

TERMINATION ASSEMBLY

This invention relates to optical fibre installations.

5 Installation of optical fibre bundles along ducts
utilising viscous drag of compressed air injected at one
end of a duct to propel a lightweight fibre package
along the duct is described in our European Patent
0108590. In this technique, known as fibre blowing, the
10 individual fibres are packaged together in a bundle,
typically of eight fibres, with a lightweight foam
polyethylene covering. This covering provides
protection for the fibres within the installation ducts,
but at terminations the foam covering has to be removed
15 so that the individual fibres can be separated and
connected to other elements of the assembly. At present
about one metre of fibre package is stripped of the foam
covering and the individual exposed fibres are spliced
to reinforced ('ruggedised') terminal connection leads.
20 The splices and the excess lengths of exposed fibres,
which are required for ease of handling during the
splicing operation and for future splicing, are wound
into a storage container into which the installation
duct enters at one side and from which the ruggedised
25 connection leads extend at the opposite side. The
storage container for the splices and exposed fibre is
large (compared with the fibre package dimensions) and
the splices to the ruggedised connector leads have the
disadvantage of up to 0.5 dB loss and introduction of
30 cladding modes in a region where there is exposed fibre
and also relatively simple access since the splices are
accessible for servicing.

The present invention is directed towards providing a
35 compact assembly that is more easily installed at a

fibre bundle termination, is more compact and avoids the necessity for splices to separate ruggedised leads.

5 According to the invention a break out assembly for a blown optical fibre package that comprises a plurality of optical fibres and a lightweight, protective outer covering, the assembly comprising a break out member having a bore with a first aperture adapted to receive the blown fibre package and a second aperture adapted to engage a separate
10 manifold, the manifold having a plurality of passageways for the receipt of exposed fibres from which the protective outer covering of the package has been removed, the passageways extending from the manifold into separate ruggedised tubes which are reinforced to protect an
15 inserted optical fibre.

The invention also provides a blown fibre breakout installation comprising a blown fibre package with a plurality of optical fibres in a lightweight, protective outer covering, the covering having been removed from a
20 length at one end of the package to expose the individual optical fibres, a breakout member having a bore mounted over the end of the outer covering of the package with a first aperture a sliding fit accommodating the outer covering and the bore extending to a larger second aperture
25 engaged with a manifold, the manifold having a plurality of passageways extending into separate ruggedised tubes which are reinforced to protect the exposed individual optical fibres therein.

The invention is now described by way of example with
30 reference to the accompanying drawings in which:

Figure 1 is perspective view of an embodiment of the invention prior to assembly;

Figure 2 is a perspective view of the embodiment of Figure 1 assembled and showing an outer clamp enclosure, and

Figure 3 shows the embodiment of Figure 2 with the clamp fully assembled.

Referring to Figure 1, a fibre blowing fibre package 1 is inserted into a break out member 3 through an aperture 2 in the end of the member. The break out member 3 preferably comprises a tube, which may be

flared, as shown, or have a cylindrical shape. The break out member 3 has an axial bore opening at aperture 2 at one end where the diameter is sufficient to slidably accommodate the fibre package, the bore then widens to a conical bore region with the wider end of the bore defining an aperture 4 at the other end of the member 3 to the aperture 2. Once located on the fibre package 1 the break out member is slid along until about a metre of fibre package extends out of aperture 4, and the outer coating is removed from the fibre package to expose the individual fibres 5 of the package. The break out member 3 is then slid a short way back along the fibre package, towards the exposed fibres so that the complete packaged fibre enters aperture 2 and extends along the first cylindrical part of the bore and the exposed length of fibres where the cladding has been removed commences at the conical region of the bore and the fibres have space to be flared apart.

Each individual fibre 5 is threaded through a corresponding aperture or bore 6 in a manifold tube 7. In general the fibres are threaded singly, but it is possible in some applications to conduct more than one fibre through a single aperture. The manifold tube 7 has a protective tube 8 attached to the exit of each of the bores 6 so that the fibres 5 having passed along the manifold bore each enter an individual protective tube 8. The manifold tube 7 is shaped to engage with the break out member 3 so that once the exposed fibres have been threaded through the manifold and into the protective tubes 8 the manifold and break out member can be engaged together into a single unit as shown in Figure 2. A suitable engagement mechanism is a push fit of the manifold into the aperture 4 of the break out member and in the embodiment shown the bore of the break out tube has a large diameter cylindrical portion

extending from the wider end of the conical portion in order to facilitate this push fit. In order to protect the fibres, relative rotation of the manifold and break out member should be prevented. This may be achieved by fixing the parts together with epoxy resin. The fibre package is also secured in position in the break out member by epoxy resin or other suitable means. Preferably the free space within the bore is filled with a suitable resin: this may be achieved by injection via the aperture 2 (if a sufficiently loose fit around the fibre package) or via specifically provided injection holes.

