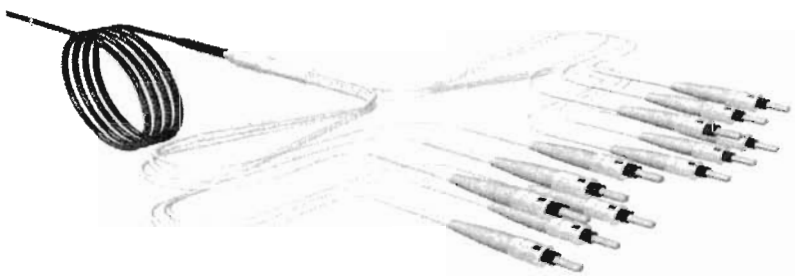
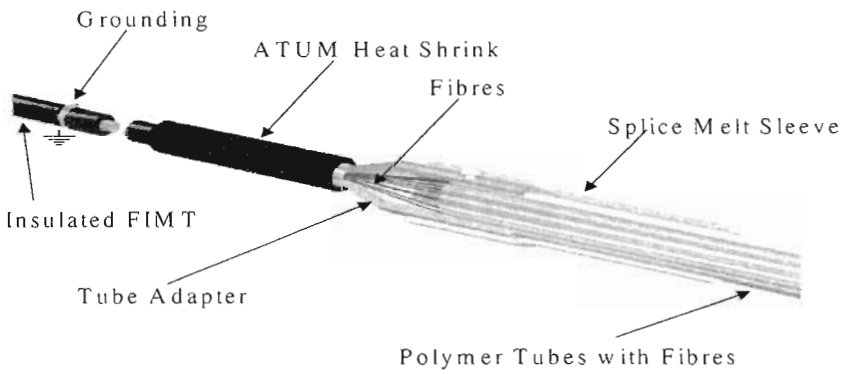
Nexans

ASSEMBLY PROCEDURE

Termination of Optical Fibres in 2,3 mm steel tube





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1 TERMINATION OF FIBRE OPTIC STEEL TUBES

This procedure describes the termination procedure for 2.3mm fibre optic steel tube elements. The procedure is applicable for both surface terminations (dry) and oil filled pressure compensated termination boxes. Note that individual length adjustment might be needed, depending on the termination design.

Tooling and termination kit, and a CD-ROM with an animated termination procedure (in English, Portuguese and French) are available upon request.

