Airbond Splicers

143 Series Splicers

Splicers for heavy yarns and tows

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The new-generation Airbond splicers

Airbond has a well-established reputation for supplying tough, reliable splicers. We have achieved this reliability by developing simple designs, and by the use of rugged components.

We have now moved on; our products are now even simpler, and even stronger. We've done this by investing in cutting-edge new additive-manufacturing (3d printing) technology.

From 2020 onward, all Airbond products will be printed, in materials which are more durable than those used in the past.

The first generation of printed products will be familiar to our customers; they are direct replacements for the existing products - identical in shape and function.

The Model 143 is the printed equivalent of the established 113.

Model 143

The manual-cut splicer for very high-count synthetics, up to 9000 tex.

The Airbond Model 143 is a light, user- friendly tool, designed principally for the composites market. Matching the performance of our larger splicers, the 143 range makes neat, strong joints in yarns of heavy count. These are typically glass fibre and carbon fibre rovings heavier than 4800 Tex or more which, before the arrival of the latest Airbond technology, were difficult to splice.
The Airbond Model 143 is a splicer designed for such yarns – up to around 9000 tex in the right circumstances.

Developed as a printed version of the existing Model 113, the 143 retains most of the 113's characteristics, but is lighter and stronger than its predecessor. And, like the 113, this splicer can be supplied with a handle to suit the customer's requirements, or with a very short base, so that it can be used in confined environments.

Like the 113, the 143 can be supplied with a flow control system which supplies variable-pressure air to the blast chamber, while keeping the main factory line pressure unchanged..

With distinct, innovative techniques for joining brittle yarns such as glass and carbon and joining inherently strong aramids, the Model 143 is already recognized as the definitive user-friendly, heavy-count splicer.

Splice format:	Ends opposed.
Applications:	Composites processes such as filament winding, pultrusion, and weaving.
Yarns:	Carbon fibre, glass fibre, aramid, Panox, synthetic C.F.
Yarn counts:	Up to 9000 tex.
Twist:	Zero or low twist.

Getting started

Model 143 – getting started

Please read this section before you start operating the splicer. The rest of the manual deals with maintenance, and with details of products; those sections will not be needed immediately.

Remove all packaging. For each splicer, you will have the appropriate splicing chamber – which will usually already be fitted.

Depending on what you have ordered, you may have some or all of the following:

Additional splicing chamber(s)

Optional hanger

Optional hanging clip

Optional flow control device

It may be useful to have a fixed place to store the splicer temporarily when the operator has finished, in which case you will have specified the “W” modification. This modification will change the splicer designation – the Model 143 H, for example, becomes the 143 HW. If it has been supplied, bolt the hanging clip to a convenient spot on a machine. The splicer can then be placed in the hanging clip when not in use. This reduces the likelihood of the splicer being dropped and damaged in service.

You may have chosen to have a flow control device fitted. In that case, you will have specified the “F” modification. This modification changes the splicer designation further – the Model 143 H, for example, becomes the 143 HF, and the Model 143 HW becomes the 143 HFW.

Connect the splicer to an air line.

Under normal circumstances, the line pressure should be around 6 bar. The line should preferably be fitted with a pressure regulator so that adjustment may be made to suit local needs.

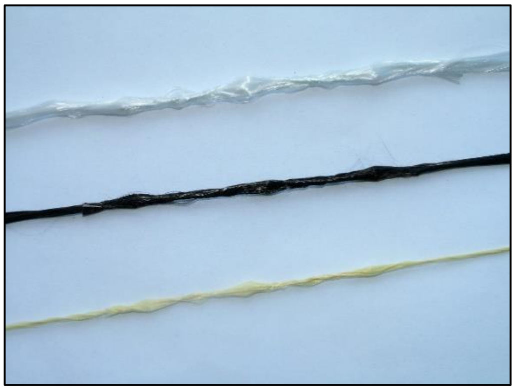
Hold the splicer with the trigger button facing the body, and press the trigger with the thumb.

