and shoring panel must be backfilled and compacted.

Before the lowering process proper, the soil beneath the shoring panels and slide rails is excavated in accordance with the project management's instructions. The slide rails and shoring panels are pressed down in turn, with special use being made of pressure beams for the shoring panels.

The shoring components must be pressed and on no account struck or hammered.

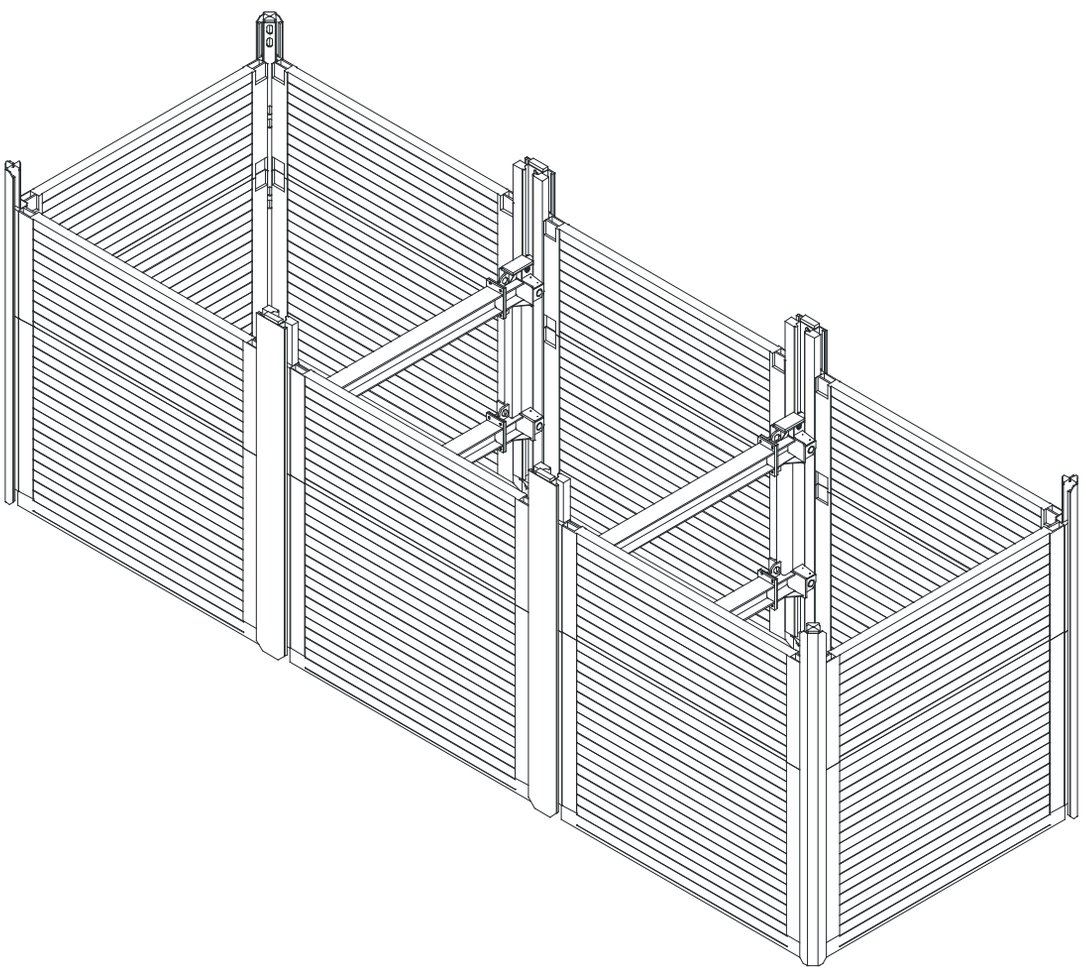
7. Installing the inner top panels



Depending on the required trench depth, the inner top panels are inserted in the soldier guides when the inner base panels (B) have been lowered to the provisional trench bottom.

The base and top panels must be joined together with connectors (3) and pins (4).

8. Installation example of a trench-end unit



There is no problem combining single-rail linear shoring with corner shoring. This way it is possible to continuously shore pits and trenches.