terra
infrastructure







PRODUCT AND SERVICE PORTFOLIO

FOR INFRASTRUCTURE PROJECTS WORLDWIDE

Baltic States
terra infrastructure UAB
Liepų str. 83
93269 Klaipėda
Lithuania
P: +370 46 355-401
info@terra-infrastructure.lt
www.terra-infrastructure.com/lt

Eastern Europe
terra infrastructure GmbH
Hollestr. 7a
DE-45127 Essen
Germany
P: +49 201 565 783 20
easterneurope@terra-infrastructure.com
www.terra-infrastructure.com/eu/en

Poland
terra infrastructure Polska Sp. z o.o.
ul. Zygmunta Starego 26
44-100 Gliwice
Poland
T: +48 728 969 047
ewa.sakwerda@terra-infrastructure.com
www.terra-infrastructure.com/eu/eu

South West Europe
terra infrastructure GmbH
Hauptstrasse 35a
77866 Rheinau-Freistett
Germany
P: +49 7844 9143 0
export-sweurope@terra-infrastructure.com
www.terra-infrastructure.com/eu/en

Group Headquarter
terra infrastructure GmbH
Hollestr. 7a
DE-45127 Essen
Germany
P: +49 201 565 783 20
info@terra-infrastructure.com
www.terra-infrastructure.com



WE ARE YOUR LOCAL **SOLUTION PARTNER**

PRODUCTS

Steel & Piling Products
- Sheet piling
- Steel beams
- Tube & pipes
- Anchors
- Flood protection system

Machinery
- Excavator-mounted vibratory hammers
- Vibratory hammers
- Power packs
- RTG leader technology
- Drilling technology

Trench Shoring
- Box shoring (aluminium & steel)
- Auxiliary products
- Linear shoring
- Site road systems (plastics, steel)

SERVICES

Engineering Services
- Static preliminary study
- Shop drawings (preparation & coating)
- Certifiable structural engineering
- Technical consulting incl. alternative offers
- Cooperation with engineering planning offices
- Partnering
- Execution planning incl. pile driving plans/simulation

Consulting

Preparation & Service
- On-site service/ induction
- Pitching holes
- Pairing
- Coating
- Corrosion-protection
- Sealant
- Cut to size/ customized
- Fabrication
- Logistics

After-Sales Service
- Troubleshooting & repair
- Support line incl. remote services
- Hire equipment
- Inspection & maintenance
- 24 h services for spare parts
- User training
- Monitoring

OFFERINGS

Sale | **Hire** | **Buy back**

OUR MARKETS

Civil engineering · Bridge construction · Tunneling · Railway construction · Road construction · Hydraulic engineering · Dyke construction · Harbours · Canal construction · Pipeline construction · Sewage plant construction · Landscaping · Demolition · Various (festivals etc.)

OUR PROMISE: safety: efficient and sustainable



Our solutions always begin with a comprehensive assessment of the individual challenges of our customers' respective sites. That is why we always start with a comprehensive consultation, from which we derive our recommendation for a tailor-made solution. Our offer comprises detailed planning and the optimal combination of materials, machinery and installation methods, naturally tailored to the local conditions.

As an innovative partner, we contribute every day to ensuring that safe construction is efficient and sustainable, rather than a contradiction in terms. Our solutions ensure safety on construction sites and create a real competitive advantage through efficiency.

Our business has sustainable alignment, as our rental business has been promoting the circular economy for decades, for example.

'safety: efficient. sustainable.' describes our commitment to operating safely and efficiently, as well as to managing environmental issues responsibly. This is underpinned by our management systems, which are certified by DIN EN ISO norms and which support the continues improvement of our quality and environmental performance.

We enjoy achieving our shared goals – and each individual has the freedom to help shape the future on the basis of our secure foundation.

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SHEET PILING

SHEET PILES
ANCHOR TECHNOLOGY AND
FLOOD PROTECTION SYSTEMS

We offer our customers around the world an integrated range of system solutions.

Central components of our offering are the sale and rental of sheet piling, anchor equipment and flood protection. Here we have a wide range of products from many offering manufacturers, and we round off our offer with a comprehensive servicepackage comprising advice, technical support, and logistics.

OUR PRODUCTS AND SERVICES IN STEEL SECTION: SOLUTIONS FOR ALL CHALLENGES

We offer our customers around the world an integrated system solution program. Key components include the sale and rental of sheet piles, beams, lightweight profiles and trench sheets. We offer a wide range of products from a variety of manufacturers. Our anchors and micropiles are used in construction projects such as quay facilities, foundations for onshore and offshore wind turbines, tunnel construction, excavation pits, retaining walls and slope stabilisation. A comprehensive service package comprising consulting, technical support and logistics rounds off our offering.

Our portfolio of steel sections

Sheet piling:
- U-profiles
- Z-profiles
- Combined steel sheet piles
- Larssen steel piles
- Trench sheets
- Smaller piles
- Wide flange beams
- Double U sections
- PVC sheet piles
- UNP/UPE
- Corner sections
- Steel pipes
- Steel plates

Anchor technology:
- Round steel anchors
- terra ASF Micropile
- Driven anchor piles

Flood protection system:
- Dam beam system
- Steel sheet piles in dyke construction
- Additional equipment & optional equipment

Our services:
- Corrosion protection
- Coating
- Sealing systems
- Technical office
- Signal transmitters – lock jump detectors
- Vibration measurement
- Welded constructions
- Knife-edge bearing Z-15.6-369

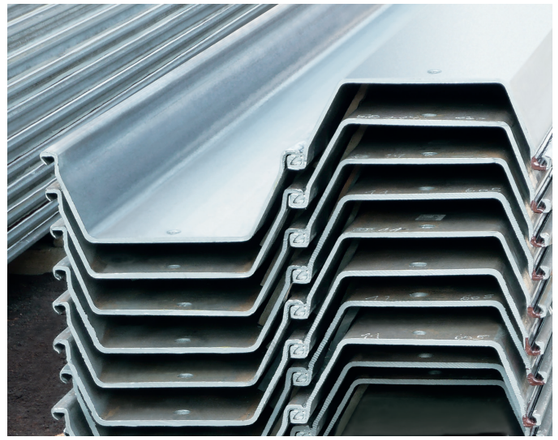


HOT-ROLLED SHEET PILING

U-Sections

Our U-Sections have excellent structural properties. These high-quality pile sections drive in extremely well. The wide range of available sections allows for use in so many different areas, such as marine engineering, embankment protection, and road engineering, and even in trench shoring.

Advantages
- Optimal reusability
- Excellent quality and drivability
- Good pile driving properties
- Purchase and rental possible



	Elastic section modulus W_y cm³/m	Plastic section modulus $W_{y,pl}$ cm³/m	Weight kg/m²	Weight Single pile kg/m	Moment of inertia I_y cm⁴/m	Flange thickness t mm	Web thickness s mm	Height h mm	Section width b mm	Classification to DIN EN 1993-5 S 270 GP	S 355 GP	S 430 GP
tkL 601	744	895	77.2	46.3	11,530	7.5	6.4	310.0	600	2	3	3
tkL 601 FP	745	906	79.0	47.4	11,547	7.2	7.0	310.0	600	3	3	3
tkL 601 K	775	936	80.8	48.5	12,019	7.8	6.8	310.0	600	2	3	3
tkL 602 A	806	979	85.5	51.3	12,499	8.0	7.3	310.0	600	2	3	3
tkL 602	842	1022	89.0	53.4	13,046	8.4	7.6	310.0	600	2	3	3
tkL 602 K	877	1,065	92.3	55.4	13,590	8.8	7.9	310.0	600	2	2	3
tkL 603 A	1,138	1,316	102.5	61.5	18,205	9.0	8.0	320.0	600	3	4	4
tkL 603	1,200	1,386	107.0	64.2	19,199	9.6	8.2	320.0	600	3	3	4
tkL 603 KN	1,230	1,427	111.5	66.9	19,682	9.8	8.6	320.0	600	3	3	4
tkL 603 K	1,241	1,444	113.0	67.8	19,853	9.8	9.0	320.0	600	3	3	4
tkL 603 N	1,273	1,519	105.7	63.4	24,269	9.8	7.9	381.2	600	2	2	3
tkL 603 Z	1,300	1,525	120.2	72.1	20,930	10.0	10.0	322.0	600	3	3	4
tkL 603 Z11	1,404	1,653	131.0	78.6	22,470	11.0	11.0	320.0	600	2	3	3
tkL 604 A	1,564	1,823	118.3	71.0	30,495	9.6	8.8	390.0	600	3	3	4
tkL 604	1,618	1,885	121.8	73.1	31,548	10.0	9.0	390.0	600	3	3	4
tkL 604 K	1,672	1,947	125.3	75.2	32,600	10.4	9.2	390.0	600	3	3	3
tkL 605 A	1,821	2,125	127.5	76.5	38,243	10.7	9.0	420.0	600	2	3	3
tkL 605 N	2,019	2,348	136.9	82.1	42,664	12.0	9.5	422.6	600	2	2	3
tkL 606 A	2,205	2,541	142.3	85.4	47,402	13.4	9.0	430.0	600	2	2	2
tkL 606 AN	2,355	2,714	149.6	89.8	50,878	14.4	9.4	432.0	600	2	2	2
tkL 606 N	2,506	2,887	156.8	94.1	54,389	15.4	9.8	434.0	600	2	2	2

	Elastic section modulus W_y cm³/m		Weight kg/m²	Weight Single pile kg/m	Moment of inertia I_y cm⁴/m	Flange thickness t mm	Web thickness s mm	Height h mm	Section width b mm			
tkL 628 -1,5	2,607	3,006	158.6	95.2	58,938	14.8	9.5	452.1	600	2	2	2
tkL 628 AN	2,701	3,114	163.1	97.9	61,219	15.4	9.8	453.3	600	2	2	2
tkL 628 A	2,809	3,238	168.0	100.8	63,856	16.1	10.0	454.7	600	2	2	2
tkL 628	2,841	3,276	169.6	101.8	64,640	16.3	10.1	455.1	600	2	2	2
tkL 628 K	2,903	3,347	172.5	103.5	66,165	16.7	10.3	455.9	600	2	2	2
tkL 607 A	3,006	3,460	177.1	106.2	68,232	17.7	10.0	453.9	600	2	2	2
tkL 607	3,211	3,701	187.3	112.4	73,300	19.0	10.6	456.5	600	2	2	2
tkL 607 K	3,365	3,882	194.7	116.8	77,153	20.0	11.0	458.5	600	2	2	2

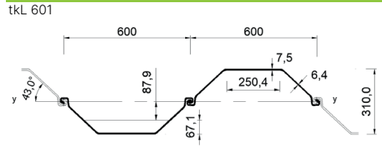
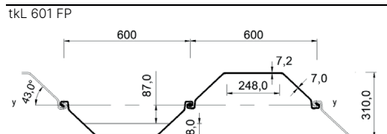
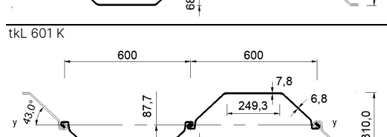
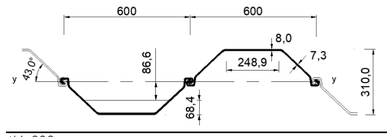
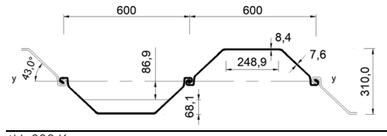
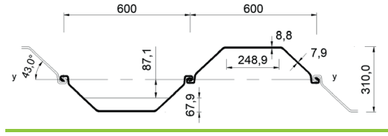
Overview: Special sections *

Profile	Elastic section modulus Wy cm³/m	Plastic section modulus Wy,pl cm³/m	Weight kg/m²	Weight Single pile kg/m	Moment of inertia Iy cm⁴/m	Flange thickness t mm	Web thickness s mm	Height h mm	Section width b mm	Classification to DIN EN 1993-5 S 270 GP	S 355 GP	S 430 GP
tkL 602 A8	831	1,016	89.5	53.7	12,843	8.0	8.0	309.2	600	2	3	3
tkL 602 90	854	1,038	90.0	54.0	13,241	8.5	7.7	310.2	600	2	2	3
tkL 602 D	881	1,071	92.9	55.7	13,650	8.8	8.0	310.0	600	2	2	3
tkL 602 +0,5	894	1,087	93.3	56.0	13,905	8.9	8.1	311.0	600	2	2	3
tkL 602 +0,7	907	1,101	94.0	56.4	14,128	9.1	8.1	311.4	600	2	2	3
tkL 603 AN	1,161	1,342	104.0	62.4	18,601	9.2	8.1	320.4	600	3	4	4
tkL 603 108	1,215	1,404	108.0	64.8	19,456	9.7	8.3	320.2	600	3	3	4
tkL 603 K10	1,261	1,465	114.1	68.4	20,196	10.0	9.0	320.4	600	3	3	4
tkL 604 AN	1,409	1,637	107.1	64.3	27,478	8.7	7.7	390.0	600	3	4	4
tkL 604 124	1,659	1,932	124.0	74.4	32,407	10.3	9.1	390.6	600	3	3	3
tkL 605 A +0,5	1,885	2,194	130.1	78.1	39,681	11.2	9.0	421.0	600	2	3	3
tkL 605 N 1975	1,975	2,299	134.8	80.9	41,681	11.7	9.4	422.0	600	2	3	3
tkL 605 N 2020	2,020	2,350	137.0	82.2	42,684	12.0	9.5	422.6	600	2	2	3
tkL 605 N 138,5	2,050	2,384	138.5	83.1	43,362	12.2	9.6	423.0	600	2	2	3
tkL 605 N 139,2	2,065	2,401	139.2	83.5	43,699	12.3	9.6	423.2	600	2	2	3
tkL 605 K	2,068	2,414	142.9	85.7	43,434	12.4	10.0	420.0	600	2	2	3
tkL 605 N +0,5	2,094	2,433	140.5	84.3	44,350	12.5	9.7	423.6	600	2	2	3
tkL 606 AS +0,5	2,228	2,578	144.9	87.0	47,898	13.4	9.5	430.0	600	2	2	2
tkL 606 A +0,5	2,269	2,611	144.9	86.9	48,893	13.9	9.0	431.0	600	2	2	2
tkL 606 AN 10	2,402	2,778	153.4	92.0	51,913	14.5	10.0	432.2	600	2	2	2
tkL 606 N 157	2,517	2,897	157.0	94.3	54,645	15.5	9.8	434.2	600	2	2	2
tkL 504 A	1,423	1,677	127.0	63.5	24,198	11.2	8.7	340.0	500	2	2	2
tkL 504	1,504	1,771	133.2	66.6	25,575	12.0	9.0	340.0	500	2	2	2
tkL 504 K	1,602	1,885	140.6	70.3	27,233	13.0	9.3	340.0	500	2	2	2
tkL 507 A	2,800	3,275	184.6	92.3	61,185	17.5	10.2	437.0	500	2	2	2
tkL III n	1,600	1,857	155.5	62.2	23,206	13.0	9.0	290.0	400	2	2	2

* Only on request

Details: U-Sections

Section
S = Single pile
D = Double pile
T = Triple pile

Profile		Elastic section modulus Wy cm³	Weight kg/m	Cross sectional area cm²	Coating area m²/m	Static moment Sy cm³	Moment of inertia Iy cm4	Radius of gyration cm
tkL 601 	per m wall	744	77.2	98.3	2.57	448	11,530	10.83
	per S	221	46.3	59.0	1.60		2,360	6.32
	per D	893	92.6	118.0	3.08		13,836	10.83
	per T	1,044	138.9	177.0	4.56		19,235	10.42
tkL 601 FP 	per m wall	745	79.0	100.7	2.57	453	11,547	10.70
	per S	223	47.4	60.4	1.60		2,360	6.25
	per D	894	94.8	120.8	3.08		13,857	10.70
	per T	1,047	142.3	181.2	4.56		19,262	10.30
tkL 601 K 	per m wall	775	80.8	102.9	2.57	468	12,019	10.81
	per S	229	48.5	61.8	1.60		2,457	6.31
	per D	931	97.0	123.5	3.08		14,423	10.81
	per T	1,088	145.5	185.3	4.56		20,050	10.40
tkL 602 A 	per m wall	806	85.5	109.0	2.57	490	12,499	10.71
	per S	245	51.3	65.4	1.60		2,601	6.31
	per D	968	102.6	130.7	3.08		14,998	10.71
	per T	1,135	153.9	196.1	4.57		20,865	10.31
tkL 602 	per m wall	842	89.0	113.3	2.57	511	13,046	10.73
	per S	252	53.4	68.0	1.60		2,698	6.30
	per D	1,010	106.8	136.0	3.08		15,655	10.73
	per T	1,184	160.2	204.0	4.57		21,773	10.28
tkL 602 K 	per m wall	877	92.3	117.7	2.57	533	13,590	10.75
	per S	260	55.4	70.6	1.60		2,797	6.29
	per D	1,052	110.8	141.2	3.08		16,308	10.75
	per T	1,232	166.2	211.8	4.56		22,676	10.35

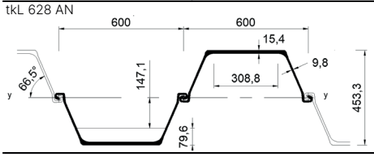
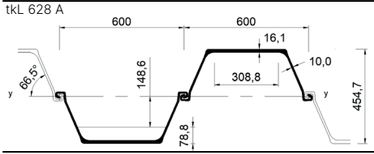
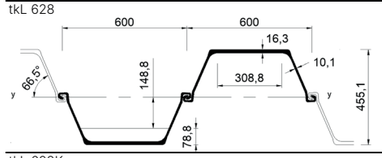
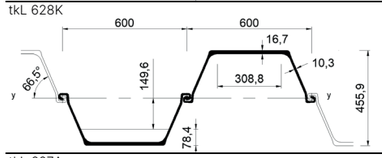
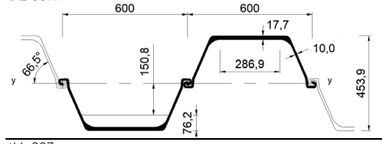
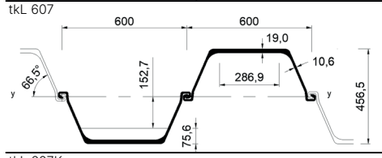
1: The U-profile section modulus may be considered where at least every second interlock is locked for shear transfer
2. Section modulus: Single piles – individual pile axis; triple piles – pile group axis; double piles – wall axis y-y
3. The coating areas refer to both sides, excluding the interlock

		Elastic section modulus Wy cm³	Weight kg/m	Cross sectional area cm²	Coating area m²/m	Static moment Sy cm³	Moment of inertia Iy cm⁴	Radius of gyration cm
tkL 603 A	per m wall	1,138	102.5	130.6	2.76	658	18,205	11.81
	per S	296	61.5	78.3	1.72		3,503	6.69
	per D	1,365	123.0	156.7	3.31		21,846	11.81
	per T	1,574	184.5	235.0	4.90		30,296	11.35
tkL 603	per m wall	1,200	107.0	136.3	2.76	693	19,199	11.87
	per S	304	64.2	81.8	1.73		3,641	6.67
	per D	1,440	128.4	163.6	3.31		23,039	11.87
	per T	1,657	192.6	245.3	4.90		31,933	11.41
tkL 603 KN	per m wall	1,230	111.5	142.0	2.77	713	19,682	11.77
	per S	324	66.9	85.2	1.73		3,856	6.73
	per D	1,476	133.7	170.4	3.32		23,618	11.77
	per T	1,705	200.6	255.6	4.90		32,776	11.32
tkL 603 K	per m wall	1,240	113.0	143.9	2.77	722	19,853	11.74
	per S	326	67.8	86.4	1.73		3,873	6.70
	per D	1,489	135.6	172.7	3.32		23,824	11.74
	per T	1,720	203.4	259.1	4.90		33,056	11.30
tkL 603 N	per m wall	1,237	105.7	134.6	2.75	760	24,269	13.43
	per S	375	63.4	80.8	1.70		4,908	7.80
	per D	1,528	126.8	161.5	3.30		29,123	12.92
	per T	1,782	190.2	242.3	4.89		40,467	13.43
tkL 603 Z	per m wall	1,300	120.2	153.1	2.77	763	20,930	11.69
	per S	350	72.1	91.9	1.73		4,162	6.73
	per D	1,560	144.2	183.7	3.32		25,115	11.69
	per T	1,808	216.3	275.6	4.91		34,874	11.25
tkL 603 Z11	per m wall	1,404	131.0	166.9	2.77	827	22,470	11.60
	per S	375	78.6	100.2	1.73		4,472	6.68
	per D	1,685	157.2	200.3	3.32		26,964	11.60
	per T	1,954	235.8	300.5	4.90		37,443	11.16
tkL 604 A	per m wall	1,564	118.3	150.8	2.98	912	30,495	14.22
	per S	418	71.0	90.5	1.85		5,834	8.03
	per D	1,877	142.0	181.0	3.58		36,594	14.22
	per T	2,167	213.0	271.5	5.31		50,737	13.67

1: The U-profile section modulus may be considered where at least every second interlock is locked for shear transfer
2. Section modulus: Single piles – individual pile axis; triple piles – pile group axis; double piles – wall axis y-y
3. The coating areas refer to both sides, excluding the interlock

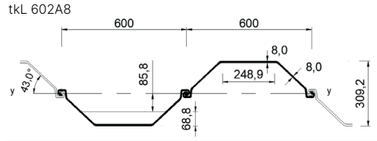
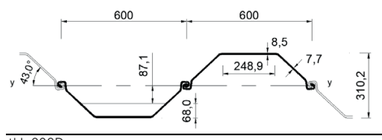
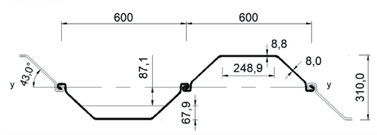
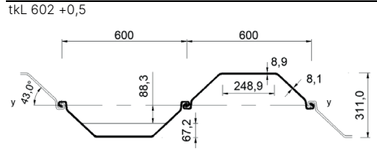
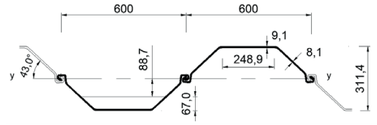
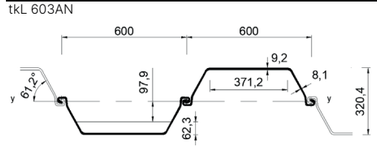
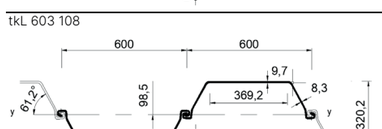
		Elastic section modulus Wy cm³	Weight kg/m	Cross sectional area cm²	Coating area m²/m	Static moment Sy cm³	Moment of inertia Iy cm⁴	Radius of gyration cm
tkL 604	per m wall	1,618	121.8	155.2	2.97	943	31,548	14.26
	per S	426	73.1	93.1	1.85		5,984	8.02
	per D	1941	146.2	186.2	3.56		37,857	14.26
	per T	2,240	219.3	279.4	5.27		52,471	13.70
tkL 604 K	per m wall	1,672	125.3	159.7	2.97	974	32,600	14.29
	per S	435	75.2	95.8	1.85		6,140	8.00
	per D	2,006	150.4	191.7	3.56		39,121	14.29
	per T	2,312	225.6	287.5	5.27		54,207	13.73
tkL 605 A	per m wall	1,821	127.5	162.5	3.03	1,063	38,243	15.34
	per S	475	76.5	97.5	1.89		7,113	8.54
	per D	2,185	153.0	194.9	3.64		45,892	15.34
	per T	2,517	229.5	292.4	5.39		63,560	14.74
tkL 605 N	per m wall	2,019	136.9	174.4	3.02	1,174	42,664	15.64
	per S	486	82.1	104.6	1.88		7,488	8.46
	per D	2,423	164.2	209.2	3.62		51,197	15.64
	per T	2,773	264.4	313.8	5.36		70,759	15.02
tkL 606 A	per m wall	2,205	142.3	181.3	3.04	1,271	47,402	16.17
	per S	500	85.4	108.8	1.90		7,981	8.56
	per D	2,646	170.8	217.6	3.65		56,883	16.17
	per T	3,011	256.2	326.4	5.41		78,504	15.51
tkL 606 AN	per m wall	2,355	149.6	190.6	3.04	1,357	50,878	16.33
	per S	512	89.8	114.4	1.89		8,281	8.51
	per D	2,827	179.6	228.8	3.65		61,056	16.33
	per T	3,207	269.5	343.3	5.40		84,168	15.66
tkL 606 N	per m wall	2,506	156.8	199.8	3.03	1,443	54,389	16.50
	per S	520	94.1	119.9	1.89		8,545	8.44
	per D	3,008	188.2	239.7	3.65		65,266	16.50
	per T	3,401	282.3	359.6	5.40		89,870	15.81

1: The U-profile section modulus may be considered where at least every second interlock is locked for shear transfer
2. Section modulus: Single piles – individual pile axis; triple piles – pile group axis; double piles – wall axis y-y
3. The coating areas refer to both sides, excluding the interlock

		Elastic section modulus Wy cm³	Weight kg/m	Cross sectional area cm²	Coating area m²/m	Static moment Sy cm³	Moment of inertia Iy cm⁴	Radius of gyration cm
tkL 628 -1,5	per m wall	2,607	158.6	202.0	3.05	1,503	58,938	17.08
	per S	567	95.2	121.2	1.88		9,560	8.88
	per D	3,129	190.3	242.4	3.66		70,725	17.08
	per T	3,549	285.5	363.6	5.44		97,487	16.37
tkL 628 AN	per m wall	2,701	163.1	207.8	3.05	1,557	61,219	17.17
	per S	575	97.9	124.7	1.88		9,763	8.85
	per D	3,241	195.7	249.3	3.66		73,462	17.17
	per T	3,671	293.6	374.0	5.44		101,204	16.45
tkL 628 A	per m wall	2,809	168.0	214.0	3.05	1,619	63,856	17.27
	per S	582	100.0	128.4	1.88		9,973	8.81
	per D	3,370	201.6	256.8	3.66		76,627	17.29
	per T	3,810	302.4	385.2	5.44		105,494	16.55
tkL 628	per m wall	2,841	169.6	216.1	3.05	1,638	64,640	17.29
	per S	586	101.8	129.7	1.88		10,053	8.81
	per D	3,409	203.6	259.3	3.66		77,568	17.29
	per T	3,852	305.4	389.0	5.44		106,775	16.57
tkL 628K	per m wall	2,903	172.5	219.8	3.05	1,674	66,165	17.35
	per S	590	103.5	131.9	1.88		10,173	8.78
	per D	3,483	207.0	263.7	3.66		79,398	17.35
	per T	3,932	310.5	395.6	5.44		109,205	16.62
tkL 607A	per m wall	3,006	177.1	225.6	3.13	1,730	68,232	17.39
	per S	586	106.2	135.3	1.95		10,164	8.67
	per D	3,608	212.5	270.7	3.75		81,879	17.39
	per T	4,060	318.7	406.0	5.54		112,560	16.65
tkL 607	per m wall	3,211	187.3	238.6	3.13	1,851	73,300	17.53
	per S	605	112.4	143.2	1.95		10,617	8.61
	per D	3,854	224.8	286.3	3.75		87,960	17.53
	per T	4,328	337.1	429.5	5.54		120,819	16.77
tkL 607K	per m wall	3,365	194.7	248.0	3.13	1,941	77,153	17.64
	per S	617	116.8	148.8	1.95		10,920	8.57
	per D	4,038	233.6	297.5	3.75		92,583	17.64
	per T	4,528	350.4	446.3	5.54		127,084	16.87

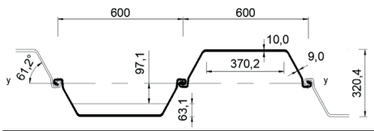
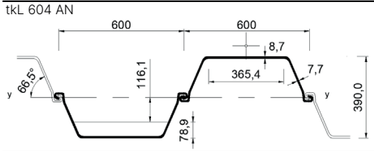
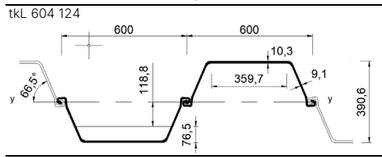
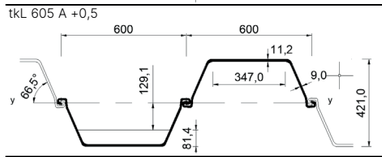
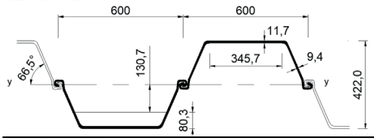
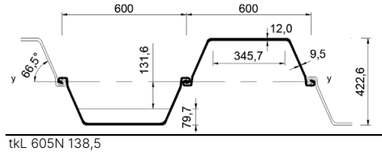
1: The U-profile section modulus may be considered where at least every second interlock is locked for shear transfer
2. Section modulus: Single piles – individual pile axis; triple piles – pile group axis; double piles – wall axis y-y
3. The coating areas refer to both sides, excluding the interlock

Details: Special sections *

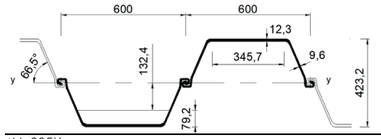
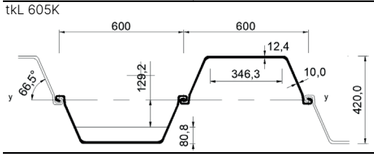
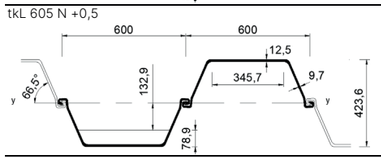
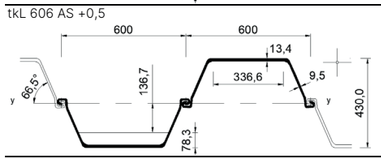
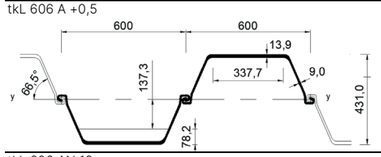
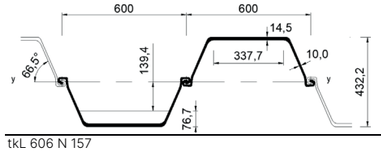
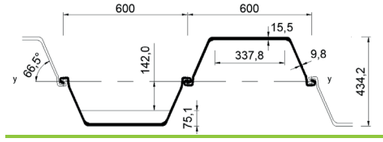
		Elastic section modulus Wy cm³	Weight kg/m	Cross sectional area cm²	Coating area m²/m	Static moment Sy cm³	Moment of inertia Iy cm⁴	Radius of gyration cm
tkL 602A8	per m wall	831	89.5	114.0	2.57	508	12,843	10.61
	per S	252	53.7	68.4	1.60		2,668	6.25
	per D	997	107.4	136.8	3.08		15,411	10.61
	per T	1,170	161.1	205.2	4.56		21,438	10.22
tkL 602 90	per m wall	854	90.0	114.7	2.57	519	13,241	10.74
	per S	253	54.0	68.8	1.60		2,720	6.29
	per D	1,024	108.1	137.6	3.08		15,890	10.74
	per T	1,200	162.1	206.5	4.57		22,093	10.34
tkL 602D	per m wall	881	92.9	118.3	2.57	536	13,650	10.74
	per S	260	55.7	71.0	1.60		2,802	6.28
	per D	1,057	111.4	142.0	3.08		16,380	10.74
	per T	1,238	167.2	213.0	4.56		22,774	10.34
tkL 602 +0,5	per m wall	894	93.3	118.8	2.57	543	13,905	10.82
	per S	257	56.0	71.3	1.60		2,789	6.26
	per D	1,073	112.0	142.6	3.08		16,686	10.82
	per T	1,253	168.0	213.9	4.57		23,178	10.41
tkL 602 +0,7	per m wall	907	94.0	119.8	2.57	551	14,128	10.86
	per S	259	56.4	71.9	1.60		2,819	6.26
	per D	1,089	112.9	143.8	3.08		16,954	10.86
	per T	1,271	169.3	215.7	4.56		23,545	10.45
tkL 603AN	per m wall	1,161	104.0	132.4	2.76	671	18,601	11.85
	per S	298	62.4	79.5	1.72		3,539	6.67
	per D	1,393	124.7	158.9	3.31		22,321	11.85
	per T	1,604	187.1	238.4	4.90		30,941	11.39
tkL 603 108	per m wall	1,215	108.0	137.7	2.77	702	19,456	11.89
	per S	305	64.8	82.6	1.73		3,663	6.66
	per D	1,458	129.7	165.2	3.32		23,347	11.89
	per T	1,677	194.5	247.8	4.90		32,351	11.43

* Only on request

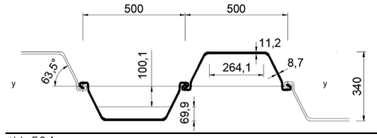
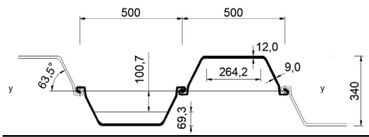
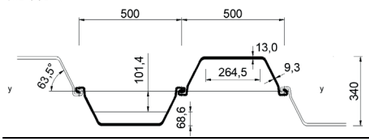
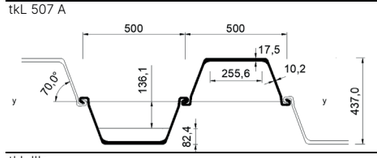
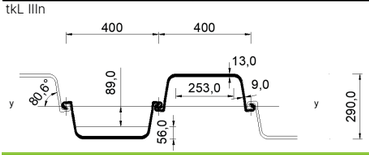
1: The U-profile section modulus may be considered where at least every second interlock is locked for shear transfer
2. Section modulus: Single piles – individual pile axis; triple piles – pile group axis; double piles – wall axis y-y
3. The coating areas refer to both sides, excluding the interlock

		Elastic section modulus Wy cm³	Weight kg/m	Cross sectional area cm²	Coating area m²/m	Static moment Sy cm³	Moment of inertia Iy cm⁴	Radius of gyration cm
tkL 603K10	per m wall	1,261	114.1	145.3	2.88	732	20196	11.79
	per S	327	68.4	87.2	1.73		3905	6.69
	per D	1513	136.9	174.4	3.32		24235	11.79
	per T	1746	205.3	261.5	4.91		33617	11.34
tkL 604 AN	per m wall	1,409	107.1	136.5	2.98	819	27,478	14.19
	per S	393	64.3	81.9	1.85		5,438	8.15
	per D	1,691	128.6	163.8	3.58		32,973	14.19
	per T	1,959	192.8	245.7	5.31		45,776	13.65
tkL 604 124	per m wall	1,659	124.0	158.0	2.97	966	32,407	14.32
	per S	430	74.4	94.8	1.85		6,070	8.00
	per D	1,991	148.8	189.5	3.56		38,888	14.32
	per T	2,294	223.2	284.3	5.27		53,874	13.77
tkL 605 A +0,5	per m wall	1,885	130.1	165.7	3.03	1,097	39,681	15.47
	per S	478	78.1	99.4	1.89		7,244	8.54
	per D	2,262	156.1	198.9	3.64		47,618	15.47
	per T	2,600	234.2	298.3	5.39		65,905	14.86
tkL 605 N 1975	per m wall	1,975	134.8	171.7	3.02	1,150	41,681	15.58
	per S	483	80.9	103.0	1.88		7,401	8.48
	per D	2,370	161.8	206.1	3.62		50,017	15.58
	per T	2,717	242.7	309.1	5.36		69,157	14.96
tkL 605 N 2020	per m wall	2,020	137.0	174.5	3.02	1,175	42,684	15.64
	per S	486	82.2	104.7	1.88		7,491	8.46
	per D	2,424	164.4	209.4	3.62		51,220	15.64
	per T	2,774	246.6	314.1	5.36		70,791	15.01
tkL 605N 138,5	per m wall	2,050	138.5	176.4	3.02	1,192	43,362	15.68
	per S	489	83.1	105.8	1.88		7,554	8.45
	per D	2,460	166.2	211.7	3.62		52,034	15.68
	per T	2,814	249.2	317.5	5.36		71,897	15.05

1: The U-profile section modulus may be considered where at least every second interlock is locked for shear transfer
2. Section modulus: Single piles – individual pile axis; triple piles – pile group axis; double piles – wall axis y-y
3. The coating areas refer to both sides, excluding the interlock

		Elastic section modulus Wy cm³	Weight kg/m	Cross sectional area cm²	Coating area m²/m	Static moment Sy cm³	Moment of inertia Iy cm⁴	Radius of gyration cm
tkL 605 N 139,2	per m wall	2,065	139.2	177.3	3.02	1,200	43,699	15.70
	per S	490	83.5	106.4	1.88		7,583	8.44
	per D	2,478	167.0	212.8	3.62		52,439	15.70
	per T	2,833	250.5	319.2	5.36		72,446	15.07
tkL 605K	per m wall	2,068	142.9	182.0	3.03	1,207	43,434	15.45
	per S	512	85.7	109.2	1.89		7,821	8.46
	per D	2,482	171.4	218.4	3.64		52,121	15.45
	per T	2,849	257.2	327.7	5.38		72,102	14.83
tkL 605 N +0,5	per m wall	2,094	140.5	179.0	3.02	1,217	44,350	15.74
	per S	491	84.3	107.4	1.88		7,636	8.43
	per D	2,513	168.6	214.8	3.62		53,220	15.74
	per T	2,870	252.9	322.1	5.36		73,504	15.11
tkL 606 AS +0,5	per m wall	2,228	144.9	184.6	3.04	1,289	47,898	16.11
	per S	506	87.0	110.8	1.90		8,048	8.52
	per D	2,673	173.9	221.5	3.65		57,477	16.11
	per T	3,044	260.9	332.3	5.41		79,319	15.45
tkL 606 A +0,5	per m wall	2,269	144.9	184.6	3.04	1,305	48,893	16.28
	per S	503	86.9	110.7	1.90		8,096	8.55
	per D	2,723	173.9	221.5	3.65		58,672	16.28
	per T	3,093	260.8	332.2	5.41		80,930	15.61
tkL 606 AN 10	per m wall	2,402	153.4	195.4	3.04	1,389	51,913	16.30
	per S	517	92.0	117.2	1.89		8,373	8.45
	per D	2,883	184.0	234.4	3.65		62,295	16.30
	per T	3,270	276.0	351.6	5.40		85,852	15.63
tkL 606 N 157	per m wall	2,517	157.0	200.1	3.04	1,449	54,645	16.53
	per S	520	94.3	120.1	1.89		8,560	8.44
	per D	3,020	188.5	240.1	3.65		65,574	16.53
	per T	3,414	282.8	360.2	5.40		90,286	15.83

1: The U-profile section modulus may be considered where at least every second interlock is locked for shear transfer
2. Section modulus: Single piles – individual pile axis; triple piles – pile group axis; double piles – wall axis y-y
3. The coating areas refer to both sides, excluding the interlock

		Elastic section modulus Wy cm³	Weight kg/m	Cross sectional area cm²	Coating area m²/m	Static moment Sy cm³	Moment of inertia Iy cm⁴	Radius of gyration cm
tkL 504A	per m wall	1,423	127.0	161.7	2.98	838	24,198	12.23
	per S	329	63.5	80.9	1.56		3,993	7.30
	per D	1,423	127.0	161.7	2.98		24,198	12.23
	per T	1,652	190.5	242.6	4.40		33,596	11.77
tkL 504	per m wall	1,504	133.2	169.7	2.98	886	25,575	12.28
	per S	341	66.6	84.8	1.56		4,181	7.20
	per D	1,504	133.2	169.7	2.98		25,575	12.28
	per T	1,744	199.8	254.5	4.40		35,493	11.81
tkL 504 K	per m wall	1,602	140.6	179.1	2.98	942	27,233	12.33
	per S	355	70.3	89.6	1.56		4,408	7.20
	per D	1,602	140.6	179.1	2.98		27,233	12.33
	per T	1,854	210.9	268.7	4.40		37,780	11.86
tkL 507 A	per m wall	2,800	184.6	235.2	3.32	1,638	61,185	16.13
	per S	554	92.3	117.6	1.73		8,797	8.65
	per D	2,800	184.6	235.2	3.32		61,185	16.13
	per T	3,203	276.9	352.8	4.91		84,512	15.48
tkL IIIn	per m wall	1,600	155.5	198.1	3.28.	928	23,206	10.82
	per S	255	62.2	79.3	1.38		2,849	5.99
	per D	1,280	124.4	158.5	2.62		18,565	10.82
	per T	1,469	186.6	237.8	3.88		25,703	10.40

1: The U-profile section modulus may be considered where at least every second interlock is locked for shear transfer
2. Section modulus: Single piles – individual pile axis; triple piles – pile group axis; double piles – wall axis y-y
3. The coating areas refer to both sides, excluding the interlock

Conformity assessments
Certificate of conformity (Ü-Sign, ÜHP);
Proof of conformity for products of the building industry
according to regulation Bauregelliste 4

Product certification
Deutsche Bahn – Manufacturer qualification
according to DBS 918 002-02

Interlock forms, shapes of supply, handling holes and interlocking

Interlock

U-Section
(LARSSEN interlock)
Interlock according DIN EN 10248-2
and EAU 2020

Shape of supply

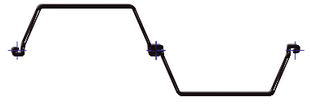
S



D
(S-shape)



D
(Z-shape
is non-standard)

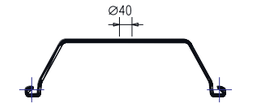


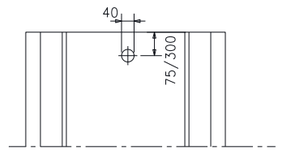
T
(Triple pile
on request)



Handling holes and crimping/welding

Handling holes can be cut on request. They are cut in every pile flange according to the drawing below. The distance of the hole from the top edge is 75 or 300 mm (diameter 40mm) and must be specified with the order. Factory crimping, factory shear-resistant welding, or site welding of the interlocks is required to achieve the section moduli of the U-sections specified in this publication. Crimped double piles are delivered with crimping points spaced approx. 0.6 m apart. Closer spacing can be specified for crimping points and handling holes on request. The loadbearing capacity of each crimping point is min. 75 kN for a mutual displacement of 5 mm. On request sheet piling can also be provided with shear-resistant welding.



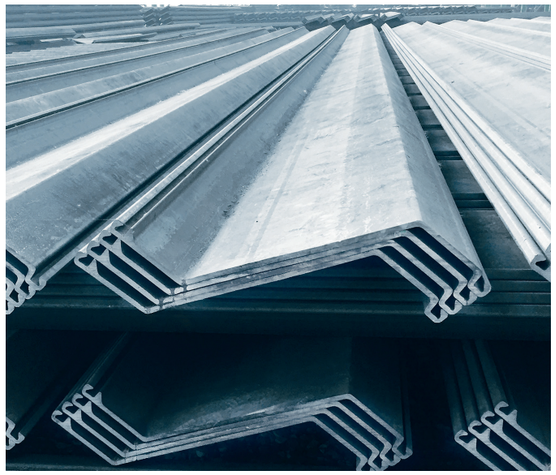


Z-Sections

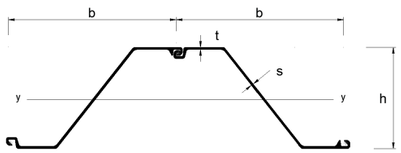
The continuous web in the sheet piling and the external interlocks are the key features of Z-Sections. Both factors have a positive effect on the section modulus in the sheet pile – at relatively low weight. That results in high-cost efficiency.

Advantages

- The interlock connection is positioned in the area with the lowest shear forces
- The external LARSSEN lock facilitates an extremely favorable weight–section modulus ratio
- The tall installation heights of the sections lead to high rigidity values



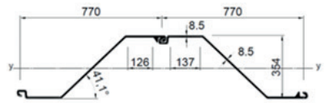
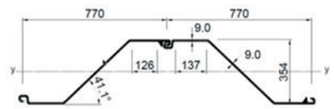
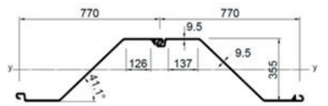
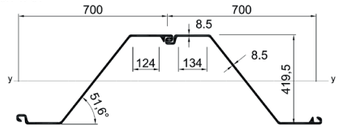
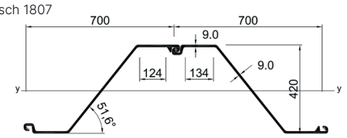
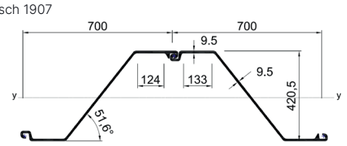
Overview: Z-Sections



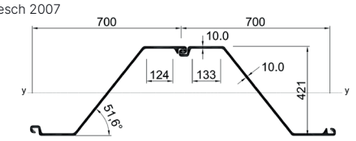
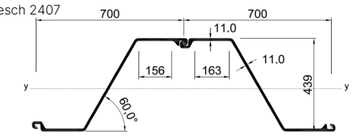
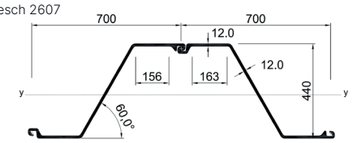
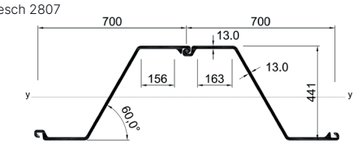
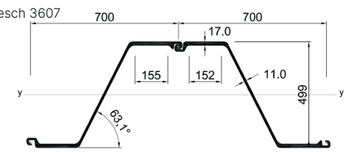
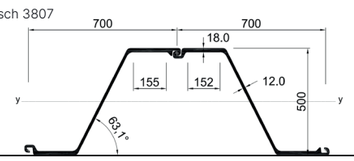
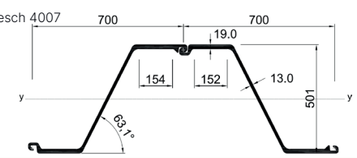
Profile	Elastic section modulus W_y cm³	Plastic section modulus W_{xpl} cm³	Weight kg/m²	Weight Single Pile kg/m	Moment of inertia I_y cm⁴/m	Flange thickness t mm	Web thickness s mm	Height h mm	Section width b mm	Classification acc. EN 1993-5 S 270 GP	S 355 GP	S 430 GP
Hoesch 1208	1,301	1,540	95.0	73.2	22,995	8.5	8.5	354.0	770	3	3	3
Hoesch 1308	1,357	1,609	99.5	76.6	24,013	9.0	9.0	354.0	770	2	3	3
Hoesch 1408	1,412	1,678	104.0	80.1	25,030	9.5	9.5	355.0	770	2	2	3
Hoesch 1707	1,731	2,031	104.6	73.2	36,304	8.5	8.5	420.0	700	3	3	3
Hoesch 1807	1,804	2,121	109.5	76.7	37,894	9.0	9.0	420.0	700	2	3	3
Hoesch 1907	1,878	2,212	114.5	80.1	39,485	9.5	9.5	421.0	700	2	3	3
Hoesch 2007	1,951	2,303	119.4	83.6	41,076	10.0	10.0	421.0	700	2	3	3
Hoesch 2407	2,432	2,819	135.9	95.1	53,379	11.0	11.0	439.0	700	2	3	3
Hoesch 2607	2,606	3,030	146.5	102.5	57,329	12.0	12.0	440.0	700	2	2	3
Hoesch 2807	2,779	3,241	157.0	109.9	61,279	13.0	13.0	441.0	700	2	2	2
Hoesch 3607	3,600	4,111	168.8	118.1	89,826	17.0	11.0	499.0	700	2	2	2
Hoesch 3807	3,800	4,357	179.9	125.9	95,004	18.0	12.0	500.0	700	2	2	2
Hoesch 4007	3,999	4,604	191.0	133.7	100,184	19.0	13.0	501.0	700	2	2	2

Details: Z-Sections

Sections
S = Single pile
D = Double pile

		Elastic section modulus Wy cm³	Weight kg/m	Cross sectional area cm²	Coating area m²/m	Static moment Sy cm³	Moment of inertia Iy cm⁴	Radius of gyration cm
Hoesch 1208	per m wall	1,301	95.0	121.0	1.21	770	22,995	13.78
	per S	1,000	73.2	93.2	0.93		17,707	13.78
	per D	2,004	146.3	186.4	1.87		35,413	13.78
Hoesch 1308	per m wall	1,357	99.5	126.8	1.21	805	24,013	13.76
	per S	1,043	76.6	97.60	0.93		18,490	13.76
	per D	2,089	153.2	195.2	1.87		36,980	13.76
Hoesch 1408	per m wall	1,412	104.0	132.5	1.21	839	25,030	13.74
	per S	1,086	80.1	102.0	0.93		17,773	13.74
	per D	2,175	160.1	204.0	1.87		35,546	13.74
Hoesch 1707	per m wall	1,731	104.6	133.2	1.33	1,015	36,304	16.51
	per S	1,209	73.2	93.3	0.93		25,413	16.51
	per D	2,423	146.4	186.5	1.87		50,826	16.51
Hoesch 1807	per m wall	1,804	109.5	139.5	1.33	1,060	37,894	16.48
	per S	1,261	76.7	97.7	0.93		26,526	16.48
	per D	2,526	153.3	195.3	1.87		53,052	16.48
Hoesch 1907	per m wall	1,878	114.5	145.9	1.33	1,106	39,485	16.45
	per S	1,313	80.1	102.1	0.93		27,640	16.45
	per D	2,629	160.3	204.2	1.87		55,279	16.45

1.The coating surfaces correspond to the surfaces on both sides, without the interlock!

		Elastic section modulus W_y cm³	Weight kg/m	Cross sectional area cm²	Coating area m²/m	Static moment S_y cm³	Moment of inertia I_y cm⁴	Radius of gyration cm
Hoesch 2007 	per m wall	1,951	119.4	152.2	1.33	1,151	41,076	16.43
	per S	1,366	83.6	106.5	0.93		28,754	16.43
	per D	2,732	167.2	213.0	1.87		57,507	16.43
Hoesch 2407 	per m wall	2,432	135.9	173.1	1.39	1,410	53,379	17.56
	per S	1,701	95.1	121.2	0.97		37,365	17.56
	per D	3,405	190.2	242.4	1.95		74,730	17.56
Hoesch 2607 	per m wall	2,606	146.5	186.6	1.39	1,515	57,329	17.53
	per S	1,824	102.5	130.6	0.97		40,130	17.53
	per D	3,648	205.0	261.2	1.95		80,260	17.53
Hoesch 2807 	per m wall	2,779	157.0	200.0	1.39	1,620	61,279	17.50
	per S	1,945	109.9	140.0	0.97		42,896	17.50
	per D	3,891	219.8	280.0	1.95		85,791	17.50
Hoesch 3607 	per m wall	3,600	168.8	215.0	1.45	2,055	89,826	20.44
	per S	2,515	118.1	150.5	1.02		62,878	20.44
	per D	5,040	236.3	301.1	2.03		125,757	20.44
Hoesch 3807 	per m wall	3,800	179.9	229.2	1.45	2,179	95,004	20.36
	per S	2,654	125.9	160.4	1.02		66,503	20.36
	per D	5,320	251.9	320.9	2.03		133,006	20.36
Hoesch 4007 	per m wall	3,999	191.0	243.3	1.45	2,302	100,184	20.29
	per S	2,792	133.7	170.3	1.02		70,128	20.29
	per D	5,599	267.4	340.7	2.03		140,258	20.29

The coating surfaces correspond to the surfaces on both sides, without the interlock!

Conformity assessments
Certificate of conformity (Ü-Sign, ÜHP);
Proof of conformity for products of the building industry according to regulation Bauregelliste 4

Interlock forms, shapes of supply, handling holes and interlocking

Interlock

Z-Section
(LARSSEN interlock)
Interlock according DIN EN 10248-2
and EAU 2020

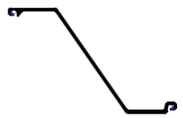


Handling holes and crimping/welding

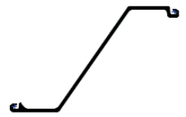
every pile flange according to the drawing below. The distance of the hole from the top edge is 75 or 300 mm and must be specified with the order. Crimping/welding of double piles on request.

Shape of supply

Eb



Ea

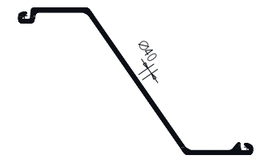


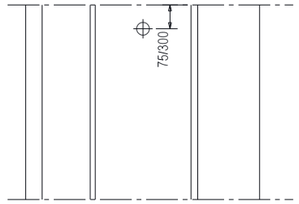
Db



Da





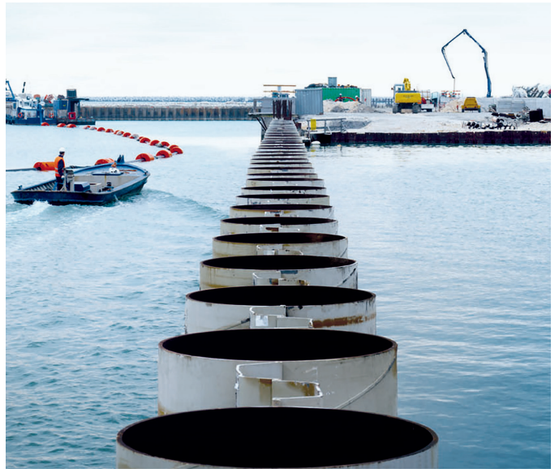


Combined steel sheet piling

Our combined steel sheet piling consists of load-bearing and intermediate piles and is used especially in heavy-duty marine engineering projects on the coast, including marine applications such as quay walls, piers, dock structures, and ro-ro vessels. The combined piles are also used in sluices, dams, inland ports, landfills, and abutments.

Advantages

- Modular system, which provides options for combined sheet piling
- Optimum adaptation to suit structural and constructional requirements
- Good driving characteristics thanks to essentially symmetrical arrangement of pile sections

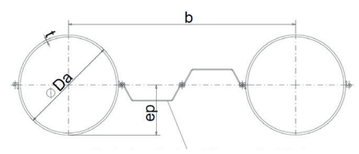


Pipe pile wall
with LPB 180-12 connector

Pipe diameter	Wall thickness	Width	Moment of inertia	Section modulus	Edge distance	Dead load related to pipe length – Length of connector LPB 180 as % of pipe length	Coating area
Da	t	b	I_y	W_y	ep	100%	Water site
mm	mm	(m)	cm^4/m	cm^3/m	cm	kg/m^2	m^2/m
813	10.00	0.993	204,797	5,038	40.65	228.63	1.50
813	12.00	0.993	243,942	6,001	40.65	267.92	1.50
813	14.00	0.993	282,496	6,949	40.65	307.01	1.50
819	10.00	0.999	208,164	5,083	40.95	228.74	1.50
819	12.00	0.999	247,966	6,055	40.95	268.09	1.50
819	14.00	0.999	287,172	7,013	40.95	307.24	1.50
914	10.00	1.094	265,217	5,803	45.70	230.29	1.50
914	12.00	1.094	316,170	6,918	45.70	270.51	1.50
914	14.00	1.094	366,440	8,018	45.70	310.54	1.50
1,016	10.00	1.196	334,322	6,581	50.80	231.68	1.51
1,016	12.00	1.196	398,817	7,851	50.80	272.68	1.51
1,016	14.00	1.196	462,535	9,105	50.80	313.50	1.51
1,220	12.00	1.400	593,413	9,728	61.00	276.07	1.52
1,220	14.00	1.400	688,907	11,294	61.00	318.13	1.52
1,220	16.00	1.400	783,444	12,843	61.00	360.06	1.52
1,420	14.00	1.600	955,140	13,453	71.00	321.52	1.53
1,420	16.00	1.600	1,086,970	15,309	71.00	364.37	1.53
1,420	18.00	1.600	1,217,666	17,150	71.00	407.10	1.53
1,620	16.00	1.800	1,440,667	17,786	81.00	367.73	1.53
1,620	18.00	1.800	1,614,739	19,935	81.00	411.19	1.53
1,620	20.00	1.800	1,787,496	22,068	81.00	454.54	1.53
1,820	18.00	2.000	2,068,284	22,728	91.00	414.46	1.53
1,820	20.00	2.000	2,290,504	25,170	91.00	458.41	1.53
1,820	22.00	2.000	2,511,231	27,596	91.00	502.26	1.53
1,820	25.00	2.000	2,839,537	31,204	91.00	567.84	1.53

Steelwall connectors LPB 180-12

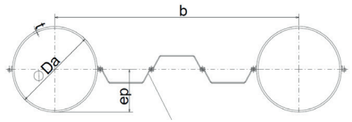
Pipe / sheet pile wall
with tkL 603 double pile
intermediate piles I



Intermediate pile tkL 603 double pile

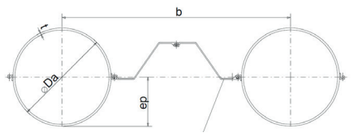
Pipe diameter	Wall thickness	Width	Including intermediate piles: Moment of inertia	Including intermediate piles: Section modulus	Excluding intermediate piles: Moment of inertia	Excluding intermediate piles: Section modulus	Edge distance	Deadweight related to pipe length – Length of connector as % of pipe length: 60%	80%	100%	Coating area
Da	t	b	I_y	W_y	I_y	W_y	ep				Water side
mm	mm	m	cm^4/m	cm^3/m	cm^4/m	cm^3/m	cm	kg/m^2	kg/m^2	kg/m^2	m^2/m
813	10.00	2,073	109,216	2,687	98,101	2,413	40.65	138.83	153.26	167.70	1.41
813	12.00	2,073	127,967	3,148	116,852	2,875	40.65	157.65	172.08	186.52	1.41
813	14.00	2,073	146,434	3,602	135,320	3,329	40.65	176.37	190.81	205.24	1.41
819	10.00	2,079	111,109	2,713	100,027	2,443	40.95	139.14	153.53	167.92	1.41
819	12.00	2,079	130,235	3,180	119,153	2,910	40.95	158.05	172.44	186.83	1.41
819	14.00	2,079	149,074	3,640	137,992	3,370	40.95	176.86	191.25	205.64	1.41
914	10.00	2,174	144,060	3,152	133,462	2,920	45.70	143.84	157.60	171.36	1.42
914	12.00	2,174	169,701	3,713	159,103	3,481	45.70	164.07	177.84	191.60	1.42
914	14.00	2,174	194,998	4,267	184,400	4,035	45.70	184.22	197.98	211.75	1.42
1,016	10.00	2,276	185,804	3,658	175,681	3,458	50.80	148.44	161.59	174.73	1.43
1,016	12.00	2,276	219,694	4,325	209,571	4,125	50.80	169.98	183.13	196.27	1.43
1,016	14.00	2,276	253,177	4,984	243,054	4,785	50.80	191.44	204.58	217.73	1.43
1,220	12.00	2,480	344,281	5,644	334,991	5,492	61.00	180.34	192.41	204.47	1.44
1,220	14.00	2,480	398,189	6,528	388,899	6,375	61.00	204.09	216.16	228.22	1.44
1,220	16.00	2,480	451,557	7,403	442,267	7,250	61.00	227.76	239.82	251.89	1.44
1,420	14.00	2,680	578,830	8,153	570,233	8,031	71.00	214.63	225.79	236.95	1.45
1,420	16.00	2,680	657,534	9,261	648,937	9,140	71.00	240.21	251.37	262.54	1.45
1,420	18.00	2,680	735,562	10,360	726,965	10,239	71.00	265.72	276.88	288.04	1.45
1,620	16.00	2,880	908,417	11,215	900,417	11,116	81.00	250.93	261.32	271.71	1.46
1,620	18.00	2,880	1,017,212	12,558	1,009,212	12,459	81.00	278.09	288.48	298.87	1.46
1,620	20.00	2,880	1,125,185	13,891	1,117,185	13,792	81.00	305.18	315.57	325.96	1.46
1,820	18.00	3,080	1,350,522	14,841	1,343,041	14,759	91.00	288.86	298.57	308.29	1.46
1,820	20.00	3,080	1,494,821	16,427	1,487,340	16,344	91.00	317.39	327.11	336.82	1.46
1,820	22.00	3,080	1,638,150	18,002	1,630,669	17,919	91.00	345.87	355.58	365.30	1.46
1,820	25.00	3,080	1,851,336	20,344	1,843,855	20,262	91.00	388.46	398.17	407.88	1.46

Other intermediate piles on request

Pipe / sheet pile wall with tkL 603 triple pile intermediate piles	Pipe diameter Da mm	Wall thickness t mm	Width b m	Including intermediate piles: Moment of inertia I_y cm⁴/m	Including intermediate piles: Section modulus W_y cm³/m	Excluding intermediate piles: Moment of inertia I_y cm⁴/m	Excluding intermediate piles: Section modulus W_y cm³/m	Edge distance ep cm	Dead load related to pipe length - Length of connector as % of pipe length: 60% kg/m²	80% kg/m²	100% kg/m²	Coating area Water side m²/m
	813	10.00	2,673	88,000	2,165	76,081	1,872	40.65	122.08	138.07	154.07	1.38
	813	12.00	2,673	102,542	2,523	90,623	2,229	40.65	136.67	152.67	168.67	1.38
	813	14.00	2,673	116,864	2,875	104,945	2,582	40.65	151.19	167.19	183.19	1.38
	819	10.00	2,679	89,517	2,186	77,625	1,896	40.95	122.36	138.32	154.28	1.39
	819	12.00	2,679	104,359	2,548	92,467	2,258	40.95	137.03	152.99	168.95	1.39
	819	14.00	2,679	118,979	2,905	107,086	2,615	40.95	151.63	167.59	183.55	1.39
	914	10.00	2,774	116,080	2,540	104,595	2,289	45.70	126.61	142.03	157.44	1.39
	914	12.00	2,774	136,175	2,980	124,690	2,728	45.70	142.47	157.89	173.30	1.39
	914	14.00	2,774	156,001	3,414	144,515	3,162	45.70	158.26	173.68	189.09	1.39
	1,016	10.00	2,876	150,108	2,955	139,030	2,737	50.80	130.87	145.74	160.60	1.40
	1,016	12.00	2,876	176,928	3,483	165,850	3,265	50.80	147.91	162.78	177.65	1.40
	1,016	14.00	2,876	203,426	4,004	192,348	3,786	50.80	164.89	179.76	194.63	1.40
	1,220	12.00	3,080	280,077	4,591	269,733	4,422	61.00	157.72	171.60	185.48	1.41
	1,220	14.00	3,080	323,484	5,303	313,139	5,133	61.00	176.84	190.72	204.61	1.41
	1,220	16.00	3,080	366,455	6,007	356,111	5,838	61.00	195.90	209.78	223.66	1.41
	1,420	14.00	3,280	475,635	6,699	465,922	6,562	71.00	187.11	200.15	213.18	1.42
	1,420	16.00	3,280	539,943	7,605	530,229	7,468	71.00	208.01	221.05	234.08	1.42
	1,420	18.00	3,280	603,697	8,503	593,983	8,366	71.00	228.85	241.89	254.93	1.42
	1,620	16.00	3,480	754,328	9,313	745,173	9,200	81.00	218.73	231.02	243.31	1.43
	1,620	18.00	3,480	844,365	10,424	835,210	10,311	81.00	241.21	253.50	265.79	1.43
	1,620	20.00	3,480	933,722	11,527	924,567	11,414	81.00	263.63	275.92	288.21	1.43
	1,820	18.00	3,680	1,132,725	12,448	1,124,067	12,352	91.00	252.23	263.85	275.47	1.44
	1,820	20.00	3,680	1,253,497	13,775	1,244,839	13,680	91.00	276.11	287.73	299.35	1.44
	1,820	22.00	3,680	1,373,457	15,093	1,364,799	14,998	91.00	299.94	311.56	323.18	1.44
	1,820	25.00	3,680	1,551,884	17,054	1,543,226	16,959	91.00	335.59	347.21	358.83	1.44

Intermediate pile tkL 603 triple pile

Other intermediate piles on request

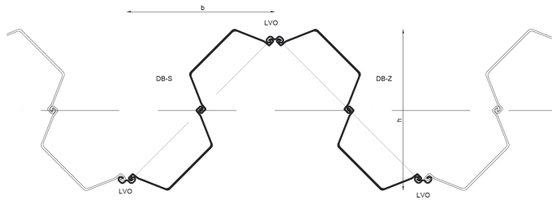
Pipe / sheet pile wall with Hoesch 1807 double pile iintermediate piles	Pipe diameter Da mm	Wall thickness t mm	Width b m	Including intermediate piles: Moment of inertia I_y cm⁴/m	Including intermediate piles: Section modulus W_y cm³/m	Excluding intermediate piles: Moment of inertia I_y cm⁴/m	Excluding intermediate piles: Section modulus W_y cm³/m	Edge distance ep cm	Dead load related to pipe length - Length of connector as % of pipe length: 60% kg/m²	80% kg/m²	100% kg/m²	Coating area Wasser side m²/m
	813	10.00	2,273	112,875	2,777	89,469	2,201	40.65	132.47	147.59	162.71	1.38
	813	12.00	2,273	129,976	3,197	106,570	2,622	40.65	149.64	164.75	179.87	1.38
	813	14.00	2,273	146,819	3,612	123,413	3,036	40.65	166.72	181.83	196.95	1.38
	819	10.00	2,279	114,593	2,798	91,249	2,228	40.95	132.77	147.85	162.93	1.38
	819	12.00	2,279	132,040	3,224	108,696	2,654	40.95	150.02	165.10	180.18	1.38
	819	14.00	2,279	149,226	3,644	125,882	3,074	40.95	167.19	182.26	197.34	1.38
	914	10.00	2,374	144,629	3,165	122,219	2,674	45.70	137.33	151.80	166.28	1.39
	914	12.00	2,374	168,109	3,679	145,699	3,188	45.70	155.86	170.34	184.81	1.39
	914	14.00	2,374	191,275	4,185	168,865	3,695	45.70	174.31	188.78	203.26	1.39
	1,016	10.00	2,476	182,977	3,602	161,490	3,179	50.80	141.83	155.71	169.59	1.40
	1,016	12.00	2,476	214,130	4,215	192,643	3,792	50.80	161.63	175.51	189.39	1.40
	1,016	14.00	2,476	244,908	4,821	223,422	4,398	50.80	181.35	195.23	209.11	1.40
	1,220	12.00	2,680	329,843	5,407	309,992	5,082	61.00	171.86	184.68	197.50	1.41
	1,220	14.00	2,680	379,728	6,225	359,877	5,900	61.00	193.83	206.65	219.47	1.41
	1,220	16.00	2,680	429,113	7,035	409,262	6,709	61.00	215.73	228.55	241.37	1.41
	1,420	14.00	2,880	549,106	7,734	530,633	7,474	71.00	204.35	216.28	228.21	1.42
	1,420	16.00	2,880	622,345	8,765	603,872	8,505	71.00	228.15	240.08	252.01	1.42
	1,420	18.00	2,880	694,953	9,788	676,481	9,528	71.00	251.89	263.82	275.75	1.42
	1,620	16.00	3,080	859,221	10,608	841,948	10,394	81.00	238.96	250.11	261.27	1.43
	1,620	18.00	3,080	960,951	11,864	943,678	11,650	81.00	264.36	275.51	286.67	1.43
	1,620	20.00	3,080	1,061,914	13,110	1,044,641	12,897	81.00	289.69	300.85	312.00	1.43
	1,820	18.00	3,280	1,277,368	14,037	1,261,149	13,859	91.00	275.31	285.78	296.26	1.44
	1,820	20.00	3,280	1,412,868	15,526	1,396,649	15,348	91.00	302.10	312.58	323.05	1.44
	1,820	22.00	3,280	1,547,458	17,005	1,531,238	16,827	91.00	328.84	339.31	349.79	1.44
	1,820	25.00	3,280	1,747,645	19,205	1,731,425	19,027	91.00	368.83	379.31	389.78	1.44

Intermediate pile Hoesch 1807 double pile

Other intermediate piles on request

Jagged Wall

The Jagged Wall is an economical solution for shoring structures with high requirements in terms of resistance and moment of inertia. In this design, U-profiles are driven at an angle of 45° along the shoring axis. This arrangement allows conventional U-profiles to achieve moments of resistance of up to 8,108 cm³/m, enabling retaining walls with high loads to be implemented economically.



Profile	Width b mm	Height h mm	Weight kg/m²	Moment of inertia I_y* cm⁴/m	Moment of inertia I_y cm⁴/m	Elastic section modulus W_y* cm³/m	Elastic section modulus W_y cm³/m	Static moment S_y cm³/m	Static moment S_y cm³/m
tkL 601	912	910	116,4	126.475	162.021	2.897	3.562	1.782	2.191
tkL 601FP	912	910	118,8	129.303	164.849	2.962	3.624	1.820	2.229
tkL 601K	912	910	121,2	132.231	167.777	3.029	3.689	1.865	2.274
tkL 602A	912	910	127,4	139.717	175.263	3.198	3.853	1.968	2.377
tkL 602	912	910	131,9	145.271	180.817	3.325	3.975	2.048	2.458
tkL 602K	912	910	136,4	150.804	186.350	3.452	4.097	2.128	2.538
tkL 603A	912	929	149,7	176.885	212.431	3.806	4.571	2.424	2.834
tkL 603	912	930	155,6	184.720	220.266	3.975	4.739	2.536	2.945
tkL 603KN	912	930	161,5	191.902	227.448	4.128	4.893	2.633	3.042
tkL 603K	912	930	163,5	194.546	230.091	4.185	4.950	2.668	3.078
tkL 603N	912	910	153,9	190.423	225.969	4.199	4.968	2.575	2.984
tkL 603Z	912	930	173,0	206.874	242.420	4.447	5.211	2.832	3.241
tkL 604A	912	978	170,6	223.396	258.942	4.570	5.297	2.941	3.350
tkL 604	912	978	175,2	230.065	265.611	4.706	5.433	3.031	3.440
tkL 604K	912	978	179,8	236.841	272.386	4.845	5.572	3.122	3.531
tkL 605A	912	990	182,6	249.309	284.855	5.039	5.757	3.243	3.653
tkL 605N	912	992	194,9	270.008	305.554	5.446	6.162	3.514	3.923
tkL 606A	912	994	202,1	284.767	320.313	5.731	6.446	3.700	4.110
tkL 606AN	912	995	211,7	300.868	336.414	6.046	6.760	3.909	4.319
tkL 606N	912	997	221,2	317.023	352.569	6.362	7.075	4.119	4.528
tkL 628 - 1,5	912	1.009	223,5	326.967	362.513	6.479	7.183	4.204	4.613
tkL 628AN	912	1.010	229,4	337.151	372.697	6.675	7.379	4.334	4.744
tkL 628A	912	1.011	235,9	348.499	384.044	6.893	7.596	4.479	4.889
tkL 628	912	1.011	238,1	352.163	387.709	6.964	7.666	4.526	4.936
tkL 628K	912	1.012	241,8	358.734	394.280	7.090	7.792	4.610	5.020
tkL 607A	912	1.002	247,8	367.913	403.458	7.340	8.049	4.743	5.153

* Static values excluding the corner sections

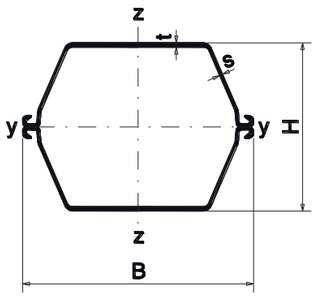
LARSSEN steel piles

Larssen steel piles, also known as dolphins, are essential elements for shipping channels and harbors. They serve as robust anchoring points for ships, protect shore areas and ensure a safe infrastructure. Thanks to their high stability and resistance to weathering and currents, they are a reliable solution for maritime structures. a reliable solution for maritime structures.

