
# HIGH PERFORMANCE
# CRANE ROPE

# OUR WORLD

Usha Martin is one of the largest manufacturers of wire ropes in the world. Our journey of more than six decades has been focused on manufacturing excellence, product innovation, technology upgradation and customer satisfaction which resulted in establishing Usha Martin crane ropes as one of the preferred and trusted brands in the world.

Our manufacturing architecture includes latest generation of machineries starting from automatic pickling plant, state-of-the-art patenting furnaces and high speed straight - through wire drawing machines for producing high quality highest tensile wires that are required for manufacturing high performance crane ropes. Our quality management system has been certified as per ISO 9001:2015 standards, along with manufacturing assessment certifications from ABS, Lloyd's, DNV, SNI, CCS, Class NK, and BV Marine & Offshore. We also hold certificate of authority for the API monogram.

Our crane ropes are extensively used in high-capacity cranes installed in renowned ports of the world and by world-class crane manufacturing companies in non-critical and critical applications. Our crane ropes are developed to perform smoothly in extreme temperatures as well as in challenging environmental conditions.

Our desire to excel is manifested through our group dynamics having manufacturing facilities in India, Thailand, Dubai & United Kingdom, distribution centres spread over all continents, Global Design Centre in Italy and service centres in India, Netherlands, Scotland, Singapore and Dubai. Our service module through the Customer Value Management (CVM) initiative has elevated us from a wire rope supplier to Lifting Solution Provider and enabled us to partner the growth process with our customers.

# GLOBAL FOOTPRINT

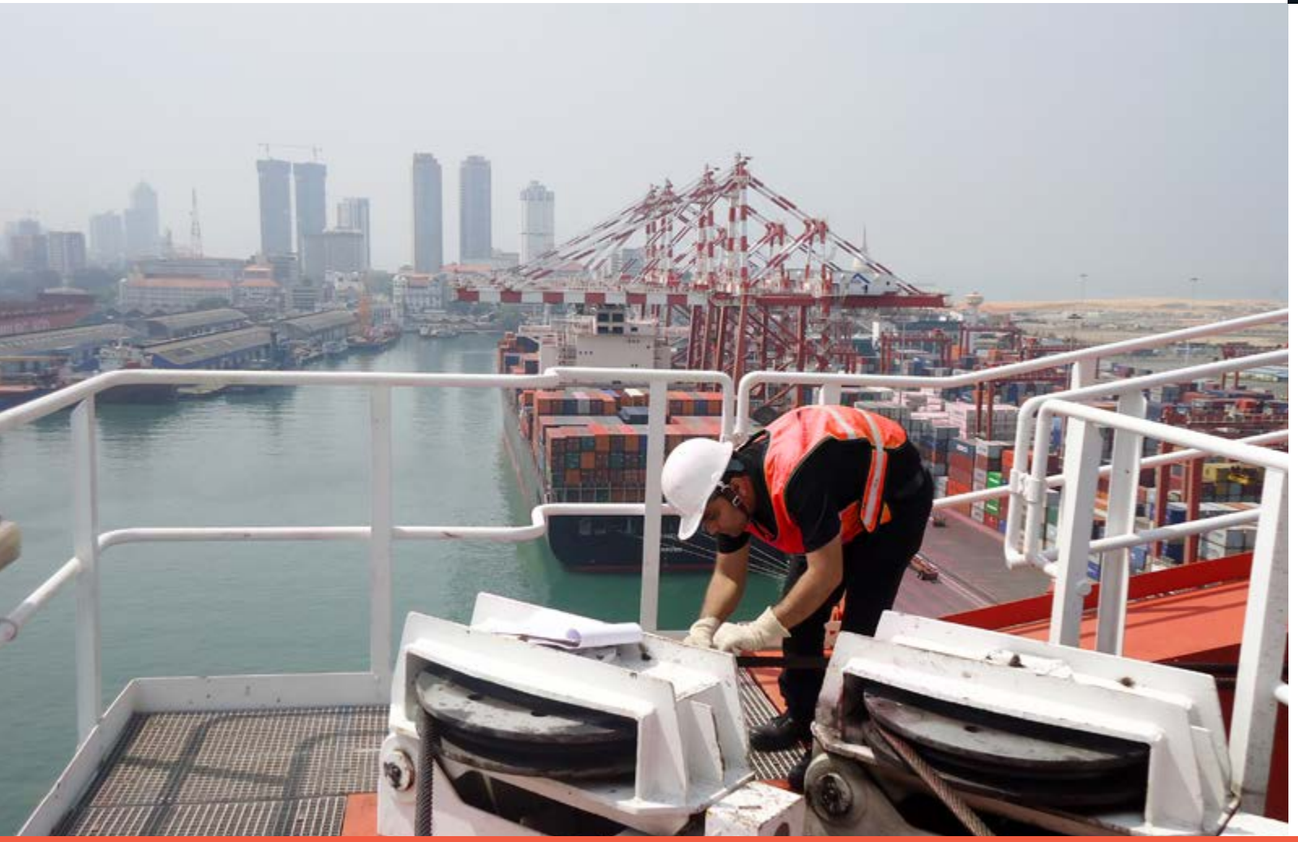
**60+** YEARS OF LEADERSHIP

PRESENCE ACROSS **75+** COUNTRIES

**06** MANUFACTURING FACILITIES

**02** R&D CENTRES

**300+** CHANNEL PARTNERS



# MANUFACTURING CAPABILITIES

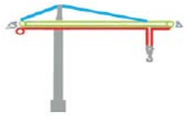
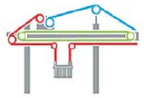
- Our state-of-the-art manufacturing facilities have the capability to produce wire ropes ranging upto 160 mm in diameter and are available in various tensile grades, from 1370 to 2160 N/mm$^2$ tensile.
- Our fully equipped rigging shop allows pressed terminations from 3 mm to 128 mm and wire rope socketing up to 165 mm.
- Undergoing all kinds of destructive and non-destructive testing.
- 9000 kN rope breaking load testing machine.
- All crane ropes undergo rigorous testing procedures to meet the technical specifications as per our customer demand for today's challenging working conditions.
- Our technical experts offers on-site installation services and conduct periodic wire rope inspections for customers.

# EMPOWERING CUSTOMER SUCCESS THROUGH CUTTING-EDGE SOLUTIONS

Delivering one-stop crane rope solutions tailored to your unique needs.

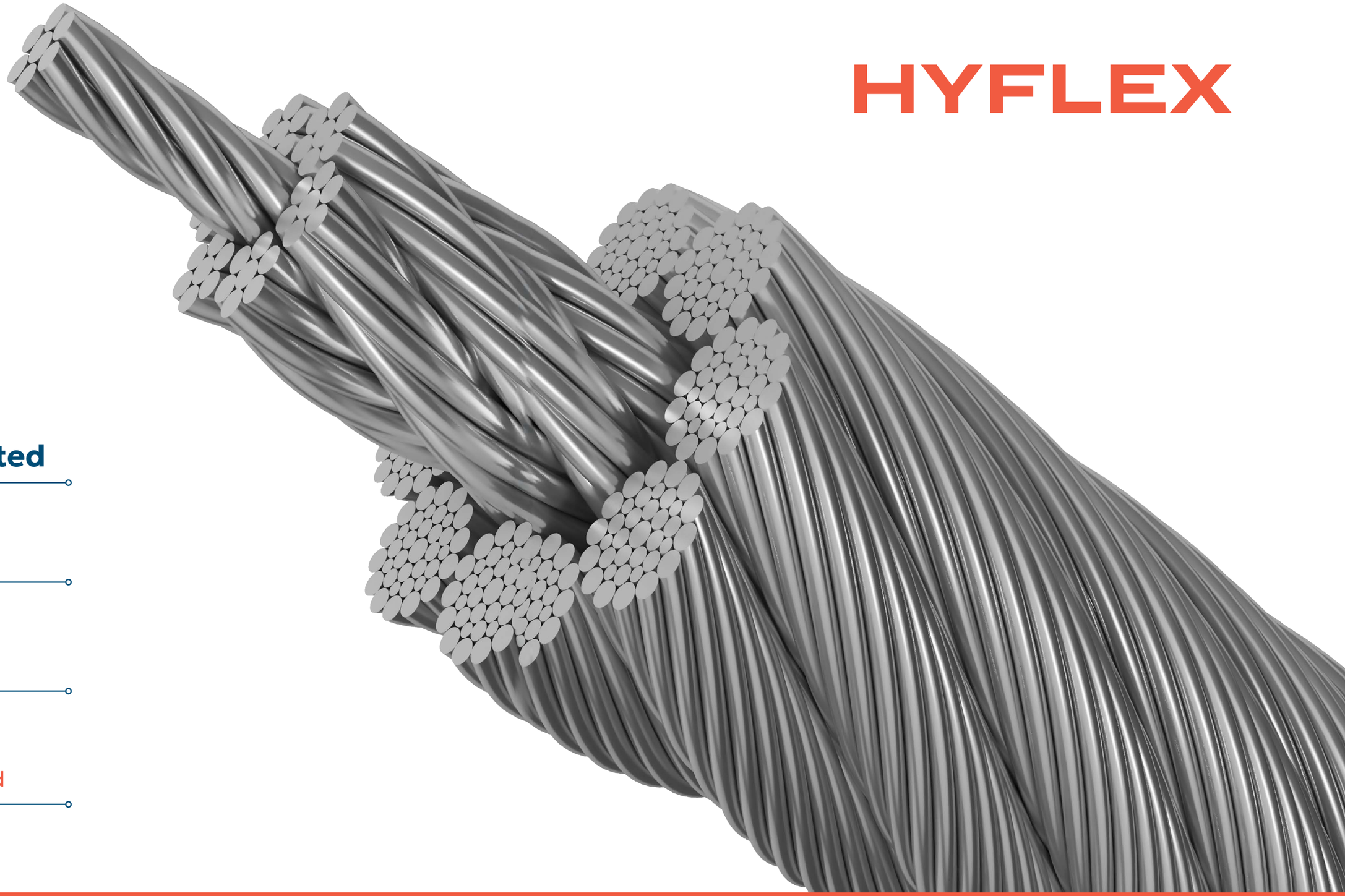
Building stronger connections with an unwavering commitment to customer satisfaction.

