

Materials Services
Infrastructure

Instructions for use

Edge-supported shoring units
e+s



thyssenkrupp

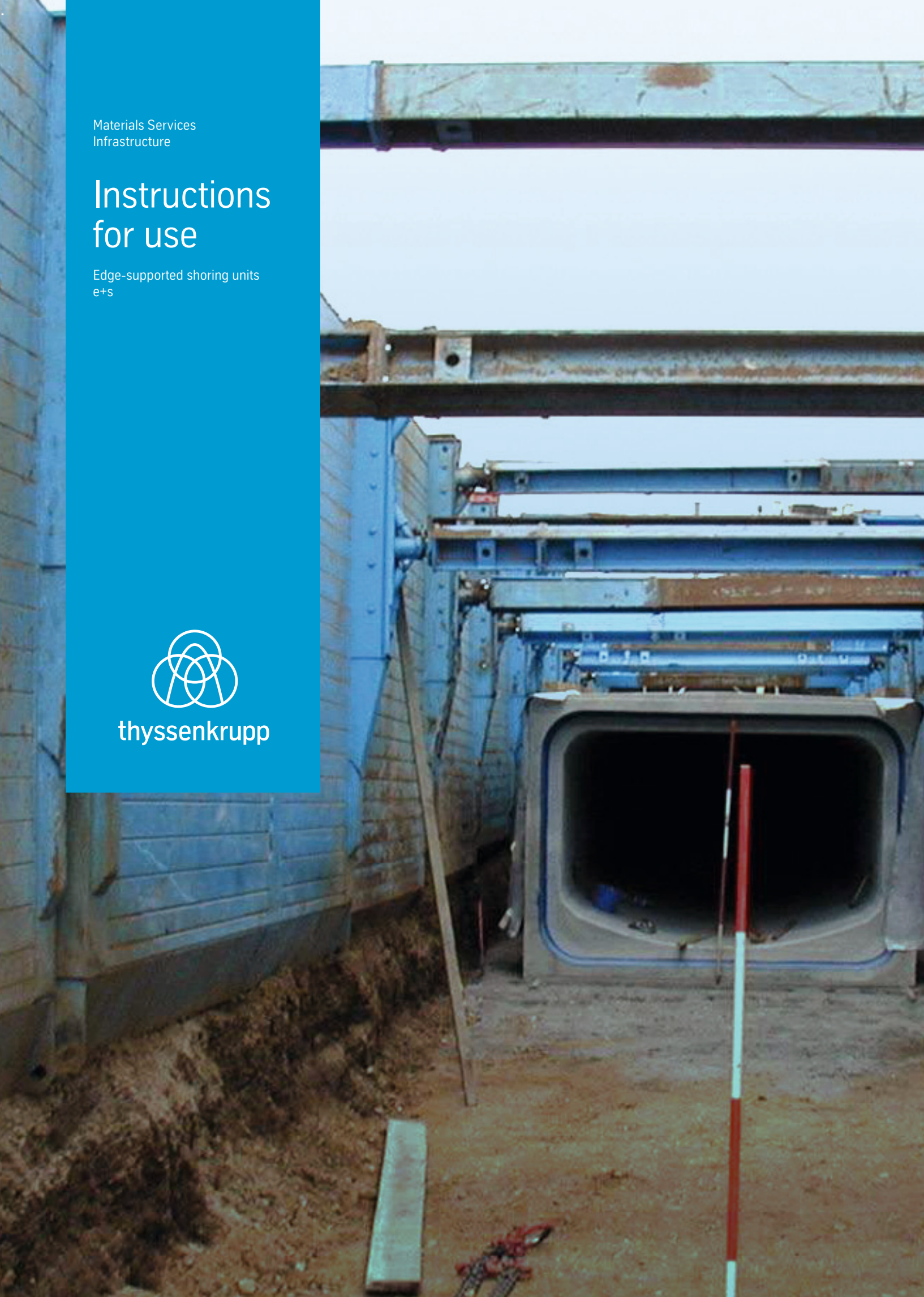
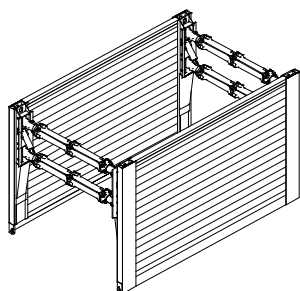


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System overview edge-supported shoring units (es)

1. Lightweight-Boxes

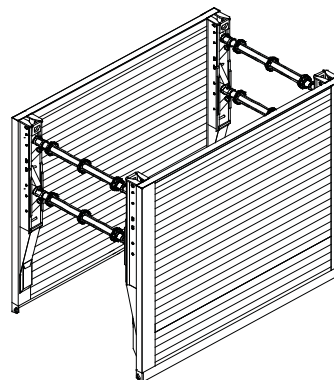


Shoring length	2,00 m - 3,50 m
Height base unit	1,60 m / 1,95 m / 2,25 m / 2,40 m
Height top unit	0,96 m / 1,32 m
Pipe culvert height	0,81 m / 1,16 m / 1,19 m / 1,34 m
Weight	745 kg - 1540 kg

Designation for base module B conforming to EN 13331-1:

ES - B - SV - C - XX - 2,00 / 3,50 x 1,60 / 1,95 / 2,25 / 2,40 x 0,08
- 0,64 / 4,38 - 0,81 / 1,34 - 17,5 / 23,0 - 0,75 / 1,54

2. Medium-Boxes

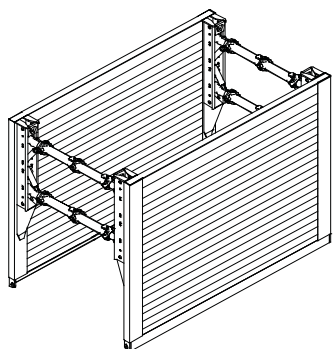


Shoring length	2,00 m - 4,50 m
Height base unit	2,60 m
Height top unit	1,32 m / 2,00 m
Pipe culvert height	1,45 m
Weight	1460 kg - 2780 kg

Designation for base module B conforming to EN 13331-1:

ES - B - SV - C - XX - 2,00 / 4,50 x 2,60 x 0,09 / 0,10
- 0,78 / 4,52 - 1,45 - 34,1 - 1,46 / 2,78

3. Magnum-Boxes

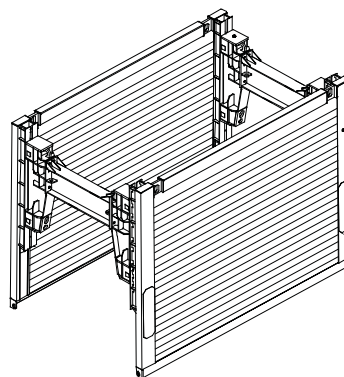


Shoring length	2,00 m - 6,84 m
Height base unit	3,15 m / 4,00 m
Height top unit	1,32 m / 1,44 m / 2,00 m
Pipe culvert height	1,75 m / 2,00 m / 2,46 m
Weight	1860 kg - 7130 kg

Designation for base module B conforming to EN 13331-1:

ES - B - SV - C - XX - 2,00 / 6,84 x 3,15 / 4,00 x 0,08 / 0,16
- 0,78 / 4,62 - 1,75 / 2,46 - 25,8 / 34,1 - 1,86 / 7,13

4. Linear-Boxes

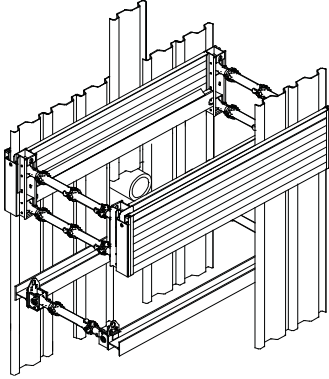


Shoring length	3,40 m / 3,70 m / 4,00 m / 4,50 m
Height base unit	3,00 m
Height top unit	1,32 m / 2,00 m
Pipe culvert height	variable
Weight	2050 kg - 2940 kg

Designation for base module B conforming to EN 13331-1:

ES - B - SN - F - XX - 3,40 / 3,70 / 4,00 / 4,50 x 3,00 x 1,00 - 0,94 / 3,14 - variable
- 34,10 - 2,05 / 2,94

5. Sheet pile element (before 09/2009)

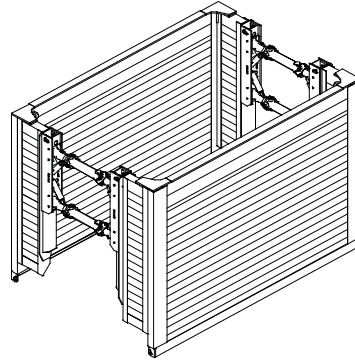


Shoring length	3,40 m / 3,63 m / 4,03 m
Height sheet pile element	0,97 m
Pipe culvert height	variable
Weight	1884 kg - 2163 kg

Designation for base module B conforming to EN 13331-1:

GV - B - SV - C - XX - 3,40 / 3,63 / 4,03 x 0,97 x 0,30 - 0,78 / 4,52 - variable - 1,88 / 2,16

7. Manhole

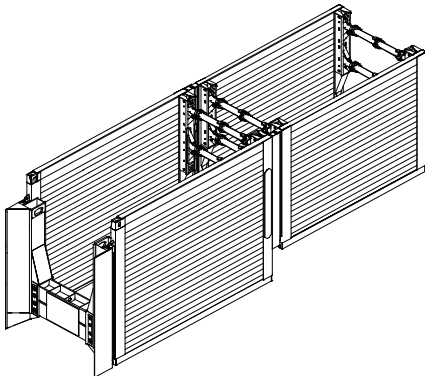


Shoring length	2,50 m / 3,00 m / 3,50 m
Height base unit	2,60 m
Height top unit	1,50 m
Pipe culvert height	1,45 m
Weight	2260 kg - 2710 kg

Designation for base module B conforming to EN 13331-1:

ES - B - SV - F - XX - 2,50 / 3,00 / 3,50 x 2,60 x 0,10 - 1,69 / 5,43 - 1,45 - 34,10 - 2,26 / 2,71

6. Dragbox



Shoring length	3,70 m / 4,25 m / 5,08 m
Height base unit	3,00 m / 3,15 m
Height towing plate	2,60 m
Pipe culvert height	max. 2,00 m
Weight	2745 kg - 3790 kg

Designation for base module B conforming to EN 13331-1:

DB - B - SN - F - XX - 3,70 / 4,25 / 5,08 x 3,00 / 3,15 x 0,1 / 0,12 - 1,00 / 4,30 - 2,00 - 34,10 - 2,75 / 3,79

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.

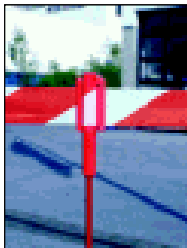
It is prohibited to stand within the pivoting range of the excavator/crane and beneath suspended loads.

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.

From an intermediate piece length combination of 1.10 m, it is mandatory to mount the shoring horizontally.



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.

Lightweight-Boxes LBR



LBR Lightweight shoring covers the whole range of applications in urban civil engineering projects, particularly the laying of cables and pipes for electricity, gas and water. Depending on the structural requirements and the conditions on site locally, the Lightweight box is either dropped into the finished trench or lowered using the dig-and-push method.

Lightweight shoring is the smallest and lightest trench box in the E+S range. It can be equipped with the high-performance system strut that is also used with Medium and Magnum boxes. The combination of base and top panels permits the shoring of trenches up to 4 m deep. As with all top panels, assembly is simple, quick, but nevertheless safe. Connections with posts and pins eliminate the risk of error.

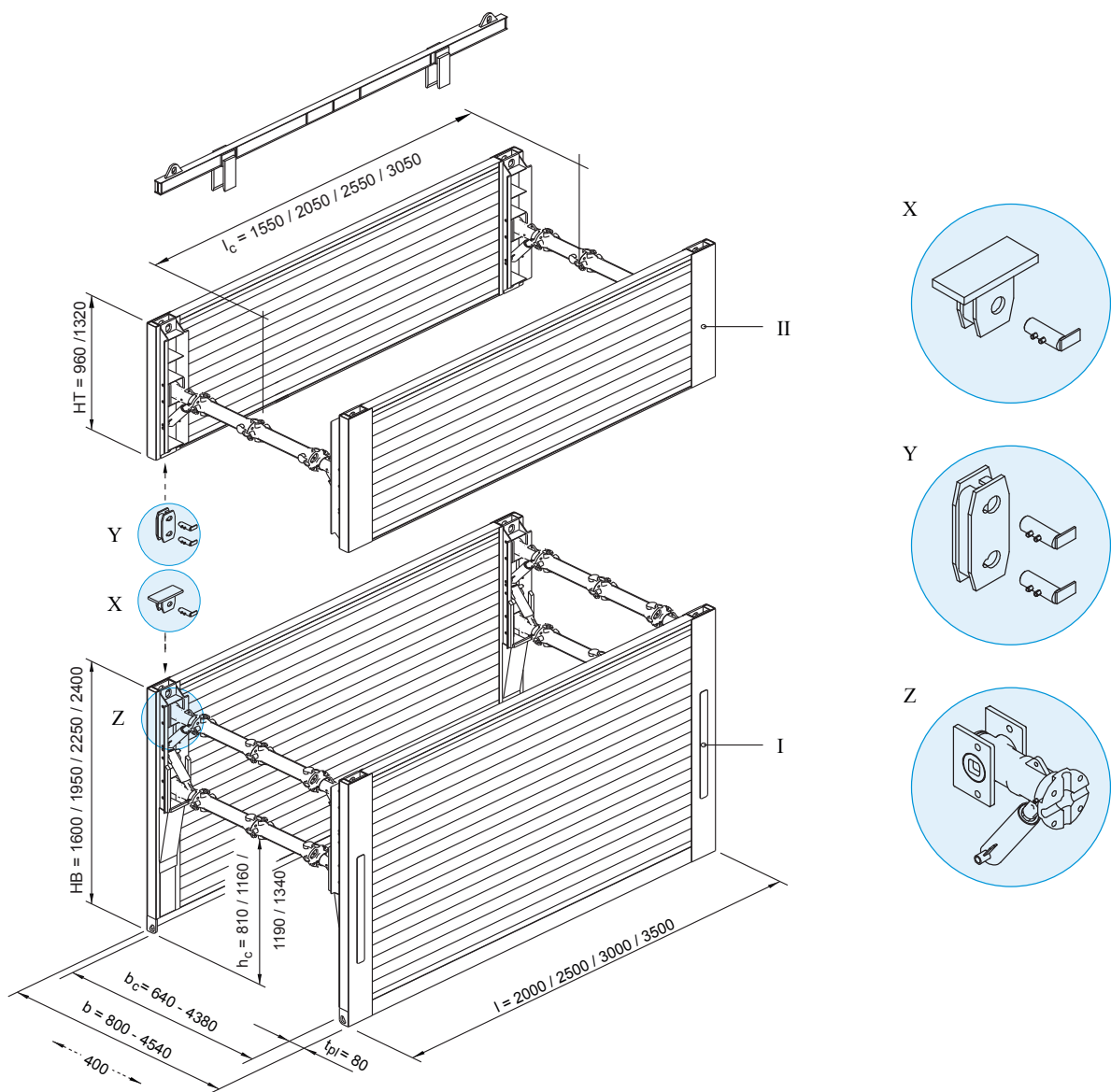
Basic data

Shoring length	2,00 m - 3,50 m
Height base unit	1,60 m / 1,95 m / 2,25 m / 2,40 m
Height top unit	0,96 m / 1,32 m
Pipe culvert height	0,81 m / 1,16 m / 1,19 m / 1,34 m
Weight	745 kg - 1540 kg
Trench width	variable, see page 57

Advantages

- Highly economical shoring solution for urban civil engineering projects
- Can be either dropped in or lowered
- Utmost safety standard
- Strut system compatible with Medium- and Magnum-class shorings
- Easy handling

Lightweight-Boxes



(All dimensions in mm)

I	Base unit	l _c	Pipe culvert length	X	Pressure plate
II	Top unit	b	Shoring / trench width	Y	Connector
HB	Height base unit	b _c	Inner width	Z	Spreader with bearing plate and shock absorber
HT	Height top unit	h _c	Pipe culvert height		
l	Length	t _{pl}	Thickness		

Base units (Height 1,60 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m ²]	eh [kN/m ²]
801 455	2,00	0,08	0,81	1,55	373,0	746,0	3,20	70,5
801 505	2,50	0,08	0,81	2,05	420,0	840,0	4,00	50,9
801 568	3,00	0,08	0,81	2,55	502,0	1.004,0	4,80	34,0
801 578	3,50	0,08	0,81	3,05	538,0	1.076,0	5,60	24,3

Base units (Height 1,95 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m ²]	eh [kN/m ²]
801 475	2,00	0,08	1,16	1,55	423,0	846,0	3,90	58,3
801 525	2,50	0,08	1,16	2,05	478,0	956,0	4,88	46,6
801 565	3,00	0,08	1,16	2,55	548,0	1.096,0	5,85	34,0
801 575	3,50	0,08	1,16	3,05	618,0	1.236,0	6,83	24,3
801 590	4,00	0,08	1,19	3,55	798,0	1.596,0	7,80	18,6

Base units (Height 2,25 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m ²]	eh [kN/m ²]
801 015	2,00	0,08	1,19	1,55	515,0	1.030,0	4,50	61,1
801 055	2,50	0,08	1,19	2,05	595,0	1.190,0	5,63	48,9
801 105	3,00	0,08	1,19	2,55	670,0	1.340,0	6,75	34,0
801 108	3,50	0,08	1,19	3,05	740,0	1.480,0	7,88	24,3
801 109	4,00	0,08	1,19	3,55	960,0	1920,0	9,00	18,6

Base units (Height 2,40 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m ²]	eh [kN/m ²]
801 210	2,00	0,08	1,34	1,55	550,0	1.100,0	4,80	50,6
801 215	2,50	0,08	1,34	2,05	635,0	1.270,0	6,00	40,5
801 220	3,00	0,08	1,34	2,55	675,0	1.350,0	7,20	34,0
801 110	3,50	0,08	1,34	3,05	770,0	1.540,0	8,40	24,3
801 115	4,00	0,08	1,34	3,55	980,0	1960,0	9,60	18,6

Top units (Height 0,96 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m ²]	eh [kN/m ²]
801 595	2,00	0,08	-	1,55	278,0	556,0	1,92	70,5
801 625	2,50	0,08	-	2,05	317,0	634,0	2,40	50,9
801 665	3,00	0,08	-	2,55	357,0	714,0	2,88	34,0
801 675	3,50	0,08	-	3,05	395,0	790,0	3,36	24,3
801 676	4,00	0,08	-	3,55	465,0	930,0	3,84	18,6

Top units (Height 1,32 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m ²]	eh [kN/m ²]
801 628	2,00	0,08	-	1,55	341,0	682,0	2,64	70,5
801 630	2,50	0,08	-	2,05	391,0	782,0	3,30	50,9
801 635	3,00	0,08	-	2,55	408,0	816,0	3,96	34,0
801 680	3,50	0,08	-	3,05	430,0	860,0	4,62	24,3
801 678	4,00	0,08	-	3,55	573,0	1.146,0	5,28	18,6

Extension bars

Art. No.	Short description	l [m]	G [kg]
850 091	Extension bar GGG 50	0,250	11,2
850 100	Extension bar GGG 50	0,550	18,7
850 112	Extension bar HEB 180	0,275	28,0
850 110	Extension bar HEB 180	0,550	43,0
850 124	Extension bar HEB 180	1,100	70,0
850 132	Extension bar HEB 180	1,650	100,0
850 135	Extension bar HEB 180	2,200	130,0

Trench widths (for cast iron tubular extension bars l = 0.55 m)

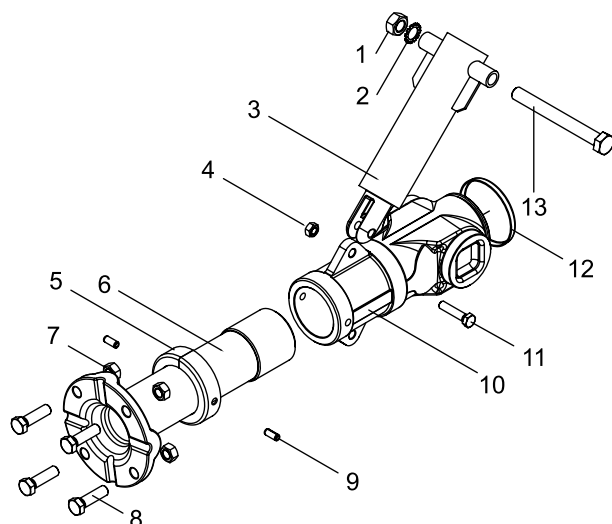
Number of extension bars	Length extension bars [m]	b _c [m]	b [m]
0	0,00	0,64 - 1,08	0,80 - 1,24
1	0,55	1,19 - 1,63	1,35 - 1,79
2	1,10	1,74 - 2,18	1,90 - 2,34
3	1,65	2,29 - 2,73	2,45 - 2,89
4	2,20	2,84 - 3,28	3,00 - 3,44
5	2,75	3,39 - 3,83	3,55 - 3,99
max. 6	3,30	3,94 - 4,38	4,10 - 4,54

From-to sizes dependent on spindle adjustment range.

