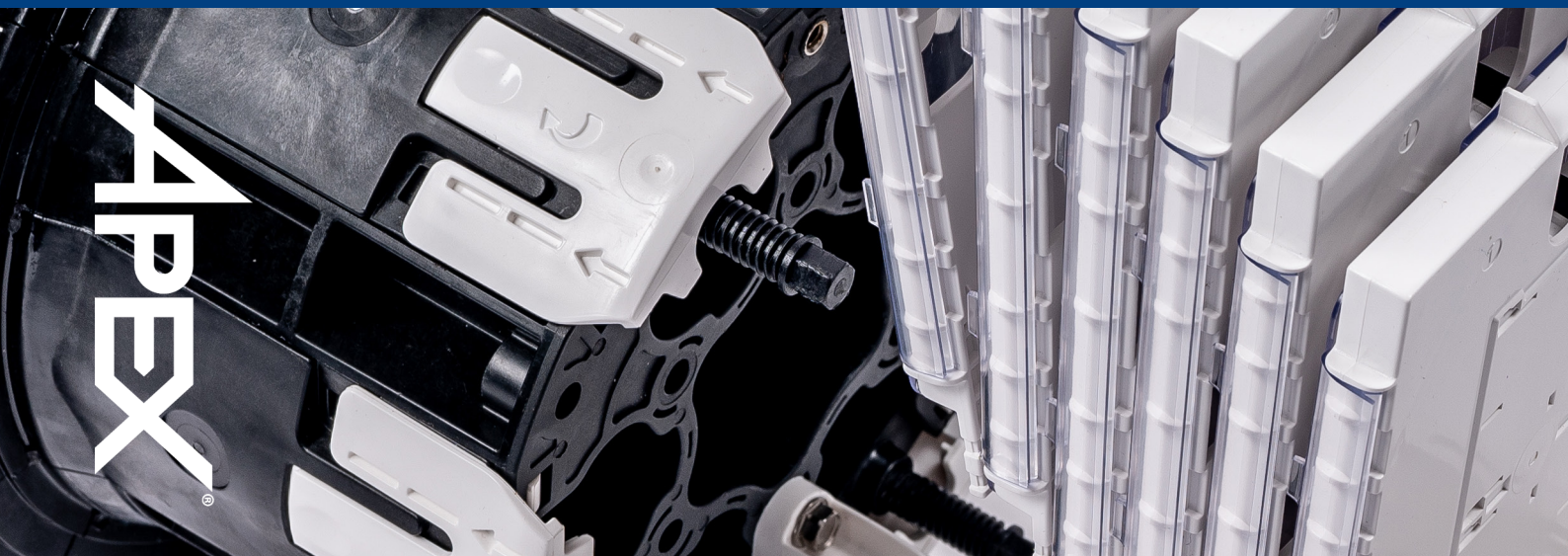


APEX X2 INSTALLATION GUIDE

Installation of Fujikura 432f high-capacity SpiderWeb Ribbon® optical fibre cable and a 432f Spur using the APEX X2 closure.

This guide details the Network Rail-specific installation requirements to build a spliced joint

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PA05/07895

DOCUMENT VERSION
NR1

DATE OF LAST UPDATE
03/08/26

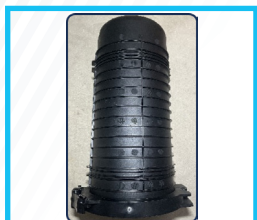
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Please use these instructions in addition to the Apex installation guide.

1

REQUIRED PARTS: AX-2-B-L-6-4-0-B-NR



[a]
Apex closure X-2



[b]
Cable
attachment unit
(1 x per cable)



[c]
Crown bracket
with 6x M6
bcrews



[d]
Hose clamp
(1 x per cable)



[e]
Spur bracket
(1 x per cable)

2

CROWN BRACKET INSTALLATION

Before the cables can be installed into the Apex the crown bracket must be attached to the base.

1.
Remove the 6 bolts 3/8" from the Apex base [figure 2.1].
2.
Position the crown bracket (no orientation) with the screw holes in the Apex base.
3.
Install the crown bracket using the supplied 6 M6 screws [figure 2.2].
4.
Tighten to 1.12Nm (10in/lb).