# GUIDE TO APPLICATION & ROPE SELECTION

| | DOCK-SIDE / DECK CRANES / OFF-SHORE PEDESTAL | | | TOWER CRANES | | | MOBILE AND CRAWLER CRANES | | CONTAINER CRANES / UNLOADERS | | | PILLING | LADLE CRANES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TYPICAL APPLICATIONS** |  |  |  |  | | |  |  |  |  | |  |  |
| | **MAIN HOIST** | **BOOM HOIST** | **WHIP HOIST** | **MAIN HOIST** | **STAY** | **TROLLEY** | **MAIN HOIST** | **BOOM HOIST** | **MAIN HOST** | **BOOM HOIST** | **TROLLEY/ RACKING** | **HOIST** | **HOIST** |
| **HYFLEX 6/6P POWERFORM® 6/6P** | ✕ | ✓ | ✕ | ✕ | ✓ | ✓ | ✕ | ✓ | ✓ | ✓ | ✓ | ! | ✓ |
| **HYFLEX 8/8P POWERFORM® 8/8P** | ! | ✓ | ✕ | ✕ | ✓ | ✓ | ✕ | ✓ | ✓ | ✓ | ✓ | ✕ | ✓ |
| **HYFLEX 4** | ✓ | ✕ | ✕ | ✕ | ✕ | ✕ | ✓ | ✕ | ✕ | ✕ | ✕ | ! | ✕ |
| **HYFLEX 18/18P POWERFORM® 18/18P** | ✓ | ✕ | ✓ | ✓ | ✕ | ✕ | ✓ | ✕ | ✕ | ✕ | ✕ | ✓ | ✕ |
| **HYFLEX 35/35P POWERFORM® 35/35P** | ✓ | ✕ | ✓ | ✓ | ✕ | ✕ | ✓ | ✕ | ✕ | ✕ | ✕ | ✓ | ✕ |

**Key:** ✓ Recommended ! Allowed ✕ Not Recommended

# HYFLEX



## Non Compacted

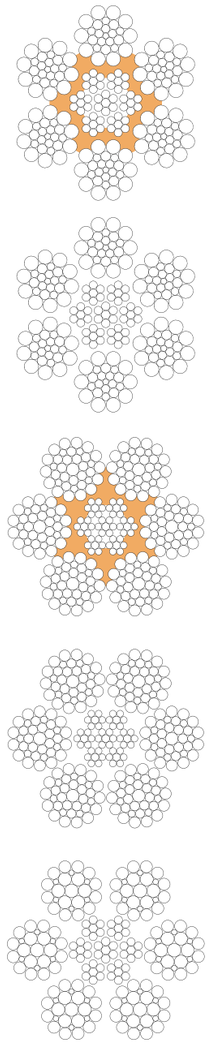
## Lay direction
LH or RH

## Lay Type
Ordinary or Langs

## Finish
Bright or Galvanised

# HYFLEX 6 / 6P

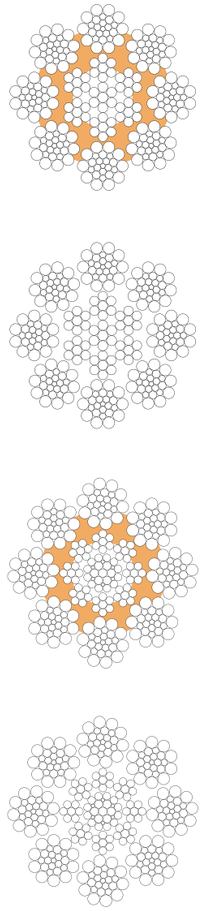
| NOMINAL ROPE DIAMETER | | APPROX. MASS | | MINIMUM BREAKING LOAD | | |
|---|---|---|---|---|---|---|
| | | | | 1770 GRADE | 1960 GRADE | 2160 GRADE |
| mm | inch | kg/m | lb/ft | kN | kN | kN |
| 8 | | 0.273 | 0.184 | 43.3 | 47.9 | 52.8 |
| 9 | | 0.346 | 0.233 | 54.8 | 60.6 | 66.8 |
| 10 | | 0.427 | 0.287 | 67.6 | 74.9 | 82.5 |
| 11 | | 0.517 | 0.347 | 81.8 | 90.6 | 100 |
| 12 | | 0.615 | 0.413 | 97.4 | 108 | 119 |
| | 1/2 | 0.689 | 0.463 | 109 | 121 | 133 |
| 13 | | 0.722 | 0.485 | 114 | 127 | 139 |
| 14 | | 0.837 | 0.563 | 133 | 147 | 162 |
| | 5/8 | 1.08 | 0.726 | 171 | 190 | 209 |
| 16 | | 1.10 | 0.739 | 174 | 192 | 212 |
| 17 | | 1.24 | 0.833 | 197 | 218 | 240 |
| 18 | | 1.39 | 0.934 | 220 | 244 | 269 |
| 19 | | 1.55 | 1.04 | 246 | 272 | 300 |
| 20 | | 1.72 | 1.16 | 272 | 301 | 332 |
| 22 | | 2.08 | 1.40 | 329 | 365 | 402 |
| | 7/8 | 2.12 | 1.42 | 336 | 372 | 410 |
| 24 | 15/16 | 2.48 | 1.67 | 392 | 434 | 478 |
| 25 | | 2.69 | 1.81 | 425 | 471 | 519 |
| | 1 | 2.77 | 1.86 | 438 | 485 | 535 |
| 26 | | 2.91 | 1.96 | 460 | 509 | 561 |
| 28 | | 3.37 | 2.26 | 533 | 591 | 651 |
| | 1 1/8 | 3.51 | 2.36 | 556 | 615 | 678 |
| 30 | | 3.87 | 2.60 | 612 | 678 | 747 |
| | 1 1/4 | 4.33 | 2.91 | 686 | 760 | 837 |
| 32 | | 4.40 | 2.96 | 697 | 771 | 850 |
| 36 | | 5.57 | 3.74 | 876 | 970 | 1069 |
| 40 | | 6.88 | 4.62 | 1082 | 1198 | 1320 |
| 44 | | 8.32 | 5.59 | 1270 | 1406 | 1549 |
| 48 | 1 7/8 | 9.90 | 6.65 | 1511 | 1673 | 1844 |
| 52 | | 11.6 | 7.81 | 1773 | 1964 | 2164 |
| 56 | | 13.5 | 9.05 | 2056 | 2277 | 2510 |
| 60 | 2 3/8 | 15.5 | 10.4 | 2361 | 2614 | 2881 |



