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ALUMINIUM LIGHT WEIGHT SHORING

OPERATING MANUAL

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09-2023

► Aluminium - Light weight shoring

1. Introduction

The LITEBOX aluminium trenching system from FRIEDR. ISCHEBECK GMBH complies with the standards DIN 4124 (Excavations and trenches) and DIN EN 13331 (Trench lining systems) and in Germany has been checked for safety by the appropriate committee of the employer's liability insurance association responsible.
This trench lining system can be employed as a full shoring system for trenches as deep as 6 m.
According to DIN 4124, trenches with a depth not exceeding 1.25 m in stiff (or better) cohesive soils and rock do not require any shoring measures. For trench depths between 1.25 and 1.75 m, it is sufficient to employ measures that support the upper 0.50 m of the trench only. But for depths exceeding 1.75 m, a full shoring system must be installed. Depending on the depth of trench required, one of the tested standard trench lining arrangements A-K (see section 4.2) approved in Germany by the employer's liability insurance association must be installed. A detailed description of how the trench lining system is set up is given in section 5.

- max. trench depth 3 m with 3.00 x 0.50 m LITEBOX panel
- max. trench depth 6 m with 2.00 x 0.50 m and smaller LITEBOX panels
- trench widths from 0.60 to approx. 2.26 m (depending on the LITEBOX strut used)

Trench shoring solution in stiff cohesive soils and rock for trenches no deeper than 1.75 m.

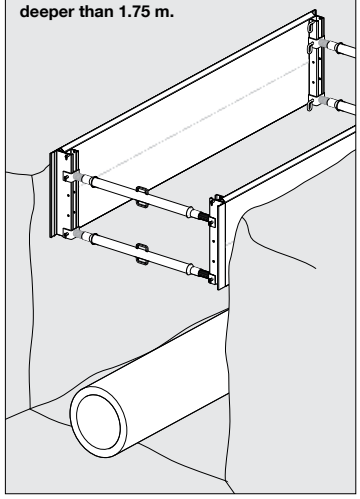
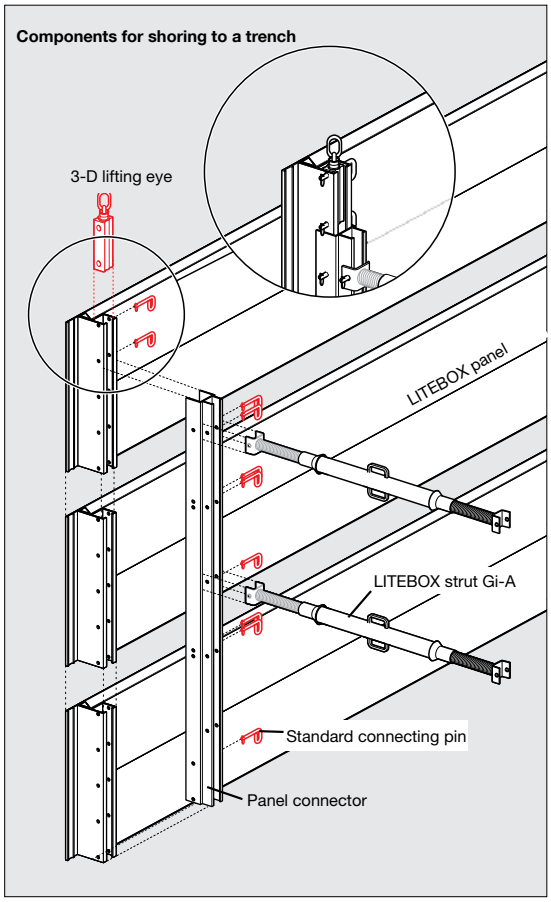


Fig. 1

Components for shoring to a trench



Components for shoring to a manhole

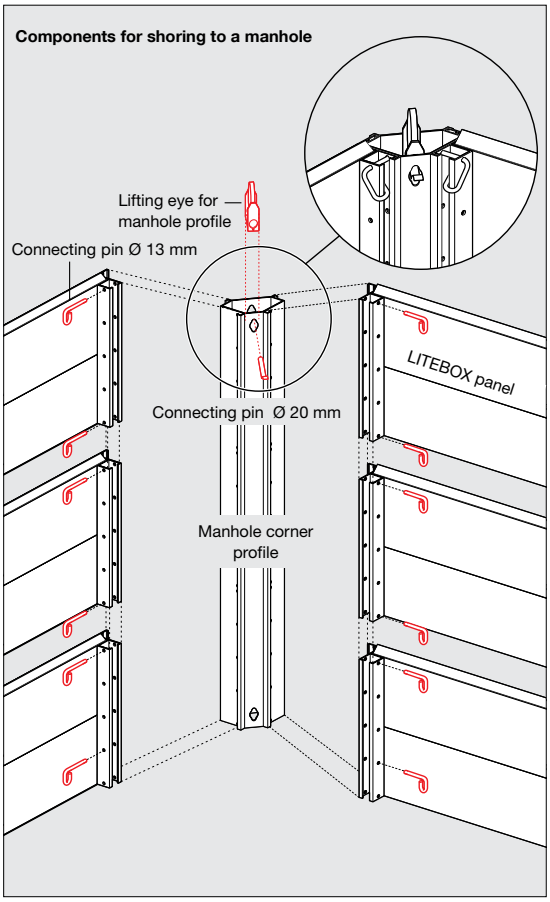


Fig. 2 | Overview of construction principles for shoring to trenches and manholes

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2. Safety advice

The relevant legislation, standards and safety directives currently valid in the respective country of use must be complied with at all times. Make sure you are familiar with these and that neither you nor your colleagues infringe any safety regulations.
Trench lining systems may only be installed, removed and/or relocated by persons who have been fully instructed in their use.
These instructions describe how to assemble, install and remove the system in accordance with its designated use. Other procedures are conceivable, provided these comply with safety regulations and do not lead to overloads.
The trench lining system and its components may only be loaded in the way described here. Other applications must be validated separately by an engineer.
Only components in a proper functioning condition may be used. Damaged components must be rejected. Repairs may only be carried out by the manufacturer.

- Never enter an open, unsecured trench.
- Trenches > 1.15 m deep must be provided with a ladder for access/egress.
- Both spindles of every trench strut must be extended by the same amount (Fig. 3).
- Fix all the galvanised spindles of the trench struts to one side of the shoring system, all painted spindles to the opposite side (Fig. 3).
- The vertical distance between trench struts may not exceed 1.15 m (Fig. 4).
- The trench shoring must extend min. 50 mm above the top edge of the trench on both sides (Fig. 5).
- Once the trench shoring has been set up in the trench, backfill all hollow spaces between the shoring and the side of the trench (Fig. 6).

3. Standards and regulations

DIN 4124	Excavations and trenches
DIN EN 13331	Trench lining systems
UVV	In addition, the relevant safety rules currently valid in the respective country of use must be complied with at all times.

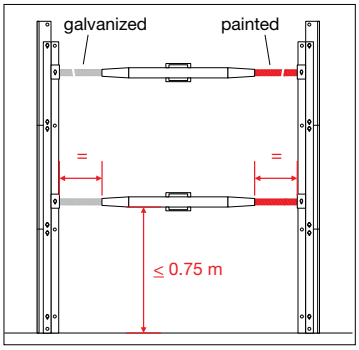

Fig. 3

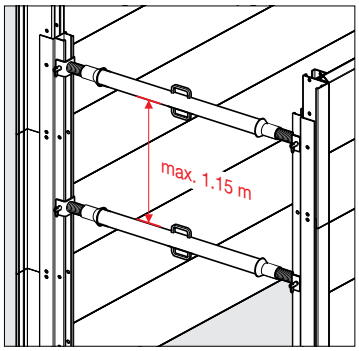

Fig. 4

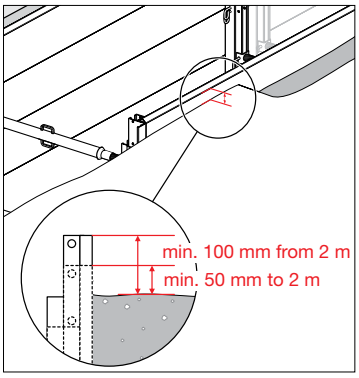

Fig. 5

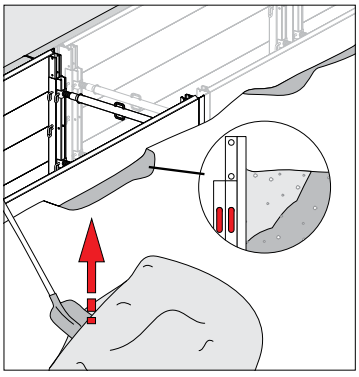
Fig. 6

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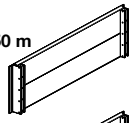
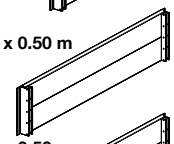
❶ LITEBOX panel
The aluminium panel is the main element which can be combined with other components to create trench lining for max. 3 m deep trenches (3.00 x 0.50 m panel) or max. 6 m deep trenches (2.00 x 0.50 m and smaller panels).

LITEBOX panel 0.91 x 0.50 m
Weight: 15.2 kg
Art.no.: 0230500021

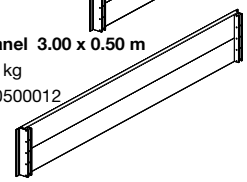
LITEBOX panel 1.55 x 0.50 m
Weight: 23.5 kg
Art.no.: 0130500010



LITEBOX panel 2.00 x 0.50 m
Weight: 28.3 kg
Art.no.: 0130500011



LITEBOX panel 3.00 x 0.50 m
Weight: 42.1 kg
Art.no.: 0130500012



Connecting pins
The connecting pins are used to connect the elements of the aluminium trench lining system quickly and securely together.

