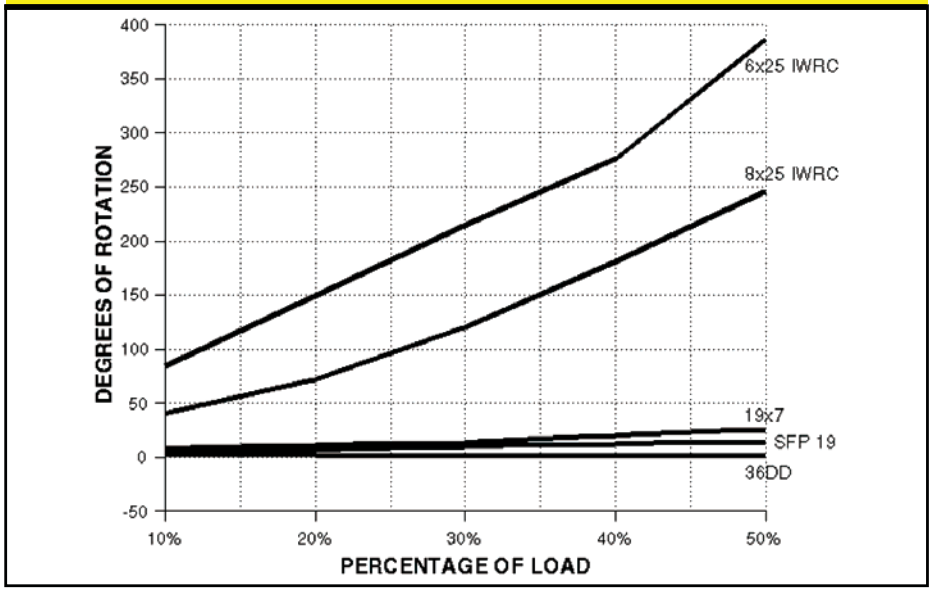
Rotation Resistant Wire Rope

Rotational Property Comparison



In certain instances the use of rotation-resistant wire rope is necessary to provide rotational stability to the lifted load. In general, the use of these wire ropes is limited to those situations where it is impractical to:

1. Use a tag line.
2. Relocate rope dead end.
3. Increase sheave sizes.
4. Eliminate "odd-part" reeving.
5. Significantly reduce rope loading and rope fall length.

Rotation-resistant wire ropes have less of a tendency to unlay when loaded than do conventional wire ropes. This results in improved rotational stability to the lifted load. Rotation-resistant wire ropes are designed in such a way that the rotational force of the outer strands is partially counteracted by the rotational force of the inner strands or core when the rope is subjected to a load.

The chart compares the rotational properties of rotation-resistant ropes with a standard 6x25 wire rope. The rotation-resistant ropes far surpass the rotational stability of a conventional 6x25 IWRC wire rope on both short and long falls.

Safety Design Factors

ASME B30.5 specifies that rotation-resistant ropes have a safety design factor of five or greater. The required strength design factor of rotation-resistant rope becomes very important from the standpoint of maintaining the inherent low rotation of the rope and eliminating any tendency to overload the inner core, thereby causing a reduction in rope strength.

Handling & Installation

Precautions should be followed when using rotation-resistant wire rope. The rope ends must be properly seized and secured (refer to Handling and Installation: Seizing Wire Rope) and cut with a saw or impact hammer to prevent unlaying of the strands.

Attachment of end fittings must be done with care to prevent kinking or unlaying of rope, which harms the rotational balance of the rope.

Operation of rotation-resistant wire ropes with a swivel is not recommended by WW. The use of a swivel allows the inner core to twist tighter, resulting in a significant reduction in rope strength, possibly leading to premature rope failure. A swivel may be used as a temporary device only during the initial installation period to help eliminate any installation-induced twisting or cabling.

The swivel must be removed from the reeving after rope installation is completed and before the crane begins operation.

Due to the opposite lay direction of the inner core and outer strand layers in rotation-resistant ropes, care should be taken to avoid shockloading. Shockloading will result in distortion of the rope structure, causing birdcaging, core protrusion, etc. Due to the potential for complete rope failure, shockloaded wire ropes must be immediately removed from service.

Rotation Resistant Wire Rope

The rated strengths of the 8x19 Class and 19x7 wire ropes are less than wire ropes in the 6x19 and 6x37 Classes. Larger sheaves are required in order to achieve comparable fatigue life.

8x19 Classification Rotation-Resistant

The 8x19 Classification rotation-resistant ropes are recommended for hoisting unguided loads with a single-part or multipart line.

The eight outer strands are manufactured in right lay, with the inner strands being left lay.

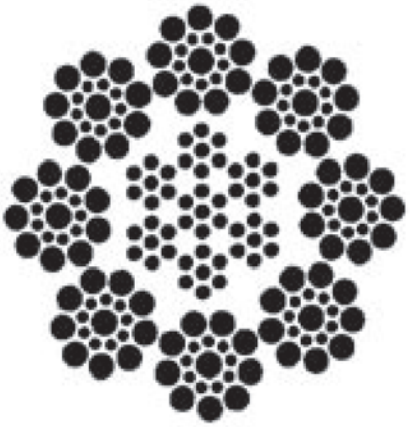
These ropes are slightly stronger and significantly more rugged than the 19x7 construction. However, the rotation-resistant properties of the 8x19 rotation-resistant ropes are much less than those of the 19x7 construction.