Other trench widths possible by combining the two different extension bar lengths l = 0.25 m and l = 0.55 m.

Larger trench widths available on request.

l	Length	h _c	Pipe culvert height	G	Weight
l _c	Pipe culvert length	t _{pl}	Thickness	G / VP	Weight per shoring panel
b	Trench width	d	Diameter	G / Box	Weight per shoring box
b _c	Inner width	A	Area	eh	Earth pressure max.

e+s spreader, complete, right/left, with shock absorber

- | | |
|----|------------------------------|
| 1 | Nut M 20 |
| 2 | Lock washer A 20 |
| 3 | Shock absorber |
| 4 | Nut M 12 |
| 5 | Metal cap for spindle |
| 6 | Spindle, right / left |
| 7 | Nut M 16 |
| 8 | Hexagon screw M 16 x 55 |
| 9 | Damping sleeve 10 x 24 mm |
| 10 | Cast-iron nut, right / left |
| 11 | Hexagon screw M 12 x 55 |
| 12 | PVC dust cap for spindle nut |
| 13 | Hexagon screw M 20 x 180 |

Accessories / Spares

Art. No.	Short description	l [m]	d [m]	G [kg]
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
842 750	Adapter for DKU piling frame, e+s spreader			31,0
850 699	Bar for adjusting e+s/krings spindles (Medium, Magnum, KS 100, slide rail)	0,7	0,024	2,5
302 125	Bearing plate -closed-			4,2
850 500	Cast iron connector (for Medium boxes, Magnum boxes, Manhole)			6,7
862 214	Connector (for Linear box, top unit with struts)			6,1
HB 0190 F	Damping sleeve 10 x 24 mm			0,01
842 099	DKU piling frame guide frame	2,27		105,0
842 100	DKU piling frame guide frame	3,81		175,0
859 981	Drop-in bearing block, e+s			25,6
HD 0110 F	Grease nipple		0,01	0,01
HD 0050 F	Metal cap for spindle			0,1
HD 0013 F	Metal cap for spindle housing			0,2
IA 0095 F	Nut M 12			0,01
IA 0120 F	Nut M 16			0,03
IA 0130 F	Nut M 20			0,03
IA 0185 F	Nut M 30			0,30
HD 0040 F	PE cap for the spindle			0,01
850 600	Pin	0,195	0,035	1,8
850 610	Pin (for Lightweight box)	0,095	0,030	0,5
850 614	Pin 200 x 40 mm (Linear box boogie car)			1,9
851 010	Pressure plate (for Lightweight-Boxes)			7,0
851 005	Pressure plate (for Medium Boxes, Magnum Boxes, Manhole)			19,0
IB 0215 F	Screw M 12 x 55			0,06
IB 0310 F	Screw M 16 x 55			0,11
IB 0420 F	Screw M 20 x 180			0,56
IB 0360 F	Screw M 20 x 45			0,17

Accessories / Spares (contd.)

Art. No.	Short description	l [m]	d [m]	G [kg]
300 100	Shock absorber	0,143		4,5
GB 0070 E	Spindle housing, left hand			9,4
GB 0040 E	Spindle housing, right hand			9,4
GB 0090 E	Spindle, lefthand -heavy duty-			17,1
GB 0080 E	Spindle, lefthand -hollow-			9,5
GB 0030 E	Spindle, righthand -heavy duty-			17,1
GB 0020 E	Spindle, righthand -hollow-			9,5
301 010	Spreader complete, left hand -heavy duty-			27,1
301 000	Spreader complete, left hand -hollow-			19,5
300 010	Spreader complete, right hand -heavy duty-			27,1
300 000	Spreader complete, right hand -hollow-			19,5
159 161	Spring cotter (850 614)			0,1
HE 0050 F	Spring cotter 6 mm		0,006	0,03
ID 0160 F	Spring ring A 20			0,01
336 960	Support bracket for DKU piling frame element			40,0
821 100	Suspension chain KL-13-8	5,000		25,7

l	Length	h _c	Pipe culvert height	G	Weight
l _c	Pipe culvert length	t _{pl}	Thickness	G / VP	Weight per shoring panel
b	Trench width	d	Diameter	G / Box	Weight per shoring box
b _c	Inner width	A	Area	eh	Earth pressure max.

Medium-Boxes



On the market for medium-sized products, Medium shoring from e+s occupies a special place. Its various dimensions and special design features give it universal and varied applications. In addition, the strut system is compatible with Magnum and Light-weight shoring. The top panels can also be used with the Magnum shoring system.

The e+s strut system consists of two efficient individual components: The nut made of nodular cast-iron (GGG 50) effectively withstands the tensile and compressive forces. The spindle is a threaded tube with a friction-welded flange and four holes for the flange bolts. Thanks to its stepless adjustment, it can be adapted perfectly to the demanded trench width required. For this, there are extension bars of different lengths and grades that are also capable of discharging greater loads.

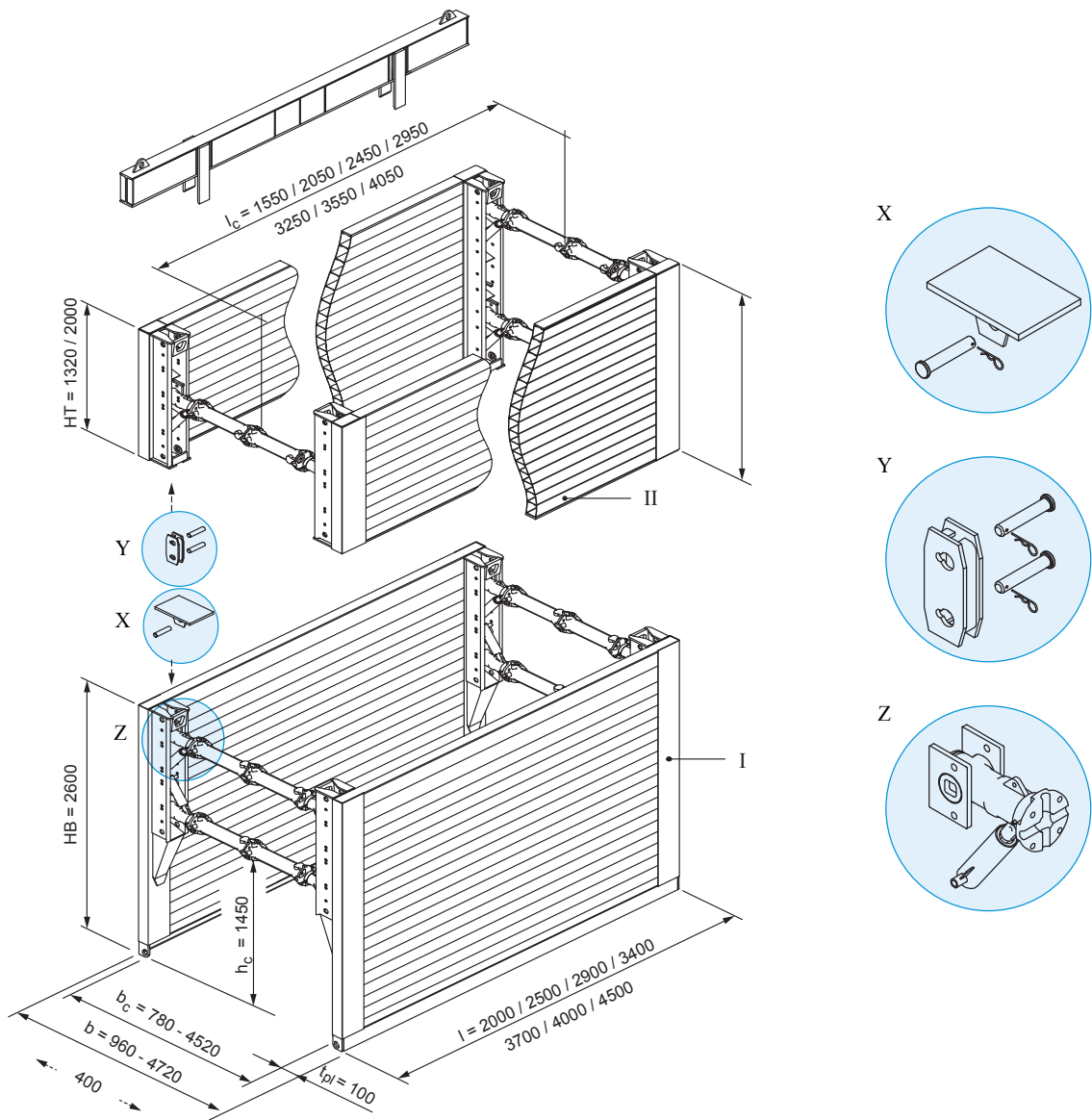
Basic data

Shoring length	2,00 m - 4,50 m
Height base unit	2,60 m
Height top unit	1,32 m / 2,00 m
Pipe culvert height	1,45 m
Weight	1460 kg - 2780 kg
Trench width	variable, see page 60

Advantages

- Economical shoring solution for urban civil engineering projects
- Stepless adjustability for optimum adaptation to the trench width
- Strut system compatible with Magnum and Lightweight shoring
- Top panels compatible with Magnum shoring

Medium-Boxes



(All dimensions in mm)

I	Base unit	l_c	Pipe culvert length	X	Pressure plate
II	Top unit	b	Shoring / trench width	Y	Connector
HB	Height base unit	b_c	Inner width	Z	Spreader with bearing plate and shock absorber
HT	Height top unit	h_c	Pipe culvert height		
l	Length	t_{pl}	Thickness		

Base units (Height 2,60 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m²]	eh [kN/m²]
800 010	2,00	0,10	1,46	1,55	730,0	1.460,0	5,20	70,0
800 100	2,50	0,10	1,46	2,05	825,0	1.650,0	6,50	60,0
800 150	2,90	0,10	1,46	2,45	908,0	1.816,0	7,54	55,0
800 200	3,40	0,10	1,46	2,95	1.028,0	2.056,0	8,84	50,8
800 300	3,70	0,10	1,46	3,25	1.118,0	2.236,0	9,62	42,3
800 400	4,00	0,10	1,46	3,55	1.257,0	2.514,0	10,40	44,0
800 440	4,50	0,10	1,46	4,05	1.390,0	2.780,0	11,70	34,2

Top units (Height 1,32 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m²]	eh [kN/m²]
800 550	2,00	0,10	-	1,55	463,0	926,0	2,64	165,0
800 600	2,50	0,10	-	2,05	531,0	1.062,0	3,30	99,3
800 650	2,90	0,10	-	2,45	578,0	1.156,0	3,83	71,5
800 700	3,40	0,10	-	2,95	658,0	1.316,0	4,49	50,5
800 800	3,70	0,10	-	3,25	692,0	1.384,0	4,88	42,1
800 900	4,00	0,10	-	3,55	775,0	1.550,0	5,28	43,8
800 950	4,50	0,10	-	4,05	820,0	1.640,0	5,94	34,2

Top units (Height 2,00 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m²]	eh [kN/m²]
802 680	2,00	0,10	-	1,55	697,0	1.394,0	4,00	165,0
802 690	2,50	0,10	-	2,05	785,0	1.570,0	5,00	99,3
802 550	2,90	0,10	-	2,45	840,0	1.680,0	5,80	71,5
802 700	3,40	0,10	-	2,95	930,0	1.860,0	6,80	50,5
802 750	3,70	0,10	-	3,25	990,0	1.980,0	7,40	42,1
802 751	4,00	0,10	-	3,55	1.085,0	2.170,0	8,00	43,8
800 951	4,50	0,10	-	4,05	1.192,0	2.384,0	9,00	34,2

Extension bars

Art. No.	Short description	l [m]	G [kg]
850 091	Extension bar GGG 50	0,250	11,2
850 100	Extension bar GGG 50	0,550	18,7
850 112	Extension bar HEB 180	0,275	28,0
850 110	Extension bar HEB 180	0,550	43,0
850 124	Extension bar HEB 180	1,100	70,0
850 132	Extension bar HEB 180	1,650	100,0
850 135	Extension bar HEB 180	2,200	130,0

Trench widths (for cast iron tubular extension bars l = 0.55 m)

Number of extension bars	l [m]	b _c [m]	b [m]
0	0,00	0,78 - 1,22	0,98 - 1,42
1	0,55	1,32 - 1,77	1,52 - 1,97
2	1,10	1,88 - 2,32	2,08 - 2,52
3	1,65	2,43 - 2,87	2,63 - 3,07
4	2,20	2,98 - 3,42	3,18 - 3,62
5	2,75	3,53 - 3,97	3,73 - 4,17
max. 6	3,30	4,08 - 4,52	4,28 - 4,72

From-to sizes dependent on spindle adjustment range.

Other trench widths possible by combining the two different extension bar lengths l = 0.25 m and l = 0.55 m.

Larger trench widths available on request.

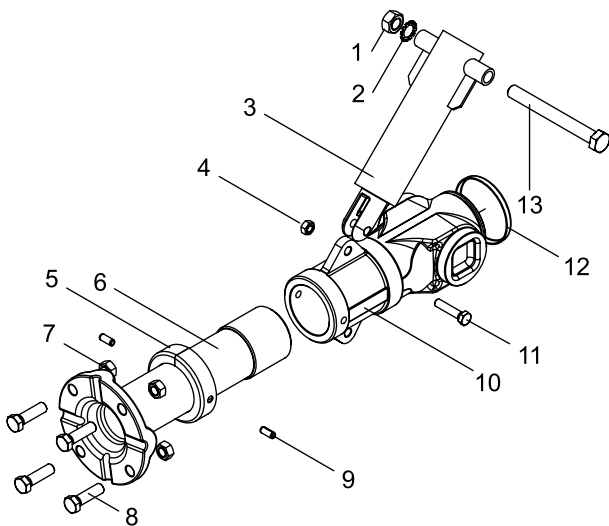
Trench widths (for extension bars HEB 180)

l [m]	b _c [m]	b [m]
0,000	0,780 - 1,220	0,980 - 1,420
0,275	1,055 - 1,495	1,255 - 1,695
0,550	1,330 - 1,770	1,530 - 1,970
1,100	1,880 - 2,320	2,080 - 2,520
1,650	2,430 - 2,870	2,630 - 3,070
2,200	2,980 - 3,420	3,180 - 3,620
2,200 + 1,100	4,080 - 4,520	4,280 - 4,720

From-to dimensions depend on the spindle adjustment range.

Other trench widths are possible by combining different HEB lengths.

Larger trench widths are available on request.

E+S spreader, complete, right/left, with shock absorber

- | | |
|----|------------------------------|
| 1 | Nut M 20 |
| 2 | Lock washer A 20 |
| 3 | Shock absorber |
| 4 | Nut M 12 |
| 5 | Metal cap for spindle |
| 6 | Spindle, right / left |
| 7 | Nut M 16 |
| 8 | Hexagon screw M 16 x 55 |
| 9 | Damping sleeve 10 x 24 mm |
| 10 | Cast-iron nut, right / left |
| 11 | Hexagon screw M 12 x 55 |
| 12 | PVC dust cap for spindle nut |
| 13 | Hexagon screw M 20 x 180 |

Accessories / Spares

Art. No.	Short description	l [m]	d [m]	G [kg]
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
842 750	Adapter for DKU piling frame, e+s spreader			31,0
850 699	Bar for adjusting e+s/krings spindles (Medium, Magnum, KS 100, slide rail)	0,7	0,024	2,5
302 125	Bearing plate -closed-			4,2
850 500	Cast iron connector (for Medium boxes, Magnum boxes, Manhole)			6,7
862 214	Connector (for Linear box, top unit with struts)			6,1
HB 0190 F	Damping sleeve 10 x 24 mm			0,01
842 099	DKU piling frame guide frame	2,27		105,0
842 100	DKU piling frame guide frame	3,81		175,0
859 981	Drop-in bearing block, e+s			25,6
HD 0110 F	Grease nipple		0,01	0,01
HD 0050 F	Metal cap for spindle			0,1
HD 0013 F	Metal cap for spindle housing			0,2
IA 0095 F	Nut M 12			0,01

Accessories / Spares (contd.)

Art. No.	Short description	l [m]	d [m]	G [kg]
IA 0120 F	Nut M 16			0,03
IA 0130 F	Nut M 20			0,03
IA 0185 F	Nut M 30			0,30
HD 0040 F	PE cap for the spindle			0,01
850 600	Pin	0,195	0,035	1,8
850 610	Pin (for Lightweight box)	0,095	0,030	0,5
850 614	Pin 200 x 40 mm (Linear box boogie car)			1,9
851 010	Pressure plate (for Lightweight-Boxes)			7,0
851 005	Pressure plate (for Medium Boxes, Magnum Boxes, Manhole)			19,0
IB 0215 F	Screw M 12 x 55			0,06
IB 0310 F	Screw M 16 x 55			0,11
IB 0420 F	Screw M 20 x 180			0,56
IB 0360 F	Screw M 20 x 45			0,17
300 100	Shock absorber	0,143		4,5
GB 0070 E	Spindle housing, left hand			9,4
GB 0040 E	Spindle housing, right hand			9,4
GB 0090 E	Spindle, lefthand -heavy duty-			17,1
GB 0080 E	Spindle, lefthand -hollow-			9,5
GB 0030 E	Spindle, righthand -heavy duty-			17,1
GB 0020 E	Spindle, righthand -hollow-			9,5
301 010	Spreader complete, left hand -heavy duty-			27,1
301 000	Spreader complete, left hand -hollow-			19,5
300 010	Spreader complete, right hand -heavy duty-			27,1
300 000	Spreader complete, right hand -hollow-			19,5
159 161	Spring cotter (850 614)			0,1
HE 0050 F	Spring cotter 6 mm		0,006	0,03
ID 0160 F	Spring ring A 20			0,01
336 960	Support bracket for DKU piling frame element			40,0
821 100	Suspension chain KL-13-8	5,000		25,7

l	Length	h _c	Pipe culvert height	G / VP	Weight per shoring panel
l _c	Pipe culvert length	t _{pl}	Thickness	G / Box	Weight per shoring box
b	Shoring / trench width	A	Area	eh	Earth pressure max.
b _c	Inner width	G	Weight		

Magnum-Boxes



The boxes of the Medium and Magnum class keep the project running smoothly and cost-effectively, particularly when pipes with large diameters or lengths have to be laid. The edge-supported box system scores with a large pipe clearance between the bottom strut and the shoring panel below it. This simplifies the installation of pipes with nominal widths up to 2,500 mm. For construction projects involving pipes greater than 6 m in length, the Magnum boxes with large panel lengths are an ideal choice.

