WIRELINE ADVISORY

- **WIRELINE HANDLING & SPOOLING PROCEDURES[1]**

Preface

Proper spooling of any cable is highly dependent on the following:

a. PROPER ALIGNMENT OF THE EQUIPMENT.
b. PROPER ROUTING OF THE LINE FROM UNIT TO UNIT
c. PROPER TENSION ON THE LINE (CABLE).
d. PROPER SETTING OF THE INITIAL WRAP (COMMONLY REFERRED TO AS "BED" WRAP).

NB: The reel must have a true core that does not vary in diameter and straight flanges with the reference to the core center line

The points above are vital to realize good service and to obtain maximum useful life from the wireline. The proper transfer of the line from one reel or shipping spool to another reel is an extremely important task.

***LINE CAN BE EASILY DAMAGED TO THE POINT WHERE THE *ENTIRE LENGTH* MAY HAVE TO BE SCRAPPED! ***

Descriptions

A. ROUTING LINE

The proper routing **must** be established in order that the natural curvature of the line is not reversed. Improperly done, the line will *reverse-bend*, making the line more difficult to handle, and causing kinking and tangling.

Majority of wireline units are spooled where the line *passes over the upper portion of the core*. The recommendation is for the line to **always** be passed under both reels. However, it is not incorrect to *pass the line under both cores.*

B. ATTACHING LINE

a. A clamp knot or "dog knot" is used to secure conductor line to the reel. A simple knot is sufficient for slick line.
b. Put 3 to 5 wraps of line on the reel to ensure the knot does not pull free.
NB: This should be performed with minimum amount of tension.

c. At this time, the required maximum tension should be induced and maintained throughout the entire spooling operation.

C. INITIAL WRAP

This should be considered the most important step in spooling line (cable). The setting of the bed wrap will vary on each reel due to the width of the reel and line size (diameter).

a. The line is tapped firmly towards its termination in order to eliminate any gaps.
b. As the line approaches the opposite flange, enough space for the "packing or spacer" must be allowed.
NB: This space is equal to ½ the diameter of the line to be spooled.

c. The packing is to start at a point directly opposite from the *termination and parallel across the reel.*
d. The packing is to continue completely around the reel to within one (1) inch of the starting point.
e. At this point, the second wrap will begin and the same procedure should be repeated as per the first wrap. (Any gap should be tapped firmly against the packing and gradually tapered across the reel to avoid any gap with the second wrap).

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NB: When tapping line, use a dulled chisel and small hammer to avoid damaging the line.

D. LINE TENSION

Below is listed the recommended spooling tensions for three (3) commonly used non-conductor and conductor lines:

NON-CONDUCTOR LINES:

0.082" : 300 – 375 *lbf*
0.092" : 400 – 450 lbf
0.108" : 500 – 600 *lbf*
0.125" : 700 – 850 *lbf*
0.187" : 600 – 2,000 *lbf*
0.250" : 600 – 2,200 *lbf*

CONDUCTOR LINES:

3/16" : 1,200 – 1,500 *lbf*
7/32" : 2,000 – 2,200 *lbf*
5/16" : 2,800 – 3,000 *lbf*

[1] *Courtesy of Shell Labuan*

- **OPERATIONS[2]**

Preface

Line (cable) is subject to many cycles of bending stresses during operations. Bending occurs whenever line deviates from a straight-line condition, such as when it passes over pulleys or reel-drums, or when flexed by hand. During a typical operation, the line goes through a minimum of fourteen (14) bending cycles.

Therefore, it is *necessary* to employ specific, fit-for-purpose, Operator-approved, standard equipment such as reel-drums, hay pulleys, stuffing box pulleys and measuring wheels during operations.
(NB: We have experienced two significant events in which stuffing box gland materials are inappropriate (e.g. steel instead of brass) and the stuffing box itself is not of an acceptable standard that has compromised an operation, resulting in downtime and other associated negative effects.)

