

TWF TIEFBAUTECHNIK

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SLIDE RAIL Shoring

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OPERATING MANUAL

► TWF - Slide Rail Shoring

Contents

► General instructions	4 - 5
TWF-Slide Rail Shoring	4
Measures to reduce danger, Standards and guidelines	5
 ► Technical description / System drawings	 6 - 13
Technical description	6
Single Slide Rail Shoring	7
Double Slide Rail Shoring, Standard	8
Double Slide Rail Shoring, XL	9
Slide Rail Plates	10
Rolling Struts	11
Slide Rails	12
Accessories	13
 ► Assembly / Installation	 14- 20
Slide rail frame assembly	14 - 15
Assembly help	16
Installation instructions	17 - 20
 ► Re-Installation	 21 - 22
Instructions for removing	21
Bottom support	22
 ► Shaft and Manhole Shoring	 23 - 25
Technical description / System drawings	23
Installation instructions	24 - 25
 ► Adjustable clamping device	 26 - 27
System drawings	26
Technical description	26
Assembly instructions	27



► Operating Manual



► TWF - Slide Rail Shoring

TWF-Slide Rail Shoring

**A further development of the proven slide-rail shoring:
Varied. Economical. Safe.**

- A modular system made out of double- and corner slide bars, roller sliders, shoring-plates
- Perfect for the protection of low-lying infrastructure-buildings
- For temporarily stable grounds until the trench depth of 6 meters

TWF-Double-slide-rail-shoring is adequate as edge-supported shoring system especially for temporarily stable grounds until the trench depth of 6 meters, in the inner-city for instance for the exchange of low-lying sewage-collectors.

Our TWF-shoring system is only used as an extension or complementation for various tasks. Referring to this concept, our slide rail shoring has been designed. TWF-Double-slide-rail serial number 750 is to be installed in a low-vibrating lowering process under the consideration of the working space widths according to DIN 4124 and EN 1610, during which the shoring is being guided until 5 centimeters into the ground.

The application of our slide rail shoring takes place at challenging ground conditions, like for example at roll able and flowing grounds with stratum water. Through the application of TWF-slide rails and TWF-slide rail plates with lateral guide rails, it is an ideal replenishment for our modular shoring system.

The result: Huge economical advantages through easy and fast installation.

TWF-Double-slide-rail-shoring uses available shoring- and cutting inserts with lateral guide-rails and increases therefore their utilization factor.



The slide rail first is being pushed or alternatively merged into the already lowered shoring-plates. Each side of the shoring is being guided individually and gradually lowered with the progressing excavation. The gradual lowering of the slide rails assures an equal introduction.

Simultaneously occurs a material gentle and quick installation.

After the installation of the pipes and the backfill of the ditches, the shoring is to be removed progressively. Each side of the shoring can be pushed in or pulled out independent individually. In this way the lowering- and extraction forces can be minimized.

To avoid subsidence and cavities after removing the slide rails, it is recommended to backfill and to compress the cavities.

Through the application of TWF- slide-rail-shoring, the number of struts towards to the edge-supported high-rise-shoring is being reduced considerably. Less struts cause a systematic advantage referring to the installation of the supply line and less workload.

TWF-Double-slide-rail is supported by a distributed back of 320 millimeters and its torsion-resistant design against the ditch side and prevents therefore twisting at one-sided load-introduction through the shoring panel.



► Operating Manual

Following safety regulations, standards and guidelines must be followed equally during construction process:

- DIN 4123 – uilding protection in range of excavations
- DIN 4124 – excavations and ditches
- DIN 1054 – subsoil (ground)
- DIN EN 13331 – shoring equipment
- DGUV-regulations of the BG BAU
§ 28 safety against slippage of mass

Regulations:

- EAB recommendation of the working group
“Baugruben” (excavations)
- EAU recommendation of the working committee
“Ufereinfassungen” (waterfront structure)
- Further technical recommendations (ZTV)
- DIBt-notifications
- Soil- or rockfaces referring to DIN 4124 “excavation and ditches; embankments, working area widths, shoring” must be sloped and installed.
- The minimum trench width has to be determined referring to the nominal size or rather and the pipe diameter and the trench depth. Therefore, the bigger minimum trench width is crucial. For sewer pipes stands chart 1 (DIN EN 1610). For all other lines, Table 2 applies (DIN 4124).
- Utility trenches have to be installed standardized referring to DIN 4124. If the measures deviate from the measures of the standard-assembly, the shoring has to be proven statistically. Arisen cavities between shoring and ground have to be backfilled.
- The shoring and its entire surface shall adjoin close to the ground and stick out at least 5 or 10 centimeters above the ground surface. Trough bumps no ground is supposed to leak.
- The front side of the ditches also have to be installed or sloped gapless.

- On the upper edge, on both sides, an at least 0,60-meter-wide protective strip has to be kept free.
- The installation work has to start at the latest at 1,25-meter trench depth.
- All parts of the shoring have to be checked:
 - After strong rainfalls
 - At significant changes of the charges
 - At beginning of a thaw
 - After long interruptions of work
 - After blasts

Crossing – access

- Within ditches with the width on > 0,80 meters, crossing is necessary; the crossings need the width of at least 0,50 meters.
- Within the ditch depth of > 2,00 meters, a double-sided-crossing is needed with three-part side guard.
- Within the ditch depth of > 1,25 meters, accesses have to be used in form of stairs of ladders.

Traffic safety

- Traffic safety has to be carried out, if ditches are installed in the range of public transport or if the production of the ditches effects the public transport. Consultation with the responsible road authority, building authorities and the police.
- Safety distance between the edges of the ditch and construction vehicles, construction machinery and lifting gears are to be maintained.

Reference and further information:

„BGV C22 “Bauarbeiten”

„Richtlinie zur Sicherung von Arbeitsstellen an Straßen“

• DIN 4124

• DIN EN 1610

► TWF - Slide Rail Shoring

Technical description

- End-supported, slide rail guided shoring
- for trench depths up to 6,00 m without extension rail
- in the plate lengths up to 7,00 m
- in the base plate height 2,40 m
- in the countertop height 1,40 m
- for working widths up to 6,24 m



Advantages

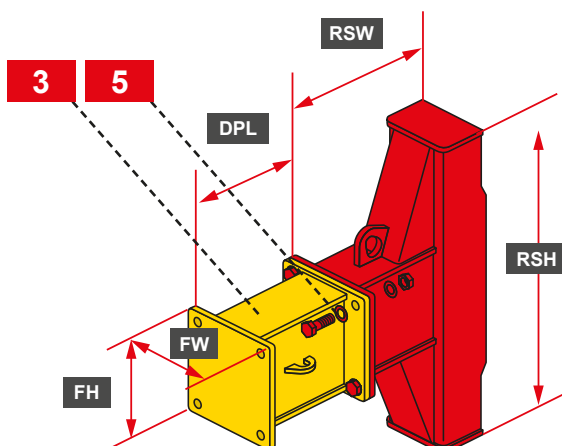
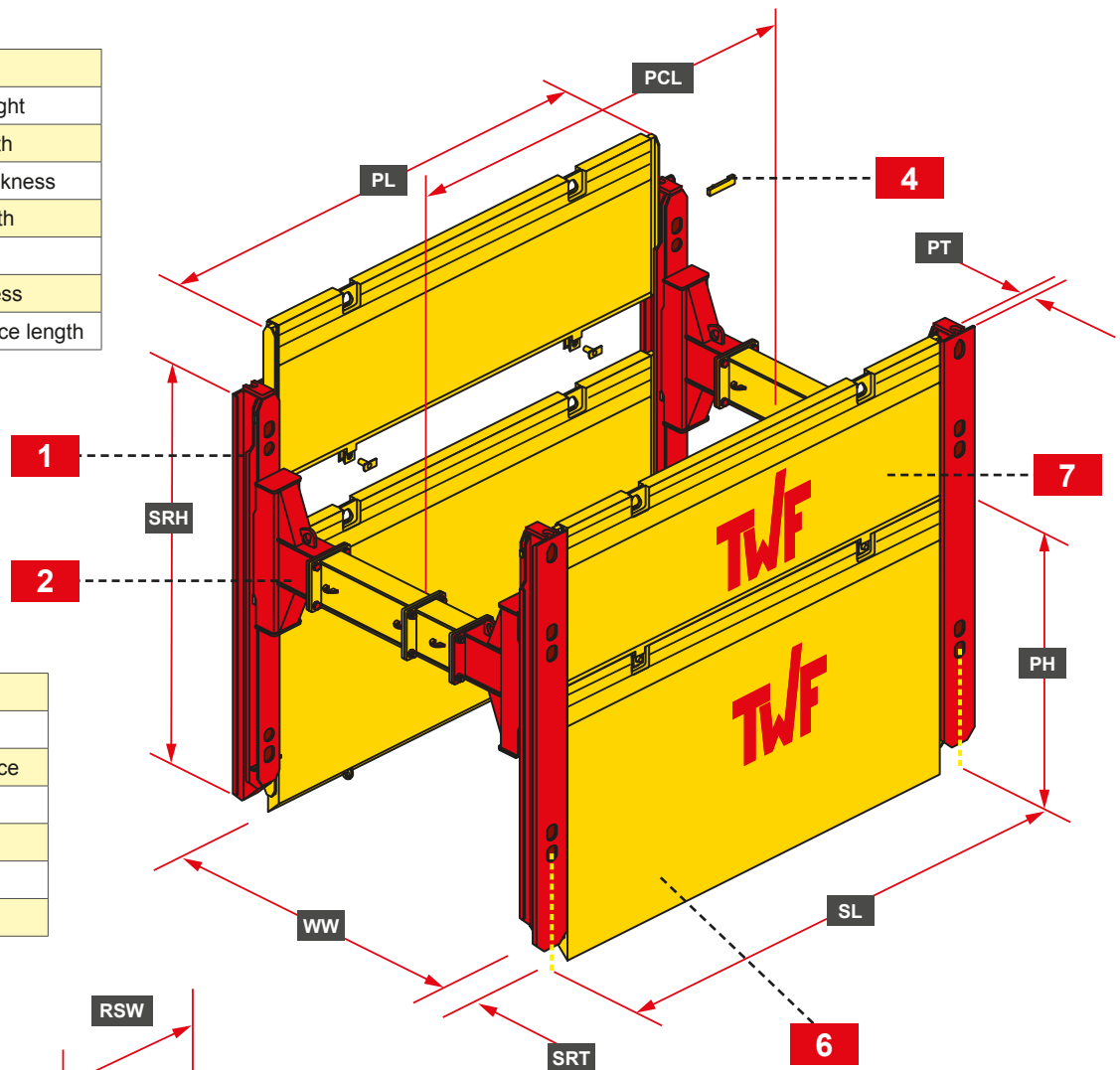
- Easy installation and re-installation, since plates, rails and rolling struts can be positioned individually.
- Continuously variable adjustment of strut clearance heights
- Robust distance pieces in 0,25 | 0,50 | 0,75 | 1,00 | 2,00 & 3,00 m
Special dimensions on request
- Easy flange-mounting of the distance pieces with bolts M30 of quality 10.9

