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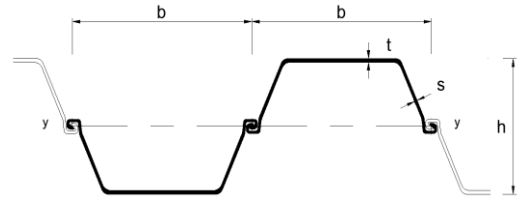
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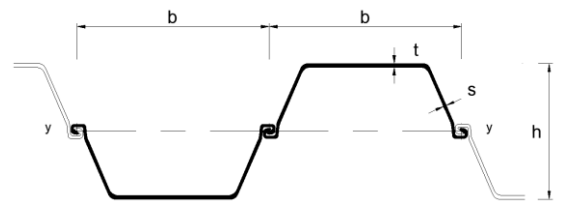
Hot-rolled sheet pile sections

Overview: U-Sections



| Technical data | | | | | | | | | | | | | |
|--------------------------|---|--|-----------------------------|-------------------------------|---|--------------------------------|-----------------------------|-------------------|-----------------------------|------------------------------------|----------|----------|--|
| thyssenkrupp Sections | Elastic section modulus W_y cm ³ | Plastic section modulus $W_{y,pl}$ cm ³ | Weight kg/m ² | Weight Single pile kg/m | Moment of inertia I_y cm ⁴ /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 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 605 KN | 2,117 | 2,466 | 142.7 | 85.6 | 44,886 | 12.6 | 10.0 | 424.0 | 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 | |
| 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*



| Technical data | | | | | | | | | | | | | |
|--------------------------|---|--|-----------------------------|-------------------------------|---|--------------------------------|-----------------------------|-------------------|-----------------------------|------------------------------------|----------|----------|--|
| thyssenkrupp Sections | Elastic section modulus W_y cm ³ | Plastic section modulus $W_{y,pl}$ cm ³ | Weight kg/m ² | Weight Single pile kg/m | Moment of inertia I_y cm ⁴ /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

| Technical data | | Elastic section modulus W_y cm ³ | Weight kg/m | Cross sectional area cm ² | Coating area m ² /m | Static moment S_y cm ³ | Moment of inertia I_y cm ⁴ | Radius of gyration cm |
|-----------------------|------------|---|----------------|---|-----------------------------------|---|---|--------------------------|
| thyssenkrupp Sections | | | | | | | | |
| <p>tkL 601</p> | per m wall | 744 | 77.2 | 98.3 | 2.47 | 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 | 3.80 | | 13,836 | 10.83 |
| | per T | 1,044 | 138.9 | 177.0 | 4.56 | | 19,235 | 10.42 |
| <p>tkL 601 FP</p> | per m wall | 745 | 79.0 | 100.7 | 2.47 | 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 | 3.80 | | 13,857 | 10.70 |
| | per T | 1,047 | 142.3 | 181.2 | 4.56 | | 19,262 | 10.30 |
| <p>tkL 601 K</p> | per m wall | 775 | 80.8 | 102.9 | 2.47 | 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 | 3.80 | | 14,423 | 10.81 |
| | per T | 1,088 | 145.5 | 185.3 | 4.56 | | 20,050 | 10.40 |
| <p>tkL 602 A</p> | per m wall | 806 | 85.5 | 109.0 | 2.47 | 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 | 3.80 | | 14,998 | 10.71 |
| | per T | 1,135 | 153.9 | 196.1 | 4.57 | | 20,865 | 10.31 |
| <p>tkL 602</p> | per m wall | 842 | 89.0 | 113.3 | 2.47 | 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 | 3.80 | | 15,655 | 10.73 |
| | per T | 1,184 | 160.2 | 204.0 | 4.57 | | 21,773 | 10.28 |
| <p>tkL 602 K</p> | per m wall | 877 | 92.3 | 117.7 | 2.47 | 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 | 3.80 | | 16,308 | 10.75 |
| | per T | 1,232 | 166.2 | 211.8 | 4.56 | | 22,676 | 10.35 |

- 1) The elastic section modulus of the U-profiles may only be applied in the static calculation if at least every second plank lock in the wall is interlocked to absorb the shear forces
- 2) Elastic section modulus: for S and T related to the axis of gravity of the respective element, for D and per m wall related to the wall axis y-y

| Technical data | | Elastic section modulus W_y cm^3 | Weight kg/m | Cross sectional area cm^2 | Coating area m^2/m | Static moment S_y cm^3 | Moment of inertia I_y cm^4 | Radius of gyration cm |
|----------------|------------|---|----------------------|------------------------------------|------------------------------------|-----------------------------------|---------------------------------------|--------------------------------|
| | per m wall | 1,138 | 102.5 | 130.6 | 2.65 | 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 |
| | per m wall | 1,200 | 107.0 | 136.3 | 2.65 | 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 |
| | per m wall | 1,230 | 111.5 | 142.0 | 2.65 | 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 |
| | per m wall | 1,240 | 113.0 | 143.9 | 2.65 | 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 |
| | per m wall | 1,300 | 120.2 | 153.1 | 2.65 | 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 |
| | per m wall | 1,404 | 131.0 | 166.9 | 2.64 | 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 |
| | per m wall | 1,564 | 111.3 | 150.8 | 2.88 | 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 |
| | per m wall | 1,618 | 121.8 | 155.2 | 2.85 | 943 | 31,548 | 14.26 |
| | per S | 426 | 73.1 | 93.1 | 1.85 | | 5,984 | 8.02 |
| | per D | 1,941 | 146.2 | 186.2 | 3.56 | | 37,857 | 14.26 |
| | per T | 2,240 | 219.3 | 279.4 | 5.27 | | 52,471 | 13.70 |

- 1) The elastic section modulus of the U-profiles may only be applied in the static calculation if at least every second plank lock in the wall is interlocked to absorb the shear
- 2) Elastic section modulus: for S and T related to the axis of gravity of the respective element, for D and per m wall related to the wall axis y-y

| Technical data | | Elastic section modulus W_y cm ³ | Weight kg/m | Cross sectional area cm ² | Coating area m ² /m | Static moment S_y cm ³ | Moment of inertia I_y cm ⁴ | Radius of gyration cm |
|----------------|------------|---|----------------|---|-----------------------------------|---|---|--------------------------|
| | per m wall | 1,672 | 125.3 | 159.7 | 2.85 | 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 |
| | per m wall | 1,821 | 127.5 | 162.5 | 2.91 | 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 |
| | per m wall | 2,019 | 136.9 | 174.4 | 2.90 | 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 |
| | per m wall | 2,117 | 142.7 | 181.8 | 2.90 | 1,233 | 44,886 | 15.72 |
| | per S | 498 | 85.6 | 109.1 | 1.88 | | 7,742 | 8.43 |
| | per D | 2,541 | 171.7 | 218.1 | 3.62 | | 53,864 | 15.72 |
| | per T | 2,904 | 256.8 | 327.1 | 5.36 | | 74,399 | 15.08 |
| | per m wall | 2,205 | 142.3 | 181.3 | 2.93 | 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 |
| | per m wall | 2,355 | 149.6 | 190.6 | 2.92 | 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 |
| | per m wall | 2,506 | 156.8 | 199.8 | 2.92 | 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 elastic section modulus of the U-profiles may only be applied in the static calculation if at least every second plank lock in the wall is interlocked to absorb the shear
- 2) Elastic section modulus: for S and T related to the axis of gravity of the respective element, for D and per m wall related to the wall axis y-y

| Technical data | | Elastic section modulus W_y cm^3 | Weight kg/m | Cross sectional area cm^2 | Coating area m^2/m | Static moment S_y cm^3 | Moment of inertia I_y cm^4 | Radius of gyration cm |
|----------------|------------|---|-------------------------|---------------------------------------|---------------------------------------|---|---|-----------------------------------|
| | per m wall | 2,607 | 158.6 | 202.0 | 2.94 | 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 |
| | per m wall | 2,701 | 163.1 | 207.8 | 2.94 | 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 |
| | per m wall | 2,701 | 163.1 | 207.8 | 2.94 | 1.619 | 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 |
| | per m wall | 2,841 | 169.6 | 216.1 | 2.94 | 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 |
| | per m wall | 2,903 | 172.5 | 219.8 | 2.94 | 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 |
| | per m wall | 3,006 | 177.1 | 225.6 | 2.98 | 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 |
| | per m wall | 3,211 | 187.3 | 238.6 | 2.98 | 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 |
| | per m wall | 3,365 | 194.7 | 248.0 | 2.98 | 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 elastic section modulus of the U-profiles may only be applied in the static calculation if at least every second plank lock in the wall is interlocked to absorb the shear
 2) Elastic section modulus: for S and T related to the axis of gravity of the respective element, for D and per m wall related to the wall axis y-y

Details: Special sections*

| Technical data | | Elastic section modulus W_y cm ³ | Weight kg/m | Cross sectional area cm ² | Coating area m ² /m | Static moment S_y cm ³ | Moment of inertia I_y cm ⁴ | Radius of gyration cm |
|----------------|------------|---|-------------|--------------------------------------|--------------------------------|-------------------------------------|---|-----------------------|
| | per m wall | 831 | 89.5 | 114.0 | 2.47 | 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 | 3.80 | | 15,411 | 10.61 |
| | per T | 1,170 | 161.1 | 205.2 | 4.56 | | 21,438 | 10.22 |
| | per m wall | 854 | 90.0 | 114.7 | 2.47 | 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 | 3.80 | | 15,890 | 10.74 |
| | per T | 1,200 | 162.1 | 206.5 | 4.57 | | 22,093 | 10.34 |
| | per m wall | 881 | 92.9 | 118.3 | 2.47 | 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 | 3.80 | | 16,380 | 10.74 |
| | per T | 1,238 | 167.2 | 213.0 | 4.56 | | 22,774 | 10.34 |
| | per m wall | 894 | 93.3 | 118.8 | 2.47 | 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 | 3.80 | | 16,686 | 10.82 |
| | per T | 1,253 | 168.0 | 213.9 | 4.57 | | 23,178 | 10.41 |
| | per m wall | 907 | 94.0 | 119.8 | 2.47 | 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 | 3.80 | | 16,954 | 10.86 |
| | per T | 1,271 | 169.3 | 215.7 | 4.56 | | 23,545 | 10.45 |
| | per m wall | 1,161 | 104.0 | 132.4 | 2.65 | 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 |
| | per m wall | 1,215 | 108.0 | 137.7 | 2.65 | 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 elastic section modulus of the U-profiles may only be applied in the static calculation if at least every second plank lock in the wall is interlocked to absorb the shear
- 2) E section modulus: for S and T related to the axis of gravity of the respective element, for D and per m wall related to the wall axis y-y

