Application Notes

Sterlite Tech

A Comparison of Dry Versus Gel Filled Optical Cables

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Issued
December 2012

Abstract
The "dry" cable design compares favorably with a "wet" design that uses a flooding compound in the voids within the cable core and/or a thixotropic gel within the buffer tube to achieve comparable water blocking performance.

Keywords
Dry cable, super absorbent powder, fiber buffer tubes, cable weight, environment friendly, cost savings

A fully "wet" cable would have its core filled with a flooding compound and its buffer tubes filled with a thixotropic gel. A fully "dry" cable would have its core and buffer tubes filled with SAP water blocking materials. It is however possible to have three versions of a water blocked cable:

1. "Wet" cable core and "wet" buffer tubes – older style cable design, used on some cable in extremely wet areas or underwater.
2. "Dry" cable core and "wet" buffer tubes –A design that is commonly used in many cables sold today.
3. "Dry" cable core and "dry" buffer tubes – Light-weight cable that fully exploits the advantages of "dry" block cable.

"Dry" core cables produced by Sterlite have proven themselves to be successful in outside use throughout the world.

3.0 Benefits of Dry Core Cables

3.1 Faster, Cost Saving in Time:

Tests conducted by Sterlite preparing both "dry" and "wet" cables for splicing have shown it takes approximately 90 seconds less time per tube to clean the cable core and buffer tube for "dry"-core cables then for "wet" core cables. As a result, cleaning the water blocking material from its core at the end of a 72 fiber dry-core cable splice will save approximately 9 minutes. The same operation for a 144 fiber "dry"-core cable will save approximately 18 minutes. Experienced fiber technicians indicate that cleaning the fibers within the buffer tubes of a "dry" tube cable can be accomplished in approximately one third the time required for the same operation in a "wet" tube cable. For a 144 fiber cable it was estimated that a typical technician would require approximately 45 minutes to clean the gel from the fibers in the twelve buffer tubes in a "dry" tube cable and 135 minutes for the same operation in a "wet" tube cable.
Table 1 and Figure 1 present a tabular and graphical summary of the times required to clean water blocking gel and SAP from the core, buffer tubes and fibers in a 144-fiber optical cable. The absolute time values will vary somewhat between individuals based on their skill level and working conditions, however the ratio, 1:3, between cleaning "dry" to "wet" units is believed to be valid.

Table 1 – Summary of Times Required to Clean Water Blocking Compound from a 144-Fiber Cable

Cable Component Being Cleaned	Flooded Core, Gel Filled Buffer Tubes	"Dry" Core, "Dry" Buffer Tubes
Core	20 min	5 min
Buffer Tubes	135 min	45 min
Total Time	155 min	50 min

Time saved translates directly to cost savings. Using "dry" water blocking materials in the cable core and buffer tubes as compared to a flooding compound in the core and gel in the buffer tubes will save 105 minutes (155 minutes – 50 minutes) for each cable end being prepared for splicing. Time saved for a complete splice is equivalent to the cost of 2 times 105 minutes. The factor of two is used to account for the fact that two cables need to be prepared to make a standard butt splice. The cost of materials (discussed in the next section) need to be included with the labor savings to estimate total cost savings.