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Single Slide Rail Shoring

PL	Plate length
SRH	Slide rail height
WW	Working width
SRT	Slide rail thickness
SL	System length
PH	Plate height
PT	Plate thickness
PCL	Pipe clearance length

1	Slide Rail
2	Rolling Strut
3	Distance piece
4	Limit pin
5	Bolting M30
6	Base plate
7	Top plate



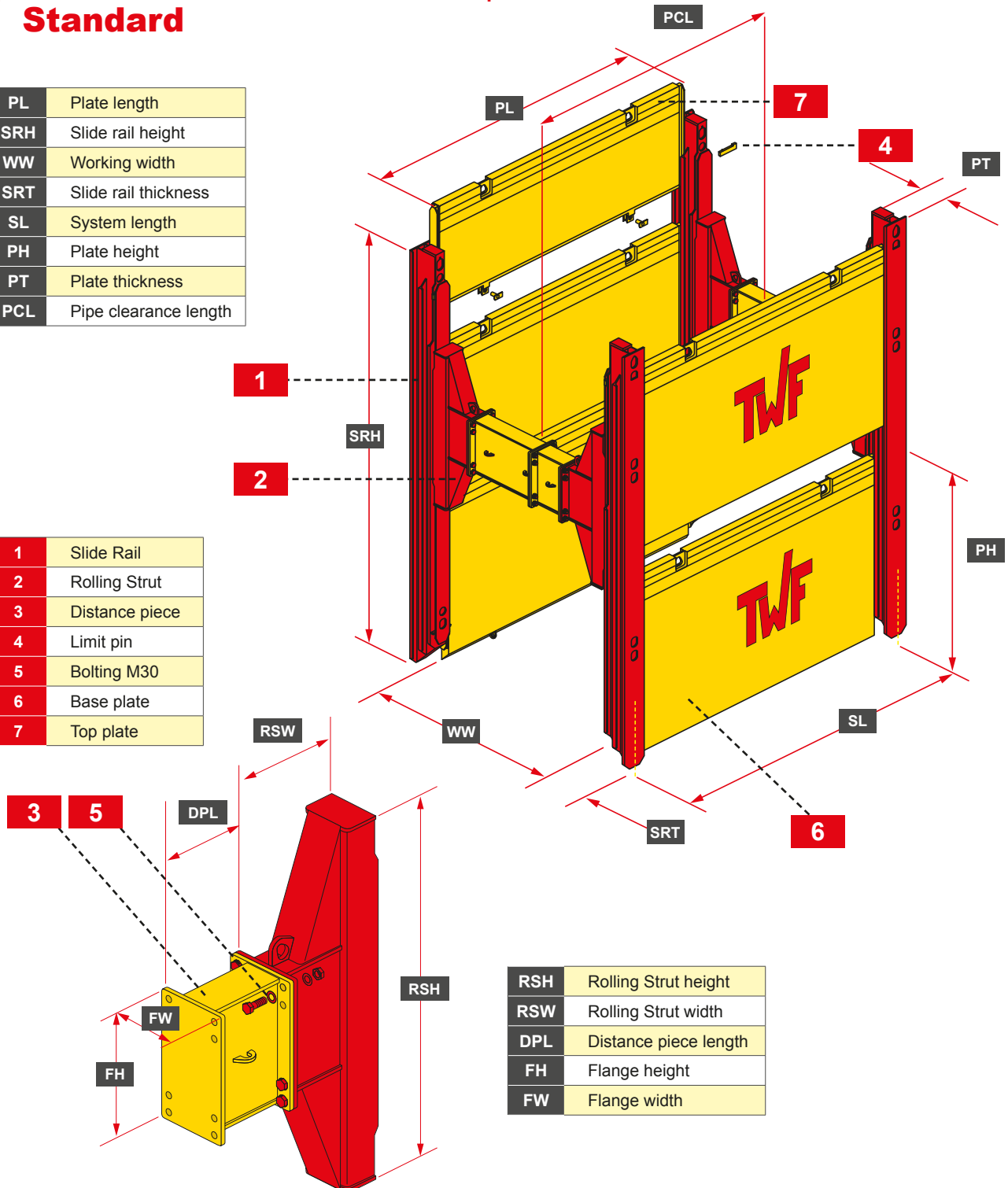
RSH	Rolling Strut height
RSW	Rolling Strut width
DPL	Distance piece length
FH	Flange height
FW	Flange width

► TWF - Slide Rail Shoring

Double Slide Rail Shoring Standard

PL	Plate length
SRH	Slide rail height
WW	Working width
SRT	Slide rail thickness
SL	System length
PH	Plate height
PT	Plate thickness
PCL	Pipe clearance length

1	Slide Rail
2	Rolling Strut
3	Distance piece
4	Limit pin
5	Bolting M30
6	Base plate
7	Top plate



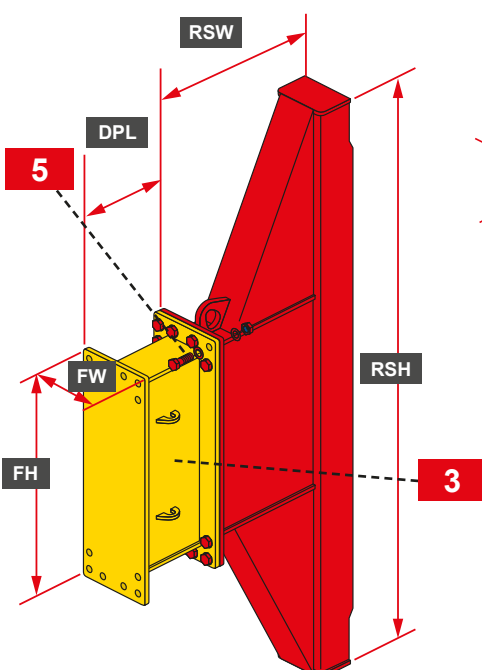
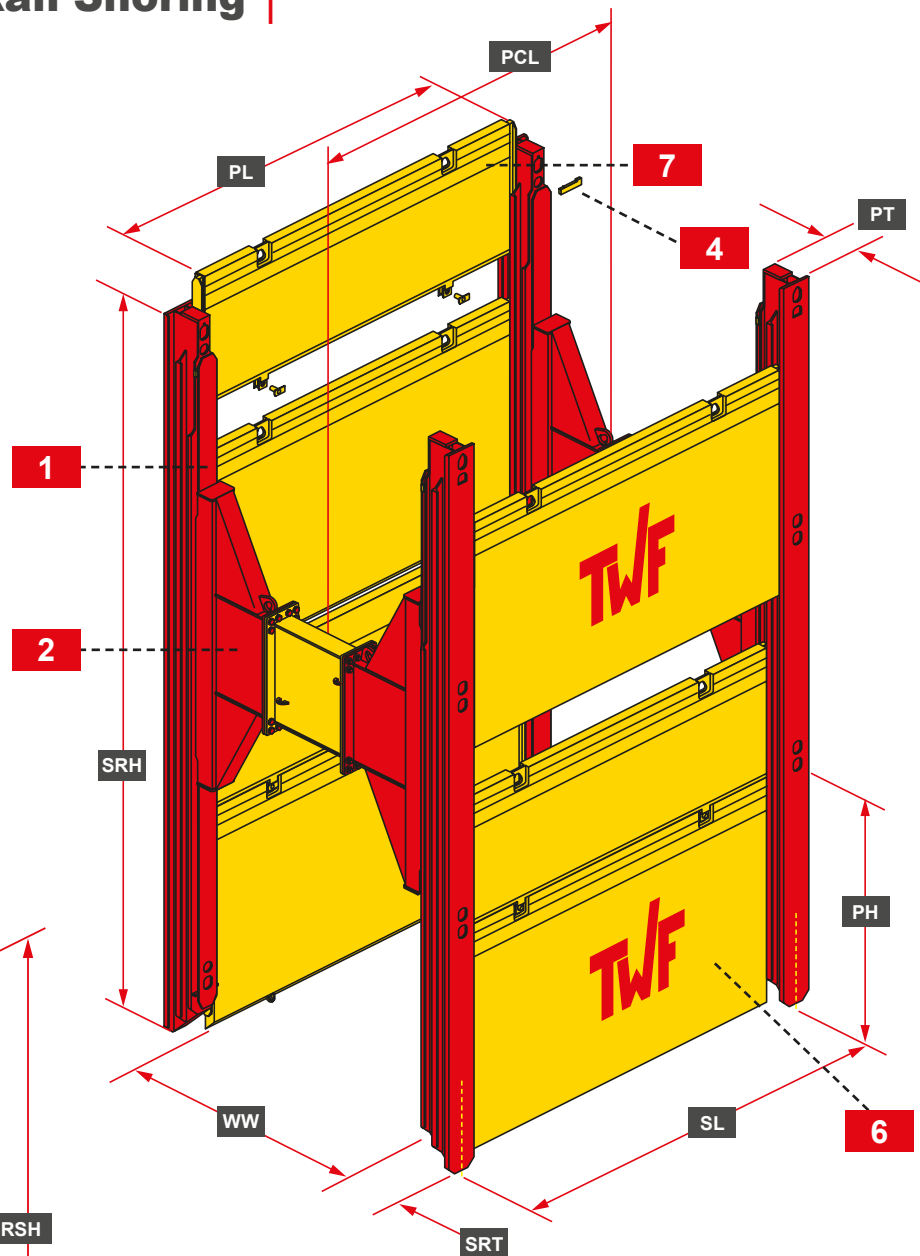
RSH	Rolling Strut height
RSW	Rolling Strut width
DPL	Distance piece length
FH	Flange height
FW	Flange width