❷ Standard connecting pin Ø 13 mm with drop-down locking nib
For all connections between panels and panel connectors, 3-D lifting eyes, trench struts and holding brackets, Ø 13 mm.
Colour: black
Weight: 0.25 kg
Art.no.: 0130500088

❸ Connecting pin Ø 20 mm with nib
For connecting manhole corner profiles to manhole corner connectors.
Colour: galvanized
Weight: 0.5 kg
Art.no.: 0130500099

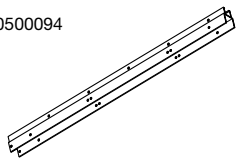
❹ Connecting pin Ø 13 mm for manhole profile
For connecting panels to manhole corner profiles.
Colour: yellow
Weight: 0.2 kg
Art.no.: 0130500096

❺ Panel connector
The panel connector is used to join together two or four panels.

Panel connector 0.28 m
- incl. 4 standard connecting pins (Ø 13 mm, black) ❷
Weight: 2.03 kg
Art.no.: 0130500087

Panel connector 1.35 m
- incl. 6 standard connecting pins (Ø 13 mm, black) ❷
Weight: 6.55 kg
Art.no.: 0130500090

Panel connector 1.85 m
- incl. 8 standard connecting pins (Ø 13 mm, black) ❷
Weight: 9 kg
Art.no.: 0130500094



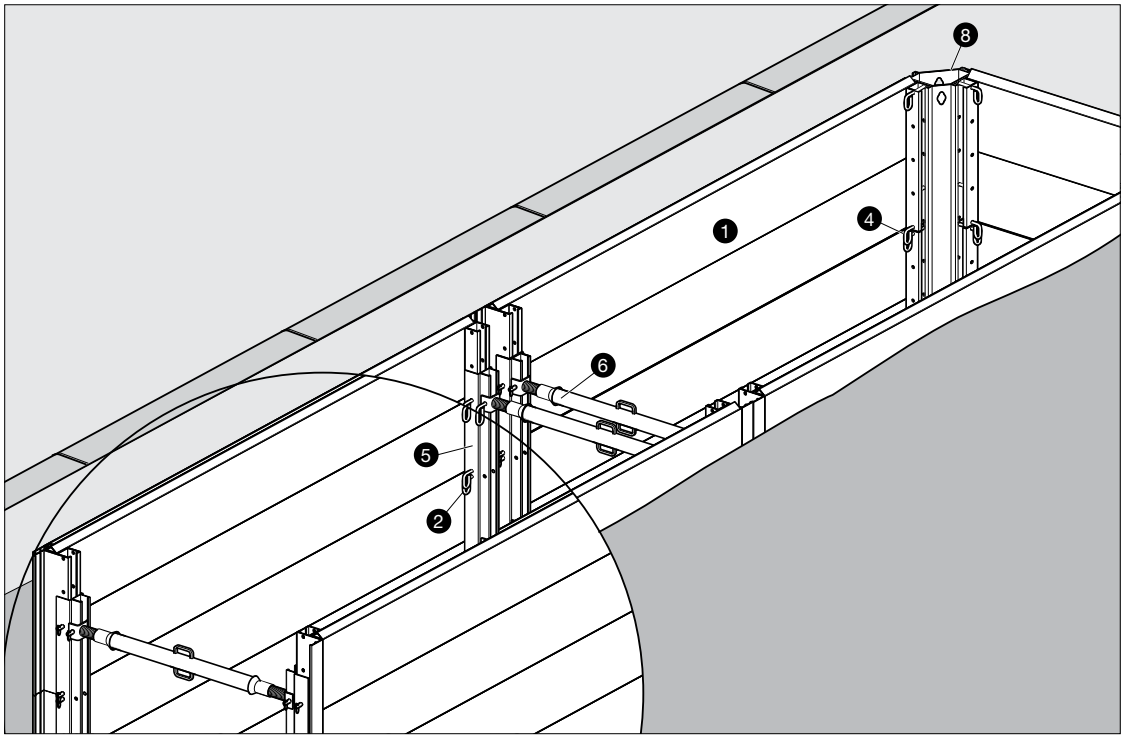


Fig. 7

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❻ LITEBOX strut Gi-A

The infinitely adjustable Gi-A struts enable the lining to trenches between 0.60 and 2.26 m wide to be securely propped. The strut can be attached to the panel connector or directly to the panel. When setting up trench lining, make sure that all the galvanised spindles are on one side of the trench, the painted spindles on the other side. It is also important to make sure that both sides of the strut are extended by the same amount.

- incl. 2 standard connecting pins (Ø 13 mm, black) ❷

LITEBOX strut Gi-A/ 60-81

Weight: 5.5 kg
Art.no.: 0130500024
Trench width:
- Adjustment range A: 0.60 - 0.81 m
- Adjustment range B: 0.68 - 0.89 m

LITEBOX strut Gi-A/ 80-121

Weight: 7.35 kg
Art.no.: 0130500025
Grabenbreite:
- Adjustment range A: 0.80 - 1.21 m
- Adjustment range B: 0.88 - 1.29 m

LITEBOX strut Gi-A/ 129-218

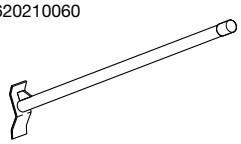
Weight: 11.49 kg
Art.no.: 0130500026
Grabenbreite:
- Adjustment range A: 1.29 - 2.18 m
- Adjustment range B: 1.37 - 2.26 m

Depending on the application, the trench struts can be attached either directly to the panels (adjustment range A) or to the panel connectors (adjustment range B). This results in different minimum/maximum trench widths.

❼ LITEBOX spanner

The LITEBOX spanner enables the trench struts to be tightened and released easily.

Weight: 2.61 kg
Art.no.: 0620210060



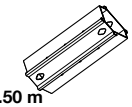
❽ Manhole corner profile

The manhole corner profile is intended for setting up a four-sided shaft. Manhole corner profiles are available in lengths of 1.50 and 0.50 m, but can also be lengthened by using the manhole corner connector.

Manhole corner profile 0.50 m

- incl. 4 connecting pins ❹ (Ø 13 mm, yellow)

Weight: 3.8 kg
Art.no.: 0130500093



Manhole corner profile 1.50 m

- incl. 12 connecting pins ❹ (Ø 13 mm, yellow)

Weight: 11 kg
Art.no.: 0130500097

❾ Manhole corner connector

The manhole corner connector is used with connecting pins to join together two manhole corner profiles.

- incl. 2 connecting pins (Ø 20 mm with nib, galvanised) ❸

Size: 300 mm
Weight: 1.4 kg
Art.no.: 0130500098

❿ Lifting eye for manhole profile

The lifting eye can be attached to the top of a manhole corner. A hook can then be attached to it to lift the manhole lining or the manhole corner profile out of the excavation (see Fig. 24, p. 11).

- incl. connecting pin (Ø 20 mm with nib, galvanised) ❸

Weight: 1.05 kg
Art.no.: 0330500094

⓫ 3-D lifting eye

A 3-D lifting eye is attached to each of the four corners of a trench lining unit. A hook can then be attached to each one so that the trench lining unit can be lifted and placed in a trench or lifted out of a trench.

- incl. 2 standard connecting pins (Ø 13 mm, black) ❷
- permissible load 10 kN

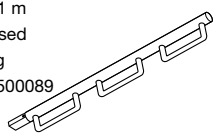
Weight: 1.5 kg
Art.no.: 0130500041

⓬ LITEBOX rail post (optional)

Used in conjunction with suitable rails, it provides a safety barrier along the edge of the trench. Can be fixed directly to the panel or to the holding bracket.

- Ø 48 mm x 1.11 m
- hot-dip galvanised

Weight: 5.8 kg
Art.no.: 0130500089

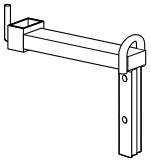


⓭ Holding bracket (optional)

The holding bracket secures the trench lining system against slippage when only the top edge of the excavation is supported. It can also be used as a fixing for a LITEBOX rail post (see Fig. 33, p. 15).

- incl. 2 standard connecting pins ❷

Weight: 4.3 kg
Art.no.: 0130500016



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Trench lining unit A. Trench edge support 0.50 m, trench max. 1.75 m deep.

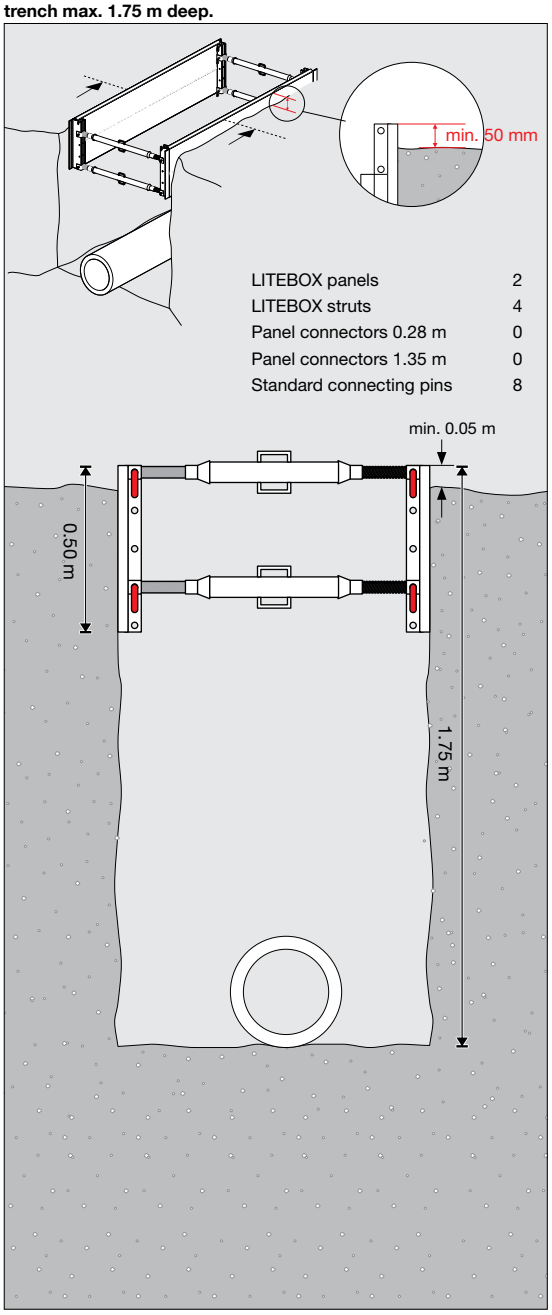

Fig. 8

Trench lining unit B. Trench max. 1.50 m deep.