The top panels of the Magnum boxes are compatible with the Medium shoring system and can be also used there as top panels. The strut system is identical to that of Lightweight and Medium shoring with full compatibility.

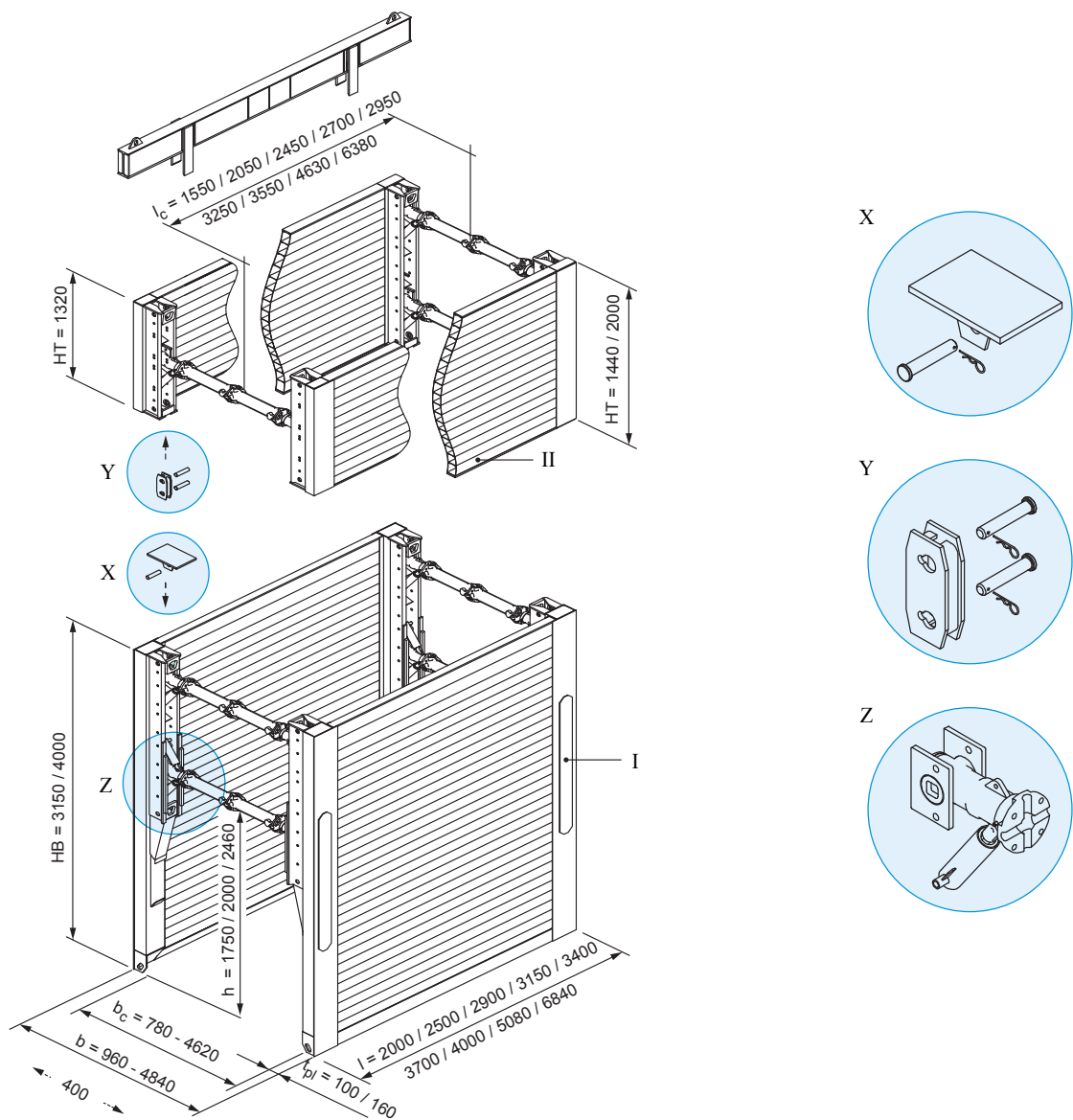
Basic data

Shoring length	2,00 m - 6,84 m
Height base unit	3,15 m / 4,00 m
Height top unit	1,32 m / 1,44 m / 2,00 m
Pipe culvert height	1,75 m / 2,00 m / 2,46 m
Weight	1860 kg - 7130 kg
Trench width	variable, see page 64

Advantages

- Cost-effective shoring solution, e.g. for laying large or long pipes
- Strut system compatible with Lightweight and Medium shoring
- Top panels compatible with Medium shoring

Magnum-Boxes



(All dimensions in mm)

I	Base unit	l_c	Pipe culvert length	X	Pressure plate
II	Top unit	b	Shoring / trench width	Y	Connector
HB	Height base unit	b_c	Inner width	Z	Spreader with bearing plate and shock absorber
HT	Height top unit	h_c	Pipe culvert height		
l	Length	t_{pl}	Thickness		

Base units (Height 3,15 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m²]	eh [kN/m²]
802 036	2,00	0,10	2,01	1,55	930,0	1.860,0	6,30	73,1
802 040	2,50	0,10	2,01	2,05	1.042,0	2.084,0	7,50	58,5
802 050	2,90	0,10	2,01	2,45	1.138,0	2.276,0	8,70	50,4
802 175	3,40	0,10	2,01	2,95	1.260,0	2.520,0	10,20	43,0
802 210	3,70	0,10	2,01	3,25	1.428,0	2.856,0	11,10	39,5
802 300	4,00	0,10	2,01	3,55	1.579,0	3.158,0	12,00	36,5
802 425	5,08	0,12	2,01	4,63	1.918,0	3.836,0	15,24	28,6
802 460	6,84	0,16	1,75	6,38	3.565,0	7.130,0	21,55	25,08

Base units (Height 4,00 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m²]	eh [kN/m²]
802 100	3,15	0,08	2,46	2,70	1.385,0	2.770,0	12,60	46,0
802 197 A	3,40	0,09	2,46	2,95	1.568,0	3.136,0	13,60	41,0

Top units (Height 1,32 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m²]	eh [kN/m²]
800 550	2,00	0,10	-	1,55	463,0	926,0	2,64	165,0
800 600	2,50	0,10	-	2,05	531,0	1.062,0	3,30	99,3
800 650	2,90	0,10	-	2,45	578,0	1.156,0	3,83	71,5
802 560	3,15	0,08	-	2,70	670,0	1.340,0	4,16	60,7
800 700	3,40	0,10	-	2,95	658,0	1.316,0	4,49	50,5
800 800	3,70	0,10	-	3,25	692,0	1.384,0	4,88	42,1
800 900	4,00	0,10	-	3,55	775,0	1.550,0	5,28	43,8
802 814	5,08	0,12	-	4,63	1.110,0	2.220,0	6,71	34,2

Top units (Height 1,44 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m²]	eh [kN/m²]
802 815	6,84	0,16	-	6,38	1.505,0	3.010,0	9,85	25,8

Top units (Height 2,00 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m²]	eh [kN/m²]
802 680	2,00	0,10	-	1,55	697,0	1.394,0	4,00	165,0
802 690	2,50	0,10	-	2,05	785,0	1.570,0	5,00	99,3
802 550	2,90	0,10	-	2,45	840,0	1.680,0	5,80	71,5
802 600	3,15	0,08	-	2,70	860,0	1.720,0	6,30	60,7
802 700	3,40	0,10	-	2,95	930,0	1.860,0	6,80	50,5
802 750	3,70	0,10	-	3,25	990,0	1.980,0	7,40	42,1
802 751	4,00	0,10	-	3,55	1.085,0	2.170,0	8,00	43,8

Extension bars

Art. No.	Short description	l [m]	G [kg]
850 091	Extension bar GGG 50	0,250	11,2
850 100	Extension bar GGG 50	0,550	18,7
850 112	Extension bar HEB 180	0,275	28,0
850 110	Extension bar HEB 180	0,550	43,0
850 124	Extension bar HEB 180	1,100	70,0
850 132	Extension bar HEB 180	1,650	100,0
850 135	Extension bar HEB 180	2,200	130,0

Trench widths (for cast iron tubular extension bars l = 0.55 m)

			for base element h = 3,15 m			for base element h = 4,00 m		
			Element l = 4,00 m	Element l = 5,08 m	Element l = 6,84 m	Element l = 3,15 m	Element l = 3,40 m	
Anz.-ZwSt.	l _{ZwSt.} [m]	b _c [m]	b [m]	b [m]	b [m]	b _c [m]	b [m]	b [m]
0	0,000	0,78 - 1,22	0,98 - 1,42	1,02 - 1,46	1,10 - 1,54	0,88 - 1,32	1,04 - 1,48	1,08 - 1,52
1	0,550	1,33 - 1,77	1,53 - 1,97	1,57 - 2,01	1,65 - 2,09	1,43 - 1,87	1,59 - 2,03	1,63 - 2,07
2	1,100	1,88 - 2,32	2,08 - 2,52	2,12 - 2,56	2,20 - 2,64	1,98 - 2,42	2,14 - 2,58	2,18 - 2,62
3	1,650	2,43 - 2,87	2,63 - 3,07	2,67 - 3,11	2,75 - 3,19	2,53 - 2,97	2,69 - 3,13	2,73 - 3,17
4	2,200	2,98 - 3,42	3,18 - 3,62	3,22 - 3,66	3,30 - 3,74	3,08 - 3,52	3,24 - 3,68	3,28 - 3,72
5	2,750	3,53 - 3,97	3,73 - 4,17	3,77 - 4,21	3,85 - 4,29	3,63 - 4,07	3,79 - 4,23	3,83 - 4,27
max. 6	3,300	4,08 - 4,52	4,28 - 4,72	4,32 - 4,76	4,40 - 4,84	4,18 - 4,62	4,34 - 4,78	4,38 - 4,82

From-to sizes dependent on spindle adjustment range.

Other trench widths possible by combining the two different extension bar lengths l = 0.25 m and l = 0.55 m.

Larger trench widths available on request.

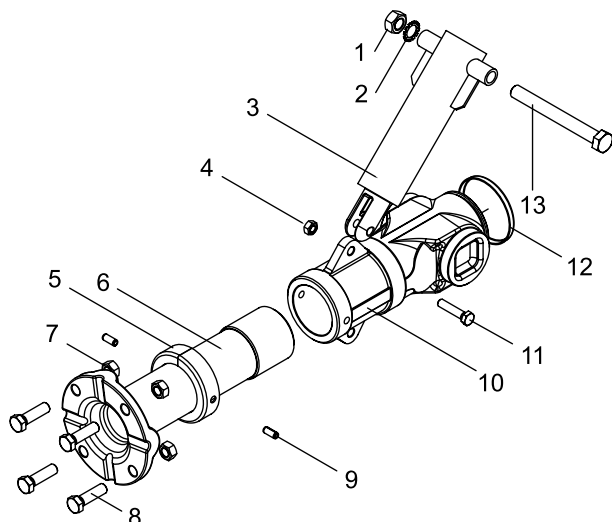
Trench widths (for extension bars HEB 180)

			for base element h = 3.15 m			for base element h = 4.00 m		
			Element l = 4.00 m	Element l = 5.08 m	Element l = 6.84 m	Element l = 3.15 m	Element l = 3.40 m	
Anz.-ZwSt.	l _{ZwSt.} [m]	b _c [m]	b [m]	b [m]	b [m]	b _c [m]	b [m]	b [m]
0	0,000	0,78 - 1,22	0,98 - 1,42	1,02 - 1,46	1,10 - 1,54	0,88 - 1,32	1,04 - 1,48	1,08 - 1,52
1	0,275	1,055 - 1,495	1,255 - 1,695	1,295 - 1,735	1,375 - 1,815	1,155 - 1,595	1,315 - 1,755	1,355 - 1,795
1	0,550	1,33 - 1,77	1,53 - 1,97	1,57 - 2,01	1,65 - 2,09	1,43 - 1,87	1,59 - 2,03	1,63 - 2,07
1	1,100	1,88 - 2,32	2,08 - 2,52	2,12 - 2,56	2,20 - 2,64	1,98 - 2,42	2,14 - 2,58	2,18 - 2,62
1	1,650	2,43 - 2,87	2,63 - 3,07	2,67 - 3,11	2,75 - 3,19	2,53 - 2,97	2,69 - 3,13	2,73 - 3,17
1	2,200	2,98 - 3,42	3,18 - 3,62	3,22 - 3,66	3,30 - 3,74	3,08 - 3,52	3,24 - 3,68	3,28 - 3,72
1	3,300	4,08 - 4,52	4,28 - 4,72	4,32 - 4,76	4,40 - 4,84	4,18 - 4,62	4,34 - 4,78	4,38 - 4,82

From-to dimensions depend on the spindle adjustment range.

Other trench widths are possible by combining different HEB lengths.

Larger trench widths are available on request.

E+S spreader, complete, right/left, with shock absorber

- | | |
|----|------------------------------|
| 1 | Nut M 20 |
| 2 | Lock washer A 20 |
| 3 | Shock absorber |
| 4 | Nut M 12 |
| 5 | Metal cap for spindle |
| 6 | Spindle, right / left |
| 7 | Nut M 16 |
| 8 | Hexagon screw M 16 x 55 |
| 9 | Damping sleeve 10 x 24 mm |
| 10 | Cast-iron nut, right / left |
| 11 | Hexagon screw M 12 x 55 |
| 12 | PVC dust cap for spindle nut |
| 13 | Hexagon screw M 20 x 180 |

Accessories / Spares

Art. No.	Short description	l [m]	d [m]	G [kg]
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
842 750	Adapter for DKU piling frame, e+s spreader			31,0
850 699	Bar for adjusting e+s/krings spindles (Medium, Magnum, KS 100, slide rail)	0,7	0,024	2,5
302 125	Bearing plate -closed-			4,2
850 500	Cast iron connector (for Medium boxes, Magnum boxes, Manhole)			6,7
862 214	Connector (for Linear box, top unit with struts)			6,1
HB 0190 F	Damping sleeve 10 x 24 mm			0,01
842 099	DKU piling frame guide frame	2,27		105,0
842 100	DKU piling frame guide frame	3,81		175,0
859 981	Drop-in bearing block, e+s			25,6
HD 0110 F	Grease nipple		0,01	0,01
HD 0050 F	Metal cap for spindle			0,1
HD 0013 F	Metal cap for spindle housing			0,2
IA 0095 F	Nut M 12			0,01
IA 0120 F	Nut M 16			0,03
IA 0130 F	Nut M 20			0,03
IA 0185 F	Nut M 30			0,30
HD 0040 F	PE cap for the spindle			0,01
850 600	Pin	0,195	0,035	1,8
850 610	Pin (for Lightweight box)	0,095	0,030	0,5
850 614	Pin 200 x 40 mm (Linear box boogie car)			1,9
851 010	Pressure plate (for Lightweight-Boxes)			7,0
851 005	Pressure plate (for Medium Boxes, Magnum Boxes, Manhole)			19,0
IB 0215 F	Screw M 12 x 55			0,06
IB 0310 F	Screw M 16 x 55			0,11
IB 0420 F	Screw M 20 x 180			0,56
IB 0360 F	Screw M 20 x 45			0,17

Accessories / Spares (contd.)

Art. No.	Short description	l [m]	d [m]	G [kg]
300 100	Shock absorber	0,143		4,5
GB 0070 E	Spindle housing, left hand			9,4
GB 0040 E	Spindle housing, right hand			9,4
GB 0090 E	Spindle, lefthand -heavy duty-			17,1
GB 0080 E	Spindle, lefthand -hollow-			9,5
GB 0030 E	Spindle, righthand -heavy duty-			17,1
GB 0020 E	Spindle, righthand -hollow-			9,5
301 010	Spreader complete, left hand -heavy duty-			27,1
301 000	Spreader complete, left hand -hollow-			19,5
300 010	Spreader complete, right hand -heavy duty-			27,1
300 000	Spreader complete, right hand -hollow-			19,5
159 161	Spring cotter (850 614)			0,1
HE 0050 F	Spring cotter 6 mm		0,006	0,03
ID 0160 F	Spring ring A 20			0,01
336 960	Support bracket for DKU piling frame element			40,0
821 100	Suspension chain KL-13-8	5,000		25,7

Anz _{ZwSt.}	Number of extension bars	b _c	Inner width	G / VP	Weight per shoring panel
l _{ZwSt.}	Total extension bar length	h _c	Vertical clearance	G / Box	Weight per shoring box
l	Length	t _{pl}	Panel thickness	eh	Max. soil pressure
l _c	Max. pipe length	A	Area		
b	Shoring / trench width	G	Weight		

Linear-Boxes



The Linear box shoring system is a combination of slide-rail shoring and box shoring. The trench box is largely immune to subsidence and capable of adapting to a wide range of site conditions. Thanks to the vertically displaceable boogie car on the principle of the linear shoring system, the shoring is extremely versatile. Among other things, it enables stepless pipe culvert heights.

Like all e+s box systems, the linear box is transported and supplied in its fully assembled state so that only the extension bars have to be fitted to achieve the desired trench width. To increase the height, a top unit compatible with Medium and Magnum Shoring with struts can be used.