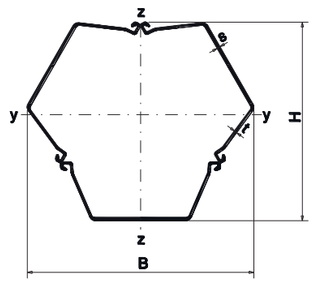


Advantages

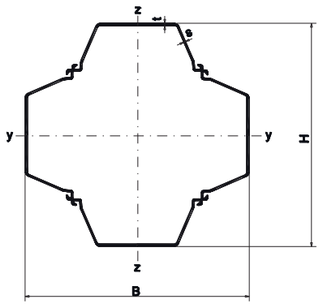
- High stability and resistance to weather conditions and currents
- Reliable solution for maritime structures



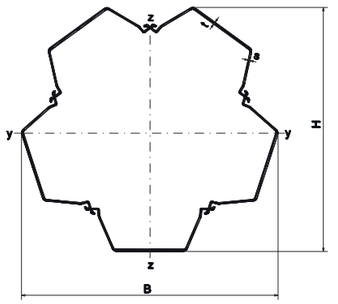
Pile sections	Section modulus W_y cm³	Section modulus W_z cm³	Weight kg/m	Dimensions b mm	Dimensions h mm	Dimensions t mm	Dimensions s mm	Peri-meter cm	Area Steel cross section cm²	Moment of inertia I_y cm⁴	Moment of inertia I_z cm⁴	Radius of gyration min.i cm
terra Infrastructure LP												
LP 601	1,047	1,532	92.6	632	348	7.5	6.4	188	118.0	18,229	48,407	12.43
LP 602	1,197	1,771	106.8	633	350	8.4	7.6	188	136.0	20,976	56,067	12.42
LP 603	1,692	2,209	128.4	638	363	9.6	8.2	202	163.6	30,718	70,370	13.70
LP 603 Z	1,863	2,554	144.2	638	369	10.0	10.0	202	183.7	34,350	81,479	13.67
LP 604 A	2,161	2,525	142.0	638	435	9.6	8.8	214	181.0	46,946	80,555	16.10
LP 604	2,238	2,582	146.2	638	435	10.0	9.0	214	186.3	48,661	82,354	16.16
LP 605 N	2,764	2,753	164.2	638	467	12.0	9.5	219	209.2	64,607	87,814	17.57
LP 605 KN	2,898	2,848	171.2	638	469	12.6	10.0	219	218.1	67,950	90,864	17.65
LP 606 A	3,006	2,748	170.8	638	475	13.4	9.0	219	217.6	71,383	87,654	18.11
LP 606 N	3,414	2,925	188.2	638	479	15.4	9.8	220	239.7	81,740	93,307	18.47
LP 628	3,854	3,127	203.6	638	501	16.3	10.1	224	259.3	96,479	99,740	19.29
LP 607 A	4,033	3,193	212.4	638	499	17.7	10.0	222	270.7	100,704	101,843	19.29
LP 607	4,190	3,427	224.8	638	502	19.0	10.6	223	286.3	105,163	109,326	19.17
LP 607 K	4,290	3,605	233.6	638	504	20.0	11.0	223	297.5	108,118	114,994	19.06
terra Infrastructure LD												
LD 601	3,000	2,999	138.9	745	724	7.5	6.4	278	177.0	111,704	111,704	25.12
LD 602	3,457	3,454	204.0	747	727	8.4	7.6	279	204.0	129,056	129,056	25.15
LD 603	4,450	4,097	192.6	818	737	9.6	8.2	299	245.3	167,522	167,522	26.13
LD 603 Z	5,022	4,612	216.3	823	741	10.0	10.0	300	275.6	189,690	189,690	26.24
LD 604 A	5,223	4,709	213.0	879	773	9.6	8.8	317	271.5	207,010	207,010	27.61
LD 604	5,379	4,850	219.3	879	773	10.0	9.0	317	279.4	213,276	213,276	27.63
LD 605 N	6,085	5,573	246.3	901	791	12.0	9.5	324	313.8	251,195	251,195	28.29
LD 605 KN	6,346	5,817	256.8	902	791	12.6	10.0	325	327.1	262,422	262,422	28.32
LD 606 A	6,359	5,850	256.2	906	794	13.4	9.0	326	326.4	264,870	264,870	28.49
LD 606 N	7,041	6,483	282.3	909	796	15.4	9.8	327	359.6	294,669	294,669	28.63
LD 628	7,664	7,083	305.4	929	809	16.3	10.1	332	389.0	329,063	329,063	29.08
LD 607 A	8,004	7,453	318.6	921	806	17.7	10.0	330	406.0	343,170	343,170	29.07
LD 607	8,478	7,898	337.2	923	807	19.0	10.6	331	429.5	364,602	364,602	29.14
LD 607 K	8,822	8,223	350.4	925	808	20.0	11.0	331	446.3	380,300	380,300	29.19



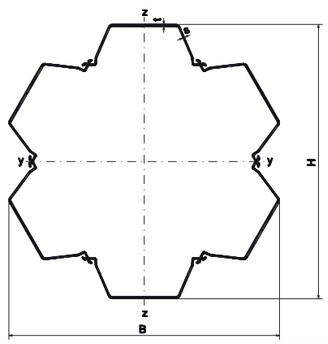
1. Further (special) sections on request
2. Steel plates can be additionally welded on to increase the static values



Pile sections	Section modulus W_y cm³	Section modulus W_z cm³	Weight kg/m	b mm	H mm	Dimensions t mm	Dimensions s mm	Peri-meter cm	Area Steel cross section cm²	Moment of inertia I_y cm⁴	Moment of inertia I_z cm⁴	Radius of gyration min.i cm
terra Infrastructure p LV												
LV 601	5,335		185.2	968	968	7.5	6.4	369	236.0		258,198	33.08
LV 602	6,145		213.6	971	971	8.4	7.6	369	272.0		298,312	33.12
LV 603	7,744		256.8	986	986	9.6	8.2	397	327.1		381,896	34.17
LV 603 Z	8,684		288.4	993	993	10.0	10.0	398	367.4		431,074	34.25
LV 604 A	8,718		284.0	1,059	1,059	9.6	8.8	421	362.0		461,491	35.70
LV 604	8,982		292.4	1,059	1,059	10.0	9.0	421	372.6		475,644	35.73
LV 605 N	10,211		328.4	1,092	1,092	12.0	9.5	430	418.5		557,375	36.49
LV 605 KN	10,656		342.4	1,093	1,093	12.6	10.0	431	436.2		582,398	36.54
LV 606 A	10,695		341.6	1,099	1,099	13.4	9.0	432	435.2		587,726	36.75
LV 606 N	11,863		376.4	1,103	1,103	15.4	9.8	433	479.5		654,278	36.94
LV 628	12,920		407.2	1,125	1,125	16.3	10.1	441	518.7		726,613	37.43
LV 607 A	13,517		424.8	1,124	1,124	17.7	10.0	438	541.3		759,384	37.46
LV 607	14,329		449.6	1,126	1,126	19.0	10.6	439	572.6		806,845	37.54
LV 607 K	14,919		467.2	1,128	1,128	20.0	11.0	440	595.1		841,559	37.61



terra Infrastructure LF												
LF 604 A	13,176	12,645	355.0	1,352	1,290	9.6	8.8	524	452,5	856.845	854.275	43.45
LF 604	13,524	12,966	365.5	1,352	1,290	10.0	9.0	524	465,5	879.595	876.751	43.40
LF 605 N	15,409	14,859	410.5	1,379	1,314	12.0	9.5	532	523,0	1.024.299	1.024.823	44.26
LF 605 KN	16,069	15,486	428.0	1,379	1,314	12.6	10.0	532	545,5	1.068.055	1.068.090	44.25
LF 606 A	16,087	15,508	427.0	1,382	1,318	13.4	9.0	537	544,0	1.075.901	1.071.598	44.38
LF 606 N	17,885	17,304	470.5	1,386	1,323	15.4	9.8	537	599,5	1.200.892	1.197.124	44.69
LF 628	19,455	18,763	509.0	1,406	1,345	16.3	10.1	545	648,5	1.330.228	1319.432	45.11
LF 607 A	20,462	19,754	531.0	1,401	1,340	17.7	10.0	544	676,5	1.395.953	1384.162	45.23
LF 607	21,637	20,975	562.0	1,404	1,342	19.0	10.6	544	716,0	1.478.955	1.472.440	45.35
LF 607 K	22,539	21,869	584.0	1,406	1,344	20.0	11.0	544	744,0	1.543.947	1.537.415	45.46



terra Infrastructure LS												
LS 604 A	18,121	18,962	426.0	1,504	1,535	9.6	8.8	632	543,0	1.390.812	1.425.933	50.61
LS 604	18,589	19,476	438.6	1,504	1,535	10.0	9.0	632	558,6	1.427.288	1.464.623	50.55
LS 605 N	21,220	22,397	492.6	1,530	1,561	12.0	9.5	638	627,6	1.665.526	1.713.384	51.36
LS 605 KN	22,139	23,345	513.6	1,530	1,561	12.6	10.0	638	654,6	1.727.179	1.785.918	51.37
LS 606 A	22,198	23,191	512.4	1,536	1,569	13.4	9.0	643	652,8	1.745.858	1.767.140	51.71
LS 606 N	24,686	26,021	564.6	1,540	1,571	15.4	9.8	643	719,4	1.938.243	2.002.728	51.91
LS 628	26,879	28,165	610.8	1,556	1,596	16.3	10.1	654	778,2	2.144.918	2.191.217	52.50
LS 607 A	28,182	29,642	637.2	1,548	1,592	17.7	10.0	650	811,8	2.244.228	2.294.323	52.58
LS 607	29,841	31,434	674.4	1,552	1,595	19.0	10.6	650	859,2	2.379.842	2.439.270	52.63
LS 607 K	31,090	32,782	700.8	1,554	1,597	20.0	11.0	650	892,8	2.482.569	2.547.128	52.73

1. Further (special) sections on request
2. Steel plates can be additionally welded on to increase the static values

COLD-ROLLED SHEET PILING

Trench sheets

Our trench sheets are used for the reliable shoring of trenches, shafts, and excavations. Such sections are used when sealed interlocks are not necessary.



Advantages

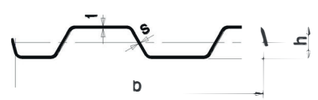
- Tailored for modern driving equipment in terms of shape, material thickness, construction width, and quality of steel
- Especially suitable for urban channel construction as trench cladding
- Intensive mutual overlapping guarantees low soil permeability

Trench sheets		Section modulus Wy cm³/m	Weight Wall kg/m²	Weight Single pile kg/m	Moment of inertia ly cm4/m	Width b mm	Height h mm	Flange thickness t mm	Web thickness s mm
KD VI	KD VI/6	184	62.00	37.50	718	600	78	6.0	6.0
	KD VI/8	237	83.00	50.00	947	600	80	8.0	8.0
	KD VI/9	263	92.55	55.53	1,066	600	81	9.0	9.0

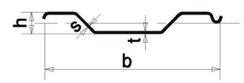
Trench sheets		Section modulus W_y cm³/m	Weight Wall kg/m²	Weight Single pile kg/m	Moment of inertia I_y cm⁴/m	Width b mm	Height h mm	Flange thickness t mm	Web thickness s mm
KD 4	KD 4/5	84	46.30	18.52	208	400	49	5.0	5.0
	KD 4/6	99	55.57	22.23	250	400	50	6.0	6.0

Forms of supply for trench sheets

E
KDVI

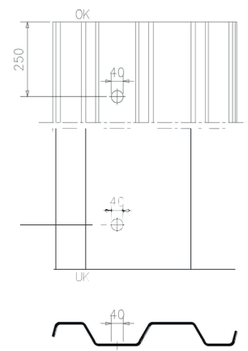


E
KD 4



Trench sheeting is only supplied as single piles (S) with handling holes

Handling holes, KD VI trench sheets



Handling holes KD VI and KD 4 trench sheets
250 from top edge
250 mm from bottom edge, standard form

Lightweight sections

Lightweight sections are mainly used for trench shoring in inner city applications and for upgrading dikes. The sections are manufactured in lengths of up to 17 m. For structures requiring greater watertightness, e. g. flood protection, we can supply the sections with an interlock filling made from a durable, pliable bitumen compound.

Advantages

- In comparison to trench sheets, lightweight sections have interlock connections and can be used in applications with flowing soil types or in areas with groundwater
- With additional seal excellent for flood protection structures in dykes



Forms of supply for FLP lightweight sections

Ea



Single pile in A-position (non-standard form)

Eb



Single pile in B position (standard form)

Da



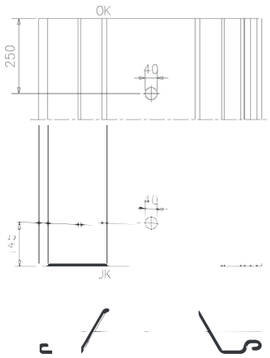
Double piles (Da) to special order only

Db



Double piles (D b) to special order only

Handling holes FLP lightweight sections



The lightweight sections are supplied with handling holes. Hand ling holes are provided at both ends according to the above drawing.

Lightweight sections		Section modulus W_y cm³/m	Weight Wall kg/m²	Weight Single pile kg/m	Moment of inertia I_y cm⁴/m	Width b mm	Height h mm	Flange thickness t mm	Web thickness s mm
FLP 700	FLP 700-4	276	44.85	31.40	2,061	700	147	4.0	4.0
	FLP 700-5	343	56.20	39.40	2,576	700	148	5.0	5.0
	FLP 700-6	409	66.90	47.20	3,084	700	149	6.0	6.0
	FLP 700-7	474	77.60	54.34	3,591	700	150	7.0	7.0
	FLP 700-8	540	88.45	61.90	4,100	700	151	8.0	8.0

Lightweight sections		Section modulus W_y cm³/m	Weight Wall kg/m²	Weight Single pile kg/m	Moment of inertia I_y cm⁴/m	Width b mm	Height h mm	Flange thickness t mm	Web thickness s mm
FLP 750	FLP 750-6	788	76.60	57.46	11,375	750	283	6.0	6.0
	FLP 750-7	912	89.30	67.00	13,263	750	284	7.0	7.0
	FLP 750-8	1,044	102.00	76.60	15,170	750	285	8.0	8.0

Lightweight sections		Section modulus W_y cm³/m	Weight Wall kg/m²	Weight Single pile kg/m	Moment of inertia I_y cm⁴/m	Width b mm	Height h mm	Flange thickness t mm	Web thickness s mm
FLP 840	FLP 840-6	617	68.40	57.46	7,832	840	250	6.0	6.0
	FLP 840-7	718	79.76	67.00	9,128	840	251	7.0	7.0
	FLP 840-8	817	91.20	76.61	10,474	840	252	8.0	8.0

* Only on request

Lightweight Z sections		Section modulus W_y cm³/m	Weight Wall kg/m²	Weight Single pile kg/m	Moment of inertia I_y cm⁴/m	Width b mm	Height h mm	Flange thickness t mm	Web thickness s mm
ZP 700	ZP 700-6	1,289	72.85	51.00	28,351	700	440	6.0	6.0
	ZP 700-7	1,500	85.00	59.50	33,060	700	441	7.0	7.0
	ZP 700-8	1,709	97.14	68.00	37,765	700	442	8.0	8.0

Lightweight Z sections		Section modulus W_y cm³/m	Weight Wall kg/m²	Weight Single pile kg/m	Moment of inertia I_y cm⁴/m	Width b mm	Height h mm	Flange thickness t mm	Web thickness s mm
ZP 774	ZP 774-6	982	65.90	51.00	18,436	774	375	6.0	6.0
	ZP 774-7	1,142	76.90	59.50	21,497	774	376	7.0	7.0
	ZP 774-8	1,300	87.90	68.00	24,555	774	377	8.0	8.0

Lightweight Z sections		Section modulus W_y cm³/m	Weight Wall kg/m²	Weight Single pile kg/m	Moment of inertia I_y cm⁴/m	Width b mm	Height h mm	Flange thickness t mm	Web thickness s mm
ZP 809	ZP 809-6	830	63.00	51.00	13,905	809	335	6.0	6.0
	ZP 809-7	965	73.50	59.50	16,213	809	336	7.0	7.0
	ZP 809-8	1,100	84.00	68.00	18,518	809	337	8.0	8.0

Terms of delivery and steel grades

The terms of delivery and tolerances for hot-rolled steel sheet piles are in accordance with DIN EN 10248. Cold-rolled sheet piles are supplied in steel grade S 275 JR to DIN EN 10249.

Excerpt from the tolerances for form and dimensions for hot-rolled sheet piling made from unalloyed steels to DIN EN 10248-2

Wall thickness, U-sections	t: ≤ 8.5 mm = ± 0.5 mm; > 8.5 mm = ± 6 % t s: ≤ 8.5 mm = – 0.5 mm; > 8.5 mm = – 6 % s *
Wall thickness, Z-sections and straight-web sections	t, s: ≤ 8.5 mm = ± 0.5 mm > 8.5 mm = ± 6 % s, t
Section width	Single pile ± 2 %; double pile ± 3 %
Section length	Lengths of sections may deviate by ±200 mm from ordered lengths
Section height, U-sections	≤ 200 mm = ± 4 mm > 200 mm = ± 5 mm
Section height, Z-sections	≤ 200 mm = ± 5 mm from 200 to 300 mm = ± 6 mm > 300 mm = ± 7 mm
Weight	Max. ±5% margin between calculated weight (according to section tables) and measured weight of total delivery

* Positive tolerances are usually a matter for the manufacturer's discretion
Positive tolerances can be agreed upon placing an order. In this case the following values should be used: +0.5 mm for s < 8.5 mm and +6% of s for s > 8.5 mm

Excerpt from the tolerances for form and dimensions for cold-rolled sheet piling made from unalloyed steels to DIN EN 10249-2

Wall thickness for nominal width Up to 1,200 mm	from 4.00 to 5.00 mm = ± 0.24 mm from 5.00 to 6.00 mm = ± 0.26 mm from 6.00 to 8.00 mm = ± 0.29 mm
Wall thickness for nominal width 1,200 to 1,500 mm	from 4.00 to 5.00 mm = ± 0.26 mm from 5.00 to 6.00 mm = ± 0.28 mm from 6.00 to 8.00 mm = ± 0.30 mm
Section width	Single pile ± 2 %; double pile ± 3 %
Section length	Lengths of sections may deviate by ±50 mm from ordered lengths
Section height	≤ 200 mm section height ±4 mm
Weight	Max. ±7% margin between calculated weight (according to section tables) and measured weight of total delivery

All information without guarantee
Errors and changes excepted

Steel grade

The steel grades used for our hot-rolled steel sheet piles comply with DIN EN 10248-1 and for our cold-rolled sheet piles DIN EN 10249-1.

Hot-rolled sheet piling sections to DIN EN 102481

Steel grade	Tensile strength N/mm	Minimum yield strength N/mm²	Minimum elongation %
S 270 GP	410	270	24
S 355 GP	480	355	22
S 390 GP	490	390	20
S 430 GP	510	430	19

Steel grades for cold-rolled trench sheeting and lightweight sections to DIN EN 102491

Steel grade	Tensile strength N/mm²	Minimum yield strength N/mm²	Minimum elongation %
S 275 JR	410	275	23
S 355 JO	470	355	22

Standardized steels for combined sheet piling

Steel grade	Standard
General structural steels	EN 10025
Fine-grain structural steels	EN 10113
Weathering steels	EN 10155
Steels for sheet piling	EN 10248
Special steels, PT series	PT material standard

Special works steels with minimum yield strengths of 355 to 460 N/mm2

Further steels on request E.g. BS, NF, ASTM, JIS, CSAG, GOST, UNI

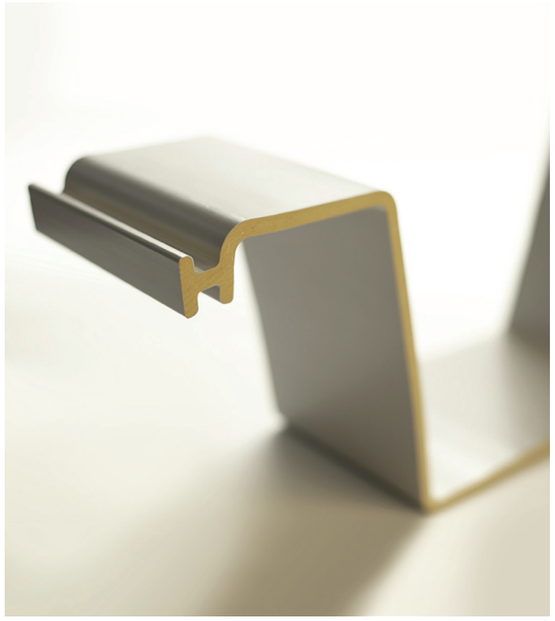
All section dimensions can be supplied to current national and international standards, also to customer specification if required. A selection can be found in the "steel grades" table.

PVC sheet piles

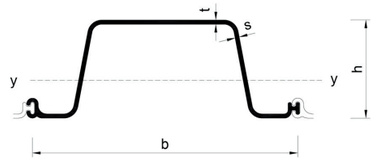
Our PVC sheet piles are the ideal solution for use in hydraulic engineering and construction projects. They are corrosion-proof and UV-resistant, making them ideal for long-term outdoor use. The range includes matching accessories such as corner sections, sealing elements, beams and installation aids.

The versatile applications range from hydraulic barriers and bank protection to the construction of canals and river beds to dams, footbridges and urban development applications.

Advantages
- Lightweight
- Corrosion-proof and UV-resistant
- Quick and easy installation
- Maintenance-free and durable

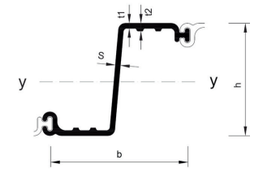


U-Profile *

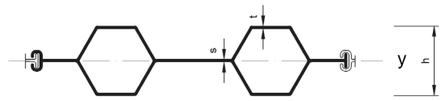


Profile	Elastic section modulus W_y cm³/m	Design bending moment M_{Rd} kN/m	Weight kg/m²	Weight Single pile kg/m	Moment of inertia I_y cm⁴/m	Flange thickness t mm	Web thickness s mm	Height h mm	Section width b mm
GW 450	273	5,47	10,90	5,1	2.107	4	4	140	460
GW 460	397	7,94	15,70	7,2	2.976	5,8	5,8	140	460
GW 590	754	15,0	18,80	11,3	9.034	6,8	6,8	220	600
GW 595	772	15,5	19,70	11,8	9.041	7,1	7,1	220	600
GW 600	967	19,3	23,00	13,5	10.063	8,0	8,0	220	600
GW 620	1.046	21,0	25,00	15,0	12.730	9,5	9,5	225	600
GW 622	1.129	22,6	25,35	15,2	14.021	9,8	9,8	230	600
GW 625	1.244	24,9	25,00	16,2	14.992	9,5	9,5	240	650
GW 650	1.366	27,3	26,34	17,2	16.180	10,5	10,5	240	650

Z-Profile *

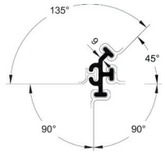
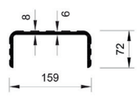
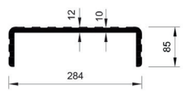


Profile	Elastic section modulus W_y cm³/m	Design bending moment M_{Rd} kN/m	Weight kg/m²	Weight Single pile kg/m	Moment of inertia I_y cm⁴/m	Flange thickness t mm	Web thickness s mm	Height h mm	Section width b mm
GW 270	451	9,0	13,3	3,6	3.612	5,6	5,6	160	270
GW 630-9	1.638	32,7	33,3	10,0	20.066	9,2/15,2	9,2	245	300
GW 630-11	1.867	37,3	34,8	11,6	22.880	11,3/17,3	11,3	245	300



Profile	Elastic section modulus W_y cm³/m	Design bending moment M_{Rd} kN/m	Weight kg/m²	Weight Single pile kg/m	Moment of inertia I_y cm⁴/m	Flange thickness t mm	Web thickness s mm	Height h mm	Section width b mm
GW 500	136	3,2	16,8	8,4	676	5/7	5	72	500
GW 500 BIS	101	4,0	18,4	9,2	1.268	5/7	5	85,5	500
GW 560	245	4,9	16,0	9,6	1.652	5	5	134	600

Accessoires *

	Profile	Weight kg/m	Flange thickness t mm	Web thickness s mm	Height h mm	Section width b mm
	Corner profile	GW 001	3,4	9	9	-	-
	Waler cover	GW 502	3,1	8 / 6	8 / 6	72	159
	Waler cover	GW 503	7,4	12,0 / 10	12,0 / 10	85	284

*Additional accessories available upon request

STEEL BEAMS:
VERSATILE, HIGH QUALITY BUILDING PRODUCTS

Wide flange beams

Whether for soldier pile walls, wallings, stiffening, or foundation elements, our wide flange beams from the HEB, HEA, or HEM series are highly versatile.

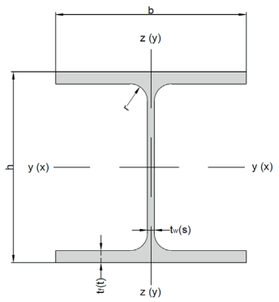


Advantages

- Flexible retaining element (soldier pile wall)
- Low noise emissions during installation in pre-drilled holes
- Can be shortened on the construction site
- Recoverable and therefore reduced CO_2 emissions

Wide Flange Beam HEA

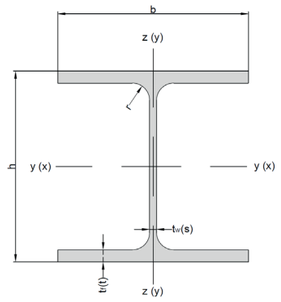
According to DIN 1025-3 / EN 10365, Tolerances according to EN 10034



Section designation HEA	Trade weight kg/m	Depth h mm	Width b mm	Web thickness s mm	Flange thickness t mm	Elastic section modulus Wy cm^3	Moment of inertia Iy cm^4
100	17.10	96	100	5.0	8.0	72.8	349
120	20.40	114	120	5.0	8.0	106	606
140	25.30	133	140	5.5	8.5	155	1,033
160	31.20	152	160	6.0	9.0	220	1,673
180	36.40	171	180	6.0	9.5	294	2,510
200	43.00	190	200	6.5	10.0	389	3,692
220	52.00	210	220	7.0	11.0	515	5,410
240	62.00	230	240	7.5	12.0	675	7,763
260	70.00	250	260	7.5	12.5	836	10,455
280	78.00	270	280	8.0	13.0	1,013	13,673
300	90.00	290	300	8.5	14.0	1,260	18,263
320	100.00	310	300	9.0	15.5	1,479	22,929
340	108.00	330	300	9.5	16.5	1,678	27,693
360	115.00	350	300	10.0	17.5	1,891	33,090
400	128.00	390	300	11.0	19.0	2,311	45,069
450	143.00	440	300	11.5	21.0	2,896	63,722
500	159.00	490	300	12.0	23.0	3,550	86,975
550	170.00	540	300	12.5	24.0	4,146	111,930
600	182.00	590	300	13.0	25.0	4,787	141,210
650	195.00	640	300	13.5	26.0	5,474	175,180
700	209.00	690	300	14.5	27.0	6,241	215,300
800	230.00	790	300	15.0	28.0	7,682	303,440
900	258.00	890	300	16.0	30.0	9,485	422,070
1,000	279.00	990	300	16.5	31.0	11,189	553,850

Wide Flange Beam HEB

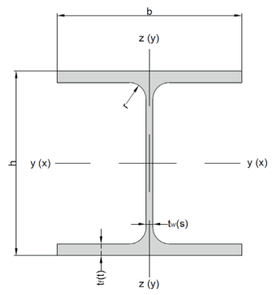
According to DIN 1025-3 / EN 10365, Tolerances according to EN 10034



Section designation HEB	Trade weight kg/m	Depth h mm	Width b mm	Web thickness s mm	Flange thickness t mm	Elastic section modulus Wy cm^3	Moment of inertia Iy cm^4
100	20.9	100	100	6.0	10.0	89.9	450
120	27.4	120	120	6.5	11.0	144	864
140	34.5	140	140	7.0	12.0	216	1.509
160	43.7	160	160	8.0	13.0	312	2,492
180	52.5	180	180	8.5	14.0	426	3,831
200	63.0	200	200	9.0	15.0	570	5,696
220	73.0	220	220	9.5	16.0	736	8,091
240	85.0	240	240	10.0	17.0	938	11,259
260	95.0	260	260	10.0	17.5	1,148	14,919
280	106.0	280	280	10.5	18.0	1,376	19,270
300	120.0	300	300	11.0	19.0	1,678	25,166
320	130.0	320	300	11.5	20.5	1,926	30,824
340	137.0	340	300	12.0	21.5	2,156	36,656
360	146.0	360	300	12.5	22.5	2,400	43,193
400	159.0	400	300	13.5	24.0	2.884	57,680
450	175.0	450	300	14.0	26.0	3.551	79,888
500	192.0	500	300	14.5	28.0	4.287	107,180
550	204.0	550	300	15.0	29.0	4.971	136,690
600	217.0	600	300	15.5	30.0	5.701	171,040
650	231.0	650	300	16.0	31.0	6.480	210,620
700	247.0	700	300	17.0	32.0	7.340	256,890
800	269.0	800	300	17.5	33.0	8.977	359,080
900	298.0	900	300	18.5	35.0	10.979	494,060
1,000	322.0	1,000	300	19.0	36.0	12.895	644,750

Wide Flange Beam HEM

According to DIN 1025-4 / EN 10365 - Tolerances according to EN 10034



Section designation HEM	Trade weight kg/m	Depth h mm	Width b mm	Web thickness s mm	Flange thickness t mm	Elastic section modulus Wy cm^3	Moment of inertia Iy cm^4
100	42.80	120	106	12.0	20.0	190	1,143
120	53.40	140	126	12.5	21.0	288	2,018
140	64.80	160	146	13.0	22.0	411	3,291
160	78.10	180	166	14.0	23.0	567	5,098
180	91.10	200	186	14.5	24.0	748	7,483
200	106.00	220	206	15.0	25.0	967	10,642
220	120.00	240	226	15.5	26.0	1,217	14,605
240	161.00	270	248	18.0	32.0	1,799	24,289
260	176.00	290	268	18.0	32.5	2,159	31,307
280	194.00	310	288	18.5	33.0	2,551	39,547
300	244.00	340	310	21.0	39.0	3,482	59,201
320	251.00	359	309	21.0	40.0	3,796	68,135
340	254.00	377	309	21.0	40.0	4,052	76,372
360	256.00	395	308	21.0	40.0	4,297	84,867
400	262.00	432	307	21.0	40.0	4,820	104,120
450	270.00	478	307	21.0	40.0	5,501	131,480
500	277.00	524	306	21.0	40.0	6,180	161,930
550	285.00	572	306	21.0	40.0	6,923	197,980
600	292.00	620	305	21.0	40.0	7,660	237,450
650	300.00	668	305	21.0	40.0	8,433	281,670
700	309.00	716	304	21.0	40.0	9,198	329,280
800	325.00	814	303	21.0	40.0	10,875	442,600
900	341.00	910	302	21.0	40.0	12,537	570,430
1,000	358.00	1,008	302	21.0	40.0	14,331	722,300

Standard steel grade S235 Other steel grades on request

Double U-profiles

Double U-beams can be used as retaining element or waling in marine engineering, road construction and civil engineering. In particular, the combination of double U-beams with tie-back systems such as round steel anchors or micropiles makes it possible to realize construction projects economically.

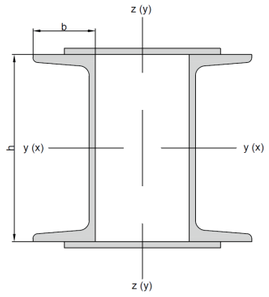
Advantages
- Versatile use, e.g. as walling or retaining system
- High load-bearing capacity
- Ecological due to high reusability



Double U Sections

According to EN 10365 *Tolerances according to EN 10279 *

Section designation UU	Double U Trade weight g kg/m	Depth h mm	Width b mm	Elastic section modulus Wy cm^3	Moment of inertia Iy cm^4
80	18.7	80	45	26.5	105.9
100	22.9	100	50	41.1	205.3
120	28.8	120	55	60.7	364.3
140	34.5	140	60	86.4	604.8
160	40.6	160	65	115.6	924.7
180	47.3	180	70	150.4	1,354
200	54.6	200	75	191.1	1,911
220	63.0	220	80	244.7	2,691
240	71.4	240	85	299.9	3,599
260	83.0	260	90	371.1	4,824
280	90.3	280	95	448.3	6,276
300	100.8	300	100	535.2	8,028
320	128.1	320	100	679.3	10,870
350	130.2	340	100	734.0	12,840
380	136.5	360	102	829.2	15,760
400	155.4	400	110	1,018.0	20,350



* Single U Section Standard steel grade S235 Other steel grades on request

UNP/UPE

Thanks to their high stability and load-bearing capacity, they offer a reliable solution for construction projects that require durable and resistant structures. Their standardized C-shape allows for easy connection with other components and ensures efficient load distribution.

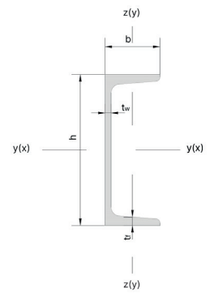
Advantages
- High load-bearing capacity
- Ideally suited for load-bearing structures, bridges and foundations
- Good welding, bolting and processing properties



UNP /UPN

In accordance with EN 10365 – Tolerances in accordance with EN 10279

Designation UNP /UPN	Netweight g kg/m	Height h mm	Width b mm	Web thickness t_w mm	Flange thickness t_f mm	Modulus of elasticity W_y cm^3	Moment of inertia I_y cm^4
200	26	200	75	8,5	11,5	191,1	1.911
220	30	220	80	9,0	12,5	244,7	2.691
240	34	240	85	9,5	13,0	299,9	3.599
260	39	260	90	10,0	14,0	371,1	4.824
280	43	280	95	10,0	15,0	448,3	6.276
300	48	300	100	10,0	16,0	535,2	8.028
320	61	320	100	14,0	17,5	679,3	10.870
350	62	350	100	14,0	16,0	734,0	12.840
380	65	380	102	13,5	16,0	829,2	15.760
400	74	400	110	14,0	18,0	1.018,0	20.350

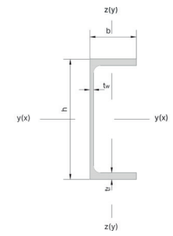


* Additional dimensions available upon request
Standard steel grade: S235 JR. Other steel grades available upon request

UPE

In accordance with EN 10365 – Tolerances in accordance with EN 10279

Designation UNP /UPN	Netweight g kg/m	Height h mm	Width b mm	Web thickness t_w mm	Flange thickness t_f mm	Modulus of elasticity W_y cm^3	Moment of inertia I_y cm^4
200	23,30	200	80	6,0	11,0	191	1.910
220	27,30	220	85	6,5	12,0	244	2.690
240	30,90	240	90	7,0	12,5	300	3.600
270	36,10	270	95	7,5	13,5	389	4.820
300	45,60	300	100	9,5	15,0	522	6.280
330	54,50	330	105	11,0	16,0	667	8.030
360	62,70	360	110	12,0	17,0	824	10.870
400	74,00	400	115	13,5	18,0	1.049	12.840



* Additional dimensions available upon request
Standard steel grade: S235 JR. Other steel grades available upon request

CORNER SECTIONS, PIPES AND STEEL PLATES: THE PERFECT COMPLEMENT

Corner sections

Branch and corner profiles are ideal for the construction of completely closed sheet pile pits. Especially rectangular excavation pits or changes to the direction of the sheet pile wall axis, the use of such systems makes sense. In addition, corner sections are one of the most important components of a sealed excavation or sheet pile wall!



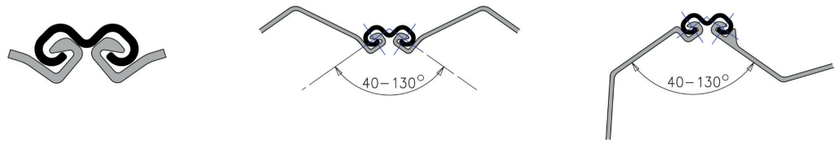
Advantages

- Suitable corner profiles for all Larssen locks
- Flexibly adaptable to the length of the sheet pile or pipes
- Supplied loose or attached to sheet pile

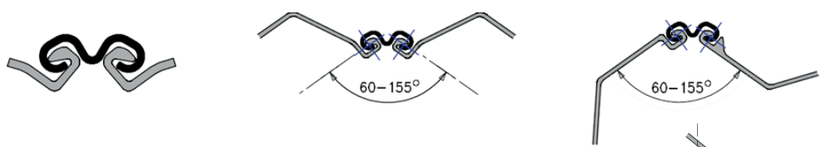
Corner profile
Interlocks corner sections and junction piles for U- and Z-piles *

Corner sections with LARSSEN lock
Interlocks in S 355

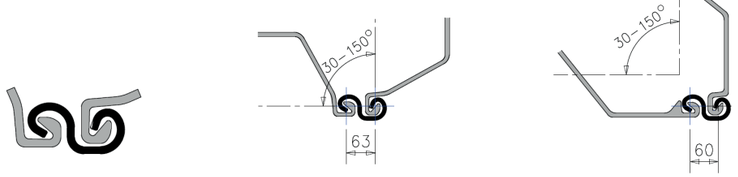
LVO
Weight: 13,85 kg/m



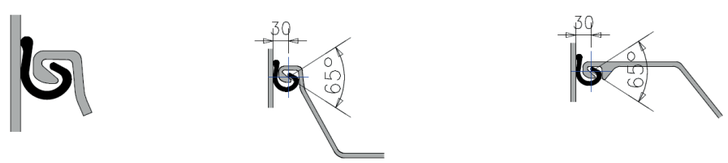
LVOn
Weight: 13,91 kg/m



LV20n
Weight: 14,07 kg/m



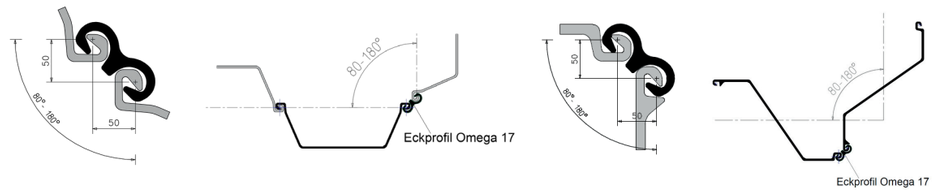
LV22
Weight: 8,0 kg/m



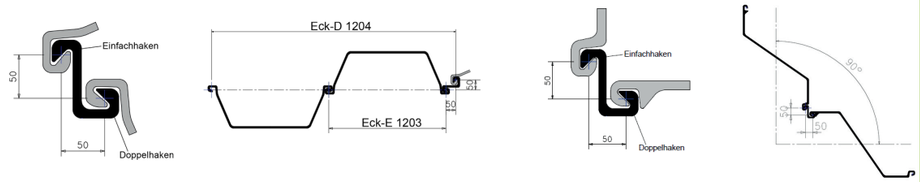
* Corner piles are connected to sheet piles in accordance with DIN EN 12063 and not suitable for single driving
"SteelWall®" is a trademark of SteelWall ISH GmbH, Germany

Corner and junction piles for U- and Z-piles*

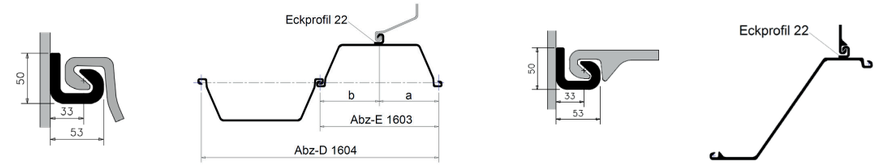
Omega 17
Weight: 17,30 kg/m



Corner section 20
Weight: 16,50 kg/m



Corner section 22
Weight: 9,20 kg/m



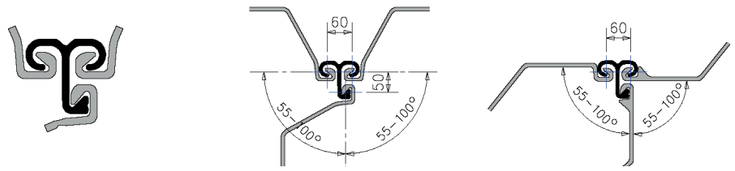
Folded corner pile



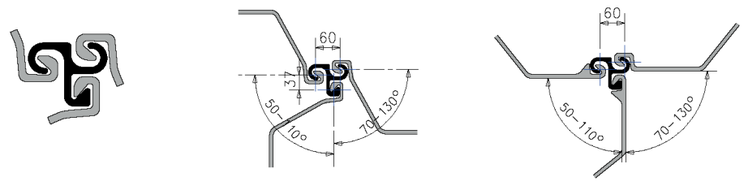
Corner and junction piles for U- and Z-piles, traditional *

SteelWall® connectors for U- and Z-piles, traditional

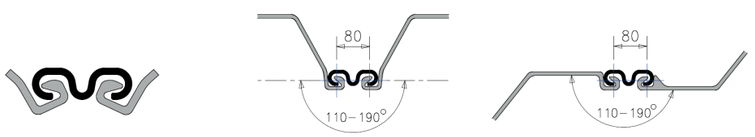
LOT
Weight: 18,0 kg/m



LT
Weight: 17,6 kg/m



LV-Omega
Weight: 14,0 kg/m



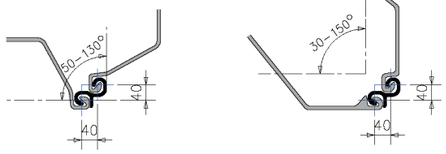
* Corner piles are connected to the sheet piles in accordance with DIN EN 12063 and not suitable for single driving
"SteelWall®" is a trademark of SteelWall ISH GmbH, Germany

Corner profile for U- and Z-piles *

SteelWall® connectors for U- and Z-piles, traditional,
Interlocks in S 35

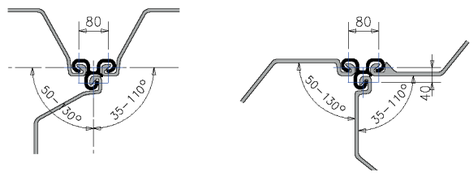
LS90
Weight: 12,70 kg/m





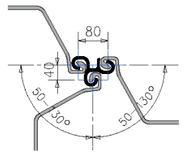
LTO
Weight: 19,80 kg/m





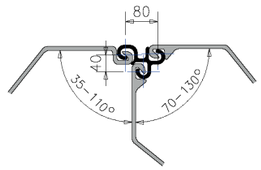
LTS
Weight: 19,0 kg/m





LTZ
Weight: 19,50 kg/m



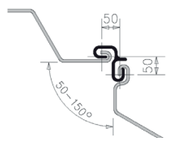


Corner and junction piles for cold rolled sheet piles *

SteelWall® connectors for cold rolled sheet piles, Interlocks in S 355

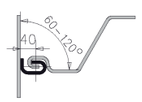
CF90
Weight: 17,50 kg/m





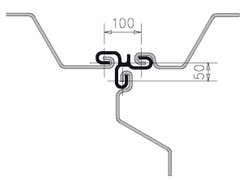
CF-Junction
Weight: 8,90 kg/m





CFT
Weight: 25,80 kg/m





* Corner piles are connected to sheet piles in accordance with DIN EN 12063 and are not suitable for single driving

"SteelWall®" is a trademark of SteelWall ISH GmbH, Germany

Steel pipes

Steel pipes can be used in supporting structures, scaffolding, foundations and piping systems. Thanks to their high load-bearing capacity and resistance to external influences, they are ideal for use in civil engineering. Different diameters and thicknesses allow flexible adaptation to a wide range of construction projects.



Advantages

- High load-bearing capacity and stability for building structures
- Recyclable: environmentally friendly, as steel tubes are almost completely recyclable

	Wall thickness in mm												
Outer diameter (OD)	**4,0**	**4,5**	**5,0**	**5,6**	**6,3**	**7,1**	**8,0**	**8,8**	**10,0**	**11,0**	**12,5**	**14,2**	**16,0**
	Weight in kg / m												
159,0	15,3	17,1	19,0	21,2	23,7	26,6	29,8	32,6	36,7	40,1	45,2	50,7	
165,1	15,9	17,8	19,7	22,0	24,7	27,7	31,0	33,9	38,2	41,8	47,0	52,8	
168,3	16,2	18,2	20,1	22,5	25,2	28,2	31,6	34,6	39,0	42,7	48,0	54,0	
177,8	17,1	19,2	21,3	23,8	26,6	29,9	33,5	36,7	41,4	45,2	51,0	57,3	
193,7	18,7	21,0	23,3	26,0	29,1	32,7	36,6	40,1	45,3	49,6	55,9	62,9	
219,1	21,1	23,8	26,4	29,5	33,1	37,1	41,6	45,6	51,6	56,4	63,7	71,8	
244,5	23,7	26,6	29,5	33,0	37,0	41,6	46,7	51,1	57,8	63,3	71,5	80,6	
273,0	26,5	29,8	33,0	36,9	41,4	46,6	52,3	57,3	64,9	71,1	80,3	90,6	
323,9	31,6	35,4	39,3	44,0	49,3	55,5	62,3	68,4	77,4	84,9	96,0	108,4	
355,6	34,7	39,0	43,2	48,3	54,3	61,0	68,6	75,3	85,2	93,5	106,0	120,0	
406,4	39,7	44,6	49,5	55,3	62,2	69,9	78,6	86,3	97,8	107,0	121,0	137,0	154,0
457,0	44,7	50,2	55,7	62,3	70,0	78,8	88,6	97,3	110,0	121,0	137,0	155,0	174,0
508,0	49,7	55,9	62,0	69,4	77,9	87,7	98,6	108,0	123,0	135,0	153,0	173,0	194,0
559,0		61,5	68,3	76,4	85,9	96,6	109,0	119,0	135,0	149,0	168,0	191,0	214,0
610,0		67,2	74,6	83,5	93,8	106,0	119,0	130,0	148,0	163,0	184,0	209,0	234,0
660,0		72,7	80,8	90,4	102,0	114,0	129,0	141,0	160,0	176,0	200,0	226,0	254,0
711,0		78,4	87,0	97,4	110,0	123,0	139,0	152,0	173,0	190,0	215,0	244,0	274,0
762,0		84,1	93,3	104,0	117,0	132,0	149,0	164,0	185,0	204,0	231,0	262,0	294,0
813,0		89,7	99,6	112,0	125,0	141,0	159,0	175,0	198,0	218,0	247,0	280,0	315,0
864,0		95,4	106,0	119,0	133,0	150,0	169,0	186,0	211,0	231,0	263,0	298,0	335,0
914,0		101,0	112,0	125,0	141,0	159,0	179,0	196,0	223,0	245,0	278,0	315,0	354,0
1.016,0		112,0	125,0	140,0	157,0	177,0	199,0	219,0	248,0	273,0	309,0	351,0	395,0
1.220,0				168,0	189,0	212,0	239,0	263,0	298,0	328,0	372,0	422,0	475,0
1.420,0					220,0	247,0	279,0	306,0	348,0	382,0	434,0	492,0	554,0

* Additional dimensions available upon request

Steel plates

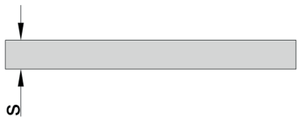
Whether as a construction road or as infill for soldier pile walls, steel plates can be used in a variety of ways. Thanks to their durability, they can be used several times and using steel plates as infill can significantly shorten the construction of a soldier pile wall shoring.



Advantages

- Quick installation and removal as infill
- Reduction of settlement behind the soldier pile wall
- Sustainable due to reusability
- Can be used as a drive-over plate

Steel plates and sheets



Thickness s mm	Weight g kg/m²	2000 x 3000* kg/pc	2000 x 4000* kg/pc	2000 x 6000* kg/pc
15	120	720	960	1.440
20	160	960	1.280	1.920
22	176	1.056	1.408	2.112
25	200	1.200	1.600	2.400
30	240	1.440	1.920	2.880

* Other dimension on request
Standard steel grade S235, other steel grades on request

SERVICE IN EVERY ASPECT: SPECIAL SERVICES

The success of a project depends on having the right equipment and the right technical support for that equipment. In addition to our products, which we both sell and rent, we also offer a wide range of different services.



Corrosion protection

Three forms of corrosion protection are available to enhance the durability of sheet piling – and hence increase the chances of success for your project: coating, hot-dip galvanizing and cathodic corrosion protection.

Coatings

The choice of coating system depends on the corrosion loads expected and the design life (see also DIN EN ISO 12944). Owing to the high loads to which steel sheet piling is usually exposed, epoxy resin or polyurethane coatings are normally used. Such coatings are also compatible with the terra interlock sealing system.

Hot-dip galvanizing

Hot-dip galvanizing is another method of corrosion protection and is also compatible with the terra interlock sealing system. It can also be combined with a coating (duplex system) to yield additional benefits. The requirements of DIN EN ISO 1461 must be adhered to.

Cathodic corrosion protection

Corrosion of steel sheet piling below the waterline can be largely eliminated using cathodic corrosion protection. This is particularly recommended in areas where renewing protective coatings or repairing corrosion damage is technically very difficult. These areas must be considered in planning.

Sealing systems

Our steel sheet piles have proven themselves in countless construction projects – both in terms of their structural and sealing function. For construction projects with higher demands on the tightness of the sheet sheet pile walls, the sheet pile wall interlocks can also be equipped with various sealing systems. Depending on the situation and requirements, bitumen, PU lip seals or seal welding can be used for this purpose.

Engineering Division

The specialists in our Engineering Division take care of every aspect of project planning, such as tendering, structural analyses and calculations, construction plans, and tailored solutions for individual needs. We are also happy to offer alternative solutions that are optimized for specific budgets.

Signal transmitters – lock jump detectors for reliable shoring control

Lock jump detectors indicate whether sheet piles are securely connected along their entire length. The signal transmitter, which is permanently attached, immediately detects lock malfunctions and enables timely corrections. This is essential for ensuring tightness and safety, especially in sensitive areas such as landfills or watertight excavation pits.

Vibration measurement

The equipment used to install sheet piles can cause vibrations in the ground. The MÜLLER data collection system MS-DATA is available to monitor vibrations in accordance with DIN 4150. Permanent monitoring of the operating parameters of the vibrator automatically prevents set vibration limits for ground or buildings from being exceeded.

Welded structures

Our plants have been fabricating welded structures from steel piles for many decades. All our sheet piling steel grades are suitable for arc welding in compliance with general welding regulations. Foundation piles, dolphins plus fittings, box piles, structural piles such as corner and junction piles, piles with impact strengthening, piles with interlocks sealed by welding, and custom piles to suit special requirements are all fabricated to proven quality standards. General and specific quality assurance procedures, e. g., non-destructive weld seam testing, are carried out by an independent institute according to German or, if required, international regulations.

Knife-edge bearing Z-15.6-369

This system, with a German national technical approval, transfers static and dynamic vertical loads directly, i. e. without intermediate fittings, from the reinforced concrete support to the sheet pile cross-section.



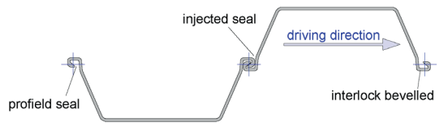


Interlock sealing system terra infrastructure

Guiding

When installing sheet piles with sealed interlocks, particular attention must be paid to guiding to ensure the piles do not lean to the front, rear or side. Any corrective measures applied must not cause any narrowing of any interlock slots containing profiled seals. DIN EN 12063 and EAU 2020 contain useful advice.

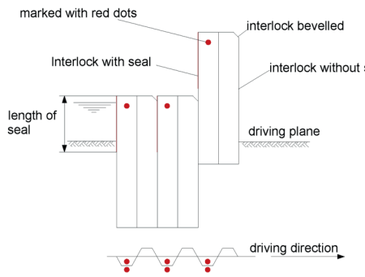


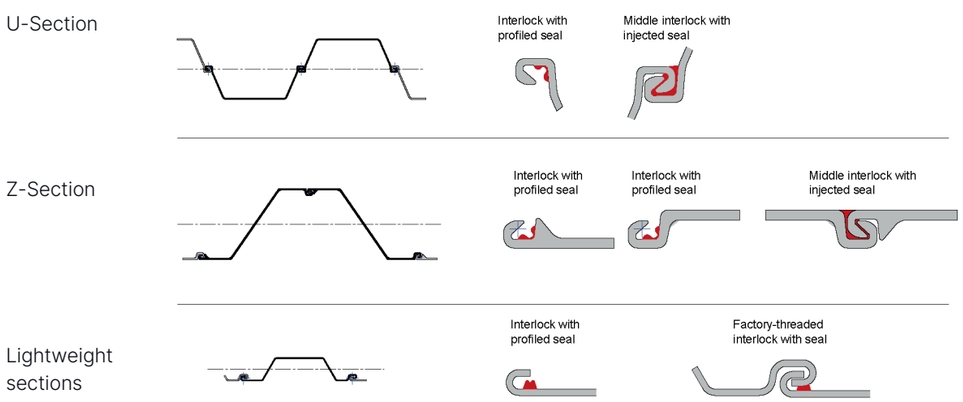


Driving direction and driving instructions

When installing sections with sealed interlocks, the direction of driving must be specified prior to starting work. When pitching double piles on-site, make sure that the free interlock is driven first and the interlock with the seal is threaded into this. For threading, the pile must be turned so that the unsealed interlock points in the direction of driving.

The side with the sealant is to be indicated by a colored dot at the top of the pile. Sheet piling should normally be driven continuously. However, staggered installation is also possible. The method used should be chosen on the basis of the overall driving conditions.

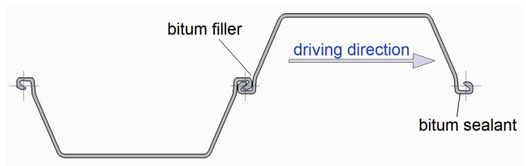




Bitumen-based interlock fillers

Material properties

Bituminous-based seals are an elastomeric bitumen hot-poured sealant. After application and cooling, this material may be anything from soft to stiff depending on the ambient temperature. It adheres well to the steel surface.

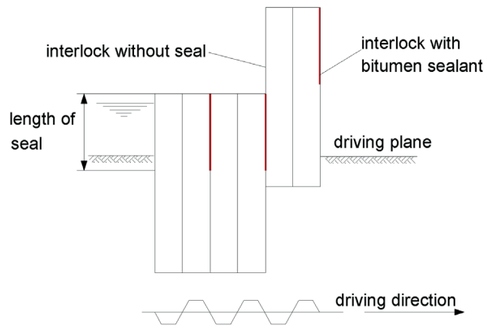


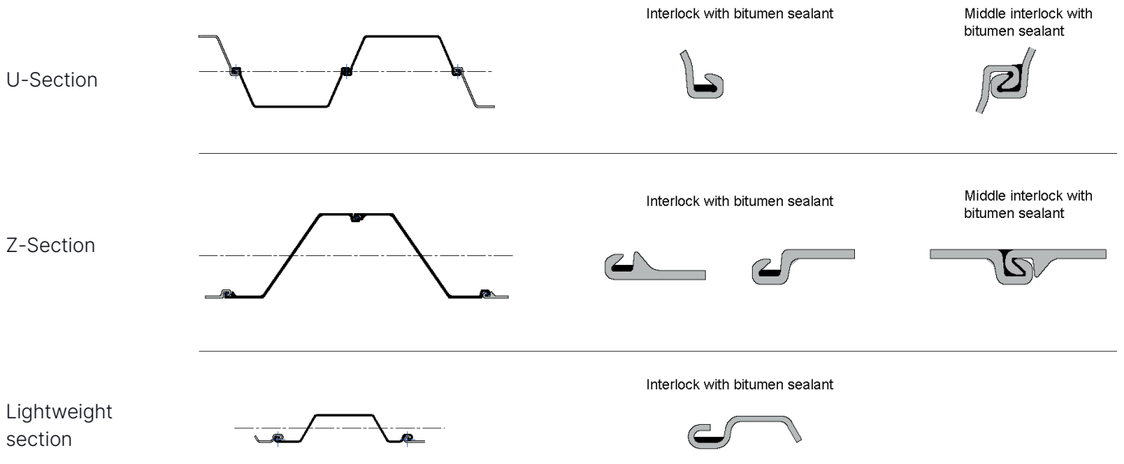


Interlock with bitumen

Driving direction and driving instructions

The direction of driving must be specified prior to installation when filled interlocks are involved. For threading, the pile must be turned so that the filled interlock points in the direction of driving.





Other sealing methods and installation advice

Other sealing and installation methods may be necessary depending on the requirements of the particular project. It is therefore essential to investigate and establish the methods to be used in advance.

The following additional sealing methods are available for interlocks that must be sealed after driving:

Where sealing requirements are not excessive, interlocks can be sealed subsequently, e.g. with timber wedges (swelling effect), rubber, or plastic cords.

If absolute watertightness is required, welding the interlocks is the only solution. As a rule, this concerns the threading interlocks only because factory-threaded interlocks can be welded prior to driving. It is important to note that the interlock can only be welded when the surfaces are dry and clean. The weld must be applied to the side of the sheet piling that faces the base of the structure to be erected. Open interlocks can be covered with, for instance, steel flats or steel sections attached to the sheet piling with fillet welds.

Effect of high temperatures

Welding carried out near seals or fillers can be expected to have an adverse, local effect on these materials. If subsequent welding cannot be avoided, resealing will be necessary.

Criteria for selecting a suitable interlock sealing system

Which interlock seal is suitable for which project? This question has to be considered for every new project, and the answer depends on the project specification and the boundary conditions. We can provide you with the information you need so that you can specify “your” system spot-on.

Example: vertical wall 10.5 m deep is required to encapsulate contaminated site. Investigations have revealed that the soil is contaminated with the following hazardous substances: chlorinated dioxins and furans, chlorobenzenes, chlorophenols, oils, mineral oils, polycyclic aromatic hydrocarbons, aliphatic and aromatic solvents.

From this it follows that the wall required must be resistant to all of the aforementioned substances. The permeability required is k ≤ 1,0. 10–9 m/s for a notional thickness of t = 60 cm. In light of the quality requirements, only factory-sealed sheet piles are permissible. The section modulus required is Wy ≥ 1,100 cm3/m. A suitable sealing system can now be determined based on the following parameters:

Permeability criteria

The interlock seepage resistance ρ ≤ k· b/t

The result is that to achieve the equivalent of a 60 cm thick diaphragm wall with k ≤ 1,0 · 10–^{9} m/s the minimum requirement is single piles with a terra infrastructure interlock sealing system in the threading interlock (critical pile width ≥ 0.50 m).

Spot-on selection

The following calculation models are based on DIN EN 12063:

See page resistance ρ (m/s)

$$\rho = \frac{q(z) \cdot \gamma}{\Delta p(z)}$$

where:

q(z) = discharge rate over time related to interlock lenght ($m^3/m \cdot s)\gamma$

g = specific gravity of fluid (kN/m^3)

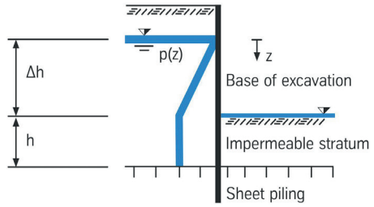
Δp(z) = hydrostatic pressure (kN/m^2)

See page rate Q ($m^3/s \cdot$ interlock)

$$Q = \int_0^{\Delta h+h} q(z) \cdot dz = (\rho/\gamma) \cdot \int_0^{\Delta h+h} \Delta p(z) \cdot dz$$

The seepage rate Q through a lock can be calculated by:

$$Q = \rho \cdot \Delta h \cdot (0{,}5 \cdot \Delta h + h)$$



To compare the imperviousness with that of a diaphragm wall, the permeability coefficient k to DIN 18130 Part 1 for soils (porous media) can be taken into account:

$$k = \frac{Q}{i \cdot A} \rightarrow Q = \frac{k \cdot \Delta p(z)}{\gamma \cdot d} \cdot A$$

where:

k = permeability coefficient (m/s)
Q = measured flow rate (m^3/s)
i = hydraulic gradient (-)
A = cross-sectional area, wall area (m^2)

Considering these fundamental relationships and the number of critical interlocks per m^2 of wall area results in this relationship for a constant seepage rate Q:

$$\frac{k \cdot \Delta p(z)}{\gamma \cdot d} = \frac{\rho \cdot \Delta p(z)}{\gamma \cdot b}$$

where:

d = thickness of diaphragm wall (m)
b = critical element width for designing seepage rate (m)

$$\rightarrow \frac{k}{d} \qquad \frac{\rho}{b}$$

The following profiles can be used	Critical element width m	Comparable k-value for 60 cm thick diaphragm wall m/s	Leakage requirement satisfied	Imperviousness requirement satisfied
EB (500-er)	0.50	$2.2 \cdot 10^{-10}$	yes	yes
DB (500-er)	1.00	$1.1 \cdot 10^{-10}$	yes	yes
EB (600-er)	0.60	$1.8 \cdot 10^{-10}$	yes	yes
DB (600-er)	1.20	$9.0 \cdot 10^{-11}$	yes	yes

A double pile (600 series) with Wy ≥ 1.100 cm^3/m is selected for economic reasons. Its imperviousness therefore compares with that of a 60 cm thick diaphragm wall with a k-value of $9.0 \cdot 10^{-11}$ m/s, or for an 80 cm thick diaphragm wall a k-value of $1.2 \cdot 10^{-10}$ m/s. Due to its lower thickness, a slurry wall must exhibit a k-value of $1.2 \cdot 10^{-11}$ m/s in order to achieve the imperviousness of the sheet piling solution.

Resistance criteria

Conventional bituminous interlock fillers are not resistant to pollutants such as aliphatic and aromatic solvents, oils, or mineral oils. However, the terra infrastructure interlock sealing system has proven to be resistant to these pollutants.

Comparison of k-values *

Sealing system	Critical element width b (m)	ρ m/s	k-value required for diaphragm d = 0,60 m	d = 0,80 m	Slurry wall d = 0,080 m
Single piles with bitumen compound in every interlock	0.50	$6.0 \cdot 10^{-8}$	$7.2 \cdot 10^{-8}$	$9.6 \cdot 10^{-8}$	$9.6 \cdot 10^{-9}$
	0.60		$6.0 \cdot 10^{-8}$	$8.0 \cdot 10^{-8}$	$8.0 \cdot 10^{-9}$
Double piles with bitumen compound in driving interlock and poured compound in middle interlock	1.00	$6.0 \cdot 10^{-8}$	$3.6 \cdot 10^{-8}$	$4.8 \cdot 10^{-8}$	$4.8 \cdot 10^{-9}$
	1.20		$3.0 \cdot 10^{-8}$	$4.0 \cdot 10^{-8}$	$4.0 \cdot 10^{-9}$
Single piles with terra infrastructure interlock sealing system in every interlock	0.50	$1.8 \cdot 10^{-10}$	$2.2 \cdot 10^{-10}$	$2.9 \cdot 10^{-10}$	$2.9 \cdot 10^{-11}$
	0.60		$1.8 \cdot 10^{-10}$	$2.4 \cdot 10^{-10}$	$2.4 \cdot 10^{-11}$
Double piles with terra infrastructure interlock sealing system in threading interlock and injected sealant in middle interlock	1.00	$1.8 \cdot 10^{-10}$	$1.1 \cdot 10^{-10}$	$1.4 \cdot 10^{-10}$	$1.4 \cdot 10^{-11}$
	1.20		$9.0 \cdot 10^{-10}$	$1.2 \cdot 10^{-10}$	$1.2 \cdot 10^{-11}$
Triple piles with terra infrastructure interlock sealing system in the threading interlock and injected sealant in the middle interlocks	1.50	$1.8 \cdot 10^{-10}$	$7.2 \cdot 10^{-11}$	$9.6 \cdot 10^{-11}$	$9.6 \cdot 10^{-12}$
	1.80		$6.0 \cdot 10^{-11}$	$8.0 \cdot 10^{-11}$	$8.0 \cdot 10^{-12}$

	ρ m/s	Critical element width for double pile m	No. of interlocks with possibly limited seepage	Ingress into excavation l/s	%	Reduction in quantity of water to be pumped %
Groundwater lowering with steel sheet pile wall				~ 115	100	+
Sheet piling without interlock sealing	$8.0 \cdot 10^{-4}$ x k_{soil}/b	0.5	900	~ 41	36	64
Sheet piling with site-applied bitumen compound in every interlock	$6.0 \cdot 10^{-8}$	0.5	900	~ 3,1	3	97
Sheet piling with factory-applied bitumen compound in driving interlock and poured compound in middle interlock	$6.0 \cdot 10^{-8}$	1	450	~ 1,5	1,3	99
Sheet piling with terra infrastructure interlock sealing system in threading interlock and injected sealant in middle interlock	$1.8 \cdot 10^{-10}$	1	450	~ 0.005	0.004	99.9

* The table values given here are for information only and represent a theoretical tightness

SOLUTIONS FOR ANY CHALLENGE: ANCHOR TECHNOLOGY

Our anchor equipment is used for construction projects such as quay structures, onshore and offshore wind turbine foundations, tunnels, trenches, retaining walls, and slope stabilization. We maintain an extensive range of products that can be used to overcome even the toughest challenges.

The solution for sheet pile walls: round steel tie rods

An anchorage employing round steel tie rods is an economical solution for securing a sheet pile wall, which can be adapted to suit the situation. The forces acting on the wall are transferred via the waling to the round steel tie rods and then to the anchor plates or walls. The selection and design of the anchoring structure is done in accordance with static and structural requirements. Upon request, we can supply a complete package from one source, consisting of the supply and installation of all the anchorage elements and accessories required for sheet piling structures. Apart from anchors and anchor parts, anchor connection elements, walings and waling fixings, sheet pile wall capping beams, recesses, ladders and mooring lugs plus bollards and special components are also part of our range.