Figure 2.1



Figure 2.2

3

SPLICE TRAY ALLOCATION

Each splice tray is allocated 1 unit bundle (72f) from the cable. Build the enclosure starting with the last unit bundle (unit 6 - white), using the lowest splice tray position [figure 3.1].

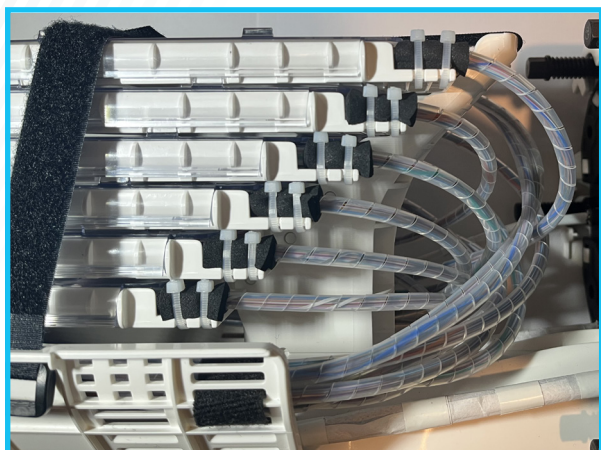


Figure 3.1

- ← fibre unit bundle 1
- ← fibre unit bundle 2
- ← fibre unit bundle 3
- ← fibre unit bundle 4
- ← fibre unit bundle 5
- ← fibre unit bundle 6

Each splice tray holds 6 ribbon splice protectors; only the top 6 are used for 432f cables. Position the splice protectors starting with ribbon 1 at the top [figure 3.2].

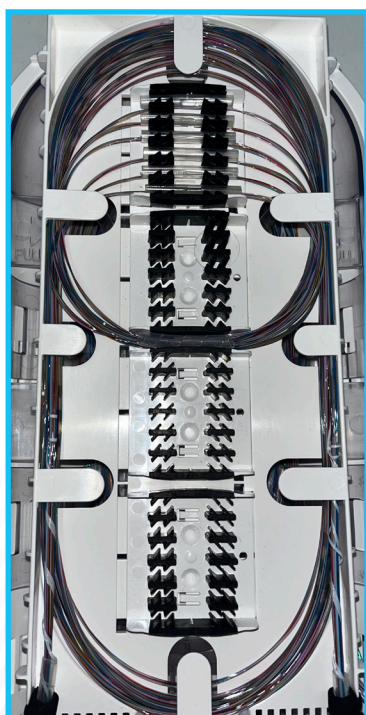


Figure 3.2

- ← Splice protector 1 (fibres 1 - 12)
- ← Splice protector 6 (fibres 61 - 72)

4

CABLE PREPARATION

432f/48f steel tape armour cable

Cable cut lengths

Joint type	Apex	Cut length
Mid-access joint	X-2	4.4m (2.2m in each direction)
Mid-access joint	X-2s	4.2m (2.1m in each direction)
Butt joint	X-2	2.8m
Butt joint	X-2s	2.5m

Table 1

1. Markup the cable at the length detailed in [table 1] and remove the outer sheath and steel tape armour [figure 4.1].

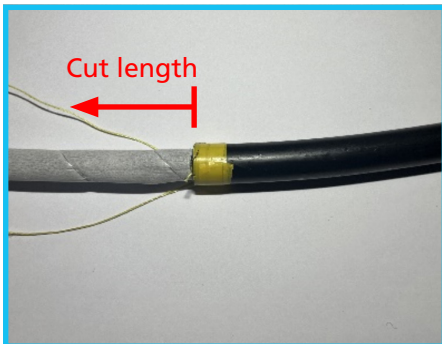


Figure 4.1

2. Remove the water blocking tape and mark the inner sheath at 80mm from the ring cut [figure 4.2].

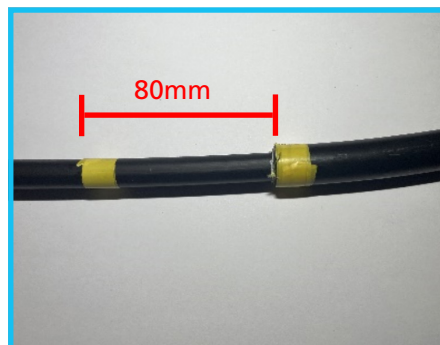


Figure 4.2

3. Remove the inner sheath to the mark. Cut back the water blocking tape, leaving 220mm from the ring cut. Loosely secure the water blocking tape over the fibres using electrical tape [figure 4.3].