- Excellent shock resistancene
- Enhanced resistance to fleet angle if plastic impregnated

# HYFLEX 8 / 8P

| NOMINAL ROPE DIAMETER | | APPROX. MASS | | MINIMUM BREAKING LOAD | |
|---|---|---|---|---|---|
| | | | | 1960 GRADE | 2160 GRADE |
| mm | inch | kg/m | lb/ft | kN | kN |
| 10 | | 0.435 | 0.292 | 72.9 | 81.4 |
| 11 | | 0.526 | 0.353 | 86.1 | 96.5 |
| 12 | | 0.626 | 0.421 | 105 | 117 |
| | 1/2 | 0.702 | 0.472 | 123 | 131 |
| 13 | | 0.735 | 0.494 | 124 | 138 |
| 14 | | 0.853 | 0.573 | 143 | 160 |
| 15 | | 0.979 | 0.658 | 164 | 183 |
| 16 | 5/8 | 1.11 | 0.746 | 187 | 208 |
| 17 | | 1.26 | 0.847 | 211 | 239 |
| 18 | | 1.41 | 0.947 | 239 | 267 |
| 19 | 3/4 | 1.57 | 1.05 | 269 | 300 |
| 20 | | 1.76 | 1.18 | 295 | 331 |
| 22 | | 2.13 | 1.43 | 356 | 400 |
| | 7/8 | 2.17 | 1.46 | 360 | 402 |
| 24 | | 2.53 | 1.70 | 423 | 475 |
| 25 | | 2.75 | 1.85 | 459 | 506 |
| | 1 | 2.84 | 1.91 | 470 | 525 |
| 26 | | 2.97 | 2.00 | 500 | 562 |
| 28 | | 3.45 | 2.32 | 572 | 642 |
| | 1 1/8 | 3.59 | 2.41 | 596 | 665 |
| 30 | | 3.96 | 2.66 | 656 | 733 |
| 32 | 1 1/4 | 4.51 | 3.03 | 747 | 836 |
| 34 | | 5.09 | 3.42 | 843 | 945 |
| 36 | | 5.70 | 3.83 | 935 | 1053 |
| 38 | 1 1/2 | 6.35 | 4.27 | 1043 | 1172 |
| 40 | | 7.04 | 4.73 | 1162 | 1313 |
| 42 | | 7.85 | 5.27 | 1305 | 1462 |
| 44 | | 8.62 | 5.79 | 1412 | 1577 |
| | 1 3/4 | 8.79 | 5.91 | 1441 | 1613 |
| 46 | | 9.42 | 6.33 | 1543 | 1731 |
| 48 | | 10.3 | 6.89 | 1680 | 1885 |
| 50 | | 11.1 | 7.48 | 1833 | 2065 |
| | 2 | 11.5 | 7.71 | 1882 | 2101 |
| 52 | | 12.0 | 8.08 | 1972 | 2202 |



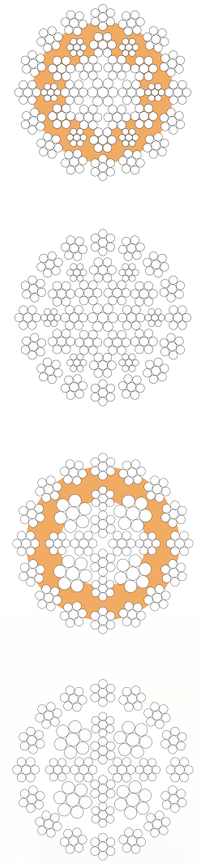
- Enhanced resistance to fleet angle if plastic impregnated
- Greater surface contact area resulting from the eight strand construction

# HYFLEX 35 / 35P

| NOMINAL ROPE DIAMETER | | APPROX. MASS | | MINIMUM BREAKING LOAD | |
|---|---|---|---|---|---|
| | | | | 1960 GRADE | 2160 GRADE |
| mm | inch | kg/m | lb/ft | kN | kN |
| 10 | | 0.448 | 0.301 | 76.0 | 86.5 |
| 11 | | 0.542 | 0.364 | 91.0 | 104 |
| 12 | | 0.645 | 0.434 | 107 | 125 |
| | 1/2 | 0.723 | 0.486 | 123 | 137 |
| 13 | | 0.757 | 0.509 | 128 | 146 |
| 14 | | 0.878 | 0.590 | 148 | 168 |
| 15 | | 1.01 | 0.677 | 170 | 194 |
| | 5/8 | 1.13 | 0.759 | 190 | 218 |
| 16 | | 1.15 | 0.771 | 194 | 221 |
| 17 | | 1.29 | 0.870 | 219 | 247 |
| 18 | | 1.45 | 0.975 | 242 | 277 |
| 19 | 3/4 | 1.63 | 1.09 | 277 | 312 |
| 20 | | 1.79 | 1.20 | 301 | 337 |
| 21 | | 1.98 | 1.33 | 335 | 370 |
| 22 | | 2.17 | 1.46 | 370 | 412 |
| | 7/8 | 2.21 | 1.49 | 376 | 418 |
| 24 | | 2.58 | 1.73 | 441 | 498 |
| 25 | | 2.80 | 1.88 | 479 | 540 |
| | 1 | 2.89 | 1.94 | 491 | 546 |

# HYFLEX 35 / 35P

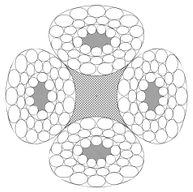
| NOMINAL ROPE DIAMETER | | APPROX. MASS | | MINIMUM BREAKING LOAD | |
|---|---|---|---|---|---|
| | | | | 1960 GRADE | 2160 GRADE |
| mm | inch | kg/m | lb/ft | kN | kN |
| 26 | | 3.03 | 2.04 | 517 | 581 |
| 28 | | 3.51 | 2.36 | 599 | 681 |
| | 1 1/8 | 3.66 | 2.46 | 621 | 704 |
| 30 | | 4.03 | 2.71 | 679 | 775 |
| | 1 1/4 | 4.52 | 3.03 | 761 | 786 |
| 32 | | 4.59 | 3.08 | 769 | 865 |
| 35 | 1 3/8 | 5.47 | 3.67 | 945 | 1044 |
| 36 | | 5.81 | 3.90 | 983 | 1085 |
| 38 | 1 1/2 | 6.50 | 4.37 | 1078 | 1205 |
| 40 | | 7.17 | 4.82 | 1202 | 1335 |
| 42 | | 7.90 | 5.31 | 1227 | 1352 |
| 44 | | 8.67 | 5.83 | 1347 | 1484 |
| | 1 3/4 | 8.85 | 5.95 | 1375 | 1515 |
| 46 | | 9.48 | 6.37 | 1472 | 1622 |
| 48 | | 10.3 | 6.94 | 1603 | 1766 |
| 50 | | 11.2 | 7.53 | 1740 | 1917 |
| | 2 | 11.6 | 7.77 | 1796 | 1979 |
| 52 | | 12.1 | 8.14 | 1881 | 2072 |



- Excellent non-rotational properties
- High flexibility and handling properties
- High resistance to side pressure and crushing

# HYFLEX 4

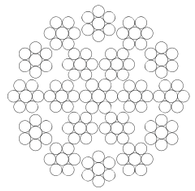
| NOMINAL ROPE DIAMETER | APPROX. MASS | | MINIMUM BREAKING LOAD | |
|---|---|---|---|---|
| | | | 1770 GRADE | 1960 GRADE |
| mm | kg/m | lb/ft | kN | kN |
| 16 | 1.09 | 0.731 | 160 | 177 |
| 18 | 1.38 | 0.925 | 203 | 225 |
| 20 | 1.70 | 1.14 | 250 | 277 |
| 22 | 2.06 | 1.38 | 303 | 335 |
| 24 | 2.45 | 1.64 | 360 | 399 |
| 25 | 2.66 | 1.78 | 391 | 433 |
| 26 | 2.87 | 1.93 | 423 | 468 |
| 28 | 3.33 | 2.24 | 490 | 543 |
| 30 | 3.83 | 2.57 | 564 | 624 |
| 32 | 4.35 | 2.92 | 641 | 710 |
| 33.5 | 4.77 | 3.20 | 703 | 778 |
| 34 | 4.91 | 3.30 | 723 | 801 |
| 35.5 | 5.36 | 3.60 | 788 | 873 |
| 36 | 5.51 | 3.70 | 811 | 898 |
| 38 | 6.14 | 4.12 | 904 | 1001 |