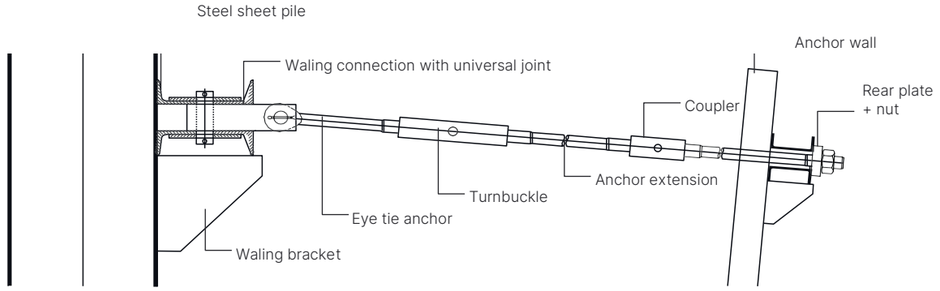


Round steel tie rods

Advantages
- Optimum transfer of tensile forces
- Better dispersion of bending moments thanks to excellent elasticity
- Extendable with the help of couplers or turnbuckles
- Minimal surface for corrosion
- Adjustable to exact length

Applications
- Cofferdams
- Ports and harbours
- Waterways
- Locks

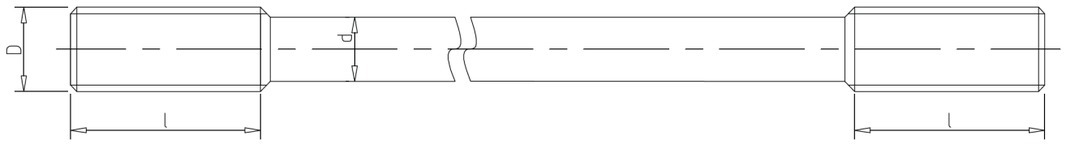
Round steel tie rod components and connecting elements



*Accessory parts as shown above on request

Anchor with upset ends – rolled thread
Round steel tie rods acc. to DIN EN 1993-5 and EAU 2020

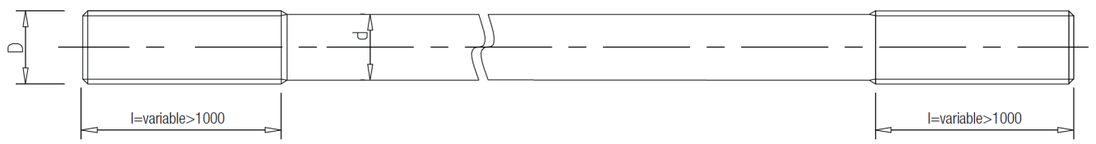
Anchor force according to DIN EN 1993-5 - kt = 0.60			M39	M42	M45	M48	M52	M56	M60	M64	M68	M72	M76	M80	M85	M90
Nominal diameter	**D**	**mm**	**39**	**42**	**45**	**48**	**52**	**56**	**60**	**64**	**68**	**72**	**76**	**80**	**85**	**90**
Shaft diameter	d	mm	36	39	42	45	49	52	56	60	64	68	72	76	81	86
Tensile stress area Thread	As	mm²	976	1,121	1,306	1,473	1,758	2,030	2,362	2,676	3,055	3,460	3,889	4,344	4,948	5,591
Cross sectional area Shaft	Ag	mm²	1,017	1,194	1,385	1,590	1,847	2,124	2,463	2,827	3,217	3,632	4,072	4,536	5,153	5,809
ASF 355 Permissible design resistance	**Rd**	**kN**	**346**	**398**	**464**	**523**	**624**	**721**	**839**	**950**	**1,085**	**1,228**	**1,381**	**1,542**	**1,757**	**1,985**
ASF 460 Permissible design resistance	**Rd**	**kN**	**449**	**516**	**601**	**678**	**809**	**934**	**1,087**	**1,231**	**1,405**	**1,592**	**1,789**	**1,998**	**2,276**	**2,572**
ASF 500 Permissible design resistance	**Rd**	**kN**	**478**	**549**	**639**	**721**	**861**	**994**	**1,156**	**1,310**	**1,496**	**1,694**	**1,904**	**2,127**	**2,423**	**2,737**
ASF 720 Permissible design resistance	**Rd**	**kN**	**632**	**726**	**846**	**955**	**1,139**	**1,315**	**1,531**	**1,734**	**1,980**	**2,242**	**2,520**	**2,815**	**3,206**	**3,623**
Weight (Shaft)	W	kg/m	7.99	9.38	10.88	12.49	14.80	16.62	19.34	22.20	25.25	28.51	31.96	35.61	40.45	45.60



Anchor force according to DIN EN 1993-5 - kt = 0.60			M95	M100	M105	M110	M115	M120	M125	M130	M135	M140	M145	M150	M155	M160
Nominal diameter	**D**	**mm**	**95**	**100**	**105**	**110**	**115**	**120**	**125**	**130**	**135**	**140**	**145**	**150**	**155**	**160**
Shaft diameter	d	mm	91	96	101	106	111	116	121	126	131	136	141	146	151	156
Tensile stress area Thread	As	mm²	6,273	6,995	7,755	8,556	9,395	10,274	11,191	12,149	13,145	14,181	15,256	16,370	17,524	18,716
Cross sectional area Shaft	Ag	mm²	6,504	7,238	8,012	8,825	9,677	10,568	11,499	12,469	13,478	14,527	15,615	16,742	17,908	19,113
ASF 355 Permissible design resistance	**Rd**	**kN**	**2,227**	**2,483**	**2,753**	**3,037**	**3,335**	**3,647**	**3,973**	**4,313**	**4,666**	**5,034**	**5,416**	**5,811**	**6,221**	**6,644**
ASF 460 Permissible design resistance	**Rd**	**kN**	**2,886**	**3,218**	**3,567**	**3,936**	**4,322**	**4,726**	**5,148**	**5,589**	**6,047**	**6,523**	**7,018**	**7,530**	**8,061**	**8,609**
ASF 500 Permissible design resistance	**Rd**	**kN**	**3,071**	**3,425**	**3,797**	**4,189**	**4,600**	**5,030**	**5,479**	**5,948**	**6,436**	**6,943**	**7,469**	**8,015**	**8,580**	**9,163**
ASF 720 Permissible design resistance	**Rd**	**kN**	**4,065**	**4,533**	**5,025**	**5,544**	**6,088**	**6,658**	**7,252**	**7,873**	**8,518**	**9,189**	**9,886**	**10,608**	**11,356**	**12,128**
Weight (Shaft)	W	kg/m	51.06	56.82	62.89	69.27	75.96	82.96	90.27	97.88	105.80	114.04	122.57	131.42	140.58	150.00

Anchor with rolled thread

Anchor force according to DIN EN 1993-5 - kt = 0.90 **Nominal diameter**	**D**	**mm**	**M 39** **39**	**M 42** **42**	**M 45** **45**	**M 48** **48**	**M 52** **52**	**M 56** **56**	**M 60** **60**	**M 64** **64**	**M 68** **68**	**M 72** **72**	**M 76** **76**	**M 80** **80**	**M 85** **85**	**M 90** **90**
Shaft diameter	d	mm	36	39	42	45	49	52	56	60	64	68	72	76	81	86
Tensile stress area Thread	As	mm²	976	1,121	1,306	1,473	1,758	2,030	2,362	2,676	3,055	3,460	3,889	4,344	4,948	5,591
Cross sectional area Shaft	Ag	mm²	1,017	1,194	1,385	1,590	1,847	2,124	2,463	2,827	3,217	3,632	4,072	4,536	5,153	5,809
ASF 355 **Permissible design resistance**	**Rd**	**kN**	**346**	**398**	**464**	**523**	**624**	**721**	**839**	**950**	**1,085**	**1,228**	**1,381**	**1,542**	**1,757**	**1,985**
ASF 460 **Permissible design resistance**	**Rd**	**kN**	**449**	**516**	**601**	**678**	**809**	**934**	**1,087**	**1,231**	**1,405**	**1,592**	**1,789**	**1,998**	**2,276**	**2,572**
ASF 500 **Permissible design resistance**	**Rd**	**kN**	**478**	**549**	**639**	**721**	**861**	**994**	**1,156**	**1,310**	**1,496**	**1,694**	**1,904**	**2,127**	**2,423**	**2,737**
ASF 720 **Permissible design resistance**	**Rd**	**kN**	**632**	**726**	**846**	**955**	**1,139**	**1,315**	**1,531**	**1,734**	**1,980**	**2,242**	**2,520**	**2,815**	**3,206**	**3,623**
Weight (Shaft)	W	kg/m	7.99	9.38	10.88	12.49	14.80	16.62	19.34	22.20	25.25	28.51	31.96	35.61	40.45	45.60



Anchor force according to DIN EN 1993-5 - kt = 0.90 **Nominal diameter**	**D**	**mm**	**M 95** **95**	**M 100** **100**	**M 105** **105**	**M 110** **110**	**M 115** **115**	**M 120** **120**	**M 125** **125**	**M 130** **130**	**M 135** **135**	**M 140** **140**	**M 145** **145**	**M 150** **150**	**M 155** **155**	**M 160** **160**
Shaft diameter	d	mm	91	96	101	106	111	116	121	126	131	136	141	146	151	156
Tensile stress area Thread	As	mm²	6,273	6,995	7,755	8,556	9,395	10,274	11,191	12,149	13,145	14,181	15,256	16,370	17,524	18,716
Cross sectional area Shaft	Ag	mm²	6,504	7,238	8,012	8,825	9,677	10,568	11,499	12,469	13,478	14,527	15,615	16,742	17,908	19,113
ASF 355 **Permissible design resistance**	**Rd**	**kN**	**2,227**	**2,483**	**2,753**	**3,037**	**3,335**	**3,647**	**3,973**	**4,313**	**4,666**	**5,034**	**5,416**	**5,811**	**6,221**	**6,644**
ASF 460 **Permissible design resistance**	**Rd**	**kN**	**2,886**	**3,218**	**3,567**	**3,936**	**4,322**	**4,726**	**5,148**	**5,589**	**6,047**	**6,523**	**7,018**	**7,530**	**8,061**	**8,609**
ASF 500 **Permissible design resistance**	**Rd**	**kN**	**3,071**	**3,425**	**3,797**	**4,189**	**4,600**	**5,030**	**5,479**	**5,948**	**6,436**	**6,943**	**7,469**	**8,015**	**8,580**	**9,163**
ASF 720 **Permissible design resistance**	**Rd**	**kN**	**4,065**	**4,533**	**5,025**	**5,544**	**6,088**	**6,658**	**7,252**	**7,873**	**8,518**	**9,189**	**9,886**	**10,608**	**11,356**	**12,128**
Weight (Shaft)	W	kg/m	51.06	56.82	62.89	69.27	75.96	82.96	90.27	97.88	105.80	114.04	122.57	131.42	140.58	150.00

Permissible design resistances Rd according to DIN 1993-5 (D) / Stressed area

Round steel tie rods and bolts

(The threads - metric thread - are rolled up)

The design resistances are calculated using the following equation over the minimum cross section:

$F_{tg,Rd}$ =	(Shaft cross section)	$A_g \times f_{y,k} / \gamma_{M0}$	$A_{Schaft} \times f_{y,k} / \gamma_{M0}$	where γ_{M0} = 1.00
$F_{tt,Rd}$ =	(Thread cross section)	$k_t \times A_S \times f_{ua,k} / \gamma_{M2}$	$k_t \times A_{Sp} \times f_{ua,k} / \gamma_{M2}$	where γ_{M2} = 1.25

Verification for the ultimate limit state to DIN EN 1993-5:

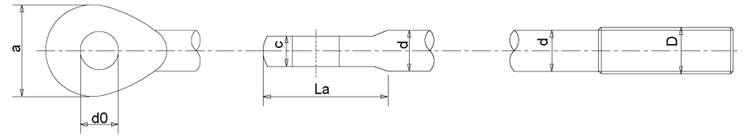
$Z_d < R_d$

Z_d:	design value of anchor force $Z_d = Z_{G,k} * \gamma_G + Z_{Q,k} * \gamma_Q$	$f_{y,k}$:	yield stress
R_d:	design resistance of anchor R_d = Min [$F_{tg,Rd}$; $F_{tt,Rd}$]	$f_{ua,k}$:	tensile strength
A_g :	cross-sectional area in shaft zone	γ_{M0} :	partial safety factor to DIN EN 1993-5 for anchor shaft
A_S :	tensile stress area in threaded zone	γ_{M2} :	partial safety factor to DIN EN 1993-5 for threaded area
		k_t :	notch factor to DIN 1993-5 (k_t = 0.60 or 0.90)

Eye anchor

ASF 355 anchor force acc. to DIN EN 1993-5 with kt = 0.6			**A150**	**A175**	**A200**	**A200**	**A225**	**A225**	**A225**	**A250**	**A275**	**A300A**	**A300B**	**A325**	**A350**	**A375A**
Shaft diameter	d	mm	36	39	42	42	45	45	45	48	52	56	60	64	68	72
Thickness eye	c	mm	25	30	33	33	39	39	39	42	47	50	50	55	60	63
Length eye	La	mm	86	106	127	127	135	135	135	147	166	190	190	210	220	235
Width eye	a	mm	72	85	105	105	110	110	110	125	135	155	155	165	180	190
Bolt diameter	d0	mm	30	33	36	36	40	40	40	47	52	56	56	62	68	70

ASF 355 anchor force acc. to DIN EN 1993-5 with kt = 0.6			**A375B**	**A400**	**A425**	**A450**	**A450**	**A475**	**A500**	**A525**	**A550**	**A575**	**A575**	**A600**	**A625**	**A650**
Shaft diameter	d	mm	75	80	85	90	90	95	100	105	110	115	115	120	125	130
Thickness eye	c	mm	63	66	72	75	75	80	85	90	95	100	100	105	115	120
Length eye	La	mm	235	253	290	300	300	323	340	350	365	373	373	380	439	459
Width eye	a	mm	190	210	230	240	240	255	270	275	290	300	300	310	330	340
Bolt diameter	d0	mm	70	76	80	85	85	90	95	100	105	105	110	115	120	125



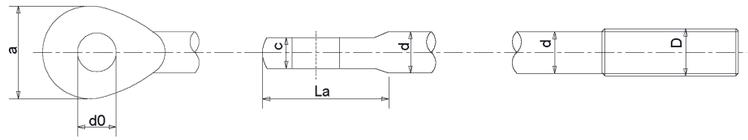
ASF 500 anchor force acc. to DIN EN 1993-5 with kt = 0.6			**A150**	**A175**	**A200**	**A200**	**A225**	**A225**	**A225**	**A250**	**A275**	**A300A**	**A300B**	**A325**	**A350**	**A375A**
Shaft diameter	d	mm	36	39	42	42	45	45	45	48	52	56	60	64	68	72
Thickness eye	c	mm	25	30	33	33	39	39	39	42	47	50	50	55	60	63
Length eye	La	mm	86	106	127	127	135	135	135	147	166	190	190	210	220	235
Width eye	a	mm	72	85	105	105	110	110	110	125	135	155	155	165	180	190
Bolt diameter	d0	mm	30	33	36	36	41	41	41	47	52	56	56	62	68	70

ASF 500 anchor force acc. to DIN EN 1993-5 with kt = 0.6			**A375B**	**A400**	**A425**	**A450**	**A450**	**A475**	**A500**	**A525**	**A550**	**A575**	**A575**	**A600**	**A625**	**A650**
Shaft diameter	d	mm	75	80	85	90	90	95	100	105	110	115	115	120	125	130
Thickness eye	c	mm	63	66	72	75	75	80	85	90	95	100	100	105	115	120
Length eye	La	mm	235	253	290	300	300	323	340	350	365	373	373	380	439	459
Width eye	a	mm	190	210	230	240	240	255	270	275	290	300	300	310	330	340
Bolt diameter	d0	mm	70	76	80	85	85	90	95	100	105	110	110	115	120	125

Eye Anchor with rolled thread

ASF 720 anchor force acc. to DIN EN 1993-5 with kt = 0.6			A150	A175	A200	A200	A225	A225	A225	A250	A275	A300A	A300B	A325	A350	A375A
Shaft diameter	d	mm	36	39	42	42	45	45	45	48	52	56	60	64	68	72
Thickness eye	c	mm	25	30	33	33	39	39	39	42	47	50	50	55	60	63
Length eye	La	mm	86	106	127	127	135	135	135	147	166	190	190	210	220	235
Width eye	a	mm	72	85	105	105	110	110	110	125	135	155	155	165	180	190
Bolt diameter	d0	mm	30	33	40	40	44	44	44	50	55	61	61	66	72	76

ASF 720 anchor force acc. to DIN EN 1993-5 with kt = 0.6			A375B	A400	A425	A450	A450	A475	A500	A525	A550	A575	A575	A600	A625	A650
Shaft diameter	d	mm	75	80	85	90	90	95	100	105	110	115	115	120	125	130
Thickness eye	c	mm	63	66	72	75	75	80	85	90	95	100	100	105	115	120
Length eye	La	mm	235	253	290	300	300	323	340	350	365	373	373	380	439	459
Width eye	a	mm	190	210	230	240	240	255	270	275	290	300	300	310	330	340
Bolt diameter	d0	mm	76	85	90	95	95	100	105	110	110	115	115	125	130	135



terra ASF micropile: Maximum loading capacity, minimum diameter

terra ASF micropile

Advantages
- Maximum strain of up to 4,242 kN
- Can be used as compression and tension piles in accordance with DIN EN 14199
- Low steel strain guarantees rapid activation of forces with low deformation
- Corrosion protection along the entire length
- Length up to 35 m deliverable ex works, unlimited extension possible

Applications
- Foundation piles
- Bracing in marine and special civil engineering
- Bracing in waterway expansion



Basics

The terra ASF micropile, approved under Z-34.14-243, is a micropile system in accordance with DIN 14199 and DIN SPEC 18539. One of its main features is the use of a low-resistance steel grade. As a result, the system exhibits low steel elongation and higher load-bearing reserves than comparable micro pile systems at loads. Steel load-bearing elements with a length of up to 34 metres can currently be supplied in one piece. Greater lengths can be achieved by means of a welded joint.

Corrosion protection

Permanent corrosion protection is ensured by the cement stone covering of the grouting body. The use of an additi-onal cement-filled ribbed pipe, as in comparable systems, is not necessary. Permanent corrosion protection of the pile head is ensured either by embedding the pile head in concrete or by using the pile head construction in accordance with the approval.

Intended purpose

Micropile for tie-back anchoring
- According to DIN EN 14199 for load transfer of tensile loads into deeper, load-bearing soil layers

Micropile for foundations
- According to DIN EN 14199 for load transfer of compressive and tensile loads in deeper, load-bearing soil layers

Nominal size		Inch	3	3½	4	4¼
Outer diameter	Ø	mm	71.0	83.0	96.0	102.0
Cross-sectional area	A	cm^2	37.0	51.3	67.7	77.3
Yield strength/tensile strength	fy/fu	N/mm^2	500/700	500/700	500/700	500/700
Characteristic load-bearing capacity for tensile load[1)]	R_k	kN	2,036	2,598	3,385	4,139
Characteristic load-bearing capacity under compressive load[1)]	R_k	kN	2.127	2.598	3,385	4,242
Elongation stiffness	E · A	MN	611	912	1,365	1,650
Weight		kg/m	31.1	42.5	56.8	64.1

1. Utilization of the load-bearing capacity is dependent on the cement stone cover according to approval Z-34.14-243
2. The use of the terra ASF micropile is regulated in Germany by the National Technical Approval Z-34.14-243 issued by the German Institute for Civil Engineering (DIBt)

Dimensioning

The verification of the internal and external load-carrying capacity must always be performed out when mircopiles are used as a tie-back anchorage or as an foundation pile. Further verifications such as the buckling analysis and the serviceability analysis may be required depending on the intended use.

Verification of the load-carrying capacity of the pile materials

The verification of the load-carrying capacity of the pile material proves that the design value of actions Ed is less than the design value of the pile resistance. The verification of the load-carrying capacity of the pile materials is carried out as follows:

Design value of actions (E_d) ≤ design value of pile resistance (R_d)

where:

$$E_d = \gamma_G * G_k + \gamma_Q * Q_k$$

$$R_d = {R_k}/{\gamma_M}$$

with

E_d Design value of actions

γ_G Partial safety factor for permanent actions
= 1.35 for BS-P (constant situation)
= 1.20 for BS-T (temporary situation)

γ_Q Partial safety factor for variable actions
= 1.50 for BS-P (constant situation)
= 1.30 for BS-T (temporary situation)

R_d Design value of the pile resistance

R_k Characteristic load capacity

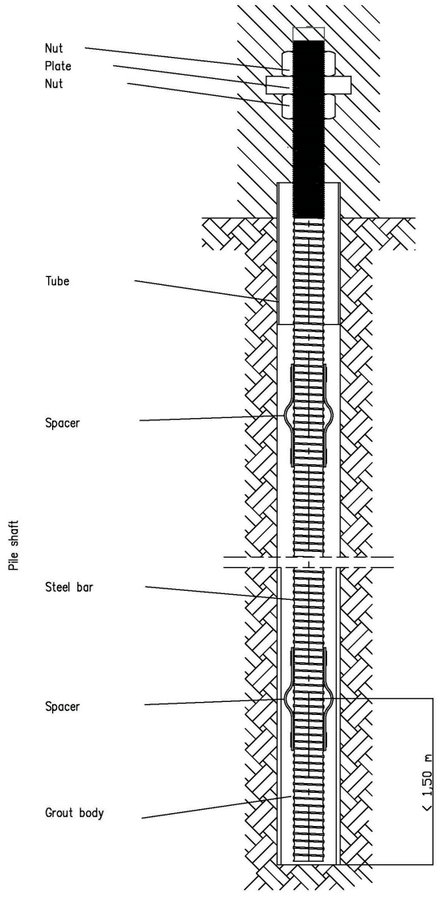
γ_M Partial safety factor Material resistance
= 1.15 for BS-P, BS-T and BS-A

Verification of the external load carrying capacity of the grout/soil friction

Micropiles transfer loads to the soil via the skin friction. For this purpose, it must be ensured that the surface of the grout body is sufficiently large enough. The required surface area is determined by the diameter and length of the grout body and the skin friction value qs,i,k, of the soil layer.

With the help of site investigations and pile test, the actually existing skin friction value of the existing soils can be determined. Alternatively, the design of the external load-carrying capacity can be performed with the empirical values of the skin friction according to EA-Piles Tab. 5.29 and 5.30.

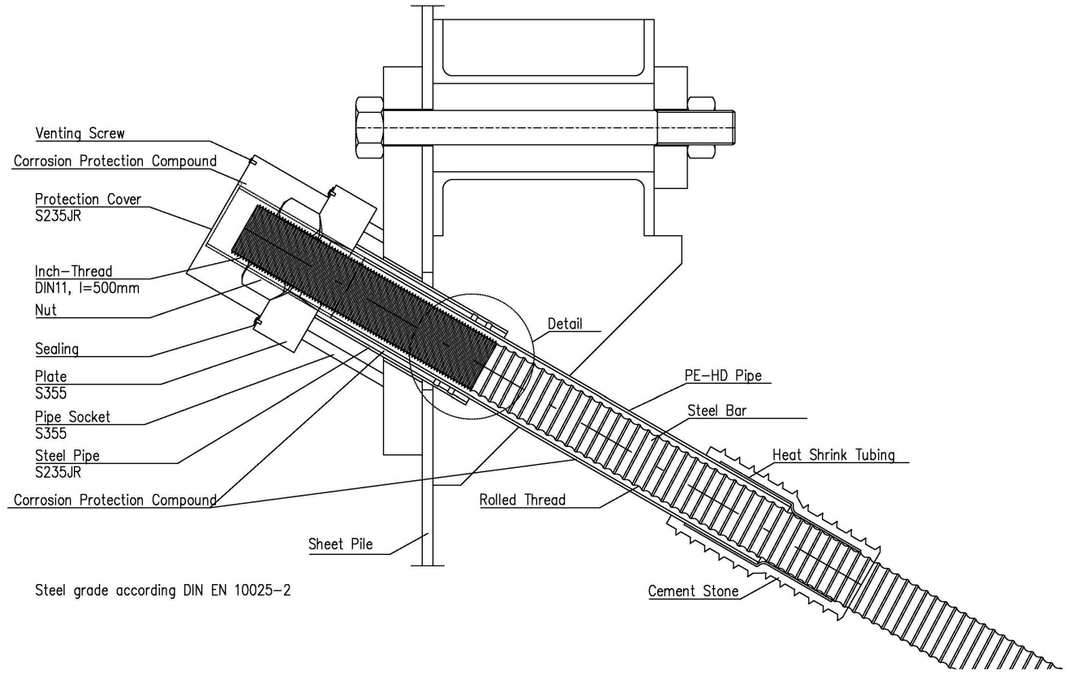
Application example deep foundation



Permanent pile head construction in detail according to Approval Z-34.14-243

In the case of tie-back anchoring of a sheet pile or combination wall, installation of the pile head in concrete is not always wanted or possible. For this reason, a pile head construction was developed for the thyssenkrupp ASF drilled injection pile that allows the permanent use (100+ years).

For the planning of the micropile, the required dimensions of the pile head-construction can be taken from the approval. The additional verification of the plates, the pipe sockets and the weld seams can be omitted. Because of this the planning of the micropiles can be performed more quickly and efficiently



Safe anchorage of high tensile forces: driven anchor piles

Our driven piles for anchoring are used in the construction of quay walls. Additional warpage can essentially increase the load on the piles, so that the maximum load is sometimes not on the head of the pile but rather behind the sheet piling. This must be taken into account when installing the piles and the pile connection.

Driven anchor piles

Advantages of slow-striking pile drivers
- Length of force application
- High bearing capacity
- Suitable for different soil types
- Immediate load-bearing capacity



Piles
according to 10248

PST	Weight	Profile height	Flange width	Web thickness	Flange thickness	Flange thickness	Coated area	Outline	Steel area	Outlined area	Y-Y axis			Z-Z axis		
		H	b	s	t1	t2					I_y	W_y	i_y	I_z	W_z	i_z
	kg/m	mm	mm	mm	mm	mm	cm	mm	mm	cm^2	cm^4	cm^3	cm	cm^4	cm^3	cm
300/ 80	80.3	305.0	305.0	9.0	13.9	9.2	181	128	102	938	18,440	1,209	13.4	6,050	397	7.69
300/ 85	85.4	306.0	306.0	10.0	14.4	9.7	182	129	109	944	19,492	1,274	13.4	6,416	419	7.68
300/ 95	95.4	308.0	308.0	12.0	15.4	10.7	183	129	122	957	21,575	1,401	13.3	7,122	462	7.66
300/106	106.0	310.0	310.0	14.0	16.4	11.8	184	131	135	970	23,767	1,535	13.3	7,906	510	7.66
370/107	107.0	366.0	379.0	9.0	15.2	12.0	225	157	136	1,402	36,489	1,994	16.4	13,176	695	9.84
370/116	116.0	366.0	382.0	10.0	15.2	12.0	226	158	148	1,415	38,148	2,085	16.0	13,827	724	9.66
370/122	122.0	370.0	382.0	12.0	17.2	14.0	225	158	155	1,422	42,274	2,285	16.5	15,192	800	9.89
370/132	132.0	369.4	383.7	13.7	16.9	13.8	227	159	168	1,434	43.594	2,360	16.1	15,790	823	9.69
370/153	153.0	374.0	386.0	16.0	19.2	16.1	229	161	195	1,462	51,212	2,739	16.2	18,555	961	9.75
400/100	100.0	392.0	379.0	10.0	13.2	10.0	230	162	127	1,501	37,668	1,922	17.2	11,380	601	9.45
400/119	119.0	396.0	381.0	12.0	15.2	12.0	231	151	151	1,525	44,969	2,271	17.3	13,568	712	9.48
400/127	127.0	400.0	380.0	11.0	17.2	14.0	231	156	162	1,536	50,469	2,523	17.6	15,210	801	9.69
400/175	176.0	408.0	387.0	18.0	21.2	18.2	235	168	224	1,597	68,365	3,351	17.5	20,748	1,072	9.63
500/108	108.0	492.0	379.0	11.0	13.2	10.0	250	182	137	1,880	61,745	2,510	21.2	11,381	601	9.10
500/136	136.0	500.0	380.0	11.0	17.2	14.0	251	191	173	1,916	81,977	3,278	21.8	15,211	801	9.38
500/158	158.0	500.0	381.0	14.0	20.2	17.0	253	196	201	1,944	9,869	3,869	22.1	18,179	954	9.50
500/177	177.0	511.0	382.0	13.0	22.7	19.6	254	186	226	1,968	111,837	4,377	22.3	20,774	1,088	9.59
600S/159	159.0	592.0	460.0	12.5	17.3	12.0	300	218	203	2,737	130,820	4,420	25.4	23,174	1,008	10.70
600/188	188.0	600.0	460.0	14.0	21.	14.0	301	220	239	2,774	158,226	5,274	25.7	26,886	1,169	10.60

Other dimensions available upon request

MOBILE FLOOD PROTECTION SYSTEM: OUR TERRA STOP LOG SYSTEM

In inner cities, ports, and industrial zones, and on road and rail crossings, permanently installed structures are often a hindrance. In these applications our terra stop log system can be used as a temporary measure instead of cost-intensive permanent solutions.

The system comprises just a few aluminium elements that can be installed at different heights. More elements can be fitted later to respond flexibly to changing conditions. The terra stop log system is approved by the Europaverband Hochwasserschutz e. V. and has already proved successful as a temporary flood protection measure in numerous applications. It is a modular system and consisting of the following elements: terra stop logs, posts with or without back stays, clamping devices, anchor plates, and bottom seal.

Applications:

- Installation on existing ground and sheet piling structures
- Protective wall
- Dike opening
- Building protection

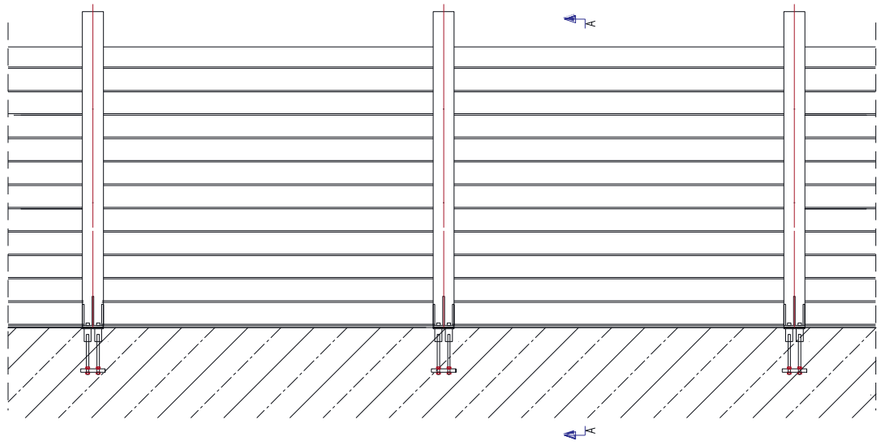


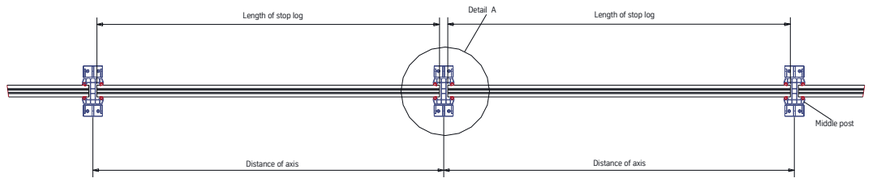


Advantages

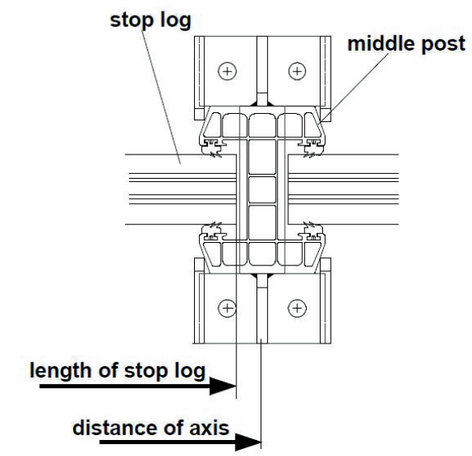
- Simple design – no special tools required
- Robust construction, high reliability
- Low repair, maintenance and storage requirements
- Resistant EPDM seal
- Optimum storage systems
- Low manpower requirements
- Short, flexible response times
- No obstruction of traffic or views in normal conditions

Flood protection wall

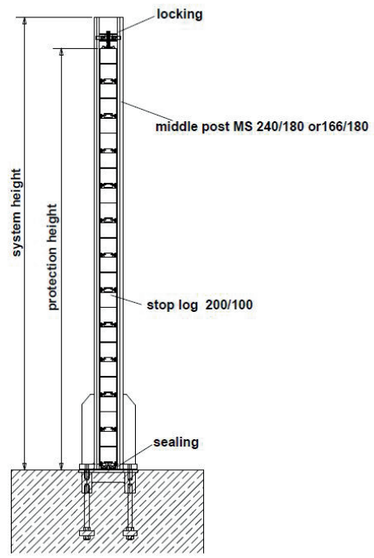




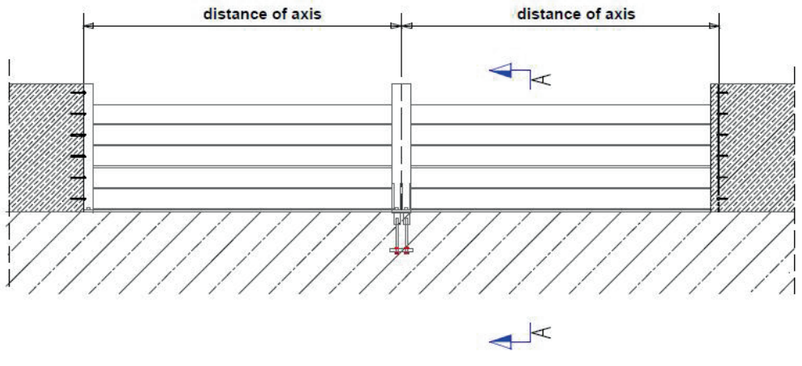
Detail A

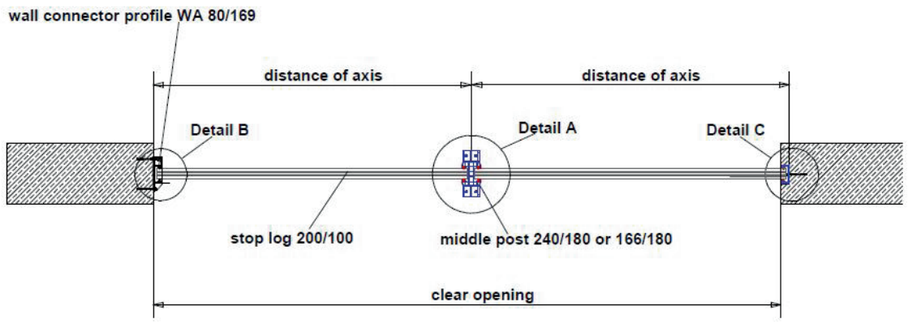


Cross section A-A

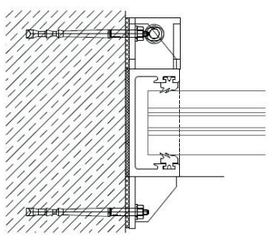


Flood protection wall

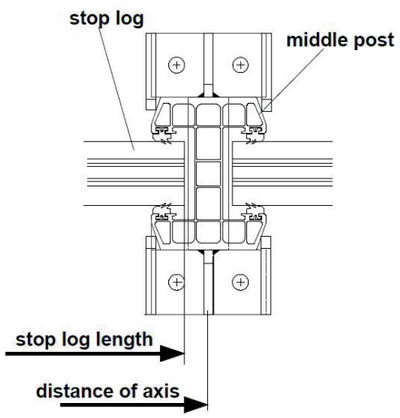




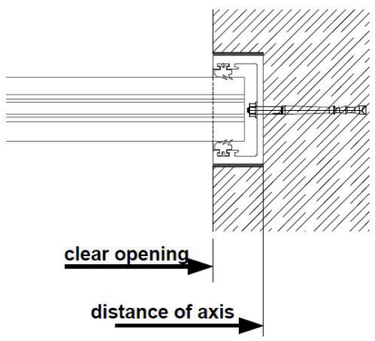
Detail B



Detail A

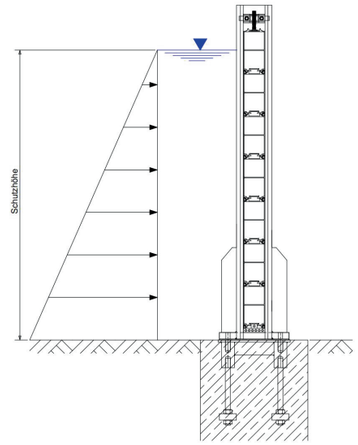


Detail C



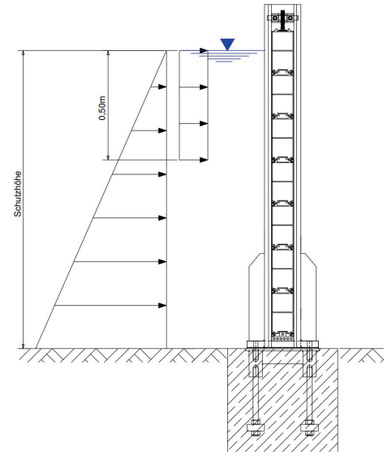
Two load cases

Load case 1: water pressure



Hydrostatic water pressure
with a weight density of 10 kN/m³
and a safety factor of 1,35.

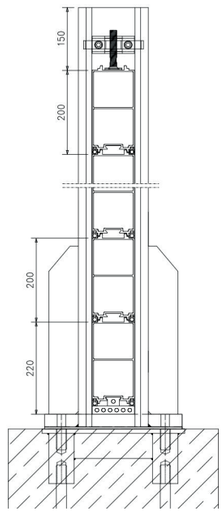
Load case 2: water pressure and impact load



In addition to the hydrostatic water pressure an impact load of 20 kN on an area of 50cm x 50cm should be considered.

Further loads as flow pressure, wave impact, ice impact, vehicle impact and load of people are not considered here.

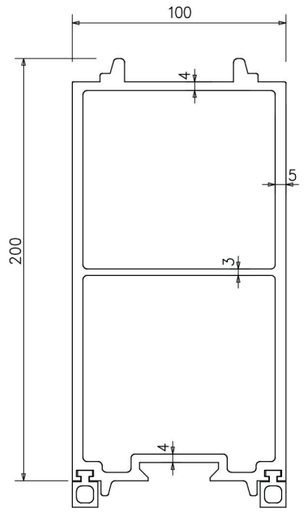
Stop log height



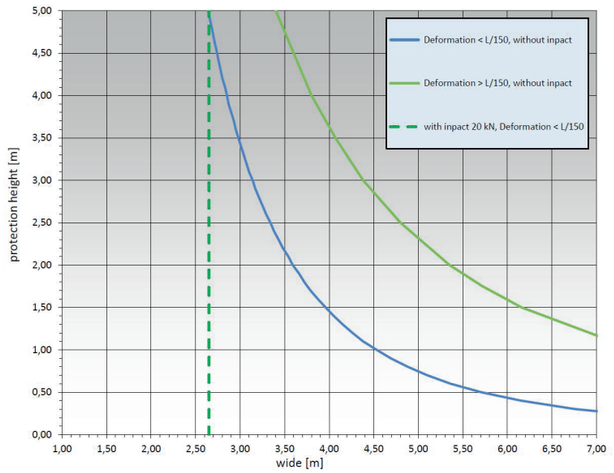
System 100 x 200

Numbers of stop log	Protection height mm	Post height mm
1	220	370
2	420	570
3	620	770
4	820	970
5	1020	1170
6	1220	1370
7	1420	1570
8	1620	1770
9	1820	1970
10	2020	2170
11	2220	2370
12	2420	2570
13	2620	2770
14	2820	2970
15	3020	3170

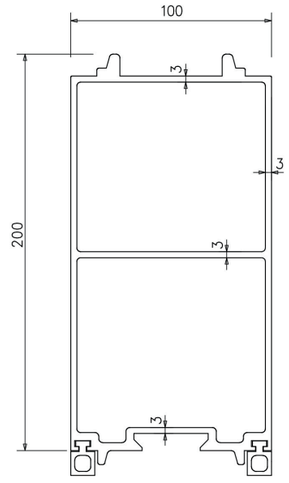
Aluminum stop log SL 200 x 100 L (on request)



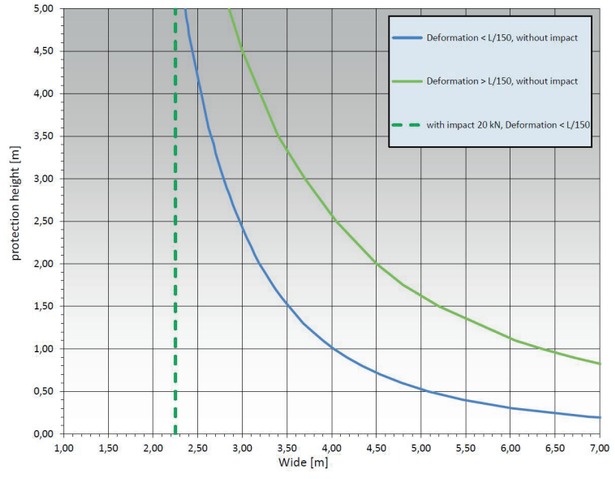
Data		
Moment of inertia	I	520.3 cm⁴
Section modulus	W	104 cm³
Cross section	A	32.23 cm²
Weight		8.70 kg/m
Material		EN AW-6063 [AlMg0,7Si] T66



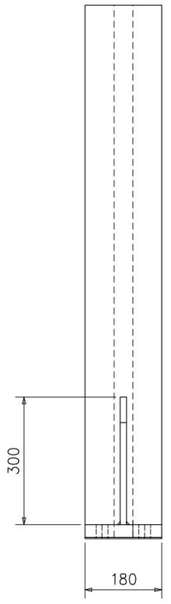
Aluminum stop log SL 200 x 100 S

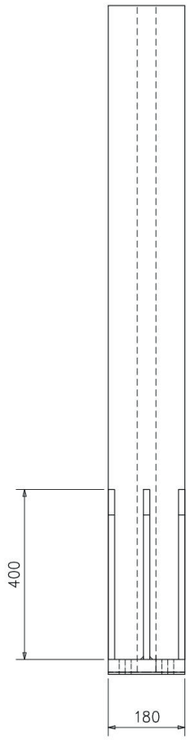


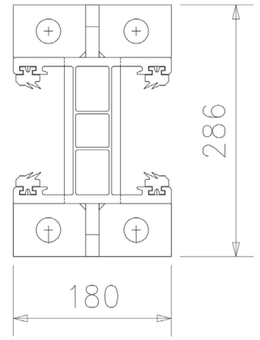
Data		
Moment of inertia	I	366.5 cm⁴
Section modulus	W	73.3 cm³
Cross section	A	24.00 cm²
Weight		6.47 kg/m
Material		EN AW-6063 [AlMg0,7Si] T66

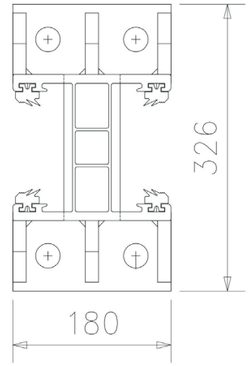


Post MP 166 x 180







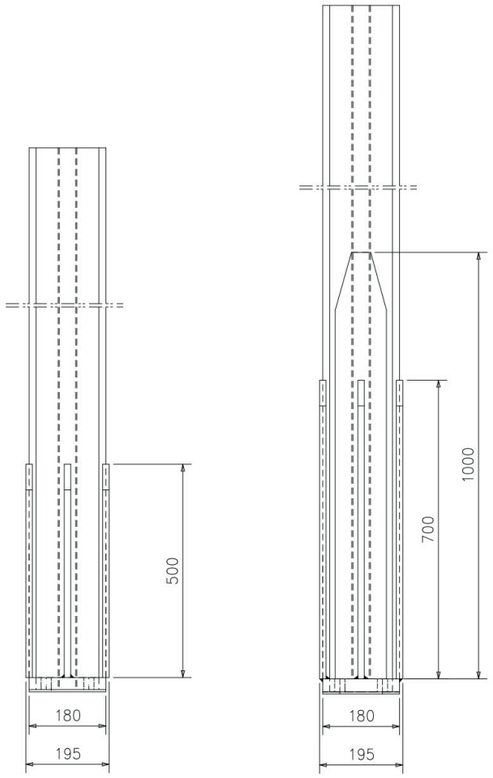


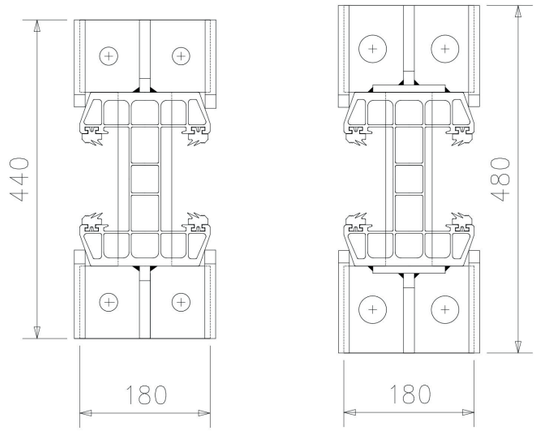
	Height (mm)	Max. wide (mm)	Weight (kg)	Anchor plate
MS 166x180 S	200	6000	10.51	300x200
	400	6000	13.43	
	600	6000	16.35	
	800	5000	19.27	
	1000	4000	22.18	
	1200	3500	25.11	
	1400	3000	28.03	
MS 166x180 L	1600	3000	32.65	340x200
	1800	3000	35.57	
	2000	2500	38.49	

(Posts are calculated as a freestanding system, with back supports, greater protection heights are possible)

Data		
Moment of inertial	I	2679 cm⁴
Section modulus	W	323 cm³
Cross section	A	54.06 cm²
Weight		14.6 kg/m
Material		EN AW-6082 [AlMgSi1] T6

Post MP 240 x 180



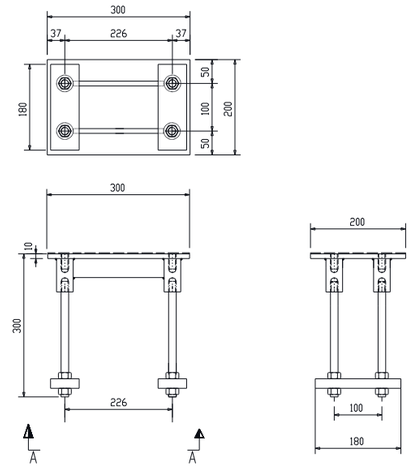


	Height (mm)	max. wide (mm)	Weight (kg)	Anchor plate
MS 240x180 S	1200	6000	38.93	440x200
	1400	5500	43.31	
	1600	5000	47.54	
	1800	4500	52.07	
	2000	3500	56.45	
	2200	3000	60.53	
	2400	2500	65.21	
MS 240x180 L	2600	3000	70.72	480x200
	2800	2500	75.10	
	3000	2000	79.84	

(Posts are calculated as a freestanding system,
with back supports, greater protection heights are possible)

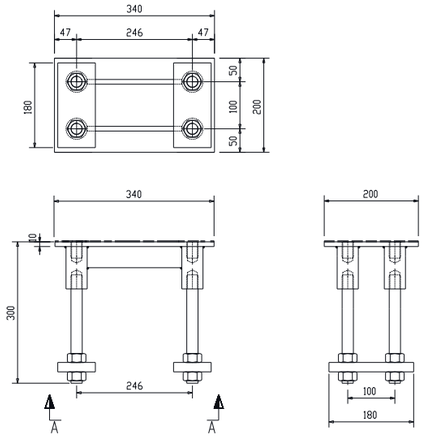
Daten		
Moment of inertial	I	7125 cm^4
Section modulus	W	594 cm^3
Cross section	A	80.96 cm^2
Weight		21.9 kg/m
Material		EN AW-6082 [AlMgSi1] T6

Anchor plate: AP100 T1 – View A-A



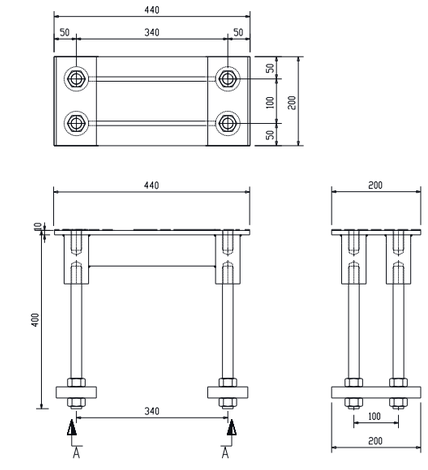
Steel grades		
Stainless steel	1.4301	Top plate / threaded sleeve
Steel	S 355	Connecting plate
Steel	8.8	Threaded bolt / Nuts
Weight	24.49 kg	

Anchor plate: AP100 T2 – View A-A



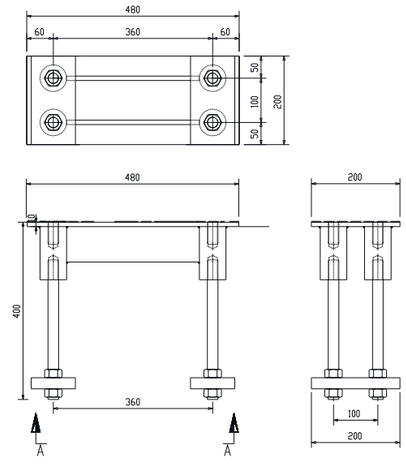
Steel grades		
Stainless steel	1.4301	Top plate / threaded sleeve
Steel	S 355	Connecting plate
Steel	8.8	Threaded bolt / Nuts
Weight	29.77 kg	

Anchor plate: AP100 T3 – View A-A



Steel grades		
Stainless steel	1.4301	Top plate / threaded sleeve
Steel	S 355	Connecting plate
Steel	8.8	Threaded bolt / Nuts
Weight	38.53 kg	

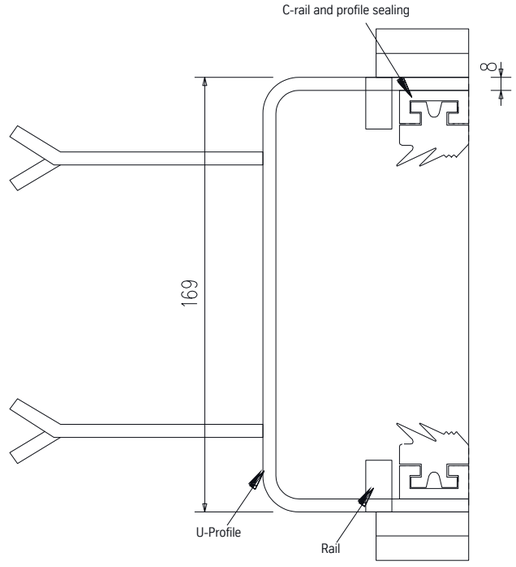
Anchor plate: AP100 T4 – View A-A



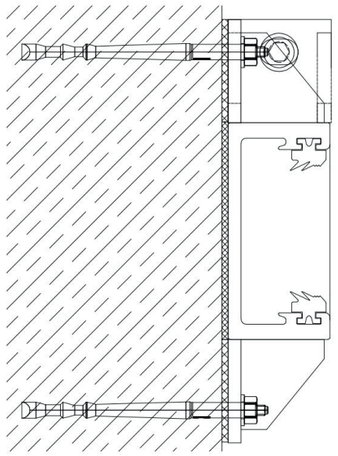
Steel grades		
Stainless steel	1.4301	Top plate / threaded sleeve
Steel	S 355	Connecting plate
Steel	8.8	Threaded bolt / Nuts
Weight	47.86 kg	

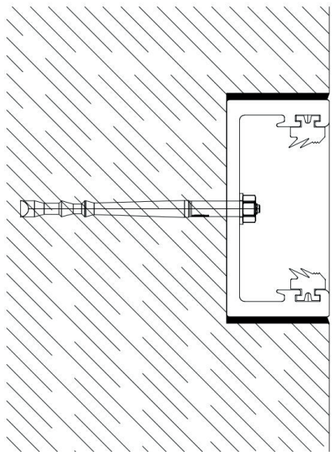
Wall connecting post
with concrete anchor

Material: Stainless steel 1.4301



Wall connecting post
End post 80 x 169

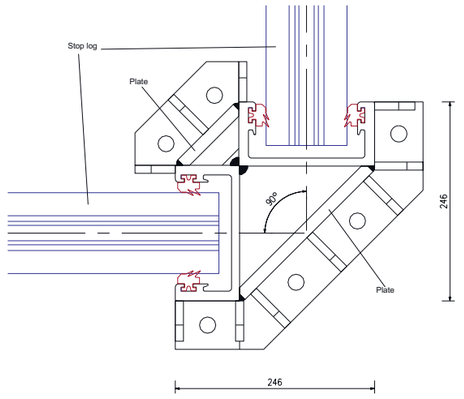




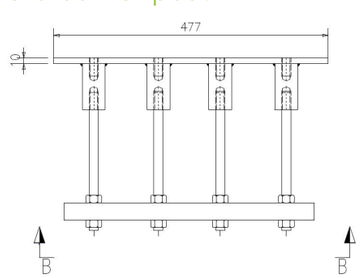
Technical data

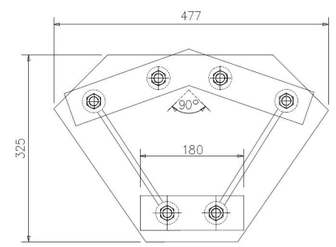
Moment of inertia	I	1611 cm⁴
Section modulus	W	191 cm³
Cross section	A	37.47 cm²
Weight		10.1 kg/m
Material		EN AW-6082 T6

Corner post 90° with endpost profile
Standard corner post



Anchor plate: 90° post for standard corner post

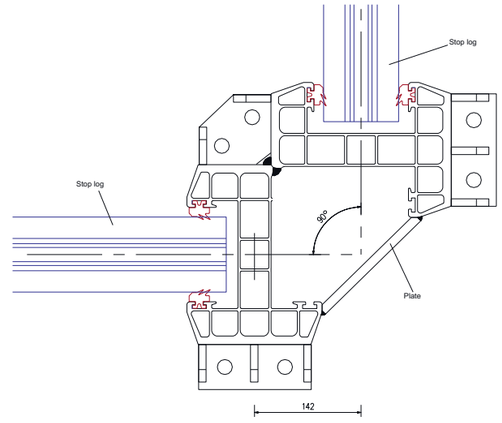




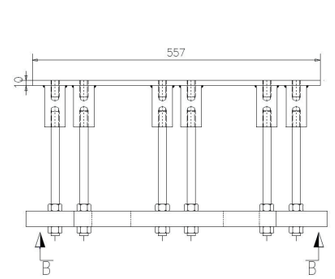
Steel grades

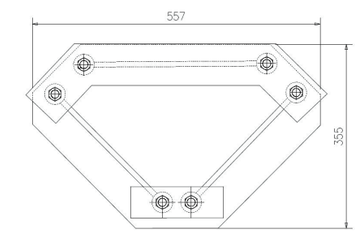
Stainless steel	1.4301	Top plate / Threaded sleeve
Steel	S 355	Connecting plate
Steel	8.8	Threaded bolts / Nuts

Corner post 90° with post MP 240x180
Special corner post for large force impact



Anchor plate: 90° for corner post MP 240/180

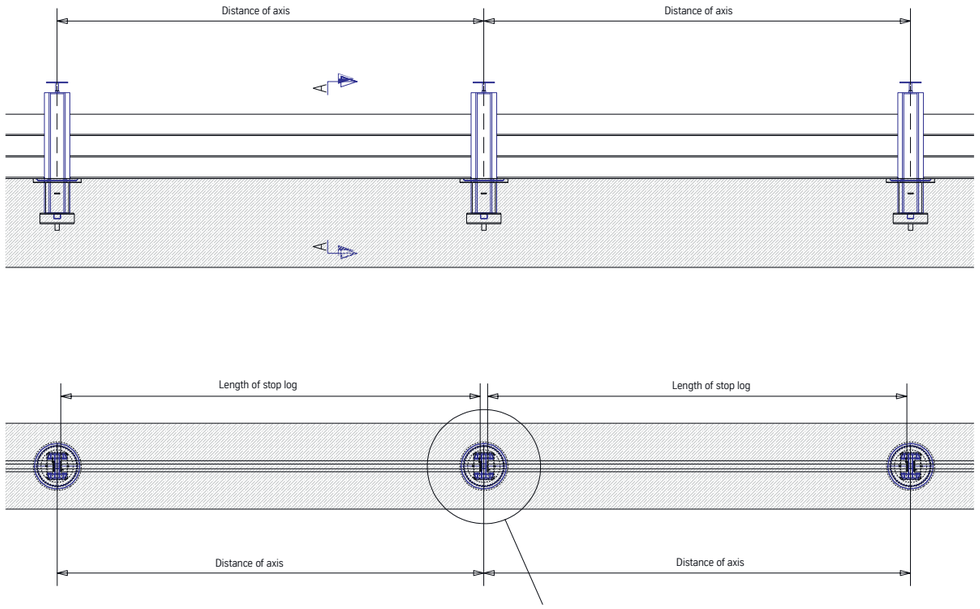




Steel grades

Stainless steel	1.4301	Top plate / Threaded sleeve
Steel	S 355	Connecting plate
Steel	8.8	Threaded bolts / Nuts

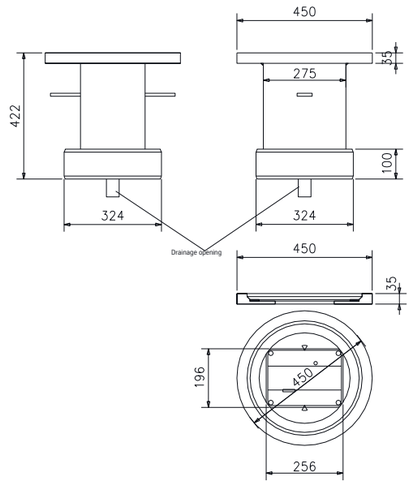
System pocket foundation*



*also available for small systems

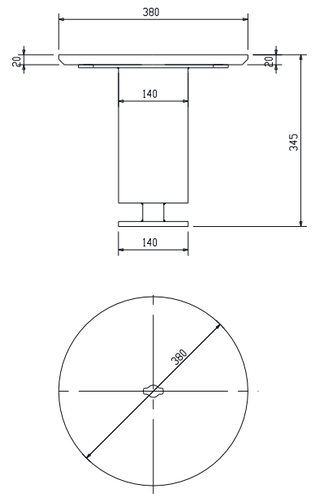
Pocket

Hot dip galvanized steel S355

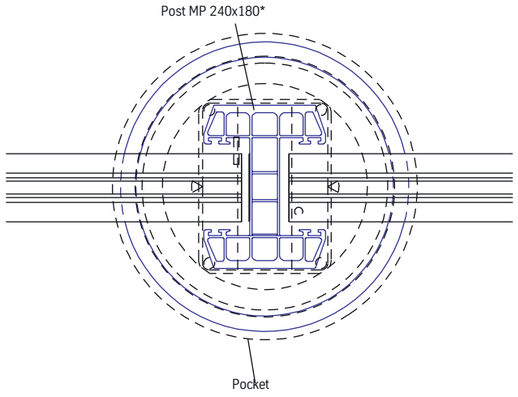


Pocket cover

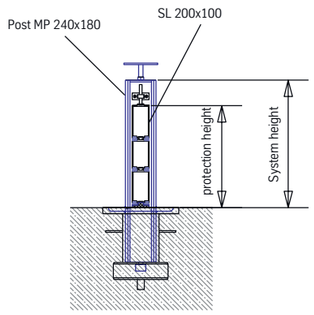
Hot dip galvanized steel S355



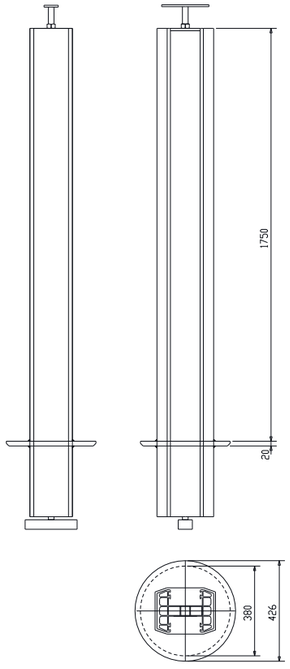
Detail A



Cross section A - A

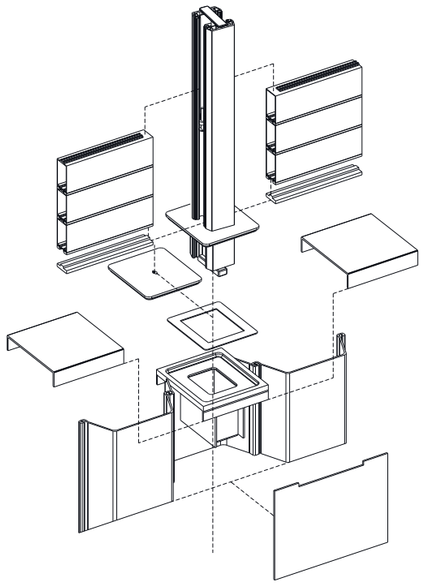


Fast construction post with pocket

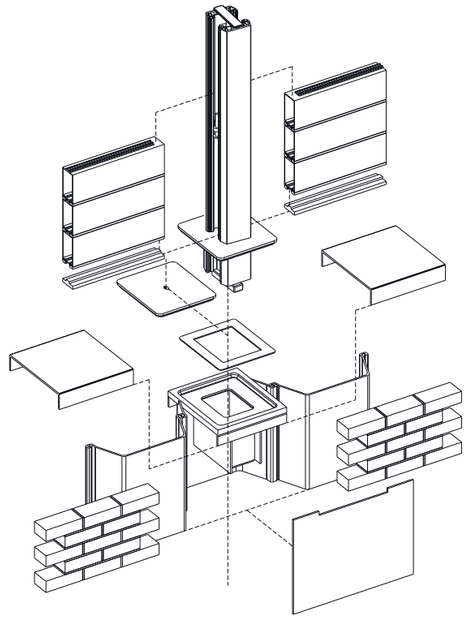


Steel grades	
Aluminum	Post EN AW 6082 T6
Weight	approx. 37.50 kg/m
Steel	Locking S 355

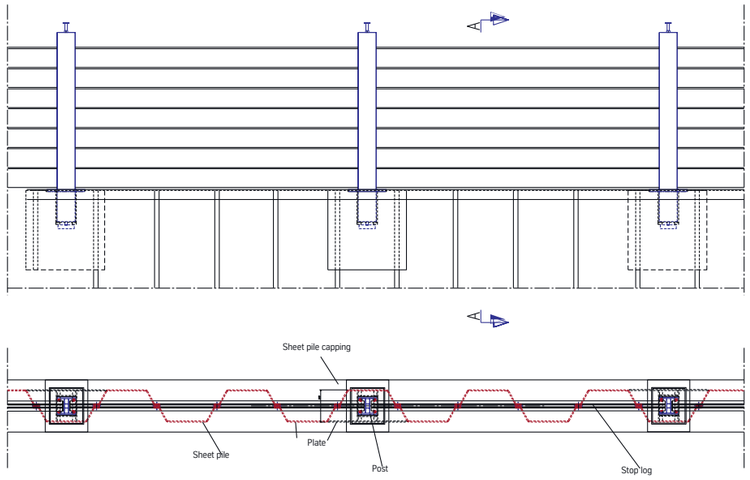
Special system: Connection to sheet pile without cladding system

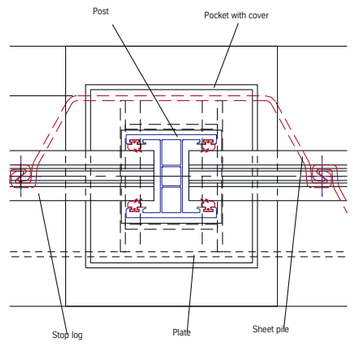


Special system: Connection to sheet pile with cladding system

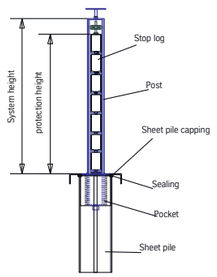


Special system: direct connection to sheet piles with support profile 166/180

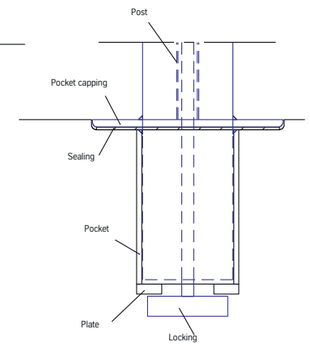




Cross section A-A

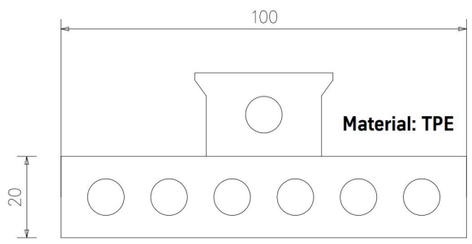


View pocket with locking



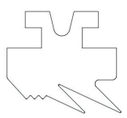
Sealing system

Base seal



Post seal

Stop log seal



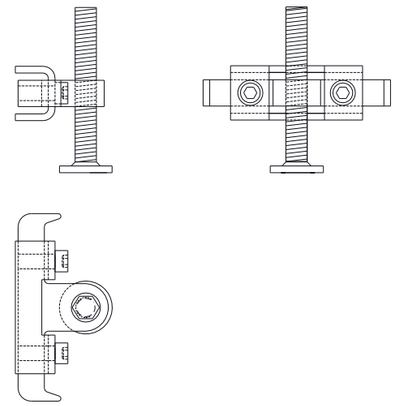


Material: EPDM

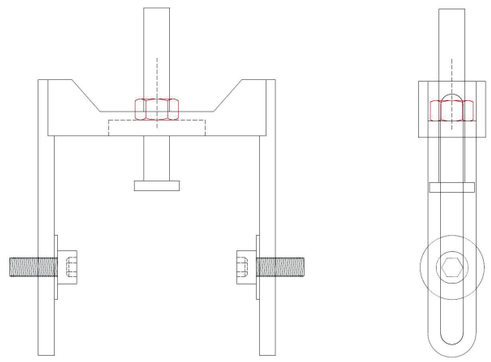
Locking system

Material: Stainless steel 1.4301

Use for all posts and wall connectors of System terra tk 100



Use only with stainless steel wall connectors on page 72. Used when a level top edge of wall and stop log is required. It is not suitable in posts area.



PERMANENT SAFETY: OUR STEEL SHEET PILING IN DIKE CONSTRUCTION

Our proven steel sheet piling is the classic solution for flood protection. A flexible and highly cost-effective solution, it has been used for decades all around the world. Mostly used for permanent systems, steel sheet piling can also serve as a base for temporary systems. This opens up a wide range of possibilities for the design of optimum flood defense solutions.



Sheet piling in dikes

In a flood, dikes are subjected to enormous loads. Often, they are no longer capable of meeting these loads as the increasing regularity of flood disasters was not foreseen by their builders. Here, our steel sheet piling offers an efficient and cost-effective solution because it can be installed quickly and easily in both existing and new dikes to stabilize and seal the dike and increase its load-bearing capacity.

Sheet piling is flexible and can follow the movements of the dike, ensuring long-term stability and watertightness. If necessary, the sheet pile interlocks can be sealed. Various bituminous materials are available for this. These sealants can be installed in the interlocks either at the factory or on-site. One particularly reliable solution is the terra interlock sealing system made from a polymer. This seal is fitted into the interlocks at the factory and is suitable for all methods of sheet pile installation.

If the piling is used for a visible wall, the polymer seal is particularly recommended as it is heat-resistant and does not run out of the interlocks in the heat of the sun. Naturally, all recommended sealing systems are groundwater-neutral and ecologically safe. Ecological reasons also clearly favour the use of sheet pile walls. As 100% steel products they are particularly environment friendly as they can be removed without residues and reused.

Sheet piling applications:

- New dike construction and dike repairs
- Dike raising
- Base for further flood defense structures such as terra glass wall system or demountable flood barriers

Lightweight steel sections

As well as hot-rolled sheet piling, cold-rolled piling sections are used for flood protection. They are cold-formed from flat material into sheet piling profiles and are mainly used for sealing purposes. They are a long-proven lowcost solution. In general they are used in the same way as hot-rolled sheet piling sections, taking their load-bearing properties into account. Production is cost-effective and service properties are ideal for many flood protection applications. The visible parts of the pile wall can be architecturally enhanced in various ways, including painting, brick facing, facing elements, greening, etc. Sheet piling in dikes is a prerequisite for mobile dike-top systems used to temporarily raise the height of dikes when there is a risk of flooding. It also forms an ideal base for raising the flood protection level of glass systems and protective walls.

Sheet pile wall modules

When existing dikes or flood defense systems are not high enough for extreme flood situations, steel sheet pile wall modules can be used as permanent or temporary flood defense solutions. They can be used cost-efficiently as dike raising elements and dike openings to protect residential and working areas in densely populated zones.

Applications of sheet pile wall modules:

- Protection of residential and working areas
- Densely populated zones
- Dike raising elements
- Dike openings



Advantages

- Absorb all static and dynamic forces generated by the flood
- Stability of the dike is guaranteed even if most of the water-side section of the dike is already eroded
- Prevents dike seepage and erosion
- Different groundwater levels on either side of the dike can be offset by staggered driving or slitting of the sheet piles
- Sheet pile walls are so flexible that they follow the movements of the ground without being damaged







MACHINERY

PILE DRIVING, PILE EXTRACTION AND DRILLING TECHNOLOGY

Optimal machinery and equipment are the key to cost-effective work in marine and foundation engineering projects.

We supply the complete range of machinery and equipment for driving and extraction of sheet piles, pipes, beams and other piling sections to our customers, for light to heavy pile driving jobs. In addition, we provide drilling technology for every field of application: from strand anchors, micropiles and self-drilling anchors to geothermal and core drilling projects.

PRODUCTS AND SERVICES OF OUR DIVISION MACHINERY: THE ANSWER TO YOUR BUILDING PROJECTS' REQUIREMENTS

Depending on the on-site requirements, we offer our customers a broad spectrum of suitable machinery, with a range of variants and performance variables.
Our product portfolio mainly focuses our own products such as MÜLLER pile driving and extracting equipment.

Our portfolio

Vibration equipment
- MÜLLER excavator-mounted vibratory hammers
- MÜLLER free-hanging vibratory hammers & power packs

Drilling technology
- VibroDrills
- Drifters
- Rotary mechanisms

MÜLLER complementary products
- Drill drives, clamping devices
- Accessories & special equipment

Leader technology[1]
[1] Exclusive distribution in Denmark, Germany, and Austria.

Our services

- Inspection & maintenance
- Problem solving & repair
- Spare parts
- Replacements / rentals
- Consultation
- Support hotline
- Transportation & setup
- (Remote-)Monitoring

With our wide range of services, we ensure that our customer's machines deliver optimum performance at all times. Our services include inspection, maintenance, spare parts, monitoring, transportation and set-up.



Characteristics

The selection of a suitable vibratory hammer depends mainly on the size and weight of the pile, the driving depth and the existing soil. In principle, the centrifugal force and amplitude must be selected so that the surface friction and the tip resistance between the pile and the surrounding soil can be overcome.

The use of additional equipment, e.g., flushing lances or pre-drilling units, can help to achieve much better driving performance with the same size or centrifugal force of the vibratory hammer.