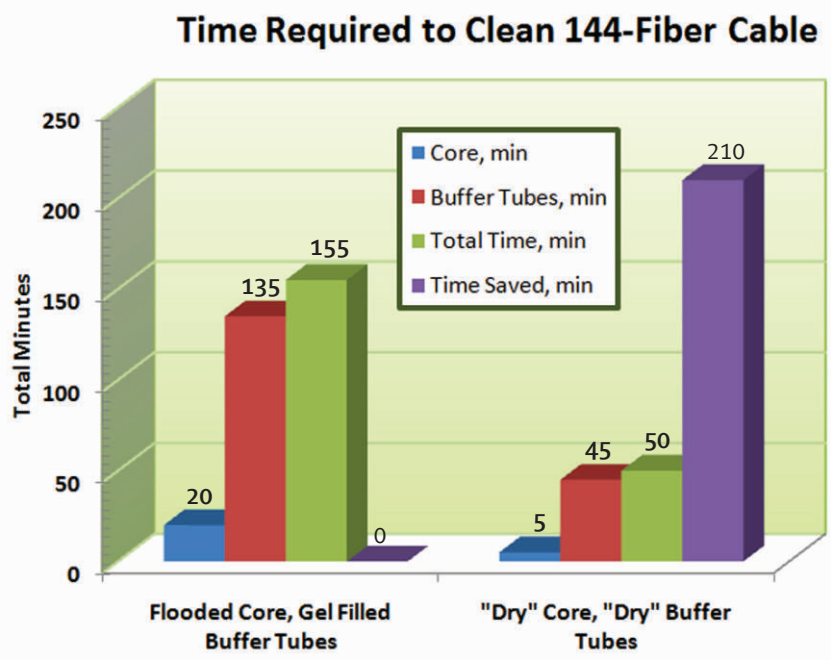

Figure 1 – Graphical Presentation of Time Required to Clean Water Blocking Compound from a 144-Fiber Cable

3.2 Uses fewer Materials, Cost Saving in Consumables:

Cleaning the "dry" portion of any fiber cable uses less cleaning materials (wipers and cleaning solvent to cut through the flooding or thixotropic gel) than cleaning the same portion of the cable if it were "wet." The solvent that is used to clean the excess gel or flooding compound from the cable core, around the buffer tubes, and around the fibers inside the buffer tubes is not required for fully "dry" cables. The reduction or elimination of these solvents in the installation process not only reduces the cost of installation, but also helps to create a cleaner work environment. It is expected that the materials used to clean "dry" cables is half that used for "wet" cables.

3.3 Reduction in Cable Weight, Easier to Place and Handle:

Cable weight plays a significant role in the cable design. In "dry" cables, lightweight, water-blocking SAP tapes and yarns replace heavier water blocking gel and flooding compounds resulting in a reduction in cable weight. Cable placing load for underground plant and messenger strand tension is dependent upon cable weight. The required cable tensile strength is directly dependent on cable weight, e.g., the lighter the cable weight, the lower the placing load for a cable or conversely "dry" cables can be placed in longer lengths.

Table2 – Typical "Dry" Versus "Wet" Optical Cable Weight Comparison

Type of Cable	Cable Weight (Kg/Km)		
	"Wet" Core	"Dry" Core	Reduction
72F Duct Cable	112	105	6%
72F Armored Cable	170	163	4%
72F ADSS Cable	110	104	5%

The 6% weight reduction for a "dry" core, 72-fiber, duct cable will result in a lower tensile force to place that cable in a duct. Lighter cables make the installation and blowing operation less difficult.

3.4 Environment Friendly:
Since cleaning "dry" cable requires no or little chemical solvents to clean the gel and water blocking compound and uses less material for clean-up than a "wet" cable, there are no harmful materials and less scrap to dispose of with "dry" water blocking material and hence it keeps our environmental cleaner.

4.0 Conclusion

As a result of extensive testing and numerous field installations, Sterlite Technologies can confidently announce that "dry" cables, produced by Sterlite, using an improved manufacturing process for optical fiber cable, not only meet all the required performance specifications, but also provide the user with a substantial installation cost saving while keeping the environment cleaner.

Sterlite recommends the use of "Dry" core cables to its customers.

5.0 Summary

Except for the most severe Outside Plant conditions, a single jacket, either metallic or dielectric armored cable will likely provide sufficient protection to the cable required for it to provide satisfactory performance under nearly all conditions.

Finally, the cable sheath which provides the optimal balance between robustness and economics for the OSP service to be provided and environment to be encountered is the sheath design that will ultimately determine the optimal cable design. That means that it is a cable design that the installation crew and splicers are most comfortable with and have the necessary equipment to install and to maintain is an important issue that cannot be ignored. Also, the final cable design must be sufficiently robust to withstand the weather conditions it will encounter over its service lifetime.

6.0 Additional Information

If there are additional questions on this topic or other fiber optic issues, please contact Sterlite Technologies at:

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