Look down into the splicer

Press trigger part-way down - see the pad move until it hits the chamber

Press trigger further - listen for the air blast

Model 143 – Splicer threading

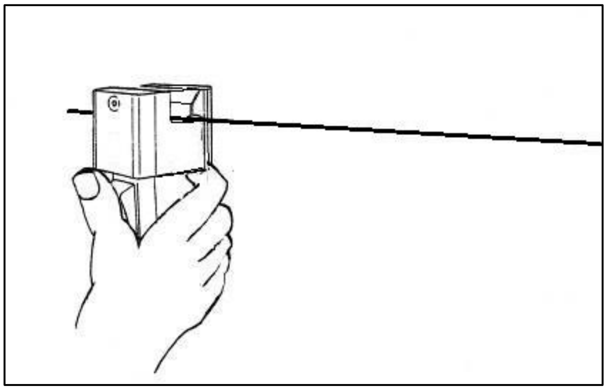


Forms of splice
The Model 143 makes only splices which we call "ends-opposed"; these are used when splice appearance is important.

Most composites applications require the flattest splice possible – and ends -opposed splice meet this criterion.

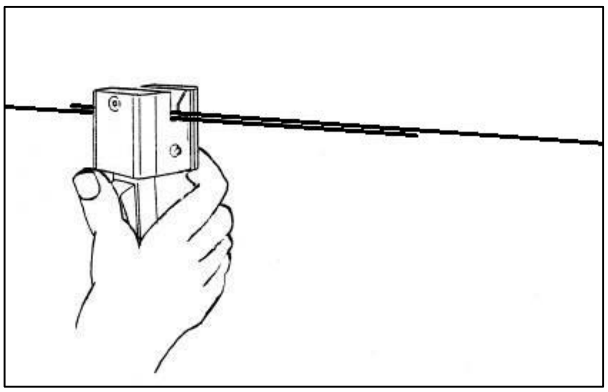
The photo opposite shows the typical output from a Model 143 splicer – glass, aramid, and carbon.

This photo shows the full potential of the Model 143; it is quite unique in that is capable of splicing yarns up to around 9600 tex.



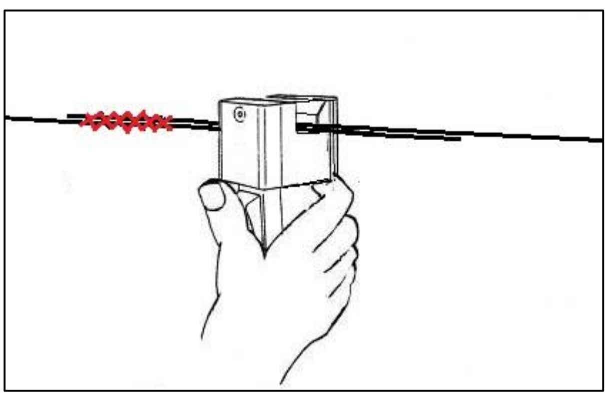
A Model 143 H splicer is shown here, as used by a right-handed operator. The splicer is held in the right hand, with the thumb on the trigger button.

Take the first yarn into the splicer, leaving a small length of yarn projecting from the left hand side.

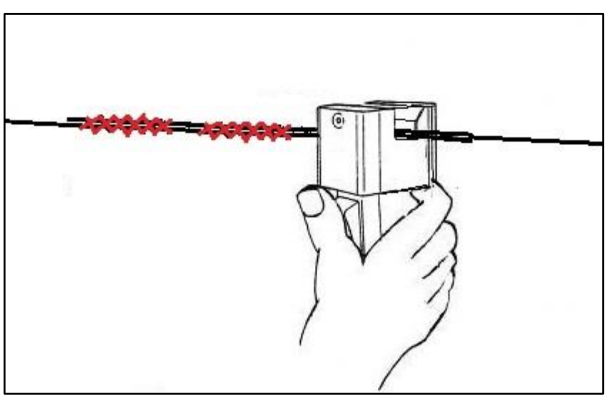


Overlap the two yarns to be joined by the desired amount.

