Steel Wire Rope Technical Data Reference

Visual PDF for construction, core type, breaking force, offshore selection and inspection checkpoints

Selection Chain	Common Grades	Key Acceptance	Offshore Focus
Diameter -> Construction -> Core -> Grade -> MBL -> Documents	1570 / 1670 / 1770 / 1870 / 1960 / 2160 MPa	Minimum Breaking Force + Certificate Match	Rotation Control + Long Length + Corrosion Protection

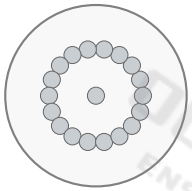
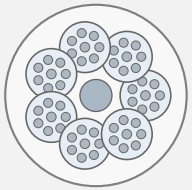
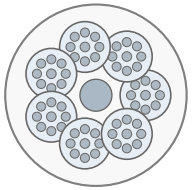
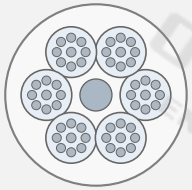
How to read this PDF

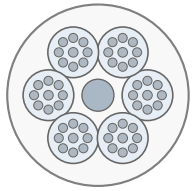
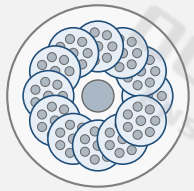
1	Construction controls flexibility, abrasion behavior and rotation stability.
2	Core type controls support, crushing resistance and rope shape under drum pressure.
3	Minimum Breaking Load (MBL) is an acceptance value, not a Working Load Limit (WLL).
4	Final release should match marking, reel label, certificate, inspection report and packing list.

Reference basis used for layout: common wire rope grouping by strands/wires, minimum breaking force review, design factor logic, ISO 2408/EN 12385 terminology and standard industry inspection practice.

1. Steel Wire Rope Construction Selection Matrix

Construction is a structure code, not a diameter. Two ropes with the same outside diameter may behave differently because strand count, wire count, core type and grade change flexibility, fatigue resistance and load stability.

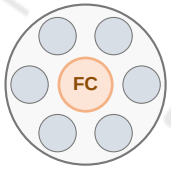
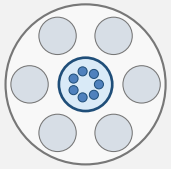
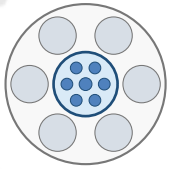
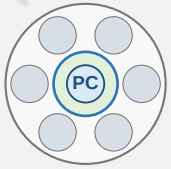
Construction	Simplified Cross-Section	Flexibility	Abrasion	Rotation Control	Typical Selection
1x19	 1x19	Low	High	Low	Railing, stay cable, marine rigging
7x7	 7x7	Medium	Medium	Low	Control cable, safety line
7x19	 7x19	High	Medium	Low	Winch line, pulley system
6x19	 6x19	Medium	High	Low	Crane, hoist, lifting and pulling

Construction	Simplified Cross-Section	Flexibility	Abrasion	Rotation Control	Typical Selection
6x36	 6x36	High	Medium	Low	Drum winding, repeated bending
19x7 / 35Wx7	 19x7	Medium-High	Medium	High	Tower crane, high lift, offshore lifting

Decision note: 6x19 usually emphasizes abrasion resistance; 6x36 improves flexibility and bending fatigue; 19x7/35Wx7/19x37 are reviewed when load rotation must be controlled.

2. Core Type Selection: Support, Crushing Resistance and Flexibility

The core supports the outer strands and affects rope strength, shape stability, crushing resistance and service life. For heavy lifting and multi-layer drum winding, IWRC is usually reviewed before a softer fiber core.

Core Type	Cross-Section	Main Advantage	Common Use	Selection Note
FC	 FC	Flexibility and lubricant retention	Light to medium-duty rope	Not first choice for heavy lifting or multi-layer drum winding
WSC	 WSC	Better support than fiber core	General steel-core rope	Simple steel core option when higher support is needed
IWRC	 IWRC	Higher strength and crushing resistance	Heavy lifting, winch, crane rope	Preferred when rope stability and load capacity are important
Protected Core	 Protected Core	Internal support, lubrication and corrosion control	Offshore, harsh service, high-duty-cycle rope	Use when internal wear, corrosion or repeated bending must be controlled

Practical check: core type must be reviewed together with construction, drum groove, bending cycle, corrosion exposure and certificate requirements.