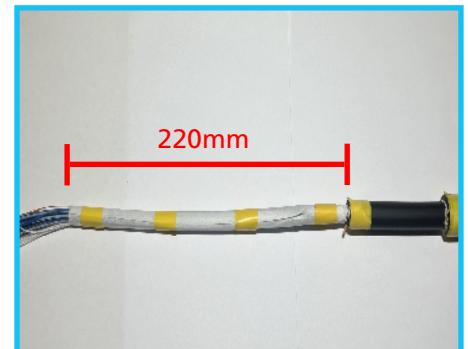


Figure 4.3

R-DISAF

When installing R-DISAF cable [Figure 4.4]. The shock absorbing layer must be removed at 20mm from the outer sheath [Figure 4.5]. All other measurements remain the same.

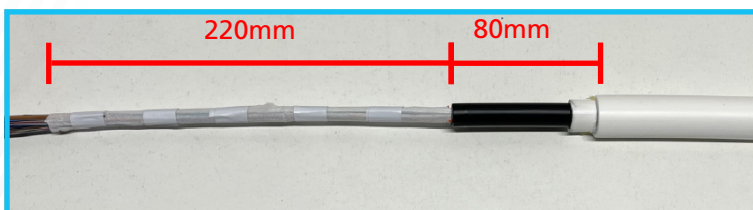


Figure 4.4

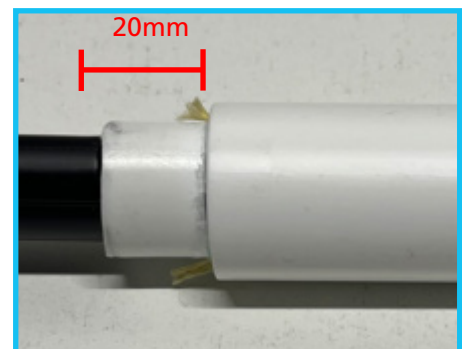


Figure 4.5

5

CABLE ATTACHMENT UNIT CAU

CAU preparation and cable attachment

1.
Each cable port in the enclosure requires 1 CAU.
2.
Snap off the top section of the CAU. The top section is not required when installing Fujikura SWR ribbon cables [\[figure 5.1\]](#).
3.
When installing a cable with an inner sheath diameter less than 14mm (0.55"), install the supplied white spacer as shown. 432f and 48f will require the spacer [\[figure 5.2\]](#).
4.
Install the cable into the CAU using the supplied hose clamp and spur bracket [\[figure 5.3\]](#). Ensure there is 20mm of cable sheath above the hose clamp. Tighten the hose clamp to 3.4nm which is about the maximum you can get using a nut driver hand tool.
5.
The spur bracket must be positioned at the top of the cable [\[figure 5.4\]](#).