| Technical data | | Elastic section modulus W_y cm^3 | Weight kg/m | Cross sectional area cm^2 | Coating area m^2/m | Static moment S_y cm^3 | Moment of inertia I_y cm^4 | Radius of gyration cm |
|----------------|------------|---|-------------------------|---------------------------------------|---------------------------------------|---|---|-----------------------------------|
| | per m wall | 1,261 | 114.1 | 145.3 | 2.65 | 732 | 20,196 | 11.79 |
| | per S | 327 | 68.4 | 87.2 | 1.73 | | 3,905 | 6.69 |
| | per D | 1,513 | 136.9 | 174.4 | 3.32 | | 24,235 | 11.79 |
| | per T | 1,746 | 205.3 | 261.5 | 4.91 | | 33,617 | 11.34 |
| | per m wall | 1,409 | 107.1 | 136.5 | 2.88 | 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 |
| | per m wall | 1,659 | 124.0 | 158.0 | 2.85 | 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 |
| | per m wall | 1,885 | 130.1 | 165.7 | 2.91 | 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 |
| | per m wall | 1,975 | 134.8 | 171.7 | 2.90 | 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 |
| | per m wall | 2,020 | 137.0 | 174.5 | 2.90 | 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 |
| | per m wall | 2,050 | 138.5 | 176.4 | 2.90 | 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 elastic section modulus of the U-profiles may only be applied in the static calculation if at least every second plank lock in the wall is interlocked to absorb the shear
- 2) Elastic section modulus: for S and T related to the axis of gravity of the respective element, for D and per m wall related to the wall axis y-y

| Technical data | | Elastic section modulus W_y cm^3 | Weight kg/m | Cross sectional area cm^2 | Coating area m^2/m | Static moment S_y cm^3 | Moment of inertia I_y cm^4 | Radius of gyration cm |
|----------------|------------|---|----------------------|------------------------------------|------------------------------------|-----------------------------------|---------------------------------------|--------------------------------|
| | per m wall | 2,065 | 139.2 | 177.3 | 2.90 | 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 |
| | per m wall | 2,068 | 142.9 | 182.0 | 2.91 | 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 |
| | per m wall | 2,094 | 140.5 | 179.0 | 2.90 | 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 |
| | per m wall | 2,228 | 144.9 | 184.6 | 2.93 | 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 |
| | per m wall | 2,269 | 144.9 | 184.6 | 2.93 | 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 |
| | per m wall | 2,402 | 153.4 | 195.4 | 2.92 | 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 |
| | per m wall | 2,517 | 157.0 | 200.1 | 2.92 | 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 |
| | per m wall | 2,517 | 157.0 | 200.1 | 2.92 | 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 elastic section modulus of the U-profiles may only be applied in the static calculation if at least every second plank lock in the wall is interlocked to absorb the shear
 2) Elastic section modulus: for S and T related to the axis of gravity of the respective element, for D and per m wall related to the wall axis y-y

| Technical data | | Elastic section modulus W_y cm^3 | Weight kg/m | Cross sectional area cm^2 | Coating area m^2/m | Static moment S_y cm^3 | Moment of inertia I_y cm^4 | Radius of gyration cm |
|----------------|------------|---|----------------------|------------------------------------|------------------------------------|-----------------------------------|---------------------------------------|--------------------------------|
| | per m wall | 1,423 | 127.0 | 161.7 | 2.85 | 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 |
| | per m wall | 1,504 | 133.2 | 169.7 | 2.85 | 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 |
| | per m wall | 1,602 | 140.6 | 179.1 | 2.84 | 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 |
| | per m wall | 2,800 | 184.6 | 235.2 | 3.18 | 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 |
| | per m wall | 1,600 | 155.5 | 198.1 | 3.12 | 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 elastic section modulus of the U-profiles may only be applied in the static calculation if at least every second plank lock in the wall is interlocked to absorb the shear
- 2) Elastic section modulus: for S and T related to the axis of gravity of the respective element, for D and per m wall related to the wall axis y-y

Conformity assessments

Certificate of conformity (Ü-Zeichen, 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

U-Section (LARSEN interlock)

Interlock form to DIN EN 10248-2
und EAU 2020



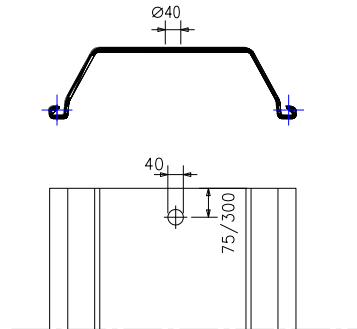
Handling holes and crimping/welding

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 triple press 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

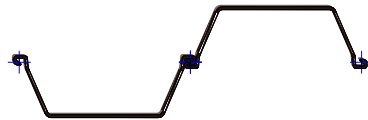
Shape of supply

S



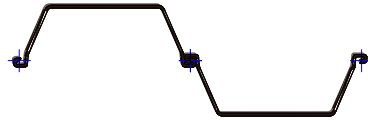
D

(S-shape)



DZ

(Z-shape is non-standart)

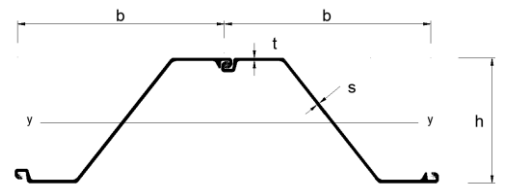


Z

Triple pile
on request



Overview: Z-Sections



| Technical data | | | | | | | | | | | | |
|--------------------------|---|--|---------------------------|--|---|---|--|------------------------------|--|------------------------------------|----------|----------|
| thyssenkrupp Sections | Elastic section modulus W_y cm^3 | Plastic section modulus $W_{y,pl}$ cm^3 | Weight kg/m^2 | Weight Single pile kg/m | Moment of inertia I_y cm^4/m | Flange thick- ness 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 |
| Hoesch 1207 | 1,205 | 1,415 | 96.6 | 67.6 | 18,833 | 8.6 | 8.5 | 312.5 | 700 | 3 | 3 | 3 |
| Hoesch 1307 | 1,307 | 1,541 | 105.6 | 73.9 | 20,494 | 9.6 | 9.5 | 313.5 | 700 | 2 | 3 | 3 |
| Hoesch 1407 | 1,409 | 1,667 | 114.7 | 80.3 | 22,156 | 10.6 | 10.5 | 314.5 | 700 | 2 | 2 | 3 |
| Hoesch 1707 | 1,731 | 2,031 | 104.6 | 73.2 | 36,304 | 8.5 | 8.5 | 419.5 | 700 | 3 | 3 | 3 |
| Hoesch 1807 | 1,804 | 2,120 | 109.5 | 76.7 | 37,894 | 9.0 | 9.0 | 420.0 | 700 | 2 | 3 | 3 |
| Hoesch 1907 | 1,878 | 2,213 | 114.5 | 80.1 | 39,485 | 9.5 | 9.5 | 420.5 | 700 | 2 | 3 | 3 |
| Hoesch 2007 | 1,951 | 2,302 | 119.4 | 83.6 | 41,076 | 10.0 | 10.0 | 421.0 | 700 | 2 | 3 | 3 |
| Hoesch 2407 | 2,432 | 2,818 | 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 | 3,240 | 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

| Technical data | | Elastic section modulus W_y cm ³ | Weight kg/m | Cross sectional area cm ² | Coating area m ² /m | Static moment S_y cm ³ | Moment of inertia I_y cm ⁴ | Radius of gyration cm |
|----------------|------------|---|----------------|---|-----------------------------------|---|---|--------------------------|
| | per m wall | 1,205 | 96.6 | 123.1 | 1.22 | 708 | 18,833 | 12.37 |
| | per S | 843 | 67.6 | 86.1 | 0.86 | | 13,183 | 12.37 |
| | per D | 1,687 | 135.2 | 172.3 | 1.71 | | 26,366 | 12.37 |
| | per m wall | 1,307 | 105.6 | 134.6 | 1.22 | 770 | 20,494 | 12.34 |
| | per S | 915 | 73.9 | 94.2 | 0.86 | | 14,346 | 12.34 |
| | per D | 1,830 | 147.9 | 188.4 | 1.71 | | 28,692 | 12.34 |
| | per m wall | 1,409 | 114.7 | 146.1 | 1.22 | 834 | 22,156 | 12.31 |
| | per S | 985 | 80.3 | 102.3 | 0.86 | | 15,510 | 12.31 |
| | per D | 1,973 | 160.6 | 204.6 | 1.71 | | 31,019 | 12.31 |
| | 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 |
| | 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 |
| | 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 |

| Technical data | | Elastic section modulus W_y cm^3 | Weight kg/m | Cross sectional area cm^2 | Coating area m^2/m | Static moment S_y cm^3 | Moment of inertia I_y cm^4 | Radius of gyration cm |
|----------------|------------|---|-------------------------|---------------------------------------|---------------------------------------|---|---|-----------------------------------|
| | per m wall | 1,951 | 119.4 | 152.5 | 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 |
| | per m wall | 2,432 | 135.9 | 173.1 | 1.39 | 1.409 | 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 |
| | 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 |
| | 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 |
| | per m wall | 3,600 | 168.8 | 215.0 | 1.45 | 2.056 | 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 |
| | 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 |
| | 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 |

Conformity assessments

Certificate of conformity (Ü-Zeichen, 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 (LARSEN interlock)

Interlock form to DIN EN 10248-2
und EAU 2020



Handling holes and crimping/welding

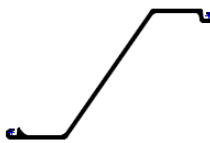
Handling holes can be cut on request. They are cut in every pile flange according to the drawing below. The distance of the hole from the top edge is 75 or 300 mm and must be specified with the order. Crimping/welding of double piles on request.