- Torque balanced rope

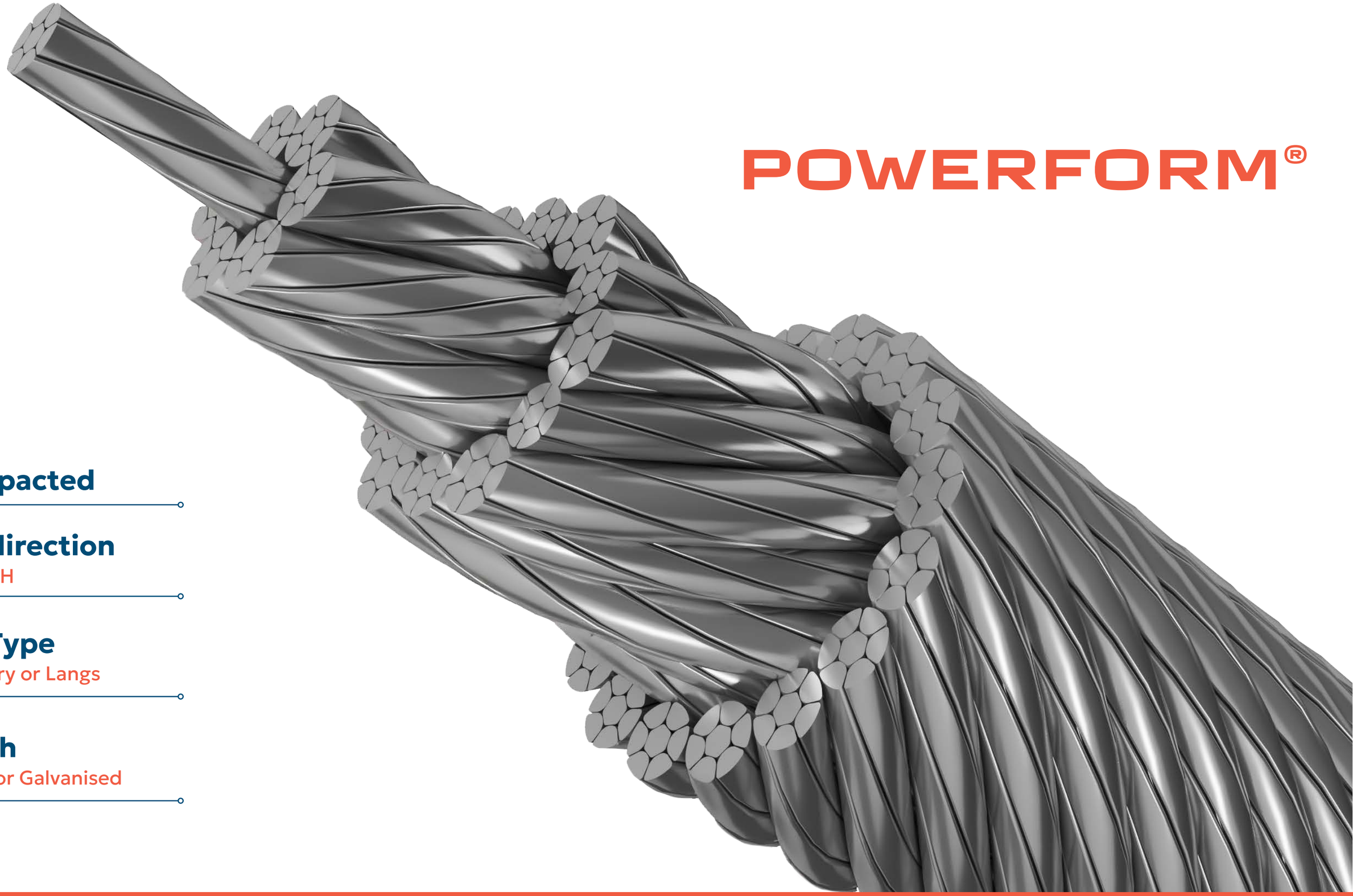
# HYFLEX 18

| NOMINAL ROPE DIAMETER | | APPROX. MASS | | MINIMUM BREAKING LOAD | |
|---|---|---|---|---|---|
| | | | | 1960 GRADE | 2160 GRADE |
| mm | inch | kg/m | lb/ft | kN | kN |
| 6 | | 0.157 | 0.105 | 25.0 | 27.0 |
| 7 | | 0.213 | 0.143 | 34.0 | 37.0 |
| 8 | | 0.278 | 0.187 | 45.0 | 49.0 |
| 9 | | 0.352 | 0.237 | 57.0 | 61.0 |
| 10 | | 0.435 | 0.292 | 70.0 | 76.0 |
| 11 | | 0.526 | 0.354 | 84.0 | 91.0 |
| 12 | | 0.626 | 0.421 | 101 | 109 |
| | 1/2 | 0.702 | 0.471 | 113 | 121 |
| 13 | | 0.735 | 0.494 | 118 | 127 |
| 14 | | 0.853 | 0.573 | 137 | 148 |
| 15 | | 0.979 | 0.658 | 157 | 169 |
| 16 | 5/8 | 1.11 | 0.748 | 180 | 194 |
| 17 | | 1.26 | 0.845 | 203 | 219 |
| 18 | | 1.41 | 0.947 | 226 | 244 |
| | 3/4 | 1.58 | 1.06 | 253 | 273 |
| 20 | | 1.74 | 1.17 | 279 | 301 |
| 22 | | 2.11 | 1.41 | 339 | 366 |
| | 7/8 | 2.15 | 1.44 | 346 | 374 |



- Good resistance to rotation
- High flexibility and handling properties

# POWERFORM®



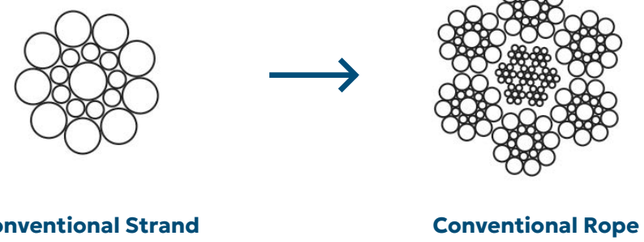
## Compacted

## Lay direction
LH or RH

## Lay Type
Ordinary or Langs

## Finish
Bright or Galvanised

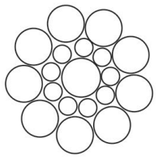
# POWERFORM® COMPACTED ROPE



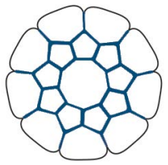
**Conventional Strand** **Conventional Rope**

**Compacted Strand** **Compacted Rope**

A Powerform® compacted rope is a steel wire rope which has been manufactured using individually compacted strands. During the compaction process the outside diameter of the strand is reduced and steel moves into the empty voids between the wires within the strand. The forming process also produces a very smooth exterior strand surface.



**Conventional**



**Compacted**

The compacted strand has very favourable internal contact conditions when compared with the point contact of round wires within a normal strand.

**Conventional**

**Compacted**

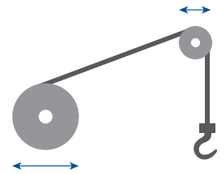
Exterior contact conditions are equally favourable. The smooth surface of the compacted rope offers a wider bearing surface to the sheave or drum groove. Inter strand contact and contact between adjacent laps of rope on the winch drum is also improved.



# POWERFORM® SELECTION

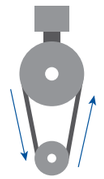
## Optimised crane design

The breaking load to size relationship can allow crane manufacturers to optimise the design of crane components such as the winch drum and sheaves whilst still complying with international crane design standards.



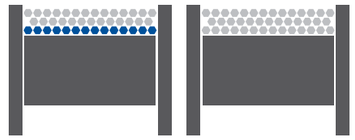
## Longer Life

Laboratory fatigue testing indicates that it is possible to achieve a significant increase in rope life when comparing a Powerform® rope with a conventional rope of equivalent construction.



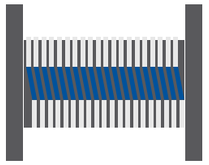
## Greater resistance to crushing in multi-layer coiling situations

Powerform® ropes are recommended for all multi-layer coiling situations where crushing on lower layers is inevitable. The more solid cross section of the Powerform® rope offers much greater resistance to this type of damage.