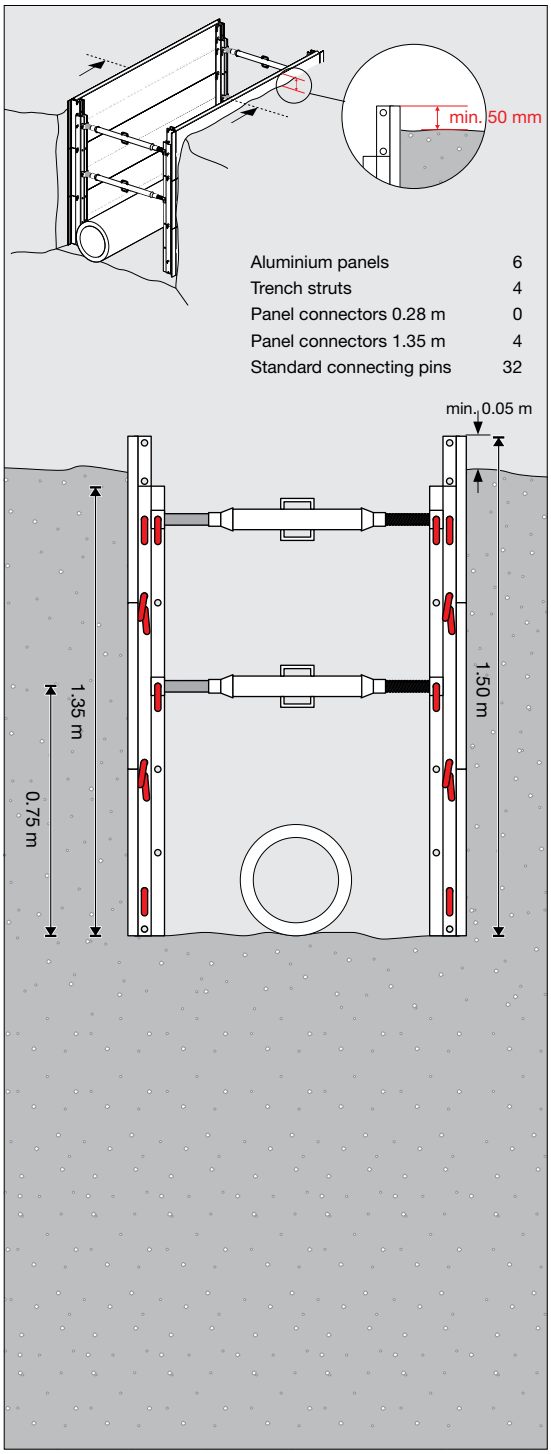

Fig. 9

Note for all trench lining units: Use 3-D lifting eyes for installing the trench lining units (see p. 5, part 11).

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Trench lining unit C. Trench max. 2.00 m deep.

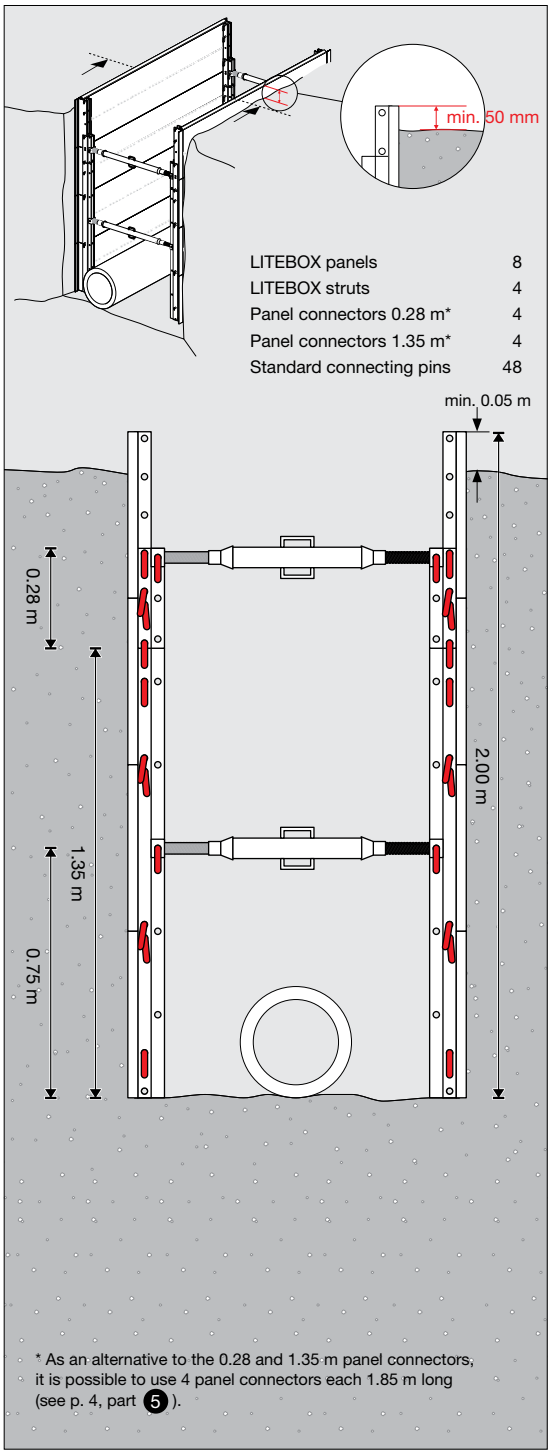

Fig. 10

Trench lining unit D. Trench max. 2.50 m deep.

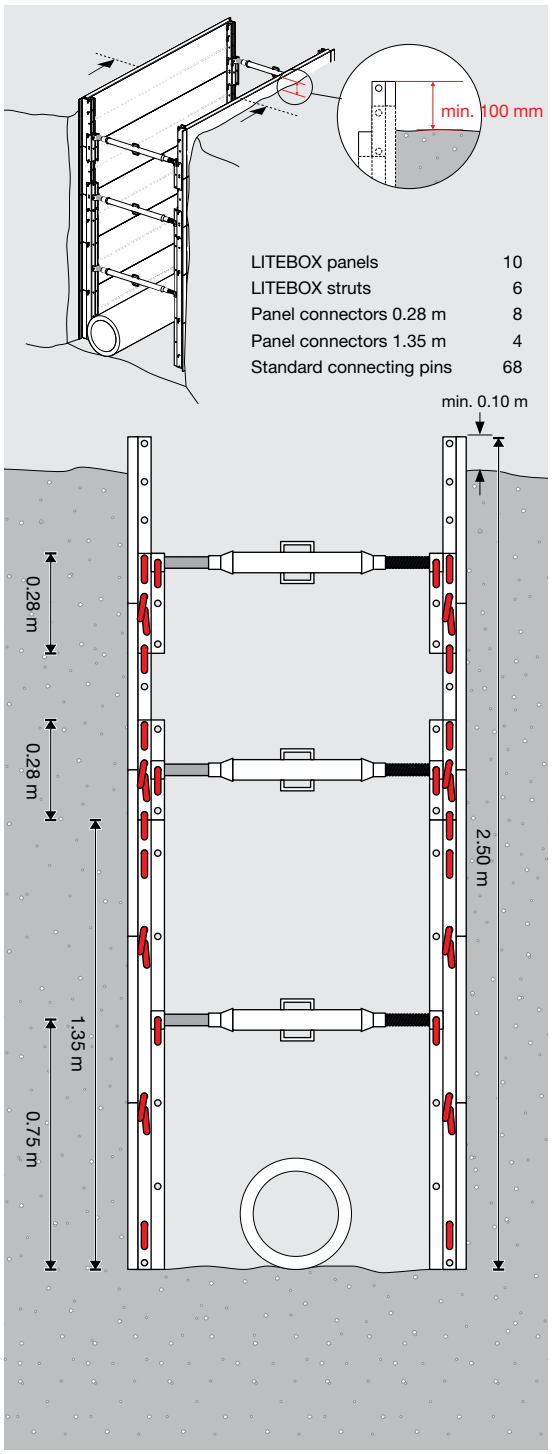

Fig. 11

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Trench lining unit E. Trench max. 3.00 m deep.

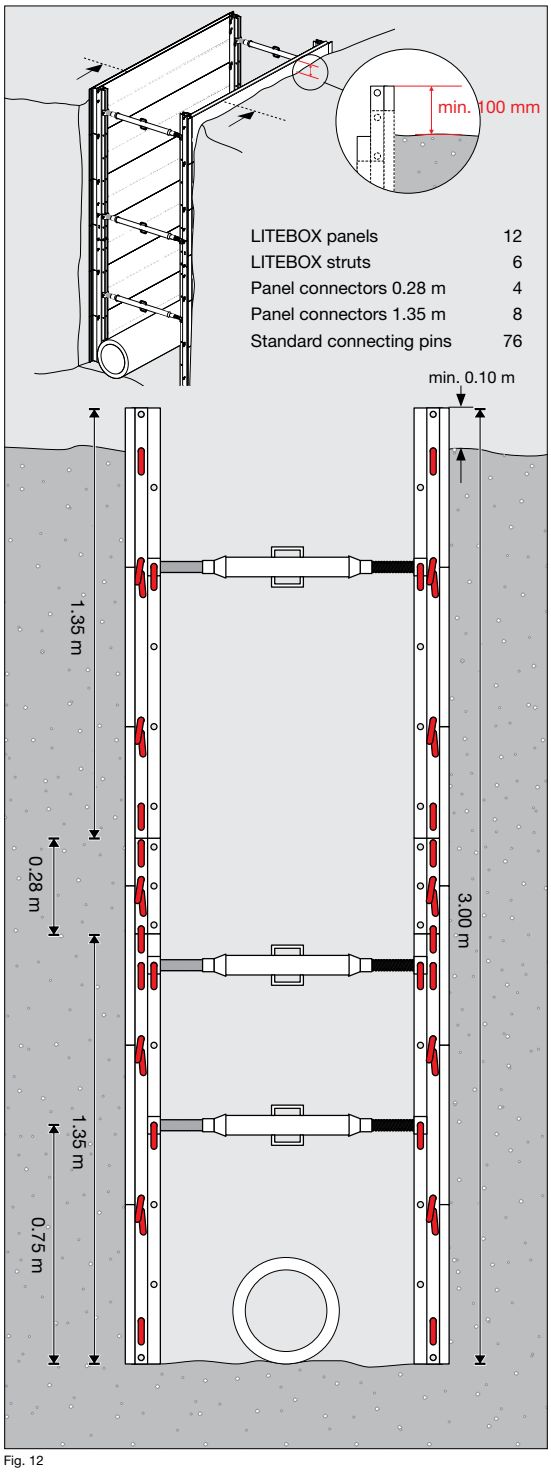

Fig. 12

Further trench lining units:
Typical arrangements for trench depths of 3.50 to 6 m (arrangements F-K) are available on request.