Shape of supply

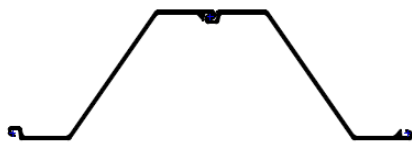
Eb



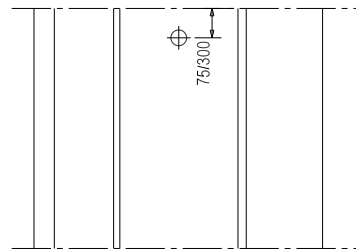
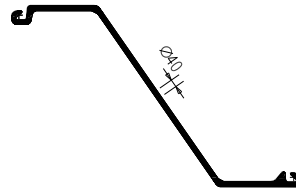
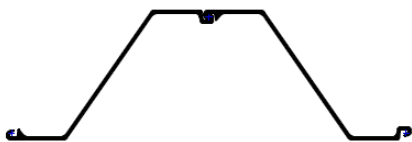
Ea



Db

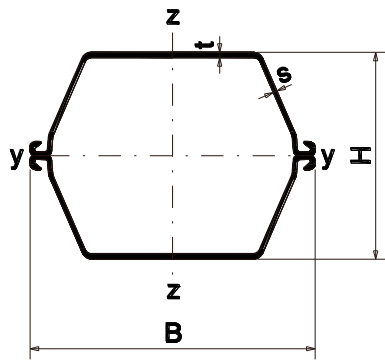


Da



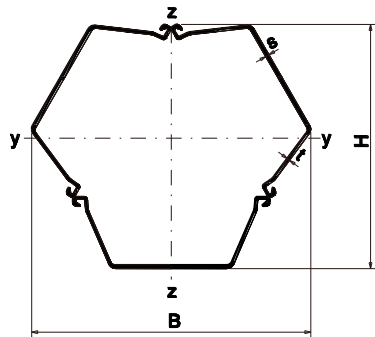
Steel box piles

Technical data



thyssenkrupp LP

| Pile sections | Section modulus W_y cm ³ | Section modulus W_z cm ³ | Weight kg/m | b mm | h mm | Dimensions t mm | s mm | Perimeter cm | Area Steel cross section cm ² | Moment of inertia I_y cm ⁴ | Moment of inertia I_z cm ⁴ | Radius of gyration min.i cm |
|---------------|---------------------------------------|---------------------------------------|-------------|------|------|-----------------|------|--------------|--|---|---|-----------------------------|
| 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 |

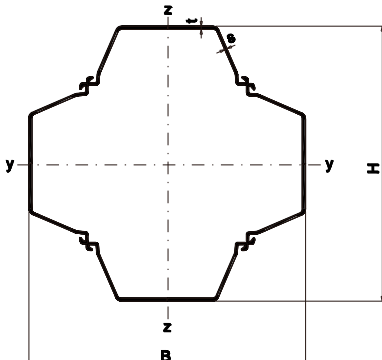
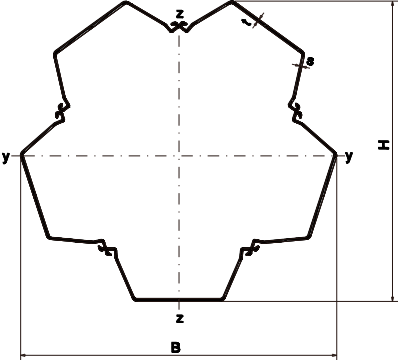
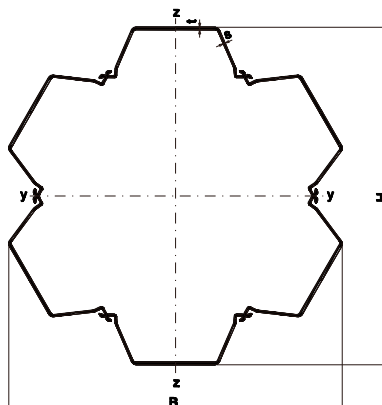


thyssenkrupp LD

| | | | | | | | | | | | | |
|-----------|-------|-------|-------|-----|-----|------|------|-----|-------|---------|---------|-------|
| 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 |

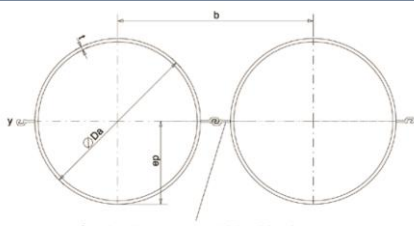
- 1) Further (special) sections on request
- 2) Slats can be additionally welded on to increase the static values

Technical Data

| | Pile sections | Section modulus W_y cm^3 | Section modulus W_z cm^3 | Weight kg/m | b mm | H mm | Dimensions t mm | s mm | Perimeter cm | Area Steel cross section cm^2 | Moment of inertia I_y cm^4 | Moment of inertia I_z cm^4 | Radius of gyration $\text{min. } i$ cm |
|---|---------------|-------------------------------------|-------------------------------------|----------------------|---------------|---------------|--------------------------|---------------|-----------------------|--|---------------------------------------|---------------------------------------|---|
| thyssenkrupp 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 | | |
| thyssenkrupp 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 | 1,319,432 | 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 | 1,384,162 | 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 |
| thyssenkrupp 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 |

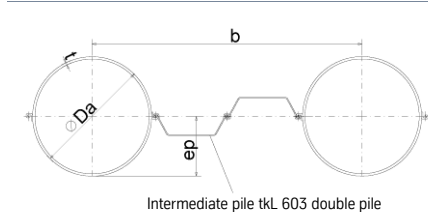
1) Further (special) sections on request
 2) Slats can be additionally welded on to increase the static values

Combined sheet pile walls

| Technical data | | | | | | | | | |
|--|---------------|----------------|-----------|--------------------------|--------------------------|---------------|--|------------------------------|--|
| 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 mm | t mm | b (m) | I_y cm ⁴ /m | W_y cm ³ /m | ep cm | 100% kg/m ² | Water site m ² /m | |
|  <p>Steelwall connectors LPB 180-12</p> | 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 | | |

Technical data

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

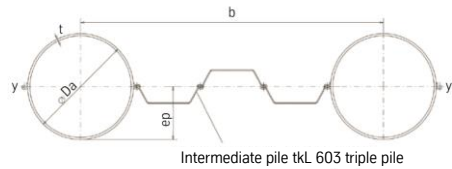


| Pipe diameter Da mm | Wall thickness t mm | Width b m | Including intermediate piles | | Excluding intermediate piles | | Edge distance ep cm | Dead load related to pipe length - Length of connector as % of pipe length | | | Coating area ly m ² /m |
|---------------------------|---------------------------|-----------------|---|---|---|---|---------------------------|--|------------------------|------------------------|---|
| | | | Moment of inertia I _y cm ⁴ /m | Section modulus W _y cm ³ /m | Moment of inertia I _y cm ⁴ /m | Section modulus W _y cm ³ /m | | Da kg/m ² | t kg/m ² | b kg/m ² | |
| | | | | | | | | | | | |
| 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

Technical data

Pipe / sheet pile wall with tkL 603 triple pile intermediate piles

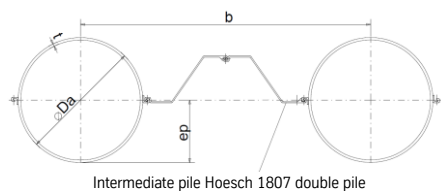


| Pipe diameter Da mm | Wall thickness t mm | Width b m | Including intermediate piles | | Excluding intermediate piles | | Edge distance ep cm | Dead load related to pipe length - Length of connector as % of pipe length | | | Coating area ly m ² /m |
|---------------------------|---------------------------|-----------------|---|---|---|---|---------------------------|--|------------------------|------------------------|---|
| | | | Moment of inertia I _y cm ⁴ /m | Section modulus W _y cm ³ /m | Moment of inertia I _y cm ⁴ /m | Section modulus W _y cm ³ /m | | Da kg/m ² | t kg/m ² | b kg/m ² | |
| | | | | | | | | | | | |
| 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 |

Other intermediate piles on request

Technical data

Pipe / sheet pile wall with Hoesch 1807 double pile intermediate piles

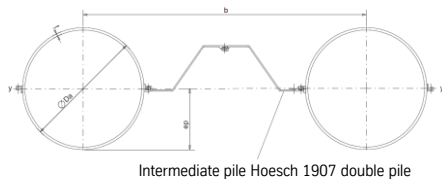


| Pipe diameter Da mm | Wall thickness t mm | Width b m | Including intermediate piles | | Excluding intermediate piles | | Edge distance ep cm | Dead load related to pipe length - Length of connector as % of pipe length | | | Coating area I _y m ² /m |
|---------------------------|---------------------------|-----------------|---|---|---|---|---------------------------|--|------------------------|------------------------|---|
| | | | Moment of inertia I _y cm ⁴ /m | Section modulus W _y cm ³ /m | Moment of inertia I _y cm ⁴ /m | Section modulus W _y cm ³ /m | | Da kg/m ² | t kg/m ² | b kg/m ² | |
| | | | | | | | | | | | |
| 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 |

Other intermediate piles on request

Technical data

Pipe / sheet pile wall with Hoesch 1907 double pile intermediate piles



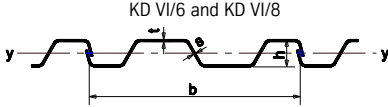
Intermediate pile Hoesch 1907 double pile

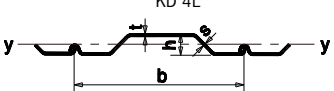
| Pipe diameter Da mm | Wall thickness t mm | Width b m | Including intermediate piles | | Excluding intermediate piles | | Edge distance ep cm | Dead load related to pipe length - Length of connector as % of pipe length | | | Coating area I _y m ² /m |
|---------------------------|---------------------------|-----------------|---|---|---|---|---------------------------|--|------------------------|------------------------|---|
| | | | Moment of inertia I _y cm ⁴ /m | Section modulus W _y cm ³ /m | Moment of inertia I _y cm ⁴ /m | Section modulus W _y cm ³ /m | | Da kg/m ² | t kg/m ² | b kg/m ² | |
| | | | | | | | | | | | |
| 813 | 10.00 | 2,273 | 113,846 | 2,801 | 89,469 | 2,201 | 40.65 | 134.32 | 150.05 | 165.79 | 1.38 |
| 813 | 12.00 | 2,273 | 130,947 | 3,221 | 106,570 | 2,622 | 40.65 | 151.49 | 167.22 | 182.95 | 1.38 |
| 813 | 14.00 | 2,273 | 147,790 | 3,636 | 123,413 | 3,036 | 40.65 | 168.56 | 184.30 | 200.03 | 1.38 |
| 819 | 10.00 | 2,279 | 115,562 | 2,822 | 91,249 | 2,228 | 40.95 | 134.62 | 150.31 | 166.00 | 1.38 |
| 819 | 12.00 | 2,279 | 133,009 | 3,248 | 108,696 | 2,654 | 40.95 | 151.87 | 167.56 | 183.25 | 1.38 |
| 819 | 14.00 | 2,279 | 150,195 | 3,668 | 125,882 | 3,074 | 40.95 | 169.03 | 184.72 | 200.41 | 1.38 |
| 914 | 10.00 | 2,374 | 145,559 | 3,185 | 122,219 | 2,674 | 45.70 | 139.10 | 154.16 | 169.22 | 1.39 |
| 914 | 12.00 | 2,374 | 169,039 | 3,699 | 145,699 | 3,188 | 45.70 | 157.63 | 172.69 | 187.76 | 1.39 |
| 914 | 14.00 | 2,374 | 192,205 | 4,206 | 168,865 | 3,695 | 45.70 | 176.08 | 191.14 | 206.21 | 1.39 |
| 1,016 | 10.00 | 2,476 | 183,869 | 3,619 | 161,490 | 3,179 | 50.80 | 143.53 | 157.97 | 172.41 | 1.40 |
| 1,016 | 12.00 | 2,476 | 215,022 | 4,233 | 192,643 | 3,792 | 50.80 | 163.33 | 177.77 | 192.21 | 1.40 |
| 1,016 | 14.00 | 2,476 | 245,800 | 4,839 | 223,422 | 4,398 | 50.80 | 183.05 | 197.49 | 211.94 | 1.40 |
| 1,220 | 12.00 | 2,680 | 330,667 | 5,421 | 309,992 | 5,082 | 61.00 | 173.42 | 186.77 | 200.11 | 1.41 |
| 1,220 | 14.00 | 2,680 | 380,552 | 6,239 | 359,877 | 5,900 | 61.00 | 195.40 | 208.74 | 222.08 | 1.41 |
| 1,220 | 16.00 | 2,680 | 429,937 | 7,048 | 409,262 | 6,709 | 61.00 | 217.30 | 230.64 | 243.98 | 1.41 |
| 1,420 | 14.00 | 2,880 | 549,872 | 7,745 | 530,633 | 7,474 | 71.00 | 205.80 | 218.22 | 230.64 | 1.42 |
| 1,420 | 16.00 | 2,880 | 623,112 | 8,776 | 603,872 | 8,505 | 71.00 | 229.61 | 242.03 | 254.44 | 1.42 |
| 1,420 | 18.00 | 2,880 | 695,720 | 9,799 | 676,481 | 9,528 | 71.00 | 253.35 | 265.76 | 278.18 | 1.42 |
| 1,620 | 16.00 | 3,080 | 859,938 | 10,617 | 841,948 | 10,394 | 81.00 | 240.32 | 251.93 | 263.54 | 1.43 |
| 1,620 | 18.00 | 3,080 | 961,668 | 11,872 | 943,678 | 11,650 | 81.00 | 265.72 | 277.33 | 288.94 | 1.43 |
| 1,620 | 20.00 | 3,080 | 1,062,631 | 13,119 | 1,044,641 | 12,897 | 81.00 | 291.05 | 302.66 | 314.28 | 1.43 |
| 1,820 | 18.00 | 3,280 | 1,278,042 | 14,044 | 1,261,149 | 13,859 | 91.00 | 276.59 | 287.49 | 298.39 | 1.44 |
| 1,820 | 20.00 | 3,280 | 1,413,542 | 15,533 | 1,396,649 | 15,348 | 91.00 | 303.38 | 314.28 | 325.19 | 1.44 |
| 1,820 | 22.00 | 3,280 | 1,548,131 | 17,012 | 1,531,238 | 16,827 | 91.00 | 330.12 | 341.02 | 351.92 | 1.44 |
| 1,820 | 25.00 | 3,280 | 1,748,318 | 19,212 | 1,731,425 | 19,027 | 91.00 | 370.11 | 381.01 | 391.92 | 1.44 |