These ropes are manufactured in right regular lay in the 8x19 Seale and 8x25 Filler Wire constructions.

Rope Diameter		Approx. Weight (lb./ft.)	Nominal Strength (tons)*
inches	mm.		Purple Plus
7/16	11.0	0.36	9.0
1/2	13.0	0.47	11.6
9/16	14.5	0.60	14.7
5/8	16.0	0.73	18.1
3/4	19.0	1.06	25.9
7/8	22.0	1.44	35.0
1	26.0	1.88	45.5
1-1/8	29.0	2.39	57.3
1-1/4	32.0	2.94	70.5
1-3/8	35.0	3.56	84.9
1-1/2	38.0	4.24	100.0

*Acceptance strength is not less than 2-1/2% below the nominal strengths listed. Tons of 2,000 lbs.

Strands: 8
Wires per strand: 19 to 25
Core: IWRC
Standard grade(s): Purple Plus
Lay: Right Regular
Finish: Bright



8x19 Seale

19x7 Rotation-Resistant

19x7 is recommended for hoisting unguided loads with a single-part line.

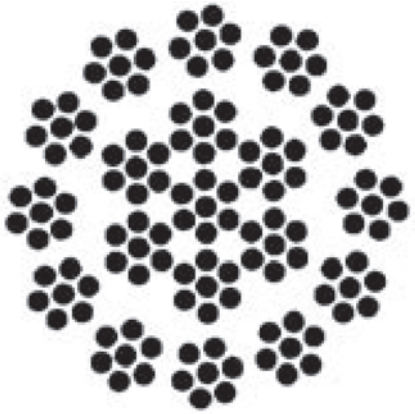
The rotation-resistant properties of this rope are secured by two layers of strands. The inner strands are left lay, while the 12 outer strands are right lay, which enables one layer to counteract the other layer's rotation.

The rotation-resistant characteristics of the 19x7 wire ropes are superior to those of the 8x19 Class wire ropes.

Rope Diameter		Approx. Weight (lb./ft.)	Nominal Strength (tons)*
inches	mm.		Purple Plus
7/16	11.0	0.350	8.33
1/2	13.0	0.450	10.80
9/16	14.5	0.580	13.60
5/8	16.0	0.710	16.80
3/4	19.0	1.020	24.00
7/8	22.0	1.390	32.50
1	26.0	1.820	42.20
1-1/8	29.0	2.300	53.10
1-1/4	32.0	2.840	65.10
1-3/8	35.0	3.430	78.40
1-1/2	38.0	4.080	92.80

*Acceptance strength is not less than 2-1/2% below the nominal strengths listed. Tons of 2,000 lbs.

Strands: 19
Wires per strand: 7
Core: WSC
Standard grade(s): Purple Plus
Lay: Regular
Finish: Bright



Rotation Resistant Wire Rope

SFP 19 Rotation-Resistant

SFP 19 is recommended for both multipart load and single-part fast line applications where rotational stability of the lifted load is needed, such as for use as a long fall on offshore pedestal cranes, rough and all terrain cranes, and crawler cranes.

SFP 19 provides:

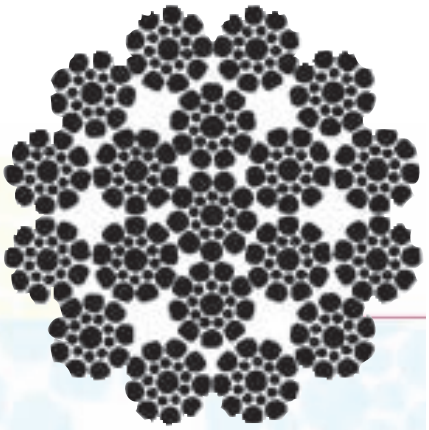
Fatigue Resistance. Improved fatigue properties are derived through the combination of the flexible 19x19 construction and die drawn strands. The drawn strand surfaces minimize the interstrand and interlayer nicking that take place in round rotation-resistant ropes.

Abrasion Resistance. Die drawn ropes provide improved abrasion resistance as compared with round wire ropes because of the greater wire and strand bearing surfaces contacting sheaves and drums.

Resistance to Drum Crushing. SFP 19 wire ropes are resistant to the effects of drum crushing due to the compacted strands and smoothness of the rope surface.

Flexibility. With 19 strands of 19 wires in all diameters, SFP 19 remains extremely flexible and easy to handle during both the installation process and under the extremely harsh conditions from fast line speeds during spooling.

Rope Diameter		Approx. Weight (lb./ft.)	Nominal Strength (tons)*
inches	mm.		Royal Purple
1/2	13.0	0.54	14.6
9/16	14.5	0.69	18.5
5/8	16.0	0.83	22.7
3/4	19.0	1.19	32.4
7/8	22.0	1.62	43.8
1	26.0	2.12	56.9
1-1/8	29.0	2.68	71.5
1-1/4	32.0	3.31	87.9
1-3/8	35.0	4.01	106.0
1-1/2	38.0	4.77	125.0

*Acceptance strength is not less than 2-1/2% below the nominal strengths listed. Tons of 2,000 lbs.

Strands: 19
Wires per strand: 7/19
Core: WSC
Standard grade(s): Royal Purple
Lay: Right Regular
Finish: Bright