Manhole lining unit A. Excavation max. 1.50 m deep.

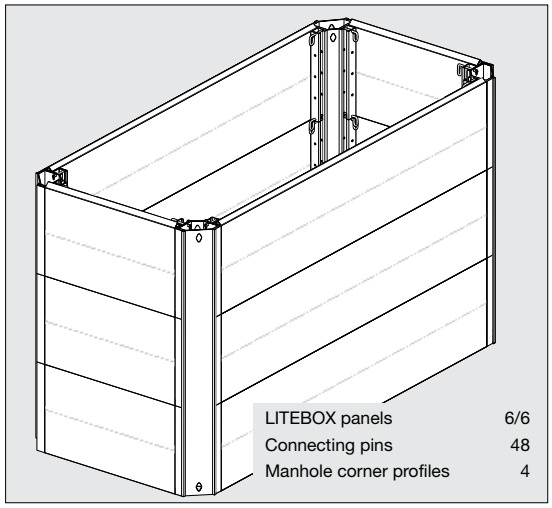

Fig. 13

Manhole lining unit B. Excavation max. 3.00 m deep.

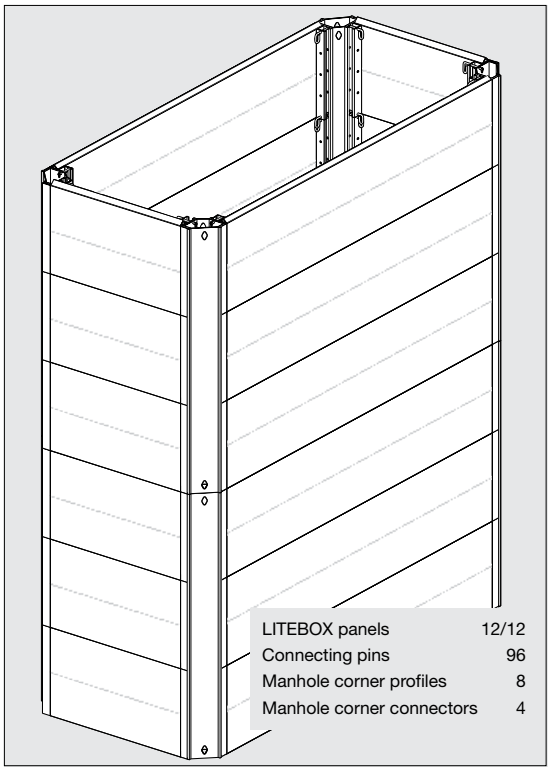

Fig. 14

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5.1 Assembling a trench lining unit

By way of an example, the following steps describe the assembly of a trench lining unit for a 1.50 m deep trench (trench lining unit B, see p. 6 for pin positions). The width of the trench can be chosen as required between 0.68 and 2.26 m depending on the Gi-A trench strut being used.

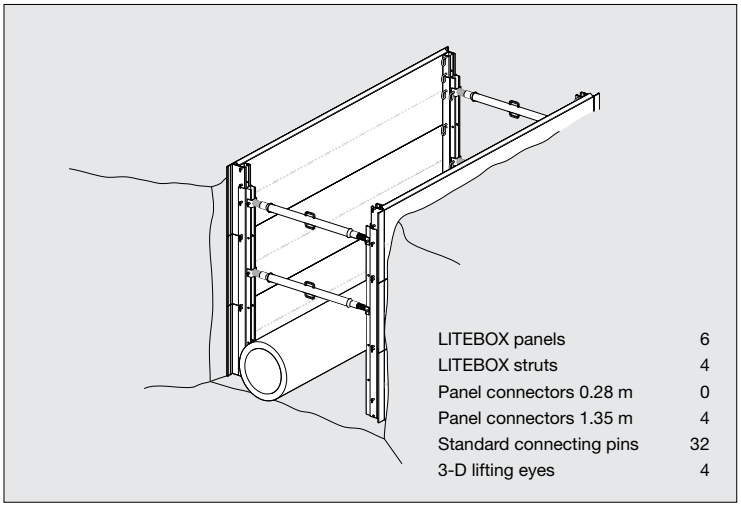


Fig. 15 | Beispiel Grabenverbau bis 1,5 m Grabentiefe

Attach the LITEBOX panel connectors to the LITEBOX panels. In doing so, use the right pin positions for the trench lining unit (see pp. 6-8). Make sure that the V-lip points upwards when both elements are in the vertical position.

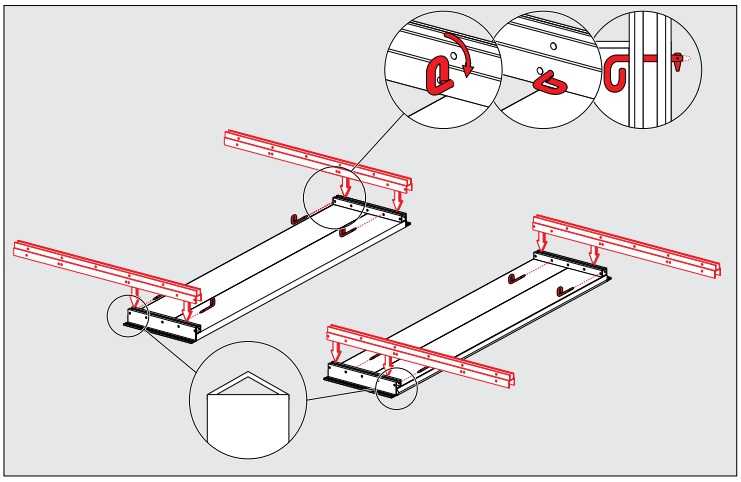
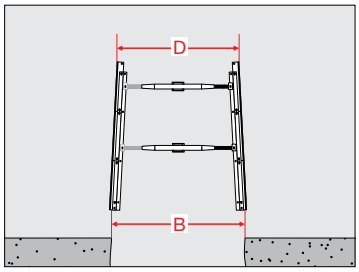


Fig. 16

Raise the elements to the vertical position and fix the trench struts with the standard connecting pins. Make sure that the spindles on both sides are extended by the same amount and that for installation the trench lining unit is slightly narrower at the top than it is at the bottom (D ≤ B).



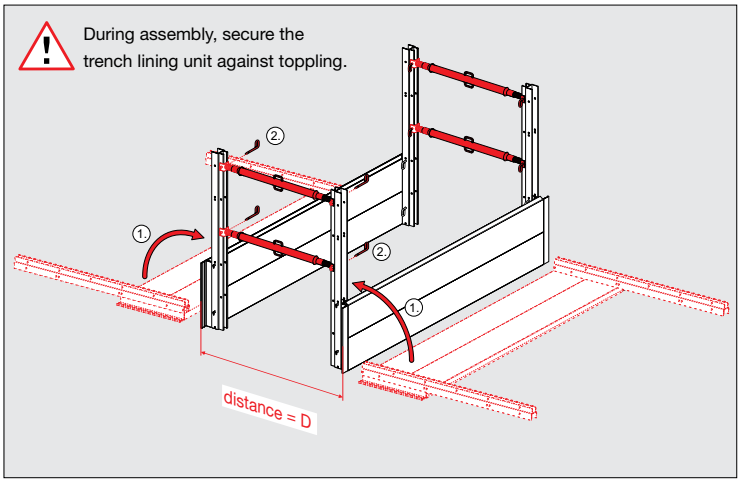


Fig. 17

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Attach further panels to the panel connectors with the help of further connecting pins (according to the pin positions for the trench lining unit, see pp. 6-8)

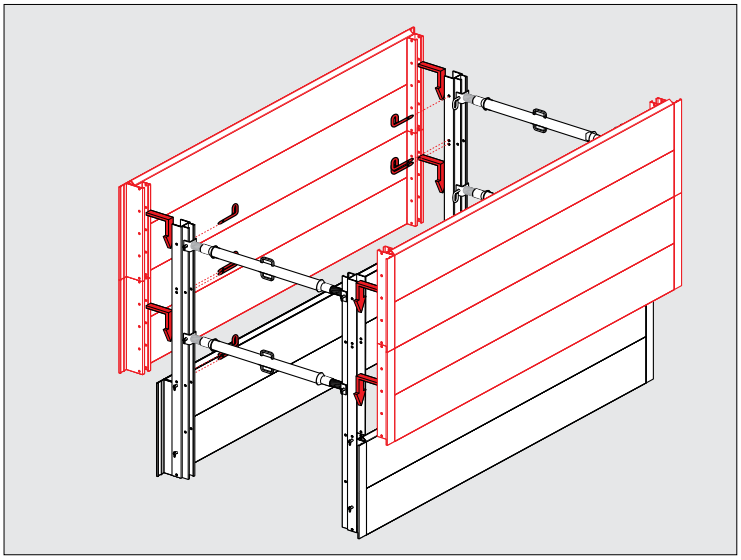


Fig. 18

Fig. 19 shows the finished trench lining unit B for a trench depth of max. 1.5 m. Trench shoring solutions for deeper trenches can be found on pp. 6-8.

