ASK BO

An OSP Installation Story—*Finis*

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The fourth of four parts of a detailed investigation & report on outside plant fiber optics installation options ends here.

This "story" started, in Part One, with a campus project involving a fiber network. The narrative in that article, and in two that followed, detailed the choices end-users and contractors face.

Included: Should you (or your customer) go with loose tube or tight buffered fiber?

As noted in Part Three, your choices in OSP fiber-optic cable design include:

1. Flooded gel-filled cable with gel-filled tubes;
2. Dry water blocking tape around the cable and gel-filled tubes;
3. Complete gel-free design for the cable and tubes (using dry water-blocking tape and yarn);
4. Tight-buffered/distribution/non-breakout style cables with dry water-blocking design; and,
5. Tight-buffer/breakout style cables with dry water-blocking design.

To get the facts, I contacted product managers, engineers, and customer service departments of 18 major fiber optic cable manufacturers—with 17 of them responding. See Table One, which provides the data obtained. Table Two, a repeat from last time, provides basic info on the suppliers' product lines.

CHECKLIST FOR YOUR DECISION

Here's a checklist you can use in determining the type of cable construction for OSP applications:

- Extreme environmental conditions—water/ice and temperature
- Fire rating OFNP/FT6 and OFNR/FT4
- Number of fiber strands
- Standards compliance
- Conduit density—existing vs. new and available pull boxes
- Bend radius
- Pulling strength minimums (lbf)
- Length
- UV, bird claws, and rodent resistance
- Non-nutritive to fungus
- Direct burial
- Aerial—Lash figure "8" or ADSS
- Underground or duct
- Foot, auto, truck, and train traffic
- OSP pathways—conduits and pull boxes, aerial
- Spool lengths and weights
- Budget

Remember: There is no magic polymer that can completely satisfy indoor fire-ratings and outdoor environmental conditions. OSP jacketing typically uses polyethylene (PE) or polyurethane (PU)—which is a rugged

Before Reading This Article, You'll Probably Want To…

…first read Parts One, Two, and Three. Each is three pages, and stored online as a PDF. Here's where to find them:

Part 1. www.tinyurl.com/k3wnt **Part 2.** www.tinyurl.com/fy75f **Part 3.** www.tinyurl.com/k3leh

jacketing and provides excellent UV and water resistance.

Indoor cable typically uses fluorinated ethylene propylene (FEP) or Teflon for OFNP (plenum) and polyvinyl chloride (PVC) for OFNR (riser) applications—but these do not provide good UV or water protection.

Indoor/outdoor cable is a hybrid of these polymers.

Note: Any loose-tube or tight-buffer OSP fiber cable can be OFC-classified, having any one or any combination of "metal" armoring, stainless steel (S/S) central strength member, S/S lashing, or a single "toner cable" embedded in the jacketing.

Like high-count shielded copper PIC cables, OFC cable has the disadvantage of having to be properly bonded and grounded.

FINAL OBSERVATIONS

I may be abusing the "author's privilege" here, but having spent so much of my time—and now yours, over four *Power Outlet* issues—on elements of the OSP selection process, I cannot resist these final observations from the study:

TABLE ONE

Cable Manufacturers' Policies Toward OSP Applications

	Manufacturer	Loose-tube flooded cables & tubes	Loose-tube dry block cable/ gel tubes	Loose-tube gel-free cables & tubes	Loose-tube 250µm indoor/ outdoor fire-rating	OFC	Tight-buffer 900µm indoor/ outdoor gel-free	Install in dry conduit below frost line	Fire-rating 900µm indoor/ outdoor fire-rating
1	ADC		Yes	Yes	OFNP&R	Yes	Yes	LSZH - Yes	OFNR
2	AFL		Yes	Yes	OFNR	Yes	Yes	No	OFNP&R
3	Alpha			Yes	OFNP&R	Yes	Limited use		
4	Belden/CDT	Yes	Yes	Yes	OFNP&R	Yes	No-limited use	Yes	
5	Berk-Tek (Nexans)		Yes	Yes	OFNP&R	Yes	Yes	Yes	OFNP
6	Corning	Yes	Yes	Yes	OFNR	Yes	Yes-limited use	No	OFNP&R
7	Draka/Alcatel		Yes		OFNR	Yes	Yes	Yes	OFNP
8	General		Yes	Yes		Yes	No		
9	Hitachi/Manchester		Yes		OFNR	Yes	Yes	No	OFNP&R
10	Mohawk	Yes	Yes	Yes	OFNR	Yes	Yes		OFNP
11	Molex			Yes	OFNP&R		No		
12	OCC					Yes	Yes		OFNP&R
13	OFS	Yes	Yes	Yes	OFNP&R	Yes	Yes		OFNP&R
14	Remee	Yes	Yes		OFNR	Yes	Yes		OFNP&R
15	Sumitomo		Yes	Yes	OFNP&R	Yes	Yes-limited use	Yes	OFNP
16	Superior Essex	Yes	Yes		OFNR	Yes	No		
17	Tyco		Yes		OFNR	Yes	Yes	Yes	OFNP&R

a. Tight buffer cable for OSP applications is now an accepted industry practice.

b. They are typically used in campus LAN applications under 1,000 meters (3,281 feet). Any longer lengths or aerial requirements typically are still of loose-tube design.

c. Each manufacturer has installation policies that *must be adhered to* in order to obtain the product warranty. Know what the installation policies and the extent of the explicit and implied warranty (example: Are they talking parts and labor?).

d. Keep all documentation shipped with the spools. Once accepted off the truck, it becomes your property—and responsibility.

e. Flooded cables are becoming obsolete and replaced with either (1) dry water-blocking tape or yarn for the cable with gel-filled tubes, or (2) gel-free construction.

TABLE TWO

Product Line information		
Part number series	Lowest operating temp	Mil-spec approved
Application	UV resistance	REA approved
OFC or OFN	Jacket color	Install below freeze line
Aerial Lashed "8"	Buffer size	Tensile strength
All-dielectric	Ribbon style	Crush resistance
Extra protection jacketing	Furcation kit required	Impact resistance
Direct Burial	Fire-rating	Cable diameter
Duct	Telcordia compliance	Spool length
Gel Flooded/Gel Tubes	ICEA compliance	Glass source

f. Furcation breakout/fan-out kits are here to stay when using any 250 µm OSP cable. So know the proper techniques for a secure, long-term termination.

g. 250 µm OSP cable has much higher pulling tensile strength that 900 µm OSP cable tight-buffer cable. This varies for each manufacturer.

h. Spool lengths can vary with each manufacturer from 2-10 km along with special colors.

i. Ribbon fiber is gaining popularity because of its density and smaller cable diameters. It is available only in loose tube format.

j. Studies by AFL have shown the cost benefit of tight-buffered cable is maximized at 24 strands. Higher fiber counts provide, in theory, an even greater cost benefit; and tight-buffered is even more economical to use for loose-tube cable. This is true even factoring in preparation and termination costs.

k. Both 250 µm and 900 µm OSP cables have Inside/Outside applications having OFNP and/or OFNR ratings—depending on the manufacturer.

l. Fusion splicing to pigtails is still one of the most popular techniques to (1) replace breakout kits, and (2) provide consistent high-quality, factory-polished enfaces required for 1 and 10 Gigabit Ethernet.

m. Know your LONG-term liabilities vs. your SHORT-term project costs.

CONCLUSION

Before you make your decision on what type of cable construction to use:

- First, go through the check list.
- Then, take into consideration these survey observations.

Get beyond the marketing noise. Do your research. To do otherwise puts you in jeopardy of finding yourself on the opposing end of a long litigation process.

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