► Operating Manual

Double Slide Rail Shoring XL

PL	Plate length
SRH	Slide rail height
WW	Working width
SRT	Slide rail thickness
SL	System length
PH	Plate height
PT	Plate thickness
PCL	Pipe clearance length

1	Slide Rail
2	Rolling Strut
3	Distance piece
4	Limit pin
5	Bolting M30
6	Base plate
7	Top plate

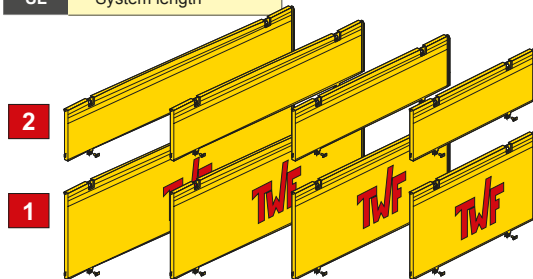


RSW	Rolling Strut width
DPL	Distance piece length
FH	Flange height
FW	Flange width

► TWF - Slide Rail Shoring

Slide Rail Plates

1	Base Plate
2	Top Plate
PL	Plate length
PH	Plate height
PT	Plate thickness
PCL	Pipe clearance length
SL	System length



- **Standard** - Rails and plates are flush inside - Inner city shoring allows a straight blacktop cut
- **in - suite concrete** - Rails and plates are flush inside
For use with in-situ ducts - Rails and plates are nearly in one level and build the formwork - protected by plastic plates or films

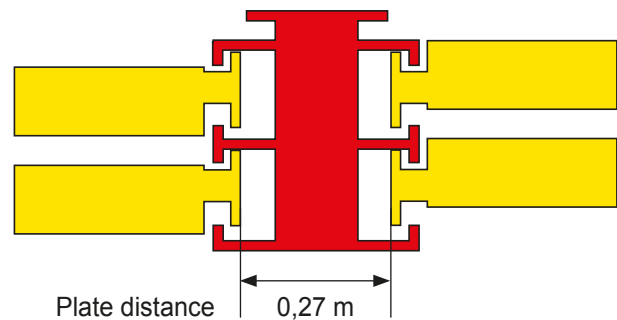


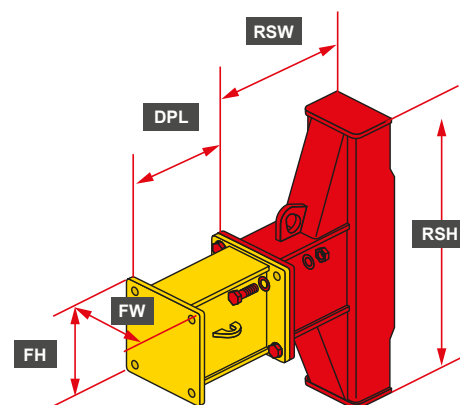
	Plate length PL (m)	Plate height PH (m)	Plate thickness PT (mm)	PC-length PCL (m)	System length (m)	Allowed earth pressure(kN/m ²)	Weight (kg)
1	2,00	2,40	107	1,80	2,27	220,2	552
2		1,40					347
1	2,50	2,40	107	2,30	2,77	141,2	660
2		1,40					434
1	3,00	2,40	107	2,80	3,27	97,9	828
2		1,40					521
1	3,50	2,40	107	3,30	3,77	72,0	966
2		1,40					608
1	4,00	2,40	107	3,80	4,27	55,1	1105
2		1,40					694
1	4,50	2,40	130	4,30	4,77	78,5	1609
2		1,40					1115
1	5,00	2,40	130	4,80	5,27	63,6	1788
2		1,40					1239
1	5,50	2,40	130	5,30	5,77	52,6	1967
2		1,40					1363
1	6,00	2,40	130	5,80	6,27	44,1	2150
2		1,40					1490
1	6,50	2,40	150	6,30	6,77	45,0	2650
2		1,40					1810
1	7,00	2,40	150	6,80	7,27	38,8	2850
2		1,40					1950

► Platten in verstärkter AUSFÜHRUNG, FÜR SCHWERE EINSÄTZE auf Anfrage

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Rolling Strut	
Height RSH (m)	1,24
Width RSW (m)	0,62
Flange width FW (mm)	405
Flange height FH (mm)	420
Weight / RS-pair (kg)	620
min. Working width WW (m)	1,24

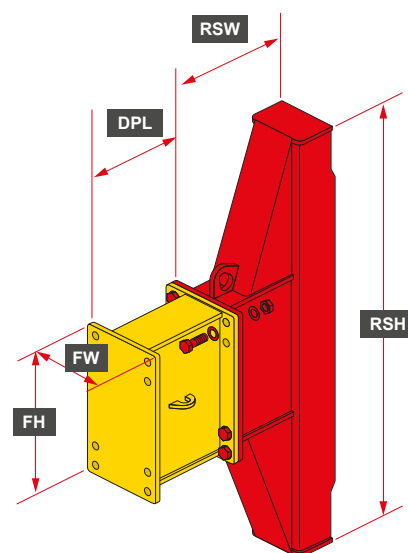
Rolling Strut



Distance piece						
Lenght DPL (m)	0,25	0,50	0,75	1,00	2,00	3,00
Weight (kg)	99	128	157	185	303	421

Rolling Strut - Standard	
Height RSH (m)	2,04
Width RSW (m)	0,50
Flange width FW (mm)	405
Flange height FH (mm)	720
Weight / RS-pair (kg)	980
min. Working width WW (m)	1,24

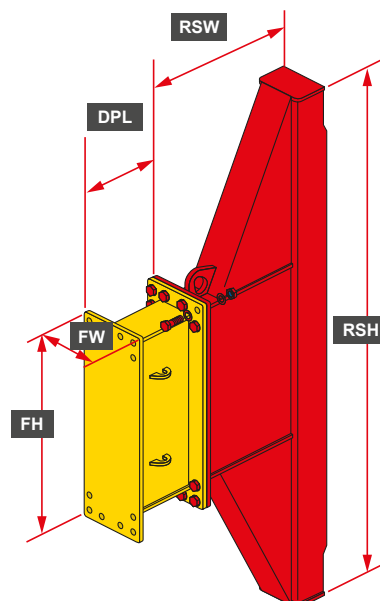
Rolling Strut Standard



Distance piece - Standard						
Lenght DPL (m)	0,25	0,50	0,75	1,00	2,00	3,00
Weight (kg)	163	201	239	277	437	597

Rolling Strut - XL	
Height RSH (m)	3,04
Width RSW (m)	0,92
Flange width FW (mm)	405
Flange height FH (mm)	1220
Weight / RS-pair (kg)	1700
min. Working width WW (m)	1,83

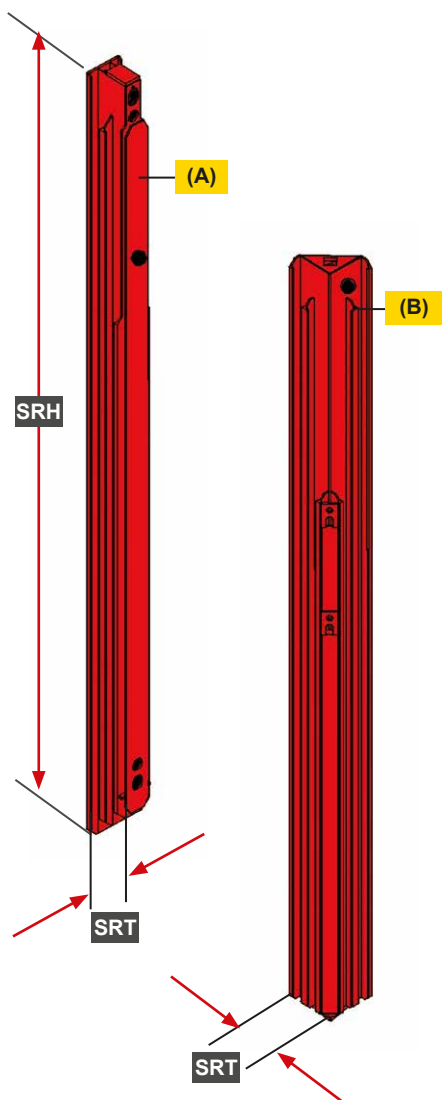
Rolling Strut XL



Distance piece - XL						
Lenght DPL (m)	0,25	0,50	0,75	1,00	2,00	3,00
Weight (kg)	306	363	418	474	714	960

► TWF - Slide Rail Shoring

| Slide Rails |



Element	Slide rail height SRH (m)	Weight (kg)	Slide rail thickness SRT (mm)	Char. System resistance
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Single Slide Rail