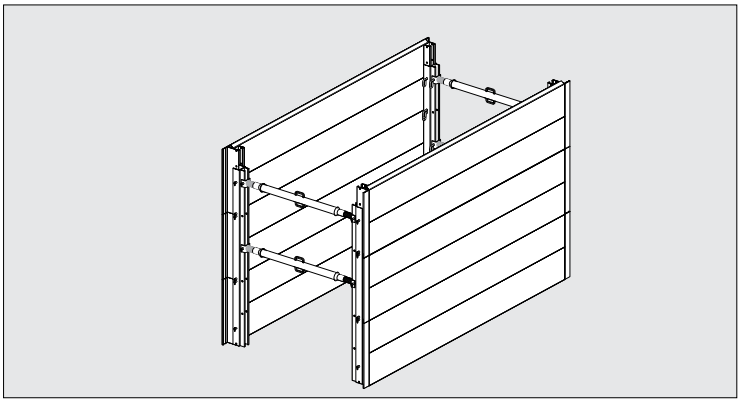


Fig. 19 | Finished trench lining unit for a trench depth of max. 1.5 m

Options/accessories: Attach 3-D lifting eyes to the topmost panels with standard connecting pins in order to lift the trench lining unit into position with the help of heavy plant such as an excaator, crane, etc.

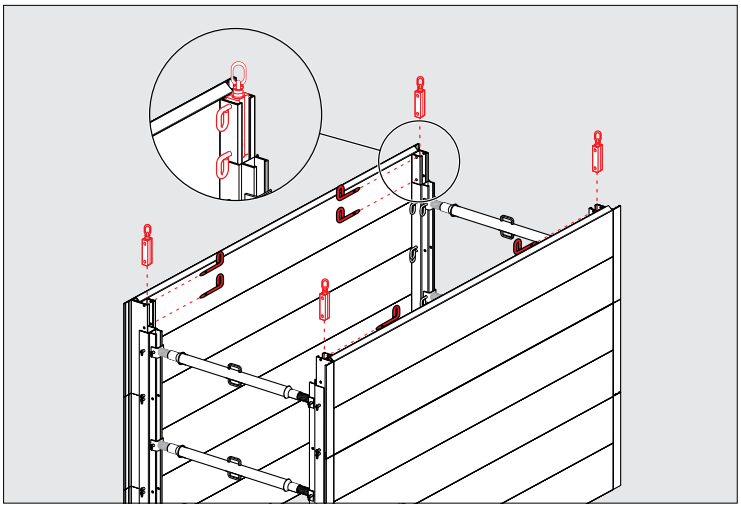


Fig. 20 | Attaching optional lifting eyes

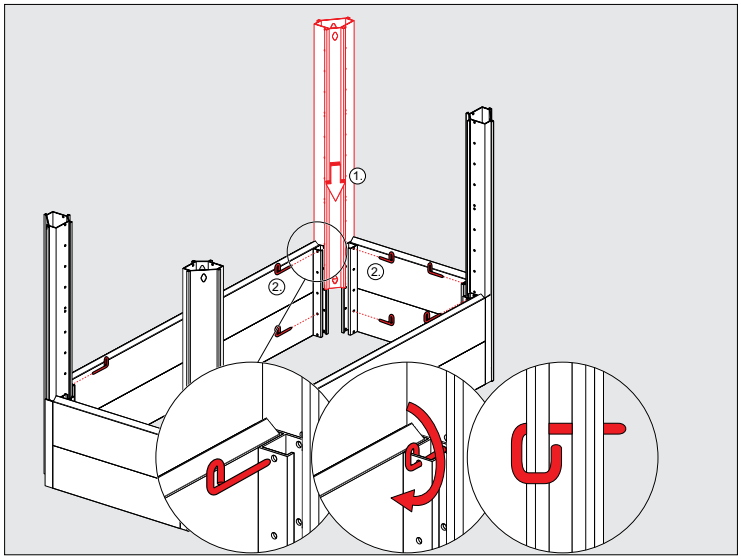
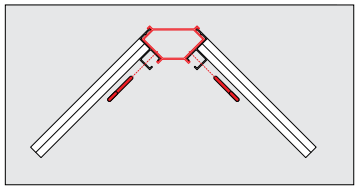


Fig. 21

5.2 Assembling a manhole lining unit for an excavation depth of max. 1.50 m

Attach the panels to the manhole corner profile with Ø 13 mm connecting pins 4.



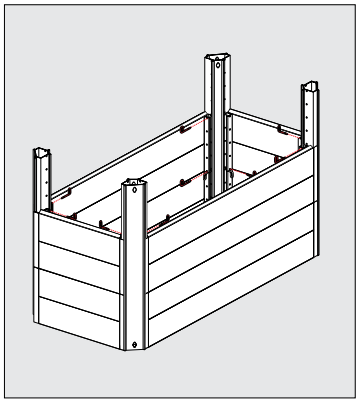


Fig. 22

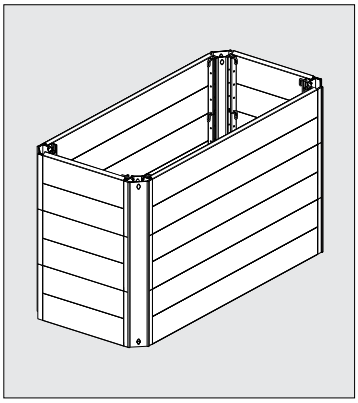


Fig. 23 | Finished manhole unit for max. 1.50 m deep excavation

Afterwards, mount further panels on the manhole corner elements and fixed these with further Ø 13 mm connecting pins 4 .

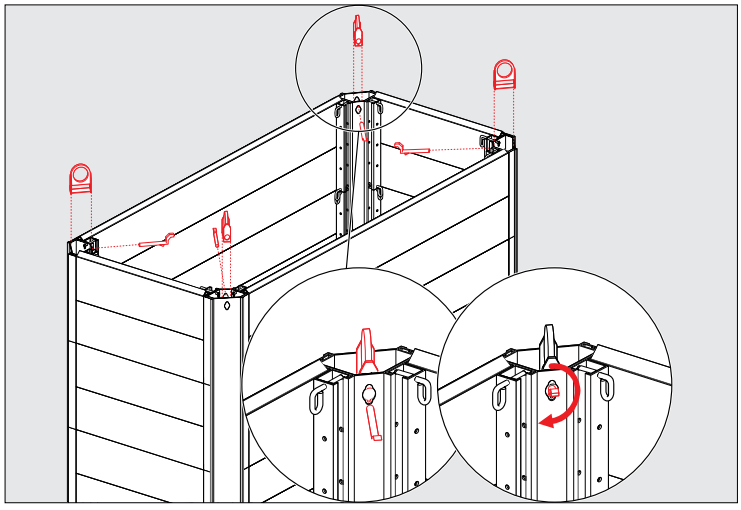
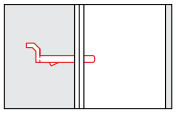
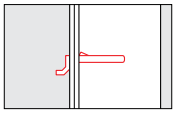


Fig. 24 | Attaching optional lifting eyes

Options/accessories: Attach lifting eyes to the manhole corner profile in order to lift the manhole lining unit into position with the help of heavy plant such as an excavator, crane, etc.



Insert connecting pin.



Turn the pin to secure it.

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Option/extension: Shoring for manholes with max. 3.00 m excavation depth
The shoring unit can be extended for manholes > 1.50 m deep. To do this, fix connectors for manhole corner profiles to the corners with Ø 20 mm connecting pins (with nib) ❸.

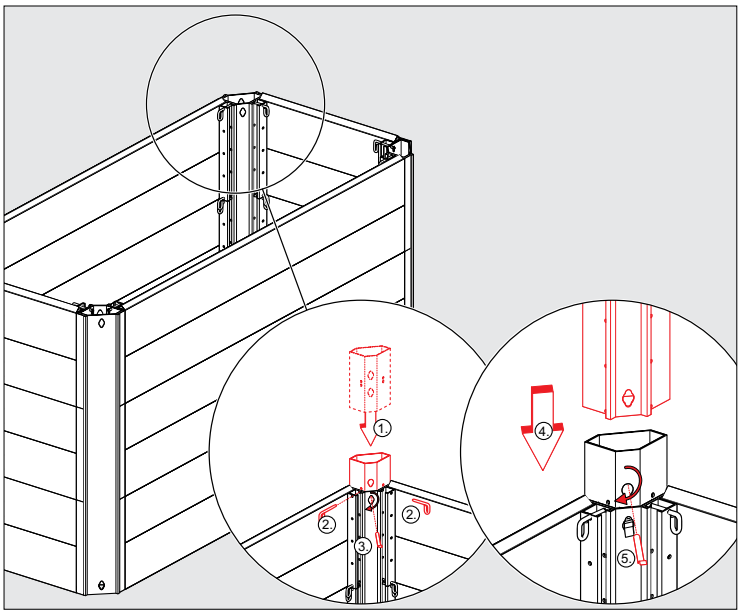

Fig. 25

Mount a further manhole lining unit on the first one and fix it in place with Ø 20 mm connecting pins (with nib) ❸. Shoring for excavations max. 3.00 m deep can be assembled in this way.

