Importance of Jacket Crimping

SENKO Product Datasheet

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RvA
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Purpose

Crimping or rather crimping strength is essential to the integrity and reliability of a patchcord. Poor crimping will lead mechanical failure and, thus, optical performance degradation or failure of the patchcord.

Good crimping does not solely depend on the crimp ring, but also on the variations in cable jacket diameter and thickness. The purpose of this document is to provide guidance on SENKO's recommended methods of cable jacket crimping, focusing on solutions to improve crimping when cable jacket diameter and thickness is less than ideal.

Overview

There are two areas which crimping applies, the backpost, and the cable jacket. Backpost crimping provides strength to prevent cable damage or disconnection under high tensile loads. Cable jacket crimping prevents the jacket from detaching or twisting, both of which are risks to fiber damage.

Due to its combination of lightweight, high tensile modulus (resistance to deformation under tension), high tensile strength (high maximum stress resistance before breaking) and very high wide working temperature range, Kevlar (para-aramid synthetic fiber) is used as strengthening fibers inside fiber optic cables. Crimping of Kevlar is critical to maintaining structural integrity, hence improving long term reliability. Failure of Kevlar crimp will transfer tensile loads onto the inner buffered fiber(s) that strain relief boots are unable to compensate for. Under such conditions there is an immediate adverse impact on both short and long term cable integrity as well as optical performance.

Cable jacket provides protection for the relatively more fragile buffered fibers from mechanical and environmental conditions. As such crimping of the cable jacket is vital to its durability and immediate and long term performance. One has to bear in mind that due to inconsistencies of cable jacket outer diameter, thickness and hardness of material type, jacket crimping cannot be as consistent as that of Kevlar crimping. In fact, whereas Kevlar crimping is easy to achieve, jacket crimping is a more complex balance between sufficient tensile pull force performance and freedom of fiber movement. By this we mean crimping must provide sufficient jacket pull force and twist performance, but must not be achieved through over-crimping to the extent it prevents fibers moving freely and adversely impacting optical performance.

Jacket Crimping Improvement Solutions

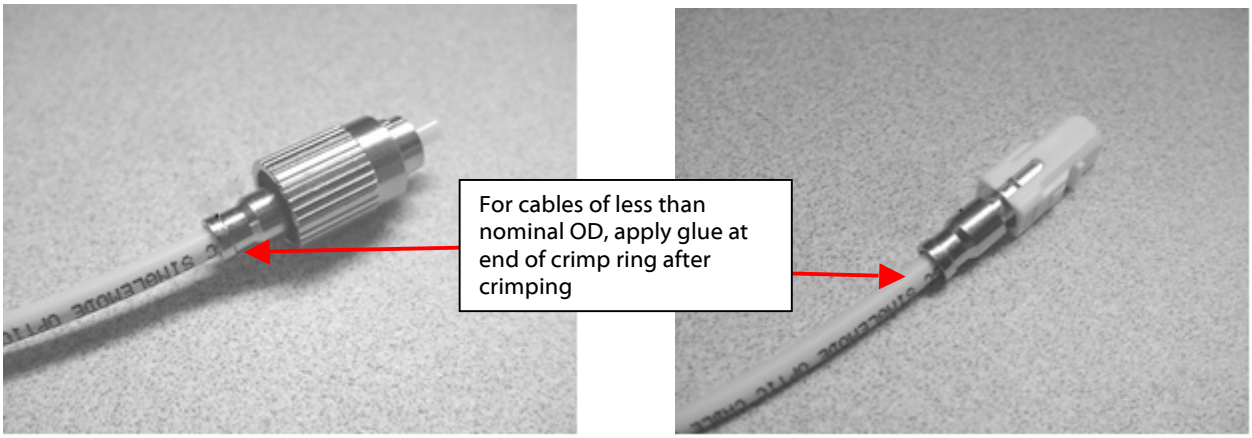
Use of a crimp ring is the conventional method of crimping both backpost and cable jacket. This is fine for cables of 3mm outer diameter or greater. However, when the diameter is less than 3mm issues emanating from variations in jacket thickness, tolerance and material becomes problematic. No singular crimp ring can be a one-stop solution for these variations, and having individual crimp rings for each and every variation is neither practical nor economical.

SENKO uses three methods to improve cable jacket crimping; application of epoxy, use of pin tube; use of heat shrink tube. SENKO's LC connectors use a crimp sleeves [crimp ring with integrated heat shrink tube].

Application Epoxy

This is a good, but least effective of the three recommended by SENKO. It does however avoid issues of over-crimping which can prevent the fibers from moving freely.