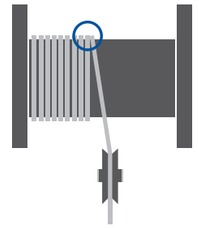
## More effective resistance to crushing at crossover points

Because of the higher steel fill factor Powerform® ropes offer much better resistance to crushing damage at crossover points on the winch drum.



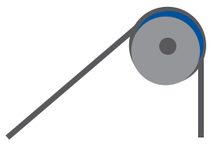
## Greater resistance to “side crushing” at the drum

Abrasive wear between adjacent laps of rope which is normally most severe where the rope moves on and off the drum can be minimised by using a Powerform® rope.



## Reduced wear on sheaves

The smooth exterior of the Powerform® rope can lead to reduced abrasive wear on both the sheave and rope.



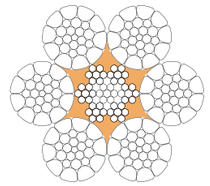
# POWERFORM® 6 / 6P

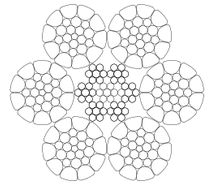
| NOMINAL ROPE DIAMETER | | APPROX. MASS | | MINIMUM BREAKING FORCE | | |
|---|---|---|---|---|---|---|
| | | | | 1770 GRADE | 1960 GRADE | 2160 GRADE |
| mm | inch | kg/m | lb/ft | kN | kN | kN |
| 10 | | 0.460 | 0.309 | 75.4 | 83.5 | 92.0 |
| 11 | | 0.557 | 0.374 | 91.0 | 101 | 111 |
| 12 | | 0.662 | 0.445 | 108 | 120 | 132 |
| | 1/2 | 0.742 | 0.499 | 121 | 134 | 148 |
| 13 | | 0.777 | 0.522 | 127 | 141 | 155 |
| 14 | | 0.902 | 0.606 | 148 | 163 | 180 |
| 15 | | 1.04 | 0.699 | 170 | 188 | 207 |
| | 5/8 | 1.16 | 0.779 | 190 | 211 | 232 |
| 16 | | 1.18 | 0.793 | 193 | 214 | 236 |
| 17 | | 1.33 | 0.894 | 218 | 241 | 266 |
| 18 | | 1.49 | 1.00 | 244 | 270 | 298 |
| 19 | 3/4 | 1.66 | 1.12 | 272 | 301 | 332 |
| 20 | | 1.84 | 1.24 | 302 | 334 | 368 |
| 22 | | 2.23 | 1.50 | 365 | 404 | 445 |
| | 7/8 | 2.27 | 1.53 | 372 | 412 | 454 |
| 24 | | 2.65 | 1.78 | 434 | 481 | 530 |
| 25 | | 2.88 | 1.94 | 471 | 522 | 575 |
| | 1 | 2.97 | 2.00 | 487 | 539 | 594 |



# POWERFORM® 6 / 6P

| NOMINAL ROPE DIAMETER | | APPROX. MASS | | MINIMUM BREAKING FORCE | | |
|---|---|---|---|---|---|---|
| | | | | 1770 GRADE | 1960 GRADE | 2160 GRADE |
| mm | inch | kg/m | lb/ft | kN | kN | kN |
| 26 | | 3.11 | 2.09 | 510 | 564 | 622 |
| 28 | | 3.61 | 2.43 | 591 | 654 | 721 |
| | 1 1/8 | 3.76 | 2.53 | 615 | 681 | 751 |
| 30 | | 4.14 | 2.78 | 679 | 751 | 828 |
| | 1 1/4 | 4.54 | 3.05 | 760 | 841 | 927 |
| 32 | | 4.61 | 3.10 | 764 | 846 | 932 |
| 34 | | 5.20 | 3.49 | 860 | 953 | 1050 |
| 35 | 1 3/8 | 5.49 | 3.69 | 910 | 1007 | 1110 |
| 36 | | 5.83 | 3.92 | 967 | 1071 | 1180 |
| 38 | 1 1/2 | 6.50 | 4.37 | 1073 | 1189 | 1310 |
| 40 | | 7.20 | 4.84 | 1196 | 1325 | 1460 |
| 42 | | 7.94 | 5.34 | 1319 | 1461 | 1610 |
| 44 | | 8.71 | 5.85 | 1442 | 1597 | 1760 |
| | 1 3/4 | 8.89 | 5.97 | 1475 | 1633 | 1800 |
| 46 | | 9.52 | 6.40 | 1582 | 1751 | 1930 |
| 48 | 1 7/8 | 10.4 | 6.99 | 1721 | 1906 | 2100 |
| 50 | | 11.3 | 7.59 | 1868 | 2069 | 2280 |
| | 2 | 11.6 | 7.79 | 1926 | 2132 | 2350 |
| 52 | | 12.2 | 8.20 | 2016 | 2232 | 2460 |
| 54 | 2 1/8 | 13.1 | 8.80 | 2172 | 2405 | 2650 |
| 56 | | 14.1 | 9.47 | 2335 | 2586 | 2850 |
| 58 | | 15.1 | 10.1 | 2508 | 2777 | 3060 |
| 60 | 2 3/8 | 16.4 | 11.0 | 2712 | 3004 | 3310 |





- Improved MBF
- Excellent shock resistance
- Good resistance to side pressure and crushing
- Enhanced resistance to fleet angle if plastic impregnated

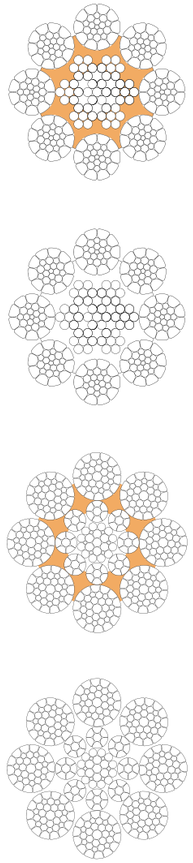
# POWERFORM® 8 / 8P

| NOMINAL ROPE DIAMETER | | APPROX. MASS | | MINIMUM BREAKING FORCE | |
|---|---|---|---|---|---|
| | | | | 1960 GRADE | 2160 GRADE |
| mm | inch | kg/m | lb/ft | kN | kN |
| 10 | | 0.460 | 0.309 | 87.8 | 94.0 |
| 11 | | 0.557 | 0.374 | 106 | 114 |
| 12 | | 0.662 | 0.445 | 126 | 135 |
| | 1/2 | 0.742 | 0.499 | 142 | 152 |
| 13 | | 0.777 | 0.522 | 148 | 159 |
| 14 | | 0.902 | 0.606 | 172 | 184 |
| 15 | | 1.04 | 0.695 | 198 | 211 |
| 16 | 5/8 | 1.18 | 0.791 | 225 | 241 |
| 17 | | 1.33 | 0.893 | 254 | 272 |
| 18 | | 1.49 | 1.00 | 284 | 304 |
| 19 | 3/4 | 1.66 | 1.12 | 317 | 339 |
| 20 | | 1.84 | 1.24 | 351 | 376 |
| 22 | | 2.23 | 1.50 | 425 | 455 |
| | 7/8 | 2.27 | 1.53 | 434 | 464 |
| 24 | | 2.65 | 1.78 | 506 | 541 |
| | 1 | 2.97 | 1.99 | 567 | 606 |



# POWERFORM® 8 / 8P

| NOMINAL ROPE DIAMETER | | APPROX. MASS | | MINIMUM BREAKING FORCE | |
|---|---|---|---|---|---|
| | | | | 1960 GRADE | 2160 GRADE |
| mm | inch | kg/m | lb/ft | kN | kN |
| 26 | | 3.11 | 2.09 | 594 | 635 |
| 28 | | 3.61 | 2.42 | 688 | 737 |
| | 1 1/8 | 3.76 | 2.52 | 717 | 767 |
| 30 | | 4.14 | 2.78 | 790 | 846 |
| 32 | 1 1/4 | 4.71 | 3.17 | 899 | 960 |
| 34 | | 5.32 | 3.57 | 1013 | 1083 |
| 36 | | 5.96 | 4.01 | 1138 | 1218 |
| 38 | 1 1/2 | 6.64 | 4.46 | 1268 | 1357 |
| 40 | | 7.36 | 4.95 | 1405 | 1503 |
| 42 | | 8.11 | 5.45 | 1535 | 1651 |
| 44 | | 8.91 | 5.98 | 1700 | 1819 |
| | 1 3/4 | 9.09 | 6.11 | 1735 | 1856 |
| 46 | | 9.73 | 6.54 | 1858 | 1985 |
| 48 | | 10.6 | 7.12 | 2023 | 2162 |
| 50 | | 11.5 | 7.73 | 2200 | 2349 |
| | 2 | 11.9 | 7.98 | 2266 | 2425 |
| 52 | | 12.4 | 8.36 | 2374 | 2541 |

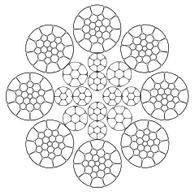


- High MBF
- Enhanced resistance to fleet angle if plastic impregnated
- Smoother contact surface in respect to conventional hoist rope

**NOTE:**
Rope wt. mentioned above is correspondence to the 1960 grade.
For 2160 grade, Rope wt. will be approx. 5% higher.