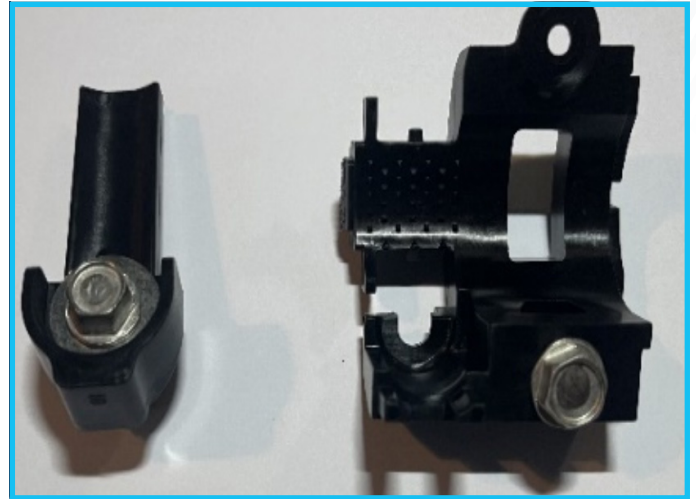


Figure 5.1

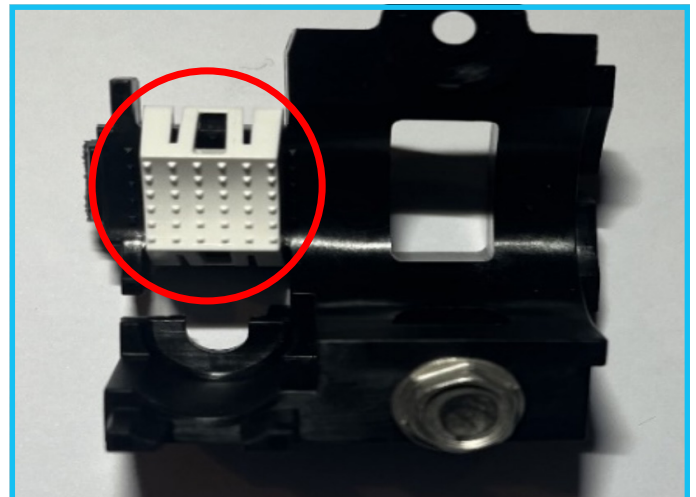


Figure 5.2

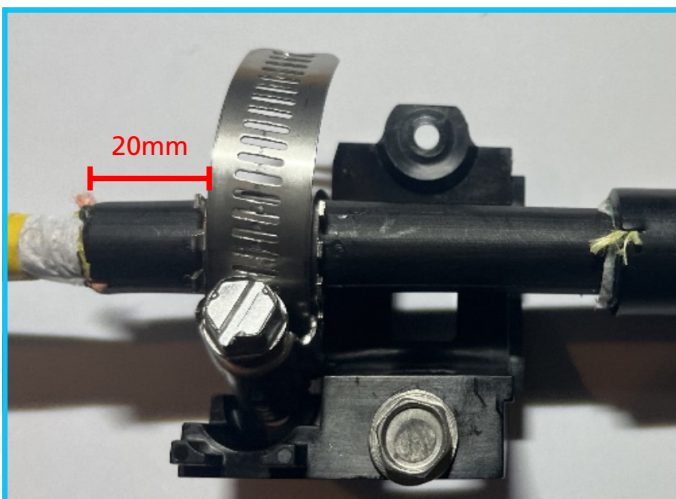


Figure 5.3



Figure 5.4

6

PORT ALLOCATION

Cable port identification 432f/48f.

Apex	Port number	Cable
X-2, X-2S	1	432f Trunk 1
X-2, X-2S	2	432f Trunk 2
X-2, X-2S	3	48f (Spur 2)
X-2, X-2S	4	432f Spur / 48f (Spur 1)

Table 2

1.
To ensure direct access to the slack basket ports 1 and 2 should be used for the 432f cable entry and exit [table 2].
2.
For additional spur cables use ports 3 and 4.
3.
To aid port identification, numbers are stamped on the base of the Apex [figure 6.1].