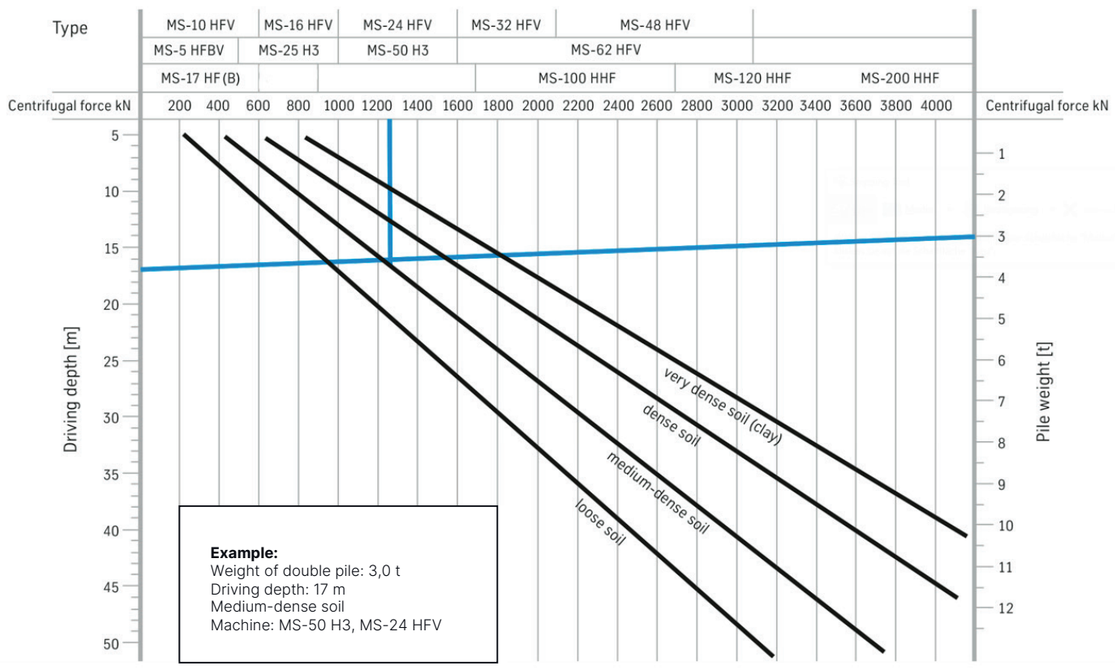
The power pack must be powerful enough to provide the necessary working torque to ensure the centrifugal force of the vibratory hammer, even in difficult soils. The drive output should be 2-3 kW per 10 kN centrifugal force.

For an exact equipment selection, depending on soil parameters and pile section data, please contact our technical consultants. They will use numerical simulation software to calculate the optimum machine for your application.

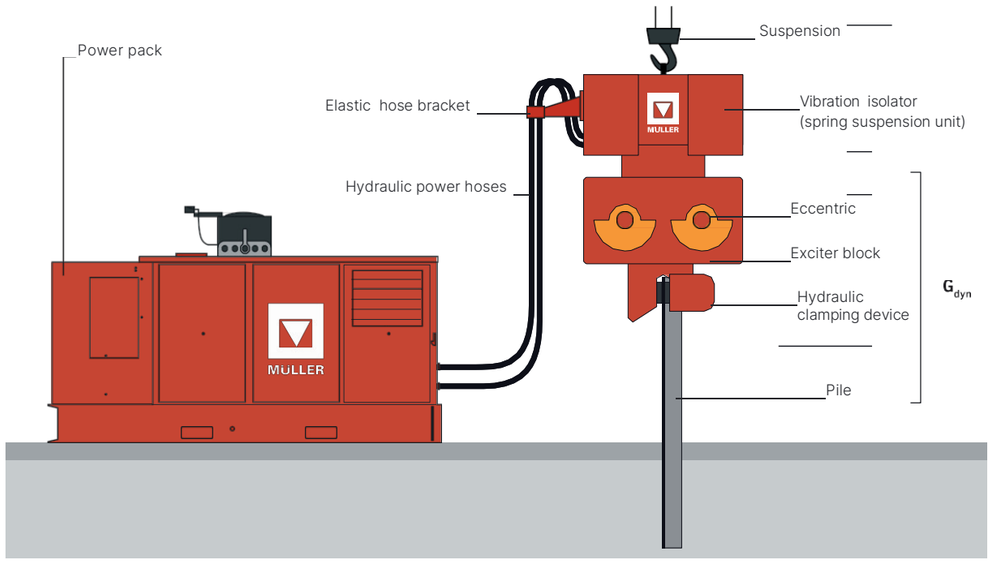
Selection guide

The selection guide below helps to choose the right vibratory hammer or determine the centrifugal force required depending on soil conditions, pile weight, and driving depth.

Equipment selection guide



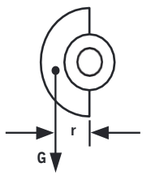
Operating principle of MÜLLER free-hanging vibratory hammers



Key formulas for vibration technology

Eccentric moment M [kgm]

$M = G \cdot r$



The eccentric moment is the measure of unbalance. As a determining factor for amplitude it is a key parameter for driving operations

Centrifugal force F [N]

$F = M \cdot \omega^2$

$F = M \cdot \left(\pi \cdot \frac{n}{30}\right)^2$

The centrifugal force must be high enough to overcome surface friction between pile and soil. Centrifugal force plays a major part in reducing surface friction and provides impact force to overcome tip resistance.

Amplitude S [m]

$$S = 2s = \frac{2 \cdot M_{stat}}{G_{dyn}} \frac{[kgm]}{[kg]}$$

Speed (frequency) n [min^{-1}]
Number of revolutions (vibrations) per minute.
The speed imposes the vibration frequency on the system, causing it to move up / down. The vibrations are transmitted via the pile into the surrounding ground, thereby significantly reducing the surface friction between the pile and the ground. High frequencies counteract unwanted vibration propagation in the ground.

Together with centrifugal force, amplitude is a measure of driving performance. A large 'stroke' and high 'impact force' ensure good driving progress. When driving and extracting in cohesive soils, the elastic connection between pile and soil can only be overcome, if the amplitude is high enough.

Acceleration a [m/s^2]

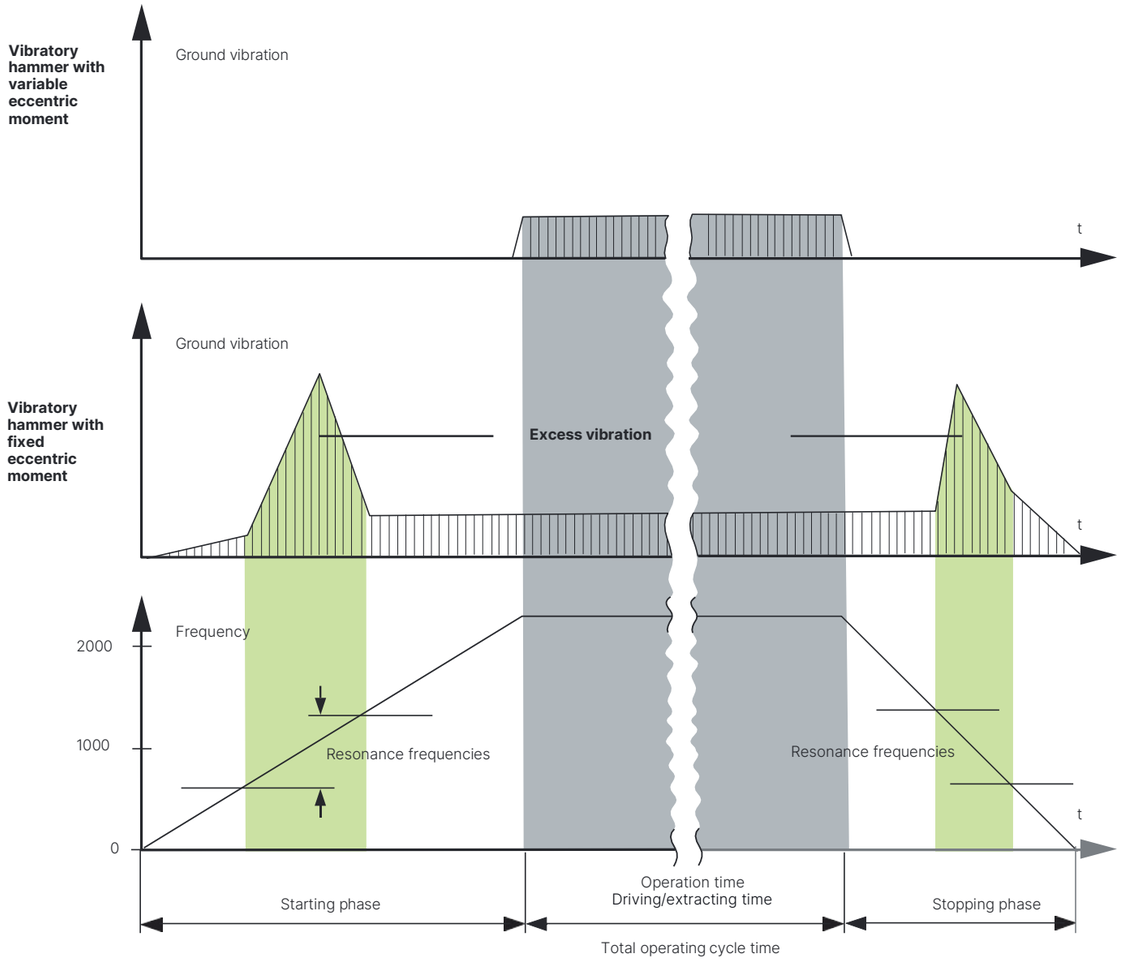
$a = s \cdot \omega^2$ with $\omega = \pi \cdot \frac{n}{30}$

Transmission of the pile acceleration to the surrounding soil causes the displacement of the grain structure and reduces grain friction and soil resistance. Acceleration is expressed as the ratio of acceleration of the vibrator to gravity:

$\eta = \frac{a}{g}$ This ratio corresponds to : $\eta = \frac{F \cdot 10^{-1}}{G_{dyn}}$

The value can lie between 10 and 30.

Principle of resonance-free starting and stopping



COMPACT ALL-ROUNDERS FOR ALL COMMON EXCAVATORS: MÜLLER EXCAVATOR-MOUNTED VIBRATORY HAMMERS AND DRILL DRIVES

The compact and lightweight MÜLLER excavator-mounted vibratory hammers can be attached to any standard excavator and connected to the excavator's board hydraulics. They are controlled via the operating levers. Our different series (HFB, HFBV, HFB S, HFB SG, HFBV SGX, RHA) and useful accessories cater to a wide range of applications.

MÜLLER HFB SG series of side-grip excavator-mounted vibratory hammers with fixed static moment

The machines of our MÜLLER HFB SG-series are capable of picking up, positioning and driving a pile into the ground in a single operation. Especially in confined installation spaces this is a key advantage, seeing as conventional excavator-mounted vibratory hammers have to clamp the pile from the top. The series also offers a specially developed, weight-optimised machine variant for working with two-way excavators during track works. The side-grip clamping device for beams and piles MS-U 43 SG can be easily and quickly replaced by the side-grip clamping device for pipes MS-U 60 SGR.

HFB SG series

Applications
- Driving and extracting of sheet piles, beams and pipes

Advantages
- With tilt-rotating device: controlled through excavator joystick and switching foot pedal
- MS-4 HFB SGL: weight-optimised for two-way excavators
- Vertical alignment via tilt sensor and indicator
- Easy setup through connection to the excavator's hydraulic system
- Allows work in limited installation spaces
- Allows work with longer piles





Type			MS-4 HFB SGL	MS-4 HFB SG	MS-6 HFB SG	MS-7 HFB SG	MS-9 HFB SG
Centrifugal force	F (max.)	kN	305	374	464	500	680
Eccentric moment	M stat (max.)	kgm	3.8	4.2	6.6	7.0	8.5
Frequency	f (max.)	Hz	45.0	47.5	42.5	42.5	45.0
Speed	n (max.)	min-1	2,700	2,850	2,550	2,550	2,700
Pulling force	F pull (max.)	kN	120	120	120	120	120
Pushing force	F Push (max.)	kN	120	120	120	120	120
Weight total	incl. clamping device[2]	kg	1,840	2,245	2,255	2,260	2,305
Weight dynamic	incl. clamping device[2]	kg	995	1,235	1,245	1,250	1,425
Amplitude	incl. clamping device[2]	mm	7.6	6.7	10.5	11.2	11.9
Power consumption	P (max.)	kW	95 / 79	100	119	119	142
Required oil flow	Q motor (max.)	l/min	162 / 135	171	204	204	243
Operating pressure	p (max.)	bar	350	350	350	350	350
Dimensions	Length L	mm	1,443	1,455	1,455	1,455	1,455
	Width B	mm	1,031	1,057	1,057	1,057	1,057
	Height H	mm	1,533	1,533	1,526	1,526	1,526
Clamping device		MS-U[2]	40	60/72	60/72	60/72	80/100
Alternative clamping device		MS-U	60/72 K	60/72 K	60/72 K	60/72 K	-
Side clamping device for beams and piles		MS-U[2]	43 SG	43 SG	43 SG	43 SG	43 SG
Side clamping device for pipes		MS-U	60 SGR	60 SGR	60 SGR	60 SGR	-
Recommended excavator	Weight	t	15	20	25	25	28
Recommended excavator	P	kW	120 / 100	125	150	150	178

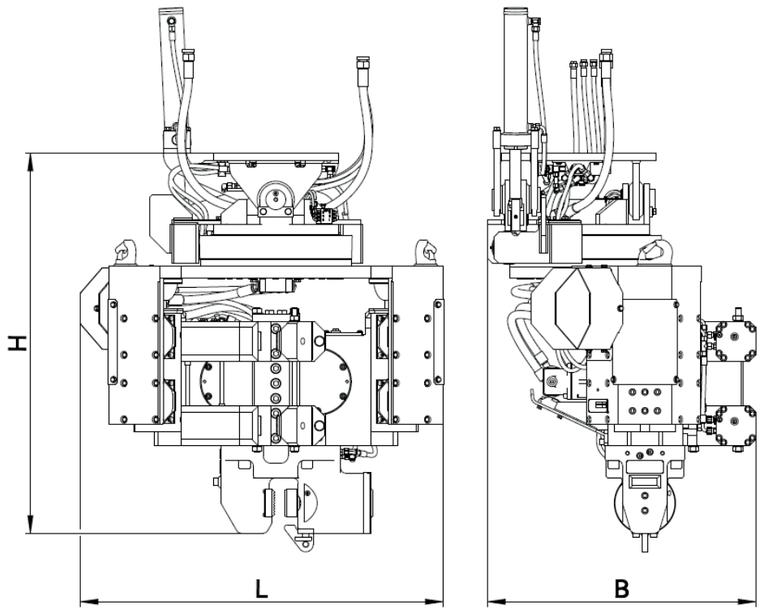


Image shows MS-4 HFB SG with MS-U 43 SG and MS-U 60/7

MÜLLER HFBV SGX series of side-grip excavator-mounted vibratory hammers with variable static moment

With the launch of our new series MS-HFBV SGX, we are extending our established series of side-grip excavator-mounted vibratory hammers MS-HFB SG by variable machines with a resonance-free start and stop system. This means that e.g. sheet piles can be driven into the ground precisely, quickly and independently by the excavator operator, even in vibration-sensitive installation spaces. The new series makes it possible to grip the pile laterally from a lying position, to clamp it and to drive it into the ground in a single operation.

HFBV SGX series

Applications

- Driving and extracting mainly of sheet piles in vibration sensitive installation spaces

Advantages

- Easy setup through connection to the excavator's hydraulic system
- Adapter for all common quick-coupler systems
- Higher safety standard: no physical contact with the pile
- Zero resonance: minimal vibration propagation in the ground; minimizes wear-and-tear of your equipment
- Allows work in limited installation spaces



Type			MS-6 HFBV SGX	MS-8 HFBV SGX	MS-10 HFBV SGX
Centrifugal force	F (max.)	kN	480	663	685
Eccentric moment	M stat (max.)	kgm	0-6	0-8	0-9.8
Frequency	f (max.)	Hz	45	46	42
Speed	n (max.)	min-1	2,700	2,750	2,525
Pulling force	F pull (max.)	kN	150	150	150
Pushing force	F Push (max.)	kN	150	150	150
Weight total	incl. clamping device[2]	kg	3,592	4,027	4,041
Weight dynamic	incl. clamping device[2]	kg	2,220	2,655	2,669
Amplitude	incl. clamping device[2]	mm	6.1	8.1	9.8
Power consumption	P (max.)	kW	126	173	184
Required oil flow	Q motor (max.)	l/min	216	297	316
Operating pressure	p (max.)	bar	350	350	350
Dimensions	Length L	mm	1,630	1,630	1,630
	Width B	mm	1,391	1,391	1,389
	Height H	mm	1,984	1,986	1,984
Clamping device		MS-U[2]	60/72	80/100	80/100
Alternative clamping device		MS-U	60/72 K	-	-
Side clamping device for beams and piles		MS-U[2]	43 SG	43 SG	43 SG
Recommended excavator	Weight	t	28	30	30
Recommended excavator	P	kW	160	220	230

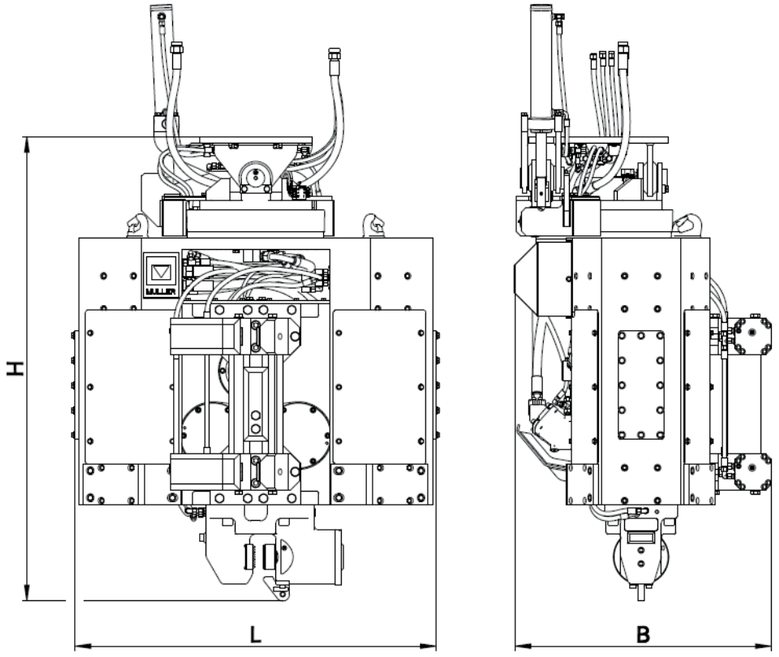


Image shows MS-6 HFBV SGX with MS-U 43 SG and MS-U 60/70







HFBV SGX-Series with variable static moment

Typ			MS-6 HFBV SGX	MS-8 HFBV SGX	MS-10 HFBV SGX
Centrifugal force	F (max.)	kN	480	599	600
Eccentric moment	M stat (max.)	kgm	0-6	0-8	0-9.8
Frequency	f (max.)	Hz	45	44	39
Speed	n (max.)	min-1	2,700	2,615	2,365
Pulling force	F pull (max.)	kN	150	150	150
Pushing force	F Push (max.)	kN	150	150	150
Weight total	incl. clamping device[2]	kg	4,292	4,292	4,306
Weight dynamic	incl. clamping device[2]	kg	3,036	3,061	3,075
Amplitude	incl. clamping device[2]	mm	4.0	5.3	9.8
Power consumption	P (max.)	kW	126	142	149
Required oil flow	Q motor (max.)	l/min	216	243	256
Operating pressure	p (max.)	bar	350	350	350
Dimensions	Length L	mm	1,630	1,630	1,630
	Width B	mm	1,426	1,426	1,426
	Height H	mm	1,984	1,986	1,984
Clamping device		MS-U[2]	60/72	60/72	60/72
Alternative clamping device		MS-U	60/72 K	80/100	80/100
Side clamping device for beams and piles		MS-U[2]	72 SGX	72 SGX	72 SGX
Recommended excavator	Weight	t	28	30	30
Recommended excavator	P	kW	160	178	187

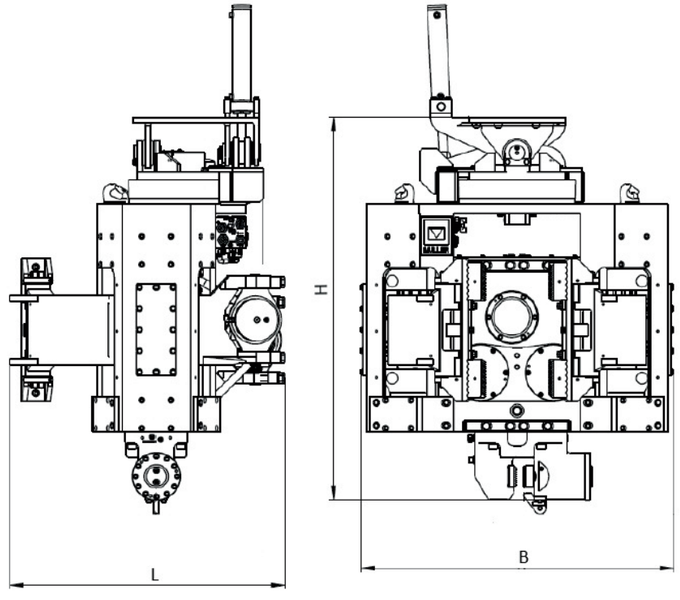


Image shows MS-8 HFBV SGX with MS-U 72 SGX and MS-U 60/70

MÜLLER HFB series with fixed static moment

Our MÜLLER HFB series of excavator-mounted vibratory hammers with fixed static moment does not only deserve the title ”tried and true“ but has also been subject to constant optimization over the course of many years.

The machines of this series impress with their compact design, their easy handling, their long service life and their versatility. A modular system allows for a wide variety of additional features and accessories.

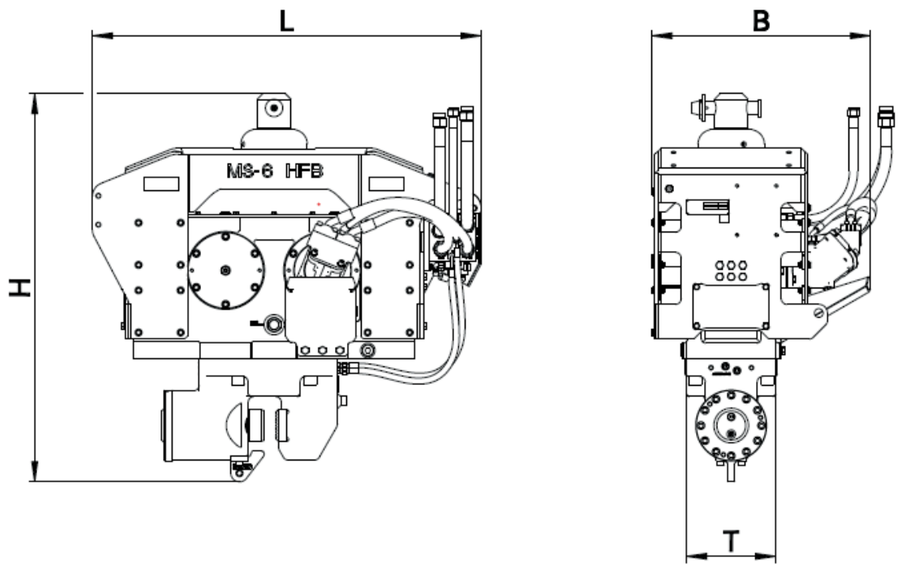
HFB series

Applications
- Driving and extracting mainly of sheet piles, beams and pipes

Advantages
- MÜLLER: running steady – robust and reliable
- Modular system – adaptable to your requirements
- Minimum overall height – maximum pile length



Type			MS-1 HFB	MS-2 HFB	MS-3 HFB	MS-4 HFB	MS-6 HFB	MS-7 HFB	MS-9 HFB	MS-17 HFB
Centrifugal force	F (max.)	kN	90	245	296	374	464	604	606	604
Eccentric moment	M stat (max.)	kgm	0.7	2.2	3.0	4.2	6.5	7.0	8.5	17.0
Frequency	f (max.)	Hz	56.0	53.1	50.0	47.5	42.5	46.7	42.5	30.0
Speed	n (max.)	min^{-1}	3,360	3,185	3,000	2,850	2,550	2,800	2,550	1,800
Pulling force	F pull (max.)	kN	34	60	60	120	120	150	150	140
Pushing force	F push (max.)	kN	34	40	40	80	80	80	80	170
Weight total	incl. clamping device[1]	kg	350	815	830	1,335	1,365	1,375	1.,395	2,445
Weight dynamic	incl. clamping device[1]	kg	230	570	585	940	970	970	1,000	1,690
Amplitude	incl. clamping device[1]	mm	6.1	7.7	10.3	8.9	13.7	14.7	17.2	20.1
Power consumption	P (max.)	kW	60 / 38	61	70	105	119	130	133	158
Required oil flow	Q Motor (max.)	l/min	102 / 64	105	120	180	204	224	229	270
Operation pressure	p (max.)	bar	350	350	350	350	350	350	350	350
Dimensions	Length L	mm	mm	835	1,153	1,348	1,348	1,348	1,348	1,348
	Width B	mm	mm	472	626	745	745	745	745	745
	Height H	mm	825	mm	825	1,344	1,344	1,344	1,344	1,344
	Throat T	mm	mm	230	260	340	340	340	340	340
Clamping device	Type	MS-U[1]	12	40	40	60/72	60/72	60/72	60/72	80/100
Recommended excavator	Weight	t	10 / 8	10	12	18	25	30	30	32
Recommended excavator	P	kW	75 / 50	80	90	130	150	160	170	200
Recommended power pack for free-hanging operation	Type	MS-A	–	–	-	190	190	190	190	190



Picture shows MS-6 HFB with MS-U 60/72

MÜLLER HFBV series with variable static moment

The HFBV series offers maximum performance with minimum ground vibration. This makes them ideal for applications in vibration-sensitive areas (e. g. inner-city) and for civil engineering projects.

HFBV series

Applications
- Urban foundation works
- Areas sensitive to vibration
- Ideal for sandy soils

Advantages
- Minimal ground vibration
- Optimal adaptation to soil conditions
- Technology that's easy on both the equipment and the environment



Type			MS-5 HFBV*	MS-7 HFBV*	MS-8 HFBV	MS-10 HFBV
Centrifugal force	F (max.)	kN	400	478	585	588
Eccentric moment	M stat (max.)	kgm	0–5	0–6.7	0–8	0–9.8
Frequency	f (max.)	Hz	45.0	42.5	43.0	39.0
Speed	n (max.)	min^{-1}	2,700	2,550	2,580	2,340
Pulling force	F pull (max.)	kN	120	120	150	150
Pushing force	F Push (max.)	kN	80	80	150	150
Weight total	incl. clamping device[1]	kg	1,660	1,680	2,180	2,230
Weight dynamic	incl. clamping device[1]	kg	1,170	1,190	1,340	1,380
Amplitude	incl. clamping device[1]	mm	8.5	11.3	12.0	14.2
Power consumption	P (max.)	kW	95 / 126	112 / 126	165 / 120	167 / 148
Required oil flow 5-hose connection	Q Motor (max.)	l/min	162 / 216	204 / 230	283 / 206	293 / 257
Required oil flow 3-hose connection	Q Motor (max.)	l/min	180 / 240	220 / 250	–	–
Operating pressure	p (max.)	bar	350	350	350	350
Dimensions	Length L	mm	1,395	1,395	1,554	1,554
	Width B	mm	707	707	761	761
	Height H	mm	1,544	1,544	1,582	1,582
	Throat T	mm	390	390	415	415
Clamping device	Type	MS-U[1]	60/72	60/72	60/72	60/72
Recommended excavator	Weight	t	18	23	30	35
Recommended excavator	P	kW	120 / 155	150 / 170	150 / 205	175 / 185
Recommended power pack for free-hanging operation	Type	MS-A	190	190	190	190

*Option: with three or five connecting hoses

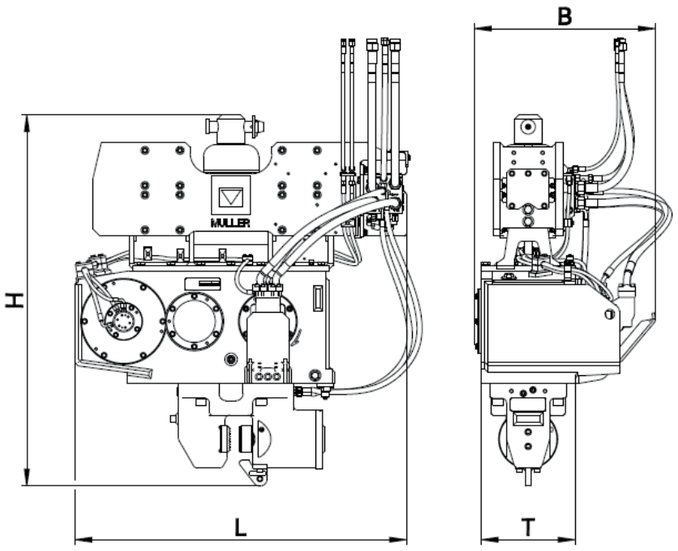


Image shows MS-5 HFBV with MS-U 60/72

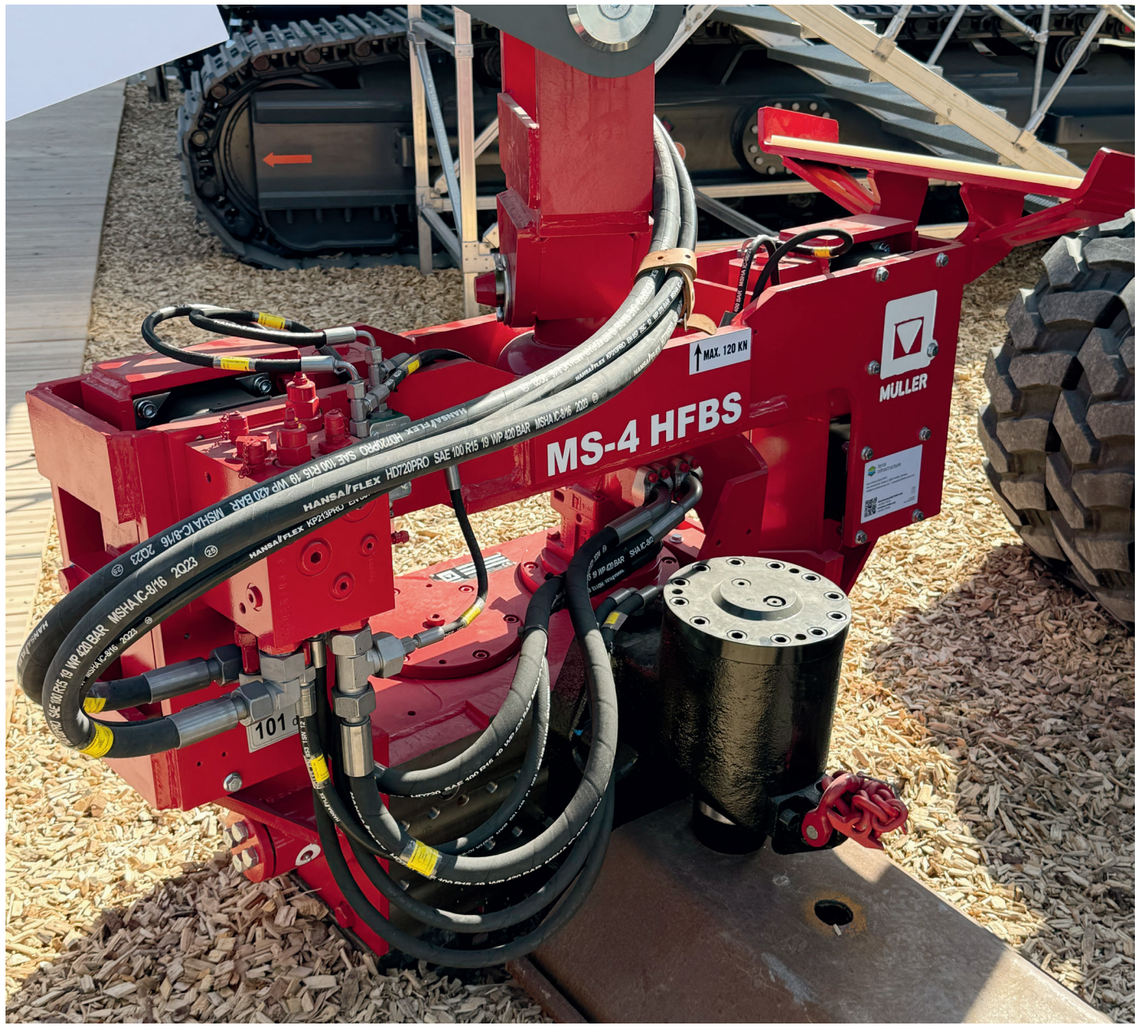
MÜLLER HFB S series with fixed static moment and pivoting exciter cell

HFB S excavator-mounted vibratory hammers with a constant amplitude are uncomplicated to operate and robust in use. In addition, they allow the pile to be picked up and deposited directly with a clamp.

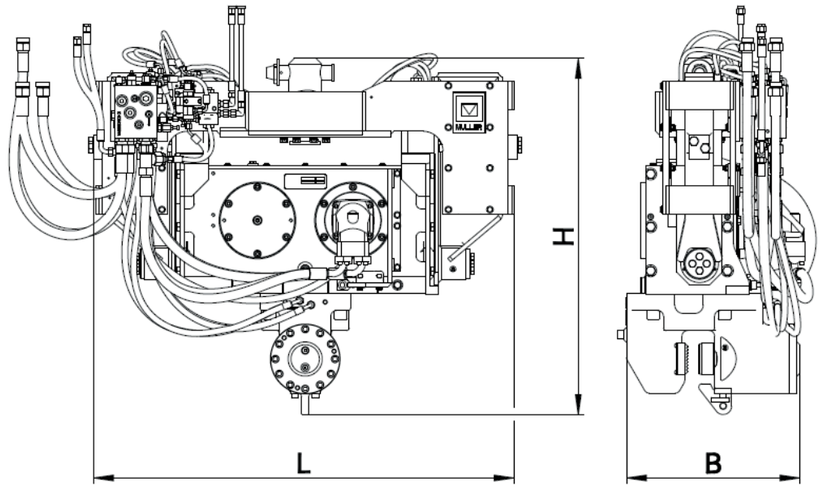
HFB S series

Applications
- Sheet pile driving

Advantages
- Direct pick-up and set-down
- Extremely low height allows driving of long piles
- Easy setup through excavator hydraulics
- Control block with safety circuit
- Manual or automatic exciter cell locking mechanism



Type			MS-4 HFB S	MS-6 HFB S	MS-7 HFB S
Centrifugal force	F (max.)	kN	378	464	604
Eccentric moment	M stat (max.)	kgm	4.2	6.5	7.0
Frequency	f (max.)	Hz	47.5	42.5	46.7
Speed	n (max.)	min^{-1}	2,850	2,550	2,800
Pulling force	F pull (max.)	kN	120	120	150
Pushing force	F push (max.)	kN	80	80	80
Weight total	incl. clamping device[1]	kg	1,360	1,370	1,380
Weight dynamic	incl. clamping device[1]	kg	1,110	1,120	1,130
Amplitude	incl. clamping device[1]	mm	7.7	11.6	12.4
Power consumption	P (max.)	kW	100	119	130
Required oil flow	Q Motor (max.)	l/min	171	204	224
Operating pressure	p (max.)	bar	350	350	350
Dimensions	Length L	mm	1,520	1,520	1,520
	Width B	mm	697	697	697
	Height H	mm	1,250	1,250	1,250
	Throat T	mm	–	–	–
Clamping device	Type	MS-U[1]	60/72	60/72	60/72
Recommended excavator	Weight	t	18	23	27
Recommended excavator	P	kW	125	150	160
Recommended power pack for free-hanging operation	Type	MS-A	190	190	190



Picture shows MS-4 HFB S with MS-U 60/72

MÜLLER RHA series
Excavator-mounted drill drives

HFB S excavator-mounted vibratory hammers with a constant amplitude are uncomplicated to operate and robust in use. In addition, they allow the pile to be picked up and deposited directly with a clamp.

RHA series

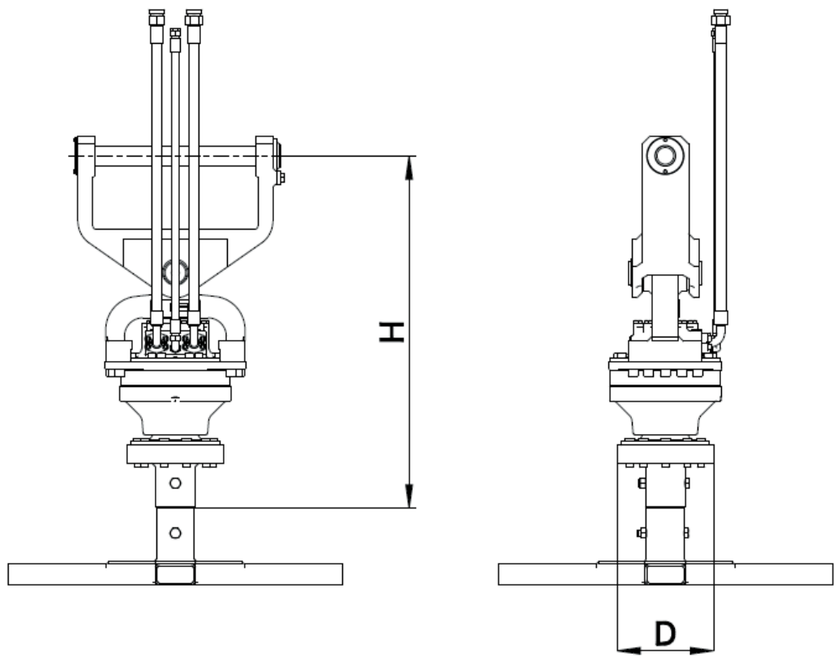
Applications
- Pre-drilling to loosen and relieve the ground
- Heavy soils

Advantages
- Various mounting options
- Fast, cost-effective drilling
- Powerful, robust, long life



Type			MS-RHA 12 3*	MS-RHA 16 3*	MS-RHA 24 3*	MS-RHA 34 3*	MS-RHA 46 3*
Torque	M (max.)	Nm	12,000	16,000	24,000	34,000	46,000
Speed	n (max.)	min^{-1}	30-125	30-115	30-110	30-100	30-70
Operating pressure	p (max.)	bar	80-350	80-350	80-350	80-350	80-350
Power consumption	P	kW	10-152	15-204	17-268	24-350	35-350
Required oil flow	Q motor (max.)	l/min	65-260	95-350	130-460	180-600	260-600
Diameter	Smallest drilling diameter	mm	200	200	400	400	400
Diameter	Largest drilling diameter	mm	700	900	1,200	1,400	1,600
Drill depth	With smallest drilling diameter (max.)	m	20	25	14	16	20
Drill depth	With largest drilling diameter (max.)	m	4	4	2	2	2
Weight	without auger/without stand	kg	300	360	440	600	760
Dimensions	Height H	mm	983	1,149	1,148	1,234	1,240
	Diameter D	mm	425	400	390	485	555
Hexagon connection		mm	70 / 70	70 / 80	80 / 80	100 / 100	120 / 120
Recommended excavator	Weight	t	10-20	15-25	20-30	28-40	35-50
Recommended excavator	P	kW	80-125	120-150	125-220	160-438	144-438

*Connection to excavator stick
Options available upon request: mounted on leader, clamped into vibratory hammer clamping device



MAXIMUM PERFORMANCE:
MÜLLER FREE-HANGING VIBRATORY HAMMERS

Our MÜLLER free-hanging vibratory hammers are attached to a crane via rope suspension and driven by a suitable hydraulic power pack. Within our portfolio we offer three series of free-hanging vibratory hammers, that allow us to cater to a wide range of customer- and construction project requirements. Our free-hanging machines can aswell be retrofitted for leader-mounting.

HFV series with variable static moment.

The vibratory hammers of our HFV series offer maximum performance with minimum ground vibration – ideal for applications in urban foundation works or in areas sensitive to vibration, all thanks to resonance-free starting and stopping. This minimises resonance vibrations both on the ground and in the direction of a lifting crane. In addition, the machines of the series allow the continuous adjustment of the amplitude (via eccentric moment). The natural frequency of the soil can therefore be taken into account – driving proceeds effectively and yet with little vibration. Thanks to the wide range of machine variants, this series can be used in a broad spectrum of construction projects.



HFV series

Applications
- Urban foundation works
- Areas sensitive to vibration
- Ideal for sandy soils

Advantages
- Maximum output at minimal soil disturbance
- Wide range of clamping devices
- Technology that's easy on both the equipment and the environment

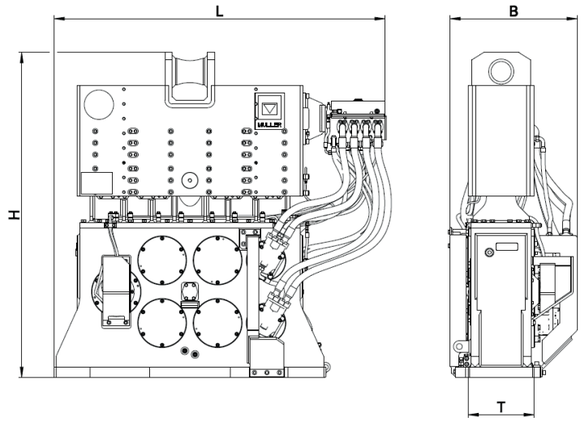
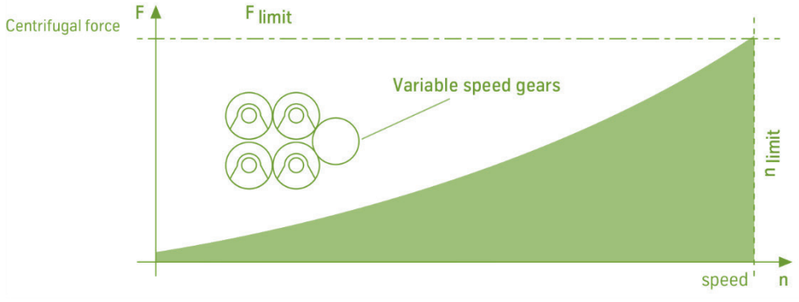
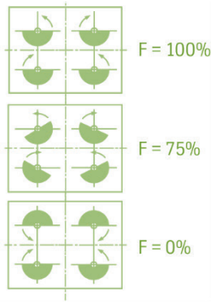


Image shows MS-24 HFV

Variable eccentric moment





MÜLLER vibratory hammers HFV series

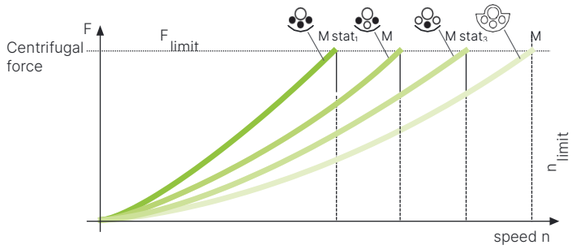
Type			MS-10 HFV	MS-12 HFV	MS-16 HFV	MS-20 HFV	MS-24 HFV
Centrifugal force	F (max.)	kN	610	740	985	1,200	1,405
Eccentric moment	M stat (variable)	kgm	0–10	0–12.3	0–16	0–19.5	0–24
Frequency	f (max.)	Hz	39.3	39.0	39.5	39.5	38.5
Speed	n (max.)	min^{-1}	2,358	2,340	2,370	2,370	2,310
Pulling force	F pull (max.)	kN	180	210	300	300	400
Weight total	without clamping device	kg	2,350	2,350	3,530	3,600	5,150
Weight dynamic	without clamping device	kg	1,750	1,750	2,565	2,530	2,900
Amplitude	without clamping device/pile	mm	11.8	14.1	12.5	15.4	16.5
Power consumption	P (max.)	kW	148 / 203	165 / 229	222 / 298	298 / 408	290 / 398
Required oil flow	Q Motor (max.)	l/min	254 / 348	283 / 393	380 / 511	511 / 700	498 / 682
Operating Pressure	p (max.)	bar	350	350	350	350	350
Dimensions	Length L	mm	1,797	1,797	2,080	2,080	2,110
	Width B	mm	732	789 / 839	782	782	866 / 956
	Height H	mm	1,560	1,560	2,060	2,060	2,210
	Throat T	mm	330	330	350	350	451
Single clamping device	Type	MS-U	80/100	80/100	150	150	180
Double clamping device	Type	MS-U	2 x 54	2 x 54	2 x 80/100	2 x 80/100	2 x 80/100
Recommended power pack	Type	MS-A	190	190	280	340	340
	Type	MS-A	280	280	340	420	420

Type			MS-28 HFV	MS-32 HFV	MS-40 HFV	MS-48 HFV	MS-62 HFV	MS-68 HFV
Centrifugal force	F (max.)	kN	1,500	1,980	2,005	2,905	3,000	3,290
Eccentric moment	M stat (variable)	kgm	0–28	0–32	0–39.2	0–48	0–62	0–68
Frequency	f (max.)	Hz	36.8	39.6	36.0	39.2	35.0	35.0
Speed	n (max.)	min^{-1}	2,210	2,375	2,160	2,350	2,100	2,100
Pulling force	F pull (max.)	kN	500	600	600	600	800	800
Weight total	without clamping device	kg	5,200	7,250	7,430	9,700	11,165	10,550
Weight dynamic	without clamping device	kg	2,950	4,850	5,020	6,520	6,805	6,905
Amplitude	without clamping device/pile	mm	18.0	13.2	15.6	14.7	18.2	19.6
Power consumption	P (max.)	kW	380 / 518	499 / 610	500 / 630	645 / 821	734 / 960	734 / 960
Required oil flow	Q Motor (max.)	l/min	652 / 888	855 / 1,046	857 / 1,080	1,105 / 1,408	1,258 / 1,646	1,258 / 1,646
Operating Pressure	p (max.)	bar	350	350	350	350	350	350
Dimensions	Length L	mm	2,110	2,465	2,465	2,465	2,465	2,465
	Width B	mm	866 / 956	800	826	1,123	1,180	1,180
	Height H	mm	2,240	2,455	2,460	2,525	2,525	2,525
	Waist T	mm	451	345	437	860	860	860
Single clamping device	Type	MS-U	180	250	250	360	360	360
Double clamping device	Type	MS-U	2 x 80/100	2 x 150	2 x 150	2 x 180	2 x 180	2 x 250
Recommended power pack	Type	MS-A	420	570	570	690 o. 700	840	840
	Type	MS-A	570	690 o. 700	690 o. 700	840	1,150 o. 1,200	1,150 o. 1,200

MÜLLER HHF series with stepwise adjustable static moment

These stepwise adjustable vibratory hammers are ideal for use in changeable geological conditions. The eccentric moment can be varied through adding or removing weights to the unbalance, so with one machine, different amplitudes and frequencies adapted to the soil profiles can be achieved with the same centrifugal force.

Stepwise adjustable eccentric moment



HHF series

Applications
- Soils with moderate to difficult driving conditions
- Suitable for heavy piles

Advantages
- Adjustment to changing soil conditions on site thanks to removable additional weights
- Quick changeover



Type			MS-100 HHF	MS-120 HHF	MS-220 HHF	MS-240 HHF
Centrifugal force	F (max.)	kN	2,500	3,003	4,686	5,160
Eccentric moment	M stat (max.)	kgm	100	116	218	240
	Steps (see illustration)	kgm	48 / 60 / 80 / 100	80 / 94 / 110 / 116	151/175/193/218	151/193/218/240
Frequency steps	f (max.)	Hz	36 / 32 / 27.8 / 25	30.9 / 28.3 / 26.2 / 25.6	27.5 / 26 / 24.5 / 23.3	29.5 / 26 / 24.5 / 23.3
Speed steps	n (max.)	min^{-1}	2,160 / 1,920 / 1,670 / 1,500	1,850 / 1,700 / 1,570 / 1,536	1,650 / 1,560 / 1,470 / 1,400	1,770 / 1,560 / 1,470 / 1,400
Pulling force	F pull (max.)	kN	600	1,200	1,200	1,200
Weight total	without clamping device	kg	10,900	15,500	20,100	20,100
Weight dynamic	without clamping device	kg	7,700	8,900	11,980	12,010
Amplitude	without clamping device / pile	mm	12.5 / 15.6 / 20.8 / 26.0	18,.0 / 21.1 / 24.7 / 26.1	25.2 / 29.2 / 32.2 / 36.4	25.1 / 32.1 / 36.3 / 40.0
Power consumption	P (max.)	kW	750 / 610	895 / 671	1,015	1,032
Required oil flow	Q Motor (max.)	l/min	1,286 / 1,045	1,534 / 1,150	1,740	1,770
Operation pressure	p (max.)	bar	350	350	350	350
Dimensions	Length L	mm	2,410	2,310	2,300	2,300
	Width B	mm	846	1,200	1,513	1,513
	Height H	mm	3,235	4,135	4,190	4,190
	Throat T	mm	500	832	832	832
Single clamping device	Type	MS-U	360	360	360*	360*
	Alternative	MS-U	–	–	–	–
Double/quadruple	Type	MS-U	2 x 150	2 x 180	4 x 180	4 x 180
clamping device	Alternative	MS-U	2 x 180	–	2 x 250*	2 x 250*
Recommended power pack	Type	MS-A	840 / 690 o. 700	1,200 o. 1,150 / 840	1,200 o. 1,150	1,200 o. 1,150

* Only permitted with reduced centrifugal force

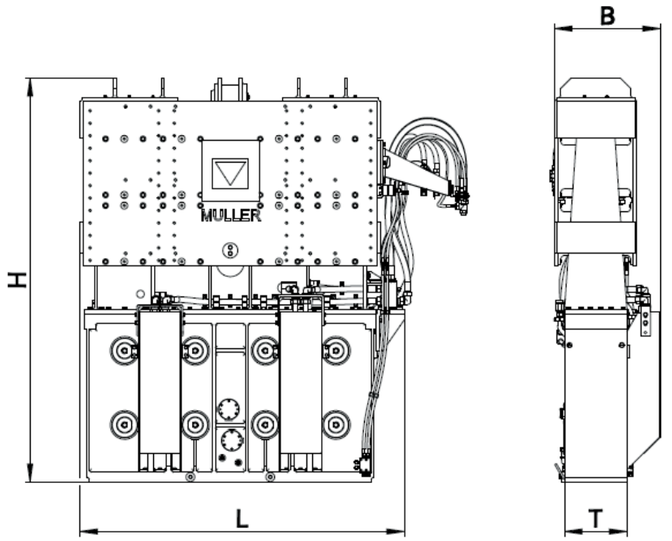
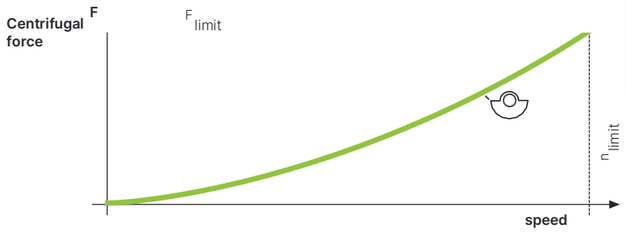


Image shows MS 100 HHF

MÜLLER H series with fixed static moment

MÜLLER vibratory hammers with constant amplitude – straightforward to use and robust. That is the foundation for good results in moderately difficult driving conditions. These vibratory hammers are fitted with unbalances that generate a fixed eccentric moment. With forced-feed lubrication and oil cooling, this series is equipped for applications in extreme climatic conditions.

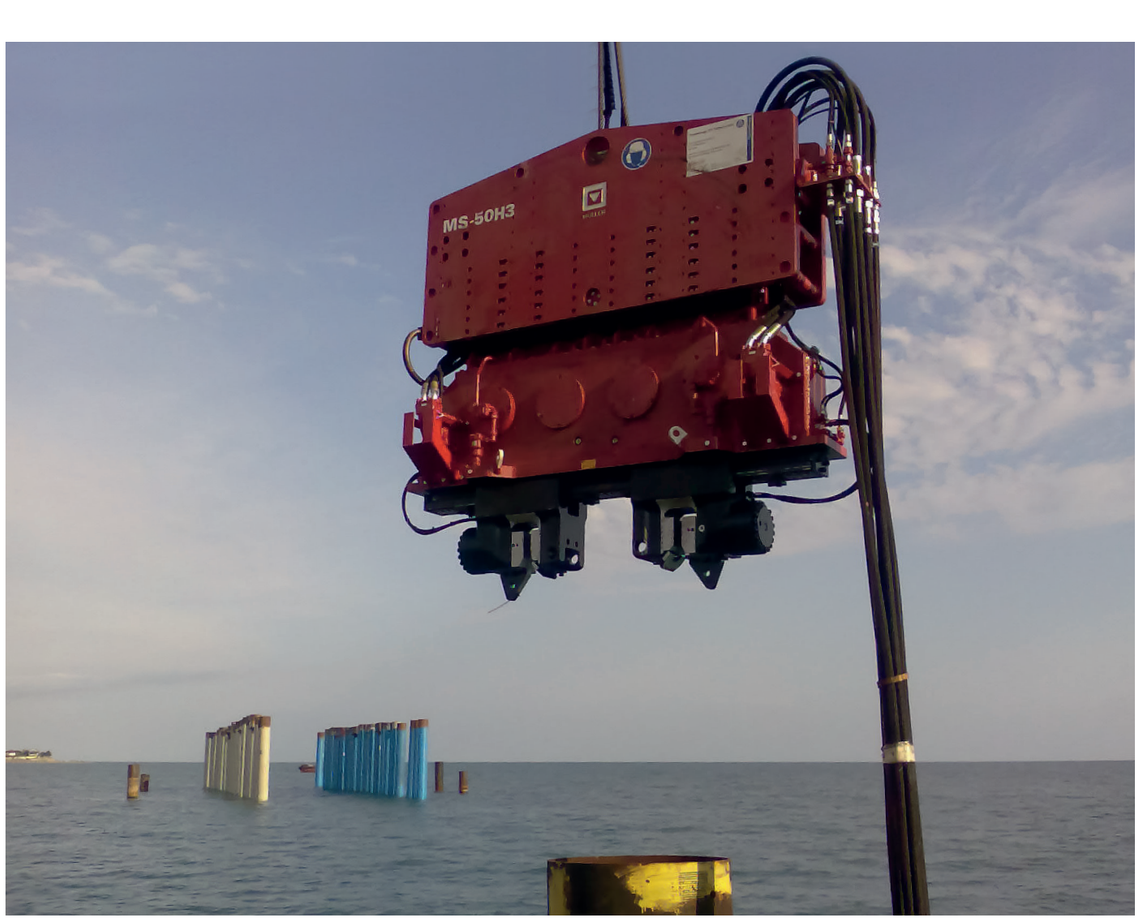
Fixed eccentric moment



H series

Applications
- Soils with light to moderately difficult driving conditions
- Driving and extracting tubular piles
- Even in extreme climatic conditions

Advantages
- Extremely robust machine design
- Easy handling and easy adjustment of clamping devices



Type			MS-25 H3	MS-35 H3	MS-50 H3	MS-65 H3
Centrifugal force	F (max.)	kN	774	834	1,430	1,670
Eccentric moment	M stat	kgm	25	32.5	50	65
Frequency	f (max.)	min^{-1}	28.0	25.5	26.9	25.5
Speed	n (max.)	Hz	1,680	1,530	1,615	1,530
Pulling force	F pull (max.)	kN	400	400	500	500
Weight total	without clamping device	kg	3,600	3,600	7,905	8,200
Weight dynamic	without clamping device	kg	2,550	2,660	3,820	4,200
Amplitude	without clamping device/pile	mm	19.6	24.4	26.2	31.0
Power consumption	P (max.)	kW	248	270	419	450 / 397
Required oil flow	Q motor (max.)	l/min	425	463	719	773 / 680
Operating pressure	p (max.)	bar	350	350	350	350
Dimensions	Length L	mm	2,250	2,250	2,800	2,800
	Width B	mm	761	761	722	737
	Height H	mm	1,760	1,760	2,140	2,140
	Throat T	mm	402	402	402	402
Single clamping device	Type	MS-U	80/100	80/100	180	200
	alternative	MS-U	150	150	–	250
Double clamping device	Type	MS-U	2 x 54	2 x 54	2 x 80/100	2 x 80/100
	alternative	MS-U	2 x 80/100	2 x 80/100	2 x 90	–
Recommended power pack	Type	MS-A	340 o. 280	340 o. 280	420	570 o. 420

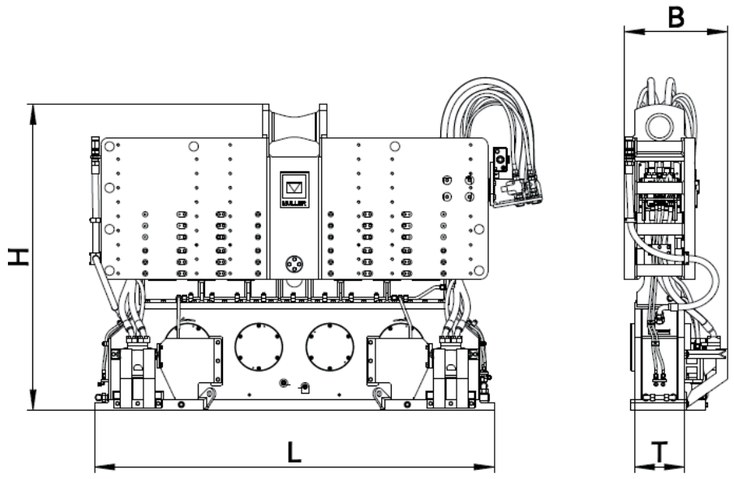
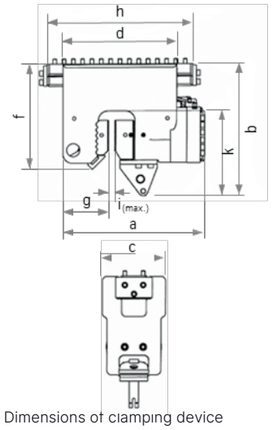
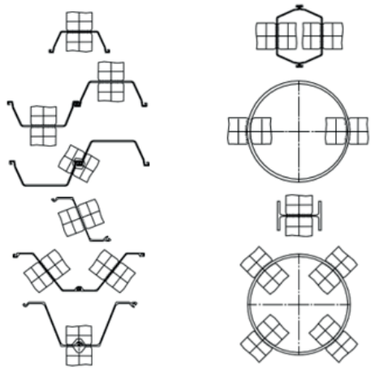


Image shows MS 50 H3

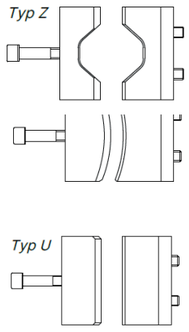
MÜLLER clamping devices



Dimensions of clamping device



Arrangement of clamps



Jaw pad types

Clamping devices for bolted mounting:

Type	Clamping force kN	Clamping pressure bar	Dimensions in mm a	c	d	f	g	h	i. max.	IPB min	Weight kg
MS-U 12	122	260	229	195	195	223	95	–	15	120	50
MS-U 40	370	300	548	260	400	285	175	–	40	120	145
MS-U 60/72	600 / 720	300 / 358	640	320	480	350	220	–	40	140	260
MS-U 80/100 A	800 / 1,000	280 / 350	798,5	330	519	410	216.5	–	48	280	400
MS-U 150 AP	1,500	350	902	360	660	580	319	–	40	320	940
MS-U 180 AP	1,800	350	893	390	740	645	314	–	80	320	1,130
MS-U 200 A	2,000	350	1,011	380	880	800	440	–	36/48	450	1,600
MS-U 250 A	2,500	350	1,173	395	860	840	380	–	63	450	1,950
MS-U 360 A	3,600	350	1,255	460	1,180	950	520	–	80	400	3,130

Clamping devices to be moved on a clamping bar:

Type	Clamping force kN	Clamping pressure bar	Dimensions in mm a	c	d	f	g	h	i. max.	IPB min	Weight kg
MS-U 54	540	350	648	270	515	694	190	730	22	180	440
MS-U 80/100 G	800 / 1,000	280 / 350	760	340	580	509	206.5	–	48	–	670
MS-U 90	900	350	770	340	580	529	290	820	28	180	515
MS-U 100 GP	1,000	350	761	345	610	534	245 / 250	780	33 / 50	280	750
MS-U 150 GP	1,500	350	892	340	640	554	309	780	45	320	920
MS-U 180 GP	1,800	350	903	390	745	645	325	880	80	320	1,250
MS-U 250 G	2,500	350	1,173	398	860	840	364	1,150	63	450	2,450

MÜLLER accessories
Intermediate plates and brackets for free-hanging vibratory hammers

Intermediate plate / bracket	Compatible with (vibratory hammer)	Compatible with (pile-driving material)
Intermediate plate, standard	MS-24 up to MS-32 HFV and MS-100 HHF	Standard version for double piles (U-profile)
Intermediate plate, narrow	MS-24 up to MS-32 HFV and MS-100 HHF	Narrow version for double piles (U-profile)
Pipe bracket MS-KRH 1800	MS-16 up to MS-40 HFV	Adaptation up to max. 1,800 mm pipe diameter*
Pipe bracket MS-KR 2300	MS-24 up to MS-62 HFV/ MS-100 and MS-240 HHF	Adaptation up to max. 2,300 mm pipe diameter*
Pipe bracket MS-KR 2800	MS-24 up to MS-62 HFV/MS-100 and MS-120 HHF	Adaptation up to max. 2,800 mm pipe diameter*
X-Bracket MS-KX 2800	MS-220 and MS-240 HHF	Adaptation up to max. 2,800 mm pipe diameter
X-Bracket MS-KX 4500	MS-220 and MS-240 HHF	Adaptation up to max. 4,500 mm pipe diameter

*Other diameters available upon request.
*Depending on the clamping-device configuration.

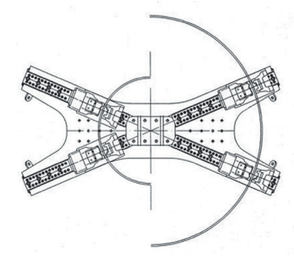


Image shows X-Bracket

Brackets for excavator mounted vibratory hammers

Pipe bracket	Compatible with (vibratory hammer)	Compatible with (pipes)
Pipe bracket DA 1160	MS-4 up to MS-17 HFB, for MS-5 up to MS-10 HFBV	d min = ca. 400 up to d max. = ca. 850 mm

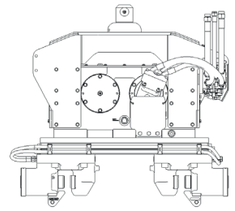


Image shows MS-9 HFB with pipe bracket DA 1160

MÜLLER ground release shackle

Type	Pulling force kN	Suitable for perforations up to mm	Weight kg
MS-SSZ-3 B	30	177	15
MS-SSZ-3 BL	30	250	19
MS-SSZ-4 B	40	306	24
MS-SSZ-5 B	50	212	26

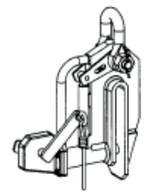


Image shows MS-SSZ 3B

MÜLLER universal connecting fork for excavator-mounted equipment

Connecting fork	Up to excavator stick width mm	Incl. pins Ø mm	Compatible with
Universal	240 – 500	60 70 80 90 100 110	all MÜLLER excavator-mounted vibratory hammers MS-RHA 12 3, 16 3 & 24 3

*Other connecting forks upon request

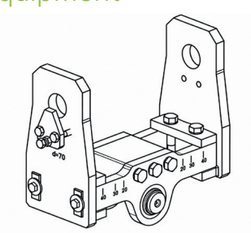
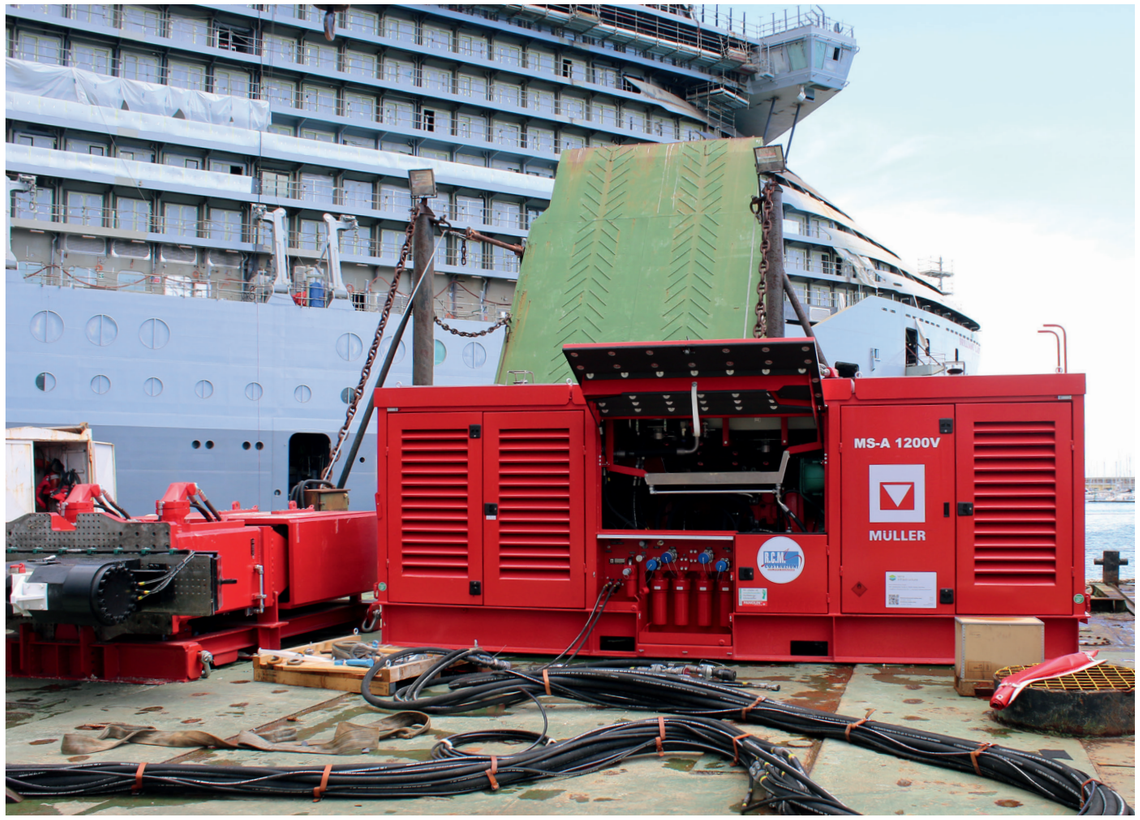


Image shows universal connecting fork

CONCENTRATED POWER FOR THE VIBRATORY HAMMER: MÜLLER POWER PACKS

Power packs are needed to supply the hydraulic vibratory hammers with energy. Inside a noise-insulated housing, diesel motors run hydraulic pumps that supply the necessary flow rate for hydraulic motors via hoses to the vibratory hammers.



The low-noise, fuel-efficient integrated diesel motors comply with the latest exhaust emission regulations. The programmable logic controller can be operated via cable or radio remote control and is used to optimize and monitor the workflows. Optionally, operating parameters and machine data can be called up remotely online via data modem.

The intelligent PLC operating controls, the well-designed construction and the high quality of the components used contribute significantly to the power pack's outstanding operational reliability and easy handling. A comprehensive range of optional extras offers a wide variety of customisation options, even for specialist requirements.

Advantages

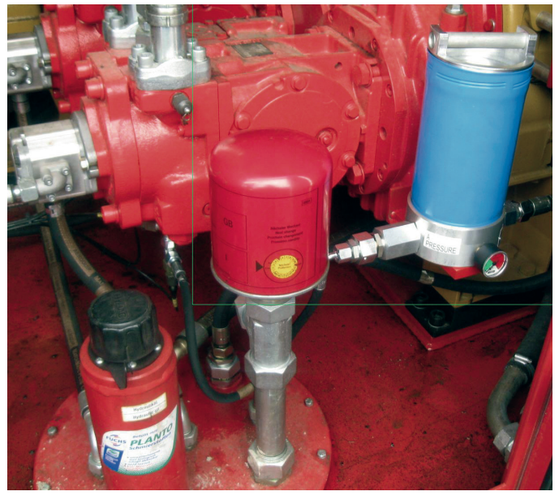
- Patented start-stop system
- Exceptional operational reliability
- Robust and reliable
- Wide range of adaptation options
- Powerful while fulfilling the highest emission standards

Additional equipment

- MÜLLER winter package
- Long-life oil system
- MS-Data
- Air compressor for underwater operation

MÜLLER fine filters

The bypass oil filter is a filter system that supplements the hydraulic filter already fitted. The bypass oil filter is used for the fine filtering of the hydraulic oil. The lower flow rate via the filter means that a much finer filter can be selected than is the case with standard filter elements. Therefore, much finer particles can be removed from the oil than is the case with full-flow oil filters.



Air compressor for underwater operation

All our free-hanging vibratory hammers can be retrofitted with minimal effort for underwater operations. Next to some small adjustments in the vibratory hammer itself, the respective power pack needs to be equipped with an air compressor.