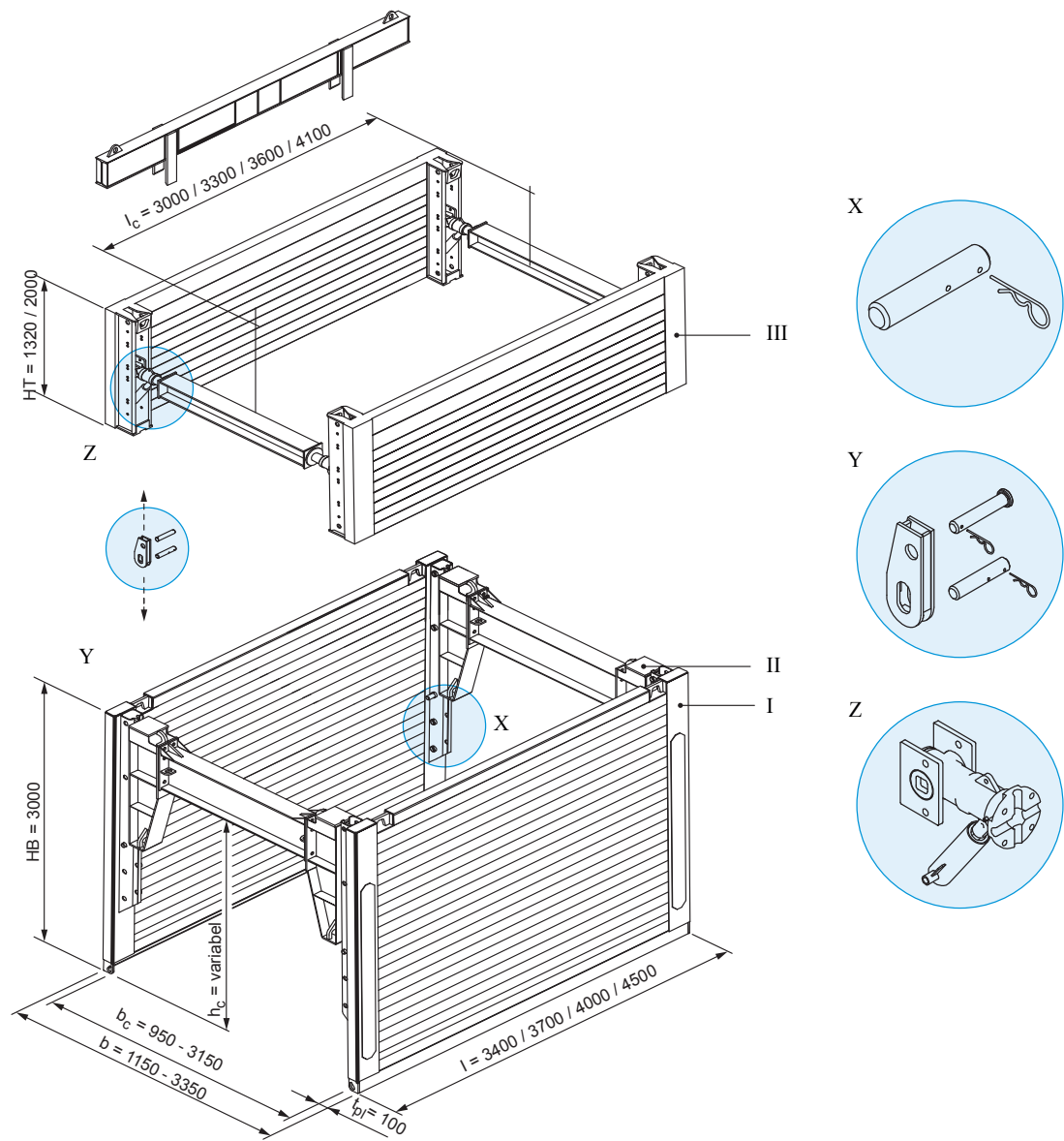
Basic data

Shoring length	3,40 m / 3,70 m / 4,00 m / 4,50 m
Height base unit	3,00 m
Height top unit	1,32 m / 2,00 m
Pipe culvert height	variable
Weight	2050 kg - 2940 kg
Trench width	variable, see page 67

Advantages

- Stepless adjustability of the pipe culvert height
- Top panel compatible with Medium- and Magnum-class shorings
- High flexibility due to the vertically displaceable boogie car

Linear box base module with medium top box



(All dimensions in mm)

I	Base unit with boogie car	l	Length	t _{pl}	Thickness
II	Linear-Box boogie car (base unit)	l _c	Pipe culvert length	X	Pin
III	Top unit with struts	b	Shoring / trench width	Y	Connector
HB	Height base unit	b _c	Inner width	Z	Spreader with bearing plate and shock absorber
HT	Height top unit	h _c	Pipe culvert height		

Boogie car

Art. No.	Short description	l [m]	G [kg]
832 226	Linear box boogie car (base unit)	1,38	200,0

Base units with boogie car

Art. No.	l [m]	h [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m²]	eh [kN/m²]
802 328	3,40	3,00	0,10	variable	3,00	1.025,0	2.050,0	10,20	48,2
802 321	3,70	3,00	0,10	variable	3,30	1.089,0	2.178,0	11,10	40,9
802 323	4,00	3,00	0,10	variable	3,60	1.255,0	2.510,0	12,00	35,2
802 325	4,50	3,00	0,10	variable	4,10	1.470,0	2.940,0	13,50	27,4

Top units with struts

Art. No.	l [m]	h [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m²]	eh [kN/m²]
800 700	3,40	1,32	0,10	-	2,95	658,0	1.316,0	4,49	50,5
802 700	3,40	2,00	0,10	-	2,95	930,0	1.860,0	6,80	50,5
800 800	3,70	1,32	0,10	-	3,25	692,0	1.384,0	4,88	42,1
802 750	3,70	2,00	0,10	-	3,25	990,0	1.980,0	7,40	42,1
800 900	4,00	1,32	0,10	-	3,55	775,0	1.550,0	5,28	43,8
800 950	4,50	1,32	0,10	-	4,05	820,0	1.640,0	5,94	34,2

Extension bars (for base and top elements with boogie car)

Art. No.	Short description	l [m]	G [kg]
831 030	Extension bar IPE 400 Linear box (element with boogie car)	0,275	57,0
831 040	Extension bar IPE 400 Linear box (element with boogie car)	0,550	75,0
831 050	Extension bar IPE 400 Linear box (element with boogie car)	1,100	115,0
831 060	Extension bar IPE 400 Linear box (element with boogie car)	1,650	155,0
831 070	Extension bar IPE 400 Linear box (element with boogie car)	2,200	195,0

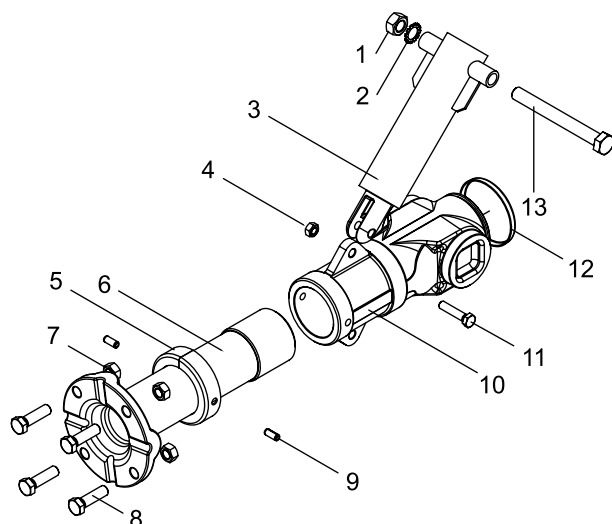
Extension bars (for top elements with spreaders)

Art. No.	Short description	l [m]	G [kg]
850 091	Extension bar GGG 50	0,250	11,2
850 100	Extension bar GGG 50	0,550	18,7
850 112	Extension bar HEB 180	0,275	28,0
850 110	Extension bar HEB 180	0,550	43,0
850 124	Extension bar HEB 180	1,100	70,0
850 132	Extension bar HEB 180	1,650	100,0
850 135	Extension bar HEB 180	2,200	130,0

Trench widths

l _{zWSt} [m]	b _c [m]	b [m]
0,000	0,950	1,150
0,275	1,225	1,425
0,550	1,500	1,700
1,100	2,050	2,250
1,650	2,600	2,800
2,200	3,150	3,350

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

E+S spreader, complete, right/left, with shock absorber

- | | |
|----|------------------------------|
| 1 | Nut M 20 |
| 2 | Lock washer A 20 |
| 3 | Shock absorber |
| 4 | Nut M 12 |
| 5 | Metal cap for spindle |
| 6 | Spindle, right / left |
| 7 | Nut M 16 |
| 8 | Hexagon screw M 16 x 55 |
| 9 | Damping sleeve 10 x 24 mm |
| 10 | Cast-iron nut, right / left |
| 11 | Hexagon screw M 12 x 55 |
| 12 | PVC dust cap for spindle nut |
| 13 | Hexagon screw M 20 x 180 |

Accessories / Spares

Art. No.	Short description	l [m]	G [kg]	d [m]
850 699	Bar for adjusting e+s/krings spindles (Medium, Magnum, KS 100, slide rail)	0,7	2,5	0,024
302 125	Bearing plate -closed-		4,2	
HB 0190 F	Damping sleeve 10 x 24 mm		0,01	
832 228	Extension bars for linear box boogie car		226,0	
HD 0110 F	Grease nipple		0,01	0,01
HD 0050 F	Metal cap for spindle		0,1	
HD 0013 F	Metal cap for spindle housing		0,2	
IA 0095 F	Nut M 12		0,01	
IA 0120 F	Nut M 16		0,03	
IA 0130 F	Nut M 20		0,03	
IA 0185 F	Nut M 30		0,30	
HD 0040 F	PE cap for the spindle		0,01	
861 072	Pressure beam	3,60	335,0	
861 076	Pressure beam (Medium, Magnum shoring, KS 100, GLS)	1,60	176,0	
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	
IB 0215 F	Screw M 12 x 55		0,06	
IB 0310 F	Screw M 16 x 55		0,11	
IB 0420 F	Screw M 20 x 180		0,56	
IB 0360 F	Screw M 20 x 45		0,17	
IB 0601 F	Screw M 30 x 65		0,60	
300 100	Shock absorber	0,143	4,5	
GB 0070 E	Spindle housing, left hand		9,4	
GB 0040 E	Spindle housing, right hand		9,4	
GB 0090 E	Spindle, lefthand -heavy duty-		17,1	
GB 0030 E	Spindle, righthand -heavy duty-		17,1	
301 010	Spreader complete, left hand -heavy duty-		27,1	

Accessories / Spares (contd.)

Art. No.	Short description	l [m]	G [kg]	d [m]
300 010	Spreader complete, right hand -heavy duty-		27,1	
ID 0160 F	Spring ring A 20		0,01	
821 100	Suspension chain KL-13-8	5,000	25,7	

Zubehör / Ersatzteile (für die Verbindung Grundlelement mit Laufwagen / Aufsatzelement mit Spreizen)

Art. No.	Short description	l [m]	G [kg]	d [m]
862 214	Connector (for Linear box, top unit with struts)		6,1	
138 070	Pin 212 x 43	0,212	2,5	0,043
138 200	Spring cotter 92 x 5	0,092	0,1	0,005
HE0065 F	Spring cotter A7		0,03	0,006

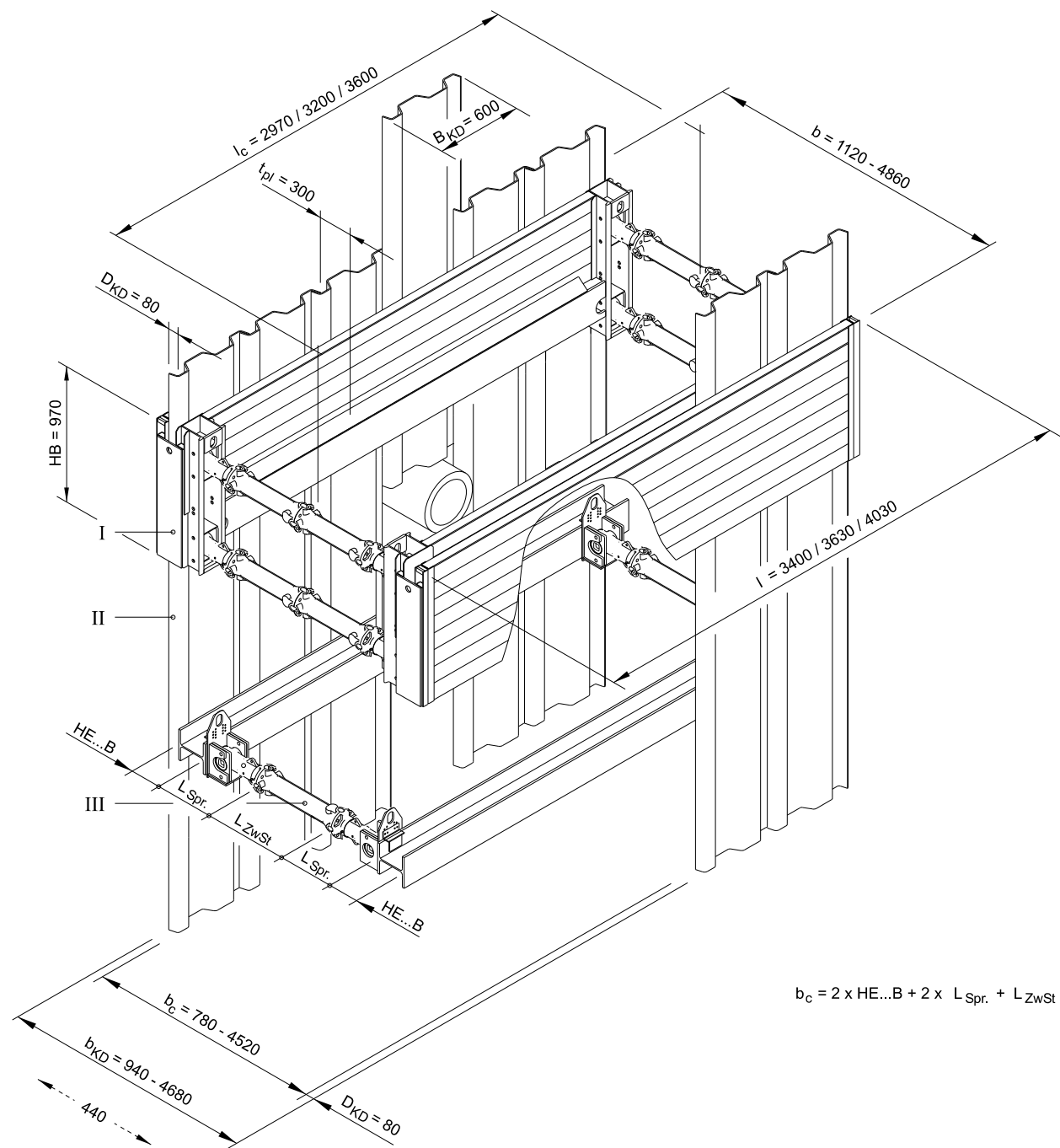
l	Length	b _c	Inner width	G	Weight
l _c	Pipe culvert length	h _c	Pipe culvert height	G / VP	Weight per shoring panel
l _{zwSt.}	Total extension bar length	t _{pl}	Thickness	G / Box	Weight per shoring box
b	Shoring / trench width	A	Area	eh	Earth pressure max.

Sheet pile element (before 09/2009)



The piling frame element serves as an installation and waling element for sheet piles. It is used particularly in trenches crossed by large numbers of pipes and cables where large-area shoring would be inappropriate. A variety of basic system lengths are available for adaptation to the pile shape and width.

Basic data	
Shoring length	3,40 m / 3,63 m / 4,03 m
Height sheet pile element	0,97 m
Shoring depth	variable



(All dimensions in mm)

I	Sheet pile element	L _{ZwSt}	Length extension bar	b _c	Inner width
II	Sheet pile	B _{KD}	Width sheet pile	b _{KD}	Shoring width -outside- / sheet pile
III	Extension bar	I	Length	h _c	Pipe culvert height
HB	Height base unit	I _c	Pipe culvert length	t _{pl}	Thickness
L _{Spr.}	Length strut	b	Shoring width	D _{KD}	Thickness sheet pile

Sheet pile elements KN 80

Art. No.	Short description	l [m]	h [m]	l _c [m]	G / VP [kg]	G / Box [kg]	A [m²]
842 520	Sheet pile element KN 80	3,40	0,97	2,97	942,0	1.884,0	3,30
842 560	Sheet pile element KN 80	3,63	0,97	3,20	989,0	1.978,0	3,52
842 600	Sheet pile element KN 80	4,03	0,97	3,60	1.081,5	2.163,0	3,91

Extension bars

Art. No.	Short description	l [m]	G [kg]
850 091	Extension bar GGG 50	0,250	11,2
850 100	Extension bar GGG 50	0,550	18,7
850 112	Extension bar HEB 180	0,275	28,0
850 110	Extension bar HEB 180	0,550	43,0
850 124	Extension bar HEB 180	1,100	70,0
850 132	Extension bar HEB 180	1,650	100,0
850 135	Extension bar HEB 180	2,200	130,0
850 105	Extension bar HEB 220	0,275	40,0
850 115	Extension bar HEB 220	0,550	58,0
850 121	Extension bar HEB 220	1,100	98,0
850 130	Extension bar HEB 220	1,650	140,0
850 141	Extension bar HEB 220	2,200	180,0

Trench widths (for cast iron tubular extension bars l = 0.55 m)

Number of extension bars	Length extension bar	VI / KD	VI / DK	VA / KD	VA / DK
n	[m]	[m]	[m]	[m]	[m]
0	0,00	0,78 - 1,22	0,48 - 0,92	0,94 - 1,38	1,12 - 1,56
1	0,55	1,33 - 1,77	1,03 - 1,47	1,49 - 1,93	1,67 - 2,11
2	1,10	1,88 - 2,32	1,58 - 2,02	2,04 - 2,48	2,22 - 2,66
3	1,65	2,43 - 2,87	2,13 - 2,57	2,59 - 3,03	2,77 - 3,21
4	2,20	2,98 - 3,42	2,68 - 3,12	3,14 - 3,58	3,32 - 3,76
5	2,75	3,53 - 3,97	3,23 - 3,67	3,69 - 4,13	3,87 - 4,31
max. 6	3,30	4,08 - 4,52	3,78 - 4,22	4,24 - 4,68	4,42 - 4,86

VI / KD Shoring width -inside- / sheet pile
VA / KD Shoring width -outside- / sheet pile

VI / DK Shoring width -inside- / sheet pile element
VA / DK Shoring width -outside- / sheet pile element

l Length
l_c Pipe culvert length
b Trench width
b_c Inner width

h_c Pipe culvert height
t_{pl} Thickness
d Diameter
A Area

G Weight
G / VP Weight per shoring panel
G / Box Weight per shoring box
eh Earth pressure max.

Manhole-Boxes

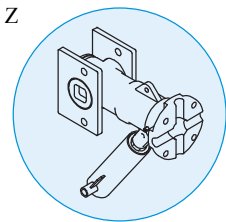
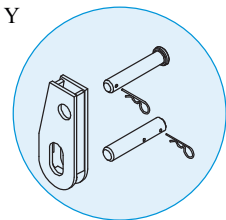
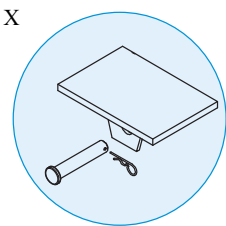
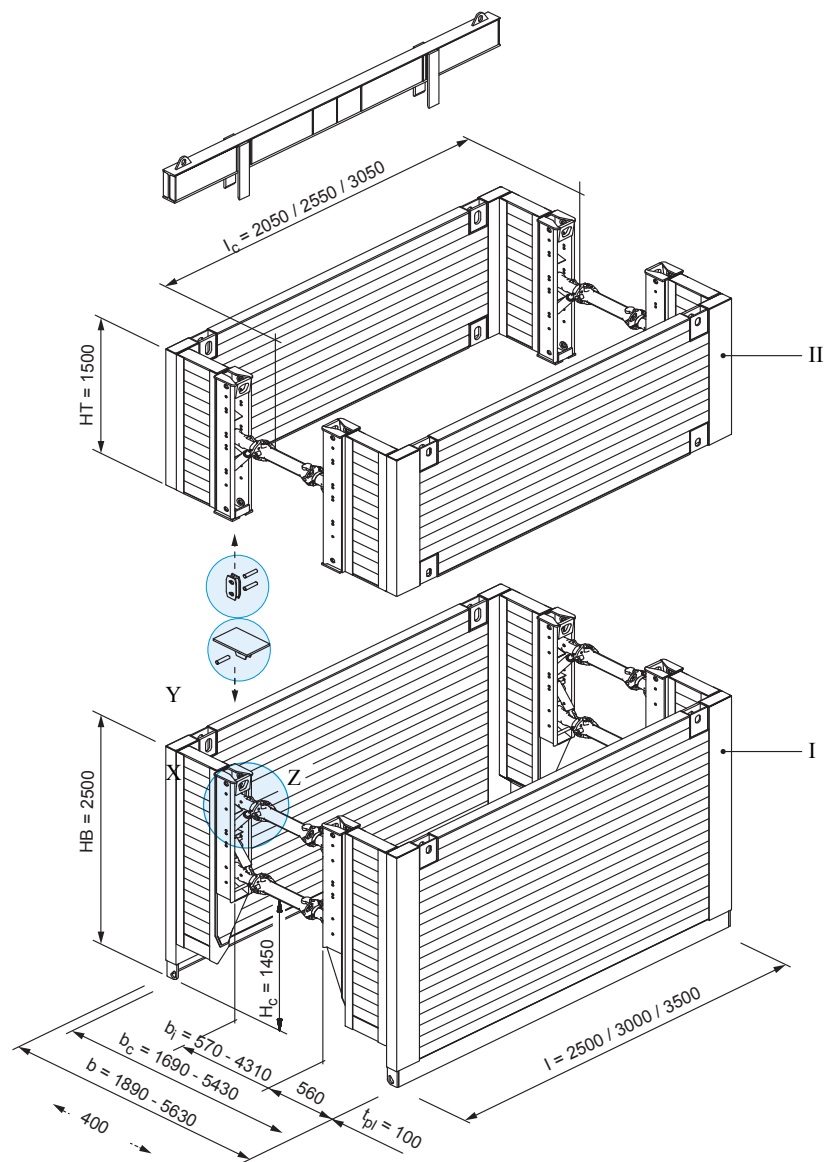


The Manhole is a manhole shoring element that unites all the features of a compact shoring system except that only the ends of the module are equipped with extra panels. These are positioned at right angles and firmly connected to the main panel. In addition to the standard solution, the edge-supported shoring system can be supplied as a custom solution in any desired length.