Slide rail	3,50	540	220	460,0 kNm
Corner rail		390	275	130,9* kN/m

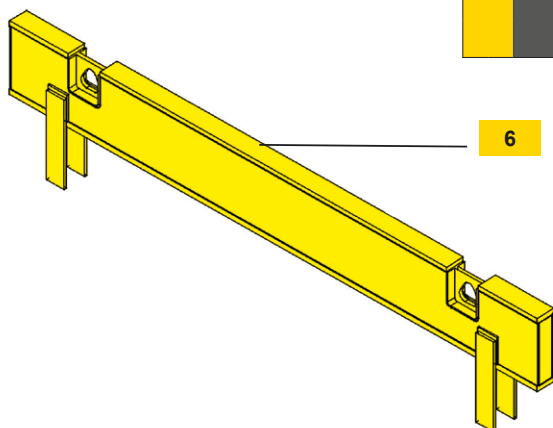
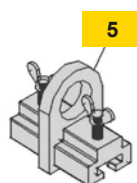
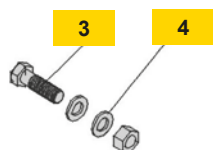
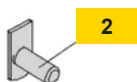
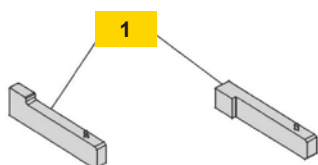
Double Slide Rail

Slide rail	4,50	960	375	949,2 kNm
	5,50	1164		
	6,00	1266		
Corner rail	4,50	810	430	130,9* kN/m
	5,50	957		
	7,50	1338		

SRH	Slide rail height
SRT	Slide rail thickness
(A)	Slide rail
(B)	Corner rail

► Operating Manual

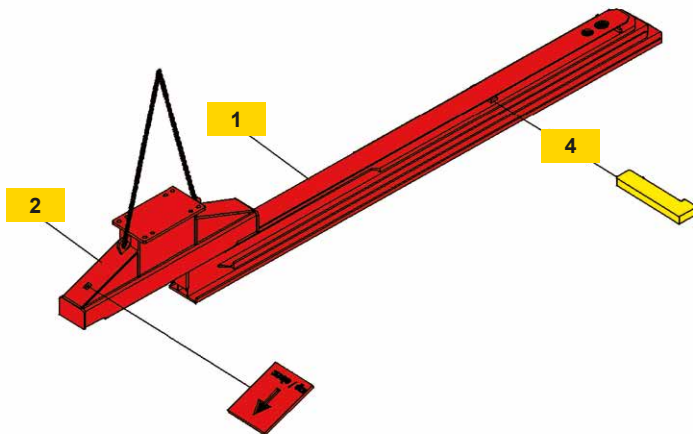
Accessories



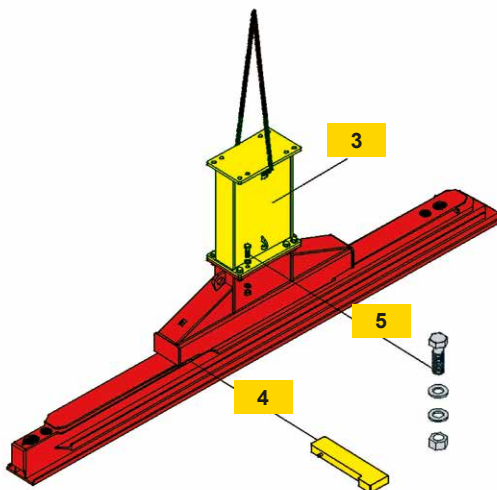
Description		Use for	for Component height	Dimension (mm)	Weight (kg)
1	Limit pin	Locking	375	25*70*260	3,0
			405	37*50*260	3,0
2	Pin	Extension Rail	to 130	Ø40 * 140	1,5
3	6sq bolt	Flange	t = 25	M30*90	0,96
			t = 25	M30*100	1,01
4	Washer	Flange		A33	0,1
5	Assembly help	Rail			15
Lenght					
6	Protection Rail	Shoring Plates	100	1.800	220
				2.240	264
				2.730	321
				3.300	379
				3.800	430
			130	3.810	467
				4.310	524
				4.810	581
				5.310	638
				5.810	695

► TWF - Slide Rail Shoring

Assembly instructions



1	Slide rail
2	Rolling strut
3	Distance piece
4	Limit pin
5	Bolting M30



- Place the rail with the guiding profile upwards onto a flat and firm underground. Position the lower limit pin, with the locking pin downward (in opposition to the rolling strut).
- To allow for the A-position, install the rolling strut with the arrow upwards according to the drawing.
- Place the lower castor of the rolling strut onto the guiding profile of the rail and slide carefully up to the top of the rail, until it reaches the lower limit pin.
- Above the rolling strut another limit pin is positioned, with the locking pin upwards (in opposition to the rolling strut). Now the rolling strut is locked in the middle of the rail and cannot be moved any longer. The assembly of the further rolling struts is effected the same way.

Important: The locking pin of the limit pin must always be turned away from the rolling strut.

- When using distance pieces, attach them to the eyes intended for this purpose, place them from above onto the flange plate of the rolling strut and join with bolts M30 of quality 10.9.

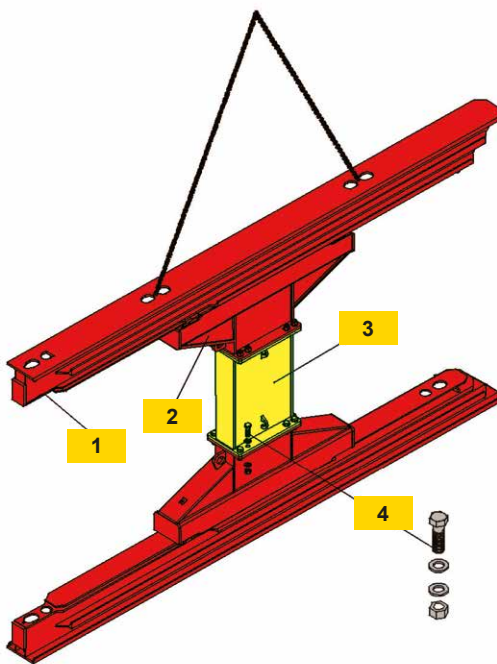
If several distance pieces are needed to achieve the required working width, they are assembled on the ground in advance and afterwards flanged on the rolling strut as described before.

- Put one washer under the bolt head and one washer under the nut.
- Turn the bolts crosswise with a torque of 1350 Nm.

During the assembly the distance piece rests in its hooked in position.

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Assembly instructions



1	Slide rail
2	Rolling strut
3	Distance piece
4	Bolting M30

For safety reasons, the assembly of the slide rail frame has to be effected on the ground when having working widths over 2,00 m.

Thereby, the slide rails, pre-assembled with rolling struts and distance pieces, are put down oppositely, aligned and bolted.

Another possibility of assembly ist the use of assembly helps.

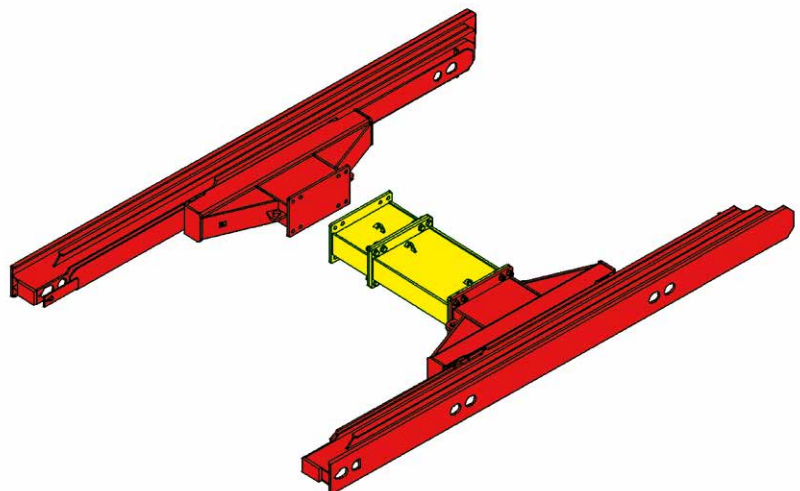
- The slide rail, pre-assembled with distance pieces, can now be put down. After hooking the chain into the assembly openings at the back of the slide rail, the rail with the flanged distance pieces is lifted and moved over the flange plate of the rail on the ground, which is pre-assembled with the rolling strut.

The alignment of the flange plates can be effected without difficulty, since the slide rail rests hooked in during assembly.

- The components are bolted together as described before.

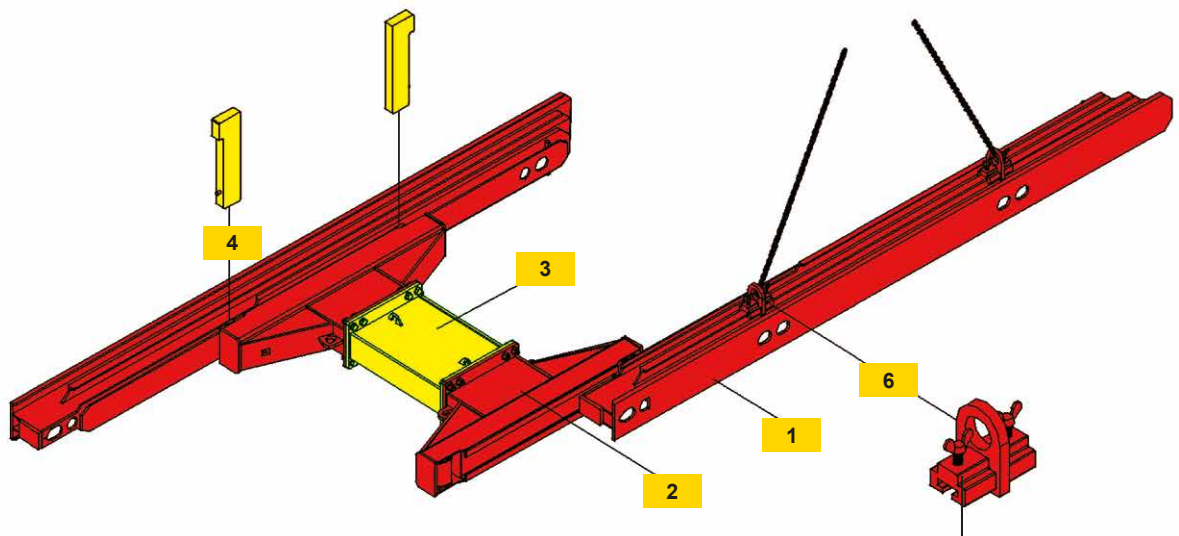
Now we have a slide rail frame which can be put down.