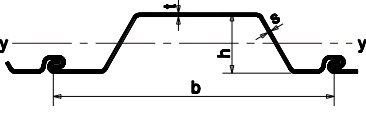
Other intermediate piles on request

Cold-rolled sheet piling sections

Trench sheeting

| Technical Data | | | | | | | | | |
|---|---------|---|----------------------------------|----------------------------|---|-----------------|------------------|----------------------------|-------------------------|
| Trench sheeting sections | | Section modulus W_y cm ³ /m | Weight Wall kg/m ² | Weight Single pile kg/m | Moment of inertia I_y cm ⁴ /m | Width b mm | Height h mm | Flange thickness t mm | Web thickness s mm |
|  | KD VI/6 | 182 | 62.5 | 37.5 | 726 | 600 | 78 | 6.0 | 6.0 |
| | KD VI/8 | 242 | 83.3 | 50.0 | 968 | 600 | 80 | 8.0 | 8.0 |

| Technical Data | | | | | | | | | |
|--|-------|---|----------------------------------|----------------------------|---|-----------------|------------------|----------------------------|-------------------------|
| Trench sheeting sections | | Section modulus W_y cm ³ /m | Weight Wall kg/m ² | Weight Single pile kg/m | Moment of inertia I_y cm ⁴ /m | Width b mm | Height h mm | Flange thickness t mm | Web thickness s mm |
|  | KD 4L | 99 | 53.3 | 21.3 | 245 | 400 | 49 | 5.8 | 5.8 |

| Technical Data | | | | | | | | | |
|---|---------|---|----------------------------------|----------------------------|---|-----------------|------------------|----------------------------|-------------------------|
| Lightweight sections | | Section modulus W_y cm ³ /m | Weight Wall kg/m ² | Weight Single pile kg/m | Moment of inertia I_y cm ⁴ /m | Width b mm | Height h mm | Flange thickness t mm | Web thickness s mm |
|  | KL 3/4* | 276 | 45.2 | 31.6 | 2.042 | 700 | 146 | 4.0 | 4.0 |
| | KL 3/5* | 339 | 55.8 | 39.1 | 2.502 | 700 | 147 | 5.0 | 5.0 |
| | KL 3/6 | 410 | 66.0 | 46.2 | 3.080 | 700 | 148 | 6.0 | 6.0 |
| | KL 3/7* | 460 | 78.0 | 54.6 | 3.500 | 700 | 149 | 7.0 | 7.0 |
| | KL 3/8 | 540 | 88.0 | 61.5 | 4.050 | 700 | 150 | 8.0 | 8.0 |

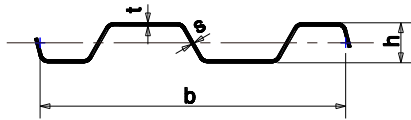
*Only on request

Trench sheeting, Technical data

Forms of supply for trench sheeting

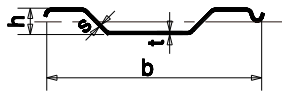
S

KD VI/6
KD VI/8

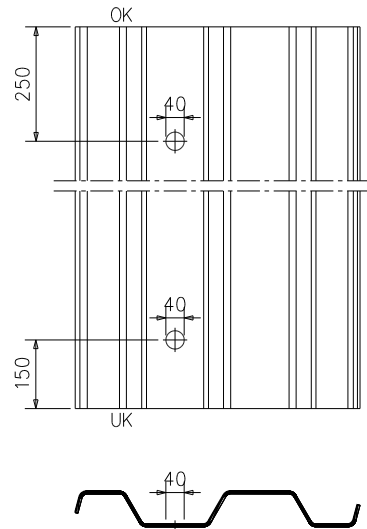


S

KD 4.4L



Handling holes, KD VI/6 and KD VI/8 trench sheets



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

Handling holes KD VI/6 and KD VI/8 trench sheets
250 mm from top edge
150 mm from bottom edge, standard form

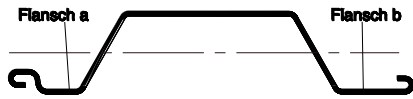
Handling holes KD 4L
250 mm from top edge
150 mm from bottom edge, standard form

Typical application: Dike protection – lightweight sections

Lightweight sections, Technical data

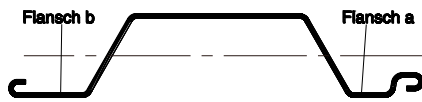
Forms of supply for KL lightweight sections

Sa



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

Sb



Single pile in B-position (standard form)

Da



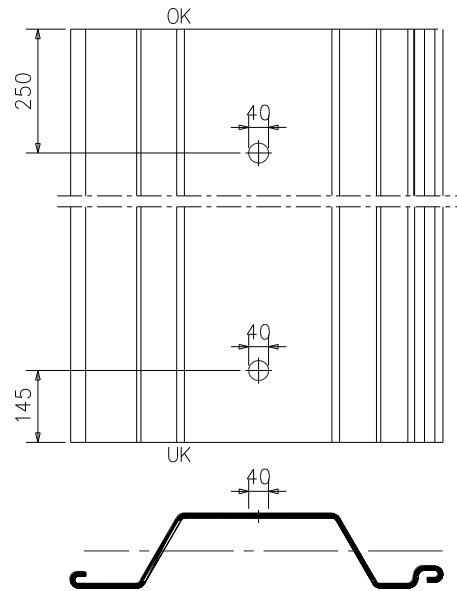
Double piles (Da) to special order only

Db



Double piles (Db) to special order only

Handling holes KL lightweight sections



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

Terms of delivery and steel grades

Terms of delivery

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: $\leq 8.5 \text{ mm} = \pm 0.5 \text{ mm}$; $> 8.5 \text{ mm} = \pm 6 \% t$ s: $\leq 8.5 \text{ mm} = -0.5 \text{ mm}$; $> 8.5 \text{ mm} = -6 \% s^*$ |
| Wall thickness, Z-sections and straight-web sections | t, s: $\leq 8.5 \text{ mm} = \pm 0.5 \text{ mm}$; $> 8.5 \text{ mm} = \pm 6 \% t$ |
| Section width | Single pile $\pm 2 \%$, double pile $\pm 3 \%$ |
| Section length | Lengths of sections may deviate by $\pm 200 \text{ mm}$ from ordered lengths |
| Section height, U-sections | $\leq 200 \text{ mm} = \pm 4 \text{ mm}$; $> 200 \text{ mm} = \pm 5 \text{ mm}$ |
| Section height, Z-sections | $\leq 200 \text{ mm} = \pm 5 \text{ mm}$; from 200 to 300 mm = $\pm 6 \text{ mm}$; $> 300 \text{ mm} = \pm 7 \text{ mm}$ |
| Weight | max. $\pm 5\%$ 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: $+0.5 \text{ mm}$ for $s < 8.5 \text{ mm}$ and $+6\%$ of s for $s > 8.5 \text{ mm}$

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

All data and contents are without guarantee. Mistake and subject to change.

Steel grade

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

Hot-rolled sheet piling sections to DIN EN 10248-1

| Steel grade | Tensile strength N/mm ² | Minimum yield strength N/mm ² | 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 10249-1

| Steel grade | Tensile strength N/mm ² | Minimum yield strength N/mm ² | Minimum elongation % |
|-------------|---------------------------------------|---|-------------------------|
| S 275 JR | 410 | 275 | 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/mm ² |
| 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.