Descriptions

Fault and cause	Result	Correction
Damage to reels: Bending of flanges, distortion of barrel. Caused by dropping.	Wire snagging during unwinding.	Use slings when handling reels or use ramps. Do not drop.
Corrosion in store: Carbon steel wire is oiled, but if stored uncovered, corrosion will develop at varying rates depending on climate. Alloy steels are for use under corrosive conditions, but they are not completely immune where there are wind-blown salts. Slight to severe damage can occur in marine environments.	Under worst conditions, there will be pitting of the surface and local reduction in strength. Slight damage at this state—scarcely visible—may increase the risk of alloy wire corrosion in service.	All types of wire: store reels upright (on edge) on level solid base in dry covered conditions. If permanenet store is not available, suppot reels off the ground under waterproof cover. The latter should be kept out of contact with the wire and fastened down just clear of the ground to allow air to circulate and minimize condensation.
Corrosion in service: There are inevitable hazards of well conditions and environment.	There may be development of surface pitting. At worst there may be stress-corrosion or hydrogen embrittlement causing brittle	When rewinding wire, wipe off well contamination. If carbon steel wire, reels are to be put back in store, re-oil the wire during rewind. Do

	fracture.	not leave any wireline downhole during shutdown.

Wire winding practice:
Wire damage may be caused at various stages in winding onto service reel from supply reel or in rewind during use. To ensure good spooling, it is recommended that an intermediate capstan is used between the supply reel and wireline unit drum to develop a high line tension without risk of cutting down. Practices are followed in the running of wireline that have to strike a balance between operational convenience and wireline. To the user some of the possibilities listed here may seem unlikely to happen, but they are given so that if any should occur their significance will not be ignored.

Fault and cause	Result	Correction
1) Uneven winding: Variable tension and/or poor control of wire traversing the barrel.	Wire pulls down between adjacent turns, preventing free running, causing snags and possibly wire breaks.	Maintain a regular traverse of the wire across the full width of the barrel to give uniform build up of layers. Coarse pitch and tension in wind onto reel will minimize risk of wire pulling down (but see 5 overleaf).
2) Loops, bends: Insufficient braking on the supply reel	Over-running with risk of snarls forming in looped wire. Even if the snarl is straightened out by hand there can be a significant reduction in strength. Over-run wire may be pulled over a reel flange and be sharply cut.	Whatever the method used to keep wire under tension during winding, a brake on the supply reel is desirable so that too much slack wire does not appear between two reels.
3) Wire abrasion: Rubbing on ground, caused by slack wire.	Reduction in wire strength as a result of loss of sectional area of steel.	Keep tension and always wind from 'top' to 'top' of reels. In service, rewind on top of reel.
Rubbing on reel side, caused by incorrect traversing.	Reduction in sectional area.	Angle of wire during traverse and total traverse must be controlled.
4) 'Wild' wire: Caused by slack winding or by reversing the natural curvature of the wire.	Wire may be difficult to control and lead to tangles and snagging.	Always wind wire in the direction of its natural curvature. Never wind from the top of one reel to the underside of the other.
5) Wire indentation: Caused by 'cross-cutting' between adjacent layers of wire.	Reduction in strength.	Avoid excessive tension in winding and excessive 'jarring' when operating down-hole tools.
6) Friction on pulleys: Possible during jarring.	Embrittlement of wire surface.	Avoid excessive 'jarring'. Cutting back the wire between uses minimizes the change of cumulative damage.
	Shock loads can produce high surges out of all proportion to the assumed loads on the wire and may cause failure.	
7) Fatigue cracks: Caused by repeated bending under high stress.	Wire failure, particularly if other factors noted above, are contributing.	Ratio of pulley and wire diameters should preferably be 120:1 to reduce the significance of bending stresses.

[2] *Courtesy of Amsito Oilwell Services (M) Sdn. Bhd. (48661-A)*

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