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OFFICIAL STATEMENT

OPTICAL CONNECTORS AND HIGH POWER

PREFACE

It is nowadays recognized that a contaminated optical connector is going to fail under high power conditions. This happens if a dirt particle deposited in the fiber core region absorbs light and converts it into heat. The generated heat can lead to a local temperature increase capable of damaging the glass surface of the optical fiber. On the other hand, a perfectly clean connector will not face any problem when operated under high power conditions (up to several Watts).

Therefore, it is essential to handle connectors under very clean condition. A microscope allowing to observe the fiber surface is an indispensable tool when working with optical fiber connector under high power conditions.

The Diamond recommended procedure when using a optical connector under elevated power condition is the following:

- connector is inspected using a microscope
- connector is cleaned if it was contaminated
- connector is inspected again
- clean connector is inserted into the adapter

This procedure has to be applied to **both** connector that participate to the connection, in addition, the mating adapter has to be perfectly clean.

DIAMOND SA has developed a special type of connector for high power applications: the **Power solution connector (PS)**.

The PS-connector is based on expanded beam technology which allows to decrease by a factor of 12 the power density at the connection interface. This technology has two main advantages:

- Tolerance towards cleanliness: Dirt particles of same diameter will cause a lower temperature increase for the PS-connector than for standard ones
- Performance at higher power: The same optical power will cause a lower temperature increase

Under similar power and cleanliness conditions, the PS-connector will have a significant better behavior than the standard connector.

Perfectly clean PS-connectors have been tested in our laboratory up to 10 W without showing any kind of degradation. This shows the high potential of this connector type.

Nevertheless, for field application it is difficult to guarantee the same degree of cleanliness than in a laboratory, even when applying the cleaning procedure described above. This comes mainly by the different environment (outside plant, position of the operator, ...) and the of the inspection microscope (magnification, image quality, ...).

In the case of a good field inspection microscope the typical threshold particle diameter that can be recognized is around 2 μm . Therefore, an optical connector which has been declared "clean" in the field, could be contaminated with particles with a diameter smaller than 2 μm .

CONCLUSION:

Under these conditions, DIAMOND SA guarantees that

- **PS-connectors can be used at optical powers up to 3 W**
- **Standard connectors can be used at optical powers up to 250 mW**

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