

National Shipbuilding Research Program (NSRP) FY26 Navy Directed Project “High-Density Blown Optical Fiber Cable & Tooling for Shipboard Installations Qualification”

By: Adair Brown

Project Overview

- SEL, (Sumitomo Electric Lightwave), is under contract with Advanced Technology International (ATI) under Base Task Order Agreement No. 2025-372
- Summary of project is to achieve QPL qualification for the following fiber bundles
 - 12f, loose fiber SMF and MMF (OM1/62.5um), (MIL-PRF-85045/27)
 - 48f, FFR SMF (MIL-PRF-85045/38)
 - 72f, FFR SMF (MIL-PRF-85045/39)

What are Air Blown Fibers?

Sumitomo Electric Lightwave was the first to introduce air blown fiber technology in North America and is the leading Air-Blown Fiber provider for over 30 years.

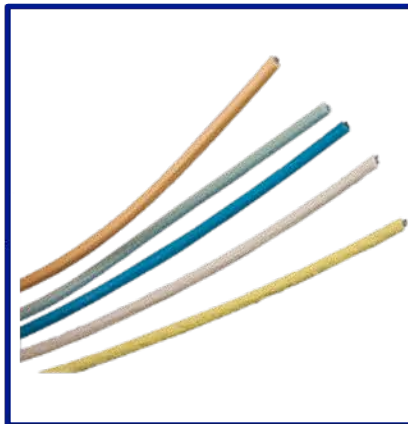
FutureFLEX® Air-Blown Fiber offers unprecedented ease of installation, flexibility, and cost savings across a wide range of design needs for current and future network requirements.

FutureFLEX® Air-Blown Fiber greatly reduces initial man-hour installation costs as well as future network/capacity expense.

FiberFutureFLEX® Air-Blown Fiber consists of five key components all of which are produced by Sumitomo:



Tube Cables



Fiber Bundles

Only product
seeking QPL
certification



**Distribution
Equipment**



**Fiber Termination
Equipment**



**Blowing
Equipment**

Just some quick numbers:

Tube Cable ct	Total Fiber capacity: 12f Bundle	Total Fiber Capacity: 48f Bundle	Total Fiber Capacity: 72f Bundle
2	24f	96f	144f
7	84f	336f	504f
12	144f	576f	864f
19	228f	912f	1368f
24	288f	1152f	1728f

Design and Construction

- **12f:**
 - Fibers = SM and MM (MIL-PRF-49291)
 - $\lambda \leq 3 \text{ g/m}$
 - OD = 1.8 mm to 2.2 mm
- **48f:**
 - Fibers = SM, 12f pliable ribbon
 - $\lambda \leq 9 \text{ g/m}$
 - OD = 3.1 mm
- **72f:**
 - Fibers = SM, 12f pliable ribbon
 - $\lambda \leq 12 \text{ g/m}$
 - OD = 3.7 mm