- The assembly of the further frames is effected the same way.



► TWF - Slide Rail Shoring

| Assembly help |



1	Slide rail
2	Rolling strut
3	Distance piece
4	Limit pin
6	Assembly help

When slide rails in lateral position (put down on the ground)

When assembling slide rail frames on the ground

When loading or placing slide rails, it can happen that they have been put down on the ground and that there is no possibility to attach at the openings. For this purpose, assembly helps have been designed, which grab into the guidances of the slide rails. After positioning and tightening the assembly helps, the chains can be attached.

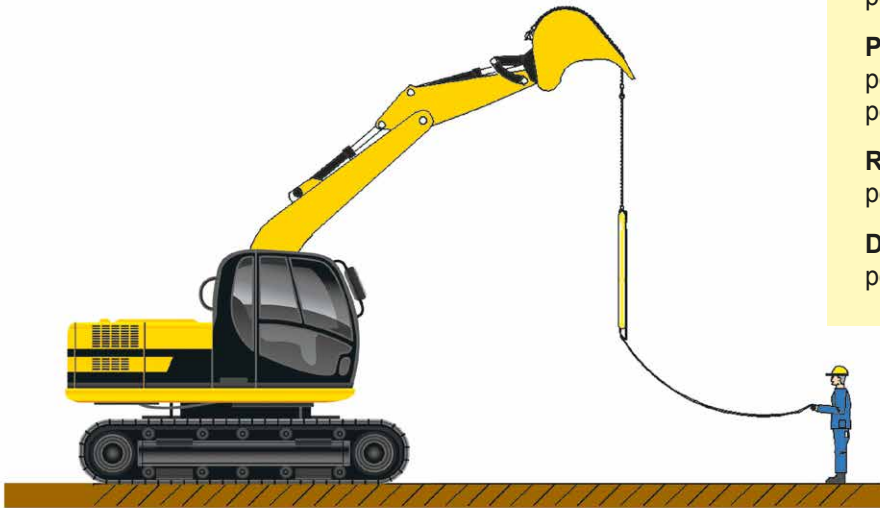
Furthermore, the assembly helps can be used, if the slide rail frame must be assembled on the ground. First, the rolling strut is pre-assembled with distance pieces. Afterwards the slide rail - which is hooked in at the assembly openings - is moved over the laterally positioned rolling strut.

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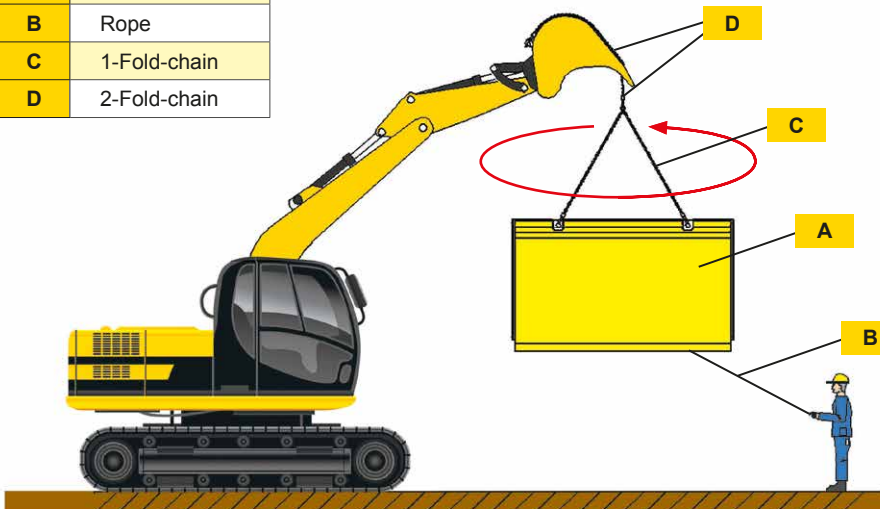
Installation instructions

Alignment of the initial shoring bay

Pre-excavation max. 1,25 m and not more than one shoring section length. In principle the pre-excavation complies with the type of soil and safety regulations.



A	Shoring Plate
B	Rope
C	1-Fold-chain
D	2-Fold-chain



Allowed tensile forces

At the single attachment points the following tensile forces can be borne:

Slide Rail

per lifting eye = 196 kN
per guiding profile opening = 164 kN

Plates

per lifting eye = 196 kN
per eye at cutting edge = 49 kN

Rolling Strut

per lifting eye = 164 kN

Distance Piece

per hooking eye = 49 kN

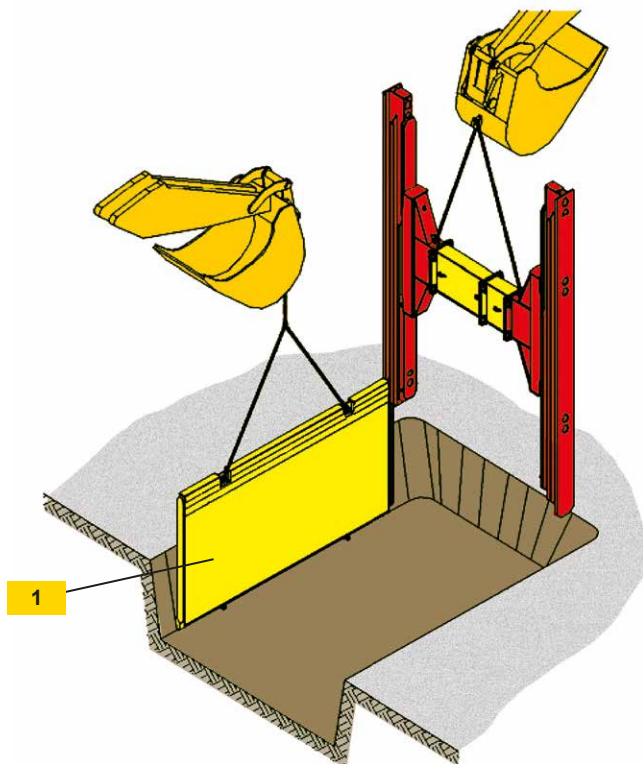
Handling of slide rails plates

For the transportation of slide rails plates, the use of a 1-fold and a 2-fold chain is recommended. The 1-fold chain is fixed to an appropriate attachment point of the excavator shovel. The length of the chain has to be chosen that way, that the ring of the 2-fold chain is located underneath the shovel in any position of the shovel. This allows an easy and safe turning of the shoring plate into the required direction without expecting the plate jerkily knocking over.

When turning the plate, the excavator must not be moved.

► TWF - Slide Rail Shoring

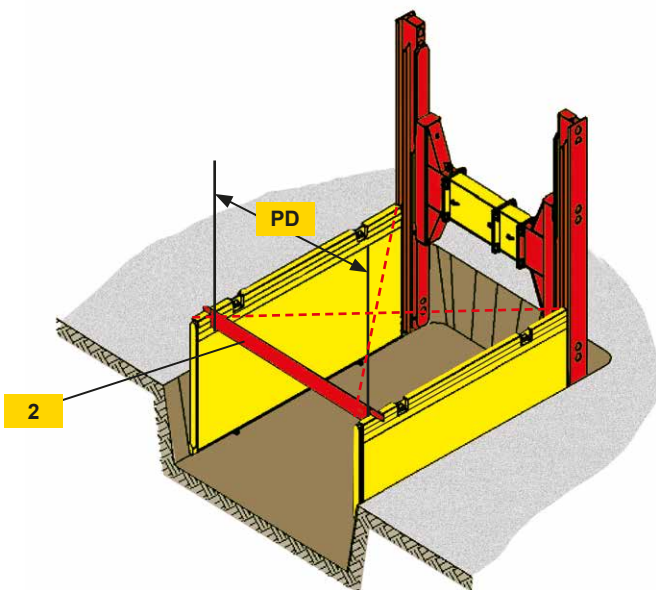
| Installation instructions |



- Place the base plate into the pre- excavated trench, push in and secure with the boom of the first excavator. The pre- assembled slide rail frame is picked up by the second excavator, which must have an appropriate lift, swung over the shoring plate into the pre-excavated trench, mounted into the outer guidance and pushed in.

At this stage the trench must not be entered.

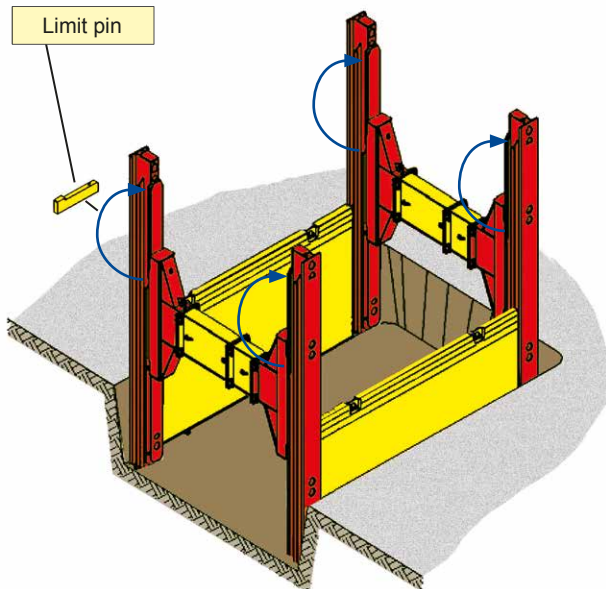
- Mount the second shoring plate in the outer guidance of the slide rail and lower up to the trench bottom.