# POWERFORM® 8 MAX

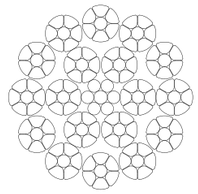
| NOMINAL ROPE DIAMETER | | APPROX. MASS | | MINIMUM BREAKING FORCE |
|---|---|---|---|---|
| | | | | 2160 GRADE |
| mm | inch | kg/m | lb/ft | kN |
| 10 | | 0.490 | 0.329 | 102 |
| 11 | | 0.593 | 0.398 | 123 |
| 12 | | 0.706 | 0.474 | 147 |
| | | 0.790 | 0.531 | 165 |
| 13 | | 0.828 | 0,556 | 172 |
| 14 | | 0.960 | 0.645 | 200 |
| 15 | | 1.10 | 0.739 | 230 |
| | 5/8 | 1.23 | 0.827 | 257 |
| 16 | | 1.25 | 0.840 | 261 |
| 17 | | 1.42 | 0.954 | 295 |
| 18 | | 1.59 | 1.07 | 331 |
| 19 | 3/4 | 1.77 | 1.19 | 368 |
| 20 | | 1.96 | 1.32 | 408 |
| 22 | | 2.37 | 1.59 | 494 |
| | 7/8 | 2.42 | 1.63 | 504 |
| 24 | | 2.82 | 1.89 | 588 |
| 25 | | 3.06 | 2.06 | 638 |
| | 1 | 3.16 | 2.12 | 658 |
| 26 | | 3.31 | 2.22 | 690 |
| 28 | | 3.84 | 2.58 | 800 |
| | 1 1/8 | 4.00 | 2.69 | 833 |
| 30 | | 4.41 | 2.96 | 918 |
| | 1 1/2 | 4.94 | 3.32 | 1030 |



- Extremely high MBF
- High resistance to side pressure and crushing

# POWERFORM® 18

| NOMINAL ROPE DIAMETER | | APPROX. MASS | | MINIMUM BREAKING FORCE | |
|---|---|---|---|---|---|
| | | | | 1960 GRADE | 2160 GRADE |
| mm | inch | kg/m | lb/ft | kN | kN |
| 6 | | 0.175 | 0.118 | 29.4 | |
| 7 | | 0.238 | 0.160 | 38.0 | |
| 8 | | 0.310 | 0.208 | 51.8 | |
| 9 | | 0.393 | 0.264 | 64.6 | |
| 10 | | 0.485 | 0.326 | 80.8 | |
| 11 | | 0.587 | 0.394 | 101 | 111 |
| 12 | | 0.698 | 0.469 | 116 | 127 |
| | 1/2 | 0.782 | 0.525 | 135 | 148 |
| 13 | | 0.820 | 0.551 | 141 | 155 |
| 14 | | 0.951 | 0.639 | 160 | 177 |
| 15 | | 1.09 | 0.732 | 182 | 201 |
| 16 | 5/8 | 1.24 | 0.833 | 209 | 232 |
| 17 | | 1.40 | 0.941 | 237 | 262 |
| 18 | | 1.57 | 1.05 | 266 | 295 |
| | 3/4 | 1.75 | 1.18 | 291 | 322 |
| 20 | | 1.94 | 1.30 | 320 | 359 |
| 22 | | 2.35 | 1.58 | 379 | 424 |
| 24 | | 2.79 | 1.87 | 462 | 523 |
| | 1 | 3.13 | 2.10 | 517 | 585 |
| 26 | | 3.28 | 2.20 | 542 | 613 |
| 28 | | 3.80 | 2.55 | 632 | 710 |
| 30 | | 4.37 | 2.94 | 721 | 809 |
| 32 | 1 1/4 | 4.97 | 3.34 | 820 | 920 |



- Good rotational stability
- Good resistance to side pressure and crushing

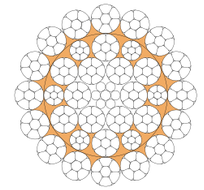
# POWERFORM® 35 / 35P

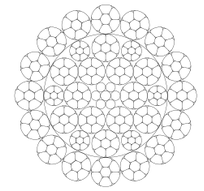
| NOMINAL ROPE DIAMETER | | APPROX. MASS | | MINIMUM BREAKING FORCE | |
|---|---|---|---|---|---|
| | | | | 1960 GRADE | 2160 GRADE |
| mm | inch | kg/m | lb/ft | kN | kN |
| 10 | | 0.490 | 0.329 | 91.0 | 100 |
| 11 | | 0.593 | 0.398 | 111 | 121 |
| 12 | | 0.706 | 0.474 | 131 | 144 |
| | 1/2 | 0.790 | 0.531 | 148 | 161 |
| 13 | | 0.828 | 0.556 | 155 | 169 |
| 14 | | 0.960 | 0.645 | 180 | 196 |
| 15 | | 1.10 | 0.739 | 207 | 225 |
| | 5/8 | 1.23 | 0.827 | 234 | 252 |
| 16 | | 1.25 | 0.840 | 238 | 256 |
| 17 | | 1.42 | 0.954 | 269 | 289 |
| 18 | | 1.59 | 1.07 | 301 | 324 |
| 19 | 3/4 | 1.81 | 1.22 | 336 | 361 |
| 20 | | 2.00 | 1.34 | 372 | 400 |
| 22 | | 2.42 | 1.63 | 450 | 484 |
| | 7/8 | 2.47 | 1.66 | 459 | 494 |

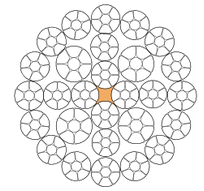


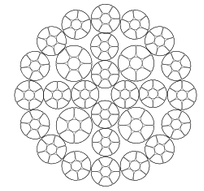
# POWERFORM® 35 / 35P

| NOMINAL ROPE DIAMETER | | APPROX. MASS | | MINIMUM BREAKING FORCE | |
|---|---|---|---|---|---|
| | | | | 1960 GRADE | 2160 GRADE |
| mm | inch | kg/m | lb/ft | kN | kN |
| 24 | | 2.88 | 1.94 | 536 | 576 |
| 25 | | 3.13 | 2.10 | 581 | 625 |
| | 1 | 3.23 | 2.17 | 600 | 645 |
| 26 | | 3.38 | 2.27 | 629 | 676 |
| 28 | | 3.92 | 2.63 | 729 | 788 |
| | 1 1/8 | 4.08 | 2.74 | 759 | 817 |
| 30 | | 4.50 | 3.02 | 837 | 904 |
| | 1 1/4 | 5.04 | 3.39 | 937 | 1010 |
| 32 | | 5.12 | 3.44 | 952 | 1040 |
| 34 | | 5.78 | 3.88 | 1080 | 1160 |
| 35 | 1 3/8 | 6.10 | 4.10 | 1130 | 1220 |
| 36 | | 6.48 | 4.35 | 1210 | 1300 |
| 38 | 1 1/2 | 7.22 | 4.85 | 1340 | 1440 |
| 40 | | 8.00 | 5.38 | 1490 | 1600 |
| 42 | | 8.82 | 5.93 | 1643 | |
| 44 | | 9.68 | 6.50 | 1803 | |
| | 1 3/4 | 9.90 | 6.65 | 1840 | |
| 46 | | 10.6 | 7.11 | 1971 | |
| 48 | | 11.5 | 7.74 | 2146 | |
| 50 | | 12.5 | 8.40 | 2328 | |
| | 2 | 12.9 | 8.67 | 2403 | |
| 52 | | 13.5 | 9.09 | 2518 | |
| 60 | | 18.0 | 12.1 | 3353 | |
| 64 | | 20.5 | 13.8 | 3814 | |
| 66 | | 21.8 | 14.6 | 4057 | |









- Extremely high MBF
- Excellent non-rotational properties
- High fatigue life and increased abrasion
- Enhanced resistance to fleet angle if plastic impregnated

# STORAGE & PRE-INSTALLATION PROCEDURE

Crane ropes, like any machine or spares, deteriorate during storage as well as in service. Therefore, the assurance of safety and economy in use of the equipment, dictates the requirement for a procedure of proper storage, handling and installation of crane ropes.