Basic data	
Shoring length	2,50 m / 3,00 m / 3,50 m
Height base unit	2,60 m
Height top unit	1,50 m
Pipe culvert height	1,45 m
Weight	2260 kg - 2710 kg
Trench width	variable, see page 70

- Advantage
- Ideal for manholes

Manhole-Boxes



(All dimensions in mm)

I	Base unit	l_c	Pipe culvert length	t_{pl}	Thickness
II	Top unit	b	Shoring / trench width	X	Pressure plate
HB	Height base unit	b_c	Inner width	Y	Connector
HT	Height top unit	b_i	Inner culvert width	Z	Spreader with bearing plate and shock absorber
l	Length	h_c	Pipe culvert height		

Base units (Height 2,50 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	eh [kN/m²]
828 005	2,50	0,10	1,45	2,05	1.130,0	2.260,0	81,8
828 015	3,00	0,10	1,45	2,55	1.275,0	2.550,0	67,4
828 025	3,50	0,10	1,45	3,05	1.355,0	2.710,0	47,7

Top units (Height 1,50 m)

Art. No.	l [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]	eh [kN/m²]
829 005	2,50	0,10	-	2,05	944,0	1.888,0	90,9
829 015	3,00	0,10	-	2,55	1.015,0	2.030,0	67,4
829 025	3,50	0,10	-	3,05	1.090,0	2.180,0	47,7

Extension bars

Art. No.	Short description	l [m]	G [kg]
850 091	Extension bar GGG 50	0,250	11,2
850 100	Extension bar GGG 50	0,550	18,7
850 112	Extension bar HEB 180	0,275	28,0
850 110	Extension bar HEB 180	0,550	43,0
850 124	Extension bar HEB 180	1,100	70,0
850 132	Extension bar HEB 180	1,650	100,0
850 135	Extension bar HEB 180	2,200	130,0

Trench widths (for cast iron tubular extension bars l = 0.55 m)

Number of extension bars	Length extension bars [m]	b _c [m]	b _i [m]	b [m]
0	0,00	1,69 - 2,13	0,57 - 1,01	1,89 - 2,33
1	0,55	2,24 - 2,68	1,12 - 1,56	2,44 - 2,88
2	1,10	2,79 - 3,23	1,67 - 2,11	2,99 - 3,43
3	1,65	3,34 - 3,78	2,22 - 2,66	3,54 - 3,98
4	2,20	3,89 - 4,33	2,77 - 3,21	4,09 - 4,53
5	2,75	4,44 - 4,88	3,32 - 3,76	4,64 - 5,08
max. 6	3,30	4,99 - 5,43	3,87 - 4,31	5,19 - 5,63

From-to sizes dependent on spindle adjustment range.

Other trench widths possible by combining the two different extension bar lengths l = 0.25 m and l = 0.55 m.

Larger trench widths available on request.

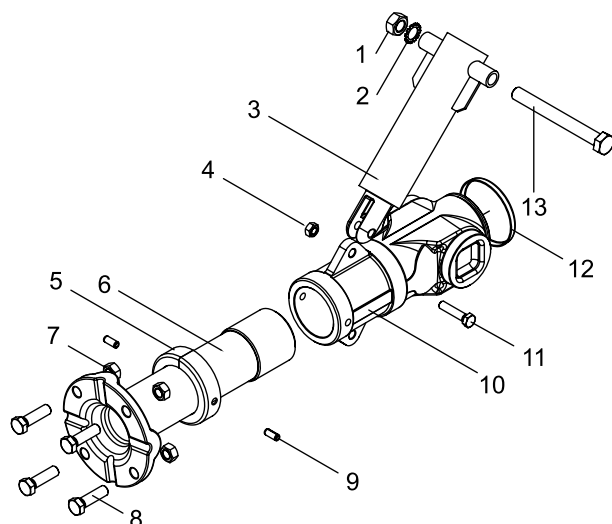
Trench widths (for extension bars HEB 180)

l _{zwSt} [m]	b _c [m]	b _i [m]	b [m]
0,000	1,690 - 2,130	0,570 - 1,010	1,890 - 2,330
0,275	1,965 - 2,405	0,845 - 1,285	2,165 - 2,605
0,550	2,240 - 2,680	1,120 - 1,560	2,440 - 2,880
1,100	2,790 - 3,230	1,670 - 2,110	2,990 - 3,430
1,650	3,340 - 3,780	2,220 - 2,660	3,540 - 3,980
2,200	3,890 - 4,330	2,770 - 3,210	4,090 - 4,530
2,200 + 1,100	4,990 - 5,430	3,870 - 4,310	5,190 - 5,630

From-to dimensions depend on the spindle adjustment range.

Other trench widths are possible by combining different HEB lengths.

Larger trench widths are available on request.

E+S spreader, complete, right/left, with shock absorber

- | | |
|----|------------------------------|
| 1 | Nut M 20 |
| 2 | Lock washer A 20 |
| 3 | Shock absorber |
| 4 | Nut M 12 |
| 5 | Metal cap for spindle |
| 6 | Spindle, right / left |
| 7 | Nut M 16 |
| 8 | Hexagon screw M 16 x 55 |
| 9 | Damping sleeve 10 x 24 mm |
| 10 | Cast-iron nut, right / left |
| 11 | Hexagon screw M 12 x 55 |
| 12 | PVC dust cap for spindle nut |
| 13 | Hexagon screw M 20 x 180 |

Accessories / Spares

Art. No.	Short description	l [m]	d [m]	G [kg]
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
842 750	Adapter for DKU piling frame, e+s spreader			31,0
850 699	Bar for adjusting e+s/krings spindles (Medium, Magnum, KS 100, slide rail)	0,7	0,024	2,5
302 125	Bearing plate -closed-			4,2
850 500	Cast iron connector (for Medium boxes, Magnum boxes, Manhole)			6,7
862 214	Connector (for Linear box, top unit with struts)			6,1
HB 0190 F	Damping sleeve 10 x 24 mm			0,01
842 099	DKU piling frame guide frame	2,27		105,0
842 100	DKU piling frame guide frame	3,81		175,0
859 981	Drop-in bearing block, e+s			25,6
HD 0110 F	Grease nipple		0,01	0,01
HD 0050 F	Metal cap for spindle			0,1
HD 0013 F	Metal cap for spindle housing			0,2
IA 0095 F	Nut M 12			0,01
IA 0120 F	Nut M 16			0,03
IA 0130 F	Nut M 20			0,03
IA 0185 F	Nut M 30			0,30
HD 0040 F	PE cap for the spindle			0,01
850 600	Pin	0,195	0,035	1,8
850 610	Pin (for Lightweight box)	0,095	0,030	0,5
850 614	Pin 200 x 40 mm (Linear box boogie car)			1,9
851 010	Pressure plate (for Lightweight-Boxes)			7,0
851 005	Pressure plate (for Medium Boxes, Magnum Boxes, Manhole)			19,0
IB 0215 F	Screw M 12 x 55			0,06
IB 0310 F	Screw M 16 x 55			0,11
IB 0420 F	Screw M 20 x 180			0,56
IB 0360 F	Screw M 20 x 45			0,17

Accessories / Spares (contd.)

Art. No.	Short description	l [m]	d [m]	G [kg]
300 100	Shock absorber	0,143		4,5
GB 0070 E	Spindle housing, left hand			9,4
GB 0040 E	Spindle housing, right hand			9,4
GB 0090 E	Spindle, lefthand -heavy duty-			17,1
GB 0080 E	Spindle, lefthand -hollow-			9,5
GB 0030 E	Spindle, righthand -heavy duty-			17,1
GB 0020 E	Spindle, righthand -hollow-			9,5
301 010	Spreader complete, left hand -heavy duty-			27,1
301 000	Spreader complete, left hand -hollow-			19,5
300 010	Spreader complete, right hand -heavy duty-			27,1
300 000	Spreader complete, right hand -hollow-			19,5
159 161	Spring cotter (850 614)			0,1
HE 0050 F	Spring cotter 6 mm		0,006	0,03
ID 0160 F	Spring ring A 20			0,01
336 960	Support bracket for DKU piling frame element			40,0
821 100	Suspension chain KL-13-8	5,000		25,7

l	Length	b _c	Inner width	G	Weight
l _c	Pipe culvert length	h _c	Pipe culvert height	G / VP	Weight per shoring panel
l _{zwSt.}	Total extension bar length	t _{pl}	Thickness	G / Box	Weight per shoring box
b	Shoring / trench width	A	Area	eh	Earth pressure max.

Dragbox



The Dragbox was developed for shoring projects carried out exclusively in open and mainly unbuilt-up terrain. The space available in the Dragbox and the installed towing panel is used for pipe-laying. Once the pipe has been laid, the excavator drags the Dragbox forward by the towing panel for the next pipe-laying cycle. To stabilize the system and for reasons of structural strength, the Dragbox has an extremely sturdy horizontal connecting element that keeps the two shoring panels the right distance apart. If necessary, it can be extended using special extension bars. Elongated cutting shoes attached to the front edge of the shoring panels aid the dragging process.

By redesigning the towing panel in a triangular shape, the efficiency of the Dragbox has been enhanced still further. During pipe-laying, working on compacting the backfill against the ground can start at the exposed face of the angled towing panel.

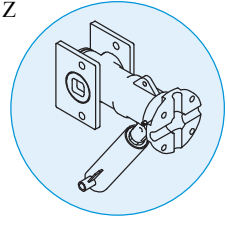
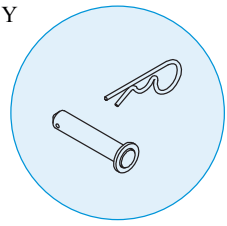
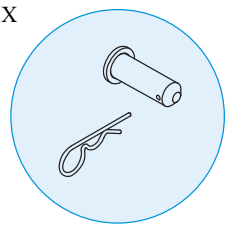
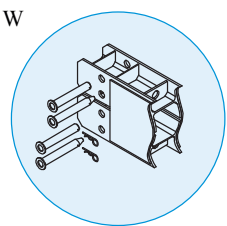
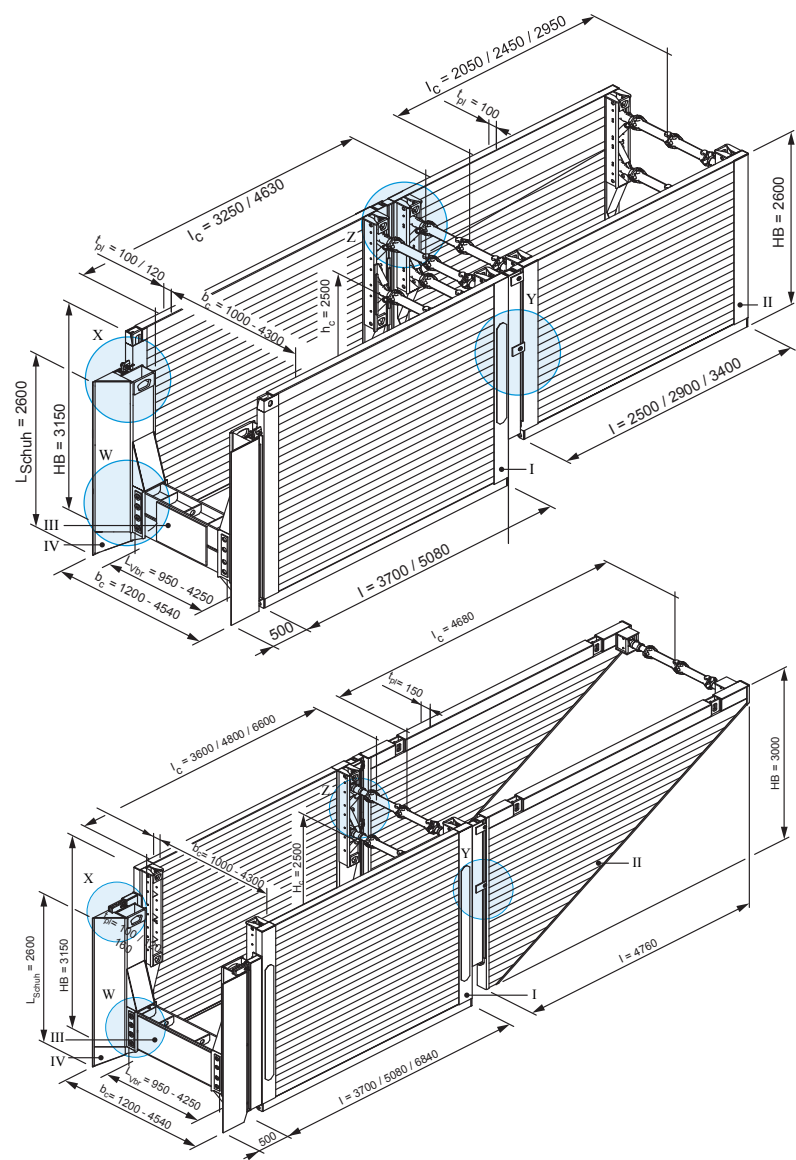
Basic data

Shoring depth	max. 4,00 m
Panel length	3,70 m / 5,08 m
Base panel height	3,00 m / 3,15 m
Pipe culvert height	max. 2,00 m
Trench width	variable, see page 73

Advantages

- Ideal for shorings in open terrain
- Exceptionally strong horizontal connecting element enables it to be dragged in the trench

Dragbox



(All dimensions in mm)

I	Dragbox base unit	L_Schuh	Length dragbox cutting edge	t _{pl}	Thickness
II	Towing plate	l	Length	W	Pin for dragbox beam
III	Dragbox-beam	l _c	Pipe culvert length	X	Pin for cutting edge
IV	Dragbox cutting edge	b	Shoring / trench width	Y	Pin for towing panel
HB	Height base unit	b _c	Inner width	Z	Spreader with bearing plate and shock absorber
L _{vbr}	Length dragbox-beam	h _c	Pipe culvert height		

Base units

Art. No.	l [m]	h [m]	t _{pl} [m]	h _c [m]	l _c [m]	G / VP [kg]	G / Box [kg]
802 269	3,70	3,15	0,10	2,00	3,25	1.570,0	3.140,0
802 411	5,08	3,00	0,12	1,88	4,63	2.085,0	4.170,0

Dragbox cutting edge

Art. No.	Short description	l [m]	G [kg]
847 100	Dragbox cutting edge right hand	0,65	580,0
847 150	Dragbox cutting edge left hand	0,65	580,0

Dragbox beams

Art. No.	Short description	l [m]	G [kg]
847 200	Dragbox beam	0,950	295,0
847 210	Dragbox beam	1,500	500,0
847 220	Dragbox beam	2,050	715,0
847 230	Dragbox beam	2,600	920,0
847 240	Dragbox beam	3,150	1.125,0
847 250	Dragbox beam	3,700	1.330,0
847 260	Dragbox beam	4,250	1.530,0

Pins

Art. No.	Short description	l [m]	G [kg]	d [m]
847 300	Pin (edgeless)	0,385	10,0	0,06
847 301	Pin (sharpened)	0,445	11,0	0,06

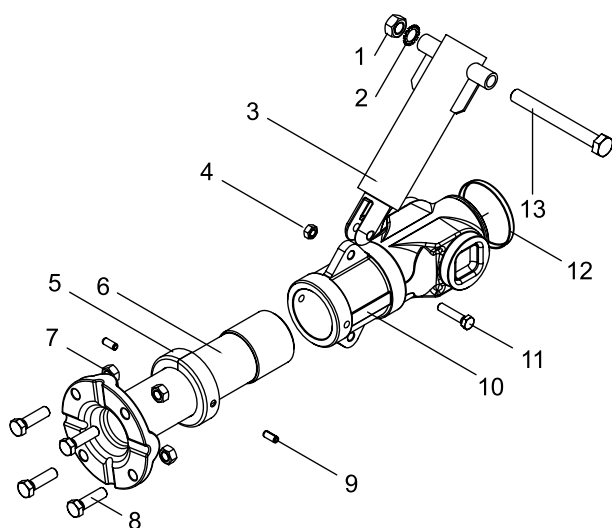
Extension bars

Art. No.	Short description	l [m]	G [kg]
850 091	Extension bar GGG 50	0,250	11,2
850 100	Extension bar GGG 50	0,550	18,7
850 112	Extension bar HEB 180	0,275	28,0
850 110	Extension bar HEB 180	0,550	43,0
850 124	Extension bar HEB 180	1,100	70,0
850 132	Extension bar HEB 180	1,650	100,0
850 135	Extension bar HEB 180	2,200	130,0
850 105	Extension bar HEB 220	0,275	40,0
850 115	Extension bar HEB 220	0,550	58,0
850 121	Extension bar HEB 220	1,100	98,0
850 130	Extension bar HEB 220	1,650	140,0
850 141	Extension bar HEB 220	2,200	180,0

Trench widths

l_{zWSt}	Length dragbox beam [m]	b_c [m]	b [m]	b [m]
0,00	0,95	1,00	1,20	1,24
0,55	1,50	1,55	1,75	1,79
1,10	2,05	2,10	2,30	2,34
1,65	2,60	2,65	2,85	2,89
2,20	3,15	3,20	3,40	3,44
2,75	3,70	3,75	3,95	3,99
3,30	4,25	4,30	4,50	4,54
			for base units $t_{pl} = 0,10$ m	for base units $t_{pl} = 0,12$ m

E+S spreader, complete, right/left, with shock absorber



- | | |
|----|------------------------------|
| 1 | Nut M 20 |
| 2 | Lock washer A 20 |
| 3 | Shock absorber |
| 4 | Nut M 12 |
| 5 | Metal cap for spindle |
| 6 | Spindle, right / left |
| 7 | Nut M 16 |
| 8 | Hexagon screw M 16 x 55 |
| 9 | Damping sleeve 10 x 24 mm |
| 10 | Cast-iron nut, right / left |
| 11 | Hexagon screw M 12 x 55 |
| 12 | PVC dust cap for spindle nut |
| 13 | Hexagon screw M 20 x 180 |

Accessories / Spares

Art. No.	Short description	l [m]	d [m]	G [kg]
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
842 750	Adapter for DKU piling frame, e+s spreader			31,0
850 699	Bar for adjusting e+s/krings spindles (Medium, Magnum, KS 100, slide rail)	0,7	0,024	2,5
302 125	Bearing plate -closed-			4,2
850 500	Cast iron connector (for Medium boxes, Magnum boxes, Manhole)			6,7
862 214	Connector (for Linear box, top unit with struts)			6,1
HB 0190 F	Damping sleeve 10 x 24 mm			0,01
842 099	DKU piling frame guide frame	2,27		105,0
842 100	DKU piling frame guide frame	3,81		175,0
859 981	Drop-in bearing block, e+s			25,6
HD 0110 F	Grease nipple		0,01	0,01
HD 0050 F	Metal cap for spindle			0,1
HD 0013 F	Metal cap for spindle housing			0,2
IA 0095 F	Nut M 12			0,01
IA 0120 F	Nut M 16			0,03
IA 0130 F	Nut M 20			0,03
IA 0185 F	Nut M 30			0,30

Accessories / Spares (contd.)