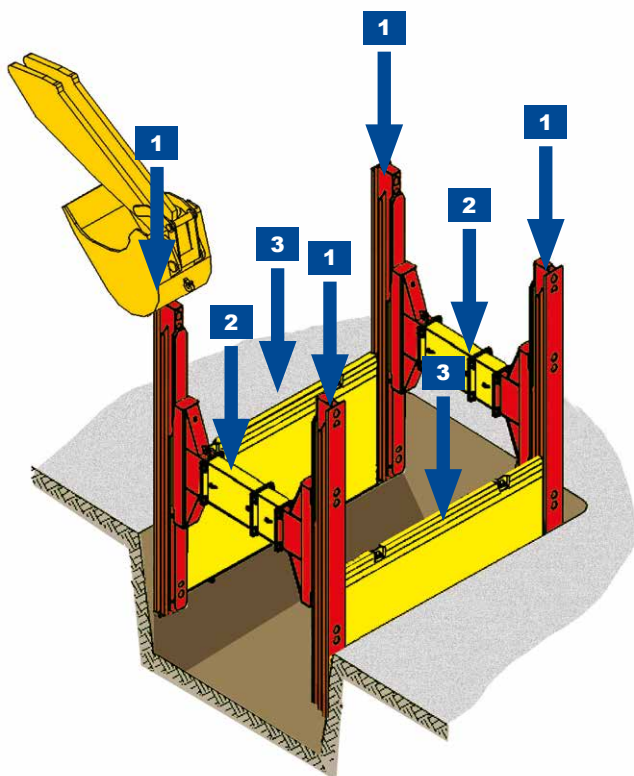
- Align parallel and over the diagonal rectangular the two shoring plates by means of spacers / assembly helps.

1	Base plate
2	Assembly help
PD	Plate distance

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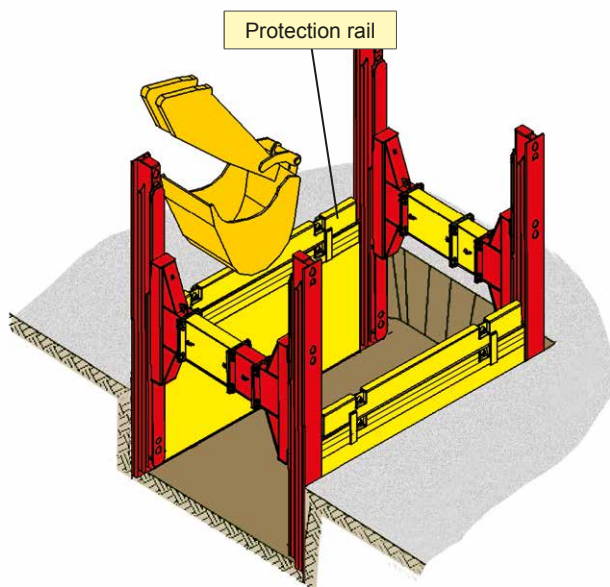
- Now the second pre-assembled slide rail frame is guided over two plate guidances and pushed into the soil. Push in slide rails and plates and align if required. Fill in and compact the excavation between shoring and soil!
- The upper limit pins must now be repositioned – as illustrated. The rolling strut pair can now be moved on the slide rails and thus allows the function of the Rolling Strut Shoring. By positioning the limit pin into the upper hole, an unintentional slipping of the rolling strut is avoided during the lowering of the shoring.



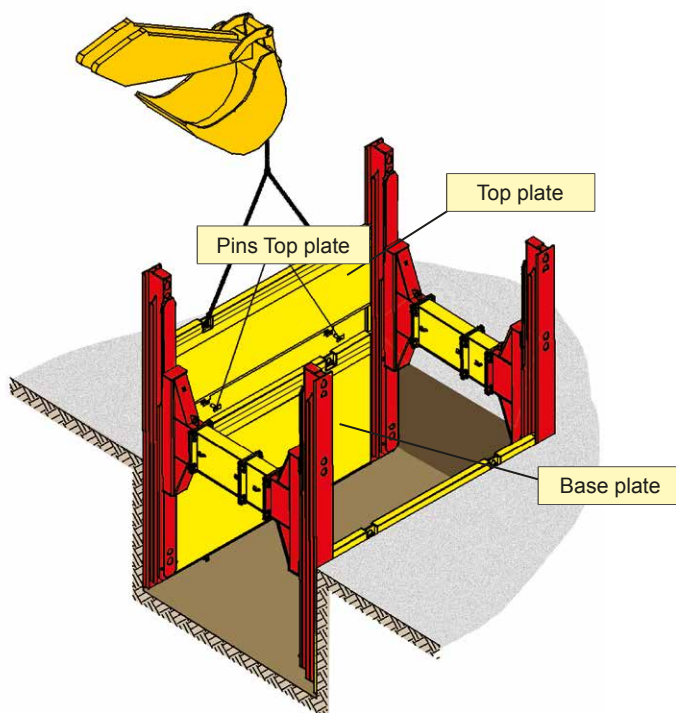
- Excavate about another 50 cm and push in by turns slide rails, rolling struts and shoring plates. It has to be paid attention that the plates do not project the slide rails below, that all components are pushed in by about the same lift and that the rolling strut is positioned as much as possible in the middle of the slide rail frame.

► TWF - Slide Rail Shoring

| Installation instructions |



- To protect the shoring plates and ensure a long life cycle we recommend the use of protection rails. The single shoring components have to be pushed in and not battered.



- When the top edge of the externally guided plate reaches the top ground surface, the system can be extended if required by using a top plate or by mounting another base plate in the inner guidance of the slide rail.

When using top plates it has to be made sure that they will be connected with the base plates by means of pins.

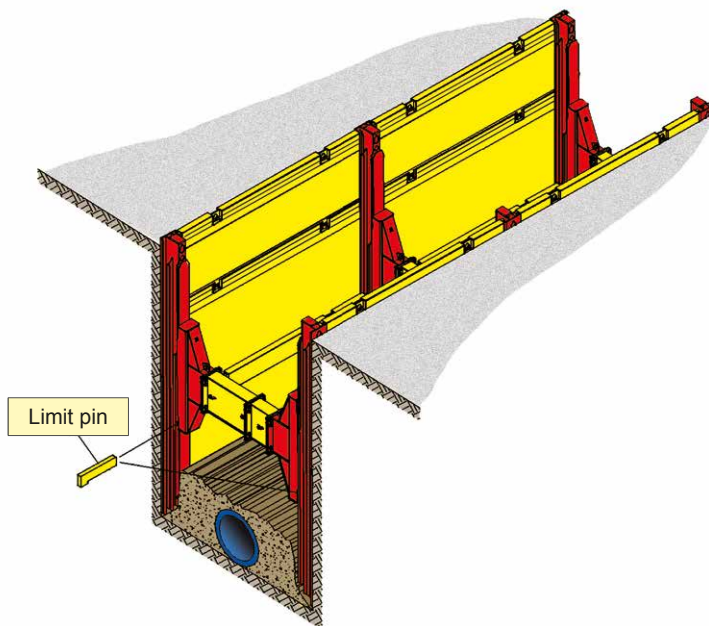
- Lower the inner guided plate down to the excavation bottom.

The lowering step-by-step, whereupon slide rails, rolling struts and inner plates are pushed down, is repeated until reaching the final trench bottom.

The top edge of the shoring must overtop the surrounding terrain by at least 5 cm!

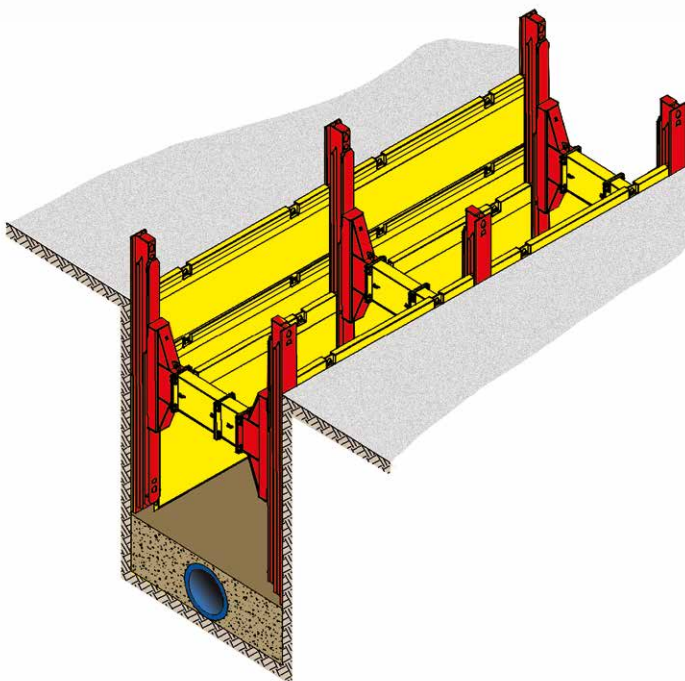
► Operating Manual

| Re-Installation |



- At the beginning of the re-installation, remove the lower limit pins at the rolling strut.

According to compacting possibilities, fill in max. 50 cm backfill.



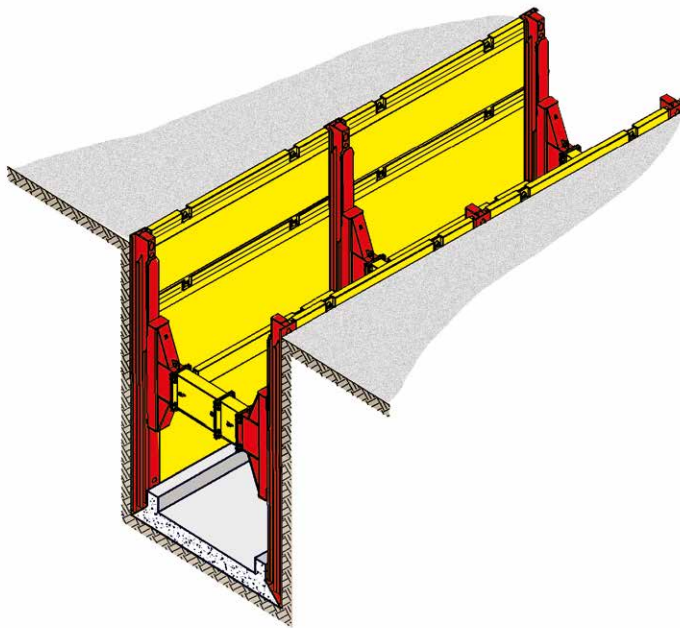
- Lift the shoring components by the filled height. Finally compact the backfill.
- Repeat this procedure as described until the shoring can be lifted out of the trench in consideration of the safety instructions.