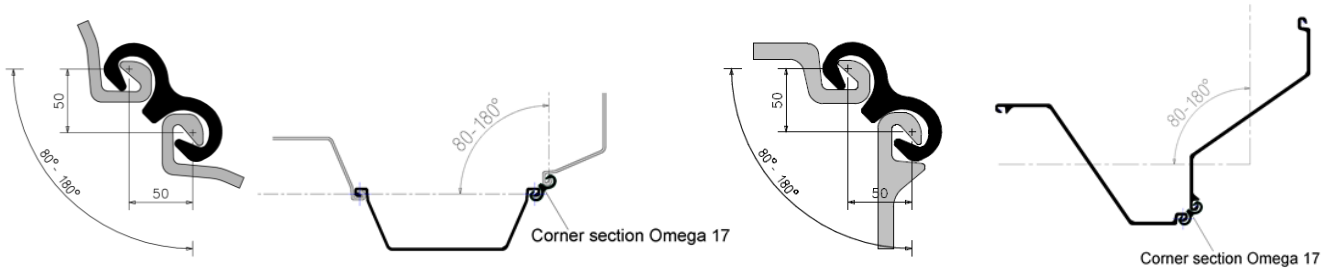
Interlocks

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

Connectors for corners and junctions for sheet piling sections with LARSEN interlock
Interlocks in S 355

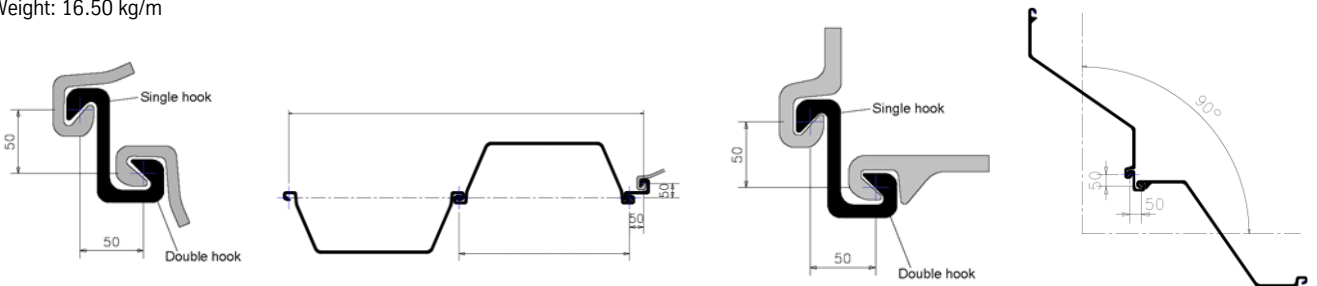
Omega 17

Weight: 17.30 kg/m



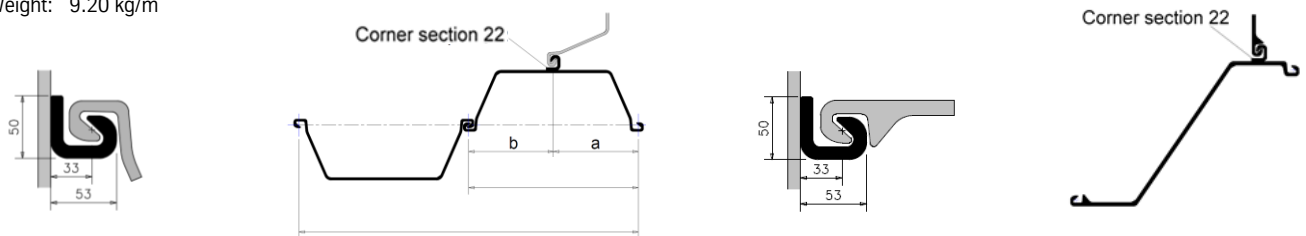
Corner section 20

Weight: 16.50 kg/m

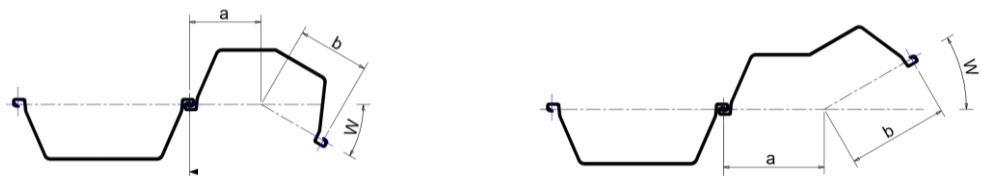


Corner section 22

Weight: 9.20 kg/m



Folded corner pile



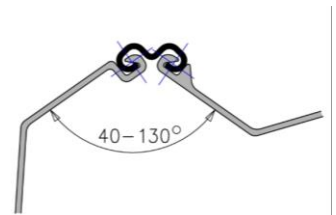
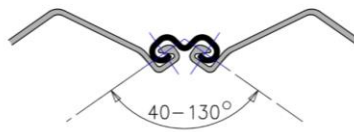
*Corner piles are connected to the sheet piles in accordance with DIN EN 12063 and are not suitable for single driving.

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

SteelWall® connectors for U- and Z-piles
Interlocks in S 355

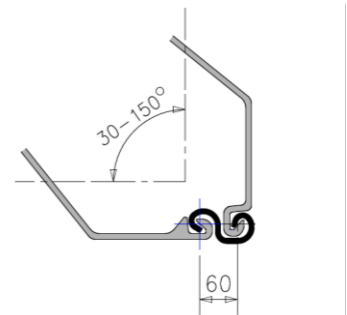
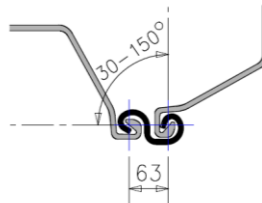
LVO

Weight: 13.85 kg/m



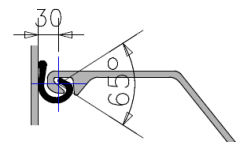
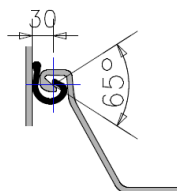
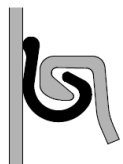
LV20n

Weight: 13.82 kg/m



LV22

Weight: 8.0 kg/m



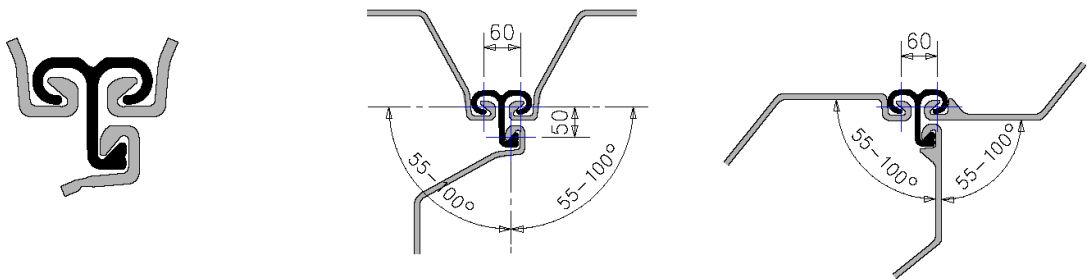
*Corner piles are connected to the sheet piles in accordance with DIN EN 12063 and are not suitable for single driving.
"SteelWall®" is a trademark of SteelWall ISH GmbH, Germany.

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

SteelWall® connectors for U- and Z-piles, traditional
Interlocks in S 355

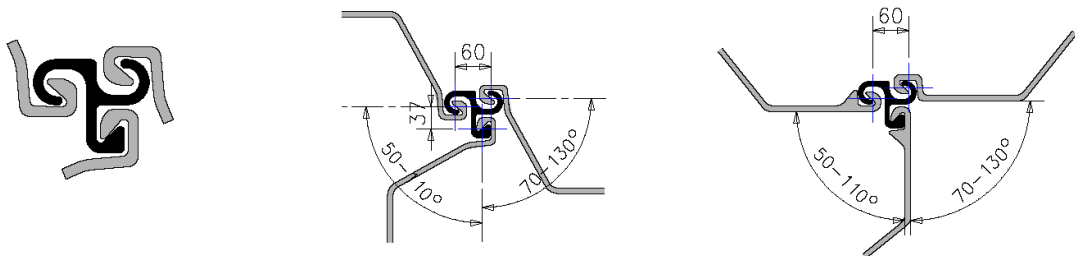
LOT

Weight: 18.0 kg/m



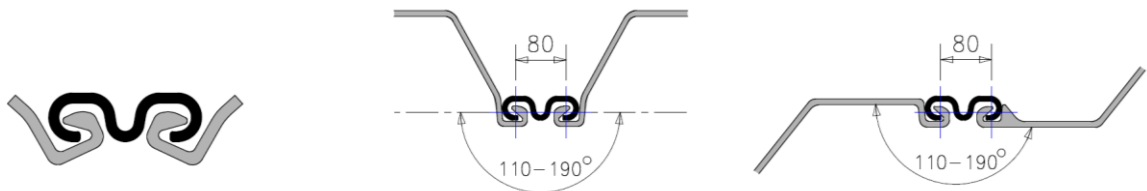
LT

Weight: 17.6 kg/m



LV-Omega

Weight: 14.0 kg/m



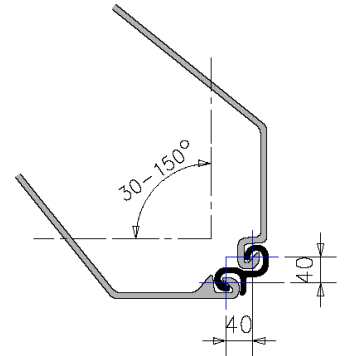
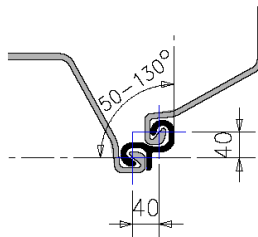
**Corner piles are connected to the sheet piles in accordance with DIN EN 12063 and are not suitable for single driving.
"SteelWall®" is a trademark of SteelWall ISH GmbH, Germany.

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

SteelWall® connectors for U- and Z-piles, universal
Interlocks in S 355

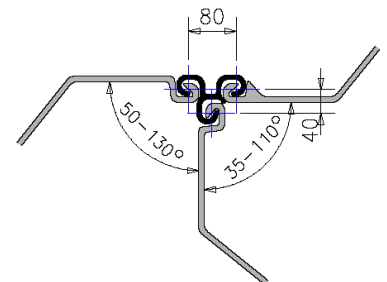
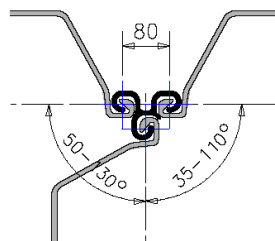
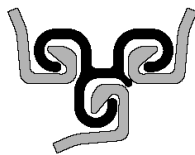
LS90

Weight: 12.70 kg/m



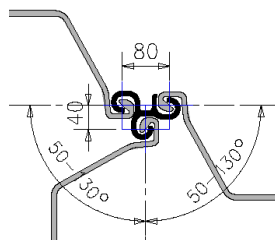
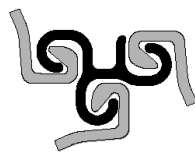
LTO

Weight: 19.80 kg/m



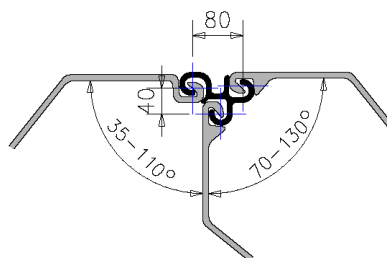
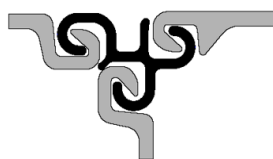
LTS

Weight: 19.00 kg/m



LTZ

Weight: 19.00 kg/m



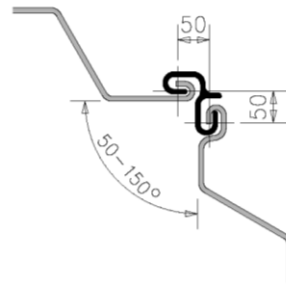
**Corner piles are connected to the sheet piles in accordance with DIN EN 12063 and are not suitable for single driving.
"SteelWall®" is a trademark of SteelWall ISH GmbH, Germany.

