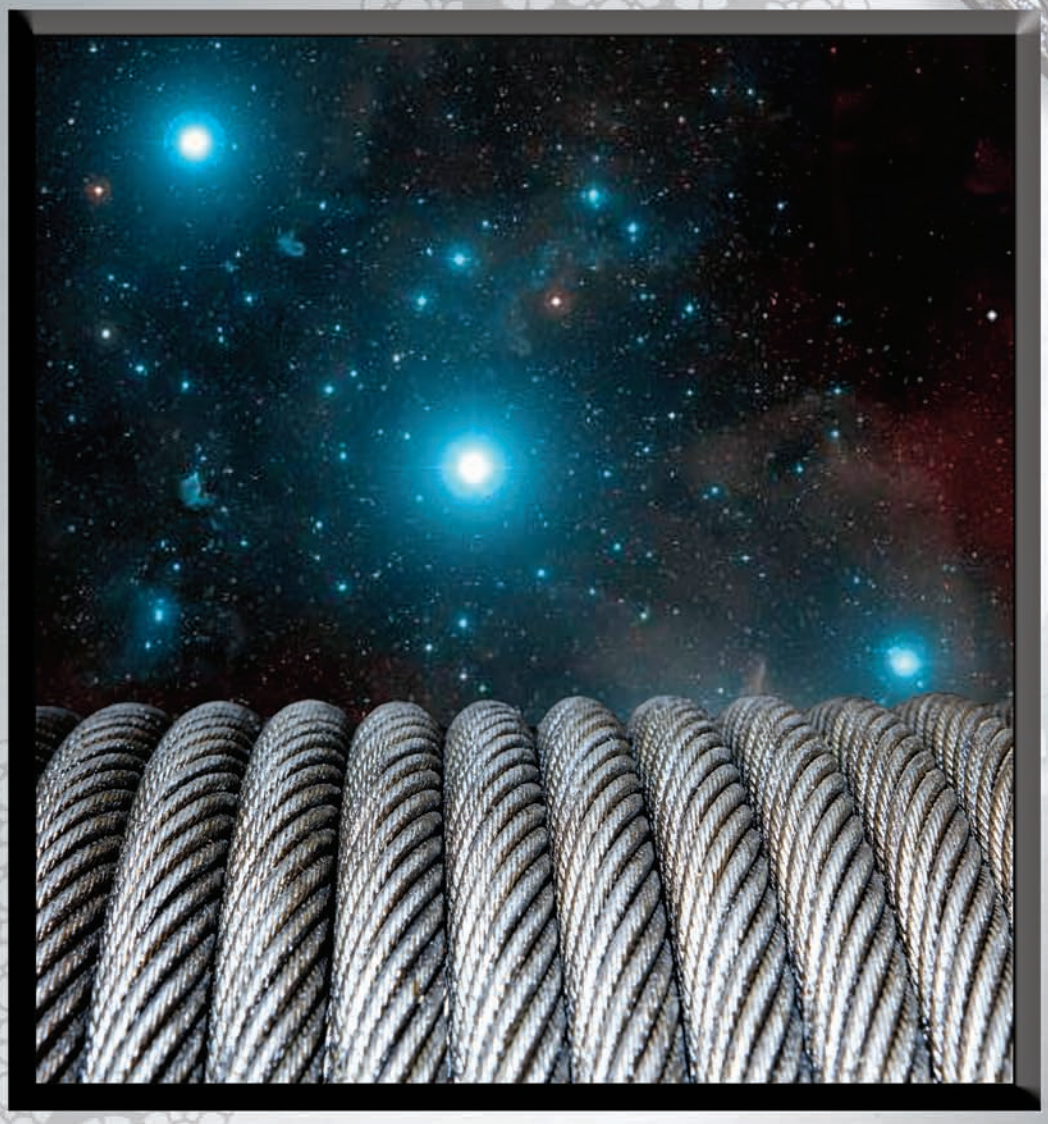
TECH-19™



QUALITY TYPE APPROVAL

Licenced under API Spec 9A

Test house approved by American Bureau of Shipping

DNV

WHEN TO REPLACE WIRE ROPE BASED ON BROKEN WIRES

Table A

Standard	Equipment	Number of broken wires in Running Ropes: In one Rope Lay	Number of broken wires in Running Ropes: In one Strand	Number of broken wires in Standing Ropes: In one Strand	Number of broken wires in Standing Ropes: At End Connection
ASME/B30.2	Overhead & Gantry Cranes	12**	4	Not specified	
ASME/B30.4	Portal. Tower & Pillar Cranes	6**	3	3	2
ASME/B30.5	Crawler, Locomotive & Truck Cranes, Rotation Resistant Rope	Retriement criteria based on number of broken wires founds in a length of wire rope equal to 6 times rope diameter - 2 broken wires maximum, and 30 times rope diameter - 4 broken wires maximum			
	Running Ropes	6**	3	3	2
ASME/B30.6	Derricks	6**	3	3	2
ASME/B30.7	Base Mounted Drum Hoists	6**	3	3	2
ASME/B30.8	Floating Cranes & Derricks	6**	3	3	2
ASME/B30.16	Overhead Hoists	12**	4	Not specified	
ANSI/A10.4	Personnel Hoists	6**	3	2**	2
ANSI/A10.5	Material Hoists	6**	Not specified	Not specified	