MÜLLER winter package for power packs

For use in temperatures down to -20°C
The winter package contains:

- Preheaters for hydraulic oil and diesel engine cooling water, with external power supply (220–240 V)
- Option: set of covers for closing off the unit's air intakes and air outlets
- A reduced airflow through the unit to help the unit reach its operating temperature faster
- Operation with some air intakes and air outlets closed depending on the ambient temperature
- Better economy thanks to faster deployment and fuel savings



Mobile collection, documentation and analysis of operating data: MÜLLER MS-Data

Our data collection system MS-Data allows the safe and easy collection of operating data. Adding the MS-Data extension module, the permissible vibration velocities can be monitored at the same time. The data collection is integrated directly into the power pack's control system. It allows the transfer to e. g. an internet server



msdata.terra-infrastructure.com

MÜLLER power packs

EU Stage V / EPA Tier 4 final exhaust certifications

Type			**MS-A 190 V**	**MS-A 340 V**	**MS-A 420 V**	**MS-A 690 V**	**MS-A 840 V**	**MS-A 1200 V**
Diesel engine			CAT	CAT	CAT	CAT	CAT	Volvo Penta
Type			C 7.1	C 9.3B	C 15	2x C 9.3B	2x C 15	2x TWD 1683 VE
Exhaust certification		EU / EPA	V / Tier 4f	V / Tier 4f	V / Tier 4f	V / Tier 4f	V / Tier 4f	V / Tier 4f
Power	P (max.)	kW	186	340	433	680	866	1,170
Speed	n (max.)	min^{-1}	2,000	2,000	2,000	2,100	2,000	1,800
Hydraulics								
Oil flow rate	Q (max.)	l/min	290	530	740	1,130	1,480	1,980
Operating pressure	p (max.)	bar	380	380	380	380	380	380
Fuel tank capacity		l	400	800	900	1,400	2,200	2,200
Hydraulic tank capacity		l	500	220	280	500	600	600
Weight without fuel		kg	4,700	5,600	6,800	10,600	14,000	15,500
Dimensions	Length L	mm	3,000	3,950	4,250	4,800	5,300	6,300
	Width B	mm	1,500	1,550	1,700	2,200	2,400	2,400
	Height H	mm	2,220	2,200	2,450	2,365	2,600	2,595

Other exhaust certifications

Type			**MS-A 280 V**	**MS-A 420 V**	**MS-A 570 V**	**MS-A 700 V**	**MS-A 840 V**	**MS-A 1150 V**
Diesel engine			CAT	CAT	Volvo Penta	CAT	CAT	Volvo Penta
Type			C 9.3B LRC	C 15	TAD 1643 VE	2x C 13	2x C 15	2x TAD 1643 VE
Exhaust certification		EU / EPA	IIIA / Tier 3	IIIA / Tier 3	II / Tier 2	IIIA / Tier 3	IIIA / Tier 3	II / Tier 2
Power	P (max.)	kW	280	433	565	708	866	1,130
Speed	n (max.)	min^{-1}	2,200	2,000	1,850	2,100	2,000	1,850
Hydraulics								
Oil flow rate	Q (max.)	l/min	525	740	1,050	1,180	1,480	2,100
Operating pressure	p (max.)	bar	380	380	380	380	380	380
Fuel tank capacity		l	750	900	1,050	1,400	2,200	2,200
Hydraulic tank capacity		l	230	280	440	500	600	600
Weight without fuel		kg	5,300	6,200	8,500	10,300	12,500	13,800
Dimensions	Length L	mm	3,950	4,250	4,750	4,800	5,300	5,300
	Width B	mm	1,480	1,700	2,000	2,200	2,400	2,400
	Height H	mm	2,400	2,450	2,370	2,450	2,570	2,595

FOR THE HIGHEST DEMANDS ON PERFORMANCE, PRECISION, QUALITY AND SAFETY: OUR DRILLING TECHNOLOGY

terra infrastructure GmbH develops, produces and distributes VibroDrills, hydraulic drifters and rotary drives for foundation engineering. We manufacture our equipment in-house – it meets the highest quality standards.

In the development and production of our products, we can build on decades of experience and are ideally prepared for the challenges of the future thanks to state-of-the-art calculation and development methods.

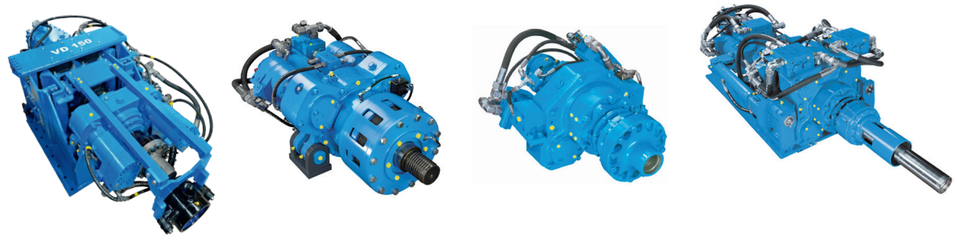
With our VibroDrills, hydraulic drifters and rotary drives, you benefit from state-of-the-art technology, first-class quality and reliable operational readiness.





Drilling technology
Procedures and applications

	VibroDrills	Hydraulic drifters	Rotary drives	Double-headed drilling systems
Drilling procedures	Vibratory drilling (rotating-vibrating) (single drill string or overburden) drilling)	Rotary percussive drilling (single drill string or overburden drilling)	Rotary drilling (+ single drill string or overburden drilling + DTH-hammer)	Overburden drilling (rotating-rotating or rotating-hammering or rotating-rotating + DTH-hammer)
Applications	Slope stabilisation Back anchorage & foundation stabilisation: self-drilling anchors (micropiles) Strand anchors Geothermal drilling Geotechnical drilling (e.g. core drilling)	Slope stabilisation Back anchorage & foundation stabilisation: self-drilling anchors (micropiles) Strand anchors	Rotary drive: slope stabilisation Back anchorage & foundation stabilisation Rotary drive + DTH-hammer: geothermal drilling Slope stabilisation Back anchorage	Slope stabilisation Back anchorage & foundation stabilisation: self-drilling anchors (micropiles) & strand anchors Geothermal drilling Geotechnical drilling (e.g. core drilling)
Geology	Rock Mixed soils Water-bearing soil layers Soft & unstable soils	Rock Mixed soils Unstable soils	Soft soils (rotary drive) Rock & mixed soils (rotary drive + DTH-hammer)	Mixed soils Water-bearing soil layers Soft & unstable soils
Portfolio terra infrastructure	VD50, VD100, VD150	HB5, HB15, HB20, HB35, HB45, HB50, HB60	HR15, HR20, HR35, HR50, HR60	HR50-HB45, HR60-HB45





VibroDrills – the modern all-rounders

VibroDrills combine the best of both worlds – the drilling and vibration technology. Our vibratory drills reliably deliver high drilling rates in all soil types. Combined with high torque, large drilling diameters and depths can be achieved.

VibroDrills

Applications
- Micropile drilling
- Overburden drilling
- Self-drilling anchors
- Geothermal drilling
- Geotechnical drilling/core drilling

Advantages
- Can be used in all soil types
- Variable machine configuration
- Easy handling



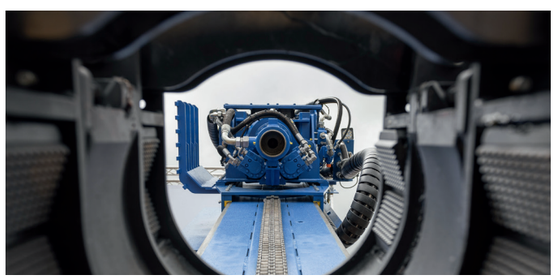
Hydraulic drifters – the powerful classics

Our drill hammers deliver optimum drilling performance in different soil conditions. Various configuration options ensure a high degree of variability. They also impress with their compact design.

Hydraulic drifters

Applications
- Micropile drilling
- Overburden drilling
- Self-drilling anchors

Advantages
- Compact design
- Variable machine configuration
- Robust equipment design



Rotary drives – the compact lightweights

terra infrastructure rotary drives score with compact design and low weight combined with high performance. Thanks to a wide range of configuration options you will receive the optimum machine for your application. At the same time, you also benefit from an extremely robust device design.

Rotary drives

Applications
- Micropile drilling
- Overburden drilling with DTH hammer
- Auger drilling

Advantages
- Compact design
- Low machine weight
- Robust equipment design

Overview VibroDrills

Drilling depth up to 100 m	Strand anchors/ micropiles		Threaded hollow bar drilling		Geothermal drilling	Geotech-nical drilling	Rock drilling	Recommended drilling rig	
VD-Type	Max. casing diameter with single casing	Overburden drilling max. out-side casing dia-meter	Max. diameter threaded hollow bar	Max. bit diameter	Max. casing diameter	Max. casing diameter	Max. bore hole diameter	Weight [t]	Power of drilling rig [kW]
VD 50	177.8 mm / 7 inch	152.4 mm / 6 inch	101.6 mm / 4 inch	177.8 mm / 7 inch	152.4 mm / 6 inch	152.4 mm / 6 inch	177.8 mm / 7 inch	8 – 12	>101
VD 100	228.6 mm / 9 inch	203.2 mm / 8 inch	152.4 mm / 6 inch	228.6 mm / 9 inch	203.2 mm / 8 inch	203.2 mm / 8 inch	228.6 mm / 9 inch	12 – 16	>127
VD 150	304.8 mm / 12 inch	254 mm / 10 inch	203.2 / 8 inch	304.8 mm / 12 inch	254 mm / 10 inch	254 mm / 10 inch	304.8 mm / 12 inch	16 – 22	>147

Overview hydaulic drifters

Bore hole depth up to 35 m	Strand anchors/ micropiles/ injected drilled piles		Threaded hollow bar drilling		Technical data		Recommended drilling rigs	
Drifter type	Micropile drilling max. casing diameter	Overburden drilling max. outside casing diameter	Max. diameter of hollow bars	Max. bit diameter	Max. impact energy [Nm]	Max. torque [Nm]	Weight [t]	Power of drilling rig [kW]
HB 15	76.2 mm / 3 inch	–	52 mm / 2 inch	76.2 mm / 3 inch	270	2,450	10 – 12	>65
HB 20	101.6 mm / 4 inch	–	52 mm / 2 inch	101.6 mm / 4 inch	270	4,900	10 – 12	>65
HB 35	152.4 mm / 6 inch	–	76.2 mm / 3 inch	152.4 mm / 6 inch	590	11,700	12 – 14	>107
HB 45	177.8 mm / 7 inch	152.4 mm / 6 inch	101.6 mm / 4 inch	177.8 mm / 7 inch	590	16,200	12 – 14	>107
HB 50	228.6 mm / 9 inch	203.2 mm / 8 inch	152.4 mm / 6 inch	228.6 mm / 9 inch	840	21,600	14 – 16	>107
HB 60	304.8 mm / 12 inch	254 mm / 10 inch	203.2 / 8 inch	304.8 mm / 12 inch	840	42,100	14 – 16	>107

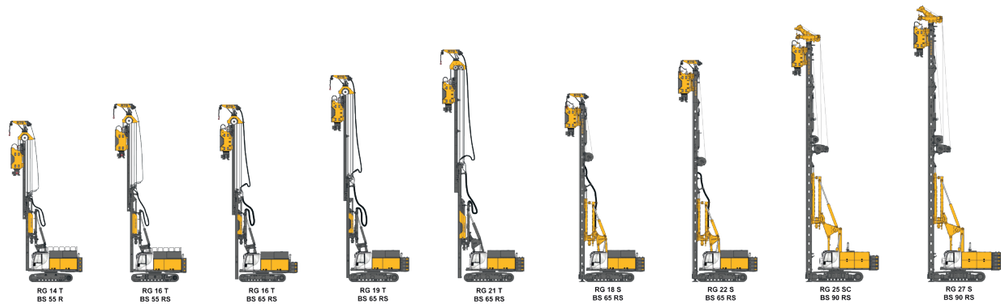
The data listed above is to be understood as reference – the project-specific limitations are determined by soil conditions and drilling depth.

THE BEST SOLUTION FOR THE MOST DIVERSE REQUIREMENTS: RTG LEADER TECHNOLOGY

RTG's range of pile drivers includes machines in various sizes that cover a wide range of applications in combination with a wide variety of attachment options.

The biggest leader is the RG 27 S. Due to its properties as fixed leader and the engine power of up to 597 kW it allows the realization of pile driving projects up to 27 m depth. The RG 14 T, RG 16 T, RG 19 T and RG 21 T are equipped with a telescopic leader mast. They are characterised by extremely compact transport dimensions and short set-up times. The RG 14 T and RG 16 T models on the lightweight BS 55 transport unit were specially developed for pile driving and predrilling. The advantages of these machines: maximum mobility (simple transport permit in Germany) and high performance on the construction site. The models RG 18 S, RG 22 S and RG 27 S have a stiff, one-piece rigid leader mast. Its extremely torsion-resistant design allows heavy pile-driving work as well as the use of drilling methods where the mast has to transmit higher torques. Due to the stiff rigid mast and the installed engine power of up to 597 kilowatts, the RG 27 S enables the realisation of heavy pile-driving work up to 27 metres. All models are designed as universal machines for many applications and have an excellent weight-to-power ratio.

RTG telescopic and rigid leader masts are designed to transmit high tensile and compressive forces and to absorb torques. In combination with the high engine power, they can be used as carrier implements for a wide range of applications. All attachments are therefore interchangeable within a series – even in a few minutes using the automatic quick coupling system ACS. The core function of all models is to vibrate sheet piles or steel pipes. In addition, RTG equipment can be used for many other processes – e. g. for vibration-free driving of sheet piles with a sheet pile press, for the production of bored piles or for use in various soil mixing processes.



Advantages

- High efficiency through effective use of engine power (EEP) as well as optimised hydraulic components – this alone saves up to 20 % of diesel fuel (approx. 1,000 l per month)
- Effective noise protection through encapsulation of the vibrator housing as well as fully automatic integrated ventilation flaps on the carrier unit.
- Far ahead in compliance with exhaust emission limits (EU stage 5)
- Professional support for the operator during work (B-Tronic for recording operating and machine data, comfort cab)



INDIVIDUAL SERVICE PACKAGE FOR OUR MACHINES AND THIRD-PARTY EQUIPMENT

With our wide range of services, we make sure that our customers' machines provide optimal performance. Our services range from inspection, maintenance, and repair to the sourcing of spare parts, monitoring, transport, and training.



Instead of just offering standard solutions, we customize our services to suit the specific needs of our customers. We can create individual service packages upon request, optimally tailored to our customers' specific requirements. With our services we make an important contribution to optimizing our customers' benefits and minimizing their risk by utilizing the unique technical expertise of our service team and our years of global experience.

Exceptionally fast service:
Our service technicians are spread throughout our local offices which allows them to be at your job site quickly to carry out maintenance or repairs.

This way we avoid long downtime on the construction site and the machines are ready to use again in no time. Get more information about the customer service centers near you:

www.terra-infrastructure.com/mt/service/en

Overview of services

Inspection and maintenance
- Regular status checks (report and recommendation)
- Preventative replacement of wear parts

Troubleshooting and repair
- Repair service on site with defined response times – depending on SLA

Spare parts
- Spare parts with defined response and delivery time – depending on SLA

Spare/rental equipment
- Provision of replacement or rental equipment in the event of damage (as part of an SLA)

Advice
- Product advice
- Required infrastructure
- Hire or sale
- Service packages
- Complementary services

Support hotline
- Informational material and documentation
- Technical questions
- Help during setup

Transport & setup
- Machine transport
- Setup and connection
- Commissioning
- Optimization of operation

(Remote-)monitoring
- Monitoring of operating data, status data, errors







TRENCH SHORING

LINEAR AND BOX SHORING

Unrivalled expertise – for over 75 years.

With our E+S and KRINGS systems, we have been providing economical and technically sound solutions for a wide range of civil engineering projects both at home and abroad, taking all safety-related aspects into account – and have been doing so for over 75 years. Because every site presents its own specific challenges, our project-specific consultancy plays a particularly important role. Together, we will find the right product for your building project from our extensive range to secure the trench or excavation pit. Whether it's our E+S linear and box shoring for demanding construction projects such as very large and wide excavation pits, or our edge-supported shoring system from KRINGS, which is particularly versatile for securing excavation pits and, thanks to its smaller dimensions, takes up very little space at mounting and during transport.

Installation on the site is very simple and quick. We offer our shoring systems not only for sale but also for hire, thereby ensuring maximum flexibility. Our product portfolio is supplemented by suitable additional equipment and supplementary products, such as lightweight shoring made from aluminium.

OUR PRODUCTS AND SERVICES IN TRENCH SHORING: UNIQUE EXPERTISE – FOR OVER 75 YEARS

Our E+S and KRINGS brand shoring systems have provided cost-effective technical processing solutions with due regard to safety aspects for numerous civil engineering projects, both domestically and on overseas markets – and have been doing so for over 75 years. Because each construction site has its own specific challenges, our project-related consulting services are of particular importance.

terra Infrastructure is among the world's best-known providers of trench shoring. We offer a wide range of trench shoring equipment and supplementary products. Our portfolio also includes temporary construction site roads made of steel or plastic.

For many construction projects, it is more economical to hire the shoring system. Our extensive range of rental equipment means we can always provide our customers with a suitable system, even for large-scale projects.

Our portfolio
- E+S Linear Shoring
- E+S Box Shoring
- KRINGS Box Shoring
- Steel and plastic construction site roads
- terra lightweight aluminium shoring
- Supplementary products civil engineering

Services

Technical office
- Individual and cost-efficient shoring solutions
- Verifiable and tested structural analyses
- Project-related drawings
- Technical specifications
- New and further developments in design

Site supervision
- Experienced site marshals assist with the installation of the shoring and thus ensure a smooth workflow

Logistics
- Organisation of delivery and removal
- Decentralized warehouses and large rental fleets ensure fast delivery and high availability

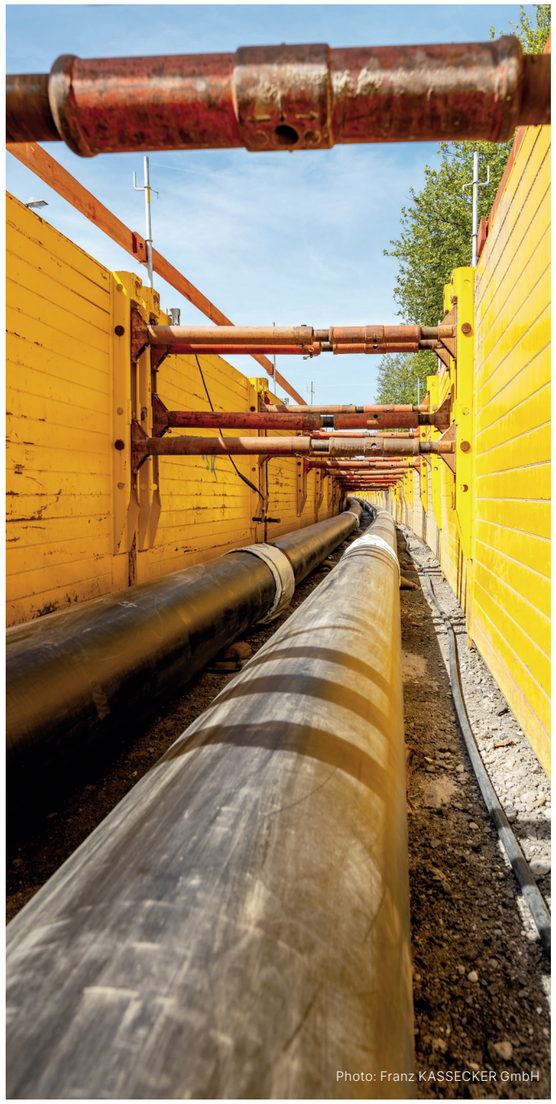


Photo: Franz KASSECKER GmbH

COST-EFFECTIVE IMPLEMENTATION OF LARGE WIDTHS AND DEPTHS: E+S LINEAR SHORING

Our E+S linear shoring system is a unique method used worldwide for trench shoring. It offers a large number of possible applications, either as a single slide rail or as a double slide rail shoring system. Our technical consultation ensures that the most economical product is always used in the most efficient combination.

With E+S linear shoring, rigid strut cars keep the supports and thus the shoring panels at an equal distance. Everything stays linearly aligned, always at the same distance from the opposite side, ensuring more effective, faster, and noticeably more cost-effective operations. A major advantage of the system is derived from the special design of the supports, as it allows the shoring panels to be pivoted in from the side.

With the double slide rail shoring system, the shoring panels are held in vertically installed rails so that they can slide past one another. Once installed, they form an overlapping shoring system. Our innovative head end shoring strut cart can handle both the compressive forces exerted from the long sides of the trench shoring and the pressure from the front, which means the sheet piles can now lean directly against the strut cart and the pressure is transferred to the shoring. The E+S linear shoring system can be used as formwork for in-situ concrete and installed with low vibrations, minimizing the impact on the surrounding soil. Existing buildings and traffic flow thus remain largely unimpaired. The system is ideally suited for use at depths of 4 to 14 metres and widths of 0.9 to far more than 10 metres.



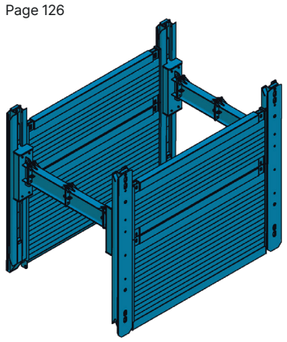
Advantages
- Low-vibration installation
- Very little impact on the surrounding soil
- No impairment of existing buildings or traffic flow
- Great depths and widths feasible
- Highly suitable for manholes
- Shoring panels can be pivoted in from the outside
- Flexible pipe culvert heights
- Plenty of working space
- Suitable as formwork for in-situ concrete
- Open guidance of the panels prevents jamming in the slide-rail



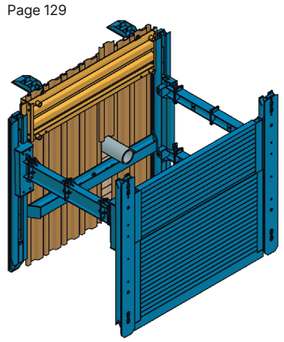
Slide-rail systems, E+S linear shoring

Recommended shoring depth: max. 4.00 m

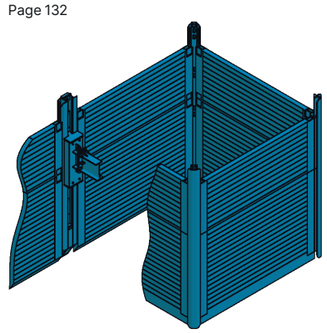
Single slide rail linear shoring
Rec. shoring depth: 4.00 m
Rec.: mobile or crawler excavator 18 – 30 t
Page 126



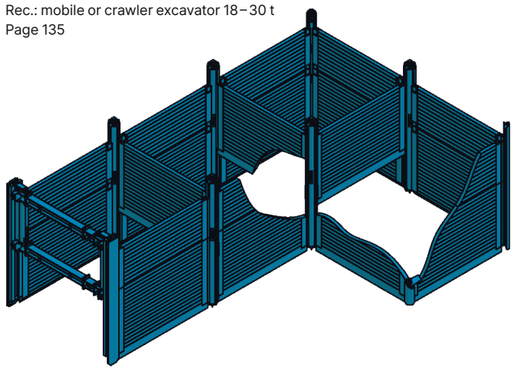
Single slide rail inner-city linear shoring
Rec. shoring depth: 4.00 m
Rec.: mobile or crawler excavator 18 – 30 t
Page 129



Single slide rail corner shoring
Rec. shoring depth: 4.00 m
Rec.: mobile or crawler excavator 18 – 30 t
Page 132

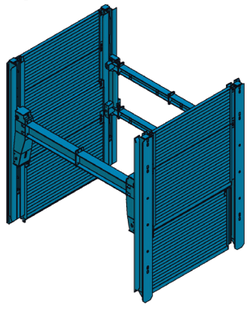


Single slide rail linear shoring – X-rail
Rec. shoring depth: 4.00 m
Rec.: mobile or crawler excavator 18 – 30 t
Page 135

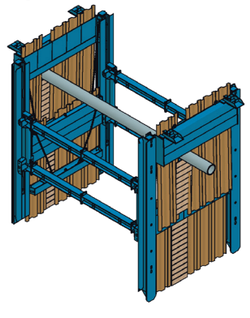


Recommended shoring depth: 5.00 m – 9.00 m

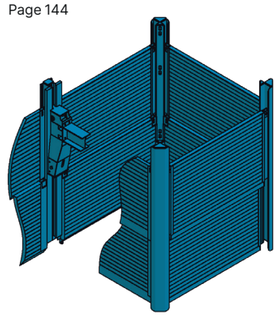
Double slide rail linear shoring
Rec. shoring depth: 5.00 m – 9.00 m
Rec.: crawler excavator max. 6.0 m: 24 – 31 t,
over 6.0 m: 30 – 50 t
Page 137



Double slide rail inner-city linear shoring
Rec. shoring depth: 5.00 m – 9.00 m
Rec.: crawler excavator max. 6.0 m: 24 – 31 t,
over 6.0 m: 30 – 50 t
Page 141

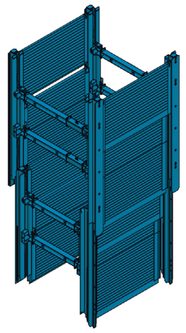


Double slide rail corner shoring
Rec. installation depth 5.00 m – 6.00 m
Rec.: crawler excavator 24 – 31 t
Page 144



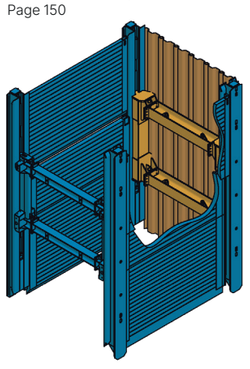
Recommended shoring depth: max. 12.00 m

Deep linear shoring
Rec. shoring depth: max. 12.00 m
Rec.: crawler excavator 50 t
Page 147

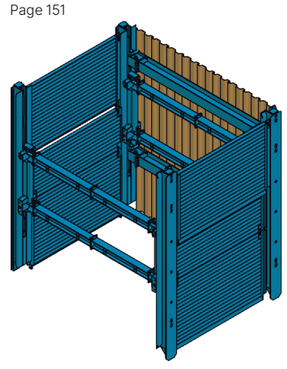


More shoring options

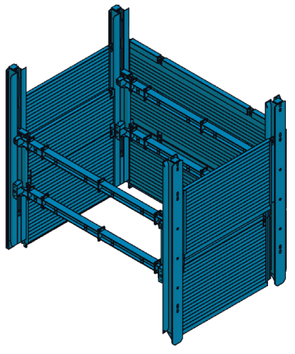
Head end shoring with head end shoring strut cart and sheet piles
Rec. installation depth: variable;
Page 150



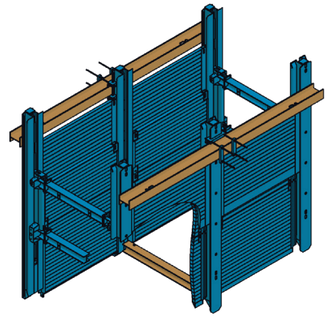
Head end shoring with head end shoring adapter and sheet piles
Rec. installation depth: variable
Page 151



Head end shoring with slide-rail panels
Rec. installation depth: variable
Page 152



Outside waler attachment
Page 153

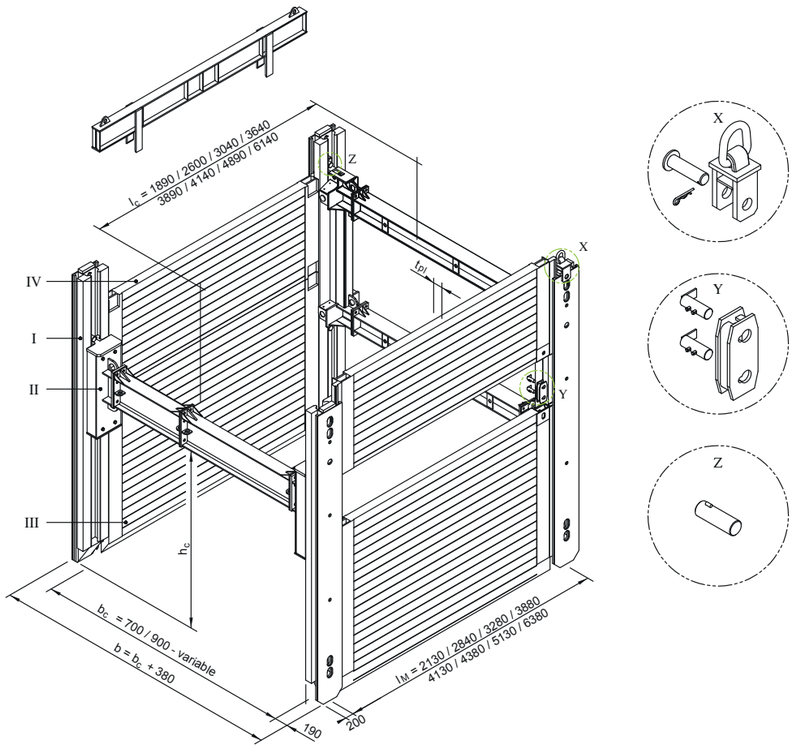


E+S Single slide rail linear shoring



General data

Module length	2.13 m–6.38 m
Slide-rail length	4.13 m
Panel height	1.32 m / 2.32 m
Pipe culvert height	variable
Shoring width	variable
Rec.: mobile or crawler excavator	18–30 t



(All dimensions in mm. The data on pipe opening length l_c refer to the rectangular strut cart.)

I	Linear shoring support	l_M	Module length	h_c	Pipe culvert height	Z	Positioning bolt
II	Linear shoring strut cart	l_c	Pipe culvert length	t_{pl}	Panel thickness		
III	Base panel	b	Shoring/trench width	X	Pull adapter with bolt		
IV	Top panel	b_c	Clear width	Y	Connector with bolts		

Linear shoring support

Art. no.	Short description	l [m]	G [kg]
820 935	Linear shoring support	4.13	710.0

Linear shoring strut carts

Art. no.	Short description	l [m]	G [kg]
832 200	Rectangular strut cart	2.00	420.0
832 205	U-type strut cart	2.00	618.0
832 197	U-type strut cart 1.20 m	1.20	340.0

Base panels -inside- (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 120	1.89	2.13	0.11	1.89	510.0	4.38	176.0
821 160	2.60	2.84	0.11	2.60	650.0	6.03	90.0
821 250	3.04	3.28	0.11	3.04	730.0	7.05	65.5
821 610	3.64	3.88	0.11	3.64	845.0	8.44	45.2
821 850	3.89	4.13	0.11	3.89	970.0	9.02	39.4
821 855	4.14	4.38	0.15	4.14	1,300.0	9.58	81.0
821 860	4.89	5.13	0.15	4.89	1,500.0	11.34	58.1
821 861	6.13	6.38	0.15	6.13	1,880.0	14.22	36.6

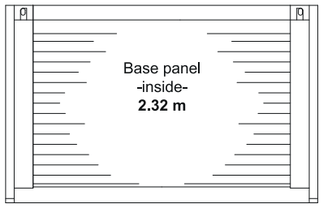
Top panels -inside- (height 1.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 060	1.89	2.13	0.11	1.89	355.0	2.49	176.0
821 180	2.60	2.84	0.11	2.60	440.0	3.43	90.0
822 120	3.04	3.28	0.11	3.04	500.0	4.01	65.5
822 620	3.64	3.88	0.11	3.64	620.0	4.80	45.2
822 760	3.89	4.13	0.11	3.89	649.0	5.13	39.4
822 783	4.14	4.38	0.15	4.14	870.0	5.45	81.0
822 800	4.89	5.13	0.15	4.89	1,100.0	6.45	58.1
822 801	6.13	6.38	0.15	6.13	1,370.0	8.09	36.6

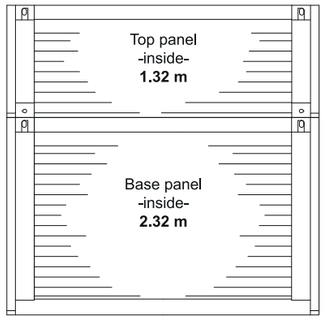
Top panels -inside- (height 2.30 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 065	1.89	2.13	0.11	1.89	530.0	4.35	176.0
822 155	2.60	2.84	0.11	2.60	660.0	5.98	90.0
822 180	3.04	3.28	0.11	3.04	740.0	6.99	65.5
822 680	3.64	3.88	0.11	3.64	850.0	8.37	45.2
822 780	3.89	4.13	0.11	3.89	980.0	8.95	39.4
822 785	4.14	4.38	0.15	4.14	1,435.0	9.50	81.0

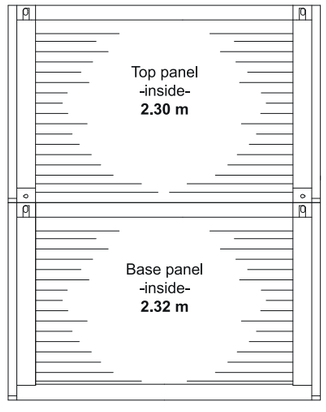
Possible height combinations



Trench depth approx. 2.32 m



Trench depth approx. 3.60 m



Trench depth approx. 4.60 m

Extension bars for rectangular strut cart

Art. no.	Short description	l [m]	G [kg]
830 005	HEB 220 extension bar	0.140	42.0
830 010	HEB 220 extension bar	0.275	50.0
830 011	HEB 220 extension bar	0.350	55.0
830 012	HEB 220 extension bar	0.375	62.0
830 015	HEB 220 extension bar	0.412	65.0
830 020	HEB 220 extension bar	0.550	70.0
830 030	HEB 220 extension bar	1.100	110.0
830 075	HEB 220 extension bar	1.650	145.0
830 125	HEB 220 extension bar	2.200	192.0

Extension bars for U-type strut cart

Art. no.	Short description	l [m]	G [kg]
831 503	HEA 450 extension bar	0.140	77.0
831 500	HEA 450 extension bar	0.275	107.0
831 507	HEA 450 extension bar	0.375	115.0
831 510	HEA 450 extension bar	0.550	140.0
831 520	HEA 450 extension bar	1.100	220.0
831 530	HEA 450 extension bar	1.650	300.0
831 540	HEA 450 extension bar	2.200	375.0

Extension bars for U-type strut cart (1.20 m)

Art. no.	Short description	l [m]	G [kg]
831 028	IPE 400 extension bar	0.140	42.0
831 029	IPE 400 extension bar	0.200	49.0
831 030	IPE 400 extension bar	0.275	57.0
831 040	IPE 400 extension bar	0.550	75.0
831 050	IPE 400 extension bar	1.100	115.0
831 060	IPE 400 extension bar	1.650	155.0
831 070	IPE 400 extension bar	2.200	195.0

Shoring widths for rectangular and U-type strut cart

Extension bar length [m]	b_c [m]	b [m]
without extension bar	0.90	1.28
0.140	1.04	1.42
0.275	1.18	1.56
0.350	1.25	1.63
0.375	1.28	1.66
0.412	1.31	1.69
0.550	1.45	1.83
1.100	2.00	2.38
1.650	2.55	2.93
2.200	3.10	3.48

Other trench widths possible by combination of different extension bar lengths.

Shoring widths for U-type strut cart (1.20 m)

Extension bar length [m]	b_c [m]	b [m]
without extension bar	0.70	1.08
0.140	0.84	1.22
0.200	0.90	1.28
0.275	0.98	1.36
0.550	1.25	1.63
1.100	1.80	2.18
1.650	2.35	2.73
2.200	2.90	3.28

l	Length	A	Surface
l_M	Module length	G	Weight
l_c	Pipe culvert length	G / VP	Weight / shoring panel
t_{pl}	Panel thickness	e_h	Admissible soil pressure
b	Shoring width	b_c	Clear width
d	Diameter		

Accessories / spare parts

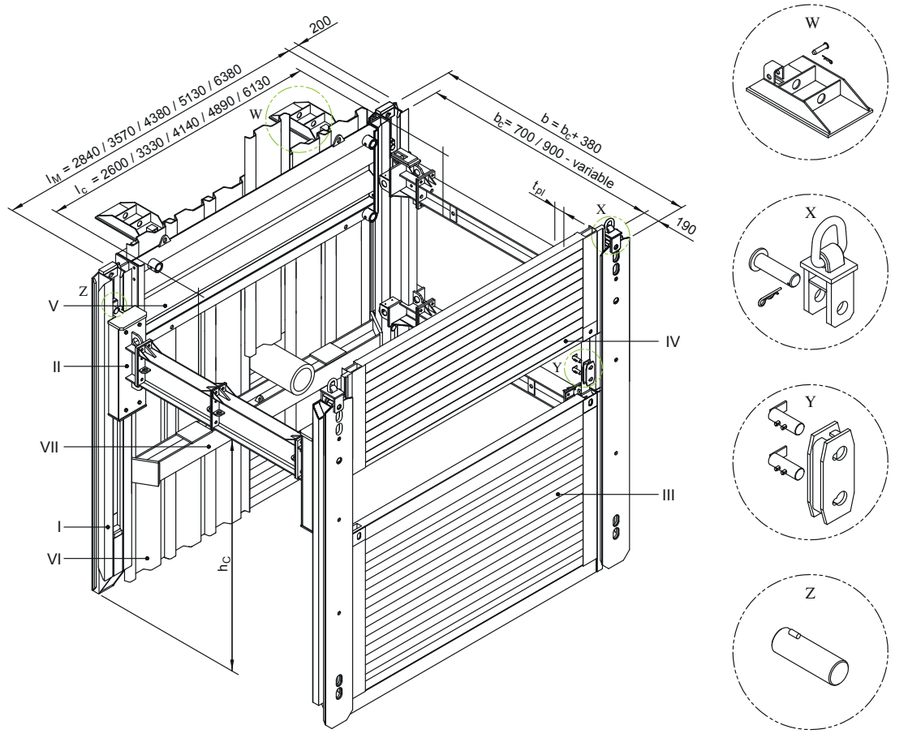
Art. no.	Short description	l [m]	d [m]	G [kg]
850 720	Linear shoring positioning bolts	0.15	0.050	2.50
861 076	Pressure beam	1.60		176.00
861 074	Pressure beam	2.35		236.00
861 070	Pressure beam	2.80		271.00
861 071	Pressure beam	3.40		318.00
861 075	Pressure beam	4.60		425.00
861 085	Pressure beam	5.80		525.00
834 015	Pressure plate, rectangular strut cart			12.40
832 230	Bolt for pressure plate, rectangular strut cart	0.15	0.035	1.40
HE 0050 F	Safety clip 6.0 mm		0.006	0.03
IA 0150 F	Nut M 24–10.9 galv. (rectangular strut cart)			0.10
IA 0185 F	Nut M 30–10.9 galv. (U-type strut cart 1.20 m)			0.30
IA 0210 F	Nut M 36–10.9 galv. (U-type strut cart)			0.40
862 200	Connector			5.50
862 100	Connector bolts	0.11	0.035	1.00
IB 0470 F	Screw M 24 × 80–10.9 galv. (rectangular strut cart)			0.40
IB 0545 F	Screw M 30 × 80–10.9 galv. (U-type strut cart 1.20 m)			0.64
IB 0614 F	Screw M 36 × 80–10.9 galv. (U-type strut cart)			1.00
834 057	Pull adapter with bolt			33.00
834 116	Covering base plate for in-situ concrete	1.47		13.50
834 117	Covering top plate for in-situ concrete	1.00		9.50

E+S Single slide rail inner-city linear shoring



General data

Module length	2.84 m / 4.38 m / 5.13 m / 6.38 m
Slide-rail length	4.13 m
Piling frame element height	1.00 m / 1.10 m
Pipe culvert height	variable
Shoring width	variable
Sheet pile length (KD VI/8)	variable
Rec.: mobile or crawler excavator	18–30 t



(All dimensions in mm. The data on pipe opening length l_c refer to the rectangular strut cart.)

I	Linear shoring support	VI	KD VI/8 sheet piles	b_c	Clear width	Y	Connector with bolts
II	Linear shoring strut cart	VII	Waler support	h_c	Pipe culvert height	Z	Positioning bolt
III	Base panel	l_M	Module length	t_{pl}	Panel thickness		
IV	Top panel	l_c	Pipe culvert length	W	Support bracket		
V	DKU piling frame element	b	Shoring/trench width	X	Pull adapter with bolt		

Linear shoring support

Art. no.	Short description	l [m]	G [kg]
820 935	Linear shoring support	4.13	710.0

Linear shoring strut carts

Art. no.	Short description	l [m]	G [kg]
832 200	Rectangular strut cart	2.00	420.0
832 205	U-type strut cart	2.00	618.0
832 197	U-type strut cart 1.20 m	1.20	340.0

Piling frame elements

Art. no.	Short description	l [m]	l_M [m]	h [m]	t_{pl} [m]	l_c [m]	G/DKP [kg]	KD/DKP
842 671	Piling frame element DKU, KD VI	2.27	2.84	1.00	0.31	2.60	510.0	4
842 687	Piling frame element DKU, KD VI	3.00	3.57	1.00	0.31	3.33	640.0	5
842 674	Piling frame element DKU, KD VI	3.81	4.38	1.00	0.31	4.14	785.0	7
842 696	Piling frame element DKU, KD VI	4.55	5.13	1.10	0.40	4.89	1,563.0	8
842 699	Piling frame element DKU, KD VI	5.80	6.38	1.10	0.40	6.13	1,880.0	10

Base panels -inside- (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 160	2.60	2.84	0.11	2.60	650.0	6.03	90.0
821 255	3.34	3.57	0.11	3.34	803.0	7.75	54.0
821 855	4.14	4.38	0.15	4.14	1,300.0	9.58	81.0
821 860	4.89	5.13	0.15	4.89	1,500.0	11.34	58.1
821 861	6.13	6.38	0.15	6.13	1,880.0	14.22	36.6

Top panels -inside- (height 1.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 180	2.60	2.84	0.11	2.60	440.0	3.43	90.0
822 140	3.34	3.57	0.11	3.34	570.0	4.41	54.0
822 783	4.14	4.38	0.15	4.14	870.0	5.45	81.0
822 800	4.89	5.13	0.15	4.89	1,100.0	6.45	58.1
822 801	6.13	6.38	0.15	6.13	1,370.0	8.09	36.6

Top panels -inside- (height 2.30 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 155	2.60	2.84	0.11	2.60	660.0	5.98	90.0
822 145	3.34	3.57	0.11	3.34	840.0	7.68	54.0
822 785	4.14	4.38	0.15	4.14	1,409.0	9.50	81.0

Walers, inner-city linear shoring

Art. no.	Short description	l [m]	l_M [m]	G/VP [kg]
842 704	Waler for piling frame element DKU, module length 2.84 m	2.60	2.84	300.0
GV000560	Waler for piling frame element DKU, module length 3.57 m	3.30	3.57	358.0
842 711	Waler for piling frame element DKU, module length 4.38 m	4.14	4.38	445.0
843 365	Waler for piling frame element DKU, module length 5.13 m	4.86	5.13	854.0
843 359	Waler for piling frame element DKU, module length 6.38 m	6.11	6.38	1,035.0

Extension bars for rectangular strut cart

Art. no.	Short description	l [m]	G [kg]
830 005	HEB 220 extension bar	0.140	42.0
830 010	HEB 220 extension bar	0.275	50.0
830 011	HEB 220 extension bar	0.350	55.0
830 012	HEB 220 extension bar	0.375	62.0
830 015	HEB 220 extension bar	0.412	65.0
830 020	HEB 220 extension bar	0.550	70.0
830 030	HEB 220 extension bar	1.100	110.0
830 075	HEB 220 extension bar	1.650	145.0
830 125	HEB 220 extension bar	2.200	192.0

Shoring widths for rectangular and U-type strut cart

Extension bar length [m]	b_c [m]	b [m]
without extension bar	0.90	1.28
0.140	1.04	1.42
0.275	1.18	1.56
0.350	1.25	1.63
0.375	1.28	1.66
0.412	1.31	1.69
0.550	1.45	1.83
1.100	2.00	2.38
1.650	2.55	2.93
2.200	3.10	3.48

Other trench widths possible by combination of different extension bar lengths

Extension bars for U-type strut cart

Art. no.	Short description	l [m]	G [kg]
831 503	HEA 450 extension bar	0.140	77.0
831 500	HEA 450 extension bar	0.275	107.0
831 507	HEA 450 extension bar	0.375	115.0
831 510	HEA 450 extension bar	0.550	140.0
831 520	HEA 450 extension bar	1.100	220.0
831 530	HEA 450 extension bar	1.650	300.0
831 540	HEA 450 extension bar	2.200	375.0

Extension bars for U-type strut cart (1.20 m)

Art. no.	Short description	l [m]	G [kg]
831 028	IPE 400 extension bar	0.140	42.0
831 029	IPE 400 extension bar	0.200	49.0
831 030	IPE 400 extension bar	0.275	57.0
831 040	IPE 400 extension bar	0.550	75.0
831 050	IPE 400 extension bar	1.100	115.0
831 060	IPE 400 extension bar	1.650	155.0
831 070	IPE 400 extension bar	2.200	195.0

Shoring widths for U-type strut cart (1.20 m)

Extension bar length [m]	b_c [m]	b [m]
without extension bar	0.70	1.08
0.140	0.84	1.22
0.200	0.90	1.28
0.275	0.98	1.36
0.550	1.25	1.63
1.100	1.80	2.18
1.650	2.35	2.73
2.200	2.90	3.28

Accessories/spare parts

Art. no.	Short description	l [m]	d [m]	G [kg]
821 100	Chain 13/ 5,000 mm	5.00		25.7
850 720	Linear shoring positioning bolts	0.15	0.05	2.5
842 751	Adapter for DKU piling frame element, H = 1.00 m KD VI			75.5
843 350	Adapter for DKU piling frame element, H = 1.10 m KD VI			115.0
834 116	Covering base plate for in-situ concrete	1.47		13.50
834 117	Covering top plate for in-situ concrete	1.00		9.50
336 960	Support brackets for DKU piling frame element incl. bolts and safety clip			40.0
861 076	Pressure beam	1.60		176.0
861 074	Pressure beam	2.35		236.0
861 070	Pressure beam	2.80		271.0
861 071	Pressure beam	3.40		318.0
861 075	Pressure beam	4.60		425.0
861 085	Pressure beam	5.80		525.0
834 015	Pressure plate, rectangular strut cart			12.4
832 230	Bolt for pressure plate, rectangular strut cart	0.15	0.035	1.4
HE 0050 F	Safety clip 6.0 mm		0.006	0.03
IA 0140 F	Nut M 24–8.0 galv. (adapter for DKU piling frame element, H = 1.00 m & 1.10 m)			0.10
IA 0150 F	Nut M 24–10.9 galv. (rectangular strut cart)			0.10
IA 0185 F	Nut M 30–10.9 galv. (U-type strut cart 1.20 m)			0.30
IA 0210 F	Nut M 36–10.9 galv. (U-type strut cart)			0.40
862 200	Connector			5.5
862 100	Connector bolts	0.11	0.035	1.0
IB 0490 F	Screw M 24 × 80–8.8 galv. (adapter for DKU piling frame element, H = 1.00 m)			0.40
IB 0515 F	Screw M 24 × 100–8.8 galv. (adapter for DKU piling frame element, H = 1.10 m)			0.42
IB 0470 F	Screw M 24 × 80–10.9 galv. (rectangular strut cart)			0.40
IB 0545 F	Screw M 30 × 80–10.9 galv. (U-type strut cart 1.20 m)			0.64
IB 0614 F	Screw M 36 × 80–10.9 galv. (U-type strut cart)			1.0
834 057	Pull adapter with bolt			33.0

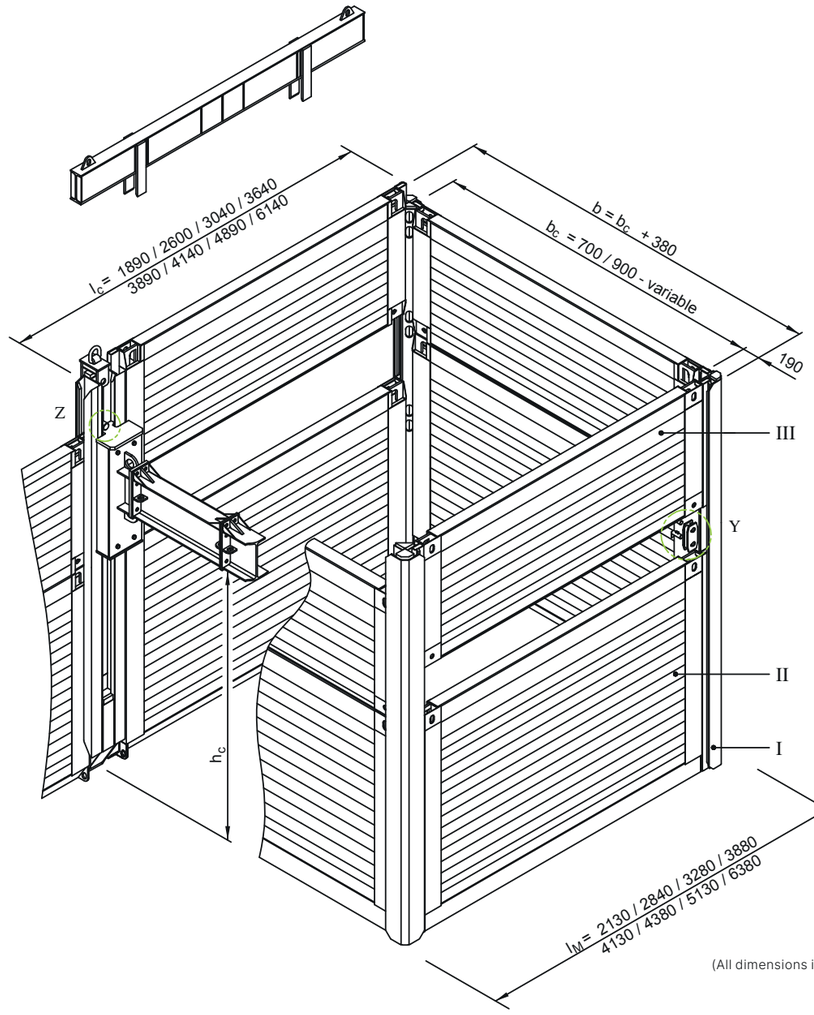
l	Length	t_{pl}	Panel thickness	A	Surface	e_h	Admissible soil pressure
l_M	Module length	b	Shoring width	G	Weight	b_c	Clear width
l_c	Pipe culvert length	d	Diameter	G / VP	Weight / shoring panel	G / DKP	Weight / piling frame element
h	Height	KD / DKP	Sheet piles / piling frame element				

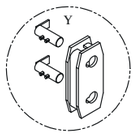
E+S Single slide rail corner shoring

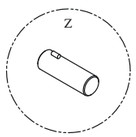


General data

Module length	2.13 m–6.38 m
Slide-rail length	2.30 m / 4.13 m
Panel height	1.32 m / 2.32 m
Shoring width	1.75 m–6.00 m
Rec.: mobile or crawler excavator	18–30 t

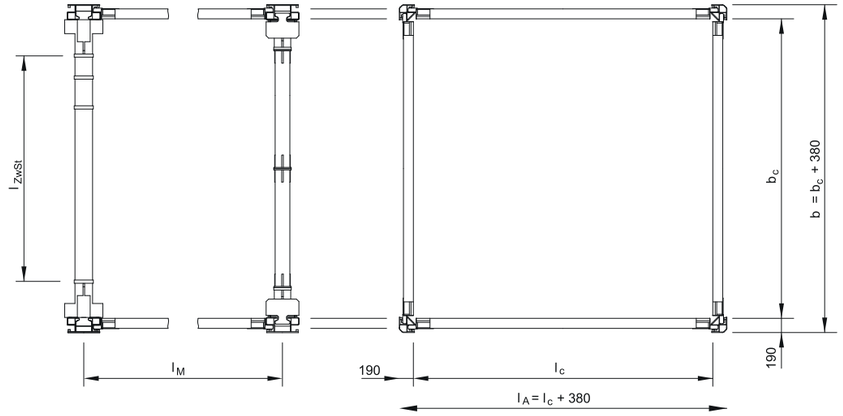






(All dimensions in mm)

I	Corner shoring support	l_M	Module length	b_c	Clear width	Y	Connector with bolts
II	Base panel	l_c	Pipe culvert length	h_c	Pipe culvert height	Z	Positioning bolt
III	Top panel	b	Shoring/trench width	$l_{zwSt.}$	Extension bar length	l_A	Shoring width



Linear shoring supports

Art. no.	Short description	l [m]	G [kg]
835 129	Corner shoring support	2.30	170.0
835 130	Corner shoring support	4.13	325.0

Base panels -inside- (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m^2]	e_h [kN/m^2]
821 120	1.89	2.13	0.11	1.89	510.0	4.38	176.0
821 160	2.60	2.84	0.11	2.60	650.0	6.03	90.0
821 250	3.04	3.28	0.11	3.04	730.0	7.05	65.5
821 610	3.64	3.88	0.11	3.64	845.0	8.44	45.2
821 850	3.89	4.13	0.11	3.89	970.0	9.02	39.4
821 855	4.14	4.38	0.15	4.14	1,300.0	9.58	81.0
821 860	4.89	5.13	0.15	4.89	1,500.0	11.34	58.1
821 861	6.13	6.38	0.15	6.13	1,880.0	14.22	36.6

Top panels -inside- (height 1.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m^2]	e_h [kN/m^2]
822 060	1.89	2.13	0.11	1.89	355.0	2.49	176.0
821 180	2.60	2.84	0.11	2.60	440.0	3.43	90.0
822 120	3.04	3.28	0.11	3.04	500.0	4.01	65.5
822 620	3.64	3.88	0.11	3.64	620.0	4.80	45.2
822 760	3.89	4.13	0.11	3.89	649.0	5.13	39.4
822 783	4.14	4.38	0.15	4.14	870.0	5.45	81.0
822 800	4.89	5.13	0.15	4.89	1,100.0	6.45	58.1
822 801	6.13	6.38	0.15	6.13	1,370.0	8.09	36.6

Top panels -inside- (height 2.30 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m^2]	e_h [kN/m^2]
822 065	1.89	2.13	0.11	1.89	530.0	4.35	176.0
822 155	2.60	2.84	0.11	2.60	660.0	5.98	90.0
822 180	3.04	3.28	0.11	3.04	740.0	6.99	65.5
822 680	3.64	3.88	0.11	3.64	850.0	8.37	45.2
822 780	3.89	4.13	0.11	3.89	980.0	8.95	39.4
822 785	4.14	4.38	0.15	4.14	1,435.0	9.50	81.0

Installation options for single slide rail linear shoring

Longitudinal side of shoring

Module length [m] l_M	6.38	5.13	4.38	4.13	3.88	3.57	3.28	2.84	2.13
Panel length [m] l_{pl}	6.14	4.89	4.14	3.89	3.64	3.33	3.04	2.60	1.89

Head end of shoring

Clear width (head end of shoring) b_c [mm]

Clear length (longitudial side) l_c [mm] →

l_M	l_{pl}	l_c=6000 \ b_c=6000	l_c=4750 \ b_c=6000	l_c=4000 \ b_c=6000	l_c=3750 \ b_c=6000	l_c=3500 \ b_c=6000	l_c=3190 \ b_c=6000	l_c=2900 \ b_c=6000	l_c=2460 \ b_c=6000	l_c=1750 \ b_c=6000	Extension bar combination [mm]: Rectangular- and U-type strut cart	Extension bar combination [mm]: Rectangular- and U-type strut cart	Extension bar combination [mm]: U-type strut cart (1.20 m)
6.38	6.14										*(6000-900=5100)* **5090** (2200+1650+1100+140)		*(6000-700=5300)* **5290** (1650+1650+1650+200+140)
5.13	4.89	l_c=6000 \ b_c=4750	l_c=4750 \ b_c=4750	l_c=4000 \ b_c=4750	l_c=3750 \ b_c=4750	l_c=3500 \ b_c=4750	l_c=3190 \ b_c=4750	l_c=2900 \ b_c=4750	l_c=2460 \ b_c=4750	l_c=1750 \ b_c=4750	*(4750-900=3850)* **3850** (2200+1650)		*(4750-700=4050)* **4050** (2200+1650+200)
4.38	4.14	l_c=6000 \ b_c=4000	l_c=4750 \ b_c=4000	l_c=4000 \ b_c=4000	l_c=3750 \ b_c=4000	l_c=3500 \ b_c=4000	l_c=3190 \ b_c=4000	l_c=2900 \ b_c=4000	l_c=2460 \ b_c=4000	l_c=1750 \ b_c=4000	*(4000-900=3100)* **3100** (2200+550+350)	*(4000-900=3100)* **3090** (2200+375+375+140)	*(4000-700=3300)* **3300** (2200+1100)
4.13	3.89	l_c=6000 \ b_c=3750	l_c=4750 \ b_c=3750	l_c=4000 \ b_c=3750	l_c=3750 \ b_c=3750	l_c=3500 \ b_c=3750	l_c=3190 \ b_c=3750	l_c=2900 \ b_c=3750	l_c=2460 \ b_c=3750	l_c=1750 \ b_c=3750	*(3750-900=2850)* **2850** (2200+375+275)		*(3750-700=3050)* **3025** (2200+550+275)
3.88	3.64	l_c=6000 \ b_c=3500	l_c=4750 \ b_c=3500	l_c=4000 \ b_c=3500	l_c=3750 \ b_c=3500	l_c=3500 \ b_c=3500	l_c=3190 \ b_c=3500	l_c=2900 \ b_c=3500	l_c=2460 \ b_c=3500	l_c=1750 \ b_c=3500	*(3500-900=2600)* **2612** (2200+412)	*(3500-900=2600)* **2615** (2200+275+140)	*(3500-700=2800)* **2815** (2200+275+200+140)
3.57	3.33	l_c=6000 \ b_c=3190	l_c=4750 \ b_c=3190	l_c=4000 \ b_c=3190	l_c=3750 \ b_c=3190	l_c=3500 \ b_c=3190	l_c=3190 \ b_c=3190	l_c=2900 \ b_c=3190	l_c=2460 \ b_c=3190	l_c=1750 \ b_c=3190	*(3190-900=2290)* **2275** (1650+350+275)	*(3190-900=2290)* **2300** (1650+375+275)	*(3190-700=2490)* **2475** (2200+275)
3.28	3.04	l_c=6000 \ b_c=2900	l_c=4750 \ b_c=2900	l_c=4000 \ b_c=2900	l_c=3750 \ b_c=2900	l_c=3500 \ b_c=2900	l_c=3190 \ b_c=2900	l_c=2900 \ b_c=2900	l_c=2460 \ b_c=2900	l_c=1750 \ b_c=2900	*(2900-900=2000)* **2000** (1650+350)	*(2900-900=2000)* **1990** (1100+375+375+140)	*(2900-700=2200)* **2200** (2200)
2.84	2.6	l_c=6000 \ b_c=2460	l_c=4750 \ b_c=2460	l_c=4000 \ b_c=2460	l_c=3750 \ b_c=2460	l_c=3500 \ b_c=2460	l_c=3190 \ b_c=2460	l_c=2900 \ b_c=2460	l_c=2460 \ b_c=2460	l_c=1750 \ b_c=2460	*(2460-900=1560)* **1552** (1100+412+40)	*(2460-900=1560)* **1575** (550+375+375+275)	*(2460-700=1760)* **1775** (1100+275+200+200)
2.13	1.89	l_c=6000 \ b_c=1750	l_c=4750 \ b_c=1750	l_c=4000 \ b_c=1750	l_c=3750 \ b_c=1750	l_c=3500 \ b_c=1750	l_c=3190 \ b_c=1750	l_c=2900 \ b_c=1750	l_c=2460 \ b_c=1750	l_c=1750 \ b_c=1750	*(1750-900=850)* **845** (550+275+20)	*(1750-900=850)* **830** (550+140+140)	*(1750-700=1050)* **1025** (550+275+200)

Example:
Head end shoring module length: l_M=3.28 m
▶ b_c=2.90 m
▶ Required extension bar combination: 2.90 m - 0.70 / 0.90 m = 2.20 / 2.00 m; depending on the width of the strut cart
▶ In some cases, the required width may not be achieved exactly using the strut cart extension bars

Explanation:

(1750-900=850)	▶ Clear width - width of the strut cart = extension bar width
845	▶ Achievable extension bar width
(550+275+20)	▶ List of the extension bars

Accessories/spare parts

Art. no.	Short description	l [m]	d [m]	G [kg]
861 076	Pressure beam	1.60		176.00
861 074	Pressure beam	2.35		236.00
861 070	Pressure beam	2.80		271.00
861 071	Pressure beam	3.40		318.00
861 075	Pressure beam	4.60		425.00
861 085	Pressure beam	5.80		525.00
862 200	Connector			5.50
862 100	Connector bolts	0.11	0.035	1.00

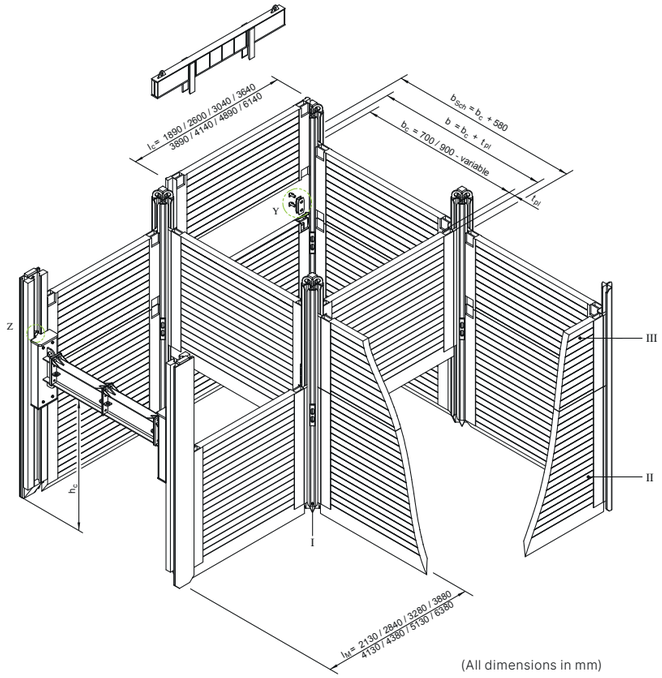
l	Length	A	Surface	t_{pl}	Panel thickness	e_h	Admissible soil pressure
l_M	Module length	G	Weight	b	Shoring width	b_c	Clear width
l_c	Pipe culvert length	G / VP	Weight / shoring panel	d	Diameter	l_{pl}	Panel length

E+S Single slide rail linear shoring – X-rail

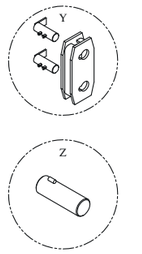


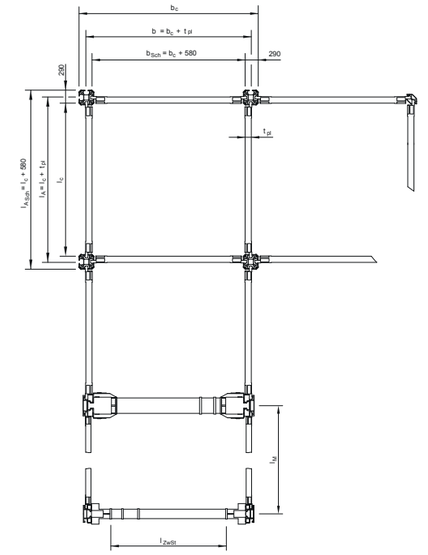
General data

Module length	2.13 m–6.38 m
X-rail length	4.13 m
Panel height	1.32 m / 2.32 m
Shoring width	1.75 m–6.00 m
Rec.: mobile or crawler excavator	18–30 t



(All dimensions in mm)





I	X-rail	l_c	Pipe culvert length	b_{Sch}	Rail outer width	t_{pl}	Panel thickness
II	Base panel	b	Shoring/trench width	l_A	Shoring/trench length	Y	Connector with bolts
III	Top panel	b_c	Clear width	l_{ASch}	Rail outer length	Z	Positioning bolt
l_M	Module length	h_c	Pipe culvert height	$l_{zwSt.}$	Extension bar length		

TRENCH SHORING

Linear shoring support

Art. no.	Short description	l [m]	G [kg]
835 160	X-rail	4.13	700.0

Base panels -inside- (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 120	1.89	2.13	0.11	1.89	510.0	4.38	176.0
821 160	2.60	2.84	0.11	2.60	650.0	6.03	90.0
821 250	3.04	3.28	0.11	3.04	730.0	7.05	65.5
821 610	3.64	3.88	0.11	3.64	845.0	8.44	45.2
821 850	3.89	4.13	0.11	3.89	970.0	9.02	39.4
821 855	4.14	4.38	0.15	4.14	1,300.0	9.58	81.0
821 860	4.89	5.13	0.15	4.89	1,500.0	11.34	58.1
821 861	6.13	6.38	0.15	6.13	1,880.0	14.22	36.6

Top panels -inside- (height 1.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 060	1.89	2.13	0.11	1.89	355.0	2.49	176.0
821 180	2.60	2.84	0.11	2.60	440.0	3.43	90.0
822 120	3.04	3.28	0.11	3.04	500.0	4.01	65.5
822 620	3.64	3.88	0.11	3.64	620.0	4.80	45.2
822 760	3.89	4.13	0.11	3.89	649.0	5.13	39.4
822 783	4.14	4.38	0.15	4.14	870.0	5.45	81.0
822 800	4.89	5.13	0.15	4.89	1,100.0	6.45	58.1
822 801	6.13	6.38	0.15	6.13	1,370.0	8.09	36.6

Top panels -inside- (height 2.30 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 065	1.89	2.13	0.11	1.89	530.0	4.35	176.0
822 155	2.60	2.84	0.11	2.60	660.0	5.98	90.0
822 180	3.04	3.28	0.11	3.04	740.0	6.99	65.5
822 680	3.64	3.88	0.11	3.64	850.0	8.37	45.2
822 780	3.89	4.13	0.11	3.89	980.0	8.95	39.4
822 785	4.14	4.38	0.15	4.14	1,435.0	9.50	81.0

Accessories/spare parts

Art. no.	Short description	l [m]	d [m]	G [kg]
861 076	Pressure beam	1.60		176.00
861 074	Pressure beam	2.35		236.00
861 070	Pressure beam	2.80		271.00
861 071	Pressure beam	3.40		318.00
861 075	Pressure beam	4.60		425.00
861 085	Pressure beam	5.80		525.00
862 200	Connector			5.50
862 100	Connector bolts	0.11	0.035	1.00

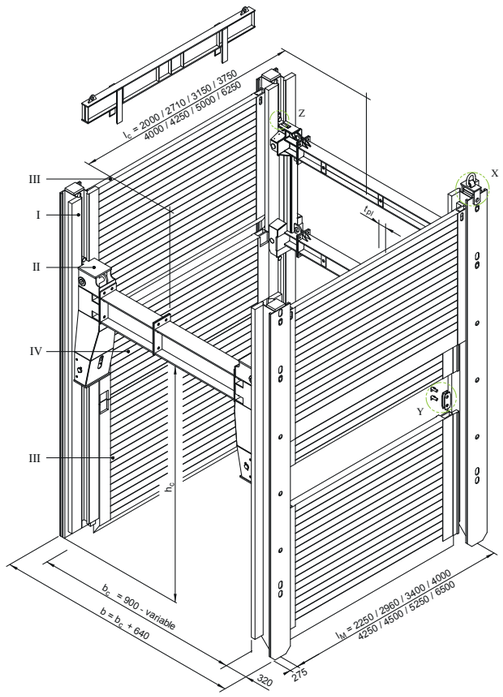
l	Length	A	Surface	G / VP	Weight / shoring panel	d	Diameter
l_M	Module length	G	Weight	t_{pl}	Panel thickness	e_h	Admissible soil pressure
l_c	Pipe culvert length						

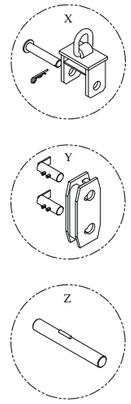
E+S Double slide rail linear shoring



General data

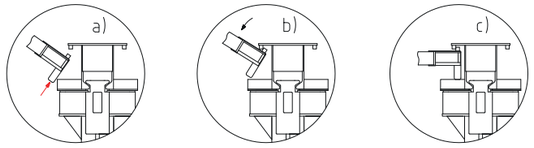
Module length		2.25 m–6.50 m
Slide-rail length		5.13 m / 6.13 m / 7.13 m / 8.13 m / 9.13 m
Panel height		1.32 m / 2.32 m
Pipe culvert height		variable
Shoring width		variable
Rec.: crawler excavator	max. 6.0 m: over 6.0 m:	24–31 t 30–50 t





I	Linear shoring support
II	Linear shoring strut cart
III	Base panel
IV	Top panel
l_M	Module length
l_c	Pipe culvert length
b	Shoring/trench width
b_c	Clear width
h_c	Pipe culvert height
t_{pl}	Panel thickness
X	Pull adapter with bolt
Y	Connector with bolts
Z	Positioning bolt

Swiveling-in of shoring panels



(All dimensions in mm. The data on pipe opening length l_c refer to the rectangular strut cart.)