Art. No.	Short description	l [m]	d [m]	G [kg]
HD 0040 F	PE cap for the spindle			0,01
850 600	Pin	0,195	0,035	1,8
850 610	Pin (for Lightweight box)	0,095	0,030	0,5
850 614	Pin 200 x 40 mm (Linear box boogie car)			1,9
851 010	Pressure plate (for Lightweight-Boxes)			7,0
851 005	Pressure plate (for Medium Boxes, Magnum Boxes, Manhole)			19,0
IB 0215 F	Screw M 12 x 55			0,06
IB 0310 F	Screw M 16 x 55			0,11
IB 0420 F	Screw M 20 x 180			0,56
IB 0360 F	Screw M 20 x 45			0,17
300 100	Shock absorber	0,143		4,5
GB 0070 E	Spindle housing, left hand			9,4
GB 0040 E	Spindle housing, right hand			9,4
GB 0090 E	Spindle, lefthand -heavy duty-			17,1
GB 0080 E	Spindle, lefthand -hollow-			9,5
GB 0030 E	Spindle, righthand -heavy duty-			17,1
GB 0020 E	Spindle, righthand -hollow-			9,5
301 010	Spreader complete, left hand -heavy duty-			27,1
301 000	Spreader complete, left hand -hollow-			19,5
300 010	Spreader complete, right hand -heavy duty-			27,1
300 000	Spreader complete, right hand -hollow-			19,5
159 161	Spring cotter (850 614)			0,1
HE 0050 F	Spring cotter 6 mm		0,006	0,03
ID 0160 F	Spring ring A 20			0,01
336 960	Support bracket for DKU piling frame element			40,0
821 100	Suspension chain KL-13-8	5,000		25,7

l	Length	b _c	Inner width	G	Weight
l _c	Pipe culvert length	h _c	Pipe culvert height	G / VP	Weight per shoring panel
l _{zwSt.}	Total extension bar length	t _{pl}	Thickness	G / Box	Weight per shoring box
b	Shoring / trench width	A	Area	eh	Earth pressure max.

Accessories/Spares

Extension bars

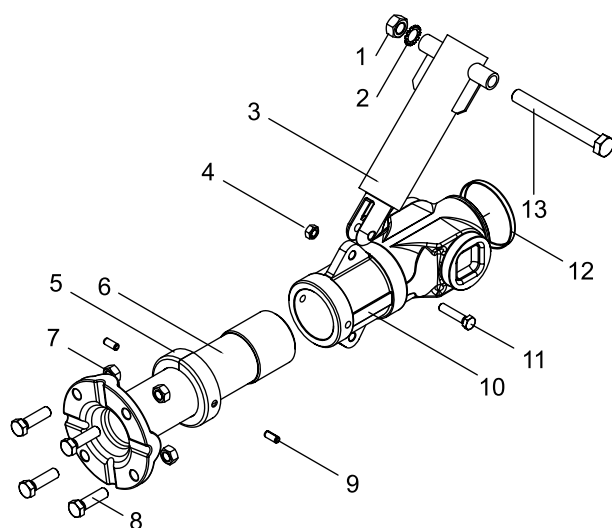
Art. No.	Short description	l [m]	G [kg]
850 091	Extension bar GGG 50	0,250	11,2
850 100	Extension bar GGG 50	0,550	18,7
850 112	Extension bar HEB 180	0,275	28,0
850 110	Extension bar HEB 180	0,550	43,0
850 124	Extension bar HEB 180	1,100	70,0
850 132	Extension bar HEB 180	1,650	100,0
850 135	Extension bar HEB 180	2,200	130,0
850 105	Extension bar HEB 220	0,275	40,0
850 115	Extension bar HEB 220	0,550	58,0
850 121	Extension bar HEB 220	1,100	98,0
850 130	Extension bar HEB 220	1,650	140,0
850 141	Extension bar HEB 220	2,200	180,0
831 030	Extension bar IPE 400 Linear box (element with boogie car)	0,275	57,0
831 040	Extension bar IPE 400 Linear box (element with boogie car)	0,550	75,0
831 050	Extension bar IPE 400 Linear box (element with boogie car)	1,100	115,0
831 060	Extension bar IPE 400 Linear box (element with boogie car)	1,650	155,0
831 070	Extension bar IPE 400 Linear box (element with boogie car)	2,200	195,0

Accessories / Spares

Art. No.	Short description	l [m]	d [m]	G [kg]
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
842 750	Adapter for DKU piling frame, e+s spreader			31,0
850 699	Bar for adjusting e+s/krings spindles (Medium, Magnum, KS 100, slide rail)	0,7	0,024	2,5
302 125	Bearing plate -closed-			4,2
850 500	Cast iron connector (for Medium boxes, Magnum boxes, Manhole)			6,7
862 214	Connector (for Linear box, top unit with struts)			6,1
HB 0190 F	Damping sleeve 10 x 24 mm			0,01
842 099	DKU piling frame guide frame	2,27		105,0
842 100	DKU piling frame guide frame	3,81		175,0
859 981	Drop-in bearing block, e+s			25,6
HD 0110 F	Grease nipple		0,01	0,01
HD 0050 F	Metal cap for spindle			0,1
HD 0013 F	Metal cap for spindle housing			0,2
IA 0095 F	Nut M 12			0,01
IA 0120 F	Nut M 16			0,03
IA 0130 F	Nut M 20			0,03
IA 0185 F	Nut M 30			0,30

Accessories / Spares (contd.)

Art. No.	Short description	l [m]	d [m]	G [kg]
HD 0040 F	PE cap for the spindle			0,01
850 600	Pin	0,195	0,035	1,8
850 610	Pin (for Lightweight box)	0,095	0,030	0,5
850 614	Pin 200 x 40 mm (Linear box boogie car)			1,9
851 010	Pressure plate (for Lightweight-Boxes)			7,0
851 005	Pressure plate (for Medium Boxes, Magnum Boxes, Manhole)			19,0
IB 0215 F	Screw M 12 x 55			0,06
IB 0310 F	Screw M 16 x 55			0,11
IB 0420 F	Screw M 20 x 180			0,56
IB 0360 F	Screw M 20 x 45			0,17
300 100	Shock absorber	0,143		4,5
GB 0070 E	Spindle housing, left hand			9,4
GB 0040 E	Spindle housing, right hand			9,4
GB 0090 E	Spindle, lefthand -heavy duty-			17,1
GB 0080 E	Spindle, lefthand -hollow-			9,5
GB 0030 E	Spindle, righthand -heavy duty-			17,1
GB 0020 E	Spindle, righthand -hollow-			9,5
301 010	Spreader complete, left hand -heavy duty-			27,1
301 000	Spreader complete, left hand -hollow-			19,5
300 010	Spreader complete, right hand -heavy duty-			27,1
300 000	Spreader complete, right hand -hollow-			19,5
159 161	Spring cotter (850 614)			0,1
HE 0050 F	Spring cotter 6 mm		0,006	0,03
ID 0160 F	Spring ring A 20			0,01
336 960	Support bracket for DKU piling frame element			40,0
821 100	Suspension chain KL-13-8	5,000		25,7

E+S spreader, complete, right/left, with shock absorber

- 1 Nut M 20
- 2 Lock washer A 20
- 3 Shock absorber
- 4 Nut M 12
- 5 Metal cap for spindle
- 6 Spindle, right / left
- 7 Nut M 16
- 8 Hexagon screw M 16 x 55
- 9 Damping sleeve 10 x 24 mm
- 10 Cast-iron nut, right / left
- 11 Hexagon screw M 12 x 55
- 12 PVC dust cap for spindle nut
- 13 Hexagon screw M 20 x 180

Assembly instructions for spacer bars

1. Basic information

From an intermediate piece length combination of 1.10 m, it is mandatory to mount the shoring horizontally.

2. Assembly of the spacer bars

The assembly of the spacer bars is illustrated in Figure 1.

To this end, two trench boxes are clamped firmly together, e.g. with the aid of screw clamps (1). Only remove the two panels by releasing the spreader connection screws M 16 x 55 (2) when the unsecured panel is held with lifting gear and a suitable sling (GS-approved) (3). The free panel is now deposited with its smooth side on the ground and each spreader is bolted to the selected and preassembled combination of spacer bars (fasteners for spacer bars/spreaders: 4 x bolt M 16 x 55-8.8-DIN 933 VZ and nut M 16-8-DIN 934 VZ (2)).

Using lifting gear and a sling, now pivot the panel fitted with spacer bars against the second upright and secured panel (4) so that the spacer bars can be reconnected to the spreaders with the given number of bolts M 16 x 55-8.8-DIN 933 and nuts M 16-8-DIN 934 (2) as per list of accessories.

Cast iron tubes and HEB girders must not be combined nor subjected to bending stresses. Only normal forces are transmitted.

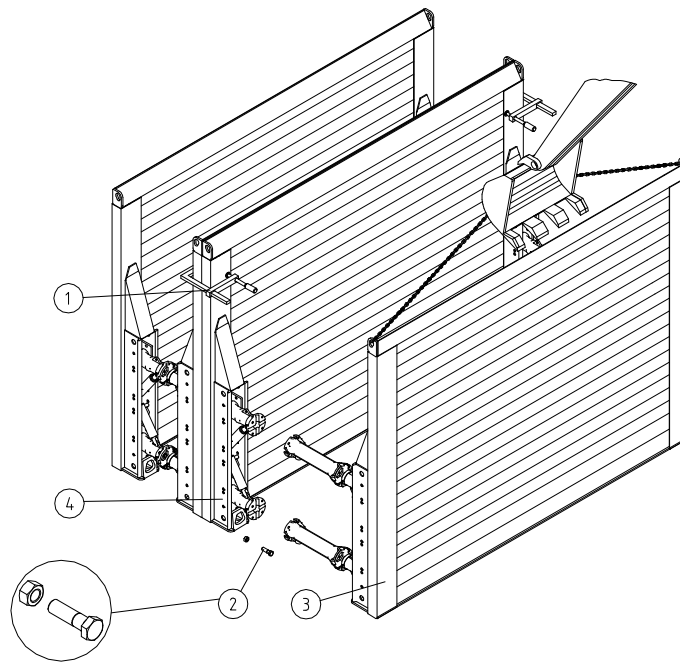


Figure 1: Assembly of the spacer bars

Keep out of trenches with a depth < 1.25 m which are not secured or sloped. It is also prohibited to stand or work with heavy equipment in the danger zone, e.g. at the edge of the trench. During all work, the relevant provisions of DIN, EN, the accident prevention regulations and the statutory accident insurance institution of the building industry must be observed (see also "Occupational safety and general remarks").

Installation instructions for edge- and center-supported shoring units

Note: According to DIN EN 13331, edge-supported shoring units are abbreviated with the abbreviation ES and center-supported shoring units with the abbreviation CS.

1. Insertion process

1.1 Preconditions

In the insertion process, trench shoring equipment is inserted into a section of trench which has already been excavated to its final depth. The insertion process is only permissible if the following preconditions have been fulfilled:

- Temporarily firm ground
- Vertical trench walls
- Same trench width for the entire length of the shoring unit
- Keep out of the trench until the shoring equipment has been inserted into it.
- There must be no pipes/cables, buildings or other structures or traffic areas within the range of the trench.
- Acceptable degree of anticipated settlement, loosening and displacement of soil within the range of the trench.

The ground is considered temporarily firm if no major crumbling is noted in the period from the start of excavation until the insertion of the shoring.

Center-supported systems may only be installed by insertion and as a pair.

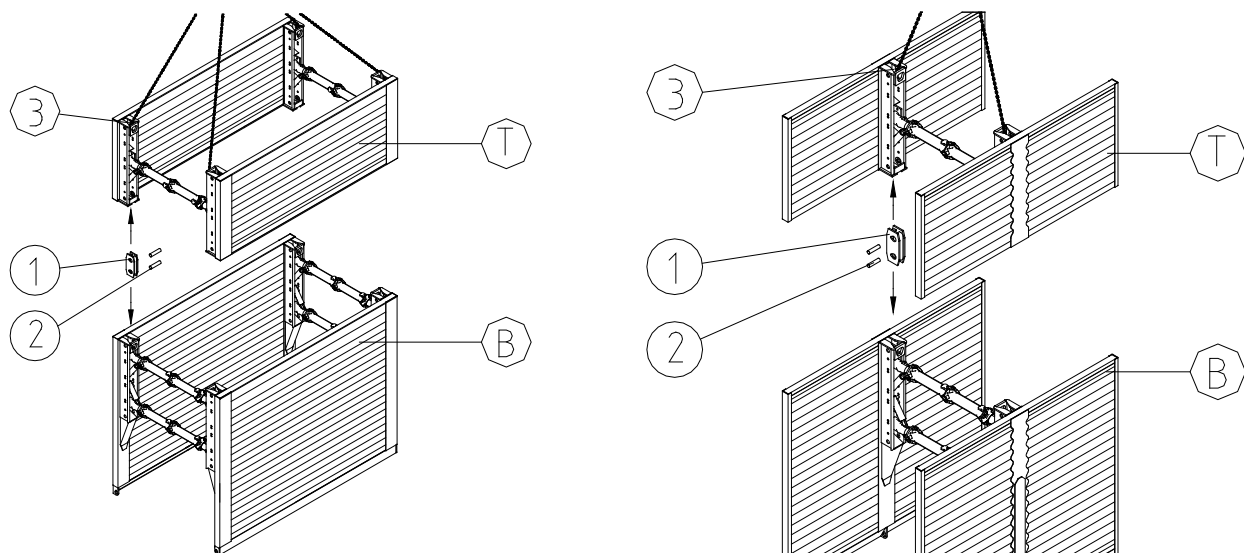


Figure 1: System overview of edge- and center-supported shoring units

1.2 Use of top panels (edge- and center-supported shoring units)

For the insertion process, the base (B) and top modules (T) must be assembled outside the trench and the system inserted as a single unit into the trench if trench boxes with top boxes are required to secure deeper trenches (Figure 1).

The base and top modules are connected with the aid of connectors (1) and bolts (2) (and additionally with spring pins in the case of Medium and Magnum shoring).

The system is assembled with the aid of lifting gear and suitable slings (GS-approved).

The sling must be exclusively attached to the envisaged attachment holes (3, erector heads (see Figure 1)) at at least four points (ES) or two points (CS).

1.3 Installation (edge- and center-supported shoring units)

The shoring unit prepared or preassembled outside the trench is inserted with the aid of lifting gear and a suitable sling (GS-approved) into the trench fully excavated to its final depth for the length and width of a trench box (Figure 2). The length of the excavated and unsecured section of trench must be no more than that required for the insertion of a single trench shoring unit. The gap between the trench wall and the inserted shoring unit must be backfilled right up to the top. In addition, the shoring unit must be pressed against the trench wall by extending the struts.

The permitted load values in accordance with the technical data of the shoring unit employed must be observed at all times. The details regarding trench depth can be found in DIN 4124.

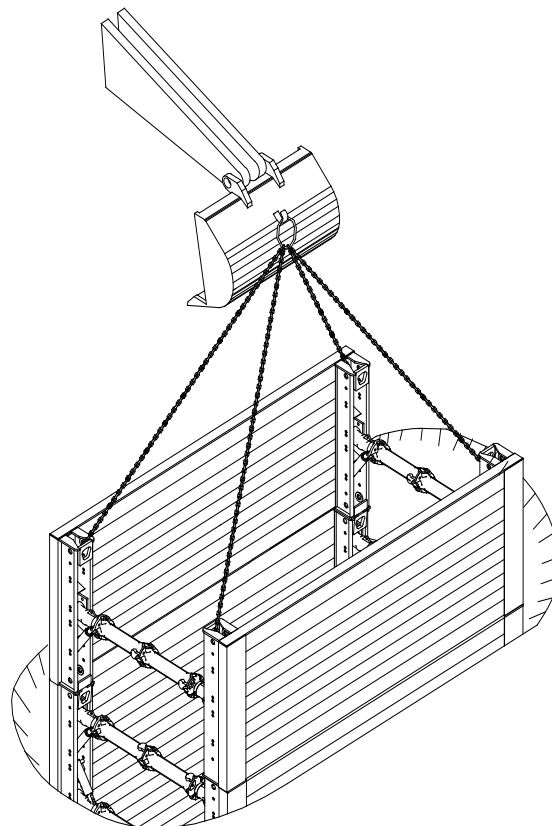


Figure 2: Insertion of the shoring unit fully assembled outside the trench

2. Lowering process

2.1 General remarks

During the lowering process, the trench shoring equipment or parts of it are pressed vertically into the ground.

The lowering process is only permitted for edge-supported shoring units. **Center-supported trench shoring units must not be inserted by lowering!**

2.2 Pre-adjustment of the shoring units

Before inserting the shoring unit in question, its struts must be adjusted by turning the spindles so that **the distance between the shoring panels of a shoring unit is greater at the bottom than at the top**. This so-called **A-form** is achieved by extending the spindles of the bottom strut by about 20 mm per meter of box height more than the spindles of the top strut.

2.3 Initial excavation and insertion and alignment of the shoring unit

When the line of the trench has been measured, advance excavation for insertion of the first shoring unit is carried out. Using lifting gear and a sling (GS-approved, connection points), the shoring unit is inserted in the center of the trench and aligned parallel with the trench axis. When the shoring has been inserted, all the screw joints must be tightened (Figure 3).

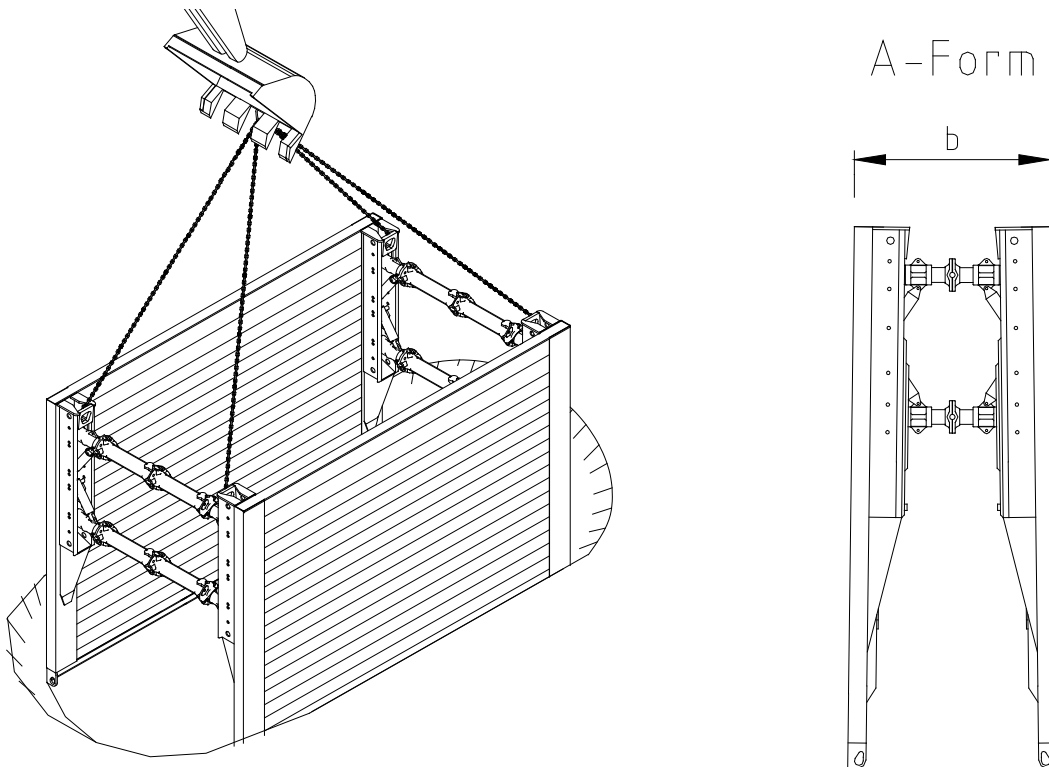


Figure 3: Insertion and alignment of the shoring unit / A-shape

When the trench line has been measured, advance excavation for insertion of the first shoring unit is carried out in accordance with the instructions of project management and with observance of the provisions of DIN 4124. The shoring unit is inserted and aligned with the aid of lifting gear and a sling (GS-approved, attachment holes) in the center of the trench and parallel with the trench axis. When the shoring has been inserted, all the screw joints must be tightened (Figure 3).