Normally, a joint in 2400 tex yarn needs around 100 – 150 mm of overlap.



Press the trigger lightly, so that the pad closes, but no air blast emerges from the chamber. Check that the position of the yarn in the chamber is correct, and that the yarn can move freely through the chamber. Then press the trigger fully, so that the air blast starts. Move the splicer to the right, leaving the first splice exposed.



Repeat the splicing operation. Three splices over about 100 mm usually makes a satisfactory joint.

Trim waste yarn ends with scissors.

Important service information

Apart from accidental damage, and the occasional replacement of cutters, the Model 143 requires very little attention. However, one aspect of maintenance should NEVER be neglected. The upper bore, in which the chamber pad moves, needs regular lubrication. The frequency of lubrication depends upon the nature of the factory environment and the workload on the splicer.

As a general rule, the cap and pad assembly should be removed and greased with Molykote 111 (available from the company) at least once per month. The service interval should be reduced if the splicer experiences very heavy work loads.

Model 143 – General product information

Introduction

With the development of high-performance yarns for industrial applications, there is an increasing need for making splices in yarns of very heavy count - typically glass fibre and carbon fibre rovings of up to 4800 tex. Counts already exceed 15000 tex.

It made good technical sense for Airbond to design the new heavy-count splicer around the design features of the successful Model 101. The 101, originally a splicer for carpet yarns, was designed with durability and simple servicing in mind, and has proved its reliability over many years of service.

The Model 101 was then improved, when the Model 105 was introduced. Even simpler than the 101, the 105 was just as effective.

The result of the further development of the Model 105 was the Model 113 - simple, small and light like the 105, but capable of splicing neat, strong joints in rovings. The 113 set a new standard as an effective and user-friendly tool for making extra-large splices in these very heavy yarns. After only a short production life, its performance was such that it has been accepted as a heavy-count splicer in countries across the world.

The 113 splices 4800 tex as routine, and in most circumstances it can handle 9600 tex.

Now the Model 143 is the direct counterpart to the Model 113 – similar in appearance but 3D printed in tough PA12 polyamide. Being 3d-printed, the Model 143 is made in one piece – the handle and body are combined, producing a lighter but stronger structure. It handles the same range of yarns as the 113 and is capable of standing up to heavy-handed use, but is still much lighter than its predecessor.

The Model 143 is currently available in nine forms. Further variants are likely to be added to the range in the near future.

General description

The Model 143 Splicer has a number of components mounted on a body in which airways conduct the compressed air for the splicing action.

Trigger - pressing the trigger initiates the splicing operation.

Valve - operation of the trigger moves the valve allowing compressed air to pass into the body head for splicing.

Pad - in the initial operation, compressed air closes the pad onto the splicing chamber prior to the splicing operation.

Splicing chamber - having a profiled recess on the front face which, with the closed pad, forms a chamber in which the splice is made. Air enters into the chamber to form the splice.

Guide plates - the plates provide a means of guiding the yarn across the splicing chamber.

The Model 143 is simple and easy to maintain. Moreover, its construction is such that it is extremely rugged, and requires very little attention in service. The splicer has revolutionary and patented splicing chamber technology, which enables the splicer to make joints in a wide range of yarns without any change - in general, there is no need to change chambers when changing yarns

143 Model range

143 H	Splicer with a 100 mm handle and no accessories
143 M	Splicer with a 60 mm handle and no accessories
143 S	Splicer with a stub handle and no accessories
143 HW	Splicer with a 100 mm handle and hanging kit
143 MW	Splicer with a 60 mm handle and hanging kit
143 SW	Splicer with a stub handle and hanging kit
143 HFW	Splicer with a 100 mm handle and hanging kit and flow control
143 HFW	Splicer with a 60 mm handle and hanging kit and flow control
143 HFW	Splicer with a stub handle and hanging kit and flow control

Example:

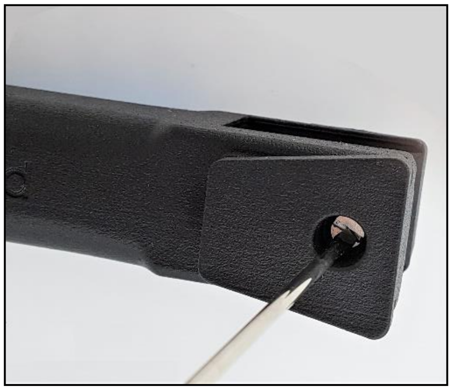
Splicer Model 143 HW, fitted with wedge hanger.

Note the QR code; scanning this code will enable the user to access the Airbond web site - and an on-line version of this technical manual for the splicer

Model 143 – Maintenance

Changing splicing chambers

Uniquely, the Model 143 can splice a wide range of industrial yarns on a single splicing chamber, so it is rarely necessary to change chambers. Nevertheless, you will sometimes need to remove the splicing chamber - during routine maintenance, or because the splicer has become fouled with fibre particles.



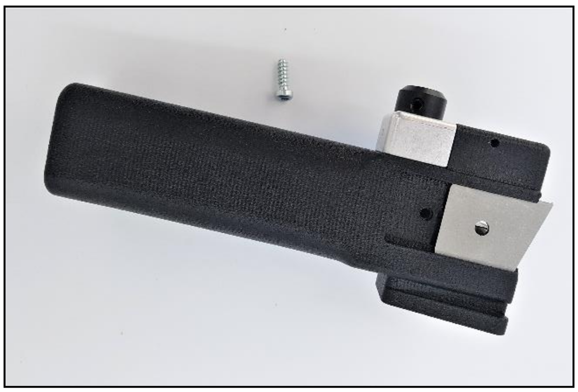
To release the splicing chamber, remove the single fixing screw from the rear of the splicer body, when the splicing chamber can be lifted clear of the splicer.

Usually, it is not necessary to remove the yarn guide side plates, but if the interior of the splicer is particularly filthy, removal of the plates will help cleaning.

WARNING: If the splicing chamber is removed while the splicer is connected to the air supply DO NOT press the trigger; the pad will be blown out of the main chamber. There will almost certainly be damage to the extension spring.

Removal of the yarn guide plates

Remove the socket-head screw,
Item 1194.



Removal of the yarn guide plates

The plate, Item 1307, should be slid upwards as shown.

Repeat the operation on the other side of the splicer.

Splicer dismantling - trigger assembly

The trigger assembly can be removed without disturbing any other elements of the splicer.

The trigger button is secured by a M4 socket set screw, Item 1017, and is released by a 2.0 mm hexagon wrench.

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Splicer dismantling - trigger assembly

Using the hexagon wrench, unscrew the trigger button securing screw.

Once the securing screw is partly withdrawn, the trigger button, Item 1318, moves freely on the air valve stem, and can be removed completely.

Splicer dismantling - trigger assembly

With the trigger button removed, the screws securing the trigger surround are exposed.

Remove the screws, Item 1191, with a hexagon wrench.

Splicer dismantling - valve assembly

With the securing screw withdrawn, and the trigger button removed, the air valve can be seen, protruding from the metal trigger surround, Item 1346.

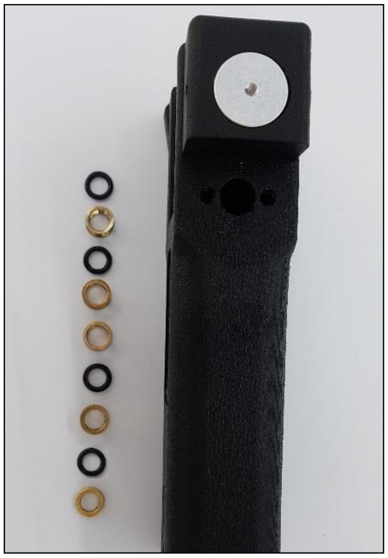
Splicer dismantling - valve assembly

With both screws removed, the trigger surround cover can be removed, exposing more of the air valve.   In this state, the air valve, Item 1310, can be removed.

