



OZ OPTICS LTD.

APPLICATION NOTE

FC/APC CONNECTORS VERSUS FLAT ANGLED FINISH FC CONNECTORS

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Connectors with angle polished (APC) finishes are a very popular choice in the market today. Connectors with APC finishes are made by polishing the fiber at either an 8 or 9 degree angle, with a radius of curvature between 5 and 12 mm (See figure 1). By angle polishing the end of the fiber, one ensures that reflections at the fiber-air interface are not captured by the fiber core. This greatly reduces backreflection levels in fiber optic systems, and in turn reduces feedback problems and improves stability. By having the angled surface polished to a radius, one also ensure that two similarly polished connectors will mate at the fiber core.

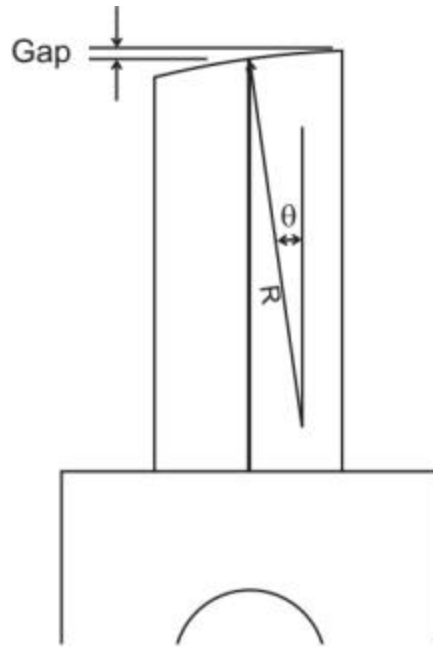
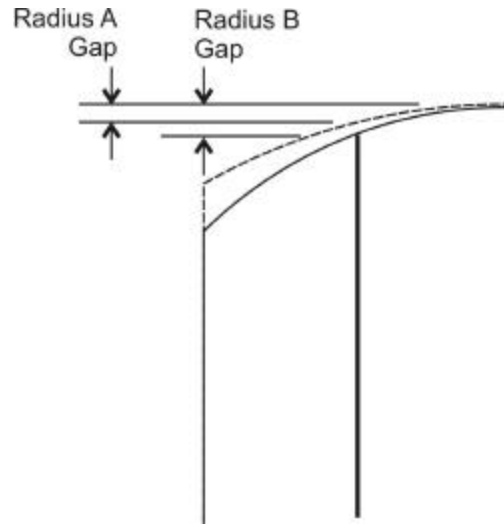
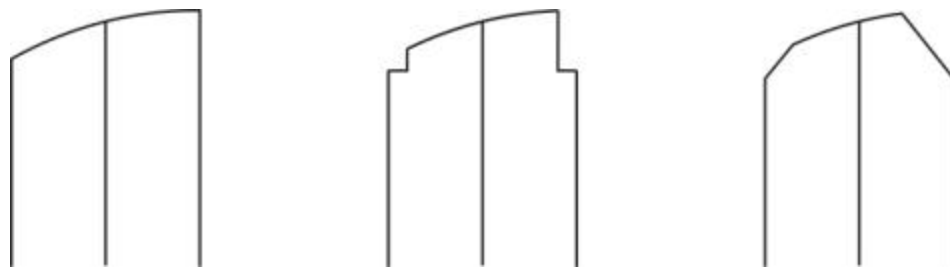


Figure 1: APC Ferrule Polish

One drawback with angled polished connectors is that the tip of the fiber is not in the same plane as the tip of the ferrule. Therefore when one butts the ferrule against a flat stop, such as in a collimator receptacle, there is a gap between the stop and the end of the fiber. Furthermore the variation in the endface geometries from one APC connector to the next affects the size of this gap (See Figure 2a). Different manufacturers also vary the very profile of the tip, further introducing errors (Figure 2b). These variations can cause the gap size to vary by as much as 100 microns. This can significantly reduce coupling efficiencies in laser to fiber couplers.



(a) Effect of Different Endface Radii



(b) Different Commercial Ferrule End Shapes

Figure 2: Variations in APC Ferrule Endface Geometries

To provide the low return losses of APC connectors without the problems in the gap spacing, OZ Optics offers an angled flat (AFC) polished connector. This connector features a beveled endface where the fiber face itself is angled, but the ferrule tip is flat. (See Figure 3). The region that is angled polished extends past the fiber cladding to a maximum of one fiber radius. This geometry reduces the variation in the gap location to less than 15 microns, greatly improving the repeatability in coupling efficiency. The relatively large flat surface also ensure better contact against a stop than the point contact an APC connector makes.

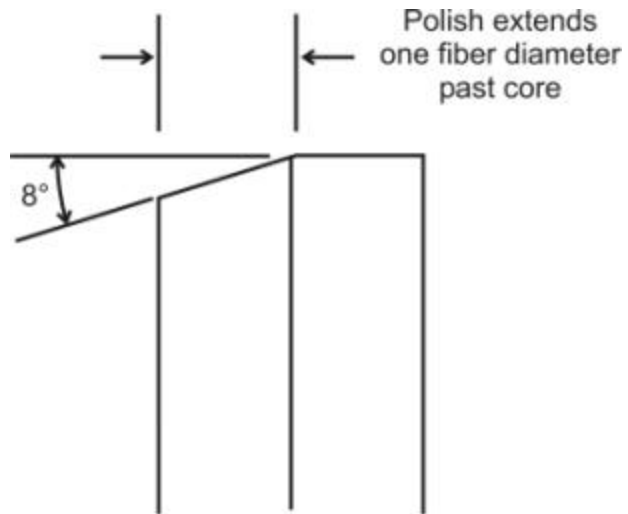


Figure 3: AFC Finish Geometry

The sole drawback of the AFC design is that the flat surface does not allow the same quality of mating between two fibers as the APC finish provides. Thus while AFC finish connectors are recommended for free space to fiber applications, the APC finish is still recommended for fiber to fiber connections.