Linear shoring supports

Art. no.	Short description	l [m]	G [kg]
820 912	Linear shoring support	5.13	1,002.0
820 915	Linear shoring support	6.13	1,192.0
820 920	Linear shoring support	7.13	1,404.0
820 924	Linear shoring support	8.13	1,859.0
820 971	Linear shoring support	9.13	2,325.0

Linear shoring strut carts

Art. no.	Short description	l [m]	G [kg]
832 200	Rectangular strut cart	2.00	420.0
832 215	Rectangular strut cart with self-aligning roller, bottom	2.20	490.0
832 205	U-type strut cart	2.00	618.0
832 220	Strut cart 0.85 m (half rectangular strut cart)	0.85	181.0

Base panels -inside- (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 120	1.89	2.25	0.11	2.00	510.0	4.38	176.0
821 160	2.60	2.96	0.11	2.71	650.0	6.03	90.0
821 250	3.04	3.40	0.11	3.15	730.0	7.05	65.5
821 610	3.64	4.00	0.11	3.75	845.0	8.44	45.2
821 850	3.89	4.25	0.11	4.00	970.0	9.02	39.4
821 855	4.14	4.50	0.15	4.25	1,300.0	9.58	81.0
821 860	4.89	5.25	0.15	5.00	1,500.0	11.34	58.1
821 861	6.13	6.50	0.15	6.25	1,880.0	14.22	36.6

Top panels -inside- (height 1.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 060	1.89	2.25	0.11	2.00	355.0	2.49	176.0
821 180	2.60	2.96	0.11	2.71	440.0	3.43	90.0
822 120	3.04	3.40	0.11	3.15	500.0	4.01	65.5
822 620	3.64	4.00	0.11	3.75	620.0	4.80	45.2
822 760	3.89	4.25	0.11	4.00	649.0	5.13	39.4
822 783	4.14	4.50	0.15	4.25	870.0	5.45	81.0
822 800	4.89	5.25	0.15	5.00	1,100.0	6.45	58.1
822 801	6.13	6.50	0.15	6.25	1,370.0	8.09	36.6

Top panels -inside- (height 2.30 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 065	1.89	2.25	0.11	2.00	530.0	4.35	176.0
822 155	2.60	2.96	0.11	2.71	660.0	5.98	90.0
822 180	3.04	3.40	0.11	3.15	740.0	6.99	65.5
822 680	3.64	4.00	0.11	3.75	850.0	8.37	45.2
822 780	3.89	4.25	0.11	4.00	980.0	8.95	39.4
822 785	4.14	4.50	0.15	4.25	1,435.0	9.50	81.0

Base panels -inside- reinforced (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 249	3.04	3.40	0.15	3.15	985.0	7.05	154.4
821 248	3.64	4.00	0.15	3.75	1,165.0	8.44	106.5

Top panels -inside- reinforced (height 2.30 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 181	3.04	3.40	0.15	3.15	1,080.0	6.99	154.4
822 182	3.64	4.00	0.15	3.75	1,260.0	8.37	106.5

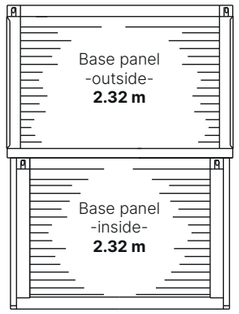
Base panels -outside- (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 150	2.00	2.25	0.11	2.00	542.0	4.64	149.0
821 170	2.71	2.96	0.11	2.71	675.0	6.29	80.0
821 310	3.15	3.40	0.11	3.15	755.0	7.31	59.0
821 770	3.75	4.00	0.11	3.75	865.0	8.70	41.4
821 910	4.00	4.25	0.11	4.00	990.0	9.28	36.3
821 913	4.25	4.50	0.15	4.25	1,313.0	9.86	75.0
821 912	5.00	5.25	0.15	5.00	1,545.0	11.60	54.5
821 916	6.25	6.50	0.15	6.25	1,910.0	14.50	34.7

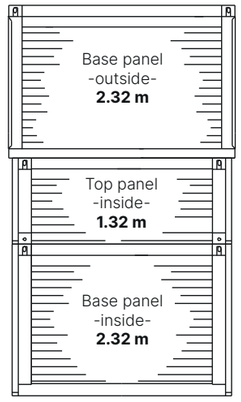
Top panels -outside- (height 1.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 075	2.00	2.25	0.11	2.00	365.0	2.64	149.0
821 190	2.71	2.96	0.11	2.71	455.0	3.58	80.0
822 310	3.15	3.40	0.11	3.15	510.0	4.16	59.0
822 710	3.75	4.00	0.11	3.75	585.0	4.95	41.4
822 810	4.00	4.25	0.11	4.00	647.0	5.28	36.3
822 813	4.25	4.50	0.15	4.25	900.0	5.61	75.0
822 815	5.00	5.25	0.15	5.00	1,115.0	6.60	54.5
822 830	6.25	6.50	0.15	6.25	1,400.0	8.25	34.7

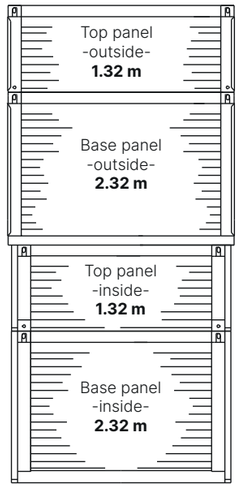
Possible height combinations



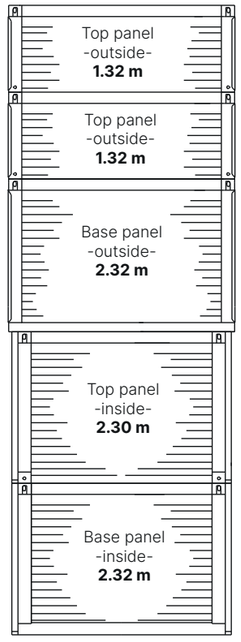
Shoring wall height
approx. 4.60 m



Shoring wall height
approx. 6.00 m



Shoring wall height
approx. 7.30 m



Shoring wall height
approx. 9.60 m

Extension bars for rectangular strut cart

Art. no.	Short description	l [m]	G [kg]
830 005	HEB 220 extension bar	0.140	42.0
830 010	HEB 220 extension bar	0.275	50.0
830 011	HEB 220 extension bar	0.350	55.0
830 012	HEB 220 extension bar	0.375	62.0
830 015	HEB 220 extension bar	0.412	65.0
830 020	HEB 220 extension bar	0.550	70.0
830 030	HEB 220 extension bar	1.100	110.0
830 075	HEB 220 extension bar	1.650	145.0
830 125	HEB 220 extension bar	2.200	192.0

Extension bars for U-type strut cart

Art. no.	Short description	l [m]	G [kg]
831 503	HEA 450 extension bar	0.140	77.0
831 500	HEA 450 extension bar	0.275	107.0
831 507	HEA 450 extension bar	0.375	115.0
831 510	HEA 450 extension bar	0.550	140.0
831 520	HEA 450 extension bar	1.100	220.0
831 530	HEA 450 extension bar	1.650	300.0
831 540	HEA 450 extension bar	2.200	375.0

Shoring widths for rectangular and U-type strut cart

Extension bar length [m]	b_c [m]	b [m]
without extension bar	0.90	1.54
0.140	1.04	1.68
0.275	1.18	1.82
0.350	1.25	1.89
0.375	1.28	1.92
0.412	1.31	1.95
0.550	1.45	2.08
1.100	2.00	2.64
1.650	2.55	3.19
2.200	3.10	3.74
Other trench widths possible by combination of different extension bar lengths		

Accessories/spare parts

Art. no.	Short description	l [m]	d [m]	G [kg]
834 110	Covering top plate for in-situ concrete	1.00		9.9
834 100	Covering base plate for in-situ concrete	0.75		7.9
832 245	Linear shoring positioning bolts	0.30	0.040	4.0
832 240	Linear shoring positioning bolts (9.13 m support)	0.39	0.065	11.0 kg
861 076	Pressure beam	1.60		176.0
861 074	Pressure beam	2.35		236.0
861 070	Pressure beam	2.80		271.0
861 071	Pressure beam	3.40		318.0
861 075	Pressure beam	4.60		425.0
861 085	Pressure beam	5.80		525.0
834 015	Pressure plate, rectangular strut cart			12.4
832 230	Bolt for pressure plate, rectangular strut cart	0.15	0.035	1.4
834 040	Distance plate for rectangular strut cart t = 6 mm		0.006	4.3
834 050	Distance plate for rectangular strut cart t = 8 mm		0.008	5.7
DF 0170 F	Distance plate for rectangular strut cart t = 20 mm		0.020	13.6
HE 0050 F	Safety clip 6.0 mm		0.006	0.03
IA 0150 F	Nut M 24–10.9 galv. (rectangular strut cart)			0.10
IA 0210 F	Nut M 36–10.9 galv. (U-type strut cart)			0.40
862 200	Connector			5.5
862 100	Connector bolts	0.11	0.035	1.0
IB 0470 F	Screw M 24 × 80–10.9 galv. (rectangular strut cart)			0.40
IB 0614 F	Screw M 36 × 80–10.9 galv. (U-type strut cart)			1.0
834 060	Pull adapter with bolts			43.6

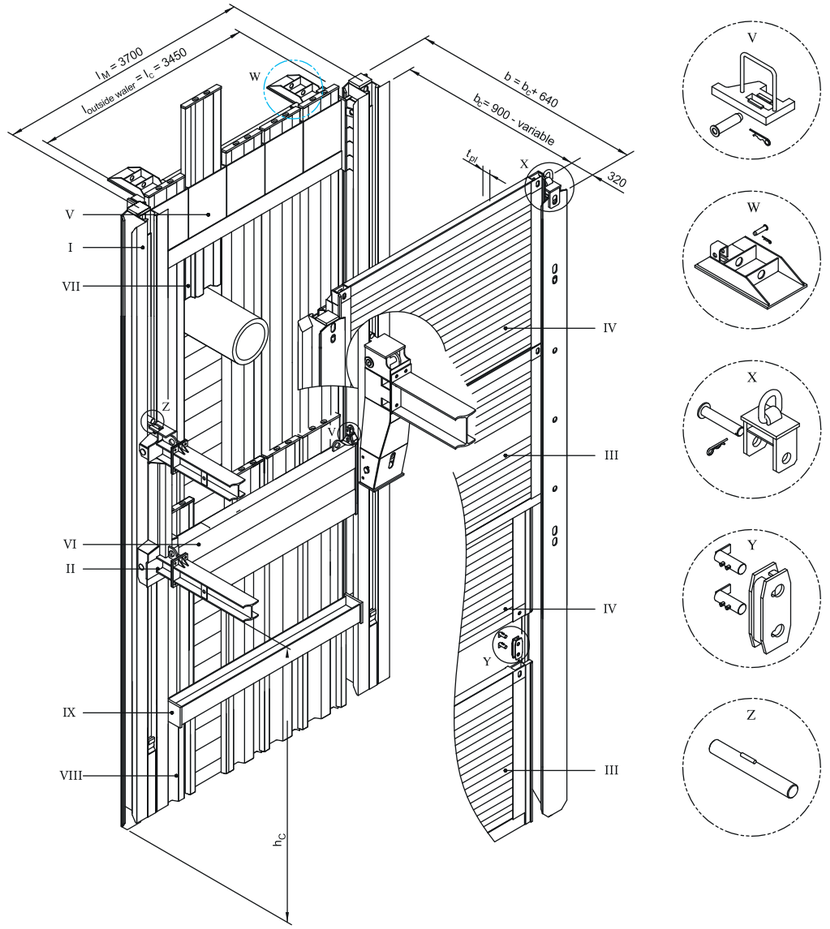
l	Length	A	Surface	t_{pl}	Panel thickness	e_h	Admissible soil pressure
l_M	Module length	G	Weight	b	Shoring width	b_c	Clear width
l_c	Pipe culvert length	G / VP	Weight / shoring panel	d	Diameter		

E+S Double slide rail inner-city linear shoring



General data

Module length		2.96 m / 3.70 m / 4.50 m / 5.25 m / 6.50 m
Slide-rail length		5.13 m / 6.13 m / 7.13 m / 8.13 m / 9.13 m
Piling frame element height		1.00 m / 1.10 m
Pipe culvert height		variable
Sheet pile length (KD VI/8)		variable
Shoring width		variable
Rec.: crawler excavator	max. 6.0 m: over 6.0 m:	24–31 t 30–50 t



(All dimensions in mm. The data on pipe opening length l_c refer to the rectangular strut cart.)

I	Linear shoring support	VI	Piling frame element (inside waler)	l_c	Pipe culvert length	V	Inside waler anchoring
II	Linear shoring strut cart	VII	Sheet piles (outside waler)	b	Shoring/trench width	W	Support bracket
III	Base panel	VIII	Sheet piles (inside waler)	b_c	Clear width	X	Pull adapter with bolts
IV	Top panel	IX	Waler support (inside waler)	h_c	Pipe culvert height	Y	Connector with bolts
V	Piling frame element (outside waler)	l_M	Module length	t_{pl}	Panel thickness	Z	Positioning bolt

Linear shoring supports

Art. no.	Short description	l [m]	G [kg]
820 912	Linear shoring support	5.13	1,002.0
820 915	Linear shoring support	6.13	1,192.0
820 920	Linear shoring support	7.13	1,404.0
820 924	Linear shoring support	8.13	1,859.0
820 971	Linear shoring support	9.13	2,325.0

Linear shoring strut carts

Art. no.	Short description	l [m]	G [kg]
832 200	Rectangular strut cart	2.00	420.0
832 215	Rectangular strut cart with self-aligning roller, bottom	2.20	490.0
832 220	Strut cart 0.85 m (half rectangular strut cart)	0.85	181.0
832 205	U-type strut cart	2.00	618.0

Piling frame elements

Art. no.	Short description	l [m]	l_M [m]	h [m]	t_{pl} [m]	l_c [m]	G/DKP [kg]	KD/DKP
820 980	Piling frame element (outside waler)	3.45	3.70	1.00	0.30	3.45	1,330.0	5
821 000	Piling frame element (inside waler)	3.34	3.70	1.00	0.30	3.45	1,217.0	5
842 671	Piling frame element DKU, KD VI	2.27	2.96	1.00	0.31	2.71	510.0	4
842 687	Piling frame element DKU, KD VI	3.00	3.69	1.00	0.31	3.44	640.0	5
842 674	Piling frame element DKU, KD VI	3.81	4.50	1.00	0.31	4.25	785.0	7
842 696	Piling frame element DKU, KD VI	4.55	5.25	1.10	0.40	5.00	1,563.0	8
842 699	Piling frame element DKU, KD VI	5.80	6.50	1.10	0.40	6.25	1,880.0	10

Base panels -outside- (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 170	2.71	2.96	0.11	2.71	675.0	6.29	80.0
821 320	3.45	3.70	0.11	3.45	815.0	8.00	49.0
821 913	4.25	4.50	0.15	4.25	1,313.0	9.86	75.0
821 912	5.00	5.25	0.15	5.00	1,545.0	11.60	54.5
821 916	6.25	6.50	0.15	6.25	1,910.0	14.50	34.7

Top panels -inside- (height 1.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 190	2.71	2.96	0.11	2.71	455.0	3.58	80.0
822 410	3.45	3.70	0.11	3.45	550.0	4.55	49.0
822 813	4.25	4.50	0.15	4.25	900.0	5.61	75.0
822 815	5.00	5.25	0.15	5.00	1,115.0	6.60	54.5
822 830	6.25	6.50	0.15	6.25	1,400.0	8.25	34.7

Base panels -inside- (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 160	2.60	2.96	0.11	2.71	650.0	6.03	90.0
821 255	3.34	3.70	0.11	3.45	803.0	7.75	54.0
821 855	4.14	4.50	0.15	4.25	1,300.0	9.58	81.0
821 860	4.89	5.13	0.15	4.89	1,500.0	11.34	58.1
821 861	6.13	6.38	0.15	6.13	1,880.0	14.22	36.6

Top panels -inside- (height 1.32 m & 2.30 m)

Art. no.	l [m]	l_M [m]	h [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 180	2.60	2.96	1.32	0.11	2.71	440.0	3.43	90.0
822 140	3.34	3.70	1.32	0.11	3.45	570.0	4.41	54.0
822 783	4.14	4.50	1.32	0.15	4.25	870.0	5.45	81.0
822 800	4.89	5.25	1.32	0.15	5.00	1,100.0	6.45	58.1
822 801	6.13	6.50	1.32	0.15	6.25	1,370.0	8.09	36.6
822 155	2.60	2.96	2.30	0.11	2.71	660.0	5.98	90.0
822 145	3.34	3.70	2.30	0.11	3.45	840.0	7.68	54.0
822 785	4.14	4.50	2.30	0.15	4.25	1,435.0	9.50	81.0

Walers, inner-city linear shoring

Art. no.	Short description	l [m]	l_M [m]	G/VP [kg]
821 003	Waler for outside waler	3.46	3.70	374.0
821 002	Waler for inside waler	3.30	3.70	310.0
842 704	Waler for piling frame element DKU	2.60	2.96	300.0
GV000560	Waler for piling frame element DKU	3.30	3.69	358.0
842 711	Waler for piling frame element DKU	4.14	4.50	445.0
843 366	Waler for piling frame element DKU	4.99	5.25	920.0
843 360	Waler for piling frame element DKU	6.24	6.50	1,097.0

Extension bars for U-type strut cart

Art. no.	Short description	l [m]	G [kg]
831 503	HEA 450 extension bar	0.140	77.0
831 500	HEA 450 extension bar	0.275	107.0
831 507	HEA 450 extension bar	0.375	115.0
831 510	HEA 450 extension bar	0.550	140.0
831 520	HEA 450 extension bar	1.100	220.0
831 530	HEA 450 extension bar	1.650	300.0
831 540	HEA 450 extension bar	2.200	375.0

Extension bars for rectangular strut cart

Art. no.	Short description	l [m]	G [kg]
830 005	HEB 220 extension bar	0.140	42.0
830 010	HEB 220 extension bar	0.275	50.0
830 011	HEB 220 extension bar	0.350	55.0
830 012	HEB 220 extension bar	0.375	62.0
830 015	HEB 220 extension bar	0.410	65.0
830 020	HEB 220 extension bar	0.550	70.0
830 030	HEB 220 extension bar	1.100	110.0
830 075	HEB 220 extension bar	1.650	145.0
830 125	HEB 220 extension bar	2.200	192.0

Shoring widths for rectangular and U-type strut cart

Extension bar length [m]	b_c [m]	b [m]
without extension bar	0.90	1.54
0.140	1.04	1.68
0.275	1.18	1.82
0.350	1.25	1.89
0.375	1.28	1.92
0.412	1.31	1.95
0.550	1.45	2.09
1.100	2.00	2.64
1.650	2.55	3.19
2.200	3.10	3.74

Other trench widths possible by combination of different extension bar lengths

Accessories/spare parts

Art. no.	Short description	l [m]	d [m]	G [kg]
821 100	Chain 13/ 5,000 mm	5.00		25.7
834 110	Covering top plate for in-situ concrete	1.00		9.9
834 100	Covering base plate for in-situ concrete	0.75		7.9
834 040	Distance plate for rectangular strut cart t = 6mm		0.006	4.3
834 050	Distance plate for rectangular strut cart t = 8mm		0.008	5.7
DF 0170 F	Distance plate for rectangular strut cart t = 20mm		0.020	13.6
842 761	Adapter for DKU piling frame element, H = 1.00 m KD VI			75.0
843 355	Adapter for DKU piling frame element, H = 1.10 m KD VI			150.0
832 245	Linear shoring positioning bolts	0.30	0.040	4.0
832 240	Linear shoring positioning bolts (9.13 m support)	0.39	0.065	11.0 kg
861 076	Pressure beam	1.60		176.0
861 074	Pressure beam	2.35		236.0
861 070	Pressure beam	2.80		271.0
861 071	Pressure beam	3.40		318.0
861 075	Pressure beam	4.60		425.0
861 085	Pressure beam	5.80		525.0
834 015	Pressure plate, rectangular strut cart			12.4
832 230	Bolt for pressure plate, rectangular strut cart	0.15	0.035	1.4
HE 0050 F	Safety clip 6.0 mm		0.006	0.03
336 920	Inside waler anchoring R/L + DK LV bolt			6.00
336 960	Support brackets for piling frame element incl. bolts and safety clip			40.0
IA 0150 F	Nut M 24–10.9 galv. (rectangular strut cart)			0.10
IA 0140 F	Nut M 24–8.0 galv. (adapter piling frame element DKU, H = 1.00 m & 1.10 m)			0.10
IA 0210 F	Nut M 36–10.9 galv. (U-type strut cart)			0.40
862 200	Connector			5.5
862 100	Connector bolts	0.11	0.035	1.0
IB 0490 F	Screw M 24 × 80–8.8 galv. (adapter piling frame element DKU, H = 1.00 m)			0.40
IB 0515 F	Screw M 24 × 100–8.8 galv. (adapter piling frame element DKU, H = 1.10 m)			0.42
IB 0470 F	Screw M 24 × 80–10.9 galv. (rectangular strut cart)			0.40
IB 0614 F	Screw M 36 × 80–10.9 galv. (U-type strut cart)			1.0
834 060	Pull adapter with bolts			43.6

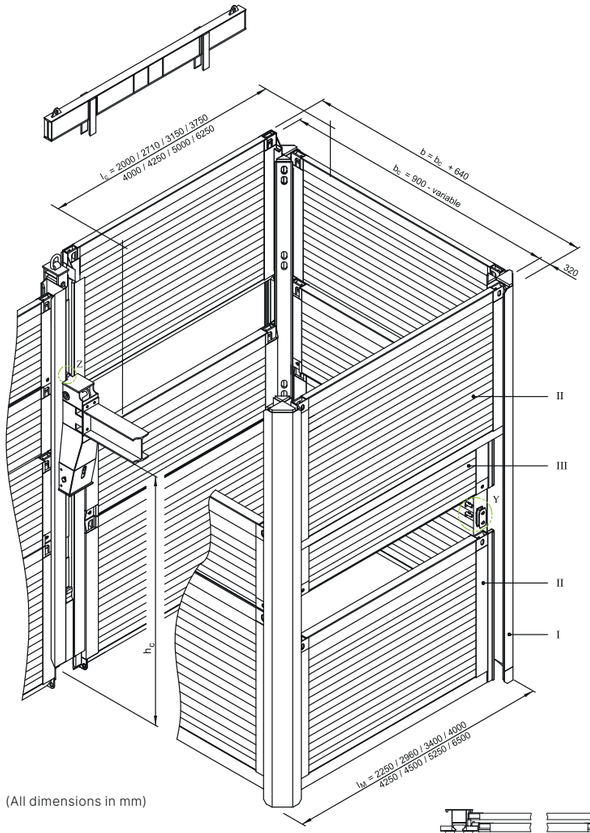
l	Length	A	Surface	t_{pl}	Panel thickness	e_h	Admissible soil pressure
l_M	Module length	G	Weight	b	Shoring width	b_c	Clear width
l_c	Pipe culvert length	G / VP	Weight / shoring panel	d	Diameter	G / DKP	Weight / piling frame element
h	Panel height	KD / DKP	Sheet piles / piling frame element				

E+S Double slide rail corner shoring

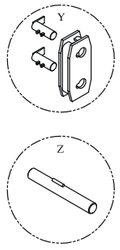


General data

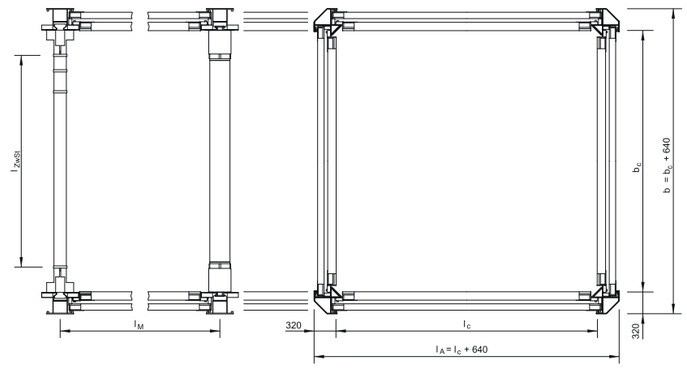
Module length	2.25 m–6.50 m
Slide-rail length	5.13 m / 6.13 m
Panel height	1.32 m / 2.32 m
Shoring width	1.75 m–6.00 m
Rec.: crawler excavator	24–31 t



(All dimensions in mm)



I	Corner shoring support
II	Base panel
III	Top panel
l_M	Module length
l_c	Pipe culvert length
b	Shoring/trench width
b_c	Clear width
h_c	Pipe culvert height
$l_{ZwSt.}$	Extension bar length
l_A	Trench width
Y	Connector with bolts
Z	Positioning bolt



Linear shoring supports

Art. no.	Short description	l [m]	G [kg]
835 100	Corner shoring support	5.13	740.0
835 120	Corner shoring support	6.13	900.0

Base panels -inside- (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 120	1.89	2.25	0.11	2.00	510.0	4.38	176.0
821 160	2.60	2.96	0.11	2.71	650.0	6.03	90.0
821 250	3.04	3.40	0.11	3.15	730.0	7.05	65.5
821 610	3.64	4.00	0.11	3.75	845.0	8.44	45.2
821 850	3.89	4.25	0.11	4.00	970.0	9.02	39.4
821 855	4.14	4.50	0.15	4.25	1,300.0	9.58	81.0
821 860	4.89	5.25	0.15	5.00	1,500.0	11.34	58.1
821 861	6.13	6.50	0.15	6.25	1,880.0	14.22	36.6

Top panels -inside- (height 1.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 060	1.89	2.25	0.11	2.00	355.0	2.49	176.0
821 180	2.60	2.96	0.11	2.71	440.0	3.43	90.0
822 120	3.04	3.40	0.11	3.15	500.0	4.01	65.5
822 620	3.64	4.00	0.11	3.75	620.0	4.80	45.2
822 760	3.89	4.25	0.11	4.00	649.0	5.13	39.4
822 783	4.14	4.50	0.15	4.25	870.0	5.45	81.0
822 800	4.89	5.25	0.15	5.00	1,100.0	6.45	58.1
822 801	6.13	6.50	0.15	6.25	1,370.0	8.09	36.6

Top panels -inside- (height 2.30 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 065	1.89	2.25	0.11	2.00	530.0	4.35	176.0
822 155	2.60	2.96	0.11	2.71	660.0	5.98	90.0
822 180	3.04	3.40	0.11	3.15	740.0	6.99	65.5
822 680	3.64	4.00	0.11	3.75	850.0	8.37	45.2
822 780	3.89	4.25	0.11	4.00	980.0	8.95	39.4
822 785	4.14	4.50	0.15	4.25	1,435.0	9.50	81.0

Base panels -outside- (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 150	2.00	2.25	0.11	2.00	542.0	4.64	149.0
821 170	2.71	2.96	0.11	2.71	675.0	6.29	80.0
821 310	3.15	3.40	0.11	3.15	755.0	7.31	59.0
821 770	3.75	4.00	0.11	3.75	865.0	8.70	41.4
821 910	4.00	4.25	0.11	4.00	990.0	9.28	36.3
821 913	4.25	4.50	0.15	4.25	1,313.0	9.86	75.0
821 912	5.00	5.25	0.15	5.00	1,545.0	11.60	54.5
821 916	6.25	6.50	0.15	6.25	1,910.0	14.50	34.7

Top panels -outside- (height 1.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 075	2.00	2.25	0.11	2.00	365.0	2.64	149.0
821 190	2.71	2.96	0.11	2.71	455.0	3.58	80.0
822 310	3.15	3.40	0.11	3.15	510.0	4.16	59.0
822 710	3.75	4.00	0.11	3.75	585.0	4.95	41.4
822 810	4.00	4.25	0.11	4.00	647.0	5.28	36.3
822 813	4.25	4.50	0.15	4.25	900.0	5.61	75.0
822 815	5.00	5.25	0.15	5.00	1,115.0	6.60	54.5
822 830	6.25	6.50	0.15	6.25	1,400.0	8.25	34.7

Installation options for double slide rail linear shoring

Long side of shoring

Module length [m]	l_M	6.50	5.25	4.50	4.25	4.00	3.70	3.40	2.96	2.25
Panel length [m]	l_{Apl}	6.25	5.00	4.25	4.00	3.75	3.45	3.15	2.71	2.00
Panel length [m]	l_{Ipl}	6.14	4.89	4.14	3.89	3.64	3.34	3.04	2.60	1.89

Head end of shoring

Clear width (head end of shoring) b C [mm]

Clear length (longitudial side) lc [mm] →

l_M	l_{Apl}	l_{Ipl}	l_c=6140 / b_c=6140	l_c=4890 / b_c=6140	l_c=4140 / b_c=6140	l_c=3890 / b_c=6140	l_c=3640 / b_c=6140	l_c=3340 / b_c=6140	l_c=3040 / b_c=6140	l_c=2600 / b_c=6140	l_c=1890 / b_c=6140	Extension bar combination [mm] Rectangular strut cart	Extension bar combination [mm] U-type strut cart
6.50	6.25	6.14	l_c=6140 / b_c=6140	l_c=4890 / b_c=6140	l_c=4140 / b_c=6140	l_c=3890 / b_c=6140	l_c=3640 / b_c=6140	l_c=3340 / b_c=6140	l_c=3040 / b_c=6140	l_c=2600 / b_c=6140	l_c=1890 / b_c=6140	*(6140-900=5240)* **5225** (2200+2200+550+275)	*(6140-900=5240)* **5225** (2200+2200+550+275)
5.25	5.00	4.89	l_c=6140 / b_c=4890	l_c=4890 / b_c=4890	l_c=4140 / b_c=4890	l_c=3890 / b_c=4890	l_c=3640 / b_c=4890	l_c=3340 / b_c=4890	l_c=3040 / b_c=4890	l_c=2600 / b_c=4890	l_c=1890 / b_c=4890	*(4890-900=3990)* **3990** (2200+1650+140)	*(4890-900=3990)* **3990** (2200+1650+140)
4.50	4.25	4.14	l_c=6140 / b_c=4140	l_c=4890 / b_c=4140	l_c=4140 / b_c=4140	l_c=3890 / b_c=4140	l_c=3640 / b_c=4140	l_c=3340 / b_c=4140	l_c=3040 / b_c=4140	l_c=2600 / b_c=4140	l_c=1890 / b_c=4140	*(4140-900=3240)* **3240** (2200+550+350+140)	*(4140-900=3240)* **3225** (2200+375+375+275)
4.25	4.00	3.89	l_c=6140 / b_c=3890	l_c=4890 / b_c=3890	l_c=4140 / b_c=3890	l_c=3890 / b_c=3890	l_c=3640 / b_c=3890	l_c=3340 / b_c=3890	l_c=3040 / b_c=3890	l_c=2600 / b_c=3890	l_c=1890 / b_c=3890	*(3890-900=2990)* **2987** (2200+375+412)	*(3890-900=2990)* **2990** (2200+375+275+140)
4.00	3.75	3.64	l_c=6140 / b_c=3640	l_c=4890 / b_c=3640	l_c=4140 / b_c=3640	l_c=3890 / b_c=3640	l_c=3640 / b_c=3640	l_c=3340 / b_c=3640	l_c=3040 / b_c=3640	l_c=2600 / b_c=3640	l_c=1890 / b_c=3640	*(3640-900=2740)* **2750** (2200+550)	*(3640-900=2740)* **2750** (2200+550)
3.70	3.45	3.34	l_c=6140 / b_c=3340	l_c=4890 / b_c=3340	l_c=4140 / b_c=3340	l_c=3890 / b_c=3340	l_c=3640 / b_c=3340	l_c=3340 / b_c=3340	l_c=3040 / b_c=3340	l_c=2600 / b_c=3340	l_c=1890 / b_c=3340	*(3340-900=2440)* **2437** (1650+412+375)	*(3340-900=2440)* **2440** (1650+375+275+140)
3.40	3.15	3.04	l_c=6140 / b_c=3040	l_c=4890 / b_c=3040	l_c=4140 / b_c=3040	l_c=3890 / b_c=3040	l_c=3640 / b_c=3040	l_c=3340 / b_c=3040	l_c=3040 / b_c=3040	l_c=2600 / b_c=3040	l_c=1890 / b_c=3040	*(3040-900=2140)* **2140** (1650+350+140)	*(3040-900=2140)* **2125** (1100+375+375+275)
2.96	2.71	2.60	l_c=6140 / b_c=2600	l_c=4890 / b_c=2600	l_c=4140 / b_c=2600	l_c=3890 / b_c=2600	l_c=3640 / b_c=2600	l_c=3340 / b_c=2600	l_c=3040 / b_c=2600	l_c=2600 / b_c=2600	l_c=1890 / b_c=2600	*(2600-900=1700)* **1690** (1650+40)	*(2600-900=1700)* **1690** (1650+20+20)
2.25	2.00	1.89	l_c=6140 / b_c=1890	l_c=4890 / b_c=1890	l_c=4140 / b_c=1890	l_c=3890 / b_c=1890	l_c=3640 / b_c=1890	l_c=3340 / b_c=1890	l_c=3040 / b_c=1890	l_c=2600 / b_c=1890	l_c=1890 / b_c=1890	*(1890-900=990)* **975** (350+350+275)	*(1890-900=990)* **985** (550+275+140+20)

Example:
Head end shoring module length: l_M=3.40 m
▶ b_c=3.04 m
▶ Required extension bar combination: 3.04 m - 0.90 m = 2.14 m; depending on the width of the strut cart
▶ In some cases, the required width may not be achieved exactly using the strut cart extension bars

Explanation:
(1890-900=990) ▶ Clear width - width of the strut cart = extension bar width
975 ▶ Achievable extension bar width
(350+350+275) ▶ List of the extension bars

Accessories/spare parts

Art. no.	Short description	l [m]	d [m]	G [kg]
861 076	Pressure beam	1.60		176.0
861 074	Pressure beam	2.35		236.0
861 070	Pressure beam	2.80		271.0
861 071	Pressure beam	3.40		318.0
861 075	Pressure beam	4.60		425.0
861 085	Pressure beam	5.80		525.0
862 200	Connector			5.5
862 100	Connector bolts	0.11	0.035	1.0

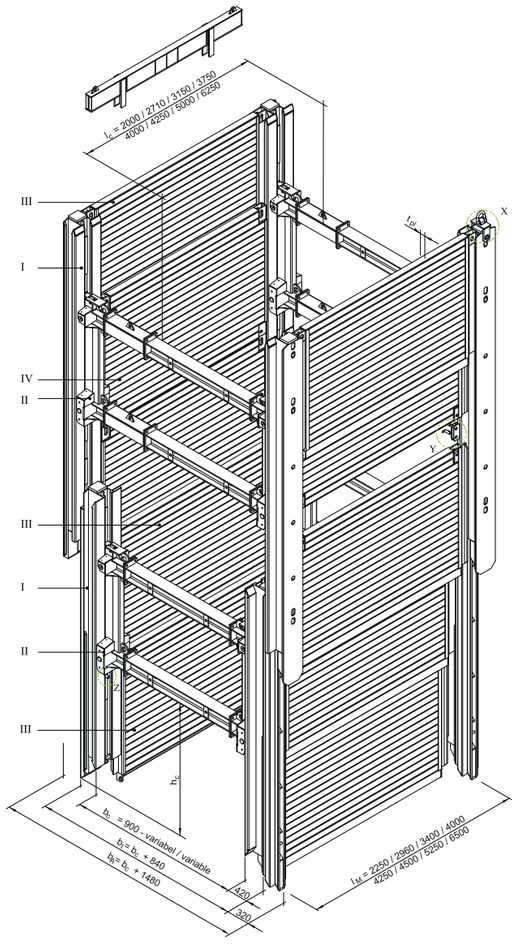
l	Length	l_{APl}	Outside panel length	G	Weight	d	Diameter
l_M	Module length	l_{IPl}	Inside panel length	G / VP	Weight / shoring panel	e_h	Admissible soil pressure
l_c	Pipe culvert length	A	Surface	t_{pl}	Panel thickness		

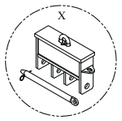
E+S Deep linear shoring

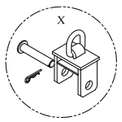


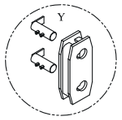
General data

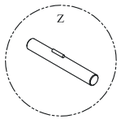
Module length	2.25 m–6.50 m
Slide-rail length	variable
Panel height	1.32 m / 2.32 m
Pipe culvert height	variable
Shoring width	variable
Rec.: crawler excavator	50 t











I	Linear shoring support
II	Linear shoring strut cart
III	Base panel
IV	Top panel
l_M	Module length
l_c	Pipe culvert length
b_A	Shoring/trench width (outside rail)
b_I	Shoring/trench width (inside rail)
b_c	Clear width
h_c	Pipe culvert height
t_{pl}	Panel thickness
X	Pull adapter with bolts
Y	Connector with bolts
Z	Positioning bolt

(All dimensions in mm. The data on pipe opening length l_c refer to the rectangular strut cart.)

Linear shoring supports

Art. no.	Short description	l [m]	G [kg]
820 952	Linear shoring support -inside-	5.13	1,189.0
820 947	Linear shoring support -outside-	6.13	1,260.0
820 948	Linear shoring support -inside-	6.13	1,409.0
820 953	Linear shoring support -outside-	7.13	1,470.0

Linear shoring strut cart

Art. no.	Short description	l [m]	G [kg]
832 215	Rectangular strut cart with self-aligning roller, bottom	2.20	490.0

Base panels -inside- (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 120	1.89	2.25	0.11	2.00	510.0	4.38	176.0
821 160	2.60	2.96	0.11	2.71	650.0	6.03	90.0
821 250	3.04	3.40	0.11	3.15	730.0	7.05	65.5
821 610	3.64	4.00	0.11	3.75	845.0	8.44	45.2
821 850	3.89	4.25	0.11	4.00	970.0	9.02	39.4
821 855	4.14	4.50	0.15	4.25	1,300.0	9.58	81.0
821 860	4.89	5.25	0.15	5.00	1,500.0	11.34	58.1
821 861	6.13	6.50	0.15	6.25	1,880.0	14.22	36.6

Top panels -inside- (height 1.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 060	1.89	2.25	0.11	2.00	355.0	2.49	176.0
821 180	2.60	2.96	0.11	2.71	440.0	3.43	90.0
822 120	3.04	3.40	0.11	3.15	500.0	4.01	65.5
822 620	3.64	4.00	0.11	3.75	620.0	4.80	45.2
822 760	3.89	4.25	0.11	4.00	649.0	5.13	39.4
822 783	4.14	4.50	0.15	4.25	870.0	5.45	81.0
822 800	4.89	5.25	0.15	5.00	1,100.0	6.45	58.1
822 801	6.13	6.50	0.15	6.25	1,370.0	8.09	36.6

Top panels -inside- (height 2.30 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 065	1.89	2.25	0.11	2.00	530.0	4.35	176.0
822 155	2.60	2.96	0.11	2.71	660.0	5.98	90.0
822 180	3.04	3.40	0.11	3.15	740.0	6.99	65.5
822 680	3.64	4.00	0.11	3.75	850.0	8.37	45.2
822 780	3.89	4.25	0.11	4.00	980.0	8.95	39.4
822 785	4.14	4.50	0.15	4.25	1,435.0	9.50	81.0

Base panels -outside- (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 150	2.00	2.25	0.11	2.00	542.0	4.64	149.0
821 170	2.71	2.96	0.11	2.71	675.0	6.29	80.0
821 310	3.15	3.40	0.11	3.15	755.0	7.31	59.0
821 770	3.75	4.00	0.11	3.75	865.0	8.70	41.4
821 910	4.00	4.25	0.11	4.00	990.0	9.28	36.3
821 913	4.25	4.50	0.15	4.25	1,313.0	9.86	75.0
821 912	5.00	5.25	0.15	5.00	1,545.0	11.60	54.5
821 916	6.25	6.50	0.15	6.25	1,910.0	14.50	34.7

Top panels -outside- (height 1.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 075	2.00	2.25	0.11	2.00	365.0	2.64	149.0
821 190	2.71	2.96	0.11	2.71	455.0	3.58	80.0
822 310	3.15	3.40	0.11	3.15	510.0	4.16	59.0
822 710	3.75	4.00	0.11	3.75	585.0	4.95	41.4
822 810	4.00	4.25	0.11	4.00	647.0	5.28	36.3
822 813	4.25	4.50	0.15	4.25	900.0	5.61	75.0
822 815	5.00	5.25	0.15	5.00	1,115.0	6.60	54.5
822 830	6.25	6.50	0.15	6.25	1,400.0	8.25	34.7

Extension bars for rectangular strut cart

Art. no.	Short description	l [m]	G [kg]
830 010	HEB 220 extension bar	0.275	50.0
830 020	HEB 220 extension bar	0.550	70.0
830 027	HEB 220 extension bar (upper shoring field)	0.840	134.0
830 030	HEB 220 extension bar	1.100	110.0
830 075	HEB 220 extension bar	1.650	145.0
830 125	HEB 220 extension bar	2.200	192.0

Shoring widths, deep linear shoring

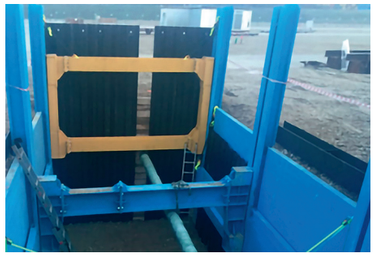
Extension bar length [m]	b_c [m]	b_l [m]	b_A [m]
without extension bar		0.90	1.28
0.275	1.18	2.02	2.66
0.550	1.45	2.29	2.93
1.100	2.00	2.84	3.48
1.650	2.55	3.39	4.03
2.200	3.10	3.94	4.58
Other trench widths possible by combination of different extension bar lengths			

Accessories/spare parts

Art. no.	Short description	l [m]	d [m]	G [kg]
832 245	Linear shoring positioning bolts	0.30	0.040	3.2
832 230	Bolt for pressure plate, rectangular strut cart	0.15	0.035	1.4
861 076	Pressure beam	1.60		176.0
861 074	Pressure beam	2.35		236.0
861 070	Pressure beam	2.80		271.0
861 071	Pressure beam	3.40		318.0
861 075	Pressure beam	4.60		425.0
861 085	Pressure beam	5.80		525.0
834 015	Strut cart pressure plate (single, double slide rail)			12.4
HE 0050 F	Safety clip 6.0 mm		0.006	0.03
IA 0150 F	Nut M 24–10.9 galv. (rectangular strut cart)			0.10
862 200	Connector			5.5
862 100	Connector bolts	0.11	0.035	1.0
IB 0470 F	Screw M 24 × 80–10.9 galv. (rectangular strut cart)			0.40
834 060	Pull adapter with bolts			43.6
832 261	TLV pressure adapter with bolts			180.0

l	Length	b	Shoring width	A	Surface	e_h	Admissible soil pressure
l_M	Module length	d	Diameter	G	Weight	b_c	Clear width
l_c	Pipe culvert length	b_l	Shoring/trench width (inside rail)	G / VP	Weight / shoring panel	b_A	Shoring/trench width (outside rail)
t_{pl}	Panel thickness						

E+S Head end shoring with head end shoring strut cart and sheet piles



I Head end shoring strut cart
II Extension bars
d_{KD} Sheet pile thickness

Head end shoring strut cart

Art. no.	Short description	l [m]	G [kg]
832 199	Head end shoring strut cart, E+S R/L	2.50	820.0

Extension bars, head end shoring strut cart

Art. no.	Short description	l [m]	b_c [m]	G [kg]
836 087	HEB 360 extension bar	0.140	1.040	86.5
836 090	HEB 360 extension bar	0.275	1.175	105.0
836 092	HEB 360 extension bar	0.375	1.275	115.0
836 091	HEB 360 extension bar	0.412	1.312	127.5
836 093	HEB 360 extension bar	0.550	1.450	150.0
836 095	HEB 360 extension bar	1.100	2.000	230.0
836 097	HEB 360 extension bar	1.650	2.550	310.0
836 100	HEB 360 extension bar	2.200	3.100	385.0
836 105	HEB 360 extension bar	3.300	4.200	543.0
836 112	HEB 360 extension bar	4.400	5.300	700.0
836 115	HEB 360 extension bar	4.950	5.850	774.0
836 120	HEB 360 extension bar	5.500	6.400	853.0
836 122	HEB 360 extension bar	6.050	6.950	937.0

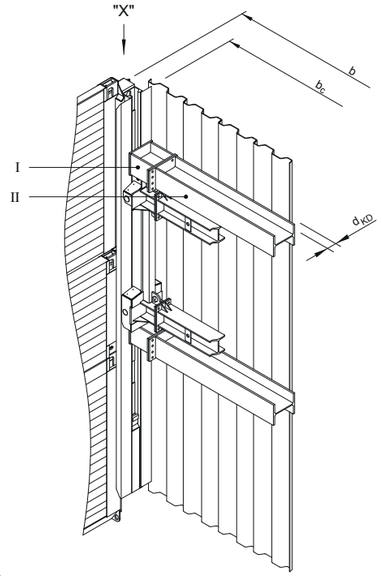
Accessories/spare parts

Art. no.	Short description	G [kg]
IB 0512F	Screw M24×100-10.9 galv.	0.50
IA 0150F	Nut M24-10.0 galv	0.10

l Length G Weight
b_c Clear width

E+S head end shoring with head shoring adapter and sheet piles





I Adapter for head end shoring
II Extension bars
b Shoring/trench width
b_c Clear width
d_{KD} Sheet pile thickness

Head end shoring adapter with sheet piles

Art. no.	Short description	l [m]	G [kg]
899 994	Head end shoring adapter	0.45	132.0

Extension bars for head end shoring

Art. no.	Short description	l [m]	b_c [m]	G [kg]
836 087	HEB 360 extension bar	0.140	1.040	86.5
836 090	HEB 360 extension bar	0.275	1.175	105.0
836 092	HEB 360 extension bar	0.375	1.275	115.0
836 091	HEB 360 extension bar	0.412	1.312	127.5
836 093	HEB 360 extension bar	0.550	1.450	150.0
836 095	HEB 360 extension bar	1.100	2.000	230.0
836 097	HEB 360 extension bar	1.650	2.550	310.0
836 100	HEB 360 extension bar	2.200	3.100	385.0
836 105	HEB 360 extension bar	3.300	4.200	543.0
836 112	HEB 360 extension bar	4.400	5.300	700.0
836 115	HEB 360 extension bar	4.950	5.850	774.0
836 120	HEB 360 extension bar	5.500	6.400	853.0
836 122	HEB 360 extension bar	6.050	6.950	937.0

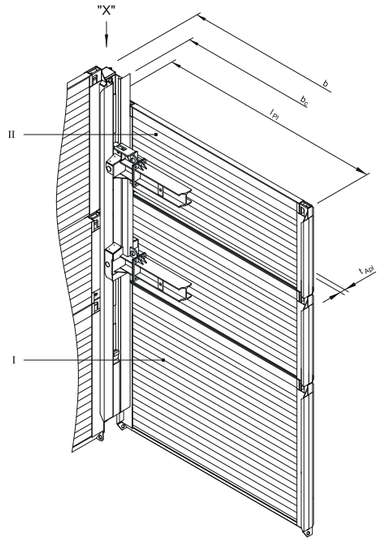
Accessories/spare parts

Art. no.	Short description	l [m]	d [m]	G [kg]
IB 0512 F	Screw M 24 × 80–10.9 galv.			0.50
IA 0150F	Nut M 24–10.0			0.10
821 100	Chain 13/ 5,000 mm	5.00		25.7

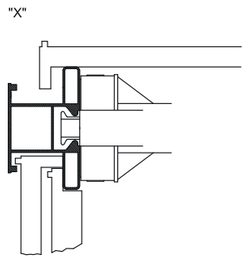
l Length G Weight b_c Clear width d Diameter

E+S Head end shoring with slide-rail panels





I	Base panel
II	Top panel
l_{pl}	Panel length
b	Shoring/trench width
b_c	Clear width
t_{Apl}	Outside panel thickness



Base panels -outside- (height 2.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
821 150	2.00	2.25	0.11	2.00	542.0	4.64	149.0
821 170	2.71	2.96	0.11	2.71	675.0	6.29	80.0
821 310	3.15	3.40	0.11	3.15	755.0	7.31	59.0
821 770	3.75	4.00	0.11	3.75	865.0	8.70	41.4
821 910	4.00	4.25	0.11	4.00	990.0	9.28	36.3
821 913	4.25	4.50	0.15	4.25	1,313.0	9.86	75.0
821 912	5.00	5.25	0.15	5.00	1,545.0	11.60	54.5
821 916	6.25	6.50	0.15	6.25	1,910.0	14.50	34.7

Top panels -outside- (height 1.32 m)

Art. no.	l [m]	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	e_h [kN/m²]
822 075	2.00	2.25	0.11	2.00	365.0	2.64	149.0
821 190	2.71	2.96	0.11	2.71	455.0	3.58	80.0
822 310	3.15	3.40	0.11	3.15	510.0	4.16	59.0
822 710	3.75	4.00	0.11	3.75	585.0	4.95	41.4
822 810	4.00	4.25	0.11	4.00	647.0	5.28	36.3
822 813	4.25	4.50	0.15	4.25	900.0	5.61	75.0
822 815	5.00	5.25	0.15	5.00	1,115.0	6.60	54.5
822 830	6.25	6.50	0.15	6.25	1,400.0	8.25	34.7

Shoring widths

Art. no.	l_{pl} [m]	l_M [m]	min. b_c [m]	Extension bar combination min. b_c [mm]	max. b_c [m]	Extension bar combination max. b_c [mm]
821 150	2.00	2.25	1.49	2 × 20 / 550	1.73	275 / 550
821 170	2.71	2.96	2.18	2 × 20 / 140 / 1,100	2.41	412 / 1,100
821 310	3.15	3.40	2.69	140 / 1,650	2.83	275 / 1,650
821 770	3.75	4.00	3.24	140 / 2,200	3.48	375 / 2,200
821 910	4.00	4.25	3.48	375 / 2,200	3.75	275 / 375 / 2,200
821 913	4.25	4.50	3.79	140 / 550 / 2,200	3.93	275 / 550 / 2,200
821 912	5.00	5.25	4.48	275 / 1,100 / 2,200	4.61	412 / 1,100 / 2,200
821 916	6.25	6.50	5.75	2 × 20 / 414 / 2,200 / 2,200	5.95	275 / 375 / 2,200 / 2,200

Accessories/spare parts

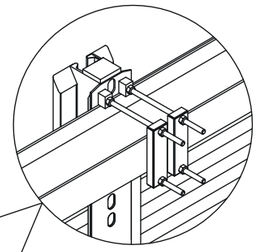
Art. no.	Short description	l [m]	d [m]	G [kg]
862 200	Connector			5.5
862 100	Connector bolts	0.11	0.035	1.0

l	Length	G	Weight
l_M	Module length	G / VP	Weight / shoring panel
l_c	Pipe culvert length	e_h	Admissible soil pressure
t_{pl}	Panel thickness	b_c	Clear width
d	Diameter	l_{pl}	Panel length
A	Surface		

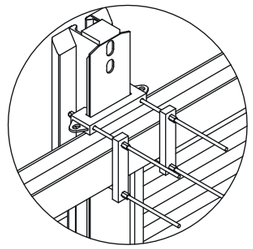
E+S Outside waler attachment

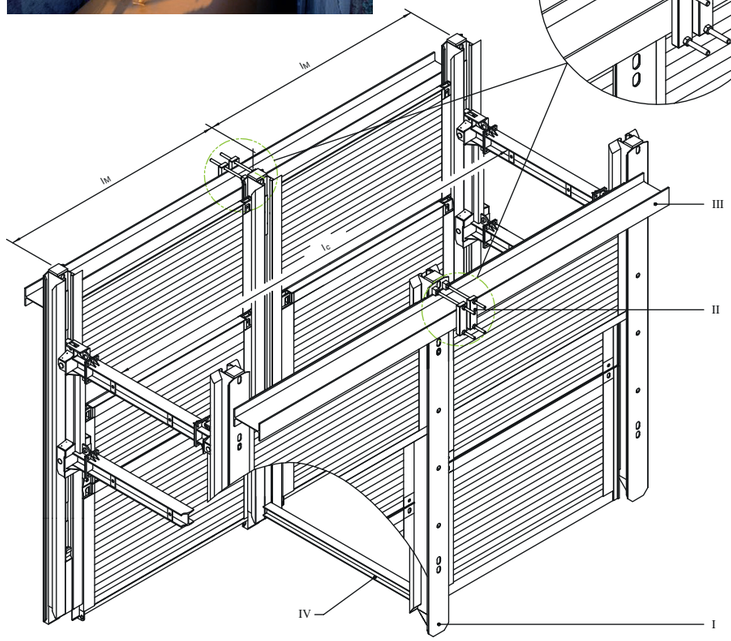


A: M36 outside waler attachment
Fixed position



B: GEWI outside waler attachment
Vertically adjustable position





I	Linear shoring support	l_M	Module length	A	M 36 outside waler attachment, fixed position, for linear shoring
II	Outside waler attachment	l_c	Pipe culvert length	B	GEWI outside waler attachment for linear and parallel shoring, vertically adjustable position, for linear shoring
III	Waler support	G	Weight	DGLV	Double slide rail, linear shoring
IV	Bottom end support			EGLV	Single slide rail, linear shoring

M36 outer waler attachment

Art. no.	Short description	G [kg]
855 836	M36 waler attachment for HEB brackets up to HEB 600	80.0
855 846	M36 waler attachment for HEB brackets from HEB 650 to HEB 800	86.5

GEWI outside waler attachment

Art. no.	Short description	G [kg]
855 838	GEWI waler attachment for HEB brackets up to HEB 600/DGLV	162.0
855 841	GEWI waler attachment for HEB brackets up to HEB 1000/DGLV	169.0
855 839	GEWI waler attachment for linear shoring support/DGLV	195.0
855 881	GEWI waler attachment for HEB brackets up to HEB 600/EGLV	170.0
855 882	GEWI waler attachment for HEB brackets up to HEB 1000/EGLV	175.0
855 880	GEWI waler attachment for linear shoring support/EGLV	200.0

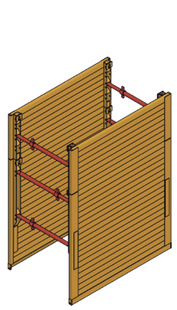
COST-EFFECTIVE LAYING OF CABLES AND PIPES: E+S AND KRINGS TRENCH BOXES

The E+S trench boxes of the Lightweight (LBR), Medium, and Magnum classes make it possible to lay pipes with unusually large diametres or lengths particularly cost-effectively. Outstanding performance factors are, for example, shoring heights of up to 6 metres, possible trench widths of over 5 metres, and vertical pipe clearances of up to 2.46 metres. The strong strut systems can handle large widths and are compatible with all three box systems.

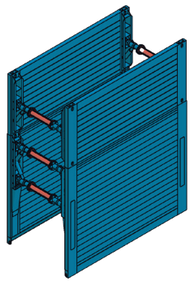
Our edge-supported shoring systems from KRINGS are particularly versatile. They take up little space during storage and transport and can be very quickly and simply assembled at the construction site.

System overview – Box systems

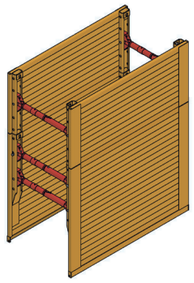
Recommended shoring depth: max. 3.50 m



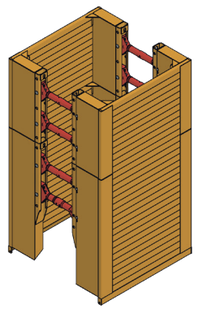
KRINGS KVL
Rec. shoring depth: max. 3.50 m
Rec.: mobile excavator 9 – 13 t
Page 156



E+S LBR
Rec. shoring depth: max. 3.50 m
Rec.: mobile or crawler excavator
Base box only: 12 – 18 t
With top unit: 18 – 30 t
Page 158

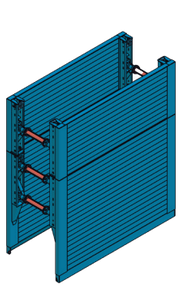


KRINGS KS 60
Rec. shoring depth: max. 3.50 m
Rec.: mobile or crawler excavator
Base box only: 12 – 18 t
With top unit: 18 – 30 t
Page 160

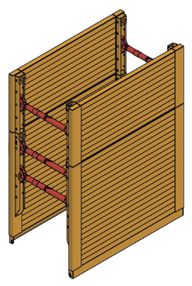


KRINGS KS 60 Manhole
Rec. shoring depth: max. 3.50 m
Rec.: mobile or crawler excavator
Base box only: 12 – 18 t
With top unit: 18 – 30 t
Page 162

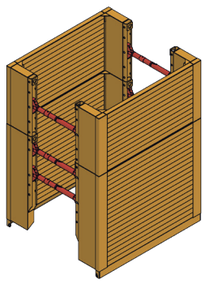
Recommended shoring depth: max. 4.00 m



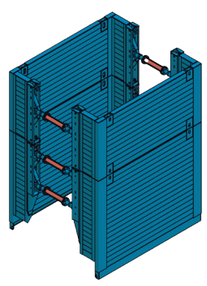
E+S Medium
Rec. shoring depth: max. 5.00 m
Rec.: mobile or crawler excavator
Base box only: 12 – 18 t
With top unit: 18 – 30 t
Page 184



KRINGS KS 100
Rec. shoring depth: max. 4.00 m
Rec.: mobile or crawler excavator
Base box only: 12 – 18 t
With top unit: 18 – 30 t
Page 166

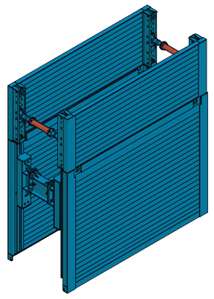


KRINGS KS 100 Manhole
Rec. shoring depth: max. 4.00 m
Rec.: mobile or crawler excavator
18 – 30 t
Page 168

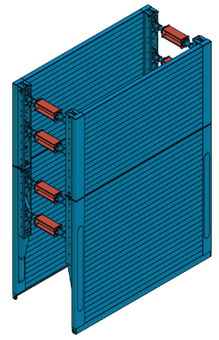


E+S Manhole
Rec. shoring depth: max. 4.00 m
Rec.: mobile or crawler excavator
18 – 30 t
Page 170

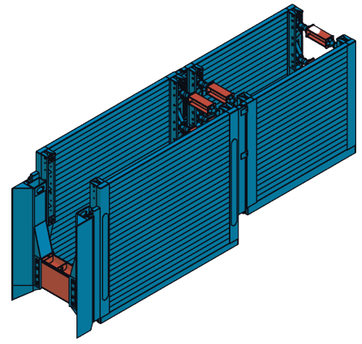
Recommended shoring depth: max. 6.00 m



E+S Linearbox
Rec. shoring depth: max. 5.00 m
Rec.: mobile or crawler excavator
18 – 30 t
Page 172

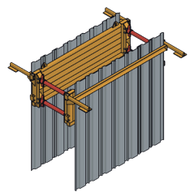


E+S Magnum
Rec. shoring depth: max. 6.00 m
Rec.: mobile or crawler excavator
18 – 30 t
Page 174

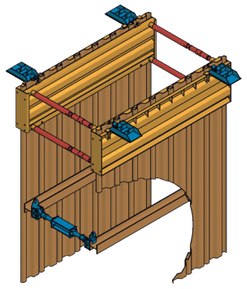


E+S Dragbox
Rec. shoring depth: max. 5.00 m
Rec.: crawler excavator 30 – 50 t
Page 178

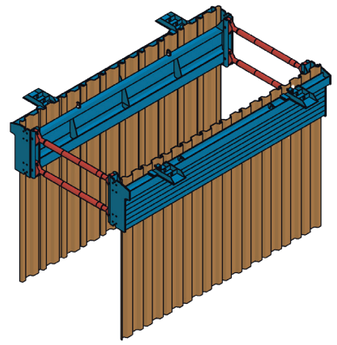
Recommended shoring depth: variable



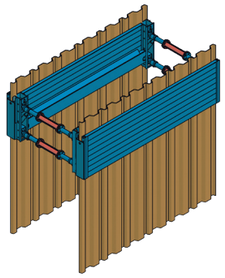
KRINGS BLU 2.41 m
Rec. shoring depth:
max. 2.40 m
Rec.: mobile excavator 9 – 13 t
Page 180



KRINGS DKU 2.27 m/3.00 m/3.81 m
Rec. shoring depth: variable
Rec.: mobile or crawler excavator
12 – 18 t
Page 182

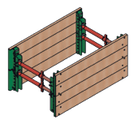


KRINGS DKU 4.55 m/5.80 m
Rec. shoring depth: variable
Rec.: mobile or crawler excavator
18 – 30 t
Page 184

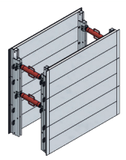


E+S DKE 3.63 m/4.03 m
Rec. shoring depth: variable
Rec.: mobile or crawler excavator
12 – 18 t
Page 186

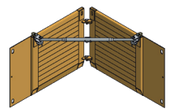
Recommended installation depth: max. 3.00 m



KRINGS Flex-shoring
Rec. shoring depth: max. 2.00 m
Rec.: mini excavator 3 – 9 t
Page 187



Alu-lightweight shoring
Rec. shoring depth: max. 3.00 m
Rec.: mini excavator 3 – 9 t
Page 188



KRINGS Corner shoring
Rec. shoring depth: max. 2.35 m
Rec.: mobile excavator 9 – 13 t
Page 192

KRINGS KVL lightweight shoring



KVL

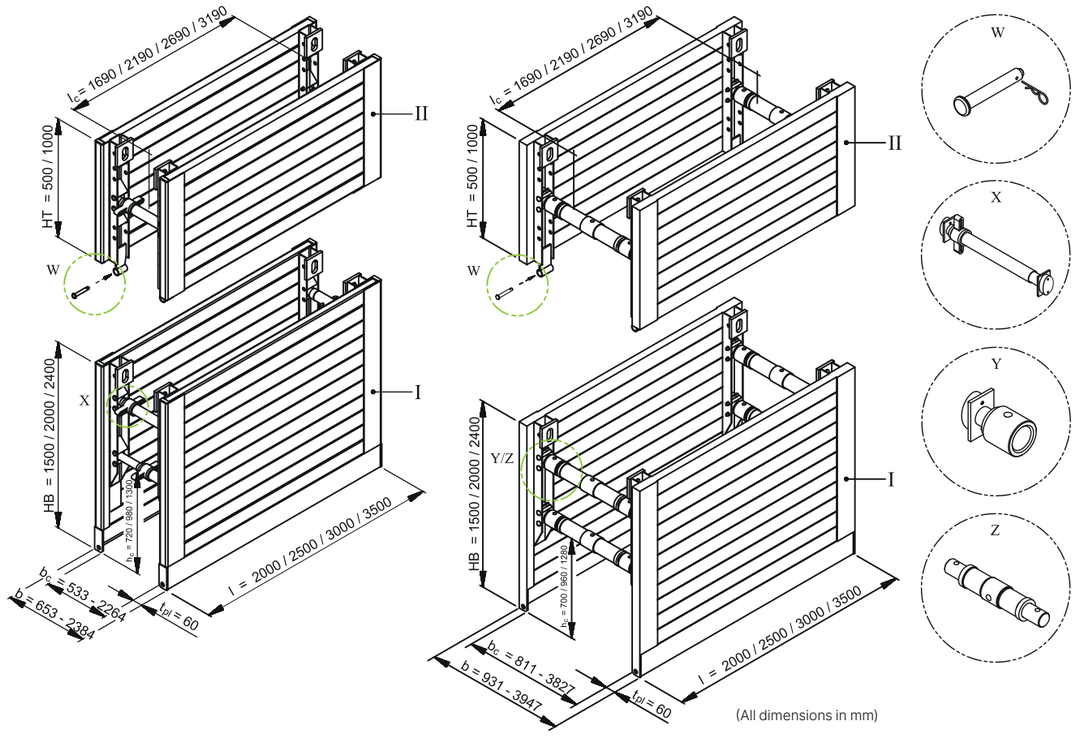
Advantages
- Suitable for use in urban centers
- Lightweight design
- Ideal for handling with smaller wheel excavators

General data

Shoring length	2.00 m–3.50 m
Base unit height	1.50 m / 2.00 m / 2.40 m
Top unit height	0.50 m / 1.00 m
Pipe culvert height	0.72 m / 0.97 m / 1.30 m
Base box weight	527 kg–1,123 kg
Shoring width	variable
Rec.: mobile excavator	9–13 t

KVL spindle 70 × ...

KVL with spindle 98 × ... and adapter



(All dimensions in mm)

I	Base unit	l	Length	h_c	Pipe culvert height	X	KVL spindle
II	Top unit	l_c	Pipe culvert length	t_{pl}	Panel thickness	Y	Adapter
HB	Base unit height	b	Shoring/trench width	W	Bolt	Z	Spindle 98 × ...
HT	Top unit height	b_c	Clear width				

Base units

Art. no.	l [m]	h [m]	t_{pl} [m]	h_c [m]	l_c [m]	G / VP [kg]	G / Box [kg]	A [m²]	e_h [kN/m²]
111 030	2.00	1.50	0.06	0.72	1.69	235.0	527.0 *	3.00	57.9
111 050	2.50	1.50	0.06	0.72	2.19	278.0	613.0 *	3.75	38.2
111 080	3.00	1.50	0.06	0.72	2.69	310.0	677.0 *	4.50	25.5
111085	3.50	1.50	0.06	0.72	3.19	349.0	755.0	5.25	18.3
111 040	2.00	2.00	0.06	0.98	1.69	295.0	647.0 *	4.00	32.2
111 060	2.50	2.00	0.06	0.98	2.19	350.0	757.0 *	5.00	25.7
111 090	3.00	2.00	0.06	0.98	2.69	400.0	857.0 *	6.00	21.4
111 092	3.50	2.00	0.06	0.98	3.19	465.0	987.0 *	7.00	18.3
111098	2.00	2.40	0.06	1.30	1.69	351.0	759.0	4.80	32.4
111088	2.50	2.40	0.06	1.30	2.19	407.0	871.0	6.00	25.9
111 091	3.00	2.40	0.06	1.30	2.69	470.0	997.0 *	7.20	21.6
111 093	3.50	2.40	0.06	1.30	3.19	533.0	1,123.0 *	8.40	18.3

Other sizes or custom-made products on request

* With spindle 70 × 650

Top units

Art. no.	l [m]	h [m]	t_{pl} [m]	h_c [m]	l_c [m]	G / VP [kg]	G / Box [kg]	A [m²]	e_h [kN/m²]
111 130	2.00	0.50	0.06	-	1.69	92.0	214.0 *	1.00	63.5
111 150	2.50	0.50	0.06	-	2.19	105.0	240.0 *	1.25	38.2
111 170	3.00	0.50	0.06	-	2.69	130.0	290.0 *	1.50	25.5
111 172	3.50	0.50	0.06	-	3.19	150.0	330.4 *	1.75	18.3
111 120	2.00	1.00	0.06	-	1.69	165.0	360.0 *	2.00	63.5
111 140	2.50	1.00	0.06	-	2.19	195.0	420.0 *	2.50	38.2
111 160	3.00	1.00	0.06	-	2.69	217.0	464.0 *	3.00	25.5
111 174	3.50	1.00	0.06	-	3.19	245.0	520.4 *	3.50	18.3

Other sizes or custom-made products on request

* With spindle 70 × 650

Shoring widths for spindle 70 × ...