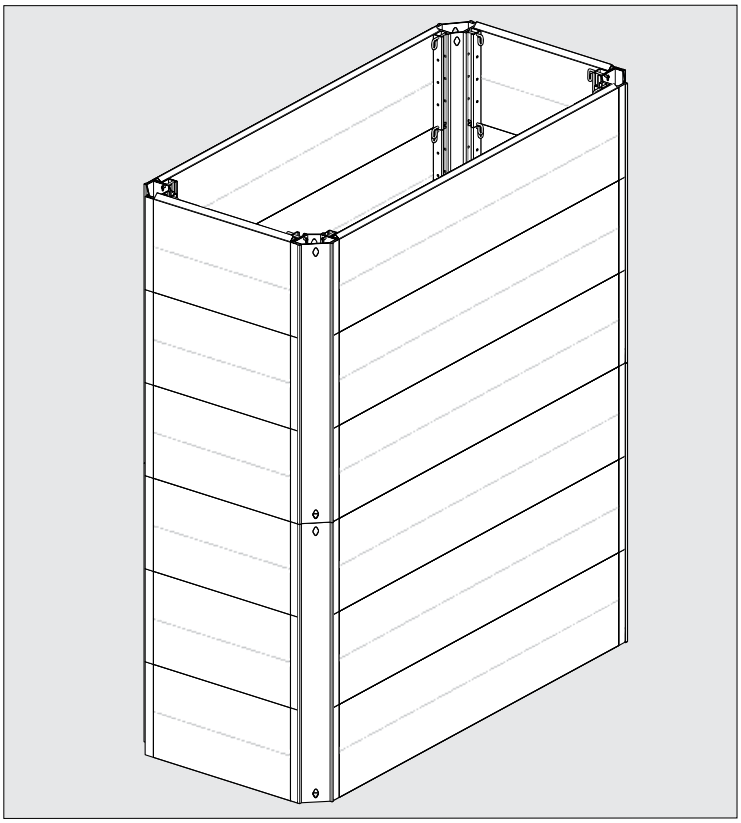
Fig. 26

5.3 Positioning a shoring unit in an excavation (e.g. trench lining unit)
After assembling the trench lining unit, the trench, which has been set out beforehand, is excavated to a depth of 1.25 m.
The maximum possible width of the trench depends on the Gi-A trench strut being used.

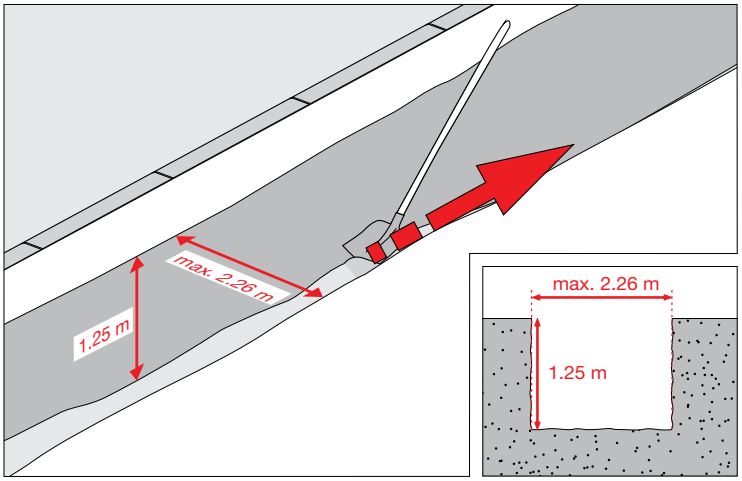

Fig. 27

Options/accessories: Attach 3-D lifting eyes to the topmost panels with standard connecting pins in order to lift the trench lining unit into position with the help of heavy plant such as an excavator, crane, etc. ❷

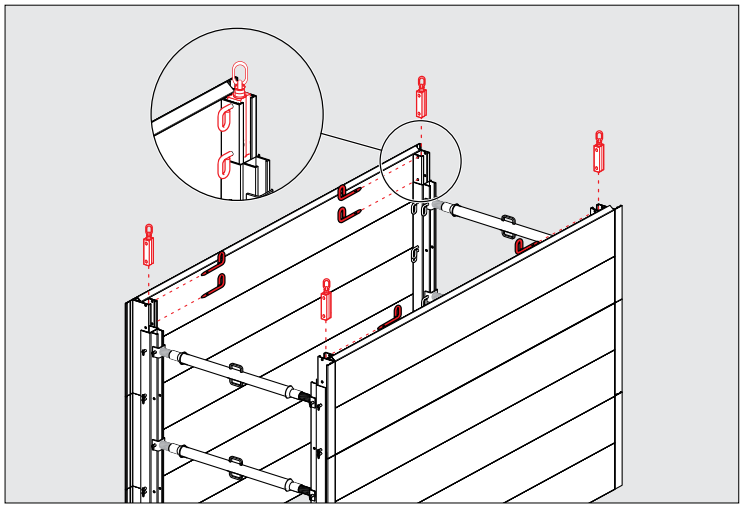
Fig. 28 | Options/accessories: 3-D lifting eyes

Position the trench lining unit in the trench.

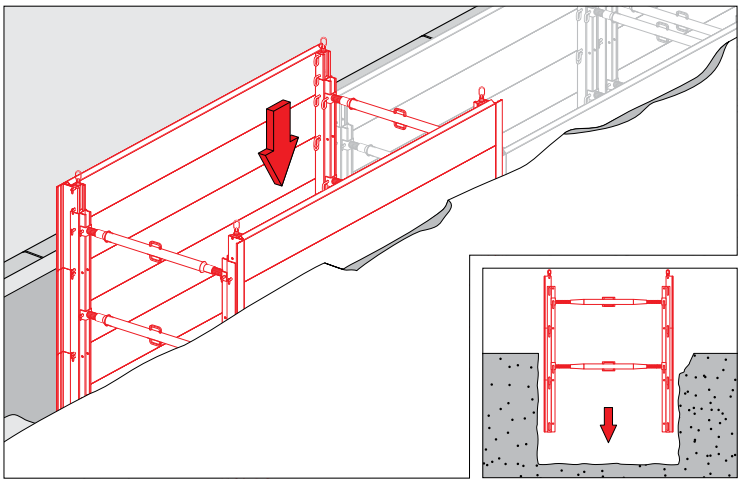
Fig. 29

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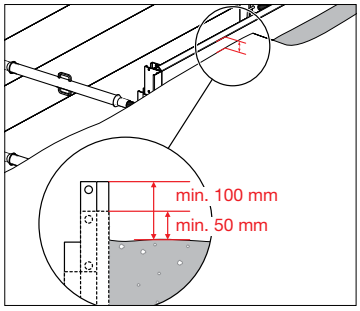
Continue excavating and while doing so allow the trench lining unit to slip down slowly into place as work proceeds.

Do not use heavy plant to force the LITEBOX aluminium trenching unit downwards into the ground.

Make sure that when the excavation is finished, the trench lining unit projects min. 50 mm or 100 mm above the top edge of the trench on both sides.



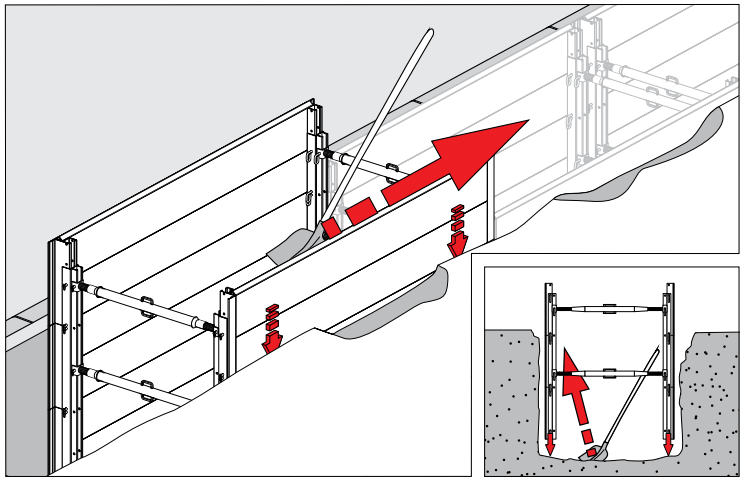


Fig. 30

Extend the spindles of the LITEBOX struts outwards on both sides with the LITEBOX spanner.

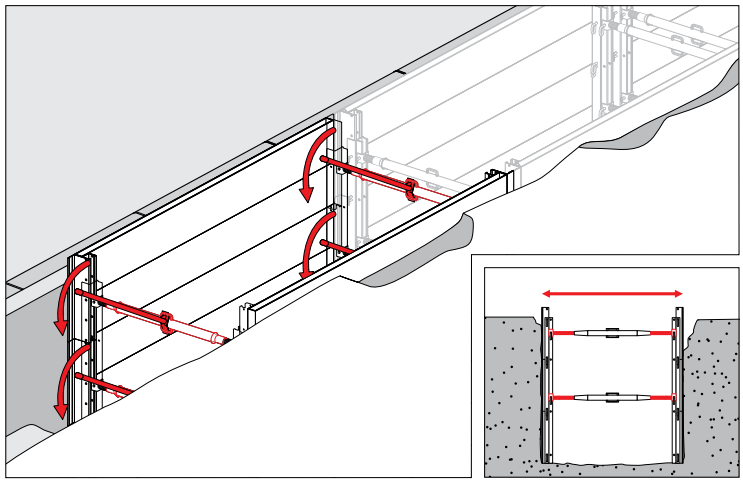


Fig. 31

Backfill any hollow spaces between the trench lining unit and the side of the trench.