This photo shows the air valve, removed from the splicer body.

The valve has a small spring, Item 787, housed in a recess at the end of the valve.   This spring returns the valve, and the trigger button, to their rest position after the splicing action is complete. The return springs fall out quite easily; they can be kept in position by applying Molykote grease to the recess in the end of the valve.

The O-rings and shells, which control the motion of the air valve, remain in the body at this stage.



Splicer dismantling - valve assembly

Using an appropriate tool, withdraw the O-rings, shells and compression spacer from the valve bore in the splicer body.

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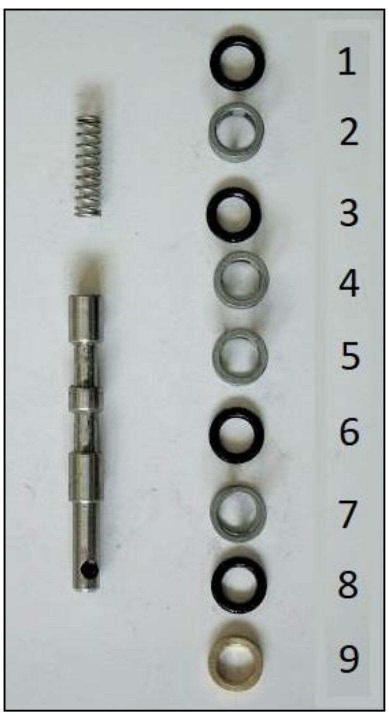


Splicer dismantling - valve assembly

Note the following:
Small hole in the lower end of the valve stem.   This is the hole which locates the socket set screw restraining the trigger button.

Brass spacer, numbered 9, Item 902, at bottom. This spacer is important; it applies a compressive force to the O-rings, so that the assembly seals properly.

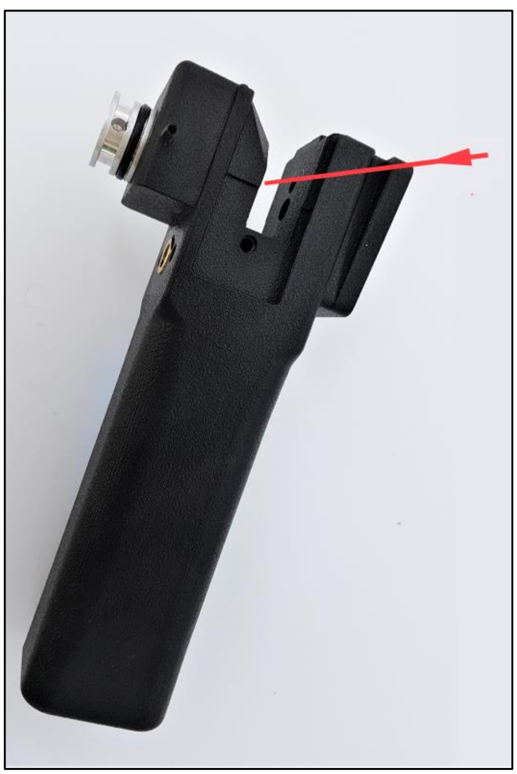
Sequence for reassembly; 1 – 9.
First item placed in the bore is the O-ring, 1, Item 264, followed by the shell, 2, Item 276, and so on to the spacer, 9.

Removing upper sealing plug and pad assembly.

The upper sealing plug, Item 1102, is retained by two socket head screws, Item 1128, whose tips fit fits into recesses in the sealing plug. Several turns of the screws will be needed to release The upper sealing plug.

Removing upper sealing plug and pad assembly.

This photo shows how far the screws will need to be exposed, before the plug can be withdrawn.