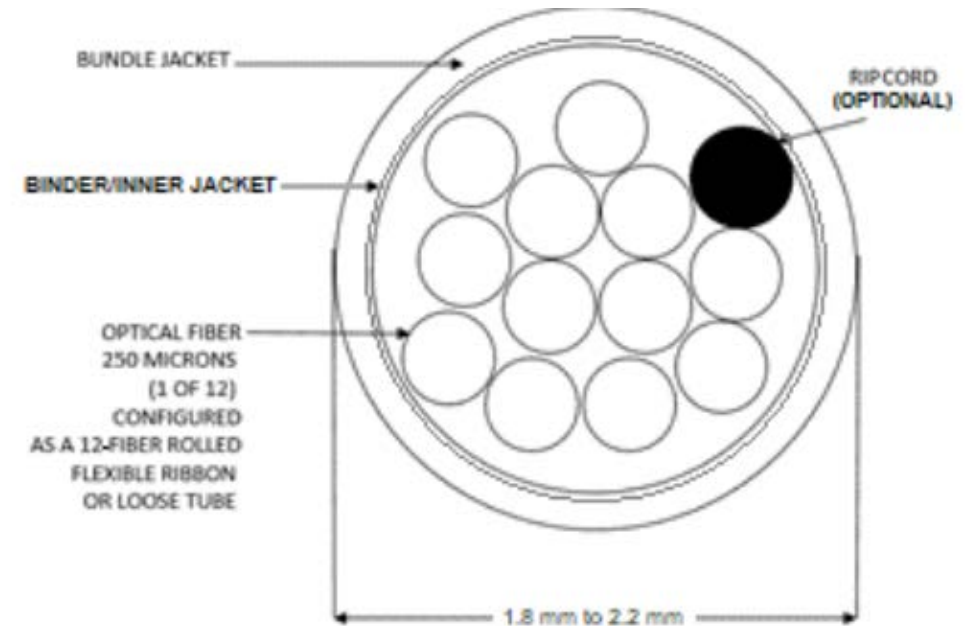


FIGURE 1. Blown optical 12-fiber bundle.

Design and Construction: 48f and 72f

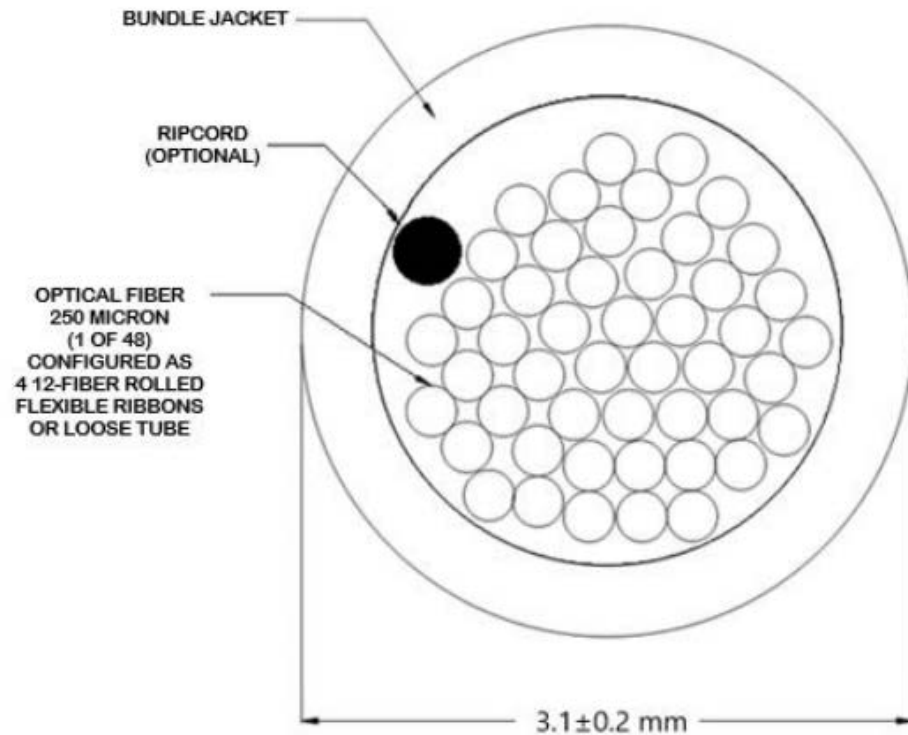


FIGURE 1. Fiber bundle, blown optical fiber, 48-fiber rolled flexible ribbon or loose tube.