3. Large Diameter Steel Wire Rope Breaking Force Reference

Data-focused reference for minimum breaking force by nominal diameter and wire rope grade. The highlighted example shows why diameter, reference weight and tensile grade must be reviewed together.

Dia. (mm)	Ref. Wt. (kg/100m)	1570	1670	1770	1870	1960	2160
12	73.4	94	100	106	112	117	129
14	100	128	136	144	152	159	176
16	131	167	177	188	199	208	229
18	165	211	225	238	251	264	290
20	204	261	277	294	310	325	359
22	247	315	335	356	376	394	434
24	294	375	399	423	447	469	516
26	345	440	469	497	525	550	606
28	400	511	543	576	608	638	703
30	459	586	624	661	698	732	807
32	522	667	710	752	795	833	918
34	590	753	801	849	897	940	1040
36	661	844	898	952	1010	1050	1160
38	736	941	1000	1060	1120	1170	1290
40	816	1040	1110	1180	1240	1300	1430
42	900	1150	1220	1300	1370	1430	**1580**
44	987	1260	1340	1420	1500	1570	1740
46	1079	1380	1470	1550	1640	1720	1900

Highlighted Example	42 mm	900 kg/100m	2160 MPa	1580 kN

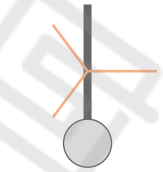
4. Heavy-Duty and Offshore Rope Selection

Specialized engineering rope is evaluated by breaking force, rotation behavior, continuous length, corrosion protection, reel design and inspection documents.

Rope Construction	Typical Review Direction
7X[6X37(b)+IWR] type steel cable rope	Large-diameter cable rope for heavy-duty lifting and engineering applications
8X[6X37+IWR]+IWRC steel cable rope	Multi-strand steel cable rope with independent wire rope core support
8X[6X61+IWR]+IWRC steel cable rope	More complex large-diameter construction for high-load service

Large Diameter Heavy Lifting	Deep Sea Non-Rotating Rope
Review: nominal diameter, reference weight, construction, grade and MBL.	Review: torque control, long continuous length, corrosion protection and class documents.
Typical grades: 1570 / 1670 / 1770 MPa; higher grades when required. Project-specific data may include 19x37 construction, 1960 or 2160 MPa wire, marine lubrication and special reel packing.	
Use: bridge lifting, crane systems, mining, offshore rigging.	Use: ROV handling, deep-sea winch, subsea equipment recovery, offshore lifting.

Standard Rope



Load rotation risk

Torque reduction by multi-layer / reverse-lay structure

19x37 Non-Rotating Rope

Stable suspended load

5. MBL, WLL, Safety Factor and Inspection Release

Minimum Breaking Load is not the same as Working Load Limit. WLL must be calculated with the required safety factor and checked against the application, termination and inspection requirement.

MBL	Safety Factor	WLL
1580 kN	**5:1**	**316 kN**
Minimum Breaking Load	Project or regulation dependent	Working Load Limit

Inspection Failure Map

Inspection Point	Failure Risk	Acceptance Focus
Diameter measurement	Wear, compression, manufacturing deviation	Compare actual diameter with certificate and order specification
Broken wire count	Fatigue, overload, repeated bending damage	Review broken wire distribution and rope replacement criteria
Surface corrosion	Coating loss, pitting, unsuitable material selection	Check corrosion grade, lubricant condition and storage history
Kink / birdcage	Permanent structural deformation	Remove from critical service if structure is damaged
Drum crushing	Multi-layer winding or high contact pressure	Check core type, drum groove and spooling condition
Certificate review	Wrong rope, MBL mismatch, document mismatch	Marking -> reel label -> certificate -> packing list must match

Document package: MTC, breaking load certificate, dimension inspection report, inspection certificate, certificate of conformity, packing list and third-party/class certificate when required.