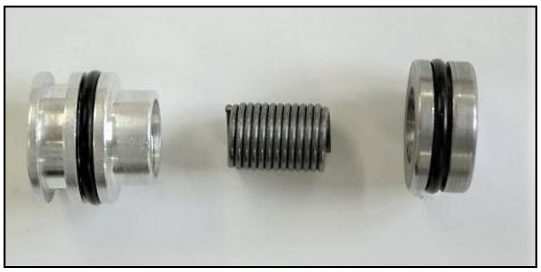
Removing upper sealing plug and pad assembly.

Once the set screws have been removed, the upper sealing plug / pad assembly can be withdrawn as a single unit.

The assembly can be released, either by the use of a threaded rod, screwed into the sealing plug, or by applying gentle pressure to the surface of the closure pad with a suitable tool.

Removal of upper sealing plug and pad assembly.

The upper sealing plug / closure pad assembly, withdrawn from the splicer body.



The pad is tethered to the upper sealing plug by an extension spring. The extension spring is screwed into the sealing plug, and the pad screwed to the spring. When the splicer has been dismantled, we recommend that the spring always be replaced.

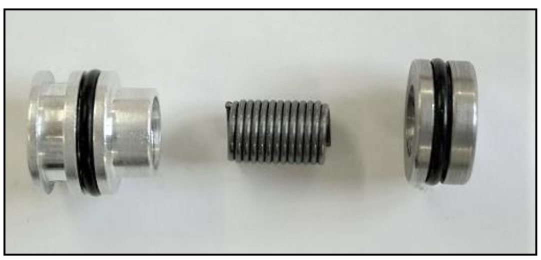
Unscrew the pad from the spring, and the spring from the sealing plug.
Discard the spring.
Thoroughly clean and de-grease the screw threads in the sealing plug and pad.

We recommend that a special flat-tipped M10 tap be used to clean out the threads in plug and pad.

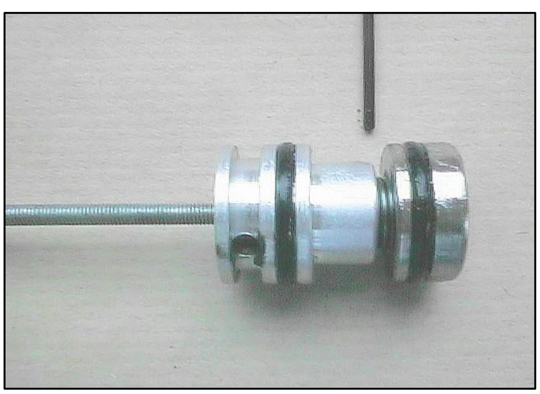
Before reassembly, ensure that the sealing plug, spring, and pad will fit together correctly. We recommend that the components first be 'dry assembled'.

Screw the spring into the sealing plug until four or five coils of the spring remain exposed. Screw the pad onto the spring for a few turns.

Check that the pad is approximately parallel to the sealing plug and that a gap of 1.5 to 2.0 millimetres between sealing plug and pad can be achieved. If the components are markedly out of parallel, discard the spring.



If the 'dry assembly' is satisfactory, dismantle and repeat the operation using adhesive. Apply a drop of Loctite Structural Adhesive 326 to the coils at one end of the spring, and screw the spring into the sealing plug until four or five coils of the spring remain exposed.



Apply more adhesive to the exposed coils of the spring and screw the pad onto the spring, ensuring that the gap between sealing plug and pad is roughly parallel and is between 1.5 and 2.0 mm. Allow the adhesive to cure for about 30 minutes.

Before replacing the assembly, lightly smear the 'O' ring in the pad with Molykote grease. Apply a small amount of grease to the surface of the main bore.

Compressed air

Pneumatic splicers are operated by compressed air. Therefore the air supply must be appropriate.

The following points are important:

Splicers generally operate at a pressure between 3 and 8 bar.

Pressure may vary according to application, but it must be as uniform as possible.

The air supply should be reasonably dry and clean, with the lowest possible flow resistance.

Because the time taken to make a splice is short, transient pressure drops associated with other demands in the mill may become important,

When the splicer is operated, line pressure at the splicer head normally drops by about 1 bar. If there are restrictions in the line, air will not be replenished, so that the pressure drop will be greater; weak splices may result.

