

Practical Experience with j-BendAble

An application note for measurement, installation and use of j-BendAble OMx bend-insensitive Multimode fibers

j-BendAble 50/125/245 μm bend-insensitive type Multimode Fibers for serial 10 Gb/s data transmission protocols (OM4/OM3/OM2⁺/OM2) are meanwhile well established in cabling networks.

With their modified design, j-BendAble fibers provide for an extremely enhanced bend-loss performance and high laser bandwidth even in challenging installation conditions and small space budgets.

However, it is the specifics of this design that demand for some extra attention in measurement, installation and use.

This application note will therefore help you to avoid misinterpretation which might occur when using j-BendAble or j-BendAble in combination with standard fibers.

It will

- answer the question, **how to correctly identify a BIMMF** and distinguish a bend-insensitive fiber from a standard Multimode fiber.
- thereby explain the **consequences that the light launching source has on correct attenuation measurement** of a j-BendAble bend-insensitive fiber.
- and give valuable insights into j-BendAble **design specifics and their consequences on termination, installation and fiber life time**

Is it a j-BendAble bend-insensitive fiber or not?

Or: How to distinguish j-BendAble from standard fibers in practical daily routines

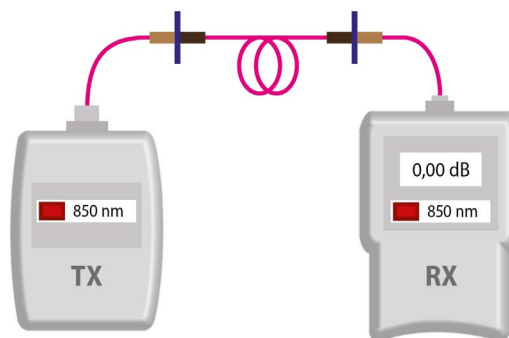
j-BendAble bend-insensitive fibers show a significantly lower bend-induced attenuation and can be identified by simply bending a fiber at a small bend-radius and measuring its bend loss behavior.

Attenuation is measured – for instance with a standard loss test set (LTS) - first without bending the fiber, memorize the value or set the display to zero, then by bending the fiber in two turns at diameter of 15 mm.

In case of a standard fiber, the attenuation value will be approx. 1 dB, while a j-BendAble bend-insensitive fiber will show an approximate 0.2 dB attenuation value.

The absolute values received by this depend strongly on the build-in light source as detailed in the following.

Loss Test Set



How to measure attenuation on j-BendAble bend-insensitive fibers?

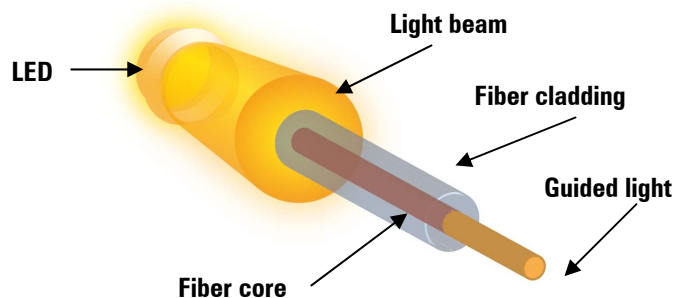
Or: The influence of light source

If only long, straight fiber links were to be measured, these lines could be ignored.

However, in reality the fiber links – especially in data centers – are short and bent and the cause for the existence of BIMMF.

As a consequence, the light source used for transmitted light measurements is essential.

A LED overfills the 50 μm core of the fiber completely, stimulating almost all possible modes. The so-called “leaky” modes are more present in BIMMF causing misleadingly high losses under bent condition.

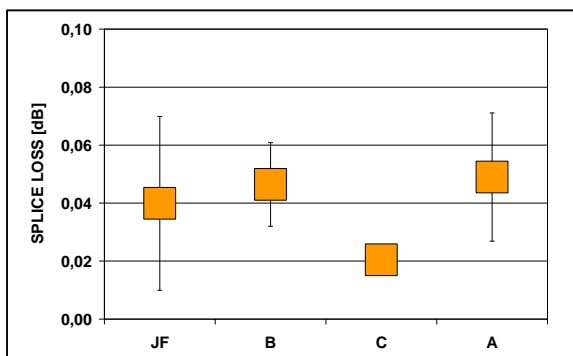
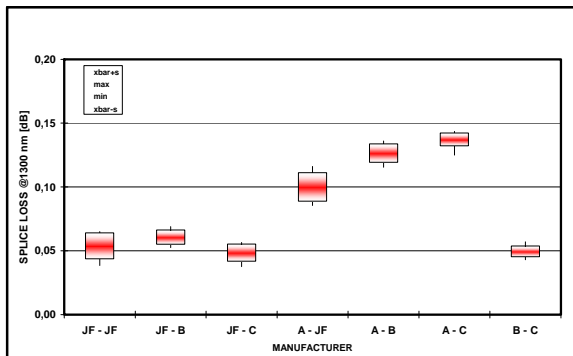


Coupling Attenuation

Are currently available BIMMF of different manufacturers compatible?

The answer: Yes! Systematic splicing tests of currently available BIMMF have shown that the attenuation values of the different BIMMF all lie within the tolerance range of 0.05 dB to 0.2 dB. When splicing different BIMMF to a standard OM3 fiber the splice loss values are nearly in the same range. All test results also apply for BIMMF when coupled by connectors.

However, depending on the design combination an increased backscatter signal on single-ended measurement can occur.



Mechanical Performance

Will j-BendAble bend-insensitive fibers be exposed to higher mechanical stress and does this impact fiber life time or system performance? Can j-BendAble be installed without caring about bend radius?

7.5 mm has been defined as the smallest bend radius for BIMMF and is much more demanding compared to the historically agreed 20 to 25 mm which makes the fiber live virtually "forever".

Therefore, careful installation is still a must. Bend-radii below the defined minimum or sharp bends might pass optical tests and measurement without warning. Careless installation or mistakes can cause long term fiber damage or even fiber breakage inside the cable.

Conclusion

j-BendAble bend-insensitive fiber has been accepted in today's cabling networks as a favorable and safe fiber solution for 10 Gb/s data transmission

j-BendAble fiber and BIMMF cables provide several advantages in installation, costs and space management without compromising on performance or fiber life time. The specific j-BendAble design requires some extra considerations in performance tests but allows for the same termination and handling as applies for standard fibers.

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