# LEONI

Certificate Number 17504-7 Date Shipped 5/30/2018

# **CERTIFICATE OF CONFORMITY**Rev 5

This is to certify that all items noted below are in conformance with the Purchase Order. contract, drawings, specification and other applicable documentation and that all process certifications, chemical and physical test reports required are on file at this facility and are available for review

All LFOI products are ROHS compliant unless otherwise stated.

Customer: Resonon Inc.

**Order#:**OE17504

PO#: 672

Item No: 096484

Description: Bundle - ~0.376M OAL (breakout at rear of common end ferrule) - 14x800/880/1100 HOH s/s 0.22NA - Side 1 End 1 316 SSTL Slit Ferrule 20mm dia. x 4" L w/1x14 linear array with 0.955mm CTC spacing in machined v-groove-1.15" dia. SSTL Flange per customer drawing - Side 2 Ends 1 thru 14 FC/PC - PVC Furcation Tubing legs

#### Serial Numbers:

280906

QA Mgr. Roger West htm

**LEONI** Fiber Optics Inc.

Billing: P.O. Box 615 Lightfoot VA 23090 Phone: 757-258-4805 Email: contact@leonifo.com Shipping: 215D Bulifants Blvd. Williamsburg, VA 23188 Fax: 757-258-4694 www.leonifiberoptics.com

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# LEONI

Certificate Number 17504-6 Date Shipped 5/14/2018

## **CERTIFICATE OF CONFORMITY**Rev 5

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## Leoni Fiber Optics, Inc.

Fiberoptics For Industry And Research Since 1982

### Fiberoptic Cable Handling And Limits of Warranty Rev.1

## (Read before handling FO cables!!)

Scope: The intent of this note is to define the recommended handling practices for fiberoptic cables manufactured by Leoni F.O., Inc and to comment on warranty issues. It relates to ALL fiber cables but is specifically targeted at larger core cables (>200µm core).

#### Section 1 - Handling Guidelines

#### A) Strength and Proof Testing:

#### Do not proof test!

Strength, or "proof" testing, is done by the fiber manufacturers. It is a carefully controlled process because it has been found that the more one stresses fiber near its strength limit, reduces it overall life time expectation to continue to resist failures. Therefore, it is specifically recommended that NO fiber be proof tested or strength tested except for sample testing in order to gather nominal strength statistics. Any overall proof or strength testing is done at the risk of damaging the fiber. Specifically, proof testing a fiber at or below its bend radius minimum or in any way uncontrolled or unapproved by Leoni F.O. will void the warranty.

#### B) Bend Radius:

#### Do not bend the fiber past the minimum bend radius!

The rule of thumb regarding bend radius is that the MINIMUM bending radius for a particular fiber is 300X the cladding diameter (assuming the cladding is also glass). Using this rule of thumb the following minimum bending chart was developed:

Fiber	Minimum Bend RADIUS
100/110/125	3°cm
200/220/245	7 cm
400/440/480	13 cm
600/660/710	20 cm
1000/1035/XXX	-31 cm

If your application requires a tighter bend radius, please call us for an in depth discussion of the best ways to minimize your risks and maximize the likelihood of a successful outcome.

#### CABLE CONSTRUCTION DOES NOT LIMIT BENDING TO THE MINIMUM RADIUS, ONLY PROPER HANDLING AND CARE CAN DO THAT!

#### C) Twisting:

Do not coll or twist the cable when spooling, un-spooling, colling or uncoiling. Cables must be handled in a "hand over hand" fashion at all times.

Fiber cables should not be handled like rope and colled or uncolled by twisting or untwisting one loop at a time. Fiber should always be handled in a "hand over hand" fashion making coils or unrolling coils by moving the fiber in a circle, one hand over the other. To do otherwise is to induce a twisting stress in the cable and hence in the fiber within the cable. Very high stresses can be achieved if a cable is uncoiled incorrectly and damage or weakening can be the result and this type of handling will void the warranty.

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#### D) Pulling:

Do not pull fiber cables by their end fittings! And, be careful of pulling in general, unless your specific cable has be rated to withstand this stress.

Fibers are usually very strong in direct tension, relative to their cross section, but when the fibers are small it is very easy to break them. Unfortunately each cable construction will have its own limits and it is difficult to give any rules of thumb in this regard. If you anticipate pulling your fiber cables in any way, please consult with Leoni F.O. for help in determining the maximum tensions allowed and to avoid problems or inappropriate expectations.

#### E) Other Handling Comments:

### Optical fiber is not wire or rope and can't be handled as such.

Any fiber optic cable, constructed with quality techniques and materials, should survive as long as care is taken when handling it. The most precarious moments in a fiber cable's life occur during inspection, testing and installation. It is very easy to exceed the bend radius guideline, especially when working with the large core cables and performing these tasks.

The main thing is to remember that smaller core fibers and the associated cables are very robust and can hull you into thinking that the recommended handling practices are "flexible." That is an incorrect assumption. Fiber is glass. While optical fiber represents an incredible achievement in materials processing, you cannot lose sight of the fact that it is still glass and glass can break.

This is not to say that one can't fabricate robust large core fiber assemblies. It is to say that we want to raise the level of awareness regarding these cables in order to ensure the maximum number of successful applications. If you have ANY questions about this, please feel free to call us for a specific discussion of your application and product.

Section 2 - Warranty,

#### A) 1 Year on Material and Workmanship:

By maintaining traceability, only using the highest grade components and carefully training each and every technician on its staff, Leoni F.O. is able to offer a one year warranty against defects in material or workmanship.

B) Receiving: When an assembly is shipped from Leoni F.O. it will be in good working order. If, for any reason, you discover upon receipt that an item has been damaged in shipping please call Leoni F.O. immediately.

#### C) Limits to Warranty (also see Leoni F.O. standard Terms and Conditions):

 As discussed above, if the user exceeds the recommended bend radius at any time the warranty against material defects is void. In order to avoid any confusion in this matter, it is strongly recommended that a broken fiber or cable be immediately placed in its original packaging and returned to Leoni F.O. for evaluation.
Leoni F.O. cables are generally shipped in coils at or near the minimum recommended bend radius. Any additional strength testing is done at the risk of the purchaser with full knowledge that by doing so may actually CAUSE damage and therefore void the warranty.

3) Any cable sent back to Leoni F.O. not in original packaging or in packaging too small for the particular cable or assembly, or with end faces un-protected (failure to replace protective caps that all cables are shipped with) will void the warranty.

4) Leoni F.O. will always gladly replace or repair, at its discretion, any cables or assemblies found to have incorporated defective material or workmanship. But, where no evidence of a defect in material or workmanship exists, the purchaser assumes full responsibility for the item and repair or replacement will not be covered by warranty.