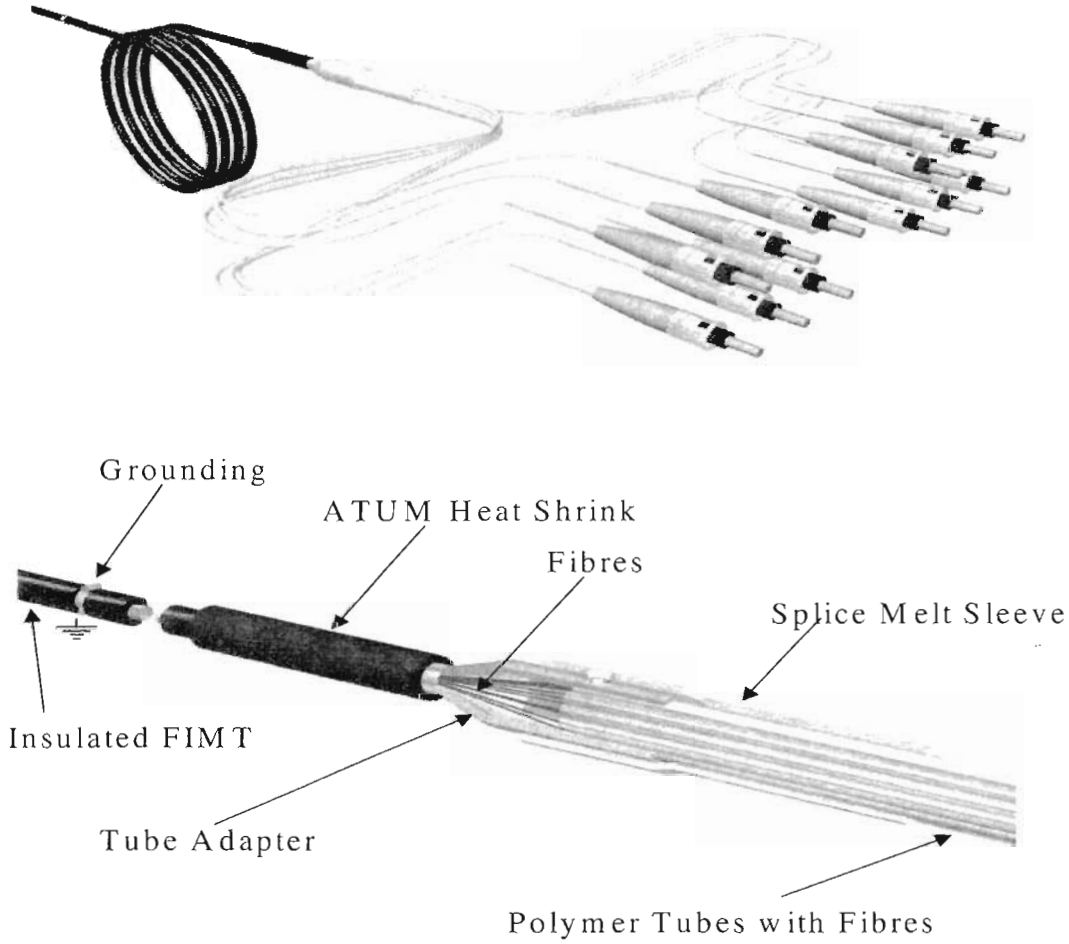

Figure 1-1: Termination of fibre optic steel tube

1.1 TERMINATION PREPARATION

1. Carefully remove the fibre steel tube from the core.
2. Straighten the tube, removing the pre-formed twist from manufacturing.
3. Remove 85mm (3 3/8") of the steel tube sheath where the tube will be cut.
4. Straighten the unsheathed part of the tube to allow the tube cutter to make a clean score on the tube.
5. Make a crack initiation with a tube cutter approx. 10mm from the sheath end. Do not tighten the cutter too deep, as this may cause the deburring tool not to fit the tube.
6. Work the cutter around the tube until the cutter moves freely. Do not tighten any more and remove the tube cutter.
7. Bend the tube at the score point slowly in one direction until it snaps. Do not break the steel tube completely by moving it further in the same direction, as this will damage the fibres. Bend the tube back and forth until it breaks. Avoid moving the two pieces too much, as it might damage the fibres. Pull the steel tube slowly off the fibre bundle, while holding the bundle to avoid fibre stress.
8. Slide the deburring tool over the fibre bundle and deburr the tube end. Turn the tool back and forth (± 90°). Further rotation of the tool can damage the fibres.
9. Clean the fibres and steel tube with WD-40 then with isopropanol/alcohol. This will make it easier to insert the fibres into the individual tubes.

1.2 TERMINATION OF STEEL CASE ADAPTER

1. Make sure that the steel tube and fibres are clean before sliding the 50mm (2") long heat shrink sleeve, ATUM 8/2, and the Steel Case Adapter over the fibres and the steel tube. Glue steel case to the steel tube with Locktite 415.
2. Use a heat gun to shrink down the ATUM 8/2 to fit over the end of the steel case and on to the sheathed steel tube.

1.3 PREPARATION AND TERMINATION OF "PIGTAILS"

1. Cut the loose polymer tubes to correct lengths, depending on splice box layout.
2. Insert four tubes into the IAKT 3/1 heat-shrink tube. The IAKT 3/1 heat-shrink tube shall be 30mm (1 3/16") long.
3. Let the polymer tube protrude 20mm (3/4") outside the IAKT. Shrink down the IAKT.

4. Distribute the other eight polymer tubes around the shrunk IAKT. Then slide IAKT 8/2 outside all twelve tubes. Let the IAKT 8/2 protrude 5mm (1/4") outside the IAKT 3/1 on each end.
5. Shrink the IAKT 8/2.
6. Cut the end of all polymer tubes 8mm (5/16") from the IAKT 8/2 with a scalpel.
7. Straighten out the tubes and tape them to a straight piece of flat stock, this will allow the fibre bundle to be advanced toward the steel tube in a uniform manner, while also keeping the tubes straight.
8. Insert one fibre into each of the loose tubes, in the "bundle".
9. Once all fibres are inserted, carefully stretch the fibres while the "bundle" enters the steel case. Push the fibre "bundle" into the steel case adapter, not more than 8mm (5/16").
10. Slide the 50mm (2") long heat-shrink sleeve over the bundle and over the steel case and shrink.
11. To allow liquid passing through during ambient pressure changes, cut a small hole in the shrunk sleeve where the sleeve covers the hole in the steel case.
12. Finalise the final fibre and tube end connector work in accordance to the procedure from the connector manufacturer.

1.4 STEEL TUBE GROUNDING

To avoid charging up of the steel tube due to its electromagnetic and static interaction with the power transmission, it is recommended to ground the steel tube to the protective earth bar or local earth. The grounding clamp shall be connected to the steel tube on a suitable spot by means of a grounding clamp and an extension grounding wire.

Tighten the grounding clamp until finger tight, and then use two spanners to tighten the screw one (1) turn.

1.5 TERMINATION BOX LAY-OUT

It is recommended to coil 1.0-1.5m (40"-60") of the sheathed steel tube into the termination box, for future re-terminations and to absorb potential fibre length variations.

Minimum bending diameters of the fibre is 60mm (2 1/4").

1.6 PART LIST

The following tables summarise the items necessary for termination of both ends of one 2.3mm fibre optic steel tube element.

1.6.1 Tool kit for 2.3mm steel tube element

Item	Quantity
Tube deburrer (for smoothing the internal edges of tube end)	1pc
Steel tube cutter	1pc

1.6.2 Termination kit for 2.3mm steel tube element

Item	Quantity
Steel case adapter, 2.3 mm tube OD	2
Splice melt sleeve	4x50mm
IAKT Heat Shrink 8/2	4x50mm
IAKT Heat shrink 8/2	4x40mm
IAKT Heat shrink 3/1	4x30mm
Locktite 415	1 bottle
El. steel tube grounding clamps	2pcs
Polymer Sleeve / tube 3M	25m

1.6.3 Related items (not included)

Item	SM or MM	Quantity
HOT MELT CONNECTORS FROM 3M		
ST 6100	MM	2 per fibre
FC 6200	MM	2 per fibre
ST 8100-Y-S	SM	2 per fibre
STANDARD CONNECTORS [1]		

[1] Standard connectors are not hot melt nor pre-filled with glue. These connectors are normally stock items and allow also use common tools etc.

Molex:	FC 86053-5500	SM	2 per fibre
Molex:	ST 86013-0500	MM	2 per fibre
Amphenol:	FC 944-601-5006F39U	SM	2 per fibre
Amphenol:	FC 944-601-5010F39U	MM	2 per fibre
Amphenol:	ST 953-101-5306	SM	2 per fibre
Amphenol:	ST 953-101-5310	MM	2 per fibre
RAPID GLUE FOR MOLEX AND AMPHENOL			
FTC-ADH 101		-	-
Accelerator (optional), FTC-ACC 101		-	-
1.5mm^2 GROUND WIRE AND CABLE SHOE		-	1 in each end