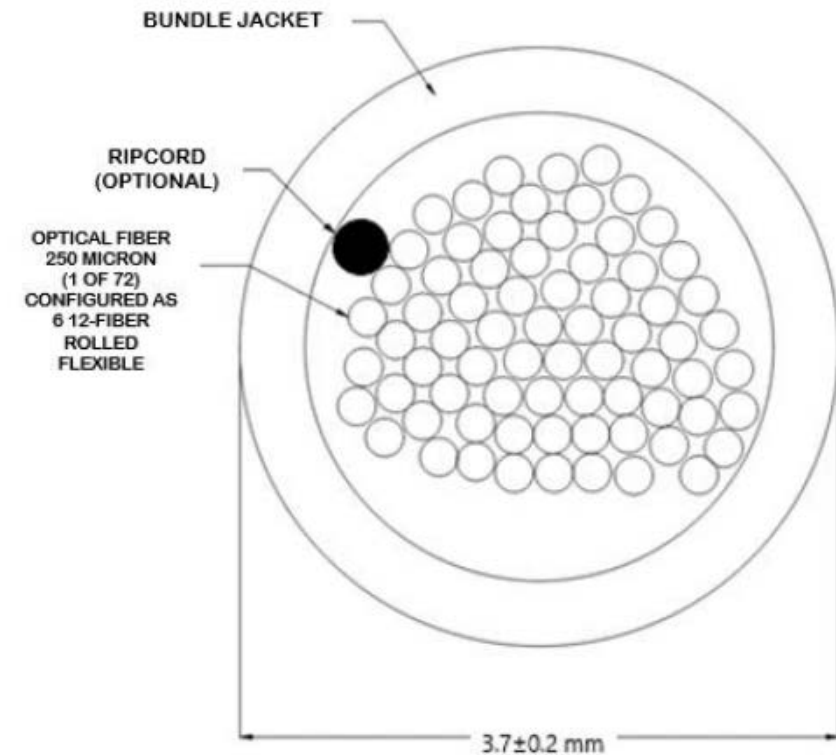


FIGURE 1. Fiber bundle, blown optical fiber, 72-fiber rolled flexible ribbon, six 12-fiber subunits.

Actual Designs and Constructions

- **12f:**

- Fibers = SM and MM (MIL-PRF-49291)
- $\lambda \leq 2 \text{ g/m}$
- OD = 2.0 mm

- **48f:**

- Fibers = SM, 12f pliable ribbon
- $\lambda \leq 5.53 \text{ g/m}$
- OD = 3.1 mm

- **72f:**

- Fibers = SM, 12f pliable ribbon
- $\lambda \leq 7.88 \text{ g/m}$
- OD = 3.7 mm

Qualifications

TABLE II. Qualification and conformance inspection.

Group	Qualification inspection	Requirement paragraph	Test paragraph	Cable length ^{1/, 2/, 3/, 4/}	Conformance inspection
I	Visual and mechanical inspection	3.4, 3.9, 3.10	4.7.2	Three samples, 0.5 km each ^{5/}	A
	Attenuation rate	3.5.1	4.7.4.1	Three samples, 0.5 km each ^{6/}	A
	Point discontinuity	^{2/}	^{2/}	Three samples, 0.5 km each ^{6/}	--
II	Crosstalk	3.5.3	4.7.4.3	Three samples, 0.5 km each ^{6/}	--
III	Temperature cycling	3.7.1	^{2/}	Two samples, 0.5 km each ^{6/} (one on reel, one off)	C
	Temperature humidity cycling	3.7.3	4.7.6.3	Two samples, 0.5 km each ^{8/}	C
	Storage temperature	3.7.4	4.7.6.4	Two samples, 0.5 km each ^{8/}	--
	Cyclic flexing	3.6.4	4.7.5.4	Six specimens, 5 m each ^{9/} (two specimens at each temp)	--
	Temperature life (life aging)	^{2/}	^{2/}	Two specimens, 300 m each ^{10/}	C
	Fungus resistance	3.8.4	4.8.4	Two specimens, 0.5 m each ^{10/}	--
	Cable element removability	3.6.18	4.7.5.18	Two specimens, 0.5 m each ^{10/}	C
IV	Thermal shock	3.7.2	4.7.6.2	One specimen, 0.5 km ^{6/} (on reel)	--
	Jacket self-adhesion or blocking	3.7.11	4.7.6.11	One specimen, 30 m ^{11/}	--
	Shock	3.7.13	4.7.6.13	One specimen, 30 m ^{11/}	--
V	Dripping	3.6.13	4.7.5.13	One specimen, 30 cm ^{11/}	--
	Cable jacket tear strength	3.6.14	4.7.5.14	Five flat extruded jacket material strips ^{12/}	C
	Cable shrinkage	3.6.17	4.7.5.17	Three specimens, 0.5 m each ^{11/}	C
	Flame extinguishing and smoke generation	3.7.12.2	4.7.6.12.2	One specimen, 50 m ^{11/}	C
	Water absorption	3.7.14	4.7.6.14	Two specimens, extruded jacket material strips ^{12/}	--
VI	Acid gas generation	3.8.1	4.8.1	One specimen, 1 m ^{13/}	C
	Halogen content	3.8.2	4.8.2	One specimen, 1 m ^{13/}	--
	Toxicity index	3.8.3	4.8.3	One specimen, 1 m ^{13/}	C
	Smoke index	3.8.5	4.8.6	One specimen, 1 m ^{13/}	C

- Eurofins
- Retention = SEL/Eurofins

TABLE II. Qualification and conformance inspection – Continued.