Use the designated lifting eyes only for lifting the shoring components.

We advise expressly, that it is forbidden to enter the danger area during the installation and also during the reinstallation.

► TWF - Slide Rail Shoring

| Bottom support |



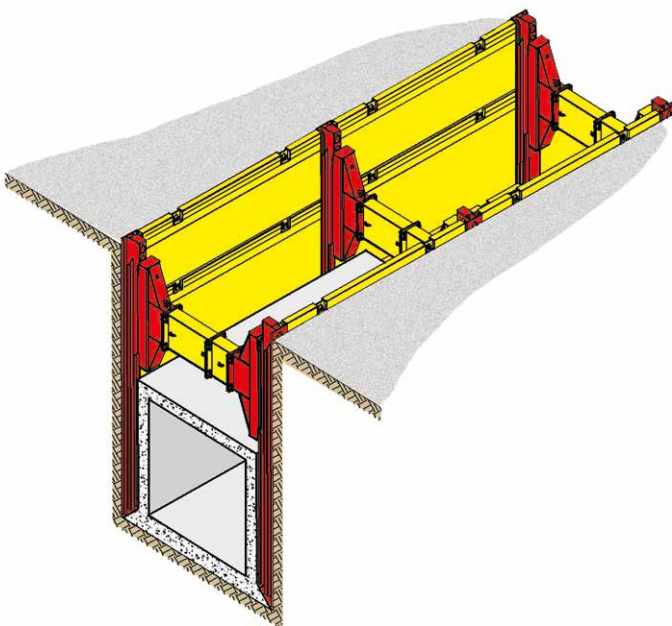
- For great strut clearance heights and/or insitu concrete projects it is often required for statical reasons to brace the slide rail rail in the trench bottom.

In doing so, the shoring is installed up to the trench bottom according to the installation guidelines.

In this phase the rolling strut should be positioned centrally.

According to the statical demands, a steel beam or a concrete slab is placed in the trench bottom.

Thereby it has to be paid attention that the steel beam is seated superficially between the guidances of the slide rail frame.



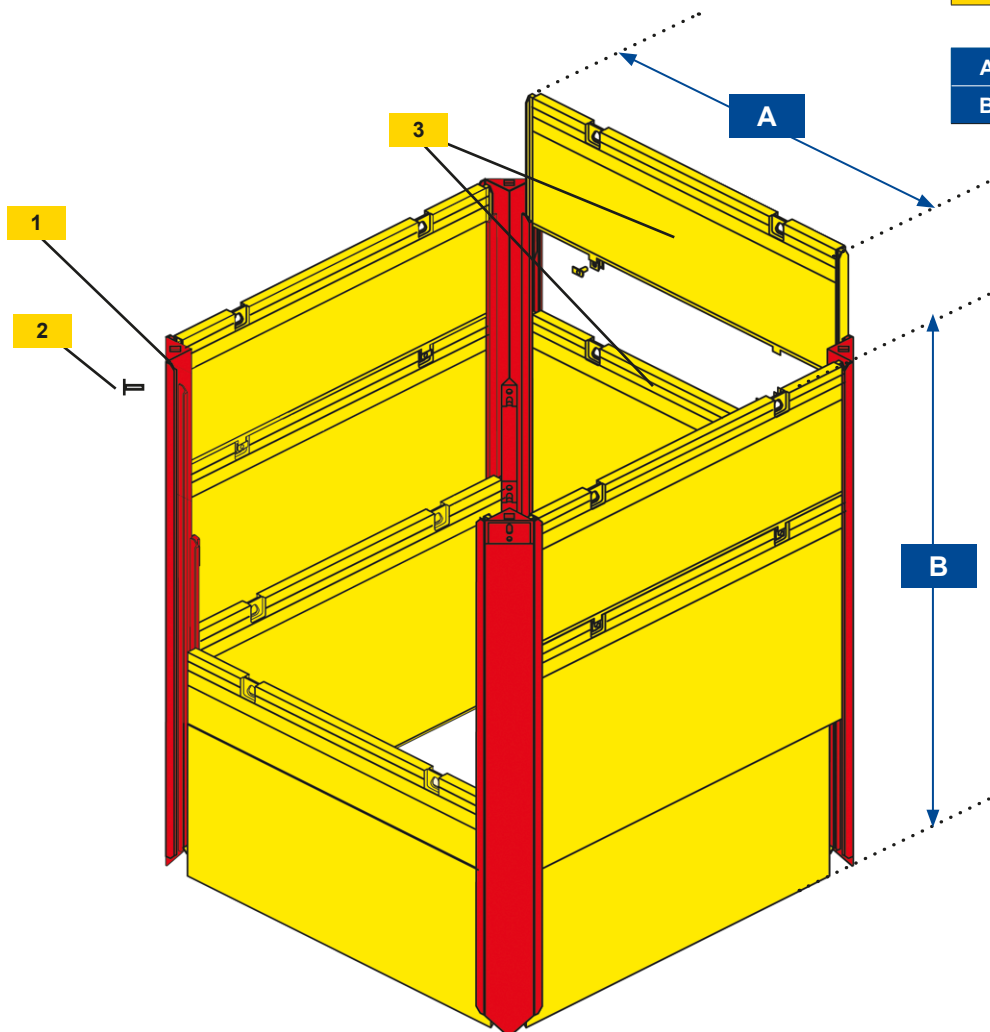
- After placing the bottom support and respectively hardening the concrete slab, the rolling strut can be lifted up to the highest limit pin in the slide rail and fixed below by means of the limit pin.

► Operating Manual

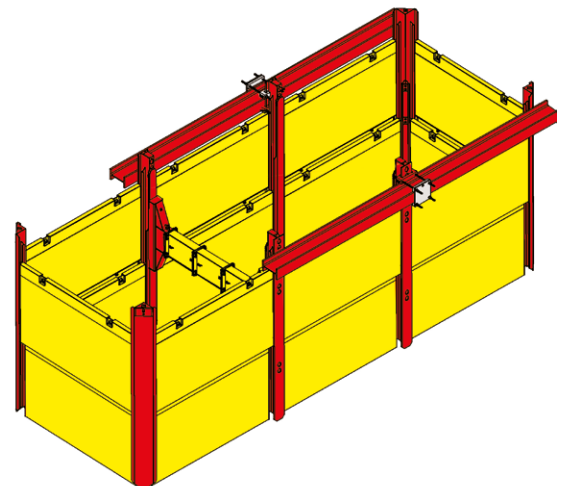
Pits

1	Corner base rail
2	Corner extension rail
3	Pin

A	Plate length
B	Slide rail length

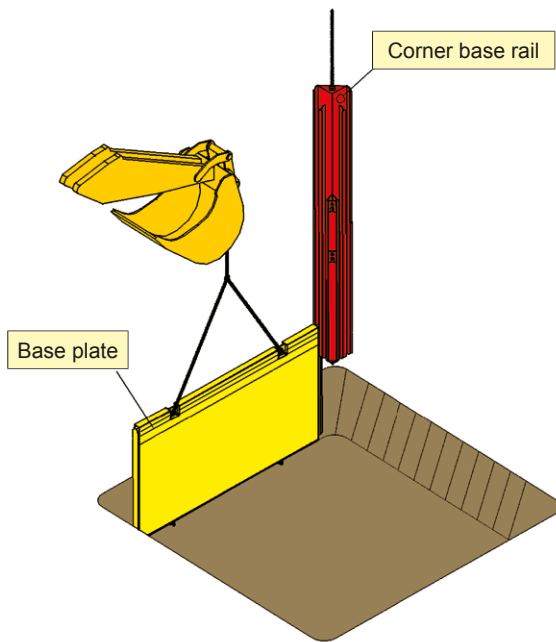


By using corner rails in combination with slide rail frames the most different pit dimensions can be realised.

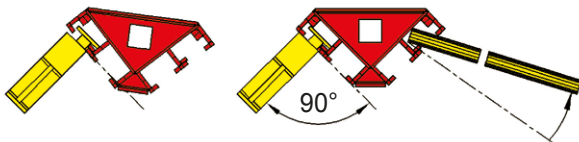


► TWF - Slide Rail Shoring

| Installation instructions |

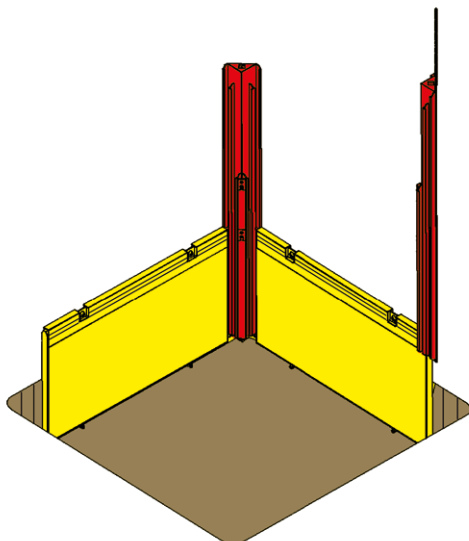


- Pre-excavation of max. 1,25 m and approx. 10 cm wider than the pit will be.
In principle the pre-excavation complies with the type of soil and safety regulations.
Place the first base plate in the preexcavated trench, push in and secure against canting over.
- The first corner slide rail is picked up by the excavator, which must have an appropriate lift, then swung over the plate, mounted in the outer guidance (side of ground) and lowered. In this phase the trench may not be entered. Align the corner slide rail and push in.

