Ezefix Ferrule

Ezefix Port Connector

Ezefix Termination System Usage Guide

The Ezefix termination system makes it quick and simple to terminate polymer optical fibre for lighting applications without the use of specialist equipment. It consists of a range of port connectors for connectiion of the fibre to a light source and ferrule connectors to finish end lit fibre and allow attachment of end fittings. While factory termination is always recommended for polymer fibre and is necessary for glass fibre, this connector system will give adequate results where maximum light output or evenness are not required. We recommend that you read this guide fully to gain a better understanding of the product before attempting to terminate your fibre.

Health & safety

Note: as with all electrical equipment, please operate a hot knife or heat gun within a suitable environment and in compliance with the manufacturer's instructions. Take care to avoid burns or electric shock. It is advisable to wear gloves and eye protection when handling adhesives. Always ensure the area in which you work has adequate ventilation.

General tips

Keep the fibre and ferrule clean as dirt will impede the light and may also lead to the fibre becoming degraded or burned in use.

Electrical tape is useful for holding bundles of fibre together while you are working and to acheive a neat harness.

Use Brass ferrules for dry areas, stainless steel for areas which may get damp.

If your harness is in a wet area then always have the light source and port connector above the highest water level to avoid the risk of water running back to the light source. Electrical equipment should always be housed in a dry area.

Why terminate fibre?

Where fibre optic end fittings are used, it is usually necessary to attach a ferrule to the end of the fibre. This allows the fibre to be terminated and polished to allow light to escape and affords a method of attaching and focussing the fitting. Though factory terminated ferrules allow the maximum strength of bond and highest light transmission, the following method using Ezefix ferrules may be adequate for your application.

What you need for terminating fibre at a fitting

To terminate multi-strand end lit sheathed fibre into an Ezefix ferrule suitable for UFO fittings you will need one *Ezefix Ferrule* per cable. These are designed for use with UFO multi-stranded black sheathed end lit polymer. They are made of brass (indoor use) or stainless steel (outdoor use) and have either an M8 or M10 thread onto which the fitiing screws. They are a push fit onto the fibre with a knurled back which grips inside the black sheathing of the fibre. You will also need:

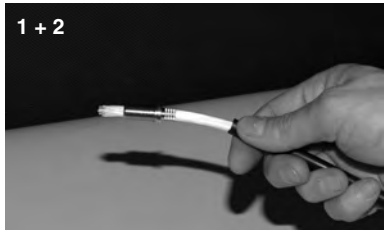
~ An adhesive suitable for use with PMMA (Acrylic) such as Loctite 401(allow about 0.3g / ferrule).
~ Sticky tape
~ An electric hot knife OR a sharp craft knife and an electric heat gun
~ A sharp knife OR cable strippers
~ Fine grade emery cloth or an abrasive polishing pad

To terminate fibre at the fitting end

1. Using your knife or cable strippers, carefully strip about 50-60mm (around 2 - 2½") of sheathing from the end of the cable. Take care not to cut any of the fibres in the cable.

2. Using a ferrule with the correct bore for your fibre size, insert the exposed fibre through the ferrule. Push the knurled part of the ferrule under the sheathing of the fibre so that it grips firmly and the sheathing mates with the shoulder of the ferrule.

3. Using a sharp pair of flush side cutters or a sharp craft knife, cut the fibre off evenly 2-3mm (about 1/8") above the end of the ferrule.



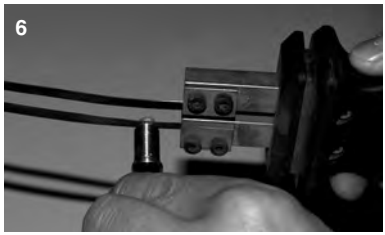
4. Wrap a small piece of sticky tape of about 10-15mm (1/2”) wide around the exposed fibre to form a funnel.

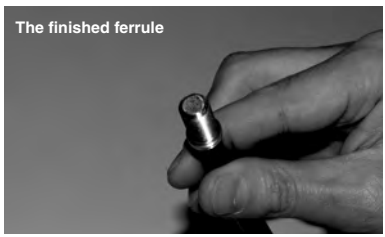
5. Holding the fibre vertically, pour a cyanoacrylate adhesive such as Loctite 401 into the funnel so there is about 2 mm above the fibre. Keep the ferrule vertical and allow the adhesive to soak down between the fibres. Remove the tape and allow the adhesive to set (this takes about 20-25 minutes using Loctite 401) while keeping the ferrule vertical.

6. Using an electric hot knife or a sharp craft knife which has been heated with a heat gun (be careful when handling the knife), cut the fibre off just above the ferrule allowing just a little to protrude.

7. Using very fine emery board or abrasive pad, polish the fibre down level with the end of the ferrule. If necessary, use a slightly coarser grade of abrasive to start then finish with a very fine grade.

