How to maximize slickline life

Correct handling will prolong the life of the line and reduce your costs.

Stretch factor, F

Wire diameter inch	Stretch factor inch/feet/lb
0.092	$6.7x10^{-5}$
0.105	$5.2x10^{-5}$
0.108	$4.9x10^{-5}$
0.125	$3.6x10^{-5}$
0.150	$2.5x10^{-5}$

For Sandvik SAF 2205 and SAF 2707 HD, the stretch factor will be 8% lower

Stretch

Under load, a wireline will elongate (stretch) elastically. The following formula can be used to calculate slickline elongation.

Imperial and metric units

$S = F \times L (T + 0.5W)$

Example

Stretch (inches) for a 0.125" Sanicro 26Mo line working at 8,000 ft, with a 200 lb tool.

F	(stretch factor):	3.6439×10^{-5}
L	(read-off length, ft):	8,000
T	(tool weight, lb):	200
W	(weight of line in well, lb):	154

$S = 3.6439 \times 10^{-5} \times 8{,}000 \times (200 + (0.5 \times 154))$

$S = 0.2195 \times (200 + 77)$

$S = 0.2195 \times 277$ **= 81(inches)**

Fishing

When a line failure occurs, the lost part will take the form of a spiral. The height per 1000 ft of lost line length can be estimated using the following figures:

Tube diameter inch	Spiral height, feet Line diameter, inch 0.092	0.105/0.108	0.125
7	820	910	955
5 1/2	920	960	980
4 1/2	950	975	988
3 1/2	970	985	993

Recommended safe load

Sandvik recommends a safe load of 75% of the effective breaking load.

Breaking load = Certified tensile strength x diameter^2 x 0.7854

What slickline length is needed, i.e. read off length at spool, to reach a desired depth in the well?

Imperial units

$$L = 12 \times \frac{R}{12 + F (T + 0.5W)}$$

Metric units

$$L = \frac{R}{1 + 0.001 \times F (T + 0.5W)}$$

where

S = stretch in inch or mm
F = stretch factor, see table at right
L = read off length, feet or m
T = tool weight, lb or kg
W = weight of wire in well, lb or kg (see table at page 5)
R = desired depth (read off line length + stretch) feet or m.

Minimum sheave diameter

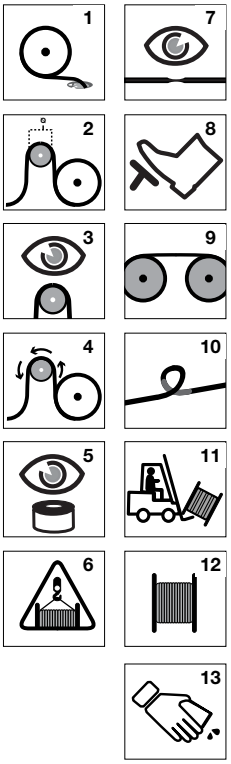
Wire diameter inch	0.092	0.105	0.108	0.125	0.14	0.15	0.16
Min. sheave diameter inch	13	15	15	17	20	21	22

Conversion table

1 inch = 25.4 mm
1 ft = 0.305 m
1 inch^2 = 645.2 mm^2
1 lb = 0.454 kg
1 lbf = 0.454 kp = 4.45 N

°C = (°F - 32) x 0.555
°F = 32 + (°C x 1.80)

1 atm = 1.013 bar
1 atm = 14.70 psi
1 atm = 0.1013 N/mm^2
1 atm = 1.033 at
= 1.033 kp/cm^2
1 MPa = 1 N/mm^2 = 145 psi
1 ksi = 1 000 psi
1 psi = 0.069 bar
1 kp/cm^2 = 14.22 psi



Recommendations for line usage

1. Avoid abrasion between the line and the ground or other equipment
2. Ensure that sheave grooves are of the correct diameter
3. Check sheaves for wear
4. Check that sheaves are able to rotate freely
5. Check the rubber seal in the stuffing box for wear
6. Use caution during jarring operations
7. Inspect lines for diameter reduction after heavy jarring
8. Brake carefully when lowering tools into the well
9. When re-spooling, always spool from top to top
10. Avoid kinking the line
11. Avoid damage to shipping spools
12. Store wireline spools vertically
13. Clean lines after use

Ductility testing

Testing lines for ductility is usually carried out by a torsion test or a wrap test. Torsion testing is the recommended method for testing ductility in carbon steel wirelines and wrap testing is the recommended method for stainless steel wirelines. The reason for using two different methods for testing ductility is purely technical: Carbon steel has the same ductility properties in all directions. This means it will tolerate being twisted. Stainless steel is vastly more complex in structure and will not tolerate being twisted. Instead, wrapping of the wire around its own diameter is recommended.

Wrap testing

The wrap test stretches the outer skin of the wire, exposing tendencies to cracking, but without causing stresses in the horizontal direction. Any tendency to cracking caused by embrittlement will be observed in the surface of the wire. A full explanation for these recommendations is provided in the document "Differences in structure, carbon and stainless steels" which can be obtained by contacting your local Sandvik office.

Torsion testing equipment

The Wraptor is a Sandvik-developed wrap and torsion tester, which can be ordered from your local Sandvik office.