

Wireline Torque

Electromechanical wireline cables are designed and manufactured to minimize the inherent torque in the cable, see Technical Bulletin "Minimizing Cable Torque during Design". However, all cables inherently have some torque and will develop a need to rotate relative to the tension applied during operations. This is generally not a problem as long as the cable is allowed to rotate freely. In today's complex oilfield there are a lot of variables that affect and restrict cable rotation. If the cable is not allowed to rotate in proportion to tension, torque build up will begin to occur in certain areas of the cable depending on what is restricting it from rotating properly. For example, the pack-off will restrict the cable from rotating and the cable will accumulate torque as the cable passes through pack-off. This results in torque build up and loose outer armor.

Cable rotation can be restricted and torque imbalance may occur from the following operations:

- Deviated or crooked well bores.
- Going in and out too fast and not observing the 80/120 tension rule, (see Technical Bulletin #9).
- Pulling out of a well at high speeds that result in excessive tension.
- Centralized and decentralizing tools.
- Heavy and viscous drilling mud and completion fluids affect the tension of the cable.
- Grease heads or pack-offs used to wipe or control pressure.
- Pulling out of a rope socket under high load conditions.
- Low fluid bypass conditions.

Field experience has shown that almost always loose outer armor is caused from the torque imbalance resulting from improper running conditions. During the seasoning or breaking in period for new cables there will generally be some areas in the cable that become loose. These areas do not cause problems under everyday use; however, it would be good insurance to normalize (tighten loose areas) a standard GIPS cable after 20 to 30 runs. This would tighten any loose outer armor that may have occurred due to the core embedment of a new cable.

If a cable has been run into a well bore with any condition that may prevent free rotation or cause torque imbalance, the cable will need attention to keep it from failing. The standard approach is to normalize the cable to be sure the outer armor is tight. If you feel or see your cable trying to curl up while laying on the ground during rig ups it has excessive torque. Running the cable in this condition will risk breaking, or getting a strand cross-over which can cause the cable to strand at deeper depths. Remember every bird cage you see is caused by getting too much slack in one location of the cable. It is a good idea to rehead, when possible, with inner armor strands on the cables that are using grease heads because they are lubricated and can torque up relatively easily.

Lack of tension means low rotation is required, and high tensions means a lot of rotations required to prevent torque build up. If you come out of a well with very high tension and torque in the cable, the next time you go into a well with very little tension, there will be a lot of torque in the cable wanting to be released. Armor separation, high strands, or bird caging are not the only issues to worry about with torque build up, you may also experience early pullouts, cable breaks, and excessive compression on the conductor which can short out the cable. The more you understand the affects of torque the better off you are in preventing cable failures and/or well site disasters.

The torque generated at maximum working load for standard cables has been calculated as follows:

TYPE	K22	N22	N29	N32	N38	N42
LOAD (pounds)	3360	3360	6000	6720	8600	11700
TORQUE (Inch-pounds)	55.5	40.7	93.5	116.7	176.5	268.3