Art. no.	Short description	Lift [m]	b_c [m]	b [m]	G [kg]
118 060	Spindle 70 × 650	0.09	0.53–0.63	0.65–0.75	12.2
118 070	Spindle 70 × 740	0.18	0.62–0.81	0.74–0.93	13.4
118 090	Spindle 70 × 920	0.36	0.81–1.17	0.93–1.29	15.8
118 020	Spindle 70 × 1280	0.73	1.16–1.89	1.28–2.01	20.5
118 100	Spindle 70 × 1470	0.92	1.35–2.26	1.47–2.38	24.0

Shoring widths for spindle 98 × 550 with adapter

Art. no. extension bar	l [m]	b_c [m]	b [m]
138 280 (spindle 98 × 550)	w/o	0.81–1.01	0.93–1.13
139 430	0.30	1.11–1.31	1.23–1.43
139 445	0.50	1.31–1.51	1.43–1.63
139 385	1.00	1.81–2.01	1.93–2.13
139 400	1.50	2.31–2.51	2.43–2.63
139 420	2.00	2.81–3.01	2.93–3.13
139 425	2.50	3.31–3.51	3.43–3.63

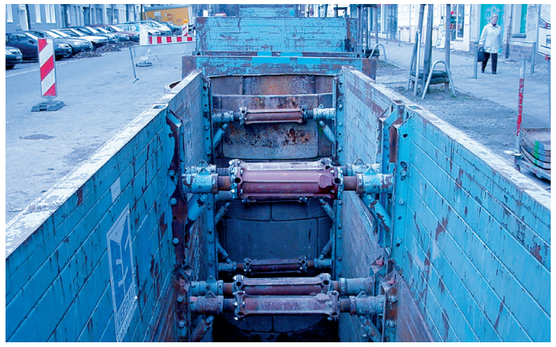
Shoring widths for spindle 98 × 700 with adapter

Art. no. extension bar	l [m]	b_c [m]	b [m]
138 290 (spindle 98 × 700)	w/o	0.99–1.33	1.11–1.45
139 430	0.30	1.29–1.63	1.41–1.75
139 445	0.50	1.49–1.83	1.61–1.95
139 385	1.00	1.99–2.33	2.11–2.45
139 400	1.50	2.49–2.83	2.61–2.95
139 420	2.00	2.99–3.33	3.11–3.45
139 425	2.50	3.49–3.83	3.61–3.95

l	Length	b_c	Clear width	t_{pl}	Panel thickness	G / VP	Weight / shoring panel
l_c	Pipe culvert length	h	Panel height	A	Surface	G / Box	Weight / shoring box
b	Trench width	h_c	Pipe culvert height	G	Weight	e_h	Admissible soil pressure

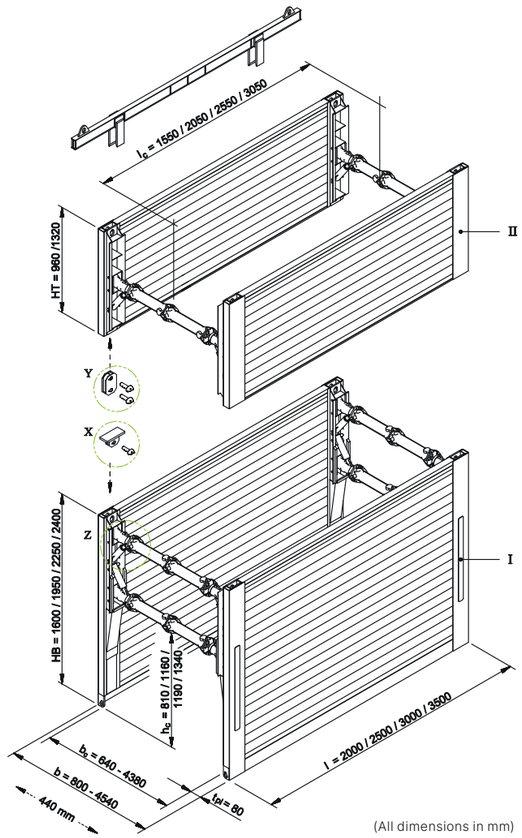
Accessories and spare parts, see page 193 – 195

E+S LBR



LBR Lightweight shoring

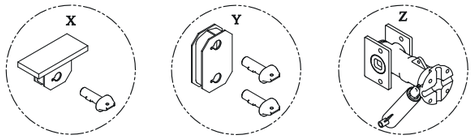
Advantages
- Highly cost-effective solution for urban civil engineering projects
- Can be either dropped in or lowered
- Highest safety standard
- Strut system compatible with Medium and Magnum shoring
- Easy handling



(All dimensions in mm)

General data

Shoring length		2.00 m–3.50 m
Base unit height		1.60 m / 1.95 m / 2.25 m / 2.40 m
Top unit height		0.96 m / 1.32 m
Pipe culvert height		0.81 m / 1.16 m / 1.19 m / 1.34 m
Base box weight		746 kg–1,540 kg
Shoring width		variable
Rec.: mobile or crawler excavator	Base box only: With top unit:	12–18 t 18–30 t



I	Base unit
II	Top unit
HB	Base unit height
HT	Top unit height
l	Length
l_c	Pipe culvert length
b	Shoring/trench width
b_c	Clear width
h_c	Pipe culvert height
t_{pl}	Panel thickness
X	Pressure plate with bolts
Y	Connector with bolts
Z	Strut with bearing plate and shock absorber

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 [m²]	e_h [kN/m²]
801 455	2.00	0.08	0.81	1.55	373.0	746.0	3.20	79.5
801 505	2.50	0.08	0.81	2.05	420.0	840.0	4.00	61.5
801 568	3.00	0.08	0.81	2.55	502.0	1,004.0	4.80	41.0
801 578	3.50	0.08	0.81	3.05	538.0	1,076.0	5.60	29.3

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 [m²]	e_h [kN/m²]
801 475	2.00	0.08	1.16	1.55	467.0	934.0	3.90	39.8
801 525	2.50	0.08	1.16	2.05	478.0	956.0	4.88	31.9
801 565	3.00	0.08	1.16	2.55	588.0	1,176.0	5.85	26.6
801 575	3.50	0.08	1.16	3.05	618.0	1,236.0	6.83	22.8

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 [m²]	e_h [kN/m²]
801 015	2.00	0.08	1.19	1.55	515.0	1,030.0	4.50	46.2
801 055	2.50	0.08	1.19	2.05	595.0	1,190.0	5.63	37.0
801 105	3.00	0.08	1.19	2.55	670.0	1,340.0	6.75	30.8
801 108	3.50	0.08	1.19	3.05	740.0	1,480.0	7.88	26.4

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 [m²]	e_h [kN/m²]
801 210	2.00	0.08	1.34	1.55	550.0	1,100.0	4.80	54.7
801 215	2.50	0.08	1.34	2.05	655.0	1,310.0	6.00	43.8
801 220	3.00	0.08	1.34	2.55	675.0	1,350.0	7.20	36.5
801 110	3.50	0.08	1.34	3.05	770.0	1,540.0	8.40	29.4

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 [m²]	e_h [kN/m²]
801 595	2.00	0.08	-	1.55	265.0	530.0	1.92	79.5
801 625	2.50	0.08	-	2.05	317.0	634.0	2.40	61.5
801 665	3.00	0.08	-	2.55	357.0	714.0	2.88	41.0
801 675	3.50	0.08	-	3.05	380.0	760.0	3.36	29.3

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]	e_h [kN/m²]
801 628	2.00	0.08	-	1.55	341.0	682.0	2.64	79.5
801 630	2.50	0.08	-	2.05	391.0	782.0	3.30	61.5
801 635	3.00	0.08	-	2.55	408.0	816.0	3.96	41.0
801 680	3.50	0.08	-	3.05	430.0	860.0	4.62	29.3

Extension bars

Art. no.	Short description	l [m]	G [kg]
850 091	Cast extension bar	0.250	11.2
850 100	Cast extension bar	0.550	18.7
850 112	HEB 180 extension bar	0.275	28.0
850 110	HEB 180 extension bar	0.550	43.0
850 124	HEB 180 extension bar	1.100	70.0
850 132	HEB 180 extension bar	1.650	100.0
850 135	HEB 180 extension bar	2.200	130.0

Shoring width (for cast pipe extension bars, l = 0.55 m)

Extension bars	l [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

Dimensions "from–to" depending on spindle stroke.
Different trench widths possible by combination of different extension bar lengths l = 0.25 m and l = 0.55 m.

l	Length	b_c	Clear width	A	Surface	G / Box	Weight / shoring box
l_c	Pipe culvert length	h_c	Pipe culvert height	G	Weight	e_h	Admissible soil pressure
b	Trench width	t_{pl}	Panel thickness	G / VP	Weight / shoring panel		

Other sizes or custom-made products on request

Accessories and spare parts, see page 193 – 195

KRINGS KS 60



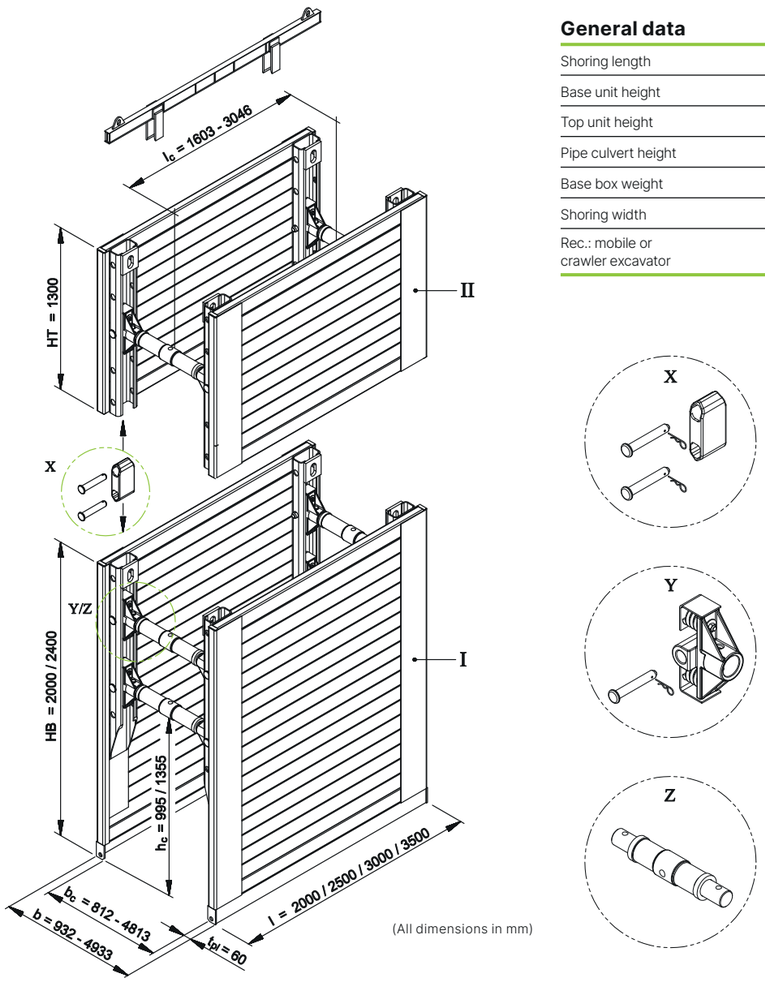
KS 60

Advantages

- Suitable for open terrain and medium-scale sewer construction in urban centers
- Shoring struts are compatible with KS 100 boxes
- Can be installed and removed using smaller excavators
- Low weight, high strength

General data

Shoring length		2.00 m–3.50 m
Base unit height		2.00 m / 2.40 m
Top unit height		1.30 m
Pipe culvert height		1.00 m / 1.36 m
Base box weight		980 kg–1,580 kg
Shoring width		variable
Rec.: mobile or crawler excavator	Base box only: With top unit:	12–18 t 18–30 t



(All dimensions in mm)

I	Base unit	l	Length	h_c	Pipe culvert height	Z	Spindle 98 × …
II	Top unit	l_c	Pipe culvert length	t_{pl}	Panel thickness		
HB	Base unit height	b	Shoring/trench width	X	Connector with bolts		
HT	Top unit height	b_c	Clear width	Y	Spring socket with bolts		

Base units

Art. no.	l [m]	h [m]	t_{pl} [m]	h_c [m]	l_c [m]	G / VP [kg]	G / Box [kg]	A [m²]	e_h [kN/m²]
131 030	2.00	2.00	0.06	1.00	1.61	350.0	980.0 *	4.00	59.5
131 035	2.50	2.00	0.06	1.00	2.11	420.0	1,120.0 *	5.00	39.7
131 060	3.00	2.00	0.06	1.00	2.61	460.0	1,200.0 *	6.00	26.3
131 080	3.50	2.00	0.06	1.00	3.05	560.0	1,400.0 *	7.00	26.6
131 040	2.00	2.40	0.06	1.36	1.61	394.0	1,068.0 *	4.80	39.1
131 050	2.50	2.40	0.06	1.36	2.11	460.0	1,200.0 *	6.00	31.3
131 070	3.00	2.40	0.06	1.36	2.61	515.0	1,310.0 *	7.20	26.1
131 090	3.50	2.40	0.06	1.36	3.05	650.0	1,580.0 *	8.40	22.3

Other sizes or custom-made products on request

* With spindle 98 × 700

Top units

Art. no.	l [m]	h [m]	t_{pl} [m]	h_c [m]	l_c [m]	G / VP [kg]	G / Box [kg]	A [m²]	e_h [kN/m²]
131 120	2.00	1.30	0.06	-	1.61	260.0	702.0 *	2.60	66.7
131 130	2.50	1.30	0.06	-	2.11	295.0	772.0 *	3.25	39.7
131 150	3.00	1.30	0.06	-	2.61	330.0	842.0 *	3.90	26.3
131 170	3.50	1.30	0.06	-	3.05	395.0	972.0 *	4.55	26.6

Other sizes or custom-made products on request

* With spindle 98 × 700

Shoring widths for spindle 98 × 550

Art. no. extension bar	l [m]	b_c [m]	b [m]
138 280 (spindle 98 × 550)	w/o	0.81–1.01	0.93–1.13
139 430	0.30	1.11–1.31	1.23–1.43
139 445	0.50	1.31–1.51	1.43–1.63
139 385	1.00	1.81–2.01	1.93–2.13
139 400	1.50	2.31–2.51	2.43–2.63
139 420	2.00	2.81–3.01	2.93–3.13
139 425	2.50	3.31–3.51	3.43–3.63

Shoring widths for spindle 98 × 700

Art. no. extension bar	l [m]	b_c [m]	b [m]
138 290 (spindle 98 × 700)	w/o	0.99–1.33	1.11–1.45
139 430	0.30	1.29–1.63	1.41–1.75
139 445	0.50	1.49–1.83	1.61–1.95
139 385	1.00	1.99–2.33	2.11–2.45
139 400	1.50	2.49–2.83	2.61–2.95
139 420	2.00	2.99–3.33	3.11–3.45
139 425	2.50	3.49–3.83	3.61–3.95

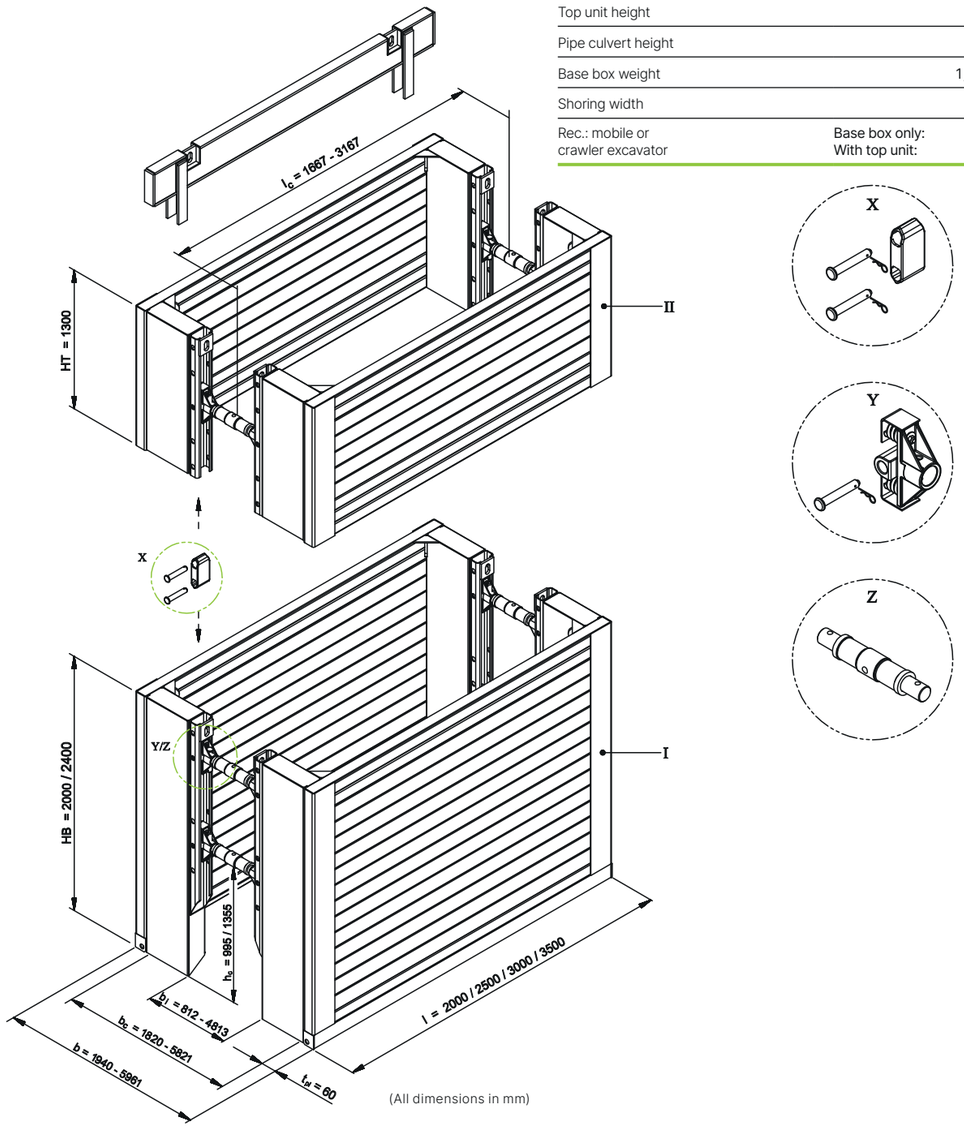
l	Length	b_c	Clear width	t_{pl}	Panel thickness	G / VP	Weight / shoring panel
l_c	Pipe culvert length	h	Panel height	A	Surface	G / Box	Weight / shoring box
b	Trench width	h_c	Pipe culvert height	G	Weight	e_h	Admissible soil pressure

Accessories and spare parts, see page 193 – 195

KRINGS KS 60 Manhole

General data

Shoring length		2.00 m–3.50 m
Base unit height		2.00 m / 2.40 m
Top unit height		1.30 m
Pipe culvert height		1.00 m / 1.36 m
Base box weight		1,380 kg–2,050 kg
Shoring width		variable
Rec.: mobile or crawler excavator	Base box only: With top unit:	12–18 t 18–30 t



(All dimensions in mm)

I Base unit
II Top unit
HB Base unit height
HT Top unit height
l Length
l_c Pipe culvert length
b Shoring/trench width
b_c Clear width
b_i Clear passage width
h_c Pipe culvert height
t_{pl} Panel thickness
X Connector with bolts
Y Spring socket with bolts
Z Spindle 98 × ...

Base units

Art. no.	l [m]	h [m]	t_{pl} [m]	h_c [m]	l_c [m]	G / VP [kg]	G / Box [kg]	A [m²]	e_h [kN/m²]
135 208	2.00	2.00	0.06	1.00	1.61	550.0	1,380.0 *	4.00	59.5
135 209	2.50	2.00	0.06	1.00	2.11	605.0	1,490.0 *	5.00	39.7
135 211	3.00	2.00	0.06	1.00	2.61	660.0	1,600.0 *	6.00	26.3
135 212	3.50	2.00	0.06	1.00	3.05	770.0	1,820.0 *	7.00	26.6
135 206	2.00	2.40	0.06	1.36	1.61	631.0	1,542.0 *	4.80	39.1
135 205	2.50	2.40	0.06	1.36	2.11	693.0	1,666.0 *	6.00	31.3
135 200	3.00	2.40	0.06	1.36	2.61	755.0	1,790.0 *	7.20	26.1
135 199	3.50	2.40	0.06	1.36	3.05	885.0	2,050.0 *	8.40	22.3

Other sizes or custom-made products on request

* With spindle 98 × 700

Top units

Art. no.	l [m]	h [m]	t_{pl} [m]	h_c [m]	l_c [m]	G / VP [kg]	G / Box [kg]	A [m²]	e_h [kN/m²]
135 285	2.00	1.30	0.06	-	1.61	430.0	1,043.0 *	2.60	66.7
135 286	2.50	1.30	0.06	-	2.11	470.0	1,122.0 *	3.25	39.7
135 290	3.00	1.30	0.06	-	2.61	505.0	1,192.0 *	3.90	26.3
135 291	3.50	1.30	0.06	-	3.05	580.0	1,342.0 *	4.55	26.6

Other sizes or custom-made products on request

* With spindle 98 × 700

Shoring widths for spindle 98 × 550

Art. no. extension bar	l [m]	b_i [m]	b_c [m]	b [m]
138 280 (spindle 98 × 550)	w/o	0.81–1.01	1.82–2.02	1.94–2.14
139 430	0.30	1.11–1.31	2.12–2.32	2.24–2.44
139 445	0.50	1.31–1.51	2.32–2.52	2.44–2.64
139 385	1.00	1.81–2.01	2.82–3.02	2.94–3.14
139 400	1.50	2.31–2.51	3.32–3.52	3.44–3.64
139 420	2.00	2.81–3.01	3.82–4.02	3.94–4.14
139 425	2.50	3.31–3.51	4.32–4.52	4.44–4.64

Shoring widths for spindle 98 × 700

Art. no. extension bar	l [m]	b_i [m]	b_c [m]	b [m]
138 290 (spindle 98 × 700)	w/o	0.99–1.33	2.00–2.34	2.12–2.46
139 430	0.30	1.29–1.63	2.30–2.64	2.42–2.76
139 445	0.50	1.49–1.83	2.50–2.84	2.62–2.96
139 385	1.00	1.99–2.33	3.00–3.34	3.12–3.46
139 400	1.50	2.49–2.83	3.50–3.84	3.62–3.96
139 420	2.00	2.99–3.33	4.00–4.34	4.12–4.46
139 425	2.50	3.49–3.83	4.50–4.84	4.62–4.96

l Length
l_c Pipe culvert length
b Trench width
b_c Clear width
b_i Clear passage width
h Panel height
h_c Pipe culvert height
t_{pl} Panel thickness
A Surface
G Weight
G / VP Weight / shoring panel
G / Box Weight / shoring box
e_h Admissible soil pressure

Accessories and spare parts, see page 193 – 195

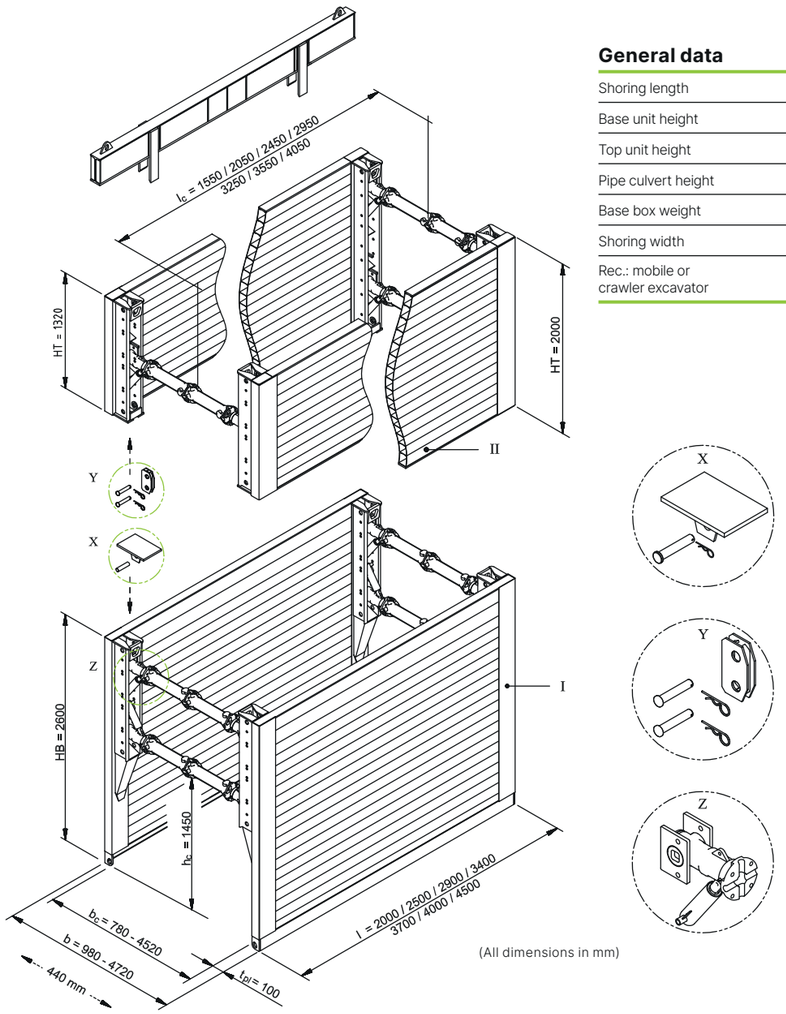
E+S Medium shoring



Medium shoring

Advantages

- Stepless adjustability for optimum adaptation to the trench width
- Strut system compatible with Lightweight and Magnum shoring
- Top panels compatible with Magnum shoring
- Easy handling



(All dimensions in mm)

General data

Shoring length		2.00 m–4.50 m
Base unit height		2.60 m
Top unit height		1.32 m / 2.00 m
Pipe culvert height		1.45 m
Base box weight		1,460 kg–2,780 kg
Shoring width		variable
Rec.: mobile or crawler excavator	Base box only: With top unit:	12–18 t 18–30 t

I	Base unit	l	Length	h_c	Pipe culvert height
II	Top unit	l_c	Pipe culvert length	t_{pl}	Panel thickness
HB	Base unit height	b	Shoring/trench width	X	Pressure plate with bolts
HT	Top unit height	b_c	Clear width	Y	Connector with bolts

Z Strut with bearing plate and shock absorber

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]	e_h [kN/m²]
800 010	2.00	0.10	1.45	1.55	730.0	1,460.0	5.20	70.0
800 100	2.50	0.10	1.45	2.05	825.0	1,650.0	6.50	60.0
800 150	2.90	0.10	1.45	2.45	908.0	1,816.0	7.54	55.0
800 200	3.40	0.10	1.45	2.95	1,028.0	2,056.0	8.84	50.8
800 300	3.70	0.10	1.45	3.25	1,118.0	2,236.0	9.62	42.3
800 400	4.00	0.10	1.45	3.55	1,257.0	2,514.0	10.40	44.0
800 440	4.50	0.10	1.45	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]	e_h [kN/m²]
800 550	2.00	0.10	-	1.55	463.0	926.0	2.64	70.0
800 600	2.50	0.10	-	2.05	531.0	1,062.0	3.30	60.0
800 650	2.90	0.10	-	2.45	578.0	1,156.0	3.83	55.0
800 700	3.40	0.10	-	2.95	658.0	1,316.0	4.49	50.8
800 800	3.70	0.10	-	3.25	692.0	1,384.0	4.88	42.3
800 900	4.00	0.10	-	3.55	775.0	1,550.0	5.28	44.0
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]	e_h [kN/m²]
802 680	2.00	0.10	-	1.55	697.0	1,394.0	4.00	70.0
802 690	2.50	0.10	-	2.05	785.0	1,570.0	5.00	60.0
802 550	2.90	0.10	-	2.45	840.0	1,680.0	5.80	55.0
802 700	3.40	0.10	-	2.95	930.0	1,860.0	6.80	50.8
802 750	3.70	0.10	-	3.25	990.0	1,980.0	7.40	42.3
802 751	4.00	0.10	-	3.55	1,085.0	2,170.0	8.00	44.0
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	Cast extension bar	0.250	11.2
850 100	Cast extension bar	0.550	18.7
850 112	HEB 180 extension bar	0.275	28.0
850 110	HEB 180 extension bar	0.550	43.0
850 124	HEB 180 extension bar	1.100	70.0
850 132	HEB 180 extension bar	1.650	100.0
850 135	HEB 180 extension bar	2.200	130.0

Shoring widths (for extension bars HEB 180)

Extension bar length [m]	b_c [m]	b [m]
0.000	0.78–1.22	0.98–1.42
0.275	1.06–1.50	1.26–1.70
0.550	1.33–1.77	1.53–1.97
1.100	1.88–2.32	2.08–2.52
1.650	2.43–2.87	2.63–3.07
2.200	2.98–3.42	3.18–3.62
2.200 + 1.100	4.08–4.52	4.28–4.72

Dimensions “from–to” depending on spindle stroke. Other trench widths possible by combination of different extension bar lengths

Shoring widths (for cast pipe extension bars, l = 0.55 m)

Extension bars	l [m]	b_c [m]	b [m]
0	0.00	0.78–1.22	0.98–1.42
1	0.55	1.33–1.77	1.53–1.97
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

Dimensions “from–to” depending on spindle stroke
Other trench widths possible by combination of the two different intermediate trench lengths l = 0.25 m and l = 0.55 m

l	Length	A	Surface
l_c	Pipe culvert length	G	Weight
b	Trench width	G / VP	Weight / shoring panel
b_c	Clear width	G / Box	Weight / shoring box
h_c	Pipe culvert height	e_h	Admissible soil pressure
t_{pl}	Panel thickness		

Other sizes or custom-made products on request.

Accessories and spare parts, see page 193 – 195

KRINGS KS 100



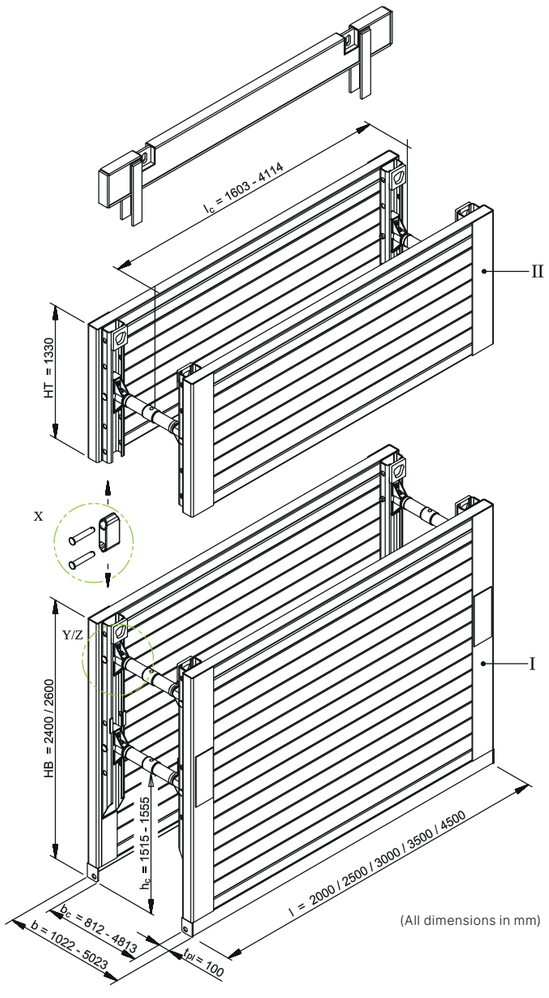
KS 100

Advantages

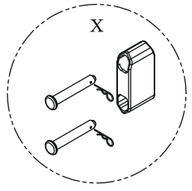
- Most widely used shoring box in the world
- No negative environmental impact from pile-driving and vibration noise
- Shoring struts are compatible with KS 60 boxes

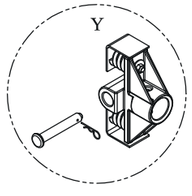
General data

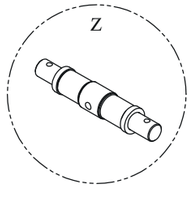
Shoring length		2.00 m–4.50 m
Base unit height		2.40 m / 2.60 m
Top unit height		1.30 m
Pipe culvert height		1.52 m / 1.56 m
Base box weight		1,414 kg–2,730 kg
Shoring width		variable
Rec.: mobile or crawler excavator	Base box only: With top unit:	12–18 t 18–30 t



(All dimensions in mm)







I	Base unit	l	Length	h_c	Pipe culvert height	Z	Spindle 98 × …
II	Top unit	l_c	Pipe culvert length	t_{pl}	Panel thickness		
HB	Base unit height	b	Shoring/trench width	X	Connector with bolts		
HT	Top unit height	b_c	Clear width	Y	Spring socket with bolts		

Base units

Art. no.	l [m]	h [m]	t_{pl} [m]	h_c [m]	l_c [m]	G / VP [kg]	G / Box [kg]	A [m²]	e_h [kN/m²]
132 030	2.00	2.40	0.10	1.52	1.61	567.0	1,414.0 *	4.80	60.0
132 050	2.50	2.40	0.10	1.52	2.11	675.0	1,630.0 *	6.00	57.0
132 070	3.00	2.40	0.10	1.52	2.61	761.0	1,802.0 *	7.20	48.0
132 090	3.50	2.40	0.10	1.52	3.11	830.0	1,940.0 *	8.40	44.0
132 140	4.00	2.40	0.10	1.52	3.61	1,000.0	2,280.0 *	9.60	40.0
132 156	4.50	2.40	0.10	1.52	4.11	1,120.0	2,520.0 *	10.80	31.8
132 040	2.00	2.60	0.10	1.56	1.61	612.0	1,504.0 *	5.20	55.0
132 060	2.50	2.60	0.10	1.56	2.11	711.0	1,702.0 *	6.50	52.0
132 080	3.00	2.60	0.10	1.56	2.61	813.0	1,906.0 *	7.80	44.0
132 100	3.50	2.60	0.10	1.56	3.11	905.0	2,090.0 *	9.10	44.0
132 150	4.00	2.60	0.10	1.56	3.61	1,090.0	2,460.0 *	10.40	40.0
132 121	4.50	2.60	0.10	1.56	4.11	1,225.0	2,730.0 *	11.70	31.8

Other sizes or custom-made products on request

* With spindle 98 × 700

Top units

Art. no.	l [m]	h [m]	t_{pl} [m]	h_c [m]	l_c [m]	G / VP [kg]	G / Box [kg]	A [m²]	e_h [kN/m²]
132 190	2.00	1.30	0.10	-	1.61	370.0	922.0 *	2.60	60.0
132 200	2.50	1.30	0.10	-	2.11	430.0	1,042.0 *	3.25	57.0
132 210	3.00	1.30	0.10	-	2.61	486.0	1,154.0 *	3.90	48.0
132 220	3.50	1.30	0.10	-	3.11	570.0	1,322.0 *	4.55	44.0
132 260	4.00	1.30	0.10	-	3.61	660.0	1,502.0 *	5.20	40.0
132 261	4.50	1.30	0.10	-	4.11	730.0	1,642.0 *	5.85	31.8

Other sizes or custom-made products on request

* With spindle 98 × 700

Shoring widths for spindle 98 × 550

Art. no. extension bar	l [m]	b_c [m]	b [m]
138 280 (spindle 98 × 550)	w/o	0.81–1.01	1.02–1.22
139 430	0.30	1.11–1.31	1.32–1.52
139 445	0.50	1.31–1.51	1.52–1.72
139 385	1.00	1.81–2.01	2.02–2.22
139 400	1.50	2.31–2.51	2.52–2.72
139 420	2.00	2.81–3.01	3.02–3.22
139 425	2.50	3.31–3.51	3.52–3.72

Shoring widths for spindle 98 × 700

Art. no. extension bar	l [m]	b_c [m]	b [m]
138 290 (spindle 98 × 700)	w/o	0.99–1.33	1.20–1.54
139 430	0.30	1.29–1.63	1.50–1.84
139 445	0.50	1.49–1.83	1.70–2.04
139 385	1.00	1.99–2.33	2.20–2.54
139 400	1.50	2.49–2.83	2.70–3.04
139 420	2.00	2.99–3.33	3.20–3.54
139 425	2.50	3.49–3.83	3.70–4.04

Shoring widths for spindle 98 × 817

Extension bars	l [m]	b_c [m]	b [m]
0	0.00	0.91–1.31	1.12–1.52
1	0.50	1.41–1.81	1.62–2.02
2	1.00	1.91–2.31	2.12–2.52
3	1.50	2.41–2.81	2.62–3.02
4	2.00	2.91–3.31	3.12–3.52
5	2.50	3.41–3.81	3.62–4.02
6	3.00	3.91–4.31	4.12–4.52
7	3.50	4.41–4.81	4.62–5.02

Depending on the shoring strut, up to 7 extension bars of 500 mm each may be used.

l	Length	t_{pl}	Panel thickness
l_c	Pipe culvert length	A	Surface
b	Trench width	G	Weight
b_c	Clear width	G / VP	Weight / shoring panel
h	Height	G / Box	Weight / shoring box
h_c	Pipe culvert height	e_h	Admissible soil pressure

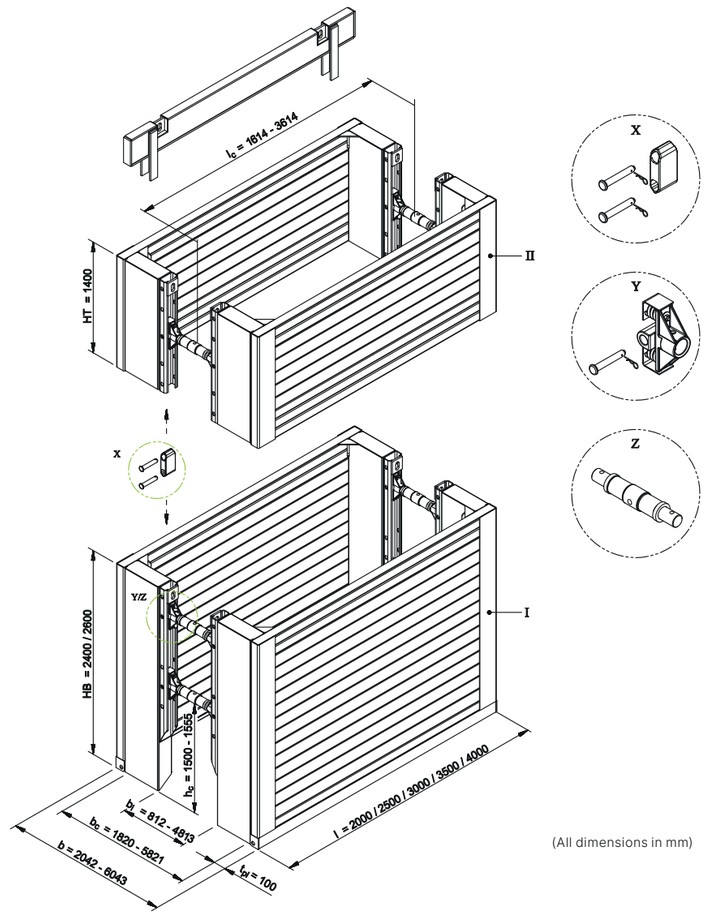
Accessories and spare parts, see page 193 – 195

KRINGS KS 100 Manhole



General data

Shoring length	2.00 m–4.00 m
Base unit height	2.40 m / 2.60 m
Top unit height	1.40 m
Pipe culvert height	1.50 m / 1.56 m
Base box weight	1,814 kg–2,960 kg
Shoring width	variable
Rec.: mobile or crawler excavator	18–30 t



(All dimensions in mm)

I	Base unit	l	Length	b_i	Clear passage width	X	Connector with bolts
II	Top unit	l_c	Pipe culvert length	h_c	Pipe culvert height	Y	Spring socket with bolts
HB	Base unit height	b	Shoring/trench width	t_{pl}	Panel thickness	Z	Spindle 98 × ...
HT	Top unit height	b_c	Clear width				

Base units

Art. no.	l [m]	h [m]	t_{pl} [m]	h_c [m]	l_c [m]	G / VP [kg]	G / Box [kg]	A [m²]	e_h [kN/m²]
135 118	2.00	2.40	0.10	1.50	1.61	767.0	1,814.0 *	4.80	60.0
135 099	2.50	2.40	0.10	1.50	2.11	860.0	2,000.0 *	6.00	57.0
135 109	3.00	2.40	0.10	1.50	2.61	961.0	2,202.0 *	7.20	48.0
135 120	3.50	2.40	0.10	1.50	3.11	1,060.0	2,400.0 *	8.40	44.0
135 121	4.00	2.40	0.10	1.50	3.61	1,225.0	2,730.0 *	9.60	40.0
135 095	2.00	2.60	0.10	1.56	1.61	840.0	1,960.0 *	5.20	55.0
135 100	2.50	2.60	0.10	1.56	2.11	950.0	2,180.0 *	6.50	52.0
135 110	3.00	2.60	0.10	1.56	2.61	1,041.0	2,362.0 *	7.80	44.0
135 130	3.50	2.60	0.10	1.56	3.11	1,160.0	2,600.0 *	9.10	44.0
135 140	4.00	2.60	0.10	1.56	3.61	1,340.0	2,960.0 *	10.40	40.0

Other sizes or custom-made products on request

* With spindle 98 × 700

Top units

Art. no.	l [m]	h [m]	t_{pl} [m]	h_c [m]	l_c [m]	G / VP [kg]	G / Box [kg]	A [m²]	e_h [kN/m²]
135 239	2.00	1.40	0.10	-	1.61	590.0	1,362.0 *	2.80	60.0
135 240	2.50	1.40	0.10	-	2.11	655.0	1,492.0 *	3.50	61.6
135 250	3.00	1.40	0.10	-	2.61	720.0	1,622.0 *	4.20	51.3
135 260	3.50	1.40	0.10	-	3.11	831.0	1,844.0 *	4.90	44.1
135 270	4.00	1.40	0.10	-	3.61	940.0	2,062.0 *	5.60	33.0

Other sizes or custom-made products on request

* With spindle 98 × 700

Shoring widths for spindle 98 × 550

Art. no. extension bar	l [m]	b_i [m]	b_c [m]	b [m]
138 280 (spindle 98 × 550)	w/o	0.81–1.01	1.82–2.02	2.04–2.24
139 430	0.30	1.11–1.31	2.12–2.32	2.34–2.54
139 445	0.50	1.31–1.51	2.32–2.52	2.54–2.74
139 385	1.00	1.81–2.01	2.82–3.02	3.04–3.24
139 400	1.50	2.31–2.51	3.32–3.52	3.54–3.74
139 420	2.00	2.81–3.01	3.82–4.02	4.04–4.24
139 425	2.50	3.31–3.51	4.32–4.52	4.54–4.74

Shoring widths for spindle 98 × 700

Art. no. extension bar	l [m]	b_i [m]	b_c [m]	b [m]
138 290 (spindle 98 × 700)	w/o	0.99–1.33	2.00–2.34	2.22–2.56
139 430	0.30	1.29–1.63	2.30–2.64	2.52–2.86
139 445	0.50	1.49–1.83	2.50–2.84	2.72–3.06
139 385	1.00	1.99–2.33	3.00–3.34	3.22–3.56
139 400	1.50	2.49–2.83	3.50–3.84	3.72–4.06
139 420	2.00	2.99–3.33	4.00–4.34	4.22–4.56
139 425	2.50	3.49–3.83	4.50–4.84	4.72–5.06

Shoring widths for spindle 98 × 817

Extension bars	l [m]	b_i [m]	b_c [m]	b [m]
0	0.00	0.91–1.31	1.92–2.32	2.14–2.54
1	0.50	1.41–1.81	2.42–2.82	2.64–3.04
2	1.00	1.91–2.31	2.92–3.32	3.14–3.54
3	1.50	2.41–2.81	3.42–3.82	3.64–4.04
4	2.00	2.91–3.31	3.92–4.32	4.14–4.54
5	2.50	3.41–3.81	4.42–4.82	4.64–5.04
6	3.00	3.91–4.31	4.92–5.32	5.14–5.54
7	3.50	4.41–4.81	5.42–5.82	5.64–6.04

Depending on the shoring strut, up to 7 extension bars of 500 mm each may be used.

l	Length	h_c	Pipe culvert height
l_c	Pipe culvert length	t_{pl}	Panel thickness
b	Trench width	A	Surface
b_i	Clear passage width	G / VP	Weight / shoring panel
b_c	Clear width	G / Box	Weight / shoring box
h	Panel height	e_h	Admissible soil pressure

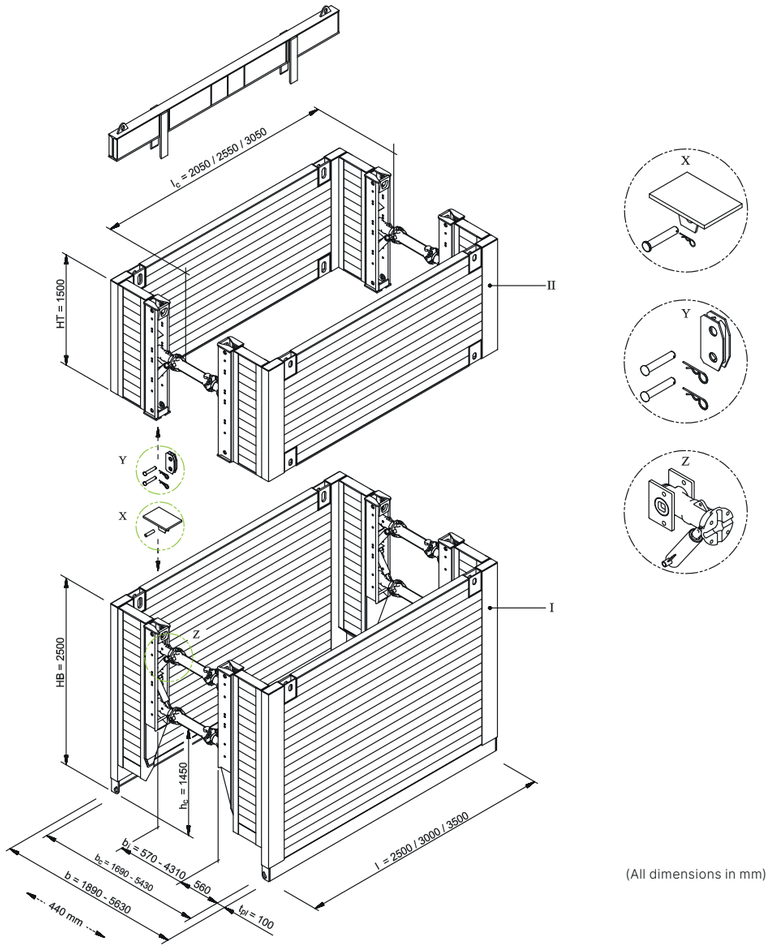
Accessories and spare parts, see page 193 – 195

E+S Manhole



General data

Shoring length	2.50 m–3.50 m
Base unit height	2.50 m
Top unit height	1.50 m
Pipe culvert height	1.45 m
Base box weight	2,260 kg–2,710 kg
Shoring width	variable
Rec.: mobile or crawler excavator	18–30 t



(All dimensions in mm)

I	Base unit	l	Length	b_i	Clear passage width	Y	Connector with bolts
II	Top unit	l_c	Pipe culvert length	h_c	Pipe culvert height	Z	Strut with bearing plate and shock absorber
HB	Base unit height	b	Shoring/trench width	t_{pl}	Panel thickness		
HT	Top unit height	b_c	Clear width	X	Pressure plate with bolts		

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]	A [m²]	e_h [kN/m²]
828 005	2.50	0.10	1.45	2.05	1,130.0	2,260.0	6.25	81.8
828 015	3.00	0.10	1.45	2.55	1,275.0	2,550.0	7.50	67.4
828 025	3.50	0.10	1.45	3.05	1,355.0	2,710.0	8.75	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]	A [m²]	e_h [kN/m²]
829 005	2.50	0.10	-	2.05	944.0	1,888.0	3.75	90.9
829 015	3.00	0.10	-	2.55	1,015.0	2,030.0	4.50	67.4
829 025	3.50	0.10	-	3.05	1,090.0	2,180.0	5.25	47.7

Extension bars

Art. no.	Short description	l [m]	G [kg]
850 091	Cast extension bar	0.250	11.2
850 100	Cast extension bar	0.550	18.7
850 112	HEB 180 extension bar	0.275	28.0
850 110	HEB 180 extension bar	0.550	43.0
850 124	HEB 180 extension bar	1.100	70.0
850 132	HEB 180 extension bar	1.650	100.0
850 135	HEB 180 extension bar	2.200	130.0

Shoring widths (for cast pipe extension bars, l = 0.55 m)

Extension bars	l [m]	b_i [m]	b_c [m]	b [m]
0	0.00	0.57–1.01	1.69–2.13	1.89–2.33
1	0.55	1.12–1.56	2.24–2.68	2.44–2.88
2	1.10	1.67–2.11	2.79–3.23	2.99–3.43
3	1.65	2.22–2.66	3.34–3.78	3.54–3.98
4	2.20	2.77–3.21	3.89–4.33	4.09–4.53
5	2.75	3.32–3.76	4.44–4.88	4.64–5.08
max. 6	3.30	3.87–4.31	4.99–5.43	5.19–5.63

Dimensions “from–to“ depending on spindle stroke. Other trench widths possible by combination of the two different intermediate trench lengths l = 0.25 m and l = 0.55 m

Shoring widths (for HEB 180 extension bars)

Extension bar length [m]	b_i [m]	b_c [m]	b [m]
0.000	0.57–1.01	1.69–2.13	1.89–2.33
0.275	0.85–1.29	1.97–2.45	2.17–2.61
0.550	1.12–1.56	2.24–2.68	2.44–2.88
1.100	1.67–2.11	2.79–3.23	2.99–3.43
1.650	2.22–2.66	3.34–3.78	3.54–3.98
2.200	2.77–3.21	3.89–4.33	4.90–4.53
2.200 + 1.100	3.87–4.31	4.99–5.43	5.19–5.63

Dimensions “from–to“ depending on spindle stroke. Other trench widths possible by combination of different extension bar lengths

l	Length	b_c	Clear width	t_{pl}	Panel thickness	G / VP	Weight / shoring panel
l_c	Pipe culvert length	b_i	Clear passage width	A	Surface	G / Box	Weight / shoring box
b	Trench width	h_c	Pipe culvert height	G	Weight	e_h	Admissible soil pressure

Other sizes or custom-made products on request.

Accessories and spare parts, see page 193 – 195

E+S Linear box



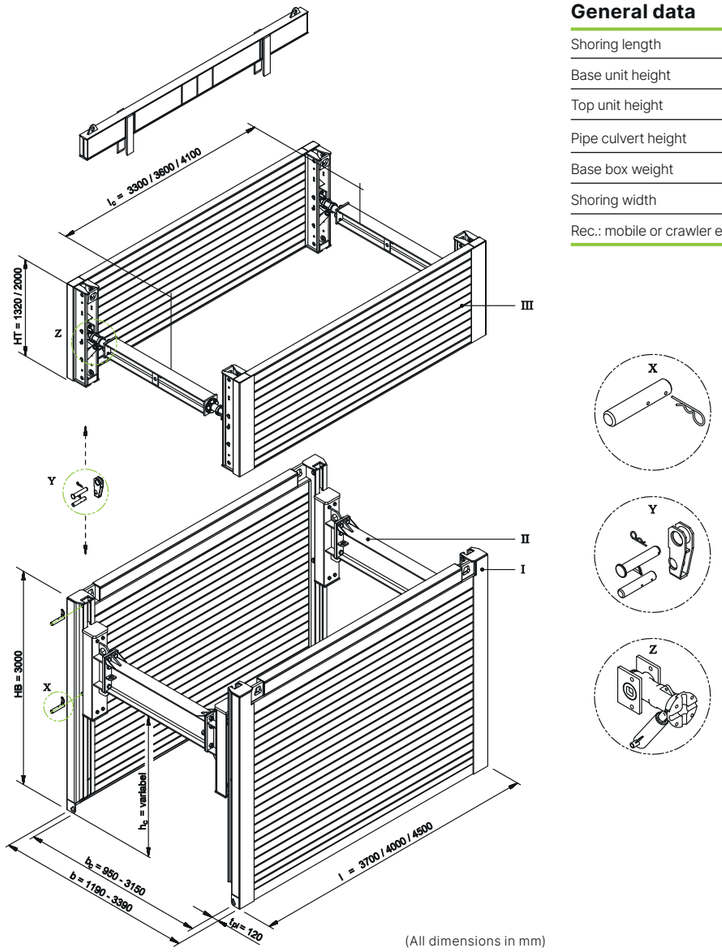
Linear box

Advantages

- Combination of slide-rail and box shoring
- Stepless adjustability of the pipe culvert height
- Top panel compatible with Medium and Magnum shorings
- High flexibility due to the vertically displaceable strut cart
- Low-settlement installation

General data

Shoring length	3.70 m–4.50 m
Base unit height	3.00 m
Top unit height	1.32 m / 2.00 m
Pipe culvert height	variable
Base box weight	4,001 kg–4,525 kg
Shoring width	variable
Rec.: mobile or crawler excavator	18–30 t



(All dimensions in mm)

Strut cart

Art. no.	Short description	l [m]	G [kg]
832 232	Linear box U-type strut cart, (base unit)	1.20	217.0

Base units

Art. no.	l [m]	h [m]	t_{pl} [m]	h_c [m]	l_c [m]	G / VP [kg]	G / Box [kg]	A [m²]	e_h [kN/m²]
802 340	3.70	3.00	0.12	variable	3.30	1,553.0	4,001.0	11.1	66.0
802 337	4.00	3.00	0.12	variable	3.60	1,643.0	4,181.0	12.0	56.0
802 386	4.50	3.00	0.12	variable	4.10	1,815.0	4,525.0	13.5	44.0

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]	e_h [kN/m²]
800 800	3.70	1.32	0.10	-	3.25	692.0	1,384.0	4.88	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
802 750	3.70	2.00	0.10	-	3.25	990.0	1,980.0	7.40	42.1
802 751	4.00	2.00	0.10	-	3.55	1,085.0	2,170.0	8.00	43.8
800 951	4.50	2.00	0.10	-	4.05	1,192.0	2,384.0	9.00	34.2

Extension bars

Art. no.	Short description	l [m]	G [kg]
831 028	IPE 400 extension bar	0.140	42.0
831 029	IPE 400 extension bar	0.200	49.0
831 030	IPE 400 extension bar	0.275	57.0
831 040	IPE 400 extension bar	0.550	75.0
831 050	IPE 400 extension bar	1.100	115.0
831 060	IPE 400 extension bar	1.650	155.0
831 070	IPE 400 extension bar	2.200	195.0

Shoring widths (for IPE 400 extension bars)

Extension bar length [m]	b_c [m]	b [m]
0.000	0.95	1.15
0.140	1.09	1.29
0.200	1.15	1.58
0.275	1.23	1.43
0.550	1.50	1.70
1.100	2.05	2.25
1.650	2.60	2.80
2.200	3.15	3.35

Other trench widths possible by combination of different extension bar lengths

I	Base unit	HT	Top unit height	b_c	Clear width
II	Linear box strut cart (base unit)	l	Length	h_c	Pipe culvert height
III	Top unit, see Magnum/Medium	l_c	Pipe culvert length	t_{pl}	Panel thickness
HB	Base unit height	b	Shoring/trench width	X	Positioning bolt
Y	Connector with bolts				
Z	Strut with bearing plate and shock absorber				

l	Length	b_c	Clear width	t_{pl}	Panel thickness	G / Box	Weight / shoring box
l_c	Pipe culvert length	h	Panel height	A	Surface	e_h	Admissible soil pressure
b	Trench width	h_c	Pipe culvert height	G / VP	Weight / shoring panel		

Other sizes or custom-made products on request.

Accessories and spare parts, see page 193 – 195

E+S Magnum shoring



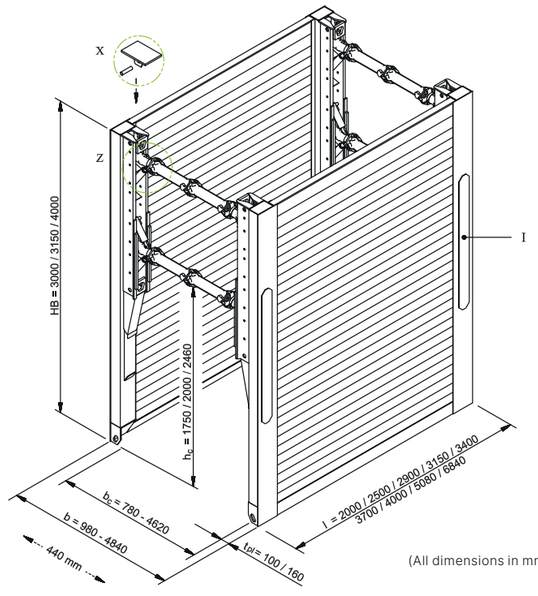
Magnum shoring

Advantages

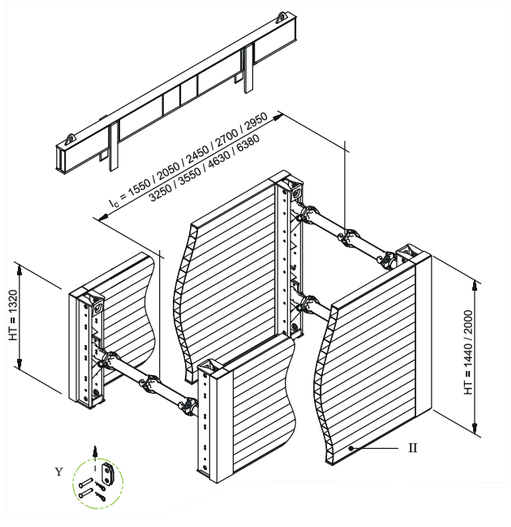
- Cost-effective shoring solution for laying large or long pipes
- Strut system compatible with Lightweight and Medium shoring
- Top panels compatible with Medium shoring

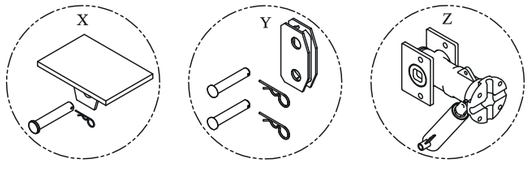
General data

Shoring length	2.00 m–6.84 m
Base unit height	3.00 m / 3.15 m / 4.00 m
Top unit height	1.32 m / 1.44 m / 2.00 m
Pipe culvert height	1.75 m / 2.01 m / 2.46 m
Base box weight	1,760 kg–7,130 kg
Shoring width	variable
Rec.: mobile or crawler excavator	18–30 t



(All dimensions in mm)





Base units (height 3.00 m)

Art. no.	l [m]	t_{pl} [m]	h_c [m]	l_c [m]	G / VP [kg]	G / Box [kg]	A [m²]	e_h [kN/m²]
802 035	2.00	0.10	2.01	1.55	880.0	1,760.0	6.00	69.5
802 042	2.50	0.10	2.01	2.05	990.0	1,980.0	7.50	55.7
802 045	2.90	0.10	2.01	2.45	1,080.0	2,160.0	8.70	48.0
802 120	3.40	0.10	2.01	2.95	1,185.0	2,370.0	10.20	41.0
802 205	3.70	0.10	2.01	3.25	1,255.0	2,510.0	11.10	37.7
802 285 A	4.00	0.10	2.01	3.55	1,410.0	2,820.0	12.00	35.8
802 400	5.08	0.12	2.01	4.63	1,868.0	3,736.0	15.24	28.6
802 450	6.84	0.16	1.75	6.38	3,465.0	6,930.0	20.52	25.8

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]	e_h [kN/m²]
802 036	2.00	0.10	2.01	1.55	930.0	1,860.0	6.00	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	36.6
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	25.8

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]	e_h [kN/m²]
802 100	3.15	0.08	2.46	2.70	1,405.0	2,810.0	12.60	45.0
802 197 A	3.40	0.09	2.46	2.95	1,740.0	3,480.0	13.60	39.0

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]	e_h [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	58.5
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
802 814	5.08	0.12	-	4.63	1,118.0	2,236.0	6.71	28.6

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]	e_h [kN/m²]
802 815	6.84	0.16	-	6.38	1,505.0	3,010.0	9.85	25.8

I	Base unit	l	Length	h_c	Pipe culvert height	Z	Strut with bearing plate and shock absorber
II	Top unit	l_c	Pipe culvert length	t_{pl}	Panel thickness		
HB	Base unit height	b	Shoring/trench width	X	Pressure plate with bolts		
HT	Top unit height	b_c	Clear width	Y	Connector with bolts		

l	Length	b_c	Clear width	A	Surface	G / Box	Weight / shoring box
l_c	Pipe culvert length	h_c	Pipe culvert height	G / VP	Weight / shoring panel	e_h	Admissible soil pressure
b	Trench width	t_{pl}	Panel thickness				

Other sizes or custom-made products on request

Accessories and spare parts, see page 193 – 195

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]	e_h [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	58.5
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

Extension bars

Art. no.	Short description	l [m]	G [kg]
850 091	Cast extension bar	0.250	11.2
850 100	Cast extension bar	0.550	18.7
850 112	HEB 180 extension bar	0.275	28.0
850 110	HEB 180 extension bar	0.550	43.0
850 124	HEB 180 extension bar	1.100	70.0
850 132	HEB 180 extension bar	1.650	100.0
850 135	HEB 180 extension bar	2.200	130.0

Shoring widths (for cast pipe extension bars, l = 0.55 m)

		for base unit h = 3.15 m				for base unit h = 4.00 m		
			l = 4.00 m	l = 5.08 m	l = 6.84 m		l = 3.15 m	l = 3.40 m
Extension bars	l [m]	b_c [m]	b [m]	b [m]	b [m]	b_c [m]	b [m]	b [m]
0	0.00	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	0.55	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	1.10	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	1.65	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	2.20	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	2.75	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	3.30	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

Dimensions “from–to” depending on spindle stroke. Other trench widths possible by combination of the two different intermediate trench lengths l = 0.25 m and l = 0.55 m

Shoring widths (for HEB 180 extension bars)

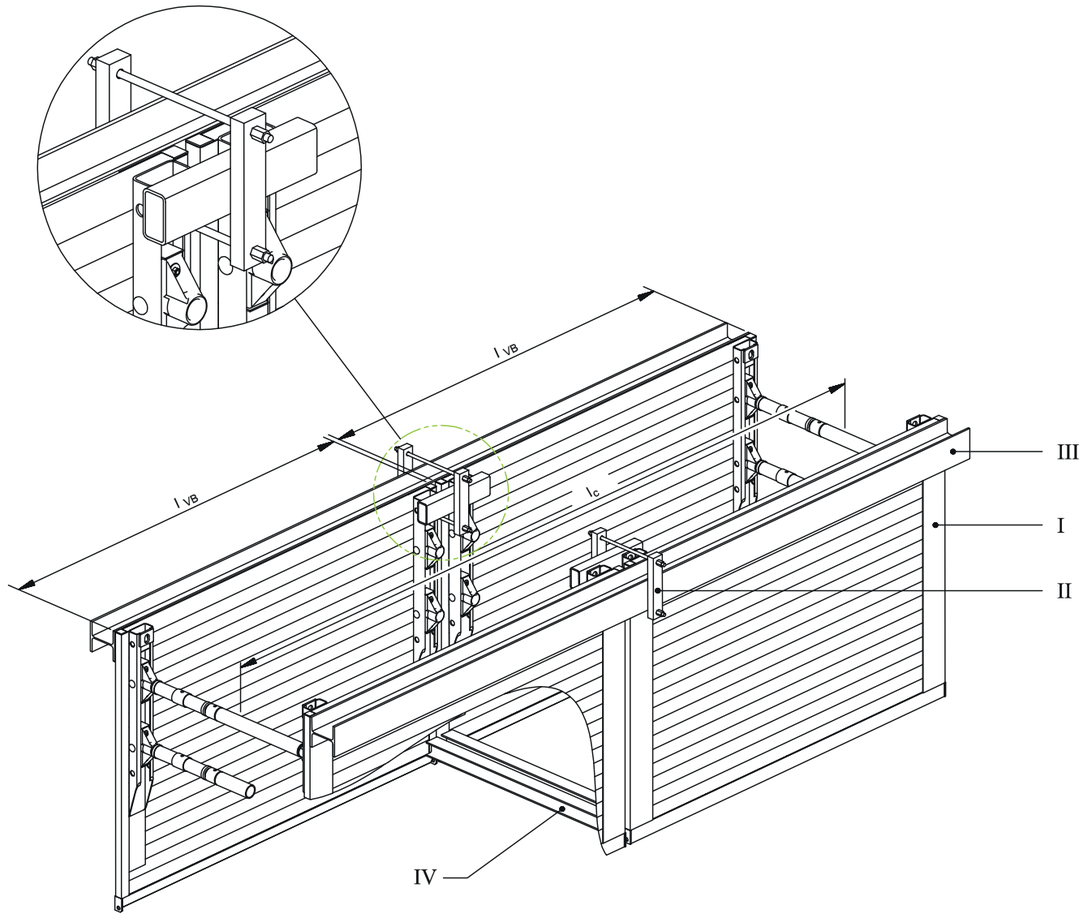
	for base unit h = 3.15 m				for base unit h = 4.00 m		
		l = 4.00 m	l = 5.08 m	l = 6.84 m		l = 3.15 m	l = 3.40 m
Extension bar length [m]	b_c [m]	b [m]	b [m]	b [m]	b_c [m]	b [m]	b [m]
0.000	0.78–1.22	0.98–1.42	1.02–1.46	1.10–1.54	0.88–1.32	1.04–1.48	1.08–1.52
0.275	1.06–1.50	1.26–1.70	1.30–1.74	1.38–1.82	1.16–1.60	1.32–1.76	1.36–1.80
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
1.100	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
1.650	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
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
2.200 + 1.100	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

Dimensions “from–to” depending on spindle stroke. Other trench widths possible by combination of different extension bar lengths

l	Length	b_c	Clear width	A	Surface	G / Box	Weight / shoring box
l_c	Pipe culvert length	h_c	Pipe culvert height	G	Weight	e_h	Admissible soil pressure
b	Trench width	t_{pl}	Panel thickness	G / VP	Weight / shoring panel		

Box installation window





I	Shoring box	III	Waler soldier	l_{VB}	Box length
II	GEWI box waler soldier attachment	IV	Bottom end support	l_c	Pipe culvert length

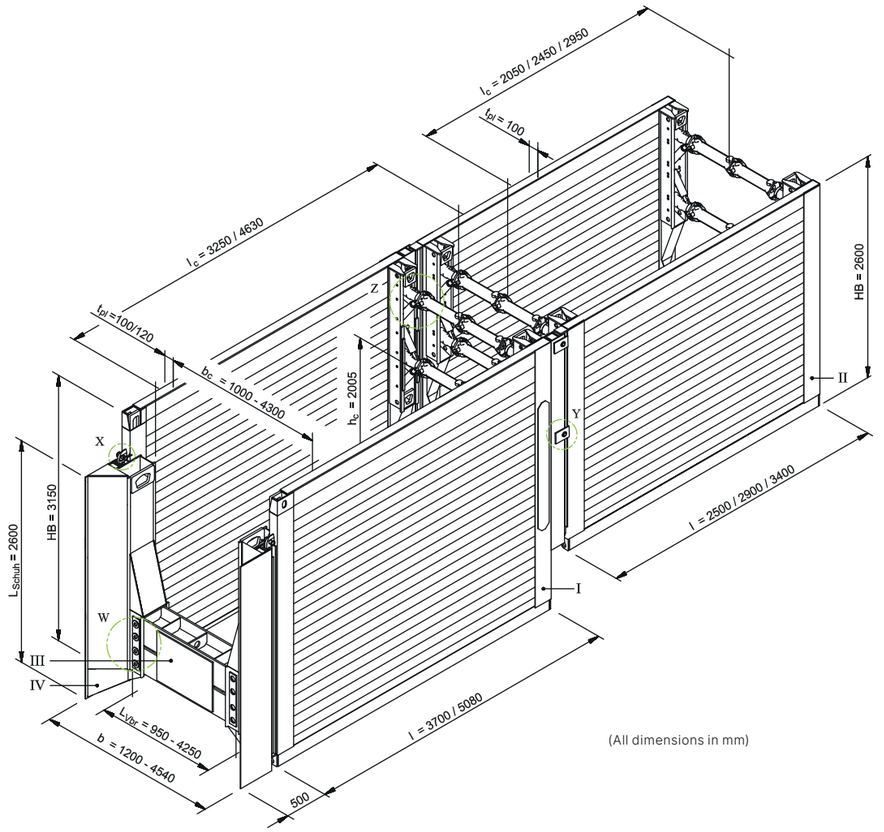
Accessories and spare parts, see page 193 – 195

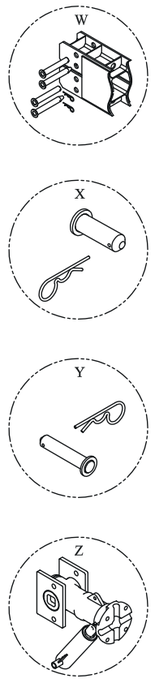
E+S Dragbox



General data

Shoring length	3.70 m–5.08 m
Base unit height	3.00 m / 3.15 m
Pipe culvert height	1.88 m / 2.00 m
Base box weight	3,140 kg–4,170 kg
Shoring width	variable
Rec.: crawler excavator	30–50 t





(All dimensions in mm)

I	Dragbox base unit	L_{Vbr}	Connection bar length	b_c	Clear width	Y	Drag plate positioning bolt
II	Drag plate	L_{Schuh}	Cutting blade length	h_c	Pipe culvert height	Z	Strut with bearing plate and shock absorber
III	Connection bar	l	Length	t_{pl}	Panel thickness		
IV	Cutting blade	l_c	Pipe culvert length	W	Connection bar positioning bolt		
HB	Base unit height	b	Shoring/trench width	X	Cutting blade positioning bolts		

Base units

Art. no.	l [m]	h [m]	t_{pl} [m]	h_c [m]	l_c [m]	G / VP [kg]	G / Box [kg]	A [m²]	e_h [kN/m²]
802 269	3.70	3.15	0.10	2.00	3.25	1,570.00	3,140.00	11.66	39.5
802 411	5.08	3.00	0.12	1.88	4.63	2,085.00	4,170.00	15.24	28.6

Cutting blades

Art. no.	Short description	l [m]	G [kg]
847 100	Right cutting blade	0.65	580.0
847 150	Left cutting blade	0.65	580.0

Connection bars

Art. no.	Short description	l [m]	G [kg]
847 200	Connection bar	0.95	295.0
847 210	Connection bar	1.50	500.0
847 220	Connection bar	2.05	715.0
847 230	Connection bar	2.60	920.0
847 240	Connection bar	3.15	1,125.0
847 250	Connection bar	3.70	1,330.0
847 260	Connection bar	4.25	1,530.0

Bolts

Art. no.	Short description	l [m]	G [kg]	d [m]
847 300	Bolt (blunt)	0.385	10.0	0.06
847 301	Bolt (inclined)	0.445	11.0	0.06

Extension bars

Art. no.	Short description	l [m]	G [kg]
850 091	Cast extension bar	0.250	11.2
850 100	Cast extension bar	0.550	18.7
850 112	HEB 180 extension bar	0.275	28.0
850 110	HEB 180 extension bar	0.550	43.0
850 124	HEB 180 extension bar	1.100	70.0
850 132	HEB 180 extension bar	1.650	100.0
850 135	HEB 180 extension bar	2.200	130.0

Shoring widths (for cast pipe extension bars, l = 0.55 m and HEB 180)

Extension bar length [m]	Connection bar length [m]	b_c [m]	for base unit t_{pl} = 0.10 m b [m]	for base unit t_{pl} = 0.12 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
2.20 + 0.55	3.70	3.75	3.95	3.99
2.20 + 1.10	4.25	4.30	4.50	4.54

l	Length	h	Panel height	G	Weight	d	Diameter
l_c	Pipe culvert length	h_c	Pipe culvert height	G / VP	Weight / shoring panel		
b	Trench width	t_{pl}	Panel thickness	G / Box	Weight / shoring box		
b_c	Clear width	A	Surface	e_h	Admissible soil pressure		

Other sizes or custom-made products on request

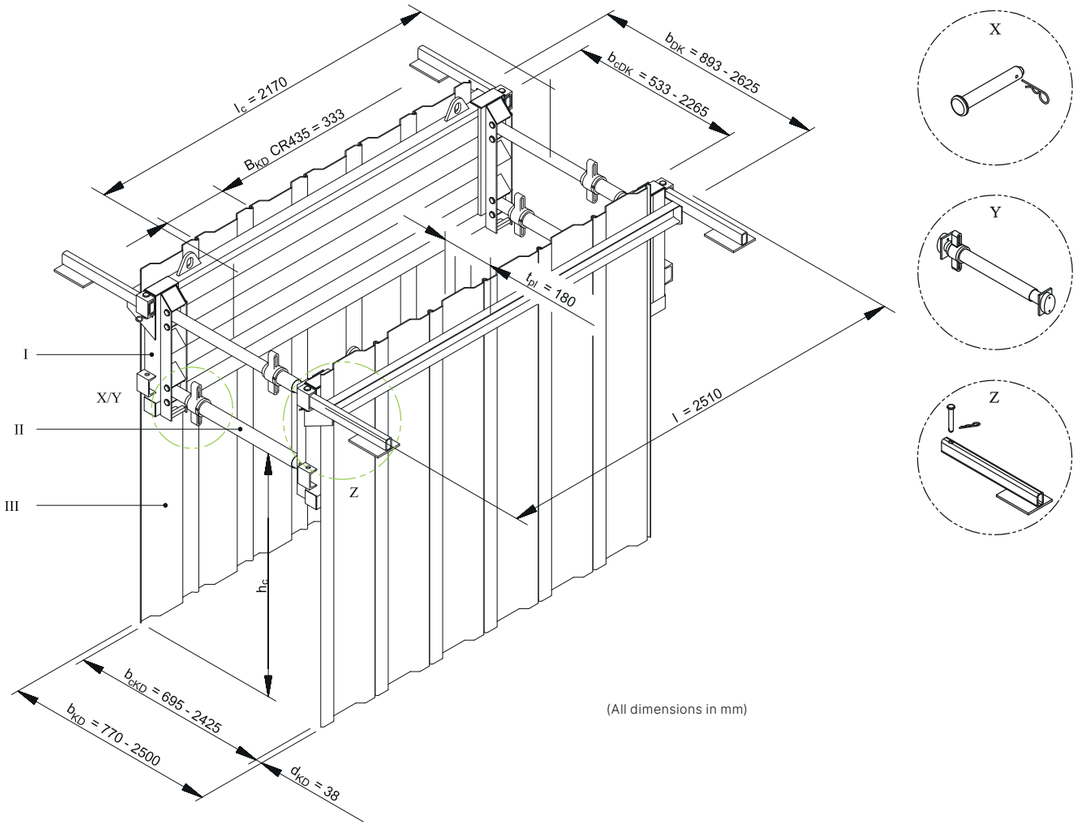
Accessories and spare parts, see page 193 – 195

KRINGS piling frame element BLU 2.41 m



General data

Shoring length	2.41 m
Piling frame element height	0.72 m
Pipe culvert length	2.17 m
Shoring depth	up to 2.40 m
Box weight	473 kg
Shoring width	variable
Rec.: mobile excavator	9–13 t



(All dimensions in mm)

Piling frame element BLU (height 0.72 m)

Art. no.	Short description	l [m]	lc [m]	G / DKP [kg]	G / Box [kg]	KD / Box
842 703	Piling frame element BLU for sheet piles CR435	2.41	2.17	190.0	473.0 *	12
842 701	Piling frame element BLU for sheet piles KD IV	2.41	2.17	190.0	473.0 *	14

* With spindle 70 × 650

Spindle types

Art. no.	Short description	l [m]	G [kg]
118 060	Spindle 70 × 650	0.52–0.62	12.2
118 070	Spindle 70 × 740	0.61–0.80	13.4
118 090	Spindle 70 × 920	0.80–1.16	15.8
118 020	Spindle 70 × 1280	1.15–1.88	20.5
118 100	Spindle 70 × 1470	1.34–2.25	24.0

Shoring widths for CR435/KD IV piles

Art. no.	Short description	Lift [m]	bcKD [m]	bcDK [m]
118 060	Spindle 70 × 650	0.09	0.70–0.79	0.53–0.63
118 070	Spindle 70 × 740	0.18	0.78–0.97	0.62–0.81
118 090	Spindle 70 × 920	0.36	0.97–1.33	0.81–1.17
118 020	Spindle 70 × 1280	0.73	1.32–2.05	1.16–1.89
118 100	Spindle 70 × 1470	0.92	1.50–2.43	1.35–2.27

Shoring widths for CR435 piles	Shoring widths for KD IV piles
$b_{KD} = b_{cKD}$ + 0.08 m	$b_{KD} = b_{cKD}$ + 0.10 m
$b_{DK} = b_{cDK}$ + 0.36 m	$b_{DK} = b_{cDK}$ + 0.38 m

I BLU piling frame element
II Spindle 70 × ...
III Sheet pile
B_{KD} Sheet pile width
d_{KD} Sheet pile thickness
t_{pl} Panel thickness
l Length
l_c Pipe culvert length
h_c Pipe culvert height
b_{cKD} Sheet pile clear width
b_{KD} Sheet pile shoring width
b_{cDK} Piling frame clear width
b_{DK} Piling frame shoring width
X Positioning bolt
Y KVL spindle
Z Support bracket with bolt

l Length
l_c Pipe culvert length
G / DKP Weight / piling frame plate
G / Box Weight / shoring box
KD / Box Sheet piles / shoring box
b_{cKD} Sheet pile clear width
b_{cDK} Piling frame clear width
b_{KD} Sheet pile shoring width
b_{DK} Piling frame shoring width

Accessories and spare parts, see page 193 – 195

KRINGS piling frame element DKU 2.27 m / 3.00 m / 3.81 m

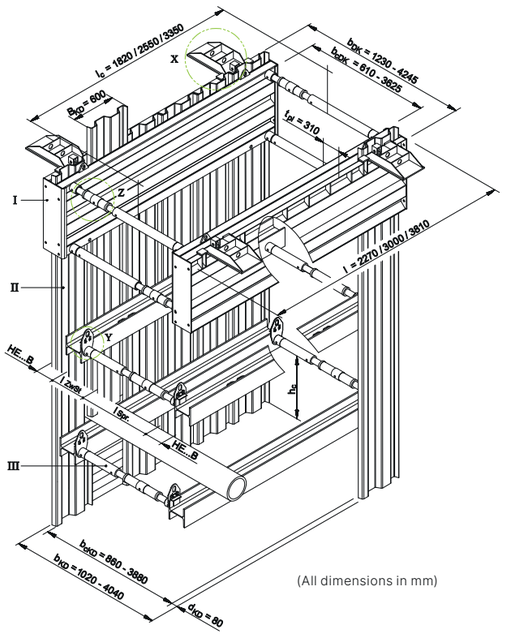


Piling frame element DKU

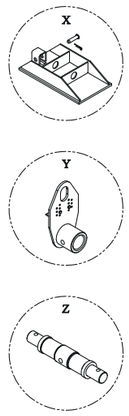
Advantages
- Ideal for construction sites with crossing lines
- Low-deformation shoring in inner-city areas
- Spindles identical with KRINGS boxes
- Can be used as corner shoring and for linear sho

General data

Shoring length	2.27 m / 3.00 m / 3.81 m
Piling frame element height	1.00 m
Pipe culvert length	1.82 m / 2.55 m / 3.35 m
Shoring depth	variable
Box weight	1,335 kg–1,885 kg
Shoring width	variable
Rec.: mobile or crawler excavator	12–18 t

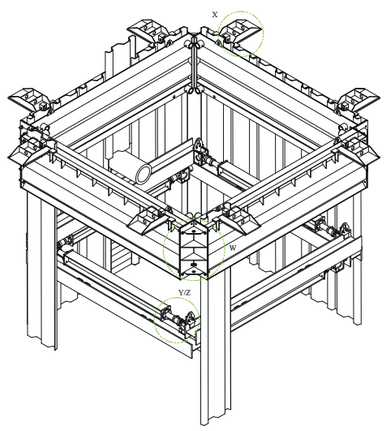


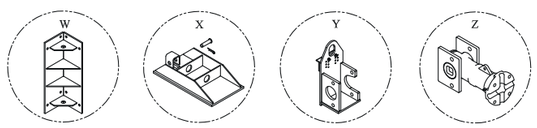
(All dimensions in mm)



I	Piling frame element DKU
II	Sheet pile
III	Waler strut
B_{KD}	Sheet pile width
d_{KD}	Sheet pile thickness
t_{pl}	Panel thickness
l	Length
l_c	Pipe culvert length
h_c	Pipe culvert height
b_{cKD}	Sheet pile clear width
b_{KD}	Sheet pile shoring width
b_{cDK}	Piling frame clear width
b_{DK}	Piling frame shoring width
X	Support bracket
Y	Suspended bearing block
Z	Spindle 98 × ...