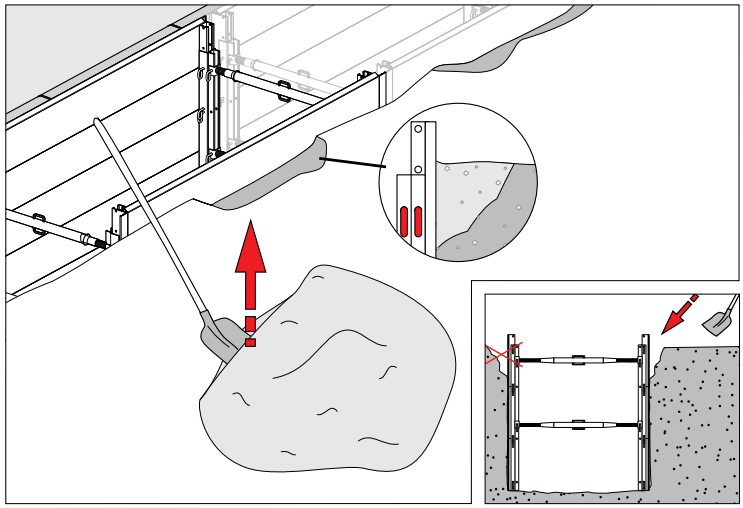


Fig. 32

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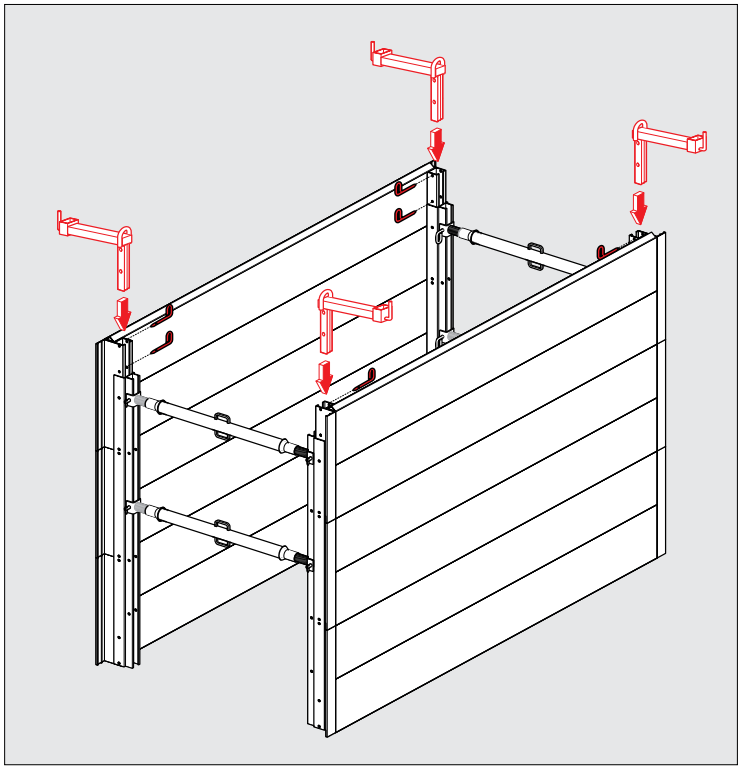

Fig. 33

5.4 Options/accessories

Holding brackets can be fixed to both trench and manhole lining units to safeguard against slippage when only the top edge of the excavation is supported and to serve as supports for temporary safety barriers. To do this, insert the holding brackets into the panels and fix these with the standard connecting pins ❷.

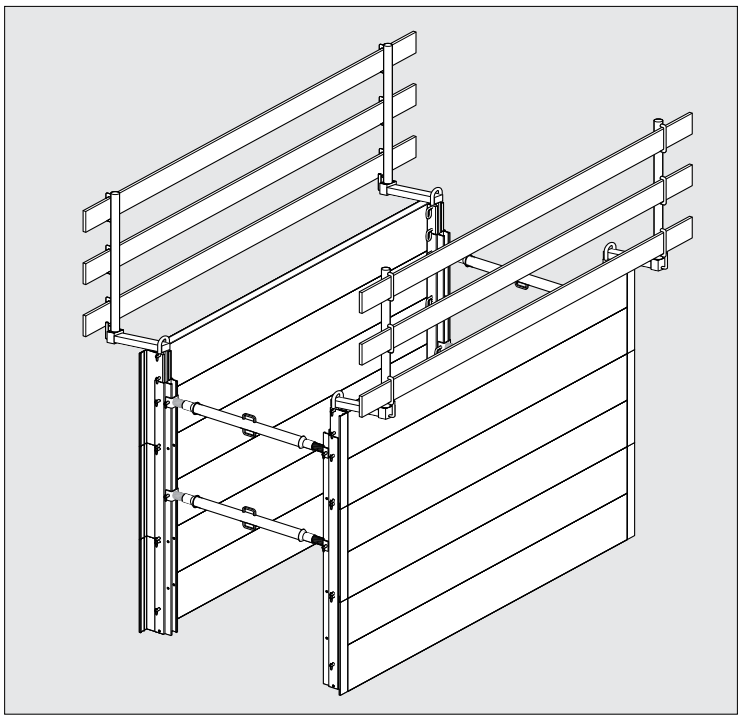

Fig. 34 | Finished trench lining unit with safety barriers

LITEBOX rail posts into the holding brackets and fit suitable timber planks onto the posts to form a safety barrier.

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6. Removal
Raise the trench lining unit step by step and backfill and compact in layers according to the regulations and specification.

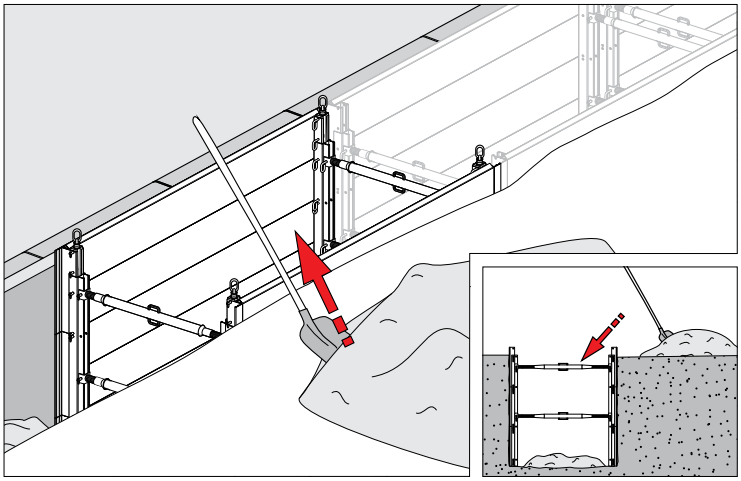

Fig. 35

Repeat the raising and backfilling/compacting steps until the trench lining unit can be lifted clear of the excavation.

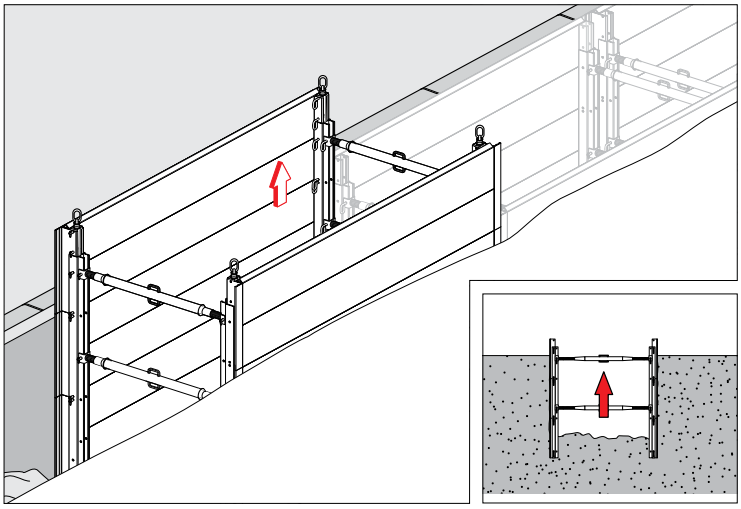

Fig. 36

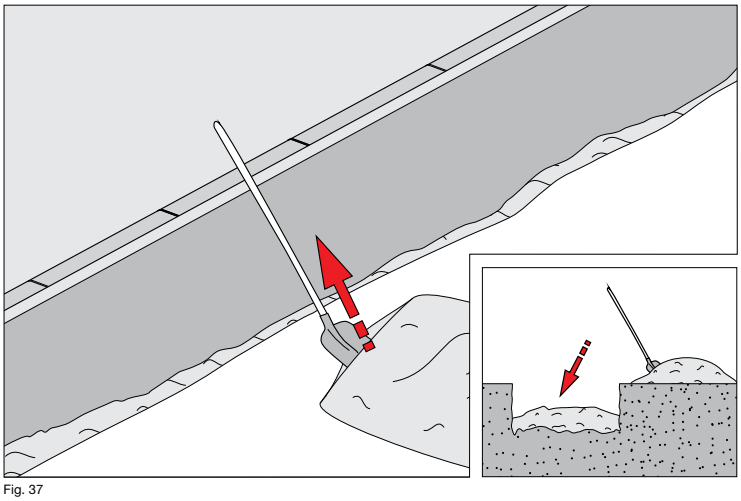

Fig. 37

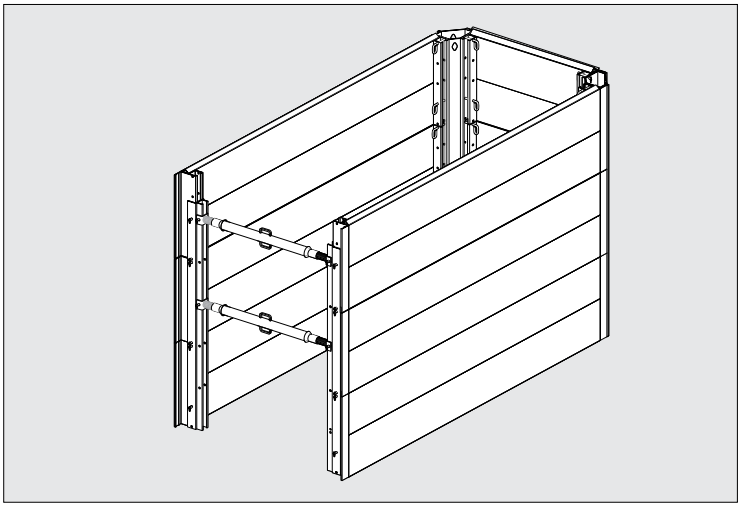

Fig. 38 | Excavation open on one side

7.1 Excavation lining unit open on one side

Where required, use an excavation lining unit open on one side at the end of a trench. This type of solution is also suitable when working up against walls (services connections to buildings).

7.2. LITEBOX aluminium trench sheeting box

Use the LITEBOX aluminium trench sheeting box in friable soils or where buried services cross or where space is restricted. This system can be quickly and easily combined with the LITEBOX aluminium trenching system with the help of a few additional components.

Please read the instructions for the LITEBOX aluminium trench sheeting box.