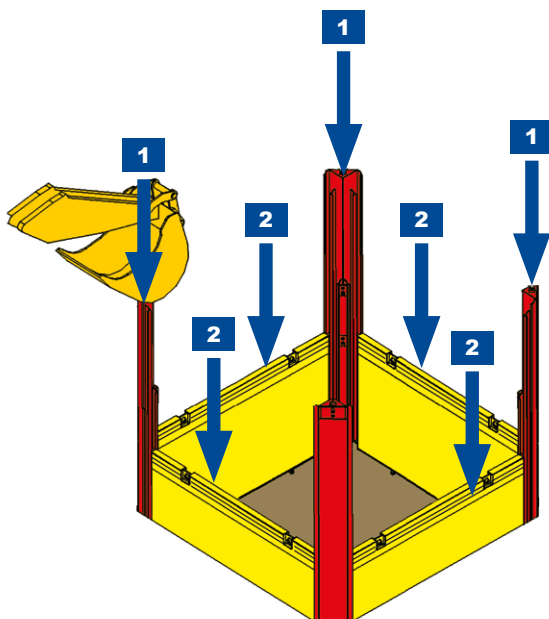
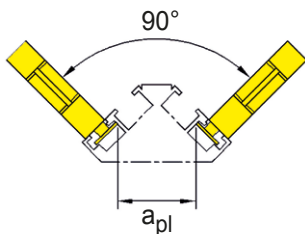
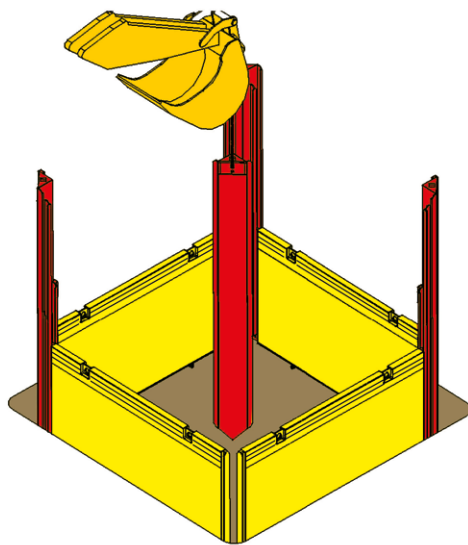


- Mount the second plate in the free outer guidance of the rail and align rectangularly.
Now the second corner slide rail is moved over the plate guidance, aligned and pushed into the soil.

The further installation is effected as described before.



► Operating Manual



- After installing the fourth plate, the free guidances of the first and of the last plate have to be aligned that way that the last corner slide rail can be mounted over both plate guidances.

The perfect distance between the guidances (a_{pl}) is 35 cm.

The pit is now completely assembled with the outer plates and if required can be aligned diagonally.

- Pre-excavate about another 50 cm and push in rails and plates by turns. It has to be paid attention that the plates do not project the slide rails by more than 50 cm.

Fill in and compact the excavation between shoring and soil!

To protect the shoring plates and to ensure a long life cycle we recommend the use of protection rails. The single shoring components have to be pushed in and not battered.

- When the top edge of the plate reaches the top ground surface, the system can be extended if required by using a top plate or by mounting another base plate in the inner guidance of the slide rail.

When using top plates it has to be made sure that they will be connected with the base plates by means of pins.

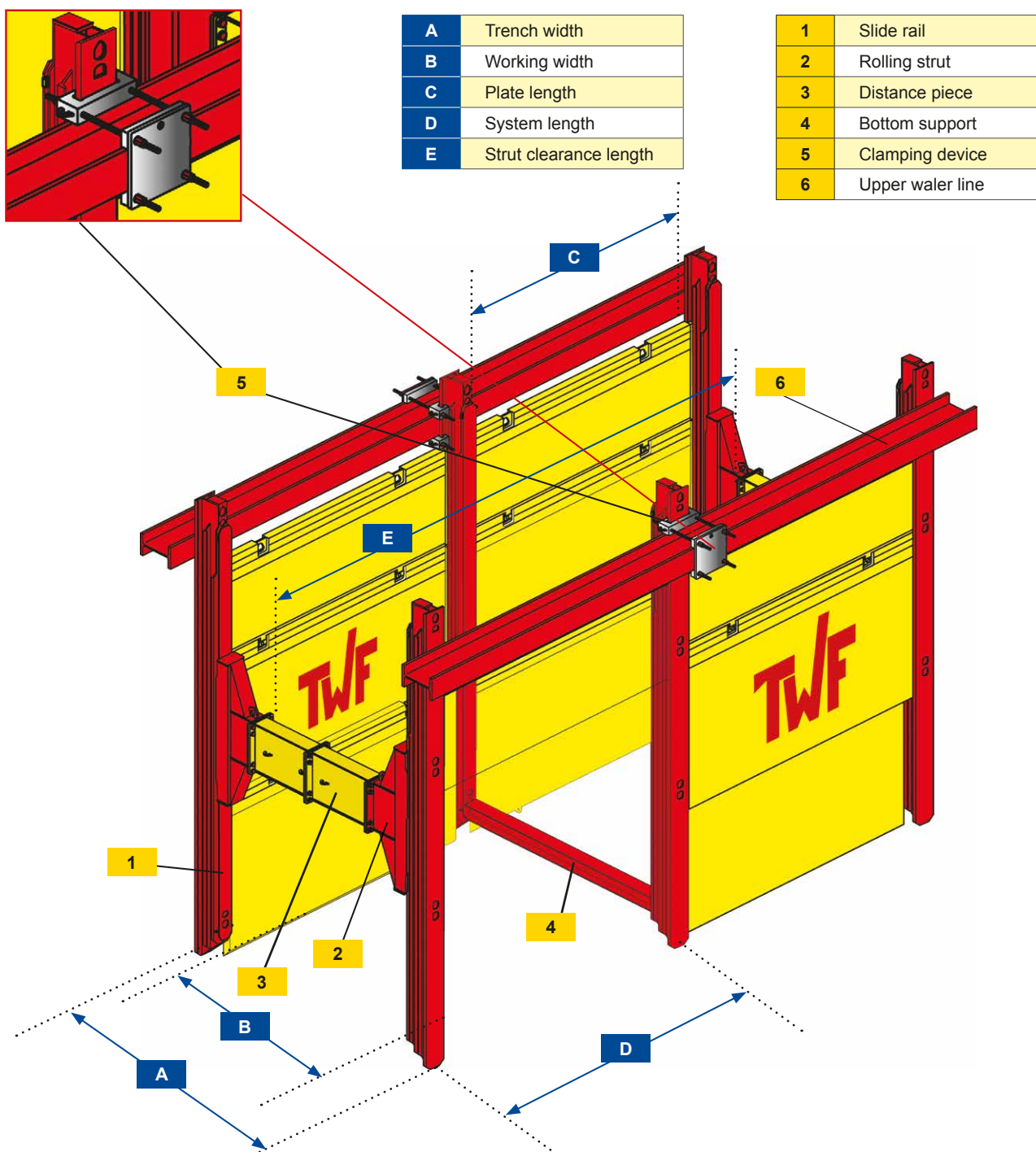
Lower the inner guided plate down to the excavation bottom.

The lowering step-by-step, whereupon slide rails, rolling struts and inner plates are pushed down, is repeated until reaching the final trench bottom.

The top edge of the shoring must overtop the surrounding terrain by at least 5 cm!

► TWF - Slide Rail Shoring

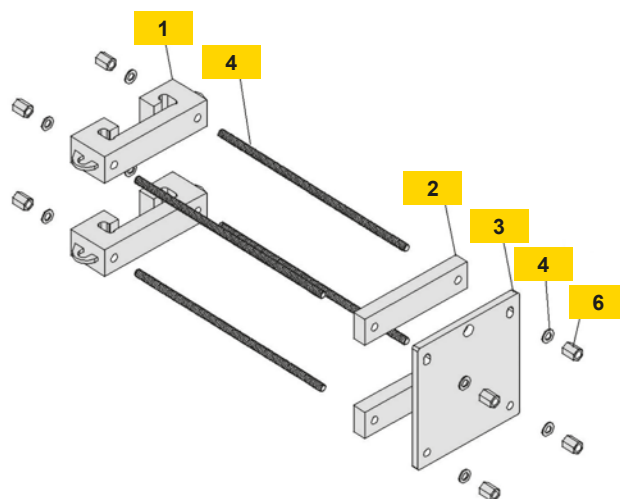
Adjustable clamping device



► Operating Manual

Technical parameters

Description	Use for	Dimension (mm)	Weight (kg)
1 Socket	Locking	120*180*520	61,3
2 Lug	Extension Rail	60*120*520	29,4
3 Flange plate	Top Plate	30*555*520	68,0
4 Threaded rod	Flange	Ø26,5 * 1000	4,50
5 Washer	Flange	Di = 31	0,05
6 6-squared nut	Rail	26.5	0,54



Strut-free pits, e.g. for the laying of long pipes, for building a structure or for placing a press drilling machine can be realised with the adjustable clamping device.

After assembling the clamping device, one or several rolling struts can be dismantled. The slide rail frames which have to be strut-free afterwards, must be about 1,35 m longer than the required trench depth. This clearance is required for the bottom support at the slide rail end and for fixing the clamping device above the trench.

The clamping device engages behind the outer rail guidance and clamps the outside horizontal upper waler. The upper forces, passed in by the slide rail, are transferred over the outer waler to the corner slide rails.

Installation instructions

After installing the rolling strut shoring and bracing the slide rail frames in the trench bottom (bottom support), the clamping device can be assembled above the trench.

Therefor the lower socket which is pre-assembled with threaded rods, is moved over the rail guidance and put down on the top ground surface. The lower lug keeps the two threaded rods at bay and serves also as lining of the upper waler. More linings, distributed over the length of the waler, can be made up of squareshaped timber for example.

The dimensioning of the waler acts in accordance with the statical requirements, whereas also 2 walers can be placed back-to-back.

Behind the slide rail, the waler is put down on the socket and lug. The upper socket, pre-assembled with threaded rods, is also moved the slide rail guidance, fit with the lugs and put down on the waler. Move the flange plate over the 4 threaded rods and torque with the washers and nuts.

Now the upper limit pins in the slide rail frames can be removed and the rolling struts can be dismantled.

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OPERATING MANUAL