Corner and junction piles for cold rolled sheet piles*

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

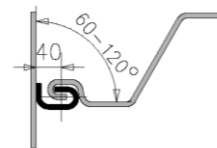
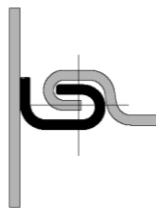
CF 90

Weight: 17.50 kg/m



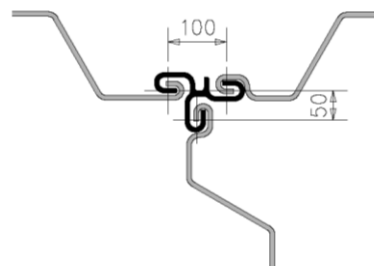
CF-Junction

Weight: 8.90 kg/m



CFT

Weight: 25.80 kg/m



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

Sealing systems

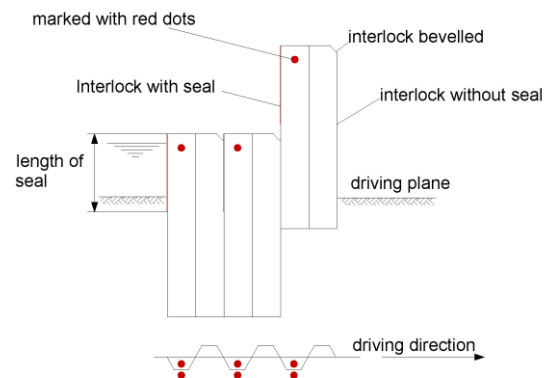
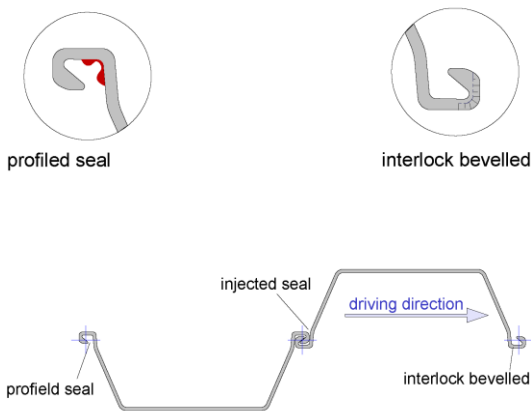
thyssenkrupp interlock sealing system

Guiding

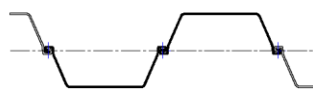
When driving sections with sealed interlocks, particular attention must be paid to guiding to ensure the piles do not lean to the front, rear or side. Any corrective measures applied must not cause any narrowing of any interlock slots containing profiled seals. DIN EN 12063 and EAU 2020 contain useful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

Driving direction

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.



U-Section



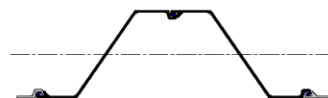
Interlock with profiled seal



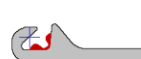
Middle interlock with injected seal



Z-Section



Interlock with profiled seal



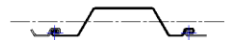
Interlock with profiled seal



Middle interlock with injected seal



Lightweight sections



Interlock with profiled seal



Factory-threaded interlock with seal



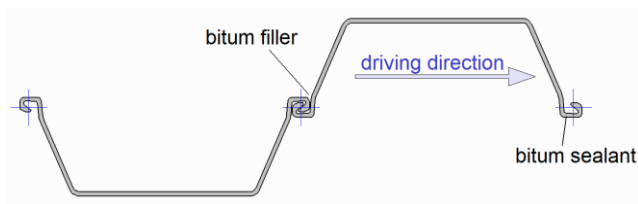
Bitumen-based interlock fillers

Material properties

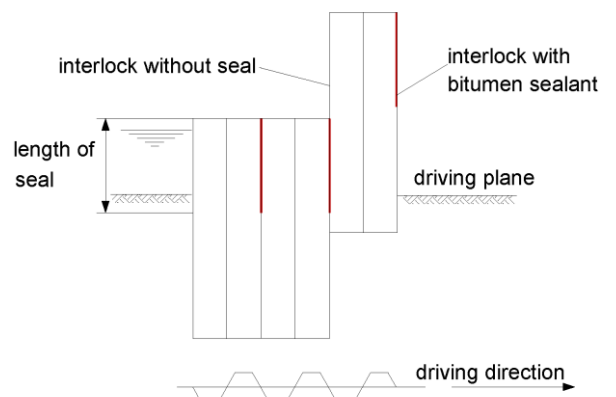
Bituminous-based seals are an elastomeric bitumen hot-poured sealant. After application and cooling, this material may be anything from soft to stiff depending on the ambient temperature. It adheres well to the steel surface.

Direction of driving

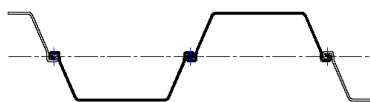
The direction of driving must be specified prior to installation when filled interlocks are involved. For threading, the pile must be turned so that the filled interlock points in the direction of driving.



Interlock with bitumen



U-Section



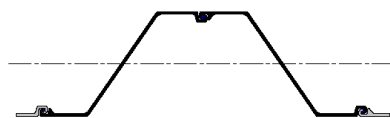
Interlock with bitumen sealant



Middle interlock with bitumen sealant



Z-Section



Interlock with bitumen sealant



Middle interlock with bitumen sealant



Lightweight section



Interlock with bitumen sealant



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 $k \leq 1,0 \cdot 10^{-9}$ m/s for a notional thickness of $d = 60$ cm. In light of the quality requirements, only factory-sealed sheet piles are permissible. The section modulus required is $W_y \geq 1,100$ cm³/m. A suitable sealing system can now be determined based on the following parameters:

Permeability criteria

The interlock seepage resistance $\rho \leq k \cdot b/d$

The result is that to achieve the equivalent of a 60 cm thick diaphragm wall with $k \leq 1,0 \cdot 10^{-9}$ m/s the minimum requirement is single piles with a thyssenkrupp 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:

Seepage resistance

ρ (m/s)

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

Seepage rate Q (m³/s · interlock)

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

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

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

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:

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

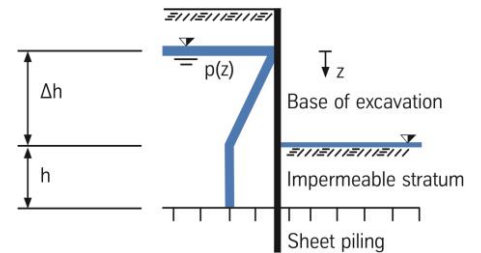
Considering these fundamental relationships and the number of critical interlocks per m² of wall area results in this relationship for a constant seepage rate Q:

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

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

where:

- $q(z)$ = discharge rate over time related to interlock length (m³/m · s)
- γ = specific gravity of fluid (kN/m³)
- $\Delta p(z)$ = hydrostatic pressure (kN/m²)



where:

- k = permeability coefficient (m/s)
- Q = measured flow rate (m³/s)
- i = hydraulic gradient (-)
- A = cross-sectional area, wall area (m²)

where:

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

The sections given in the table below can be used:

| Sections | Critical element width m | Comparable k-value for 60 cm thick diaphragm wall m/s | Leakage requirement satisfied | Imperviousness requirement satisfied |
|-----------------|-----------------------------|--|----------------------------------|---|
| SP (500-series) | 0.50 | $2.2 \cdot 10^{-10}$ | yes | yes |
| DP (500-series) | 1.00 | $1.1 \cdot 10^{-10}$ | yes | yes |
| SP (600-series) | 0.60 | $1.8 \cdot 10^{-10}$ | yes | yes |
| DP (600-series) | 1.20 | $9.0 \cdot 10^{-11}$ | yes | yes |

A double pile (600 series) with $W_y \geq 1.100 \text{ cm}^3/\text{m}$ is selected for economic reasons. Its imperviousness therefore compares with that of a 60 cm thick diaphragm wall with a k-value of $9.0 \cdot 10^{-11} \text{ m/s}$, or for an 80 cm thick diaphragm wall a k-value of $1.2 \cdot 10^{-10} \text{ m/s}$. 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 thyssenkrupp interlock sealing system has proven to be resistant to these pollutants.

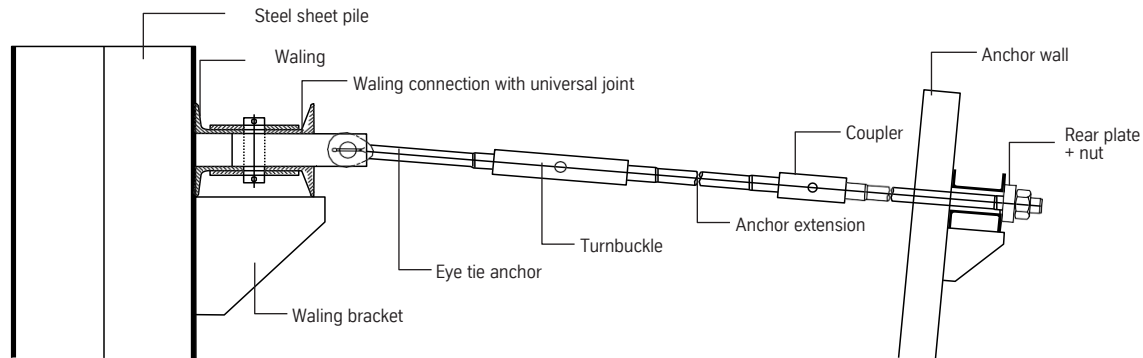
Comparison of k-values

| Technical data | | | | | |
|---|------------------------------|----------------------|--------------------------------|----------------------|-------------------------|
| Sealing system | Critical element width b (m) | ρ m/s | k-value required for diaphragm | | Slurry wall d = 0.080 m |
| | | | d = 0.60 m | d = 0.80 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 thyssenkrupp 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 thyssenkrupp 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 thyssenkrupp thyssenkrupp 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 | | $6.0 \cdot 10^{-11}$ | $8.0 \cdot 10^{-11}$ | $8.0 \cdot 10^{-12}$ |

| Technical data | | | | | | |
|---|---------------------------------------|--|---|-------------------------|-------|---|
| | ρ m/s | Critical element width for double pile m | No. of interlocks with possibly limited seepage | Ingress into excavation | | Reduction in quantity of water to be pumped % |
| | | | | l/s | % | |
| Groundwater lowering with steel sheet pile wall | | | | ~ 115 | 100 | + |
| Sheet piling without interlock sealing | $8.0 \cdot 10^{-4} \times k_{soil}/b$ | 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 thyssenkrupp 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 |