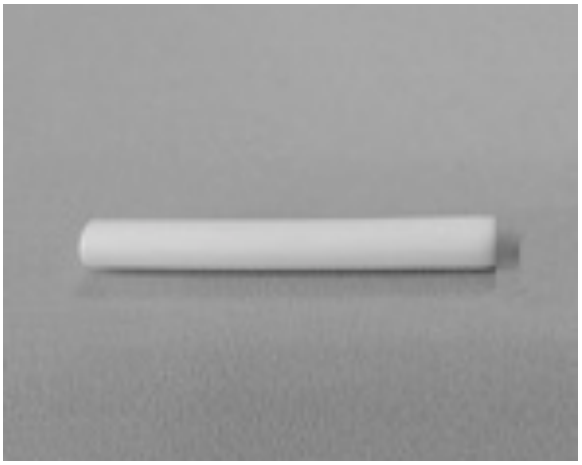
When the cable jacket is less than nominal, jacket crimp may be insufficient. In such cases silicone based epoxy can be applied to the end of the crimp ring after crimping. The epoxy adds low strength adhesion of the crimp ring to the cable jacket, thereby increasing tensile load resistance, and thus improving jacket pull and twist performance.



FC example *SC example*

Use of Heat Shrink Tubes

This is a quick, easy and effective method to increase the cable outer diameter and thickness. The additional thickness of the heat shrink tubes allow the crimp ring to bite into it, increasing jacket pull and twist performance. Risk of over-crimping is very low due to the softness of the heat shrink tube.

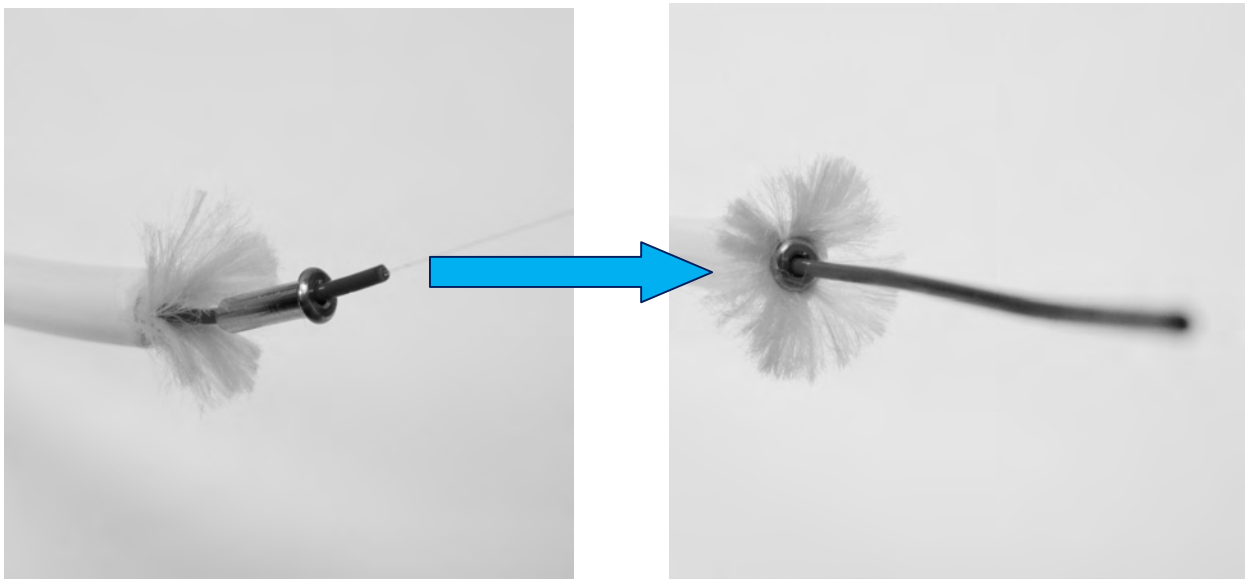


Use of Pin Tube

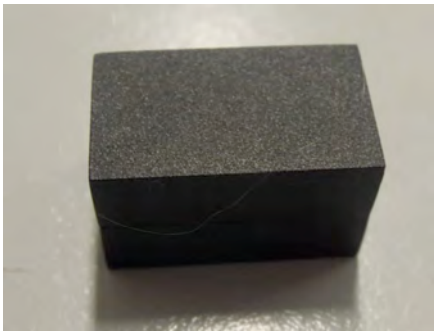
The pin tube has the effect of not only increasing the cable jacket outer diameter, but in cases where the jacket is soft, it prevents the jacket from collapsing, allowing the crimp ring to firmly bite into the jacket.

Pin Tubes also allow for a higher than normal crimping force to be applied whilst protecting fibers from over-crimping. The extra crimping force the pin tubes allow further reduces the crimp rings' inner diameter when fully crimped. This gives the crimp ring a grip on the cable jacket, increasing jacket pull and twist performance. This makes pin tubes the most effective method to use when cable diameters or jacket thicknesses are less than nominal.