2.4 Lowering the shoring unit

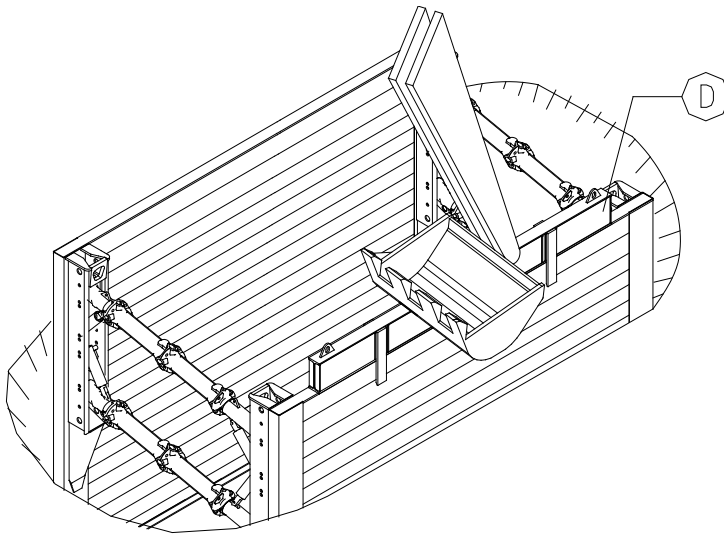


Figure 4: Lowering the shoring unit

Lowering and soil excavation are performed alternately. During the lowering process, advance soil excavation beneath the panels must not exceed 0.5 m, depending on soil conditions. When pressing down the shoring walls on one side and then the other, make sure that the angle of the struts does not exceed $\delta = \pm 8^\circ$. For the lowering process, pressure panels and/or pressure beams (D) must be used. Make sure that the shoring panels are not used as chisels. Solid obstacles (e.g. unnatural fill, rocks) must be removed by hand if necessary. To prevent settlement of the surface, the panels must be backfilled with soil.

2.5 Top panel

Depending on the required trench depth, top modules (T) are mounted on the base modules (B) (Figure 5). The base and top modules are connected with connectors (1) and bolts (2). Here again, pressure panels and/or pressure beams must be used for the ongoing lowering process.

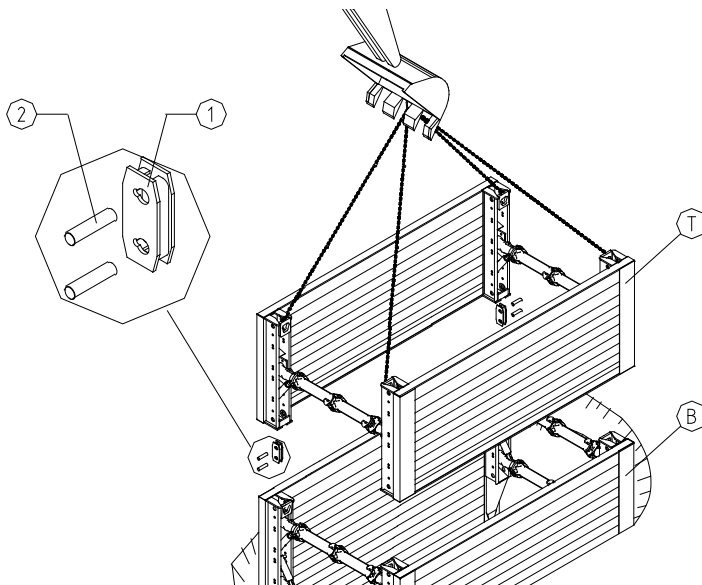


Figure 5: Fitting the top panel

2.6 Installing the next shoring unit

The next shoring unit is installed as soon as the previous unit has been fully lowered to the base of the trench. Installation is carried out in the manner described above.

Shoring must be continuous. Wall sections that are not secured with shoring units, e.g. due to lines crossing the trench, must be shored separately.

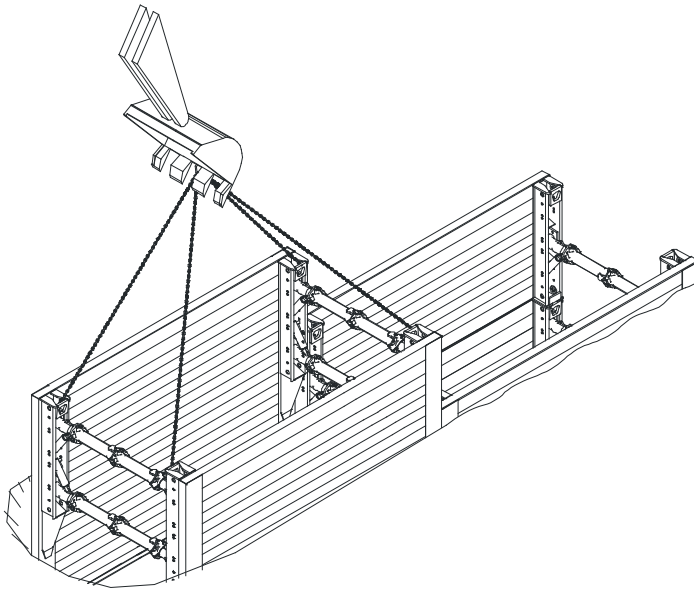


Figure 6: Installing the next shoring unit

2.7 Pipe laying

After installing the shoring in accordance with the instructions given above, pipe-laying work can start in accordance with the instructions of the pipe manufacturer.

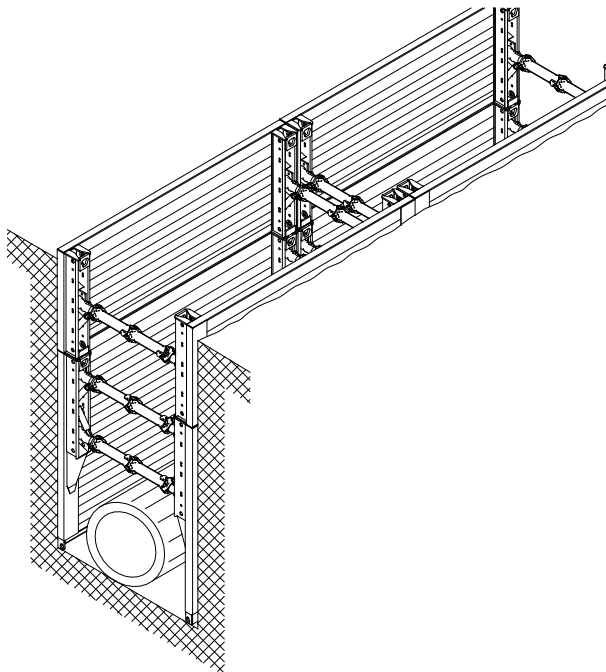


Figure 7: Pipe laying

Instructions for removing edge- and center-supported shoring systems

1. Removal, backfilling, 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.

Slings may only be attached to the envisaged attachment holes.

During removal, the angle of the struts must not exceed $\delta = \pm 8^\circ$.

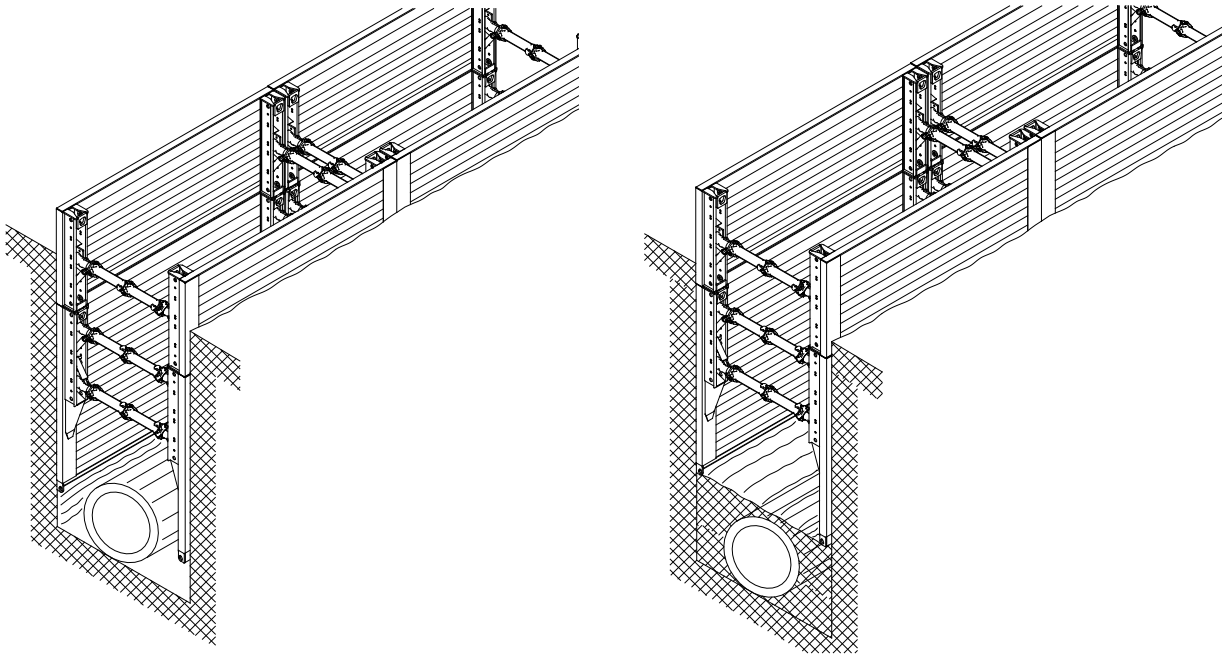


Figure 1: Extracting the shoring with backfilling and compacting of the trench

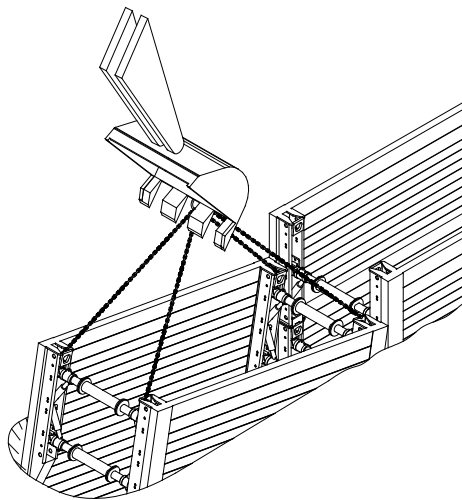


Figure 2: Avoid extracting the shoring at an angle

To prevent damage to the shoring system during removal, the shoring must always be extracted vertically. If it is removed at an angle, the edge profiles will be damaged.

2. Servicing and maintenance

Before re-use in further shoring fields, all shoring components must be checked for correct function.

Faulty parts must be replaced or repaired.

Minor repairs, **subject to consultation with the manufacturer**, may be carried out by the user.

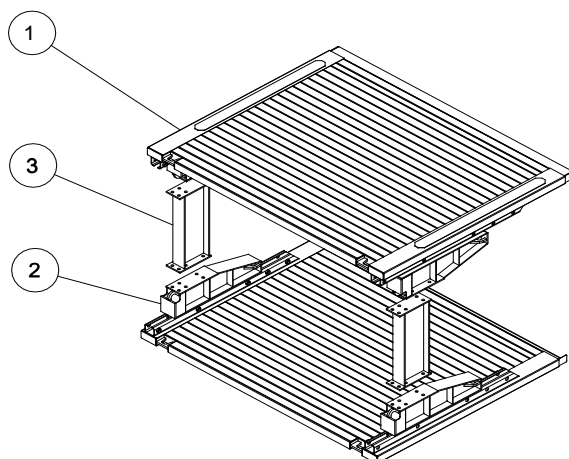
Only use the manufacturer's original replacement parts!

There is no warranty on incorrectly performed repairs and non-original parts (*see also section "Occupational safety and general remarks"*).

Assembly instructions for the linear box

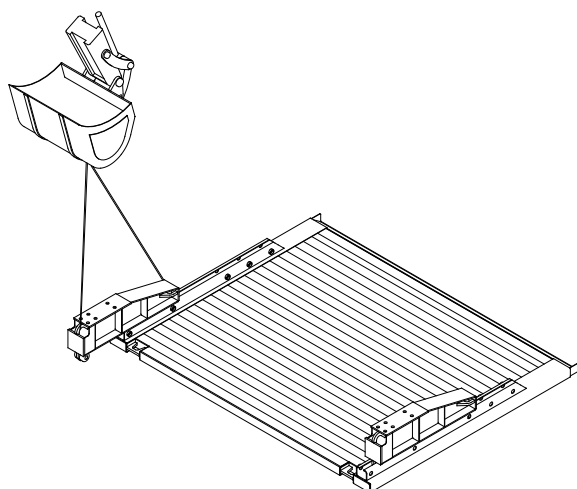
From an intermediate piece length combination of 1.10 m, it is mandatory to mount the shoring horizontally.

1. Overview of the linear box system



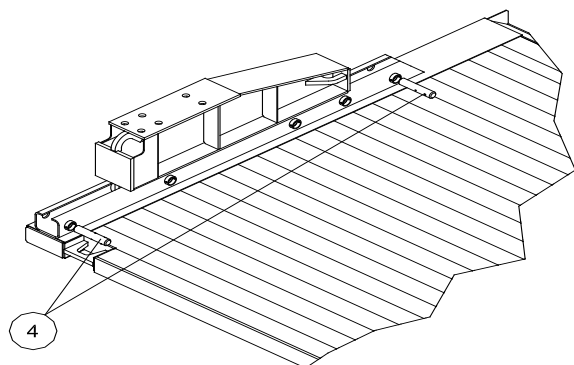
- (1) Two panels
- (2) Four roller units
- (3) Two spacer bars

2. Roller unit assembly



Using lifting gear and a suitable sling (GS-approved), slide two roller units, sloping side first, into each panel.

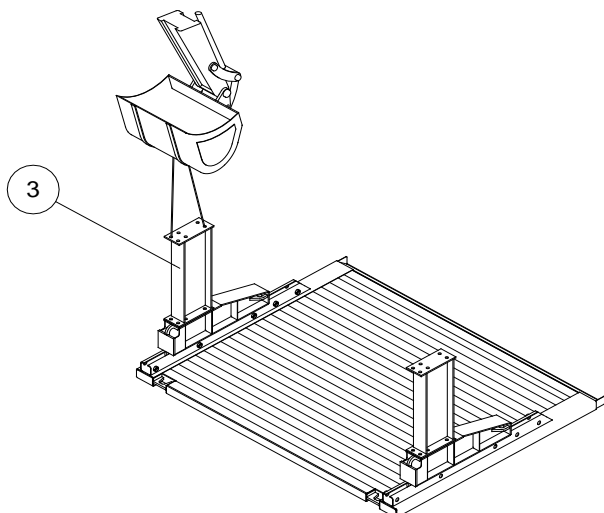
3. Pinning the roller units



The roller units in the linear box are pinned by inserting the pins (4) into the upper and lower holes of the soldier. After insertion, the pins must be secured with spring pins.

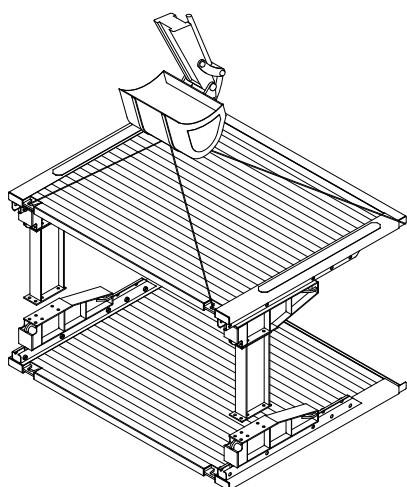
During the lowering process, make sure that there are no pins in the other holes.

4. Fitting the spacer bars



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

5. Assembly of the complete linear box

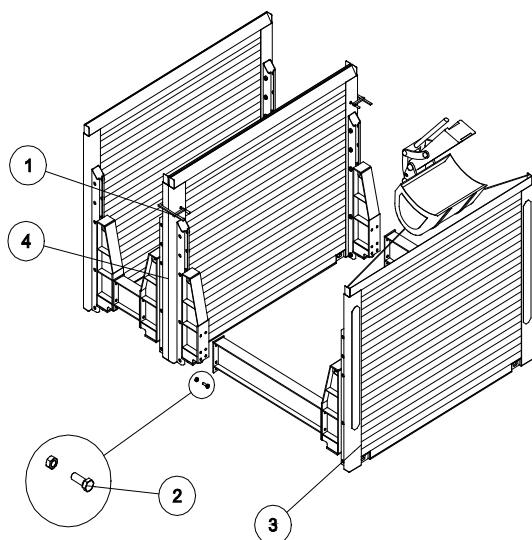


The panel preassembled with roller units and spacer bars is pivoted over the second panel so that the roller units and spacer bars can be bolted together.

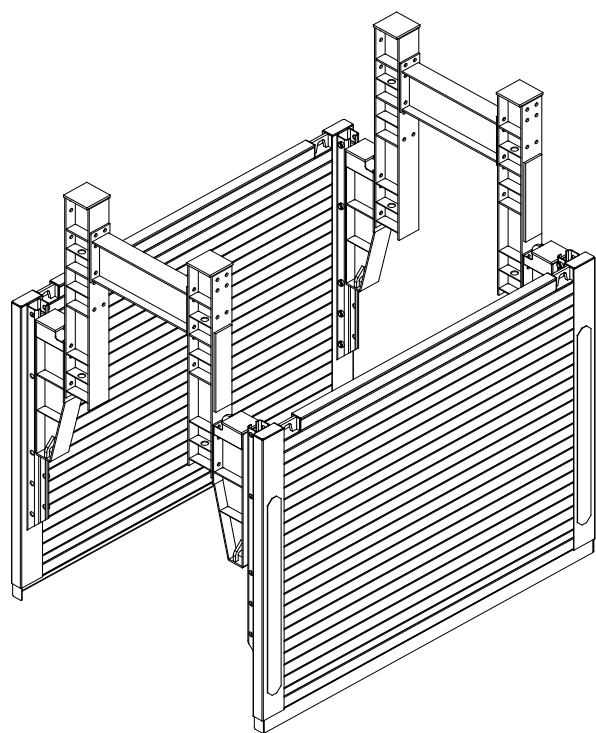
After assembly, set the linear box upright.

In the case of larger shoring widths, it is advisable to firmly join two trench boxes together, e.g. with clamps (1). The two panels are only separated by releasing the spacer bar bolts M30 x 80 (2) when the unsecured panel (3) is held with lifting gear and a suitable sling. Then lower the free panel, flat side down, onto the ground and then fit the selected spacer bars.

Using lifting gear and a suitable sling, pivot the panel fitted with spacer bars against the second, upright and secured panel in such a way that the spacer bars can be reconnected to the roller unit with the given number of bolts M30 DIN 933 and nuts M3 DIN 934 (2) as per list of accessories.