Anchor equipment Round steel tie rods

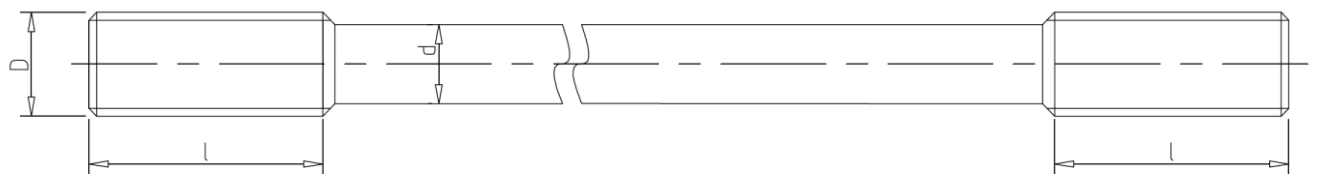
Round steel tie rod components and connecting elements



Anchor with upset ends – rolled thread

Round steel tie rods acc. to EAU 2012

| Technical data | | | | | | | | | | | | | | | |
|---|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|--------------|--------------|--------------|
| Anchor force according to EAU 2012 - $k_t = 0.55$ | | | | | | | | | | | | | | | |
| Nominal diameter | D mm | M 39 | M 42 | M 45 | M 48 | M 52 | M 56 | M 60 | M 64 | M 68 | M 72 | M 76 | M 80 | M 85 | M 90 |
| Shaft diameter | d mm | 36 | 39 | 42 | 45 | 38 | 41 | 44 | 47 | 50 | 54 | 57 | 60 | 64 | 68 |
| Tensile stress area Thread | As mm ² | 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 mm ² | 1,017 | 1,194 | 1,385 | 1,590 | 1,134 | 1,320 | 1,521 | 1,735 | 1,963 | 2,290 | 2,552 | 2,827 | 3,217 | 3,632 |
| ASF 355 Permissible design resistance | Rd kN | 205 | 235 | 275 | 309 | 366 | 426 | 491 | 560 | 634 | 736 | 824 | 912 | 1,038 | 1,172 |
| ASF 460 Permissible design resistance | Rd kN | 257 | 294 | 345 | 387 | 465 | 537 | 627 | 709 | 813 | 924 | 1,042 | 1,167 | 1,333 | 1,510 |
| ASF 500 Permissible design resistance | Rd kN | 273 | 313 | 366 | 412 | 494 | 570 | 666 | 754 | 864 | 982 | 1,107 | 1,240 | 1,416 | 1,605 |
| Weight (Shaft) | G kg/m | 7.99 | 9.38 | 10.88 | 12.49 | 8.90 | 10.36 | 11.94 | 13.62 | 15.41 | 17.98 | 20.03 | 22.20 | 25.25 | 28.51 |

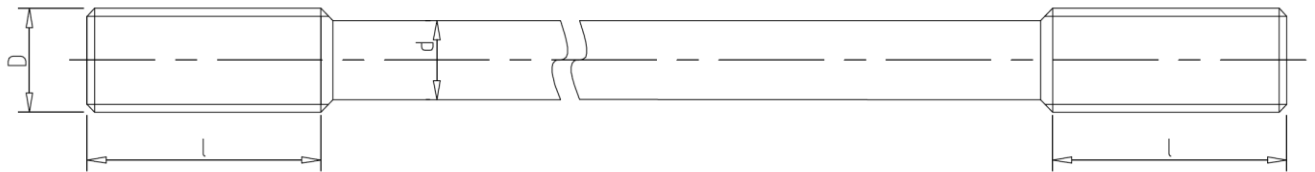


| Technical data | | | | | | | | | | | | | | | |
|---|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Anchor force according to EAU 2012 - $k_t = 0.55$ | | | | | | | | | | | | | | | |
| Nominal diameter | D mm | M 95 | M 100 | M 105 | M 110 | M 115 | M 120 | M 125 | M 130 | M 135 | M 140 | M 145 | M 150 | M 155 | M 160 |
| Shaft diameter | d mm | 73 | 77 | 81 | 85 | 89 | 93 | 97 | 101 | 105 | 109 | 113 | 118 | 123 | 127 |
| Tensile stress area Thread | As mm ² | 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 mm ² | 4,185 | 4,657 | 5,153 | 5,675 | 6,221 | 6,793 | 7,390 | 8,012 | 8,659 | 9,331 | 10,029 | 10,936 | 11,882 | 12,668 |
| ASF 355 Permissible design resistance | Rd kN | 1,351 | 1,503 | 1,663 | 1,831 | 2,008 | 2,192 | 2,385 | 2,586 | 2,795 | 3,011 | 3,237 | 3,529 | 3,835 | 4,088 |
| ASF 460 Permissible design resistance | Rd kN | 1,699 | 1,898 | 2,108 | 2,330 | 2,562 | 2,806 | 3,061 | 3,326 | 3,603 | 3,891 | 4,190 | 4,500 | 4,821 | 5,153 |
| ASF 500 Permissible design resistance | Rd kN | 1,805 | 2,017 | 2,240 | 2,476 | 2,723 | 2,981 | 3,252 | 3,534 | 3,828 | 4,134 | 4,452 | 4,781 | 5,122 | 5,475 |
| Weight (Shaft) | G kg/m | 32.86 | 36.56 | 40.45 | 44.55 | 48.84 | 53.32 | 58.01 | 62.89 | 67.94 | 73.25 | 78.73 | 85.85 | 93.28 | 99.44 |

Anchor with upset ends – rolled thread

Round steel tie rods acc. to DIN EN 1993-5

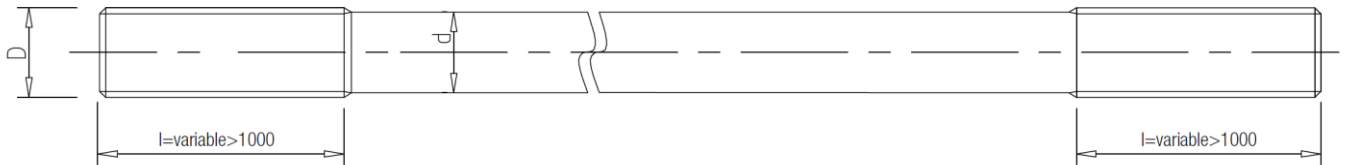
| Technical data | | | | | | | | | | | | | | | |
|--|--------------------|------------|------------|------------|------------|------------|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Anchor force according to DIN EN 1993-5 - $k_t = 0.60$ | | | | | | | | | | | | | | | |
| Nominal diameter | D mm | M 39 | M 42 | M 45 | M 48 | M 52 | M 56 | M 60 | M 64 | M 68 | M 72 | M 76 | M 80 | M 85 | M 90 |
| Shaft diameter | d mm | 36 | 39 | 42 | 45 | 38 | 41 | 44 | 47 | 50 | 54 | 57 | 60 | 64 | 68 |
| Tensile stress area Thread | As mm ² | 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 mm ² | 1,017 | 1,194 | 1,385 | 1,590 | 1,134 | 1,320 | 1,521 | 1,735 | 1,963 | 2,290 | 2,552 | 2,827 | 3,217 | 3,632 |
| ASF 355 Permissible design resistance | Rd kN | 239 | 274 | 320 | 361 | 403 | 469 | 540 | 616 | 697 | 813 | 906 | 1,004 | 1,142 | 1,289 |
| ASF 460 Permissible design resistance | Rd kN | 300 | 344 | 401 | 453 | 522 | 607 | 699 | 798 | 903 | 1,054 | 1,174 | 1,301 | 1,480 | 1,671 |
| ASF 500 Permissible design resistance | Rd kN | 318 | 366 | 426 | 481 | 567 | 660 | 760 | 867 | 982 | 1,129 | 1,269 | 1,414 | 1,608 | 1,816 |
| ASF 720 Permissible design resistance | Rd kN | 422 | 484 | 564 | 636 | 759 | 877 | 1,020 | 1,156 | 1,320 | 1,495 | 1,680 | 1,877 | 2,138 | 2,415 |
| Weight (Shaft) | G kg/m | 7.99 | 9.38 | 10.88 | 12.49 | 8.90 | 10.36 | 11.94 | 13.62 | 15.41 | 17.98 | 20.03 | 22.20 | 25.25 | 28.51 |



| Technical data | | | | | | | | | | | | | | | |
|--|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Anchor force according to DIN EN 1993-5 - $k_t = 0.60$ | | | | | | | | | | | | | | | |
| Nominal diameter | D mm | M 95 | M 100 | M 105 | M 110 | M 115 | M 120 | M 125 | M 130 | M 135 | M 140 | M 145 | M 150 | M 155 | M 160 |
| Shaft diameter | d mm | 73 | 77 | 81 | 85 | 89 | 93 | 97 | 100 | 105 | 110 | 115 | 120 | 125 | 130 |
| Tensile stress area Thread | As mm ² | 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 mm ² | 4,185 | 4,657 | 5,153 | 5,675 | 6,221 | 6,793 | 7,390 | 7,854 | 8,659 | 9,503 | 10,387 | 11,310 | 12,272 | 13,273 |
| ASF 355 Permissible design resistance | Rd kN | 1,486 | 1,653 | 1,829 | 2,014 | 2,209 | 2,411 | 2,623 | 2,788 | 3,074 | 3,374 | 3,687 | 4,007 | 4,290 | 4,582 |
| ASF 460 Permissible design resistance | Rd kN | 1,925 | 2,142 | 2,370 | 2,610 | 2,862 | 3,125 | 3,399 | 3,613 | 3,983 | 4,356 | 4,687 | 5,029 | 5,383 | 5,750 |
| ASF 500 Permissible design resistance | Rd kN | 2,048 | 2,283 | 2,531 | 2,793 | 3,067 | 3,353 | 3,653 | 3,927 | 4,291 | 4,629 | 4,979 | 5,343 | 5,720 | 6,109 |
| ASF 720 Permissible design resistance | Rd kN | 2,710 | 3,022 | 3,350 | 3,696 | 4,059 | 4,438 | 4,835 | 5,248 | 5,679 | 6,126 | 6,591 | 7,072 | 7,570 | 8,085 |
| Weight (Shaft) | G kg/m | 32.86 | 36.56 | 40.45 | 44.55 | 48.84 | 53.32 | 58.01 | 61.65 | 67.94 | 74.60 | 81.50 | 88.78 | 96.29 | 104.00 |