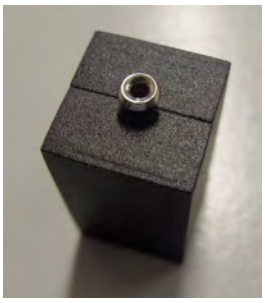
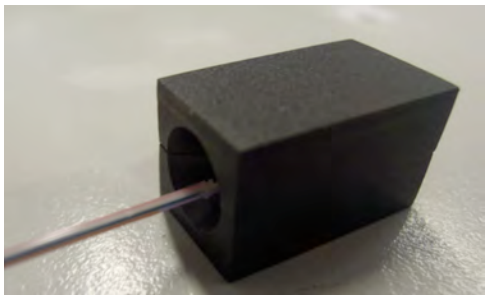
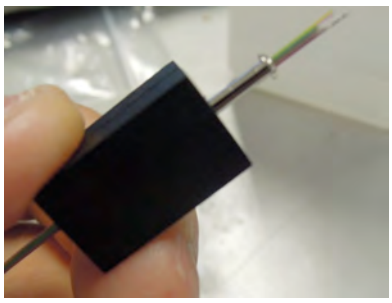
Use of pin tubes with single fiber connectors is simple. After the cable is prepared and fiber stripped in accordance with the corresponding termination procedure, the pin tube is installed between the buffered fiber and Kevlar strengthening fibers. See example below.



Greater care is required when using pin tubes with multi-fiber connectors such as the MPO, and requires the use of SENKO's 3mm 4-12F fiber insertion fixture. The fixture is a simple two-part fixture, and assembling is just a matter of using the locating pins to put the two halves together. *See next page.*

When assembled the fixture has two openings at either end. The small opening has a small straight internal diameter into which the pin tube is installed and held. The larger conical shaped opening at the opposite end is to guide fibers into the pin tube. See below.

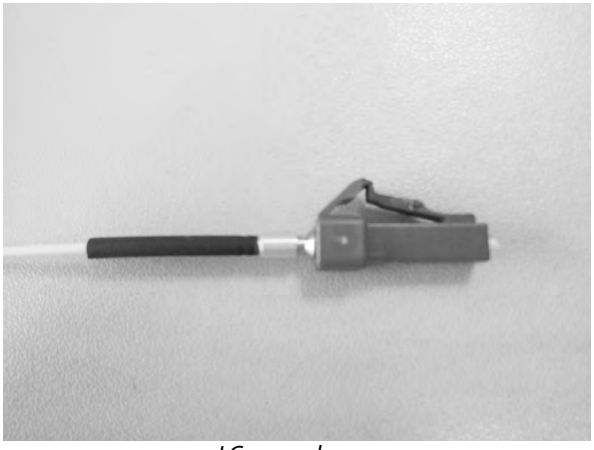




Of course use of a pin tube is not always possible as in the case of armored and other types of reinforced cables. In these cases, heat shrink tubing can be used to effectively increase jacket thickness and cable OD to improve crimp performance. However, if heat shrink tubing is not possible or undesirable, silicone based epoxy can be applied to the back of the crimp ring and cable after crimping.

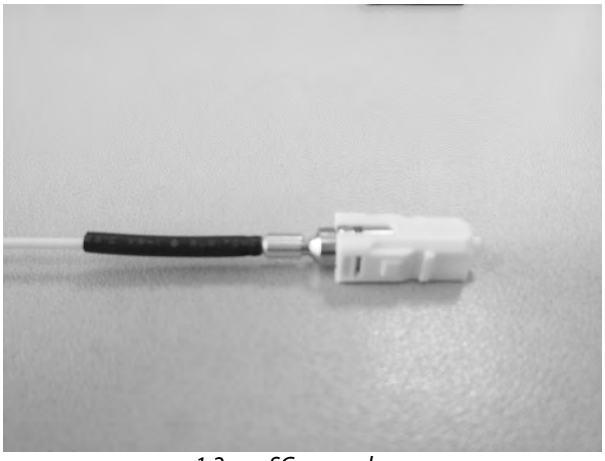
Use of Crimp Sleeve

This applies to 1.2mm cables where cable jackets are too thin, prohibiting direct jacket crimping which would be ineffective and, adversely affects fiber movement and optical performance.

The use of crimp sleeves is the only crimping method recommended by SENKO for cables of 1.2mm diameter, where the integrated heat shrink tube provide very firm and affective hold of the cable jacket, resulting in more than sufficient jacket pull and twist performance. Note that this is the standard solution for SENKO LC connectors.



LC example



1.2mm SC example

Note that this is the standard solution for SENKO LC connectors.