When finished, the ends of the fibre should be flat and when viewed obliquely the fibre / adhesive should be shiny. You can test the efficacy of the terminations by shining light through the cable. The ferrule is now ready to accept the fitting.

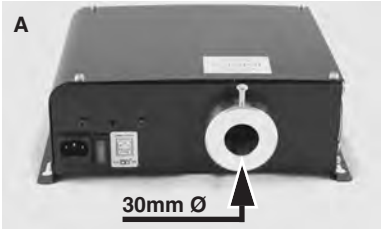




What you need for terminating fibre at the light source port

To terminate fibre into a light source you will need an *Ezefix Port Connector*. These consist of an aluminium connector with a bore sized to suit the number of fibres required and with a plastic gland to secure the bundle of fibres in place. They are designed to fit the industry standard 30mm to 32mm internal diameter port. Please check that your light source uses a **30mm port -** see picture A. The connector you require and the method of terminating the fibre will depend on the type of fibre you are using. A quick lookup guide to the connector part number suitable for a specific fibre type and number of fibres used can be found at www.fibreopticlighting.com/Ezefix/. We recommend the following fibres for use with Ezefix connectors:

~ UFO single core unsheathed end lit polymer
~ UFO single core black sheathed end lit polymer
~ UFO multi-stranded black sheathed end lit polymer
~ UFO stranded polymer side glow

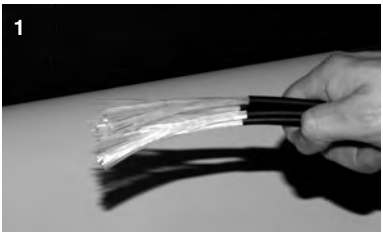


To terminate fibre into an Ezefix Port Connector you will need one *Ezefix Port Connector* per light source. You will also need:

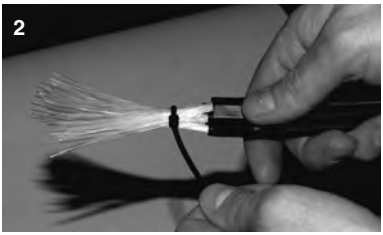
~ Electrical tape and cable ties
~ An electric hot knife OR a sharp craft knife and an electric heat gun
~ A sharp knife OR cable strippers
~ Some spare fibre
~ Fine grade emery cloth or an abrasive polishing pad

To terminate fibre at the light source end – multi stranded end lit fibre

1. Using your knife or cable strippers, carefully strip about 100mm (around 4") of sheathing from the end of the cable. Take care not to cut any of the fibres in the cable.



2. Bundle all the cables to be terminated together and secure using electrical tape. If the bundle is large then tape as several bundles then tape all the bundles together. A cable tie can be used farther up the harness to secure the bundle together. A cable tie around the fibre next to the end of the sheathing will bring all the fibres together.

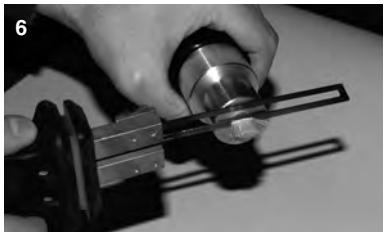


3. Try the bundle in the connector. If the bundle is slightly too small to fill the hole in the metal part then pack with extra single fibres until it is a good fit. The fibres should be well packed and not be loose in the hole. A **thin** piece of tape can be used to hold the bundle circular.

4. Holding tightly together, insert the bundle into the connector and through the hole in the metal part.Tighten the nut on to the gland so that it clamps down on the sheathing of the fibre. The gland should be as tight as is possible by hand and should firmly grip the cables. Use extra fibre if necessary to pack the metal or gland parts to get a tight fill.

5. Trim the bare fibre off using sharp side cutters or a very sharp knife leaving about 5-7mm (about 1/4") of fibre protruding.

6. Use an electric hot knife or sharp craft knife which has been heated with a heat gun (be careful when handling the knife) cut the fibre as flush as possible with the end of the port connector. Use a single motion to get a good clean finish and do not gouge the fibre. This may take a little practice and when done correctly you will find the fibres meld together slightly and form a solid mass.



7. If the fibre end isn't flat with the end of the connector, using very fine emery board or abrasive pad, polish the fibre down level with the end of the connector. If necessary, use a slightly coarser grade of abrasive to start then finish with a very fine grade. If the fibre has been well cut it should not need much polishing.