ROPE REMOVAL AND POSSIBLE CAUSE

Fault	Possible Cause
Accelerated Wear	Severe abrasion from being dragged over the ground or obstructions. Rope not suitable for application. Poorly aligned sheaves. Large fleet angle. Worn sheave with improper groove, size or shape. Sheaves and rollers have rough wear surface. Stiff or seized sheave bearings. High bearing and contact pressures. Sheaves/drum too small.
Rapid Appearance of Broken Wires	Rope not suitable for application. Reverse bends. Sheaves/drums too small. Overload and shock loads. Excessive rope vibration. Kinks that have formed and have been straightened out, Crushing and flattening of the rope. Sheave wobble.
Corrosion	Inadequate lubrication. Improper storage. Exposure to acids or alkalis.
Kinks	Improper installation. Improper handling. Slack rope pulled tight.
Excessive localized Wear	Drum crushing. Equalizer Sheave. Vibration.

Fault	Possible Cause
Stretch	Overtoad. Passed normal stretch and approaches failure.
Broken Wires near Fitting	Rope Vibration. Fittings get pulled too close to sheave or drum.
Sheaves/Drums Wear out	Material too soft
Pinching. Crushing. Oval Shape	Sheaves grooves too small. Not following proper installation and maintenance procedure on multiple layer drums
Rope Unlays (Opens up)	Wrong rope construction. Rope end attached to swivel.
Reduction in Diameter	Broken core. Overload. Internal wear Corrosion.
Bird Cage	Tight Sheaves. Rope is forced to rotate around its own axis. Shock loads. Improper Wedge Socket installation.
Core Protrusion	Shock loading. Disturbed rope lay. Rope unlays. Load spins and rotates rope around its own axis.

TECH-19

TECH-19 is recommended for both multipart load and singlepart 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.

TECH-19 PROVIDES

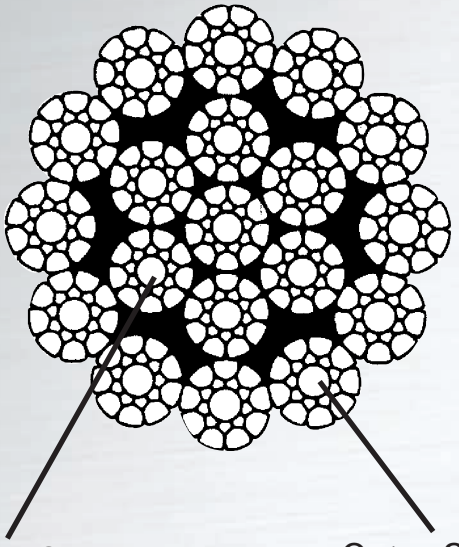
Fatigue Resistance. Improved fatigue properties are derived through the combination of the flexible 19x19 construction and die drawn strands. The drawn strand surfaces minimize the interstrand and interlayer nicking that take place in round rotation-resistant ropes.

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

Resistance to Drum Crushing. Tech-19 wire ropes are resistant to the effects of drum crushing due to the compacted strands and smooth !!ness of the rope surface.

Flexibility. With 19 strands of 19 wires in all diameters, TECH-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.

Compact Strands for Higher Strength, Crush and Abrasion Resistance.



Inner Strand
Left Hand Lay

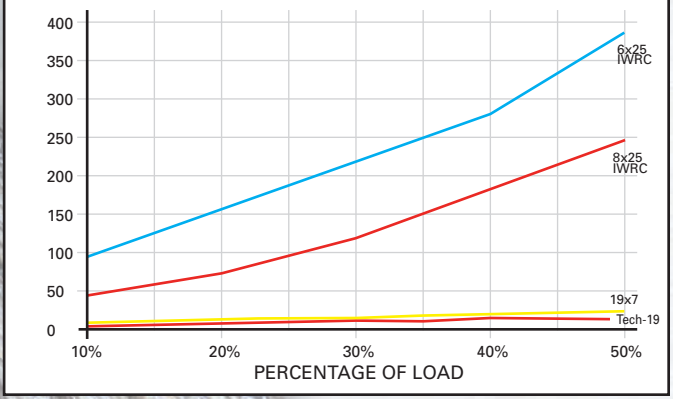
Outer Strand
Left Hand Lay

ROTATION RESISTANCE

Each wire construction will have an inherent torque characteristic where both ends of the rope are secured and an applied force will generate torque at the fixing points. Each wire rope construction will have an inherent turn characteristic where one end of the rope is free to rotate and an applied force will cause the free end of the rope to turn.

