

## THE IMPORTANCE OF POLISHING IN FIBER OPTIC CONNECTORS

Polishing of fiber optic connectors is the process of polishing the end-face of the ceramic ferrule within the fiber optic connector. The purpose is to improve the light transfer between the mating of connectors, minimizing their optical losses. This is an important aspect of fiber optic communications as losses affect the quality of the light signals.

### OPTICAL LOSSES

There are two main types of losses that are affected by the style and quality of polishing, which dictate the optical performance level of terminated fiber optic connectors:

#### 1. Insertion Loss (IL):

Insertion loss is the most important performance indicator of a fiber optic connection. This is the loss of light signal, measured in decibels (dB), during the insertion of a fiber optic connector.

#### 2. Return Loss (RL):

Return loss, which is also known as back reflection, is the loss of light signal that is reflected back to the original light source. This occurs as the light is reflected off the connector and travels back along the fiber to the light source. This indicator is measured in negative decibels (dB). When reading return loss figures, the higher the absolute value of the decibel unit means the better the performance of the interconnection.

### TYPES OF POLISHING

The amount of insertion loss is affected by fiber alignment, and/or the quality of the finishing on the end of ferrule, while return loss is affected by the style of polishing on the ceramic ferrule in a connector.

There are three different styles of polishing, reflected by their shape of the finish:

#### 1. Physical Contact (PC)

In the PC style, the fiber is polished to a smooth curve. As the name implies (i.e. physical contact), the ferrules of adjoining fibers come into physical contact. This reduces the air gap between the contacting ferrules, resulting in lower insertion losses.

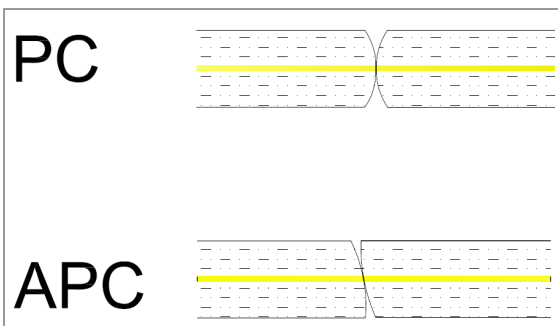
The smooth curve in the PC style is designed to reduce the return loss by reflecting the light out of the fiber. However, the PC polishing style incurs more return loss than other styles.

## 2. Ultra Physical Contact (UPC)

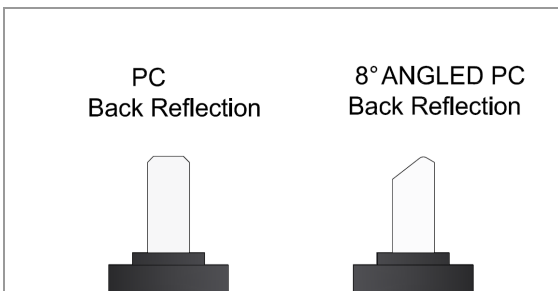
The UPC style ferrule has the shape of the PC style. They are polished with several grades of polishing film that allows for an ultra smooth surface. The main difference between UPC and PC is that the former have a lower return loss.

## 3. Angled Physical Contact (APC)

The APC style produces the lowest return loss when compared to other styles. The ferrule is finished to an **angle of typically 8 degrees**. The angle is calculated so that it is less than the critical angle, which implies that light is not propagated back along the fiber.



*Diagram-1: PC vs. APC in the mating of ferrules*



*Diagram-2: Polishing shape of PC and APC*

### **Olabs Technology Company Limited**

Blk. A, 7/F, Hang Fung Industrial Building, Phase 2, 2G Hok Yuen St.

Hung Hom, Kowloon, Hong Kong

Tel: +852 3473 1128

Fax: +852 3914 6919

Email: [sales@olabstech.com](mailto:sales@olabstech.com)

URL: <http://www.olabstech.com>

All information related to the documents here are based upon information believed to be reliable or accurate. No responsibility is assumed to any inaccuracies. The user assumes all risks and liability with the use of this document. Olabs reserves the right to change at anytime without notice.