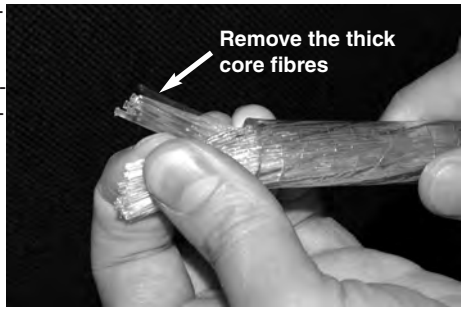
When finished, the ends of the fibre should be flat and when viewed obliquely should be quite clear and not opaque. You can test the efficacy of the termination by shining light through the cable. The Port Connector is now ready to be fitted to the light source.


The finished Port Connector

Please note that these connectors are designed for use with UFO light sources and you may need to adjust the depth they are inserted into the port if using another brand of light source.

Terminating multi-stranded side glow fibre at the light source port

Terminating stranded side glow fibre is similar to terminating the multiistranded end lit fibre (see pages 4-5) with one difference. Some types of larger side glow fibre cables contain a core. This is made from larger diameter fibres and these do not conduct the light but instead reflect the light from the smaller fibres on the outside of the bundle. These larger fibres in the core must be removed and should not be inserted into the light source.



After stripping the clear outer sheathing, carefully trim out the core fibres shown. We recommend stripping the clear outer jacket back at least 150mm to allow this to be done without damaging the light conducting fibres. The outer jacket should be inserted into the gland at the back of the Port Connector. Only the outer bundle of fibres (or complete fibre bundle in the case of smaller diameter side glow) should show through the metal hole on the connector.

See the photo below right showing the correctly stripped fibre prior to assembly into the Port Connector.

Apart from cutting out the core fibres, follow the same instructions as for multi-stranded end lit fibre.

Terminating unsheathed single pmma fibres

Terminating single unsheathed fibres is similar to terminating the multi-stranded sheathed end lit fibre (see pages 4-5) except all the fibres are loose and there is no sheathing material over the fibres to protect them. You will find it easier to terminate unsheathed fibre if you bundle it up and tape it. Be careful if using cable ties instead of tape as it is easy to break some fibres with cable ties. If you are using a thick bundle of fibre then we recommend that you split it into several bundles and tape these before taping around them to make the larger bundle. This makes it more secure.

Terminating sheathed single pmma fibres

Terminating single fibres is similar to terminating the multi-stranded sheathed end lit fibre (see pages 4-5) except all the fibres are loose. The fibres are each individually sheathed with a black coating. You will find it easier to terminate unsheathed fibre if you bundle it up and tape it. If you are using a thick bundle of fibre then we recommend that you split it into several bundles and tape these before taping around them to make the larger bundle. This makes it more secure. Do not fit the black sheathing all the way through the Port Connector. Trim the sheathing on each cable back as with the multi-stranded fibre.

Accessories

Universal Fibre Optics can supply adhesive for ferrules and abrasive cloth to aid with termination of the *Ezefix Port Connectors* and *Ezefix Ferrules*. Universal Fibre Optics are a major fibre manufacturer and we can supply all your requirements for quality optical fibre which will fit the Ezefix connectors and ferrules. Please ask about fibre, fittings and light sources. Universal Fibre Optics have a large range of quality products of our own manuafcture.

Minimum and maximum cables in a port connector

The following list shows the minimum and maximum number of cables which can be fitted into the Ezefix port connectors for a selection of fibres. These values are for UFO manufactured fibre. Some intermediate numbers of tails may not be an exact fit and will require extra short lengths of fibre to fill the connector. Please see our website for a table of connectors to suit various numbers of fibres.

Single strand unsheathed	**Min**	**Max**
0.5mm	100	1100
0.75mm	50	475
1mm	25	275
1.5mm	10	120
2mm	5	65

Single strand sheathed		
0.75mm	34	275
1mm	6	248
1.5mm	5	120
2mm	3	65

Multi-strand 0.75mm sheathed		
4 strand	10	117
7 strand	6	50
12 strand	4	40
25 strand	2	19
50 strand	1	9
75 strand	1	6
88 strand	1	5

Stranded side glow		
8.6mm	1	11
10.5mm	1	7
12.6mm	1	5
15.8mm	1	3

Suitability for use

The Ezefix range of products are designed for use in a well ventilated dry area with suitable fibre and light sources. Please ask about products from our range which may suit your application. The maximum recommended ambient temperature is 50 degrees Celcius though the fibre you use may require lower temperatures to aviod damage. Please remember that some light sources generate significant heat when planning your installation. Only use with light sources suitable for use with PMMA polymer fibre. Due to these being self-assembly products we offer no guarantee on the finished harnesses or other equipment used. Universal Fibre Optics cannot be held responsible for the efficacy of the finished harness or damage due to environmental factors or installation.

Information

Universal Fibre Optics manufacture a wide range of products for lighting including light sources, fibre, finished fibre harnesses, end fittings and custom lighting assemblies for use in display and other applications. For more information and sales, please contact your local distributor:

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