Example for additional technical solutions: Piling frame shoring with corner shoring adapter





All KRINGS DKUs can be flexibly combined with each other using corner shoring adapters

Examples:
DKU corner shoring 2.27 m × 3.81 m or
DKU corner shoring 3.00 m × 4.55 m.

W	Corner adapter
X	Support bracket
Y	Suspended bearing block
Z	Strut with bearing plate

Piling frame element DKU (height 1.00 m)

Art. no.	Short description	l [m]	lc [m]	G / DKP [kg]	G / Box [kg]	KD / Box
842 671	Piling frame element DKU	2.27	1.82	510.0	1,335.0*	8
842 687	Piling frame element DKU	3.00	2.55	640.0	1,595.0*	10
842 674	Piling frame element DKU	3.81	3.35	785.0	1,885.0*	14

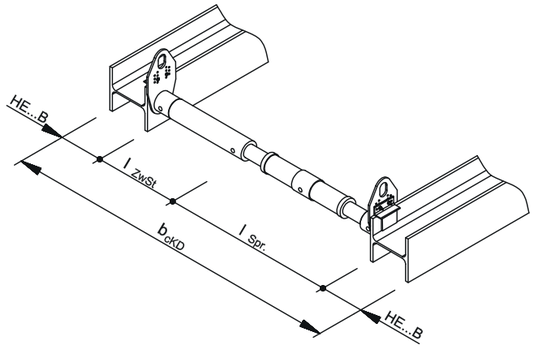
* With spindle 98 × 700

Shoring widths

		Spindle SP SB 98 × 550		Spindle SP SB 98 × 700	
Art. no. extension bar	l [m]	b_{cKD} [m]	b_{cDK} [m]	b_{cKD} [m]	b_{cDK} [m]
	0.00	0.86–1.06	0.61–0.81	1.04–1.38	0.79–1.13
139 430	0.30	1.16–1.36	0.91–1.11	1.34–1.68	1.09–1.43
139 445	0.50	1.36–1.56	1.11–1.31	1.54–1.88	1.29–1.63
139 385	1.00	1.86–2.06	1.61–1.81	2.04–2.38	1.79–2.13
139 400	1.50	2.36–2.56	2.11–2.31	2.54–2.88	2.29–2.63
139 420	2.00	2.86–3.06	2.61–2.81	3.04–3.38	2.79–3.13
139 425	2.50	3.36–3.56	3.11–3.31	3.54–3.88	3.29–3.63
		$b_{KD} = b_{cKD} + 0.16$ m	$b_{DK} = b_{cDK} + 0.62$ m	$b_{KD} = b_{cKD} + 0.16$ m	$b_{DK} = b_{cDK} + 0.62$ m

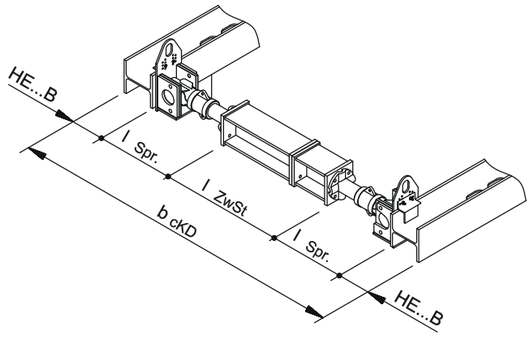
Waler struts

KRINGS Waler strut



$l_{Spr.}$ (SP SB 98 × 550) = 0.62 m – 0.82 m
$l_{Spr.}$ (SP SB 98 × 700) = 0.80 m – 1.14 m
$l_{ZwSt.} = b_{cKD} - 2 \times$ HE...B – $l_{Spr.}$

E+S Waler strut



$l_{Spr.}$ = 0.42 m – 0.64 m
$l_{ZwSt.} = b_{cKD} - 2 \times$ HE...B – 2 × $l_{Spr.}$

Different trench widths possible by combination of different extension bar lengths
For available extension bars, refer to accessories. (see p. 195–197)

l	Length	$l_{ZwSt.}$	Extension bar length	KD / Box	Sheet piles / shoring box	b_{cDK}	Piling frame clear width
l_c	Pipe culvert length	G / DKP	Weight / piling frame plate	b_{cKD}	Sheet pile clear width	b_{DK}	Piling frame shoring width
$l_{Spr.}$	Strut length	G / Box	Weight / shoring box	b_{KD}	Sheet pile shoring width		

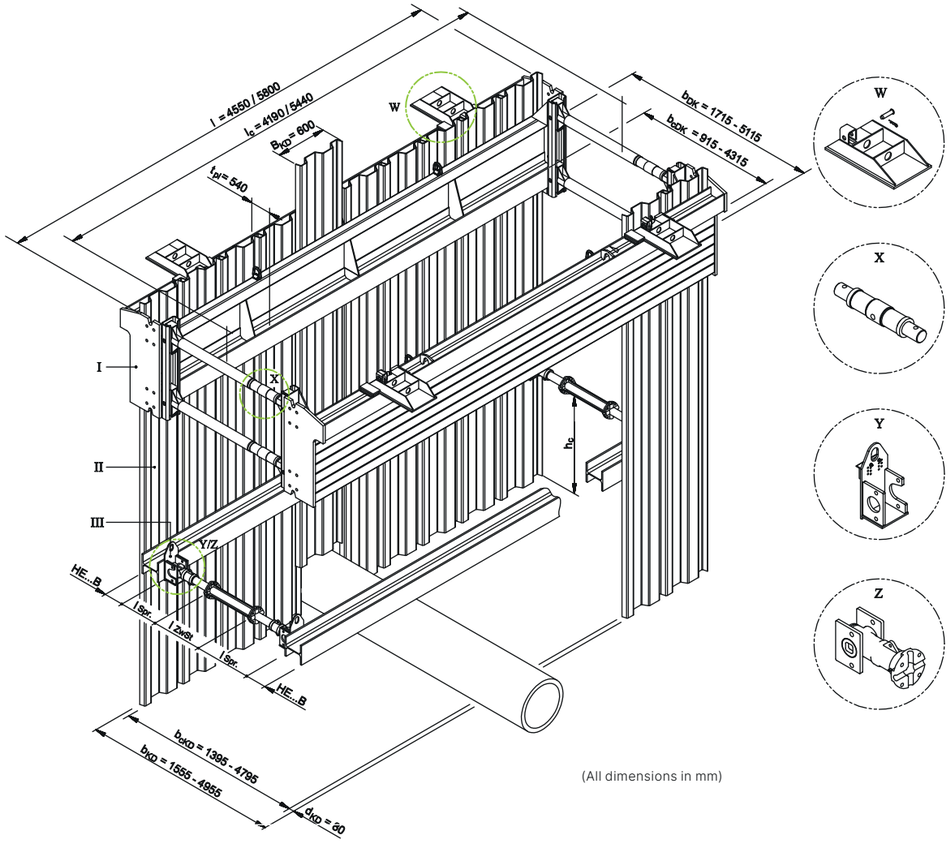
Accessories and spare parts, see page 193 – 195

KRINGS piling frame element DKU 4.55 m / 5.80 m



General data

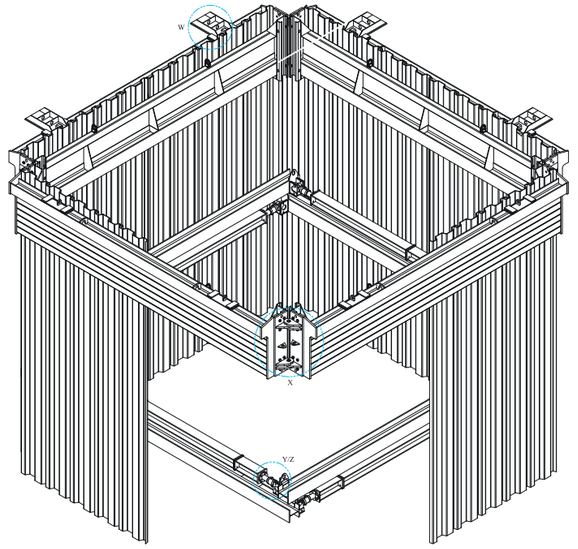
Shoring length	4.55 m / 5.80 m
Piling frame element height	1.10 m
Pipe culvert length	4.19 m / 5.44 m
Shoring depth	variable
Box weight	3,592 kg / 4,226 kg
Shoring width	variable
Rec.: mobile or crawler excavator	18–30 t



(All dimensions in mm)

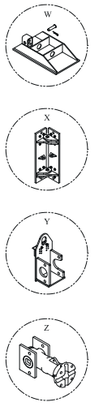
I	Piling frame element DKU	d_{KD}	Sheet pile thickness	h_c	Pipe culvert height	b_{DK}	Piling frame shoring width	Z	Strut with bearing plate
II	Sheet pile	t_{pl}	Panel thickness	b_{cKD}	Sheet pile clear width	W	Support bracket		
III	Waler strut	l	Length	b_{KD}	Sheet pile shoring width	X	Spindle 98 × …		
B_{KD}	Sheet pile width	l_c	Pipe culvert length	b_{cDK}	Piling frame clear width	Y	Suspended bearing block		

Example for additional technical solutions: Piling frame shoring with corner shoring adapter



All KRINGS DKUs can be flexibly combined with each other using corner shoring adapters.

Examples:
DKU corner shoring 2.27 m × 3.81 m or
DKU corner shoring 3.00 m × 4.55 m.



W	Support bracket
X	Corner adapter
Y	Suspended bearing block
Z	Strut with bearing plate

Piling frame elements DKU (height 1.10 m)

Art. no.	Short description	l [m]	l_c [m]	G / DKP [kg]	G / Box [kg]	KD / Box
842 696	Piling frame element DKU	4.55	4.19	1,563.0	3,592.0*	16
842 699	Piling frame element DKU	5.80	5.44	1,880.0	4,226.0*	20

* With spindle 98 × 817

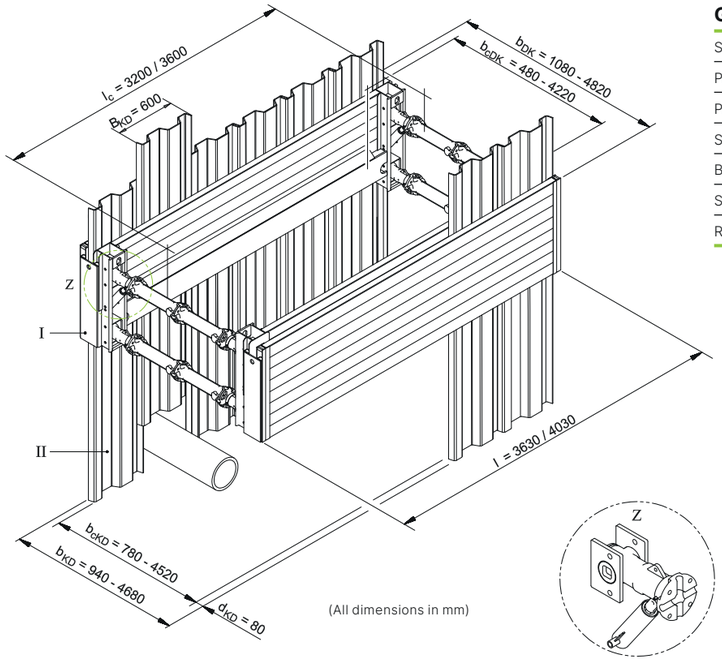
Shoring widths with spindle 98 × 817

Extension bars	l [m]	b_{cKD} [m]	b_{KD} [m]	b_{cDK} [m]	b_{DK} [m]
0	0.00	1.40–1.80	1.56–1.96	0.92–1.32	1.72–2.12
1	0.50	1.90–2.30	2.06–2.46	1.42–1.82	2.22–2.62
2	1.00	2.40–2.80	2.56–2.96	1.92–2.32	2.72–3.12
3	1.50	2.90–3.30	3.06–3.46	2.42–2.82	3.22–3.62
4	2.00	3.40–3.80	3.56–3.96	2.92–3.32	3.72–4.12
5	2.50	3.90–4.30	4.06–4.46	3.42–3.82	4.22–4.62
6	3.00	4.40–4.80	4.56–4.96	3.92–4.32	4.72–5.12

l	Length	G / DKP	Weight / piling frame plate	KD / Box	Sheet piles / shoring box	b_{KD}	Sheet pile shoring width	b_{DK}	Piling frame shoring width
l_c	Pipe culvert length	G / Box	Weight / shoring box	b_{cKD}	Sheet pile clear width	b_{cDK}	Piling frame clear width		

Accessories and spare parts, see page 193 – 195

E+S piling frame element DKE 3.63 m / 4.03 m



General data

Shoring length	3.63 m / 4.03 m
Piling frame element height	1.00 m
Pipe culvert length	3.20 / 3.60 m
Shoring depth	variable
Box weight	1,884 kg / 1,980 kg
Shoring width	variable
Rec.: mobile or crawler excavator	12–18 t

I	Piling frame element DKE
II	Sheet pile
B_{KD}	Sheet pile width
d_{KD}	Sheet pile thickness
l	Length
l_c	Pipe culvert length
b_{cKD}	Sheet pile clear width
b_{KD}	Sheet pile shoring width
b_{cDK}	Piling frame clear width
b_{DK}	Piling frame shoring width
Z	Strut with bearing plate and shock absorber

Piling frame element DKE (height 1.00 m)

Art. no.	Short description	l [m]	l_c [m]	G / DKP [kg]	G / Box [kg]	KD / Box
842 540	Piling frame element DKE	3.63	3.20	942.0	1,884.0	12
842 580	Piling frame element DKE	4.03	3.60	990.0	1,980.0	14

Extension bars

Art. no.	Short description	l [m]	G [kg]
850 091	Cast extension bar	0.250	11.2
850 100	Cast extension bar	0.550	18.7
850 112	HEB 180 extension bar	0.275	28.0
850 110	HEB 180 extension bar	0.550	43.0
850 124	HEB 180 extension bar	1.100	70.0
850 132	HEB 180 extension bar	1.650	100.0
850 135	HEB 180 extension bar	2.200	130.0

Shoring widths (for extension bars l = 0.550 m)

Extension bars	b_{cKD} [m]	b_{KD} [m]	b_{cDK} [m]	b_{DK} [m]
0	0.78–1.22	0.94–1.38	0.48–0.92	1.08–1.52
1	1.33–1.77	1.49–1.93	1.03–1.47	1.67–2.11
2	1.88–2.32	2.04–2.48	1.58–2.02	2.22–2.66
3	2.43–2.87	2.59–3.03	2.13–2.57	2.77–3.21
4	2.98–3.42	3.14–3.58	2.68–3.12	3.32–3.76
5	3.53–3.97	3.69–4.13	3.23–3.67	3.87–4.31
6	4.08–4.52	4.24–4.68	3.78–4.22	4.42–4.82

l	Length
l_c	Pipe culvert length
G	Weight
G / DKP	Weight / piling frame plate
G / Box	Weight / shoring box
KD / Box	Sheet piles / shoring box
b_{cKD}	Sheet pile clear width
b_{KD}	Sheet pile shoring width
b_{cDK}	Piling frame clear width
b_{DK}	Piling frame shoring width

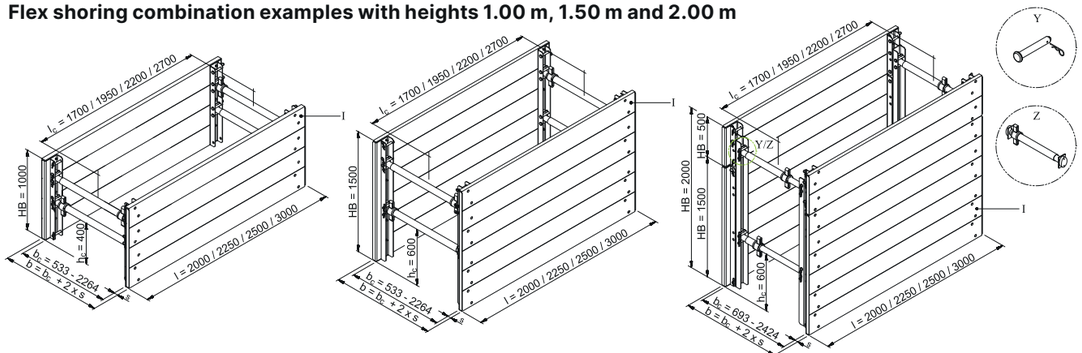
KRINGS Flex shoring



General data

Shoring/panel length	2.00 m–3.00 m
Unit height	0.50 m–2.00 m
Pipe culvert height	0.22 m / 0.60 m
Pile thickness	5 cm / 6 cm / 7 cm
Shoring depth	max. 2.00 m
Shoring width	variable
Rec.: mini excavator	3–9 t

Flex shoring combination examples with heights 1.00 m, 1.50 m and 2.00 m



Wooden panels with a height of 0.25 m and lengths between 2.00 m and 3.00 m as well as M 10 round-head screws and M 10 nuts must be provided on site.

I	Flex shoring unit
l	Length
l_c	Pipe culvert length
b	Shoring/trench width
b_c	Clear width
H_B	Unit height
h_c	Pipe culvert height
s	Pile thickness
Y	Positioning bolt
Z	KVL spindle

Traverses and couplings

Art. no.	Short description	h [m]	h_c [m]	G [kg]
888 401	Basic/attachment traverse	0.50	0.22	7.6
888 410	Basic traverse	1.00	0.41	18.6
888 400	Basic traverse	1.50	0.60	25.7
888 406	Coupling	1.83	-	30.0

Shoring widths

Art. no.	Short description	Lift [m]	b_c [m]	b [m]	G [kg]
118 060	Spindle 70 × 650	0.09	0.53–0.63	0.55–0.64	12.2
118 070	Spindle 70 × 740	0.18	0.62–0.81	0.64–0.82	13.4
118 090	Spindle 70 × 920	0.36	0.81–1.17	0.82–1.19	15.8
118 020	Spindle 70 × 1280	0.73	1.16–1.89	1.18–1.90	20.5
118 100	Spindle 70 × 1470	0.92	1.35–2.26	1.36–2.28	24.0

Dimensional minimum system resistance [kN/m²] with wood panels

		for pile thickness s [cm]			
Shoring length	Support width	4	5	6	7
2.00 m	1.76 m	10.2	15.9	22.9	31.2
2.25 m	2.01 m	7.8	12.2	17.6	23.9
2.50 m	2.26 m	6.2	9.6	13.9	18.9
3.00 m	2.76 m	4.1	6.5	9.3	12.7

(EC5, NH S10, performance class 2)

h	Panel height
h_c	Pipe culvert height
b	Trench width
b_c	Clear width
G	Weight

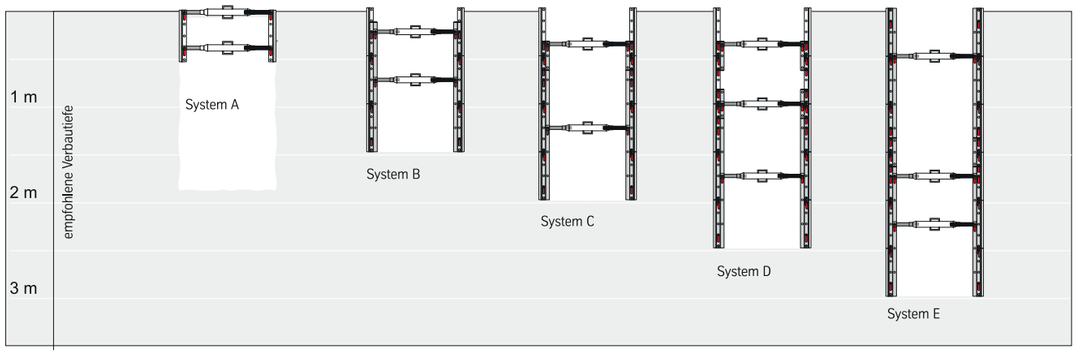
Accessories and spare parts, see page 193 – 195

Aluminum lightweight shoring

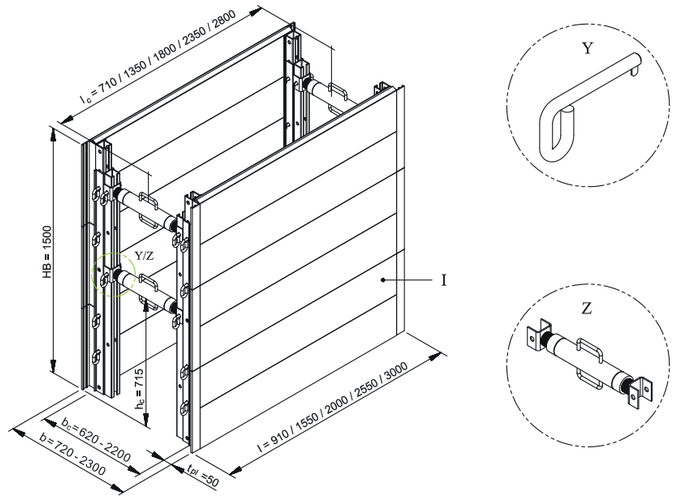


General data

Shoring length	0.91 m–3.00 m
Base unit height	0.50 m
Installation depth	max. 4.00 m
Shoring width	max. 2.18 m
Weight	variable
Rec.: mini excavator	3–9 t



	System layout A	System layout B	System layout C	System layout D	System layout E
Installation area					
Shoring depth [m]	0.50	1.50	2.00	2.50	3.00
Shoring widths [m]	0.60–2.18	0.72–2.30	0.72–2.30	0.72–2.30	0.72–2.30
Max. pipe culvert height [m]	-	0.75	0.75	0.75	0.75
Maximum weight [kg] with Gi-A/129-218 trench struts					
Aluminum panels 1.55 m	93	213	268	346	411
Aluminum panels 2.00 m	103	242	307	394	469
Aluminum panels 2.55 m	119	292	374	478	569
Aluminum panels 3.00 m	130	325	417	532	635
Number of components					
Gi-A trench struts	4	4	4	6	6
Aluminum panels	2	6	8	10	12
Aluminum couplings 0.28 m	-	-	4	8	4
Aluminum couplings 1.35 m	-	4	4	4	8
Standard positioning bolt ø 13 mm	8	32	48	68	76



(All dimensions in mm)

I	Aluminum shoring panel
HB	Unit height
l	Length
l_c	Pipe culvert length
b	Shoring/trench width
b_c	Clear width
h_c	Pipe culvert height
t_{pl}	Panel thickness
Y	Positioning bolt
Z	Trench strut

Base units (aluminum shoring panel)

Art. no.	Short description	l [m]	h [m]	h_c [m]	G / VP [kg]
804 100	Aluminum panel	0.91	0.50	0.22	13.0
804 150	Aluminum panel	1.55	0.50	0.22	21.0
804 200	Aluminum panel	2.00	0.50	0.22	28.0
804 210	Aluminum panel	2.55	0.50	0.22	37.0
804 250	Aluminum panel	3.00	0.50	0.22	42.0

Aluminum couplings

Art. no.	Short description	l [m]	G [kg]
804 280	Aluminum coupling	0.28	2.0
804 300	Aluminum coupling	1.35	6.5
804 310	Aluminum coupling	1.85	9.0

Shoring widths for Gi-A trench struts

			w/o coupling		with coupling		
Art. no.	Short description	Lift [m]	b_c [m]	b [m]	b_c [m]	b [m]	G [kg]
804 400	GI-A60-81 cm trench struts incl. 2 bolts	0.21	0.50–0.71	0.60–0.81	0.62–0.83	0.72–0.93	5.5
804 500	GI-A80-121 cm trench struts incl. 2 bolts	0.41	0.70–1.11	0.80–1.21	0.82–1.23	0.92–1.33	7.3
804 550	GI-A 129-218 cm trench struts incl. 2 bolts	0.89	1.19–2.08	1.29–2.18	1.31–2.20	1.41–2.30	11.5

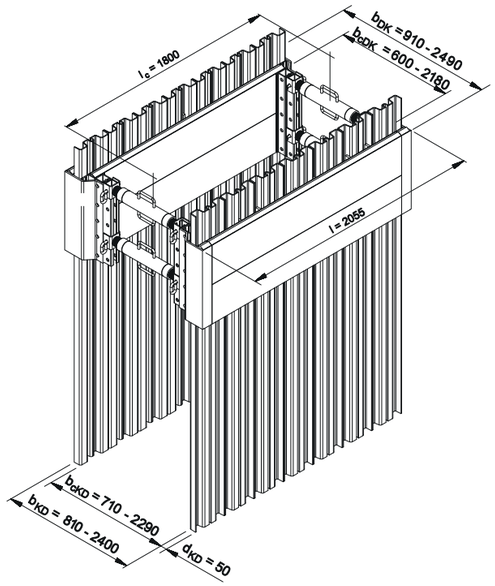
Accessories

Art. no.	Short description	G [kg]
804 350	Standard positioning bolt ø 13 mm	0.25 kg
804 671	Universal lifting eye	1.60 kg

l	Length
h	Panel height
h_c	Pipe culvert height
b	Trench width
b_c	Clear width
G	Weight
G/VP	Weight/shoring panel

Accessories and spare parts, see page 193 – 195

Aluminum trench sheeting system



General data

Shoring length	2.00 m
Element height	0.50 m
Pipe culvert length	1.80 m
Shoring depth	max. 3.00 m
Shoring width	max. 2.18 m
Box weight	343–569 kg
Shoring width	0.91–2.49 m

Base units

Art. no.	Short description	l [m]	h [m]	G / VP [kg]
804 381	Aluminum-guide panel	2.00	0.50	37.0
804 200	Aluminum panel	2.00	0.50	28.0

Aluminum trench sheets

Art. no.	Short description	l [m]	G [kg]
804 377	Aluminum trench sheet	1.50	8.4
804 382	Aluminum trench sheet	2.50	14.0
804 383	Aluminum trench sheet	3.50	19.5

Shoring widths for Gi-A trench struts

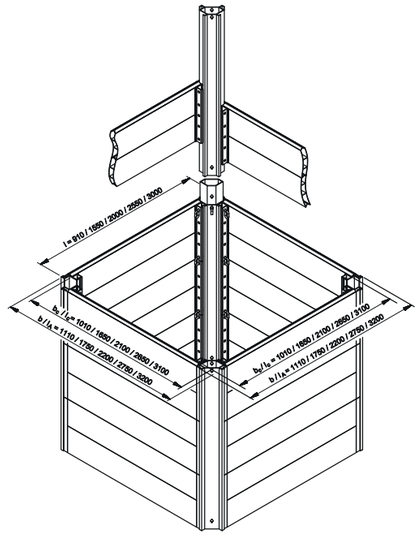
Art. no.	Short description	Lift [m]	b_{cDK} [m]	b_{DK} [m]	b_{cKD} [m]	b_{KD} [m]
804 400	Gi-A/60–81 cm trench struts incl. 2 bolts	0.21	0.60–0.81	0.91–1.12	0.71–0.92	0.81–1.02
804 500	Gi-A/80–121 cm trench struts incl. 2 bolts	0.41	0.80–1.21	1.11–1.52	0.91–1.32	1.01–1.42
804 550	Gi-A/129–218 cm trench struts incl. 2 bolts	0.89	1.29–2.18	1.60–2.49	1.40–2.29	1.50–2.39

Accessories

Art. no.	Short description	l [m]	d [m]	G / VP [kg]
804 350	Standard positioning bolt ⌀ 13 mm		0.013	0.25
804 671	Universal lifting eye			1.60
804 384	Driving head for aluminum trench sheets			1.90
804 385	Lifting clamp			3.00
804 387	Post shore positioner 38			0.10

l Length h Height G / VP Weight / shoring panel b_{KD} Sheet pile shoring width b_{DK} Piling frame shoring width
d Diameter G Weight b_{cKD} Sheet pile clear width b_{cDK} Piling frame clear width

Aluminum manhole shoring



General data

Shoring depth	max. 3.00 m
Shoring width	1.10–3.20 m

Base units (aluminum shoring panel)

Art. no.	Short description	l [m]	h [m]	G / VP [kg]
804 100	Aluminum panel	0.91	0.50	13.0
804 150	Aluminum panel	1.55	0.50	21.0
804 200	Aluminum panel	2.00	0.50	28.0
804 210	Aluminum panel	2.55	0.50	37.0
804 250	Aluminum panel	3.00	0.50	42.0

Aluminum manhole corner profiles

Art. no.	Short description	l [m]	G [kg]
804 580	Aluminum manhole corner profile	0.50	2.9
804 600	Aluminum manhole corner profile	1.50	10.9

Accessories

Art. no.	Short description	l [m]	d [m]	G / VP [kg]
804 320	Aluminum manhole corner connector	0.30		1.40
804 360	Connecting pin ⌀ 13 mm		0.013	0.20
804 370	Connecting pin ⌀ 20 mm		0.020	0.50
804 650	Lifting eye for manhole corner profile			1.00
804 671	Universal lifting eye			1.60

l Length l_A Shoring width h Height G / VP Weight / shoring panel b_c Clear width
l_c Pipe culvert length d Diameter G Weight b Trench width

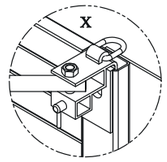
Accessories and spare parts, see page 193 – 195

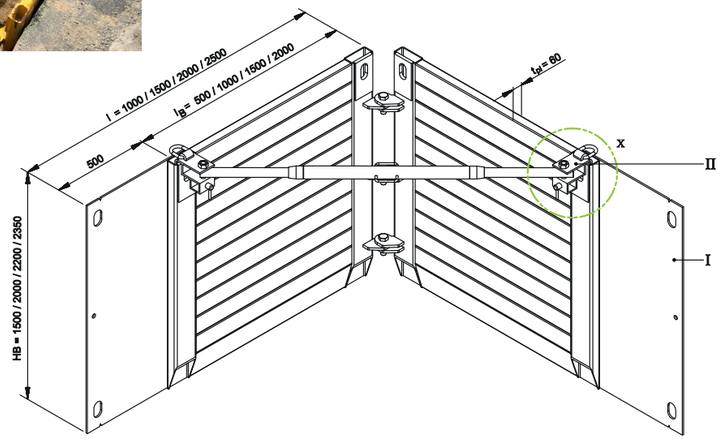
KRINGS Corner shoring



General data

Suitable trench width	0.50–2.00 m
Element height	1.50 / 2.00 / 2.20 / 2.35 m
Box weight	400–1,310 kg
Rec.: mobile excavator	9–13 t





Units

Art. no.	Short description	l Base body [m]	h Base body [m]	l Compensation plate [m]	Suitable trench width [m]	G* / Box [kg]
805 599	Corner shoring unit 0.50 × 1.50 m	0.50	1.50	0.50	0.50–1.00	400
805 619	Corner shoring unit 0.50 × 2.00 m	0.50	2.00	0.50	0.50–1.00	530
805 632	Corner shoring unit 0.50 × 2.20 m	0.50	2.20	0.50	0.50–1.00	575
805 636	Corner shoring unit 0.50 × 2.35 m	0.50	2.35	0.50	0.50–1.00	610
805 600	Corner shoring unit 1.00 × 1.50 m	1.00	1.50	0.50	1.00–1.50	525
805 620	Corner shoring unit 1.00 × 2.00 m	1.00	2.00	0.50	1.00–1.50	730
805 633	Corner shoring unit 1.00 × 2.20 m	1.00	2.20	0.50	1.00–1.50	810
805 637	Corner shoring unit 1.00 × 2.35 m	1.00	2.35	0.50	1.00–1.50	850
805 610	Corner shoring unit 1.50 × 1.50 m	1.50	1.50	0.50	1.50–2.00	720
805 630	Corner shoring unit 1.50 × 2.00 m	1.50	2.00	0.50	1.50–2.00	950
805 634	Corner shoring unit 1.50 × 2.20 m	1.50	2.20	0.50	1.50–2.00	1,025
805 638	Corner shoring unit 1.50 × 2.35 m	1.50	2.35	0.50	1.50–2.00	1,110
805 611	Corner shoring unit 2.00 × 1.50 m	2.00	1.50	0.50	2.00–2.50	780
805 631	Corner shoring unit 2.00 × 2.00 m	2.00	2.00	0.50	2.00–2.50	1,110
805 635	Corner shoring unit 2.00 × 2.20 m	2.00	2.20	0.50	2.00–2.50	1,245
805 639	Corner shoring unit 2.00 × 2.35 m	2.00	2.35	0.50	2.00–2.50	1,310

* The weights refer to two panel halves (R/L) = one corner.

Installation aid

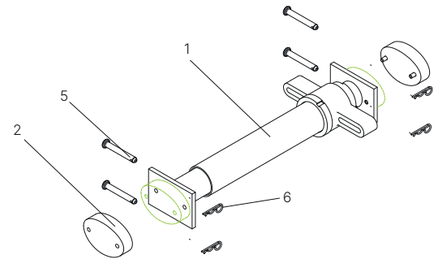
Art. no.	Short description	l [m]	G [kg]
805 640	Installation aid for corner shoring unit	0.50	17
805 645	Installation aid for corner shoring unit	1.00	23
805 650	Installation aid for corner shoring unit	2.00	28

I	Corner shoring unit
II	Installation aid
l	Length
h	Height
G	Weight
G* / Box	Weight / Box

Accessories and spare parts, see page 193 – 195

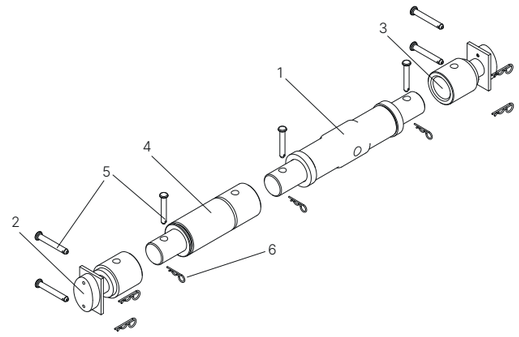
Accessories and spare partse

KVL spindle 70 × 650 / 740 / 920 / 1280 / 1470

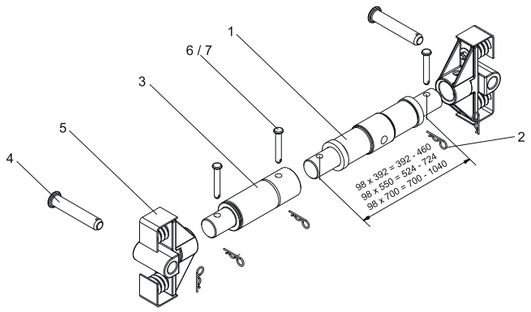


1	Spindle	3	Adapter	5	Bolt 125 × 20
2	Rubber buffer (ellipse)	4	Extension bar	6	Spring connector

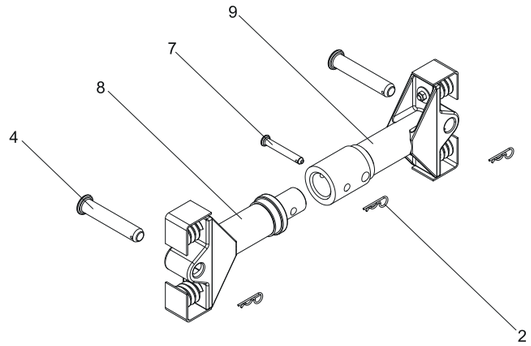
KS spindle with KVL adapter 98 × 550 / 700



Spindle 98 × 550 / 700

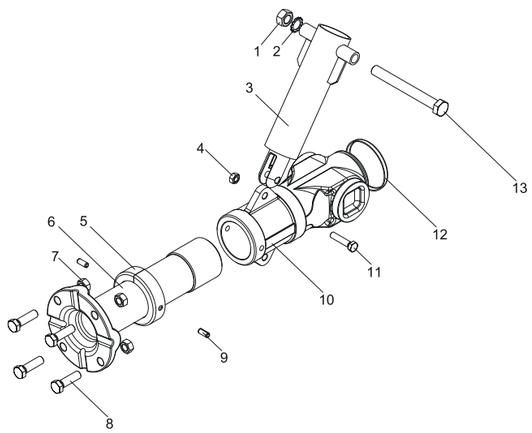


Spindle 98 × 817



1	Spindle	4	Bolt 212 × 43	7	Bolt 140 × 20
2	Spring connector	5	Spring socket	8	Spindle half, left
3	Extension bar, plug-in	6	Bolt 125 × 20	9	Spindle half, right

E+S Strut complete right/left with shock absorber



1	M 20 nut
2	A 20 toothed washer
3	Shock absorber
4	M 12 nut
5	Protective cover half for spindle
6	Spindle right/left
7	M 16 nut
8	Hex. screw M 16 × 55
9	Clamping sleeve 10 × 24 mm
10	Cast nut right/left
11	Hex. screw M 12 × 55
12	Protective cover
13	Hex. screw M 20 × 180

Additional equipment and spare parts

Art. no.	Short description	l [m]	d [m]	G [kg]
821 100	Chain 13/ 5,000 mm	5.00		25.7
850 614	Positioning bolt 200 × 40 mm (linear box strut cart)			1.9
138 030	Bolt 125 × 20 ((spindle 98 × 550 / 700, spindle KVL, adapter KVL, pressure plate KVL, spindle BLU)	0.125	0.02	0.4
138 040	Bolt 140 × 20 (spindle 98 × 817, extension bar 121 × ...)	0.14	0.02	0.4
138 070	Bolt 212 × 43 (spring socket, posts KS 60, KS 60 Manhole, KS 100, KS 100 Manhole, pressure plate KS 60 & KS 100)	0.212	0.043	2.5
843 343	Bolt ø 40 × 150 mm incl. spring connector (adapter Corner shoring for DKU 4.55 m / 5.80 m)			3.5
HE 0050 F	Safety clip 6.0 mm (E+S Boxes)		0.006	0.03
159 161	Pipe clip 60 × 6 (E+S Linear box)			0.10
138 200	Safety clip FS 92 × 5 (KRINGS Boxes)	0.092	0.005	0.1
IB 0215 F	Screw M 12 × 55–8.8 galv. (connection shock absorber-cast nut, E+S)			0.06
IB 0310 F	Screw M 16 × 55–8.8 galv. (extension bars, E+S)			0.11
IB 0420 F	Screw M 20 × 180–4.6 galv. (shock absorber E+S)			0.56
IB 0360 F	Screw M 20 × 45–8.8 galv. (bearing plate, E+S)			0.17
IB 0490 F	Screw M 24 × 80–8.8 galv. (adapter corner shoring for DKU 2.27 m / 3.00 m / 3.81 m)			0.37
IB 0515 F	Screw M 24 × 100–8.8 galv. (adapter corner shoring for DKU 4.55 m / 5.80 m)			0.42
IB 0545 F	Screw M 30 × 80–10.9 galv. (extension bars E+S Linear box)			0.6
IA 0095 F	Nut M 12–8.0 (connection shock absorber-cast nut, E+S)			0.01
IA 0120 F	Nut M 16–8.0 galv. (extension bars E+S)			0.03
IA 0130 F	Nut M 20–8.0 galv. (shock absorber, bearing plate, E+S)			0.03
IA 0140 F	Nut M 24–8.0 galv. (adapter corner shoring for DKU 2.27 m / 3.00 m / 3.81 m / 4.55 m / 5.80 m)			0.11
IA 0185 F	Nut M 30–10.0 galv. (extension bars E+S Linear box)			0.30
HD 0110 F	Cast nut lubrication nipple		0.01	0.01
138 170	FP 80 spring socket			13.0
850 510	Connector (lightweight shoring)			3.1
862 209	Connector (Linear box to Medium top unit)			8.0
850 500	Connector (Medium, Magnum)			6.7
139 100	Connector (KS 60, KS 60 Manhole, KS 100, KS 100 Manhole)			5.5
850 610	Connector bolt (lightweight shoring)	0.10	0.03	0.50
850 600	Connector bolt (Medium, Magnum, Linearbox)	0.20	0.04	1.8
118 060	Spindle 70 × 650 (KVL, BLU, Flex shoring)			12.2
118 070	Spindle 70 × 740 (KVL, BLU, Flex shoring)			13.4
118 090	Spindle 70 × 920 (KVL, BLU, Flex shoring)			15.8
118 020	Spindle 70 × 1280 (KVL, BLU, Flex shoring)			20.5
118 100	Spindle 70 × 1470 (KVL, BLU, Flex shoring)			24.0
138 280	Spindle 98 × 550 (KS 60, KS 60 Manhole, KS 100, KS 100 Manhole, DKU)			22.0
138 290	Spindle 98 × 700 (KS 60, KS 60 Manhole, KS 100, KS 100 Manhole, DKU)			34.0
138 300	Spindle 98 × 817 (KS 60, KS 60 Manhole, KS 100, KS 100 Manhole, DKU)			76.9
108 950	Spindle half, left 98 × 817			38.0
108 960	Spindle half, right 98 × 817			39.0
119 011	KVL adapter for spindles 98 × 550 / 98 × 700			7.6
301 000	Struts, left, hollow spindle			19.5
301 010	Struts, left, full spindle			27.1
300 000	Struts, right, hollow spindle			19.5
300 010	Struts, right, full spindle			27.1
300 100	Shock absorber	0.14		4.5
861 076	Pressure beam (Medium, Magnum, KS 100/Manhole, Manhole, Linearbox, Dragbox)	1.60		176.0
861 074	Pressure beam (Medium, Magnum, KS 100/Manhole, Manhole, Linearbox, Dragbox)	2.35		236.0
861 070	Pressure beam (Medium, Magnum, KS 100/Manhole, Manhole, Linearbox, Dragbox)	2.80		271.0

Art. no.	Short description	l [m]	d [m]	G [kg]
861 075	Pressure beam (Magnum 5.08 m)	4.60		425.0
861 090	Pressure beam (Magnum 6.84 m)	2.20		483.0
861 077	Pressure beam (lightweight shoring, KVL, KS 60, KS 60 Manhole)	1.80		80.0
861 078	Pressure beam (lightweight shoring, KVL, KS 60, KS 60 Manhole)	2.30		95.0
861 079	Pressure beam (lightweight shoring, KVL, KS 60, KS 60 Manhole)	2.80		110.0
861 080	Pressure beam (lightweight shoring, KVL, KS 60, KS 60 Manhole)	3.30		125.0
851 010	Pressure plate (lightweight shoring)			7.0
851 005	Pressure plate (Medium, Magnum, Manhole, Linearbox)			19.0
300 076	Pressure plate (KVL)			9.20
300 075	Pressure plate (KS 60, KS 100)			15.10
842 753	Adapter for DKU corner shoring 2.27 m / 3.00 m / 3.81 m, H = 1.00 m			94.0
843 345	Adapter for DKU corner shoring 4.55 m / 5.80 m, H = 1.10 m			230.0
843 346	Adapter for DKU corner shoring 2.27 m / 3.00 m / 3.81 m auf DKU 4.55 m / 5.80 m			153.0
842 702	Support brackets for BLU			9.0
336 960	Support brackets for DKU			40.0
859 981	Suspended bearing block, E+S			25.6
859 982	Suspended bearing block, variable, KRINGS			12.0
850 699	Rotary bar for spindle, E+S/KRINGS	0.70	0.02	2.5
302 125	Bearing plate (lightweight shoring, Medium, Magnum, Manhole, Dragbox)			4.2
888 406	Flex shoring coupling	1.83		30.0
850 091	Cast pipe extension bar (lightweight shoring, Medium, Manhole, Magnum, DKE)	0.25		11.2
850 100	Cast pipe extension bar (lightweight shoring, Medium, Manhole, Magnum, DKE)	0.55		18.7
850 112	HEB 180 extension bar (lightweight shoring, Medium, Manhole, Magnum, DKE)	0.275		28.0
850 110	HEB 180 extension bar (lightweight shoring, Medium, Manhole, Magnum, DKE)	0.55		43.0
850 124	HEB 180 extension bar (lightweight shoring, Medium, Manhole, Magnum, DKE)	1.10		70.0
850 132	HEB 180 extension bar (lightweight shoring, Medium, Manhole, Magnum, DKE)	1.65		100.0
850 135	HEB 180 extension bar (lightweight shoring, Medium, Manhole, Magnum, DKE)	2.20		130.0
831 028	IPE 400 extension bar (Linear box)	0.140		42.0
831 029	IPE 400 extension bar (Linear box)	0.200		49.0
831 030	IPE 400 extension bar (Linear box)	0.275		57.0
831 040	IPE 400 extension bar (Linear box)	0.55		75.0
831 050	IPE 400 extension bar (Linear box)	1.10		115.0
831 060	IPE 400 extension bar (Linear box)	1.65		155.0
831 070	IPE 400 extension bar (Linear box)	2.20		195.0
139 430	Extension bar 108 × 300 mm (spindle 98 × 550 / 98 × 700)	0.30		13.8
139 445	Extension bar 108 × 500 mm (spindle 98 × 550 / 98 × 700)	0.50		17.7
139 385	Extension bar 108 × 1,000 mm (spindle 98 × 550 / 98 × 700)	1.00		28.0
139 400	Extension bar 108 × 1,500 mm (spindle 98 × 550 / 98 × 700)	1.50		37.4
139 420	Extension bar 108 × 2,000 mm (spindle 98 × 550 / 98 × 700)	2.00		47.3
139 425	Extension bar 108 × 2,500 mm (spindle 98 × 550 / 98 × 700)	2.50		60.0
139 510	Extension bar 121 × 500 mm (spindle 98 × 817)	0.50		25.1
139 470	Extension bar 121 × 1,000 mm (spindle 98 × 817)	1.00		36.3

GETTING YOU QUICKLY AND EASILY TO THE CONSTRUCTION SITE: SITE ROAD SYSTEMS

The site road systems are just as suitable for construction site access roads, road widening or storage spaces as they are for crane and assembly platforms for wind energy, pipeline construction or solar installations.

Plastic site road

Our plastic site road features a combination of low weight and high load-bearing capacity. It is easy to lay, ensures optimal weight distribution, and can be installed on practically any surface. The plastic site road is a genuine lightweight. A single truck can transport up to 75 panels, which keeps transport costs to a minimum. To ensure maximum flexibility, the laying service is carried out by the customer. Thus, it is possible to deliver the panels at short notice. This makes the plastic construction road a particularly economical solution for many applications. It is not only suitable for construction sites, widening existing roads, or as storage space, but equally for use as a crane or assembly platform for wind power, line construction, or photovoltaic systems. Fitted with a specially designed geotextile underlay, the plastic site road can be used to protect sensitive surfaces such as natural stone or precast concrete paving.

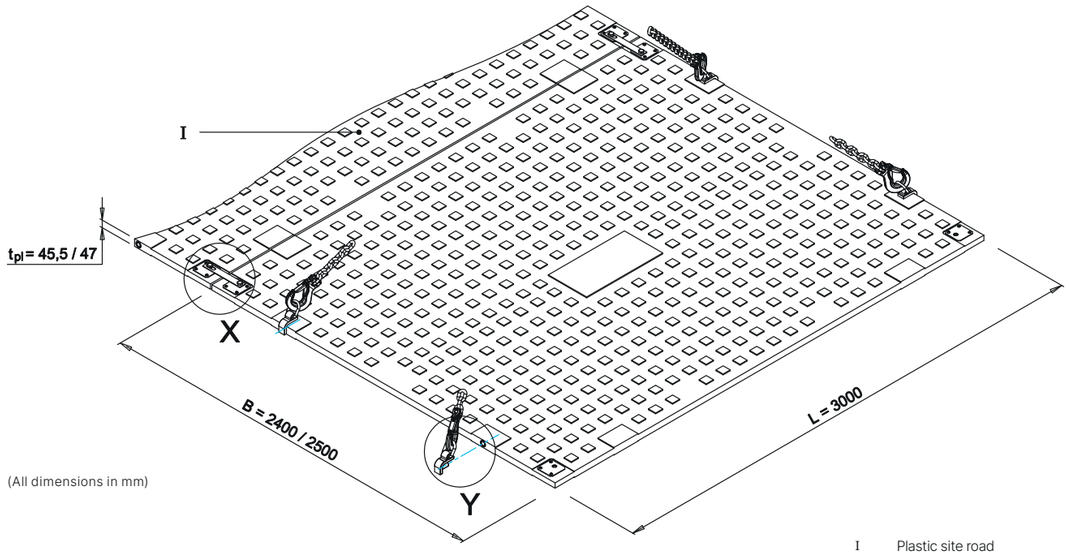
Advantages

- Low weight, but high load capacity
- Simple installation
- High installation speed
- No special vehicles required
- Secures and protects the substrate
- Cost-effective alternative to other temporary road systems
- Safe and economical

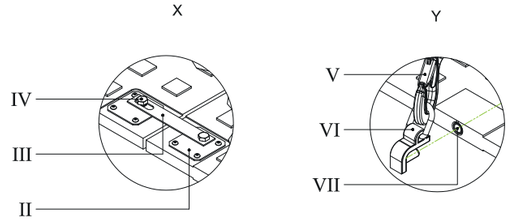
General data

Material	Polyethylene with high density
Dimensions	3.00 m × 2.50 m × 0.05 m
Weight	295 kg / panel
Dimensions	3.00 m × 2.40 m × 0.05 m
Weight	285 kg / panel
Surface	Profile on both sides
Load capacity	approx. 160 t/m² (depending on sub-surface)
Transport	75 panels / truck





(All dimensions in mm)



I	Plastic site road
II	Connector corner
III	Plastic site road connector
IV	Screw M 16
V	Four-strand chain
VI	Plastic site road lifting gear
VII	Lifting socket

Panels

Art. no.	Short description	l [m]	b [m]	t_{pl} [m]	A [m²]	G [kg]
880 227 ST	Plastic site road 3.00 × 2.40 m	3.00	2.40	0.046	7.20	285.0
880 224	Plastic site road 3.00 × 2.40 m	3.00	2.40	0.046	7.20	285.0
880 225 TK	Plastic site road 3.00 × 2.50 m	3.00	2.50	0.047	7.50	295.0

Accessories/spare parts

Art. no.	Short description	l [m]	b [m]	d [m]	G [kg]
880 236	2-way plastic site road connector, metal	0.26	0.04	0.005	0.58
IB 0260F	Screw M 16 × 30–8.8 galv.	0.03		0.016	0.15
880 250	Plastic site road lifting gear				1.15
300 077	Connector corner, upper part incl. threaded sleeve for articles 880 224 & 880 225 TK				0.31
GV000483	Connector corner, upper part incl. threaded sleeve for article 880 227 ST				0.80
CC 1188 E	Connector corner, lower part for articles 880 224 & 880 225 TK				0.24
GV000482	Connector corner, lower part for article 880 227 ST				0.22
IA 0035 F	M 8 × 20 sleeve nut				-
IC 0111 F	M 8 × 30 fillister head screw				-
IA 0036 F	Stop sleeve				-

l	Length	d	Diameter	t_{pl}	Panel thickness	G	Weight
b	Width	A	Surface		

Steel construction roads

Our E+S steel site road system provides great freedom of mobility as well as a host of technical options and broad scope for cutting costs. The site road consists of heavy-duty angles laid lengthwise and special profiles laid crosswise. Its simple design and special connectors make installation a very straightforward matter. The speed of laying is relatively high, as an excavator lifts the elements one after another from a reversing truck. The sections are then connected together with straps.



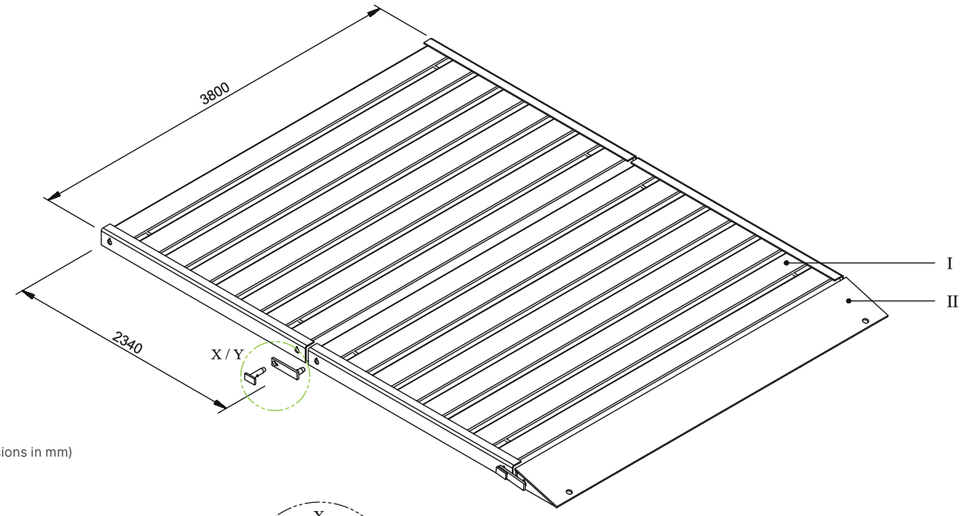
Advantages

- For highest load requirements
- Protection of the substrate
- No special vehicles required for delivery and removal
- Can be laid without earthworks
- Simple installation
- Use of the construction road in flooded areas possible

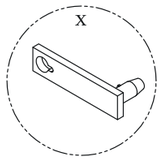
General data

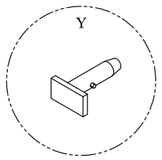
Length	2.34 m
Width	3.80 m
Height	0.16 m
Weight	869 kg
Surface	8.9 m²
Load	12 t axle load





(All dimensions in mm)





I Steel site road
II Access ramp
X Connector
Y Bolt

Accessories/spare parts

Art. no.	Short description	l [m]	b [m]	A [m²]	G [kg]
880 100	Steel site road	2.34	3.80	8.89	869.0
880 150	Connector				4.8
880 200	Access ramp	0.48	3.80	1.82	334.0
880 152	Bolt				3.4

l Length A Surface b_c Clear width G Weight

FOR SPECIFIC REQUIREMENTS:
SUPPLEMENTARY PRODUCTS FOR GROUND WORKS

KRINGS Shoring Grapple

The KRINGS Shoring Grapple allows shoring boxes to be lifted, transported and positioned precisely, quickly and safely. Operation is carried out entirely via the excavator – no additional personnel are required. A centrally positioned lifting loop in the head of the box panels is a pre-condition for the use of the shoring grab. The shoring grab grips the centrally positioned loops and thus connects to the shoring box. This largely eliminates the need for time-consuming attachment and detachment work – saving valuable time on the site. Thanks to quick-release systems, the KRINGS shoring grapple can be fitted to the excavator in no time at all. It is compatible with all standard shoring boxes that have the required mounting eye.

Key specifications

Min. formwork box width	640 mm
Max. formwork box width	2,100 mm / 2,500 mm / 2,900 mm
Load capacity	6.4 t
Oil pressure (opening/closing)	80 bar

Advantages

- Simple, quick and safe lifting, transporting and positioning of shoring boxes
- Suitable for all standard quick release systems
- Hydraulic lifting of the shoring box is controlled from the operator cab
- Manual attachment and detachment of chains is largely eliminated
- No additional personnel required
- High swing stability and safe handling on confined construction sites
- 360° rotation via the integrated rotary mechanism motor
- Precise, rapid positioning in the trench without assistance
- Minimises the risk of accidents and injuries on the site



Fall protection

The steel barrier fall protection reliably secures the excavation pit and prevents people or material from falling down. The fall protection system is both lightweight and extremely robust. Only one person is required to quickly assemble the three-part system. The steel barrier replaces the classic 3-part side protection, as it simultaneously fulfils the functions of handrail, knee rail and toe board.

Advantages

- Quick and easy installation
- Can be erected and dismantled by a single person
- No excavator required
- Suitable for box, sliding rail and sheet pile shoring
- Required from a depth of 2.0 m in accordance with DGUV
- Clamping range between 0 and 150 mm



Components

Art. no.	Short description	G [kg]	l [m]
GV000216	Steel barrier 2.60 × 1.18 m	19.0	2.60
GV000213	Clamp 150	4.8	
GV000214	Post 1500	3.5	1.50
GV000558	Transport box 25	60.0	
GV000217	Transport box 60	98.0	

Fall protection (rail guard)

Advantages

- Quick and easy installation
- Can be erected and dismantled by a single person
- No excavator required
- Suitable for box and sliding rail shoring
- Required from a depth of 2.0 m in accordance with DGUV
- Clamping range between 60 and 180 mm



Components

Art. no.	Short description	G [kg]	l [m]
880 800	Railing post, fall protection	4.6	1.00
880 900	Attachment for shoring, fall protection	7.0	
880 801	Railing post extension	2.6	0.50

Shoring ladder

The shoring ladder can be used in all standard trench shoring systems. Adjusting screws allow the ladder to be aligned vertically, regardless of whether box or slide rail shoring is used. The shoring ladder enables safe descent to a depth of up to 10 metres. The three metre long standard model can be extended to up to 10 metres with 1-metre-long extension units.

Advantages

- Easy and safe installation in the excavation pit
- Suitable for depths of up to 10 metres
- For box and linear shoring
- Easy to attach to the shoring using an excavator or lifting crane
- Adjustable between 3 and 10 metres
- 1-metre-length intermediate pieces for extension

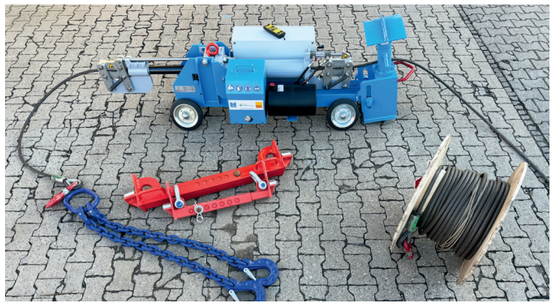
Components

Art. no.	Short description	G [kg]	l [m]
GV000210	Shoring ladder – access	134.0	0.9
GV000211	Shoring ladder – exit	92.0	2.1
GV000212	Shoring ladder – extension unit	39.0	1.0



Pipe puller

Our pipe puller allows socket joints to be pulled together without causing damage. Using the pipe puller also prevents the excavator bucket from damaging the bedding or the pipe ends. Our pipe puller is very compact: all key functional components, such as the hydraulic cylinder, control unit and double clamping tongs, are mounted on a mobile trolley. It is operated by a 12-volt battery. Vertical anchoring in the sleeve between two pipes is achieved using a sleeve spindle. The tension force is 100 kN; there is no limit to the pulling length



Advantages

- With an additional adapter, pipes of up to 2,400 millimeters in diameter can be pulled
- Compact design
- No damage to the ends of the pipes

General data

Traction	100 kN (note friction forces)
Pulling length	35 m / 50 m
Working travel (lift)	500 mm
Engine	1.3 kW–2,400 U/min–12 V
Pipe diameter	800 mm–2,400 mm
Cable	35 m / 50 m
Power supply (battery)	12 V / 170 Ah
Working pressure	160 bar

Accessories/spare parts

Art. no.	Short description	l [m]	d [m]	G [kg]
GV000520	SZ 10-M pipe puller			380.0
284 970	Pull beam for pipe ø 800 to 1,000 mm	0.80		20.0
284 940	Pull beam for pipe ø 1,000 to 1,300 mm	1.00		32.0
284 950	Pull beam for pipe ø 1,300 to 1,800 mm	1.30		40.0
284 960	Pull beam for pipe ø 1,800 to 2,400 mm	1.80		42.0
139 380	Extension bar ZW SB–108 × 100 mm	0.10		5.5
139 415	Extension bar ZW SB–108 × 200 mm	0.20		10.0
139 430	Extension bar ZW SB–108 × 300 mm	0.30		13.8
139 445	Extension bar ZW SB–108 × 500 mm	0.50		17.7
139 385	Extension bar ZW SB–108 × 1,000 mm	1.00		28.0
139 400	Extension bar ZW SB–108 × 1,500 mm	1.50		37.5
138 030	Bolt 125 × 20	0.125	0.020	0.4
138 200	Safety clip FS 92 × 5	0.092	0.005	0.1
284 830	Cable 35 m, ø 18 mm	35.00	0.018	67.0
284 850	Cable 50 m, ø 18 mm	50.00	0.018	89.0
853 090	Two-strand chain 16/1500 mm			35.0
GV000156	Remote control for SZ 10-M			0.25
GV000559	Charger for SZ 10-M			1.90
284 025	Transport box for SZ 10-M			166.0
281 475	Sleeve tension for standard pipe profile			75.0
281 477	Socket tension for egg-shaped pipe profile			96.0
281 480	Sleeve tension for rectangular pipe profile			76.0

MÜLLER sheet pile clamp

Components

Art.-Nr.	Short description	G [kg]	Zulässiges Bohlengewicht
GV000957	Sheet pile clamp MÜLLER MS-SSZ 3BL	19.0	30 kN (3 to)

Advantages

- For the safe transport of trench sheets, sheet piles and I-beams
- A safety pin prevents the ground release shackle from opening accidentally under load
- The ground release shackle is opened using a pull rope



Trench struts

Particularly in inner-city areas, rapid excavation and pipe-laying are essential. However, problems may arise in deep excavations if tie-back anchoring is not allowed – e. g. if there are adjacent buildings. In this case, trench struts can be used to support the walers.



Trench struts

TITAN terra trench strut acc. to DIN 4124



TITAN terra trench strut for wood shoring *

Ordering code	Adjustment range approx. [cm]	Admissible load [kN]	Weight approx. [kg]
terra spindle	30	–	2,1
terra Gr. 1	50–80	38–30	3,6
terra Gr. 1a	60–90	36–29	4,0
terra Gr. 2	80–110	34–29	4,6
terra Gr. 3	110–140	29–23	5,5
terra Gr. 4	140–170	26–22	6,5

TITAN 48 trench strut acc. to DIN 4124



TITAN 48 trench strut for wood shoring *

Ordering code	Adjustment range approx. [cm]	Admissible load [kN]	Weight approx. [kg]
Ti 48/120	70–117	63–48	8,0
Ti 48/150	90–150	61–45	10,0
Ti 48/210	120–210	60–38	13,0

TITAN 60 trench strut acc. to DIN 4124



TITAN 60 trench strut for wood shoring *

Ordering code	Adjustment range approx. [cm]	Admissible load [kN]	Weight approx. [kg]
Ti 60 spindle	60	–	10.0
Ti 60/150	90–150	113–99	17.0
Ti 60/200	140–200	100–93	20.0
Ti 60/250	190–250	95–84	23.0
Ti 60/300	240–300	85–72	26.0

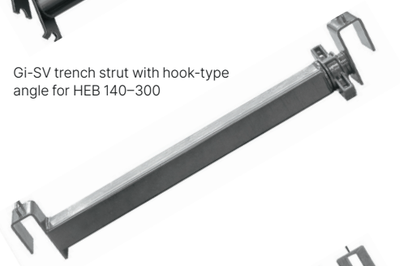
Gigant S with hook-type angle for HEB 140–240



Gi-S trench strut for steel (HEB) waler

Type inspection number	Designation	Adjustment range approx. [cm]	Admissible load [kN]	Weight approx. [kg]
Gigant S TBG 3-Gi-S trench strut	Gi-S-120	70–120	210–177	26.0
	Gi-S-170	105–170	210–177	32.0
	Gi-S-210	140–210	184–156	36.0
	Gi-S-260	190–260	176–140	40.0
	Gi-S-310	240–310	157–138	45.0

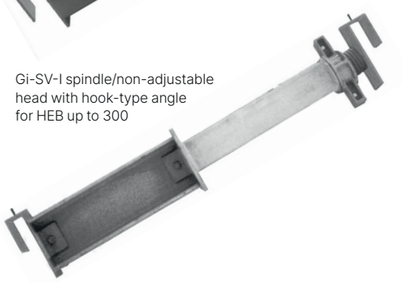
Gi-SV trench strut with hook-type angle for HEB 140–300



Gi-SV trench strut for steel (HEB) waler

Type inspection number	Designation	Adjustment range approx. [cm]	Admissible load [kN]	Weight approx. [kg]
Gigant SV TBG 3-Gi-SV trench strut	Gi-SV-210	140–210	548–290	69.0
	Gi-SV-260	190–260	471–260	81.0
	Gi-SV-310	240–310	424–260	92.0
	Gi-SV-380	310–380	310–380	107.0
	Gi-SV-450	380–450	380–450	122.0

Gi-SV-I spindle/non-adjustable head with hook-type angle for HEB up to 300



Gi-SV-I spindle/non-adjustable head for steel (HEB) waler

Type inspection number	Designation	Adjustment range approx. [cm]	Admissible load [kN]	Weight approx. [kg]
TBG 3-Gi-SV-I spindle/non-adjustable head	Gi-SV-I	72–97	448–393	50.0
	Gi-SV-I/F	–	448–393	5.0

* for sale only



terra
infrastructure

terra infrastructure GmbH
Hollestr. 7a
DE-45127 Essen
T: +49 201 565 783 20
info@terra-infrastructure.com
www.terra-infrastructure.com

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