## STORAGE

- Store rope in a clean, dry, well ventilated, dust free undercover location.
- Cover the rope with water proof material and/or canopy, if not stored inside.
- Storage should be free from steam, chemical fumes or any other corrosive agent.
- Avoid direct contact of rope with floor.
- Place reels, preferably over a frame or cradle and allow flow of air under the reel.
- Avoid rope exposure to elevated temperatures.
- Avoid handling damages to wire ropes.
- Ensure that tag/marking is intact and follow 'first in, first out' principle.
- Inspect rope periodically and apply suitable rope dressing compatible with manufactured lubricant, whenever necessary.
- Rotate reel periodically, say after every 3 months, particularly in warm environment.

## BEFORE INSTALLATION

- Before re-equipping the appliance, all grooves in drums and pulleys should be checked to ensure that they will correctly accept the replacement rope.
- Sheave groove diameter should be larger than the nominal rope diameter by about 5% to 10% and ideally at least 2.5% greater than the actual diameter of the new rope.
- The diameter of the new rope shall be measured with the rope under no tension and the value recorded. Maintain fleet angle at minimum during installation
- Prior to rope cutting, always follow proper procedure of rope seizing
- Never pull the rope from stationery coil or reel
- Avoid contact with ground while unwinding the rope
- Keep the reel on a suitable stand with braking arrangement
- Avoid formation of kink/ bends in the rope during handling
- Follow 'top to top' or 'bottom to bottom' practice for rope transfer from reel to drum / winch.

## RUNNING IN PROCEDURE

- Run the newly installed wire rope in and out six times over its maximum working length with a load approx. 25% of safe working load at reduce speed.
- Repeat this procedure with load at 50% of safe working load.
- Continue the same procedure with load at 100% of safe working load.

## SEIZING PROCEDURE

The purpose of seizing a rotation resistant wire rope is to prevent relative movement of individual strands of inner core as well as outer layer and thereby preserving its designed integrity and rotational balance. Therefore, before cutting any rotation resistant wire rope, tightly double seize with soft steel wire of suitable size, on either side of the intended cut. The length of each seizing should be at least equal to 2 x $d_{rope\ dia}$. and each of the seizing should be spaced approximately 6 x $d_{rope\ dia}$.

- Use of adhesive tape in lieu of seizing is strictly discouraged.
- Fusing of cut ends in strongly recommended.

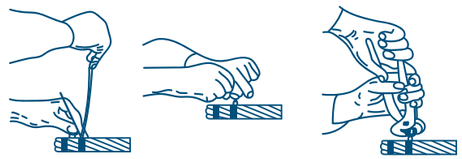
**POWERFORM® 18/HYFLEX 18 | POWERFORM® 35/HYFLEX 35**

For 6.0 mm to 24.0 mm wire rope, use 1.0 mm wire

For 25.0 mm to 36.0 mm wire rope, use 1.6 mm wire

For 37.0 mm to 56.0 mm wire rope, use 2.0 mm wire

Double seizing and end fusing mandatory

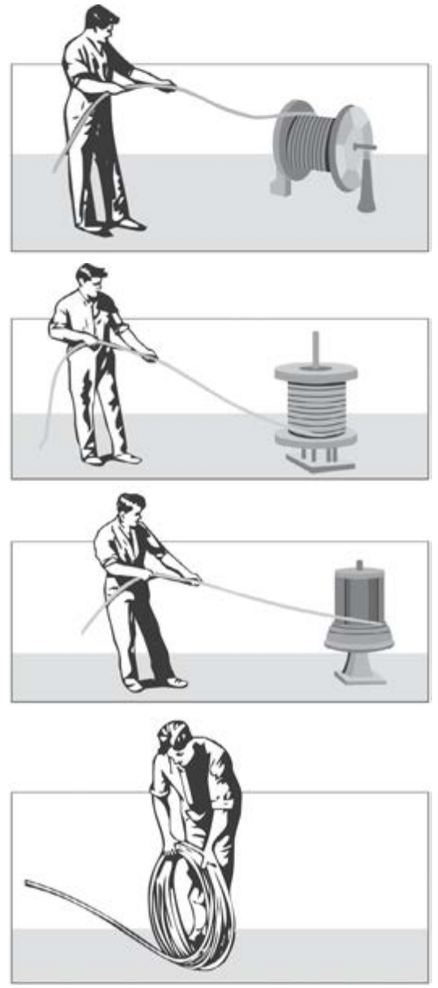




# HANDLING & INSTALLATION

## 6/8 STRANDED ROPE

- Never pull out rope from stationary coil.
- Place rope reel on ground and roll out straight.
- If heavy, place coil on turntable and pull the end away from coil.
- Prevent contamination with dust, grit, moisture, chemicals and other harmful material.
- Put a shaft of adequate strength through reel bore and place in a suitable stand.
- Allow reel to rotate freely and be braked to avoid overrun.
- Provide back tension for multilayer spooling and ensure to wind tightly, particularly the bottom layer.
- Maintain constant tension while reeving and avoid layer cross-over.
- Avoid formation of loops or kinks.
- Avoid reverse bending during reeving. Wind/Unwind 'top to top' or 'bottom to bottom'.
- Take special care while releasing the outboard end of rope from supplied reel or coil.
- Maintain fleet angle at minimum during installation.
- Check that the grooves of all sheaves are as recommended and sheaves are free to rotate.
- Check the diameter and pitch of drum grooves, and ensure that these are as recommended.
- 'Run' the new rope by running the equipment slowly, with a low load for a number of cycles.
- Inspect that the rope spools correctly on the drum and no slackness or cross-over occurs.



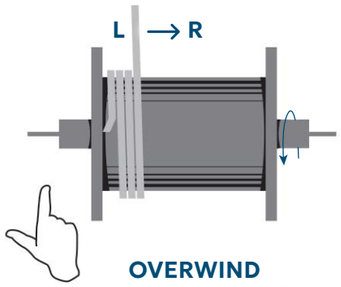
**NOTE:**
The user should always refer relevant standard/regulations like EN-12385, ISO 4309 for wire rope care, maintenance & installation.

# HANDLING & INSTALLATION

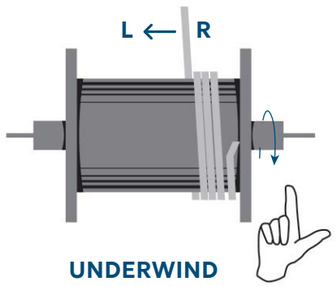
## HANDLING OF MULTI-STRAND ROTATION RESISTANT ROPES:

Since rotation resistance wire ropes have special layering and arrangements of strands that are very sensitive, therefore they require careful handling and installation in order to avoid deterioration, hoisting problems and pre-mature removal of wire ropes. The recommendations are given below to be followed in addition to the general mentioned method.

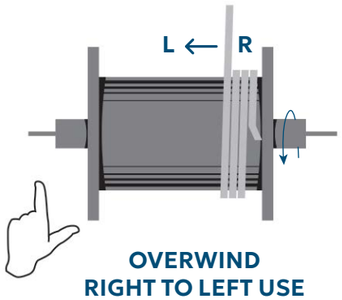
- The rope should be paid off in the correct manner to ensure that the turn is neither put in nor taken out.
- A small rope of short length, say up to 100 mtr, may be unrolled along the ground but should always be kept under control. Never pull a rope from a stationary coil.
- Ropes in larger sizes or longer lengths should always be procured on reels, and transferring these to coils should be avoided.
- A long length of rope on a reel has a high moment of inertia. Proper braking arrangements must be made to prevent overrun, which may lead to loop formation. A simple braking mechanism consists of a wooden plank acting against the reel flange.
- If, for any reason a loop does form, ensure that this does not tighten to cause a kink, which may lead to distortion of the rope, requiring its immediate discard.
- The rope should be smoothly paid out in a straight line from the reel, mounted on a stand and supported by a shaft. If the space available does not permit the same, the reel and stand must be placed to limit the fleet angle of installation to 1° 30, i.e., for 1 mtr width between flanges to 40 mtr of horizontal distance. If space allows for a longer run, then it can be used with advantage.
- Care should be taken to avoid the reel being placed in such a position that will set up a reverse bend during reeving, i.e., for an under-winding drum, the rope should be taken off the bottom of the reel.
- Multi-strand ropes are generally supplied with fixed ends, unless otherwise specified. If, for any reason, it is necessary to cut a rope at the site, at least three tight servings of soft seizing wire should be applied on either side before cutting.