Alternative structures of manifold are envisaged, for example the bores may have lateral slots communicating with the surface to aid threading. The protective tubes 8 may be demountable from the manifold to aid threading, with a suitable permanent fixing being provided after threading, again resin bonding interfitting parts being possible or alternatively a threaded coupling. Preferably the protective tubes 8 comprise part of a ruggedised terminal assembly with end connectors. The tubes 8 may include a Kevlar (registered trademark Dupont) coating for added strength. A plurality of tubes, possibly co-extruded, may be held together so that their ends constitute the manifold. The manifold may have configurations other than circular. If the ducts are co-extruded a line or array manifold formation with the ducts forming an easily separable ribbon is particularly preferred.

The break out member and manifold assembly fit into a two part clamp 9, 10 shown in Figure 2 that has a shaped recess 14 in each part to accommodate the assembly. The clamp may conveniently comprise two identical halves which can be injection moulded. The clamp parts also

each have a channel 11 for the fibre package with a series of bridges 12 and the channels for gripping the exterior of the fibre package so that any tension or disturbance is taken up by the clamp rather than transferred to the break out member and manifold assembly. Holes 13 are provided through the clamp for securing the clamp to the wall, fixing panel or other mounting. The compact assembly may be located within a housing for other apparatus, such as a computer housing, or when mounted externally the clamp assembly is not unduly large compared with the duct for the fibre package. The clamp may also be provided with means for sealing to the duct along which the fibre package is installed as well as for sealing to the fibre package itself.

A modification of the assembly is for the clamp and break out member to be made as a single unit, with the recess 14 for the break out member being replaced by a channel for direct receipt of the fibre package, for example a recess shaped similarly to the bore of the break out member 3. The manifold would remain separate, for example as a slot in a disc. In this instance the manifold could be threaded before the clamp parts are mounted around the fibre package. In order to connect the clamp to the installation duct the end 15 of the clamp is conveniently made of the same diameter as the duct so that a standard duct connector may be used. Break out assemblies and/or clamps may also be incorporated in the structure of equipment such as patch panels.

It will be realised that when the clamp and break out member are combined with the clamp, in general as shown in Figure 2, the break out member is separable along a

longitudinal partition line. Alternatively the clamp parts may be made as integral outer extensions of the break out assembly shown in Figure 1, so that there is no longitudinal break. Another option is for the break out member and manifold to be longitudinally separable.

A particular advantage of the invention is that it enables a practical realisation of a splice free optical fibre link, especially in conjunction with blown fibre and field mountable connectors.

Assemblies may be made that receive more than one fibre package.

CLAIMS

1. A break out assembly for a blown optical fibre package that comprises a plurality of optical fibres and a lightweight, protective outer covering, the assembly comprising a break out member having a bore with a first aperture adapted to receive the blown fibre package and a second aperture adapted to engage a separate manifold, the manifold having a plurality of passageways for the receipt of exposed fibres from which the protective outer covering of the package has been removed, the passageways extending from the manifold into separate ruggedised tubes which are reinforced to protect an inserted optical fibre.
2. A blown fibre breakout installation comprising a blown fibre package with a plurality of optical fibres in a lightweight, protective outer covering, the covering having been removed from a length at one end of the package to expose the individual optical fibres, a breakout member having a bore mounted over the end of the outer covering of the package with a first aperture a sliding fit accommodating the outer covering and the bore extending to a larger second aperture engaged with a manifold, the manifold having a plurality of passageways extending into separate ruggedised tubes which are reinforced to protect the exposed individual optical fibres therein.
3. A breakout assembly or installation according to claim 1 or claim 2, where the tubes are reinforced with a aramid fibre based on poly (p - phenyleneterephthalamide).
4. A break out assembly or installation according to claim 1, 2 or 3 in which the break out member includes a further aperture as an injection hole for inserting epoxy



resin to secure the fibre package inside the breakout member and to fix the manifold in position in the breakout member.

5 5. A breakout assembly or installation according to any preceding claim in which the passageways in the manifold are provided by fixing the protective tubes together at one end.

10 6. A break out assembly or installation according to any preceding claim further comprising clamping means moulded to provide an enclosure for securing the break out member and manifold.

15 7. A break out assembly or installation according to claim 6 in which the clamping means includes means for gripping the protective outer covering of the fibre package.

20 8. A break out assembly or installation according to claim 6 in which the clamping means includes means for gripping a blown fibre package installation duct.

25 9. A break out assembly or installation according to claim 6 in which the clamping means itself includes a part moulded to constitute the break out member.

30 10. A break out assembly or installation according to any preceding claim adapted to receive a plurality of blown fibre packages.