Compressed air installations should therefore be designed to minimise pressure drop.

Never use narrow-bore supply tube; this introduces resistance.

When there is doubt about the quality of the air supply system, a pressure gauge should be fitted - temporarily - as near as possible to the splicer, so that static pressure and pressure drop can be monitored. This is particularly desirable in an installation which uses long lengths of coiled hose; losses in such hoses tend to be significant.

Sometimes, static line pressure is known to be adequate, but there sometimes serious problems with transients. Then it may be useful to fit a few metres of wide-bore pipe or other form of plenum, close to the splicer. This will act as a reservoir, to minimise pressure drops while the splicer is in use.

Do not fit lubricators in the line very near to the splicer; an excess of oil on the yarn may weaken the splice.

Compressed air and safety

All our splicers have been designed with safety in mind. The few moving parts have been enclosed or shielded to reduce the possibility of injury to the operator. In normal use, the only component which is in any way a source of hazard is the knife assembly. By design, however, the blades are difficult to reach, and are not dangerous in any normal circumstances. Knives represent a hazard only during removal and disposal. So, in normal use, the splicers present no risk.

However, the splicers do use compressed air, and that has the potential to cause injury. Compressed air is dangerous: avoid any bodily contact with it.

Always follow the safety precautions recommended by the compressor manufacturer. Always ensure that unions and connectors are fully tightened and sealed, and that there are no leaks.

Check the conditions of air supply lines on a regular basis. Always ensure that any flexible hoses are unblemished; if there are any cuts or abrasions to the outer surface of the hose, stop using the splicer and have the hose replaced by qualified personnel.

Do not look into the working parts of the splicer when it is being operated.

If a splicer malfunctions, do not use it until it has been repaired by qualified personnel.

For maintenance staff, additional advice is necessary. When cleaning or servicing is being carried out, access to the internal mechanism of the splicer is essential.
Under these circumstances, maintenance engineers will be at greater risk than ordinary users. The engineer should adhere strictly to the following guidelines:

- Before undertaking any service work, disconnect the splicer from the air supply.
- Under normal circumstances, always refit safety covers before reconnecting the splicer to the air supply.
- Under exceptional circumstances, it may be necessary - for test purposes - to reconnect the splicer to the air supply without its safety covers.
- While the splicer is being tested, wear protective gear and exercise due caution.

Compressed air and noise

A splicer uses compressed air, which for a brief period - about 1 to 2 seconds – is vented to atmosphere while the splice is being made. Air at perhaps 7 bar pressure escapes through a small blast hole, creating intense turbulence in a small volume.

Noise is inevitable.

Typical maximum noise levels vary from 80 db to 98 db, depending on the splicing chamber. Some chambers are quieter than others, simply because they have a smaller blast-hole, and allow less air to emerge.

Our noisiest splicer, with the biggest blast hole in our range, generates a noise spectrum as shown in the table below:

Hz	63	125	250	500	1000	2000	4000	8000	16000
dB	47	52	57	63	74	89	92	93	95

In practice, splicers are barely noticeable in a textile mill. This is because the other mill machinery tends to be very noisy, and the sound of the splicer is lost in the general noise. Also, the blast only lasts for about one second.
Nevertheless, in compliance with UK health and safety regulations, we recommend that ear defenders (to local standards equivalent to British Standard 6344 Part 1) be worn.

Troubleshooting

Trouble with splicers generally takes one of two forms: poor splicing or component malfunctioning.

1) Splicing performance.

If there is no apparent damage to the splicer, there may still be something subtle, which cannot easily be seen. It will be best, however, to look at the possible causes which are easy to spot.
These include:

Simple checks:

- Has yarn specification changed markedly? The splicer is very flexible, but it can't do ALL yarns on one configuration. If the yarn has changed, take another look at your operating procedures and – possibly – the splicing chamber specification. If, for instance with glass, the yarn count has remained constant, but the level of sizing has increased, it may be necessary to increase air pressure and/or increase the duration of the blast.