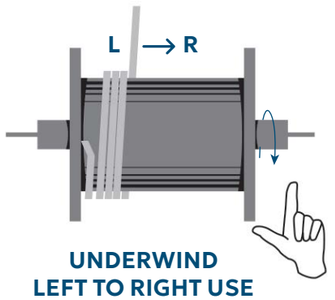

OVERWIND
LEFT TO RIGHT USE
RIGHT LAY ROPE




UNDERWIND
RIGHT TO LEFT USE
RIGHT LAY ROPE




OVERWIND
RIGHT TO LEFT USE
LEFT LAY ROPE




UNDERWIND
LEFT TO RIGHT USE
LEFT LAY ROPE



# DISCARD CRITERIA

Crane ropes must be removed from service if the examination reveals that the rope deterioration has exceeded limits of certain criteria. A general retirement plan states that one of the factors listed below, severe enough, can cause rope discard. However, rope deterioration and decision to discard, almost always, is the result of cumulative effect of combination of these factors.

Broken Wires | Diameter Reduction | Corrosion | Deformation

## NUMBER & CHARACTERISTICS OF BROKEN WIRES

Crane rope must be considered for discard if number of visible broken wires equals or exceeds the allowable limit. For 6 and 8 strand wire ropes, occurrence of wire breakages, to a large extent is on the outer surface, whereas for rotation-resistant wire ropes, majority of wire breakages are expected to occur internally and require specialized examination techniques to reveal.

The table below specifies the number of visible broken wires, which when equalled or exceeded requires mandatory discard of ropes working on steel sheaves.

VALLEY WIRE BREAKAGE

CROWN WIRE BREAKAGE

- Wire breaks in the strand valley, generally, indicate internal rope deterioration and require closer inspection of the rope equal to 6 x d.
- Broken wires at, or adjacent to the termination, require the termination to be remade by shortening the rope, otherwise the rope should be discarded.
- Concentrated close group of broken wires in a rope length of 6 x d or in any one strand, requires discard of the rope even if the number given above are not reached.
- Complete fracture of one strand or collapse of core requires immediate discard of the wire rope.

| PRODUCT | CONSTRUCTION | SECTION OF ROPE WORKING IN STEEL SHEAVES AND / OR SPOOLING ON A SINGLE LAYER DRUM | | | | SECTION OF ROPE SPOOLING ON A MULTI-LAYER DRUM | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | NO. OF VISIBLE BROKEN WIRES IN WIRE ROPE LENGTH EQUALS | | | | NO. OF VISIBLE BROKEN WIRES IN WIRE ROPE LENGTH | | | |
| | | (ORDINARY LAY) | | (LANGS LAY) | | (ORDINARY LAY) | | (LANGS LAY) | |
| | | 6 x d | 30 x d | 6 x d | 30 x d | 6 x d | 30 x d | 6 x d | 30 x d |
| HYFLEX 4 | 4X39 | 2 | 4 | 2 | 4 | 4 | 8 | 4 | 8 |
| HYFLEX 6/ POWERFORM® 6 | 6X25F | 5 | 10 | 2 | 5 | 10 | 20 | 10 | 20 |
| | 6X29F | 6 | 11 | 3 | 6 | 12 | 22 | 12 | 22 |
| | 6X26WS | 6 | 13 | 3 | 6 | 12 | 26 | 12 | 26 |
| | 6X31WS | 8 | 16 | 4 | 8 | 16 | 32 | 16 | 32 |
| | 6X36WS | 9 | 18 | 4 | 9 | 18 | 36 | 18 | 36 |
| | 6X41WS | 10 | 21 | 5 | 10 | 20 | 42 | 20 | 42 |
| HYFLEX 8/ POWERFORM® 8 | 8X25F | 6 | 13 | 3 | 6 | 12 | 26 | 12 | 26 |
| | 8X26WS | 9 | 18 | 4 | 9 | 18 | 36 | 18 | 36 |
| | 8X31WS | 10 | 21 | 5 | 10 | 20 | 42 | 20 | 42 |
| | 8X36WS | 12 | 24 | 6 | 12 | 24 | 48 | 24 | 48 |
| | 8X41WS | 13 | 26 | 6 | 13 | 26 | 52 | 26 | 52 |
| HYFLEX 18/ POWERFORM® 18 | 18X7 | 2 | 4 | 2 | 4 | 4 | 8 | 4 | 8 |
| | 18X19S | 4 | 8 | 4 | 8 | 8 | 16 | 8 | 16 |
| | 18X26WS | 6 | 12 | 6 | 12 | 12 | 24 | 12 | 24 |
| HYFLEX 35/ POWERFORM® 35 | 35X7 | 3 | 5 | 3 | 5 | 5 | 10 | 5 | 10 |
| | 35X19S | 6 | 12 | 6 | 12 | 12 | 24 | 12 | 24 |
| | 35X26WS | 6 | 12 | 6 | 12 | 12 | 24 | 12 | 24 |

# RECOMMENDED DO'S & DON'TS

## DO'S

- Lubricate ropes with good quality acid free and moisture free lubricant
- Regularly inspect the sheaves, rollers or pulleys - the life of a rope largely depends on their conditions
- Inspect ropes and fittings/terminations periodically

## DON'TS

- Do not allow ropes in store to deteriorate
- Do not mishandle ropes when uncoiling or unreeling & allow kinks to form
- Do not use langs lay with swivel for 6/8 standard rope
- Do not use a rope with too large groove diameter on drums and pulleys
- Do not cut a rope without seizing
- Do not load the rope beyond its safe working load. Reduction of safety factor may jeopardise not only rope, but also equipment, job and men

| METRIC – IMPERIAL DIAMETER CONVERSION | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| inch | mm | inch | mm | inch | mm | inch | mm | inch | mm | inch | mm |
| 5/32 | 3.97 | 1/2 | 12.7 | 15/16 | 23.8 | 1 1/2 | 38.1 | 2 1/2 | 63.5 | 4 1/4 | 108.0 |
| 3/16 | 4.76 | 9/16 | 14.3 | 1 | 25.4 | 1 5/16 | 41.3 | 2 3/4 | 69.9 | 4 1/2 | 114.3 |
| 7/32 | 5.56 | 5/8 | 15.9 | 1 1/16 | 27.0 | 1 3/4 | 44.5 | 3 | 76.2 | 4 3/4 | 120.7 |
| 1/4 | 6.35 | 11/16 | 17.5 | 1 1/8 | 28.6 | 1 7/8 | 47.6 | 3 1/4 | 82.6 | 5 | 127.0 |
| 5/16 | 7.94 | 3/4 | 19.0 | 1 3/16 | 30.2 | 2 | 50.8 | 3 1/2 | 88.9 | | |
| 3/8 | 9.53 | 13/16 | 20.6 | 1 1/4 | 31.8 | 2 1/8 | 54.0 | 3 3/4 | 95.3 | | |
| 7/16 | 11.1 | 7/8 | 22.2 | 1 3/8 | 34.9 | 2 1/4 | 57.2 | 4 | 101.6 | | |

| CONVERSION TABLE | | | | |
|---|---|---|---|---|
| Length | 1m | = 1000mm | = 3.281ft | = 39.37 inch |
| Force | 1kN | = 101.97kp | = 0.10197 t metric-f | = 224lbs-f |
| Tensile Strength | 1N/mm² | = 0.10197 kp/mm² | = 145.04 p.s.i. | = 10 bar |
| Cross Section | 1 mm² | = 0.00155 sq.inch | | |
| Weight | 1 metric t | = 1000kg = 1.102 short t | = 0.9842 long t | = 2204.6 lbs |
| Weight per Length Unit | 1 kg/m | = 0.672 lbs/ft | | |

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