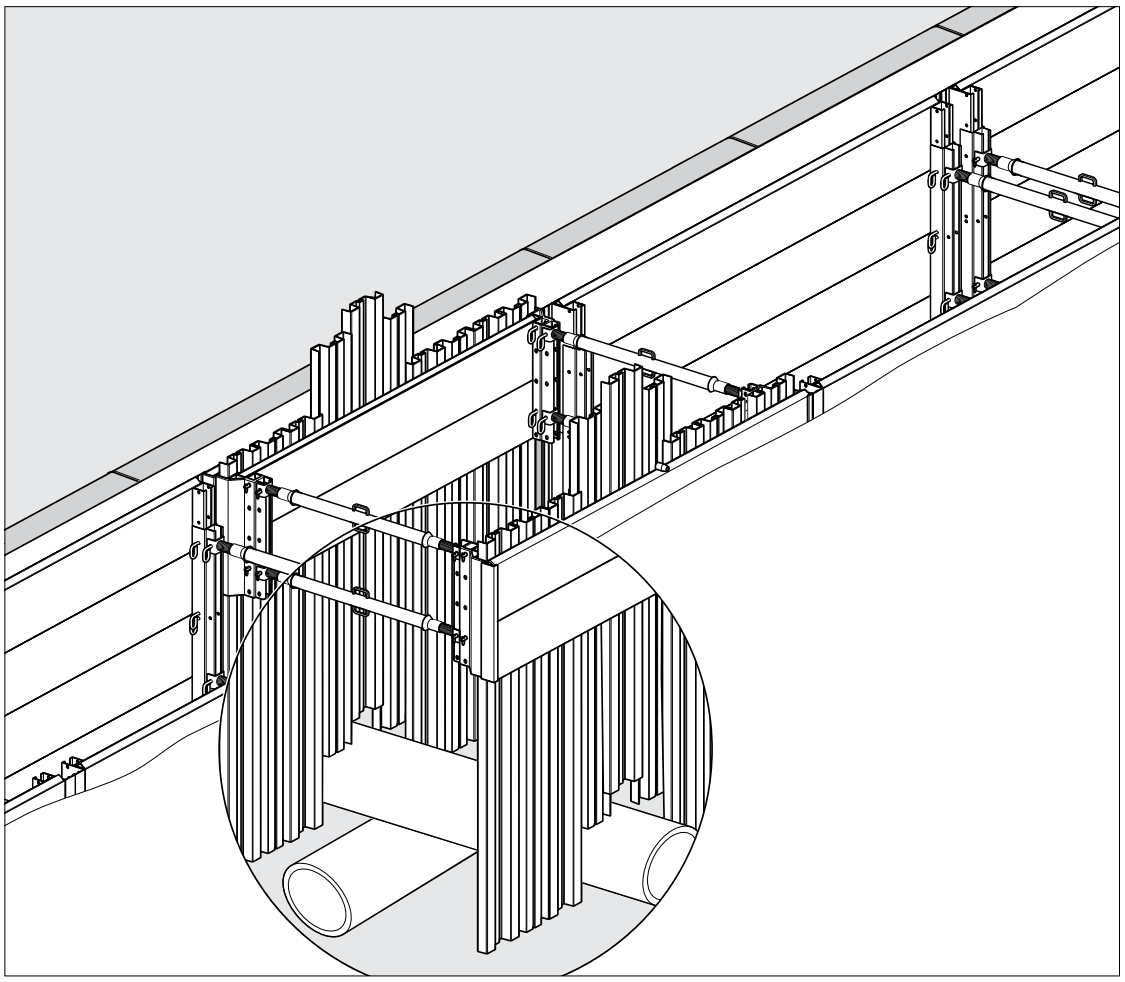

Fig. 39 | LITEBOX aluminium trench sheeting box combined with LITEBOX aluminium trenching system

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7.3. Applications adjacent to railway lines
It is also possible to use the LITEBOX aluminium trenching system adjacent to railway tracks. In this case, please note the appropriate information given in the type-testing documents. Verified typical calculations are available.

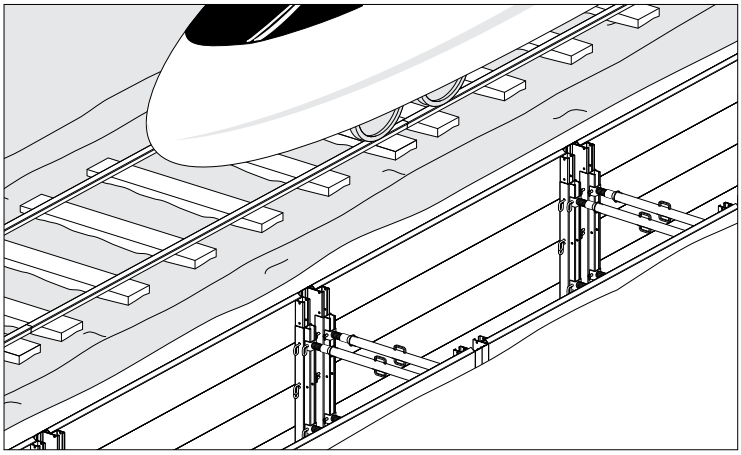

Fig. 40 | LITEBOX aluminium trenching system adjacent to railway line

Overview of application options for the LITEBOX aluminium trenching system adjacent to railway lines

For verifying applications adjacent to railway lines, the loads were assumed to be according to DIN 1054 for the weight of the soil and DIN Special Report 101 (loading case 71) for the surcharges due to railway traffic.
The excavation shoring units are assembled as given in sections 4 and 5. Make sure that the lowest trench strut is fixed no further than 0.50 m from the base of the excavation.

Depth of excavation [m]	Angel of friction of soil	Width of aluminium panel in [m]	
		2.00 m	1.55 m
2.00	25	not possible	ok
	30	ok	ok
	35	ok	ok
2.50	25	not possible	ok
	30	not possible	ok
	35	ok	ok
3.00	25	not possible	ok
	30	not possible	ok
	35	ok	ok

Assumptions:		
Angle of wall	α = 0	[°]
Slope of ground	β = 0	[°]
Angle of wall friction	δ_a = 0	[°]
Angle of slip plane	ϑ_a = 45 + φ/2	[°]
Unit weight of soil	γ = 20	[kN/m³]
Distance from track	a = 0	[m]

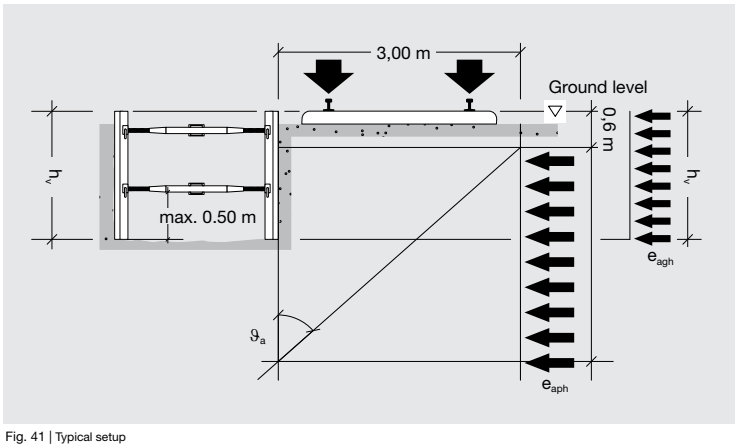

Fig. 41 | Typical setup

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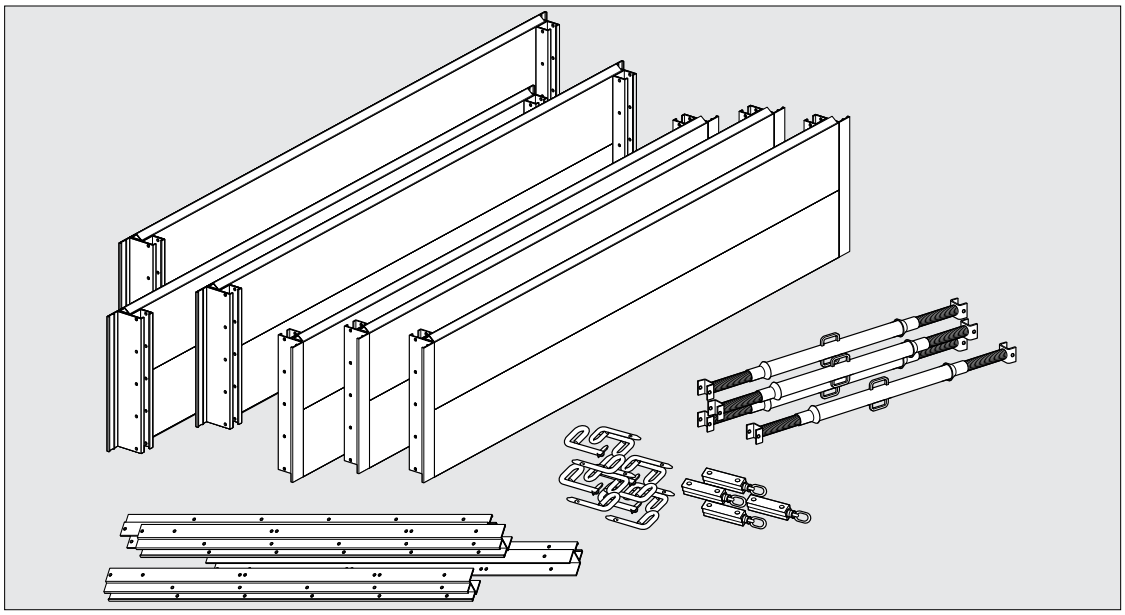

Fig. 42

8. Storage and transport

Check the delivery of components for completeness immediately upon arrival. The packaging units should be unloaded directly where they are to be used later.

Only components in a proper functioning condition may be used. Damaged components must be rejected. Repairs may only be carried out by the manufacturer.

All components must be properly secured to prevent movement during storage and transport.

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ALUMINIUM LIGHT WEIGHT SHORING

OPERATING MANUAL

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