Anchor with rolled thread

| Technical data | | | | | | | | | | | | | | | |
|--|--------------------|------------|------------|------------|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Anchor force according to DIN EN 1993-5 - $k_t = 0.90$ | | | | | | | | | | | | | | | |
| Nominal diameter | D mm | M 39 | M 42 | M 45 | M 48 | M 52 | M 56 | M 60 | M 64 | M 68 | M 72 | M 76 | M 80 | M 85 | M 90 |
| Shaft diameter | d mm | 36 | 39 | 42 | 45 | 49 | 52 | 56 | 60 | 64 | 68 | 72 | 76 | 81 | 86 |
| Tensile stress area Thread | As mm ² | 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 mm ² | 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 | Rd kN | 346 | 398 | 464 | 523 | 624 | 721 | 839 | 950 | 1,085 | 1,228 | 1,381 | 1,542 | 1,757 | 1,985 |
| ASF 460 | 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 | 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 | 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) | G 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 |



| Technical data | | | | | | | | | | | | | | | |
|--|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Anchor force according to DIN EN 1993-5 - $k_t = 0.90$ | | | | | | | | | | | | | | | |
| Nominal diameter | D mm | M 95 | M 100 | M 105 | M 110 | M 115 | M 120 | M 125 | M 130 | M 135 | M 140 | M 145 | M 150 | M 155 | M 160 |
| Shaft diameter | d mm | 91 | 96 | 101 | 106 | 111 | 116 | 121 | 126 | 131 | 136 | 141 | 146 | 151 | 156 |
| Tensile stress area Thread | As mm ² | 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 mm ² | 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 | 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 | 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 | 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 | 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) | G 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:

$$F_{t,Rd} = (\text{Shaft cross section}) \quad A_g \times f_{y,k} / \gamma_{M0} \quad \text{where } \gamma_{M0} = 1.00$$

$$F_{t,Rd} = (\text{Thread cross section}) \quad k_t \times A_s \times f_{ub,k} / \gamma_{M2} \quad \text{where } \gamma_{M2} = 1.25$$

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

$$Z_d < R_d$$

$$Z_d: \quad \text{design value of anchor force } Z_d = Z_{G,k} * \gamma_G + Z_{Q,k} * \gamma_Q$$

$$R_d: \quad \text{design resistance of anchor } R_d = \text{Min} [F_{t,Rd} ; F_{t,Rd}]$$

A_g : cross-sectional area in shaft zone

A_s : tensile stress area in threaded zone

f_{y,k} : yield stress

f_{ub,k} : tensile strength

γ_{M0} : partial safety factor to DIN EN 1993-5 for anchor shaft

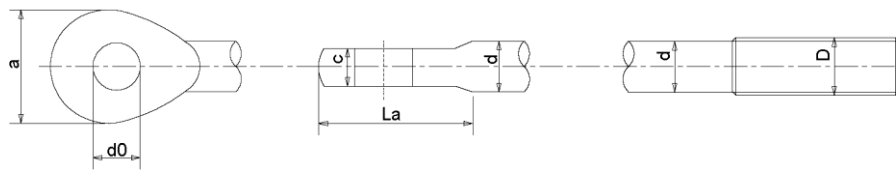
γ_{M2} : partial safety factor to DIN EN 1993-5 for threaded area

k_t : notch factor to DIN 1993-5 (k_t = 0.60 or 0.90)

Eye anchor

| Technical data | | | | | | | | | | | | | | | |
|---|-------|------|------|------|------|------|------|------|------|------|-------|-------|------|------|-------|
| ASF 355 anchor force acc. to DIN EN 1993-5 with $k_t = 0.6$ | | 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 |

| Technical data | | | | | | | | | | | | | | | |
|---|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| ASF 355 anchor force acc. to DIN EN 1993-5 with $k_t = 0.6$ | | 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 | 100 | 105 | 105 | 110 | 115 | 120 |



| Technical data | | | | | | | | | | | | | | | |
|---|-------|------|------|------|------|------|------|------|------|------|-------|-------|------|------|-------|
| ASF 500 anchor force acc. to DIN EN 1993-5 with $k_t = 0.6$ | | 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 |

| Technical data | | | | | | | | | | | | | | | |
|---|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| ASF 500 anchor force acc. to DIN EN 1993-5 with $k_t = 0.6$ | | 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 |

Technical data

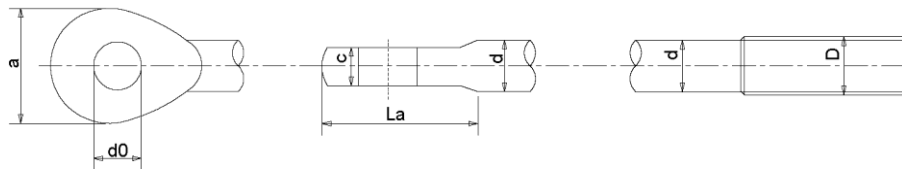
ASF 720 anchor force acc. to DIN EN 1993-5 with $k_t = 0.6$

| | | 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 |

Technical data

ASF 720 anchor force acc. to DIN EN 1993-5 with $k_t = 0.6$

| | | 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 |



thyssenkrupp drilled injection pile

Basic information

The thyssenkrupp ASF drilled injection pile according to approval Z-34.14-243 is a micropile system according to DIN 14199 and DIN SPEC 18539. A main feature of the thyssenkrupp ASF drilled injection pile is the use of a good-tolerance steel grade. As a result, the system has low steel elongation under load and higher load-bearing reserves than comparable micropile systems. Currently, micropiles with a length of up to 34 meters can be supplied in one piece.

Corrosion protection

Permanent corrosion protection is ensured with the help of the cement stone covering of the grout body. The use of an additional grouted corrugated sheathing, as in comparable systems, is not necessary. The permanent corrosion protection of the pile head is achieved either by placing 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

Technical data ASF 500/700

| Nominal size | Inches | | 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 | $f_{y/t}$ | 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 thyssenkrupp ASF drilled injection piles are regulated in Germany by 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 micropiles 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 E_d 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 und BS-A

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

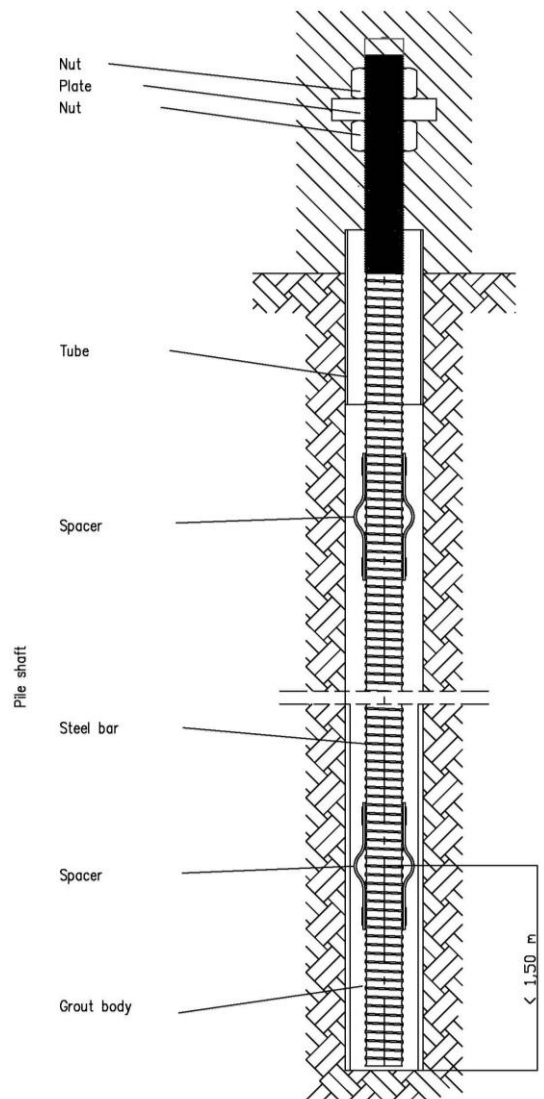
Micropiles transfer loads to the soil via the skin friction.

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 $q_{s,i,k}$ 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 und 5.30.

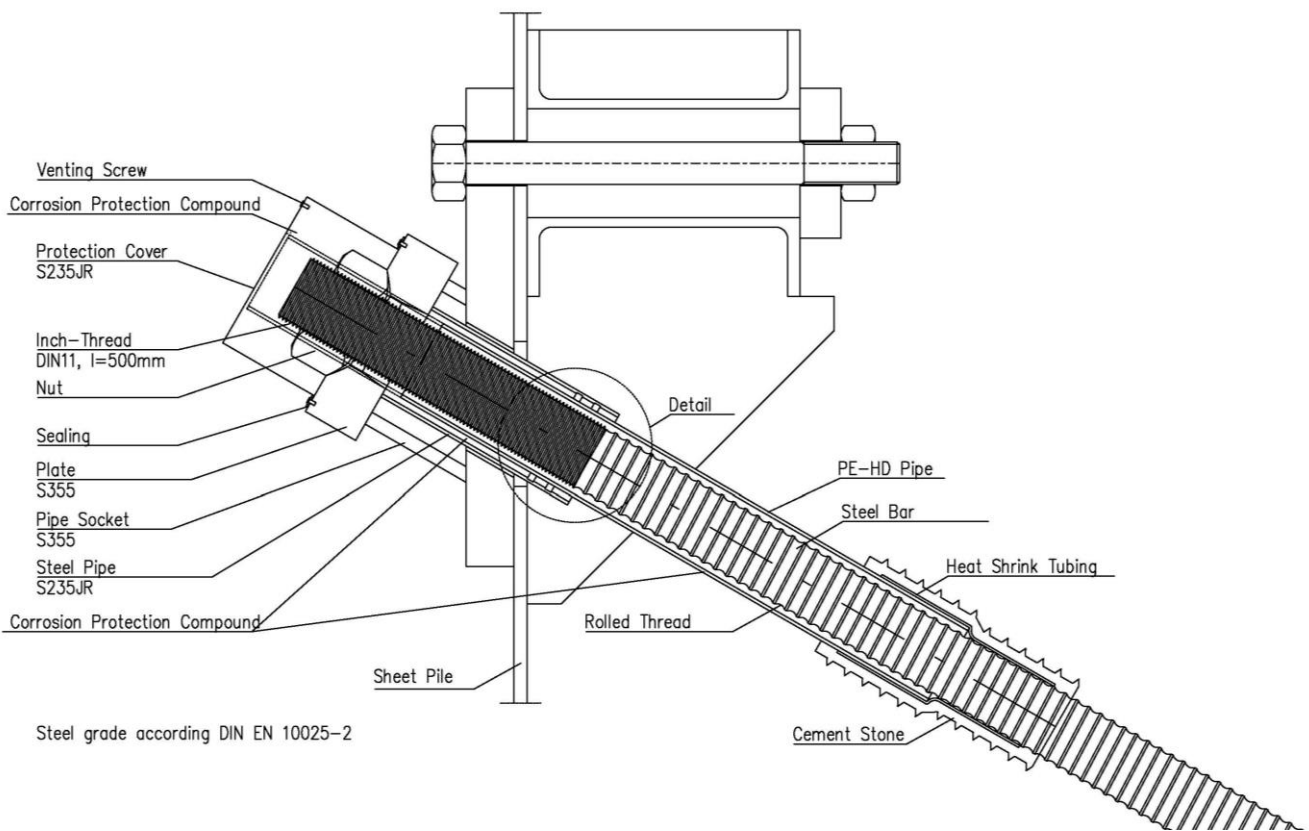
Application example deep foundation



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 calotte 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.



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