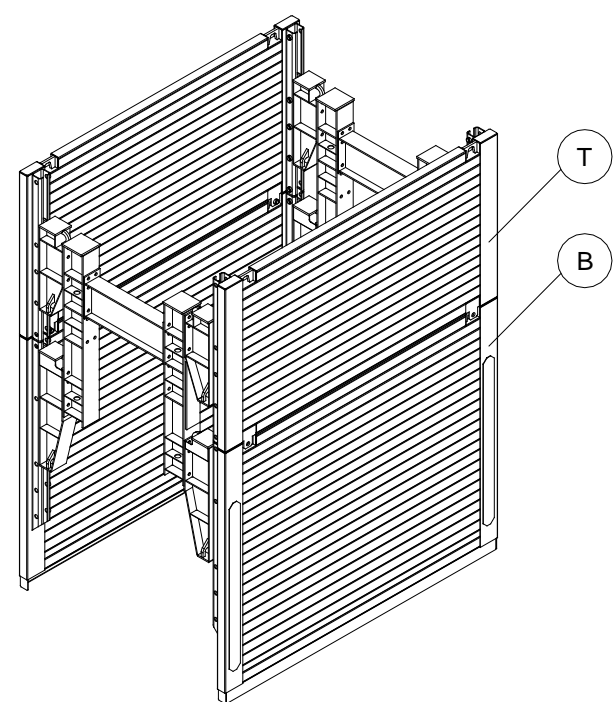
Assembly instructions for the linear box with extension



Depending on the demanded vertical pipe clearance, extensions are attached to the roller units before the spacer bars are fitted.

Assembly proceeds in accordance with the above *steps 4 to 5*.

Assembly instructions for the linear box with top panel and roller unit extension



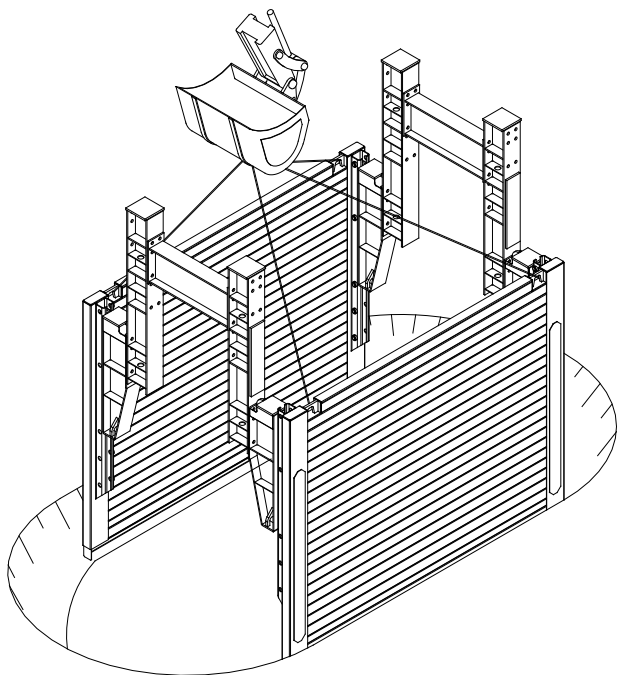
Depending on the required trench depth, the top module (T) is mounted on the base module (B) after it has been fully lowered.

To this end, the top roller units are pre-fitted to the extension during the assembly of the base module (B).

The top modules (T) are only mounted on the base modules (B) in the trench and then connected with bolts and secured with spring pins.

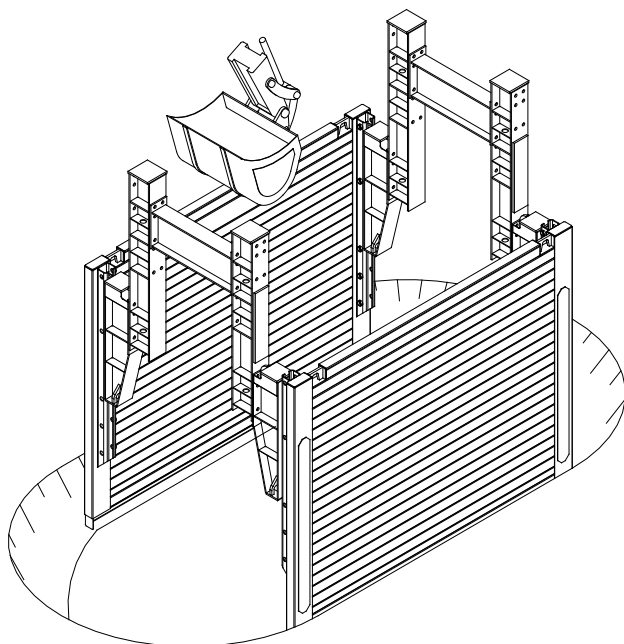
Lowering process

1. Initial excavation and insertion and alignment of the shoring unit



When the trench line has been measured, advance excavation for insertion of the first shoring unit is carried out in accordance with the instructions of project management and with observance of the provisions of DIN 4124. The shoring unit is inserted and aligned with the aid of lifting gear and a sling (GS-approved, attachment holes) in the center of the trench and parallel with the trench axis. When the shoring has been inserted, all the screw joints must be tightened.

2. Lowering the shoring unit



Before lowering proper can start, the soil beneath the shoring panels must be excavated in accordance with the instructions of project management. The shoring panels and roller units are pressed down in turn.

When lowering the box you have to take care that the boogie cars are at the lowest position.

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

When lowering the system, make absolutely sure that the roller units are positioned vertically in accordance with structural strength requirements (pay attention to cantilever lengths).

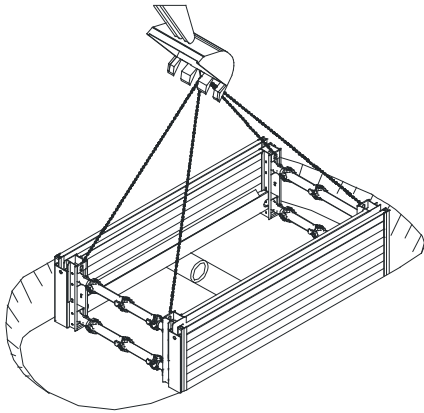
Only when the shoring has been fully lowered is the roller unit raised to the required vertical pipe clearance and pinned.

Installation instructions for sheet piling element shoring

1. General remarks

Sheet piling element shoring is a universal and cost-effective shoring method in inner-city areas, particularly in cases where pipes and cables cross the trench. The two sheet piling elements on either side of the trench, propped against each other with struts, serve as the upper guide for sheet piles inserted vertically into the soil. Sheet piles can be pressed into the ground with an excavator bucket or by vibration. Sheet piling elements are assembled and pre-adjusted in the same way as edge-supported shoring systems.

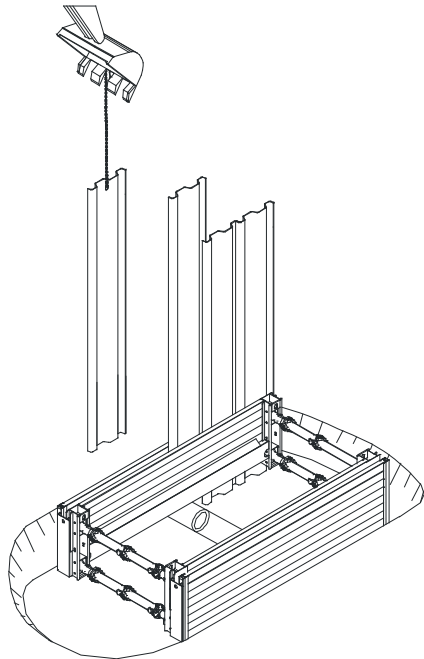
2. Advance excavation and insertion and alignment of the shoring unit



After measurement of the line of the trench, advance excavation for the insertion of the sheet piling element can take place.

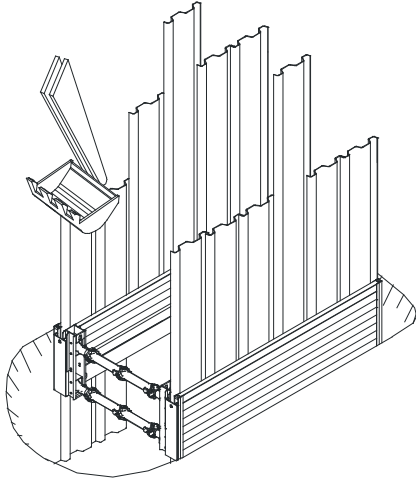
The sheet piling element is usually installed with its top edge flush with the working level, and advance excavation in this case is to a depth of approximately 1 meter. The gap between the trench wall and sheet piling element must be filled right up to the top. Furthermore, the sheet piling element must be pressed against the trench wall by extending the struts.

3. Inserting the sheet piles



The sheet piles can now be inserted into the slot formed by the double panel walls of the sheet piling elements and pressed into the ground with the excavator bucket. To make this process easier, and particularly in cases of sheet piles longer than 4 meters, it is advisable to use a sheet pile grab. The basic equipment of sheet piling elements from E+S does not include a vertical guide for the sheet piles. The advantage of this is that the piles can be inserted in any desired position. The piles can also overlap. If desired, a frame can nevertheless be supplied for vertical pile guidance. Lightweight sections KD VI/8 are used as the sheet piles.

4. Lowering the shoring system



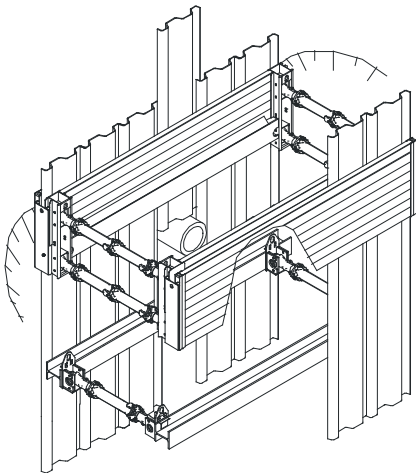
After inserting the sheet piles, the unit is lowered as soil excavation proceeds.

During the lowering process, the advance soil excavation beneath the sheet piles must not exceed 0.5 meters, depending on soil conditions. Any pipes or cables crossing the trench must be exposed beforehand and the sheet pile above them must be secured to prevent it dropping any further. It is beneficial in such cases to use shorter sheet piles.

The area beneath the cable or pipe crossing the trench is conventionally secured with horizontal wooden trench sheeting. This can be fastened to the neighboring sheet piles.

Make sure that the sheet piles are not used as chisels. Solid obstacles (e.g. unnatural fill, rocks) must be removed manually. To prevent settlement, make sure that the elements and sheet piles are backfilled with soil. In soils amenable to a driving, it is possible to drive the sheet piles to their final depth. The soil is then subsequently excavated with grab equipment or a backhoe.

5. Additional walings



Depending on the required trench depth, it may be necessary for structural reasons to take measures to ensure the stability of the shoring system. Proof of structural strength for the specific project is required as for all trench shoring systems conforming to DIN 4124.

Longitudinal waling girders must be fitted at a depth of roughly 2 meters from the surface of the ground. These are secured to the sheet piling element with chains to prevent them from falling and propped against each other with E+S waling struts. These waling girders must be lowered together with the sheet piles to the structurally required depth.

The next shoring unit is installed as soon as the preceding system has been fully lowered to the base of the trench. Depending on site conditions, this can be another piling element or a different shoring system. When the pipes have been laid, the system is removed by proceeding in reverse order.

Installation instructions for Dragbox shoring

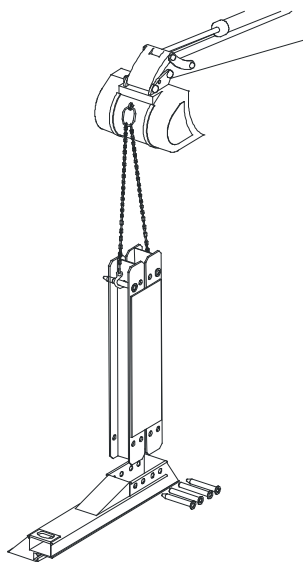
1. General remarks

Dragbox shoring is a special shoring system which can be dragged along the trench by the excavator with the aid of the cutting shoe unit at the front as excavation proceeds.

It consists of the cutting shoe unit, the Dragbox attached to it and usually by a trailing box attached to it. The elements are connected together with special panel connectors permitting relative vertical displacement. Dragboxes and trailing boxes of different lengths can be combined, as required.

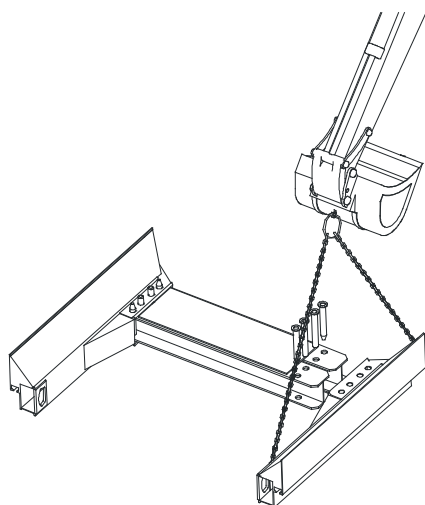
It is designed particularly for pipes laid in long sections without pipes or cables crossing the trench at shoring depths of up to about 3.5 m.

2. Attachment of the connecting bar



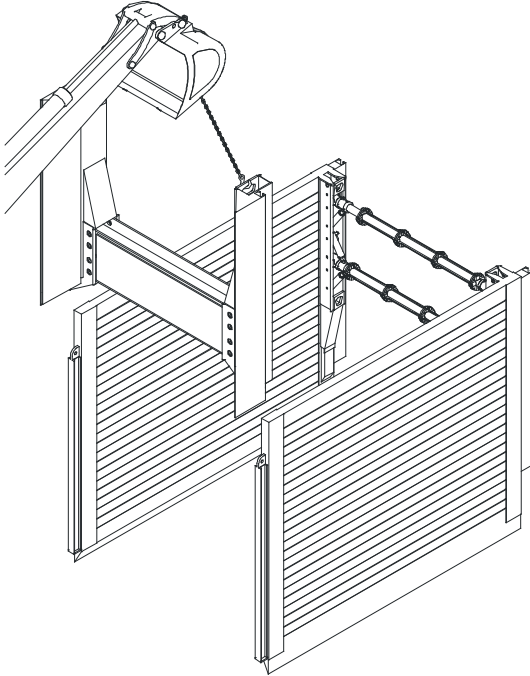
The cutting shoe unit is preassembled by inserting the connecting bar into the cutting shoe resting horizontally on the ground. By knocking in the pins, firstly if possible 2 bolts with a cone (to center the hole pattern), a firm connection is established. The bolts must be secured with split pins.

3. Assembly of the cutting shoe unit



When this configuration is turned to bring the connecting bar into the horizontal, the other cutting shoe can be fitted to the connecting bar in the manner shown and bolted.

4. Assembly of the shoring



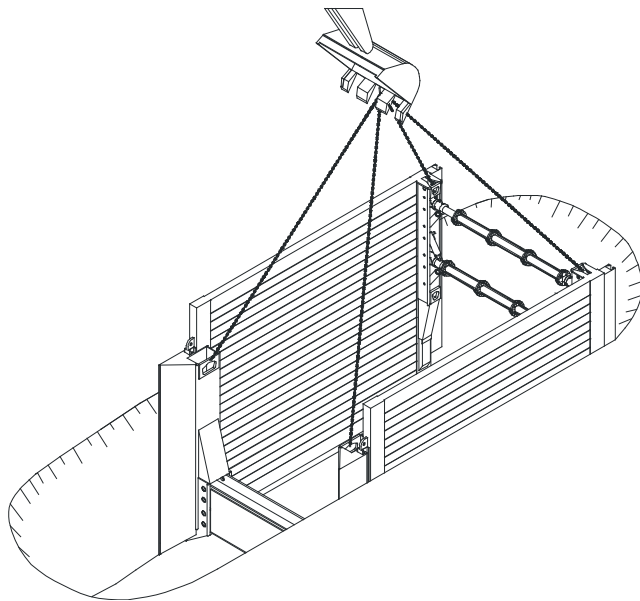
For the assembly of the Dragbox shoring system, the Dragbox and the trailing box are first adjusted to the desired trench width with the necessary spacer bars (*see also "Assembly instructions for spacer bars"*).

The Dragbox adjusted to the trench width is now brought into its installation position (cutting edge at the bottom) and the cutting shoe construction can be slid on from above.

The struts are then extended to create an A-shape (*see "Installation instructions for edge- and center-supported shoring systems", step 2.2*).

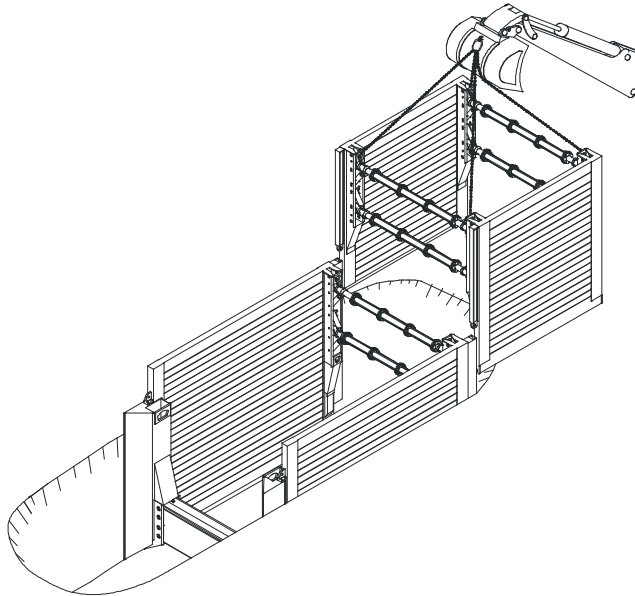
The width of the shoring unit should also taper by 10 mm/m of shoring length from the front (cutting shoe) toward the rear. This reduces the frictional forces when pulling the shoring the system along the trench.

5. Inserting the shoring



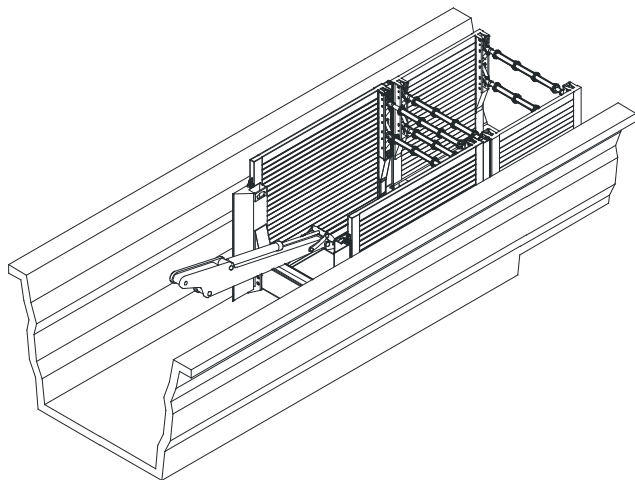
Using lifting gear and a suitable sling (GS-approved), the shoring unit prepared outside the trench is inserted into the trench fully excavated to the final depth for the length and width of a trench box. The length of the excavated and unsecured section of trench must be limited to that necessary for the installation of a single trench shoring unit.

6. Attaching the trailing box



Next, the trailing box is slid on from above and connected to the Dragbox with the panel connectors. As earlier with the Dragbox, the struts of the trailing box are adjusted into a slight A-shape. Then the trailing box is lowered and inserted into the already excavated trench.

7. Shoring advance



By excavating the trench profile ahead of the cutting shoe, the entire configuration can be moved along the trench. The excavator pulls the system, with the bucket attached to the bar of the cutting shoe, in the direction of pipe laying.

Soil is filled and compacted against the trench wall in the trailing box section. The trailing box is raised accordingly. The Dragbox remains on the bottom of the trench.

To negotiate pipes/cables crossing or close to the trench, the trailing box and Dragbox are lifted out of the trench and reinserted beyond the obstacle.