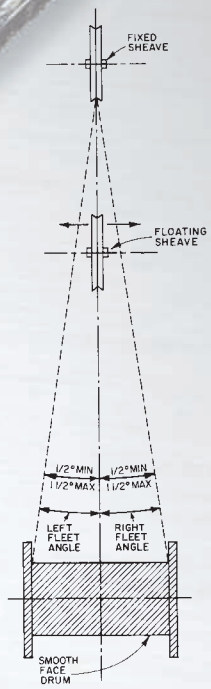
The torque or turn generated will depend upon the magnitude of the force applied and also upon the construction of the wire rope selected.

ROTATIONAL PROPERTY COMPARISON



Rope Diameter		Approx. Weight (lb./ft.)	Nominal Strength (tons)*
Inches	mm.		Tech 19
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 in not less than 2-1/2% below the nominal strengths l;asted. Tons of 2,000 lbs.

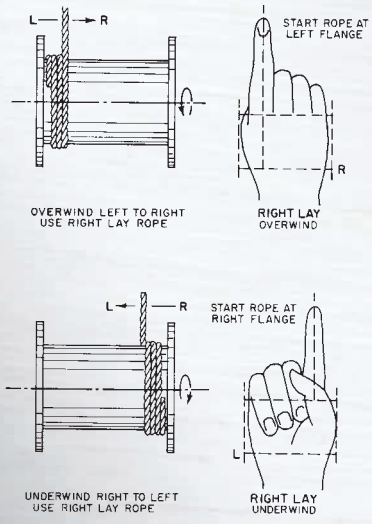


FLEET ANGLE

The achievement of even winding on a smooth faced drum is closely related to the magnitude of the D/d ratio, the speed of rotation, load on the rope, and the fleet angle. Of all these factors, the one that exerts perhaps the greatest influence on winding characteristics is the fleet angle.

The schematic drawing shows an installation where the wire rope runs from a fixed sheave, over a floating sheave, and then on to the surface of a smooth drum. The fleet angle may be defined as the included angle between two lines; one line drawn through the middle of the fixed sheave and the drum — and perpendicular to the axis of the drum and a second line drawn from the flange of the drum to the base of the groove in the sheave. (The drum flange represents the farthest position to which the rope can travel across the drum.) There are left and right fleet angles, measured to the left or right of the center line of the sheave, respectively.

It is necessary to restrict the fleet angle on installations where wire rope passes over the lead or fixed sheave and onto a drum. For optimum efficiency and service characteristics, the angle here should not exceed 1 1/2º for a smooth drum, or 2º for a grooved drum. Fleet angles larger than these suggested limits can cause such problems as bad winding on smooth drums, and the rope rubbing against the flanges of the sheave grooves. Larger angles also create situations where there is excessive crushing and abrasion of the rope on the drum. Conversely, small fleet angles – less than 1/2º – should also be avoided since too small an angle will cause the rope to pile up.



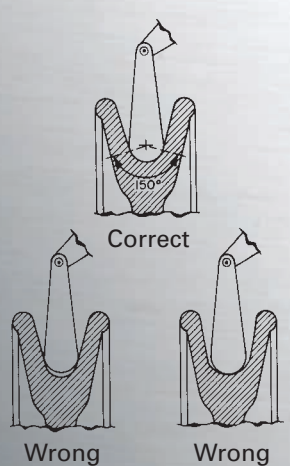
ULTRA-PAC™ ONLY AVAILABLE IN RIGHT HAND LAY

DRUMS – PLAIN (SMOOTH)

Installation of a wire rope on a plain (smooth) face drum requires a great deal of care. The starting position should be at the correct drum flange so that each wrap of the rope will wind tightly against the preceding wrap. Here too, close supervision should be maintained during installation. This will help make certain that:

1) the rope is properly attached to the drum,
2) appropriate tension on the rope is maintained as it is wound on the drum,
3) each wrap is guided as close to the preceding wrap as possible, so that there are no gaps between turns,
4) and that there are at least two dead wraps on the drum when the rope is fully unwound during normal operating cycles.

Loose and uneven winding on a plain (smooth) faced drum can, and usually does, create excessive wear, crushing and distortion of the rope. The results of such abuse are lower operating performance and a reduction in the rope's effective strength. Also, for an operation that is sensitive in terms of moving and spotting a load, the operator will encounter control difficulties as the rope will pile up, pull into the pile and fall from the pile to the drum surface. The ensuing shock can break or otherwise damage the rope.



BREAKING IN A NEW WIRE ROPE

A new wire rope requires careful installation and close adherence to following all the appropriate procedures previously noted. After the rope has been installed and the ends secured in the correct manner, the mechanisms should be started carefully and then permitted to run through a cycle of operation at very slow speed. During this trial operation, a very close watch should be kept of all working parts — sheaves, drums, rollers — to make certain that the rope runs freely, and without any possible obstructions as it makes its way thought the system. If no problems appear in running the rope, the next step should include several run-throughs of the normal operational cycle under light load and at reduced speed. This procedure allows the component parts of the new rope to make a gradual adjustment to the actual operating conditions.

Tech-35™ and Ultra-Pac™ wish to thank the Wire rope Institute for the technical information.