- Is the air pressure as it should be? The line pressure may have changed – upward or downward. Excessive air pressure will cause bad filamentation, and low air pressure will result in weak splices. Consideration should be given to using flow-control versions of the splicer.

- If you have a splicer with flow control – has the position of the flow controller shifted? This can happen if the clamping screw has come slightly loose.

- Are there any obstructions in the main air line or in the splicer itself? It has been known for foreign matter to get into the air-line, and to obstruct the chamber blast hole; this is usually accompanied by a reduction in the noise level of the blast.

- Have operating procedures changed? If the procedure changes, performance will change.

- Are the splice ends being trimmed properly – indeed, are they being trimmed at all? The splicer has no cutters, and relies for perfect performance on the operator trimming the ends. Some operators cut carelessly, leaving “tails” perhaps 30 mm long. Some have been observed doing no trimming at all – leaving tails perhaps 150 mm long. While long tails may be unimportant in some processes, they can be profoundly disruptive in others, such as pultrusion lines.

- If fitted, has the timer calibration changed?

2) Sticking closure pad

Occasionally, the main valve in the splicing unit may stick. This could be the result of some form of damage to the internal components, but the explanation is normally much simpler; a lack of lubrication around the O-rings which seal the pad assembly, or an extension spring which has come adrift.

Remove the entire valve / O-ring assembly from the splicer unit, as shown in the main text. Clean the components and the surface of the large bore with a small quantity of light solvent

Examine the components for signs of damage - particularly a damaged or displaced O-ring, or extension spring. If there is damage to any of the components, proceed as in the maintenance section of the main text, replacing components as appropriate.

Examine the surface of the large bore. Minor scuffing - the stuff of normal wear and tear in service - should be of no consequence. Look closely, to determine whether the bore surface is scratched. This is a very rare occurrence, usually associated with an earlier rebuild having gone wrong. Minor scratching can generally be rectified with careful use of a reamer.

When any faults have been eliminated, reassemble as in the main text.

Model 143 Splicer - Parts list

Description	Item No.	Part No.	Quantity
'O' Ring - BS010	264	01-10-10	4
Shell for air valve	276	2200-43-04	4
Air valve return spring	787	10-136-018	1
Splicing chamber		SPECIFY	1
Spacing bush	902	10-133-114	1
Pad (with item 905) – Item 889 without O-ring 905	903	10-113-112A	1
Extension spring	904	10-136-113	1
O-ring RM-0140-20	905	02-14-20	2
M4 x 16 countersunk slotted head screw	908	16-14-16	1
Blast valve & yarn clamp adjusting screw	1017	10-138-118	1
Upper sealing plug	1102	10-135-126	1
M3 x 10 socket set screw	1128	17-13-10	2
M4 x 12 torx cap head self tapping screw	1191	19-44-12	2
M4 x 8 torx cap head self tapping screw	1194	19-44-08	2
Model 143 side plate	1307	10-105-151	2
Blast valve	1310	10-113-126	1
Trigger button	1318	10-114-103	1
Splicer body – 143H	1326	10-133-126	1
Trigger housing 143	1346	10-121-109	1
Splicer body – 143S	1351	10-133-158	1
Name plate (45 x 16)	1503	10-139-153	1

Description	Item No.	Part No.	Quantity
Hanging Assembly parts			
Splicer holding clip	170	201-1199	SPECIFY
Splicer body – 143HW	1327	10-133-127	1
Splicer body – 143SW	1347	10-133-149	1
Flow Control parts			
M3 Washer	556	91-22-03	1
O-ring BS006	788	01-10-06	2
Flow restrictor valve 143	1164	10-113-115	1
M3 x 6 torx cap head self tapping screw	1193	19-44-06	1
Splicer body – 143HF	1328	10-133-128	1
Splicer body – 143HFW	1332	10-133-132	1

Model 143 Exploded diagram assembly