Group	Qualification inspection	Requirement paragraph	Test paragraph	Cable length ^{1/, 2/, 3/, 4/}	Conformance inspection
VII ^{14/}	Ribbon strippability	^{2/}	^{2/}	Three specimens, 2 m each ^{14/}	--
	Ribbon delamination	^{2/}	^{2/}	Three specimens, 2 m each ^{14/}	--
	Ribbon separation	^{2/}	^{2/}	One specimen, 0.5 m ^{14/}	--

External Testing Progress

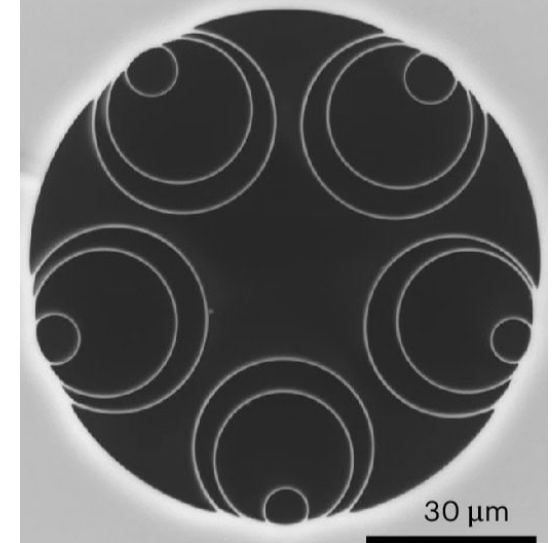
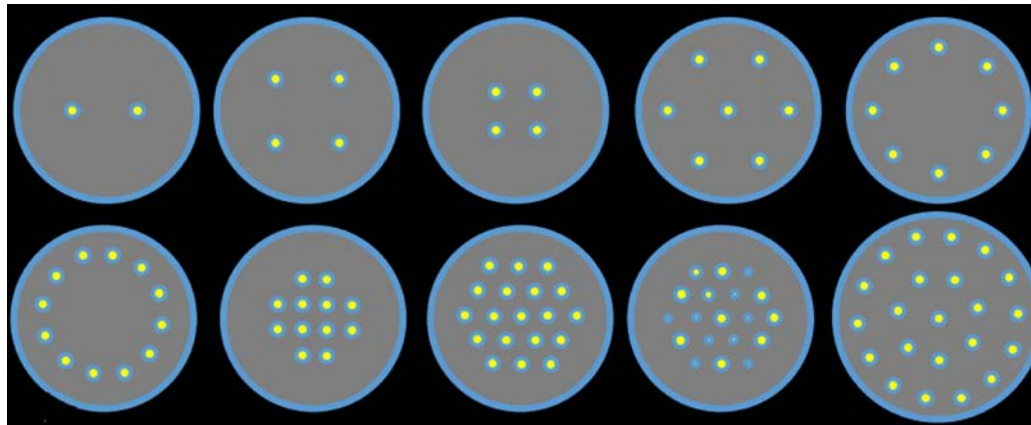
- 12f SM and MM are currently being tested at Eurofins.
 - Unfortunately there were delays on starting the external testing:
 - Interconnect system
 - Fusion splicers.
- 48f and 72f SM:
 - Currently undergoing quality inspections at SEL.

Project Timeline

	Apr-26	May-26	26-Jun	26-Jul	26-Aug	26-Sep	26-Oct	Nov-26	Dec-26	Jan-27	27-Feb
12f RH PEF	Test plan, Kickoff, documents										
		Eurofins sample									
			Interconnect and splicer								
				Eurofins Testing							
48f and 72f PP RH	Internal Qualifications										
		Commercialization									
			SEI RH FFR arrival								
				Eurofins Samples							
						Eurofins Testing					

Closing Remarks: Future Opportunities

- 12 Pliable ribbons can be spliced as a ribbon or individual fibers.
- 12f, 48f, and bundles are all under the max linear density = weight reduction.
- Future Development:
 - Multicore
 - Hollow core
 - Microsoft Patent





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