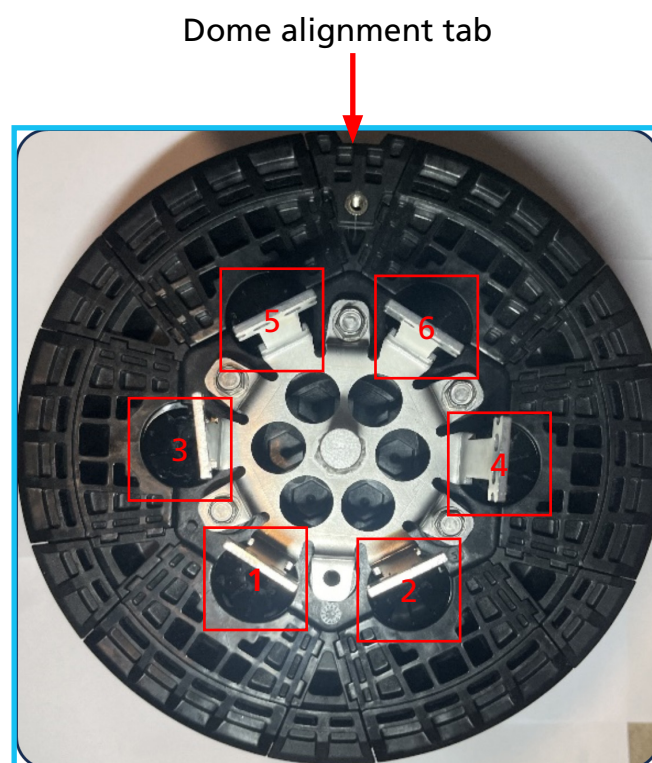


Figure 6.1

7

CAU INSTALLATION

Installing the CAU into the Apex

1. Loosen the sealing wedge compression screw and open the required Apex port by depressing the sealing wedge latch [figure 7.1].
2. Ensure the removable gel pack is in position [figure 7.2].
3. Lay the CAU with attached cable into the cable port on top of the gel pack. Ensure the CAU is fully engaged in the retaining slot [figure 7.2].



Figure 7.1

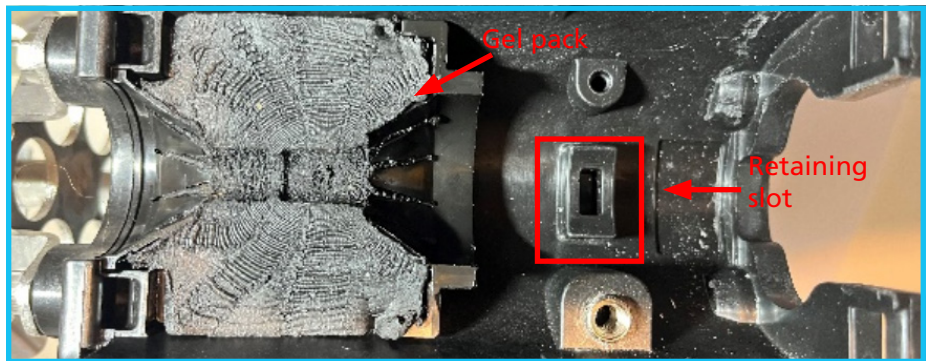


Figure 7.2

4. Fully tighten the retaining screw [figure 7.3]. Ensure the outer jacket cut is positioned just above the removable gel pack, adjust the positioning if required.
5. Secure the cable to the crown bracket using the supplied hose clamp and spur bracket [figure 7.4].
6. Fully tighten the hose clamp, with the spur bracket at the top of the cable, until it is not possible to rotate the cable [figure 7.5].

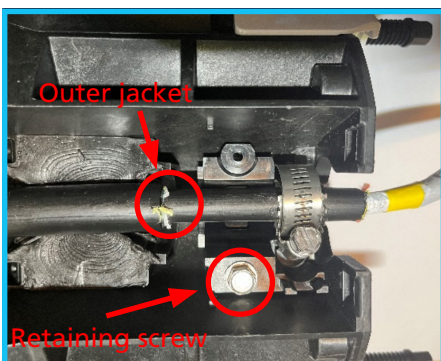


Figure 7.3

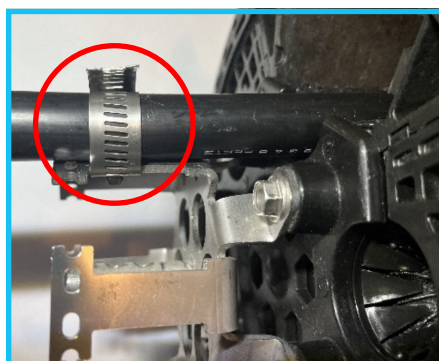


Figure 7.4



Figure 7.5

7. If installing R-DISAF cable, ensure the outer sheath and shock absorbing layer are positioned above the removable gel seal [Figure 7.6].

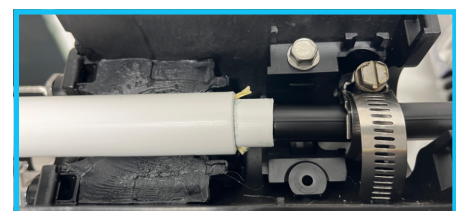


Figure 7.6

8

SEALING WEDGE INSTALLATION

Closing the cable port using the sealing wedge

1. Compress the removable gel pack [figure 8.1].
2. Fully loosen the sealing wedge compression screw and manually elongate the wedge gel block [figure 8.2].



Figure 8.1

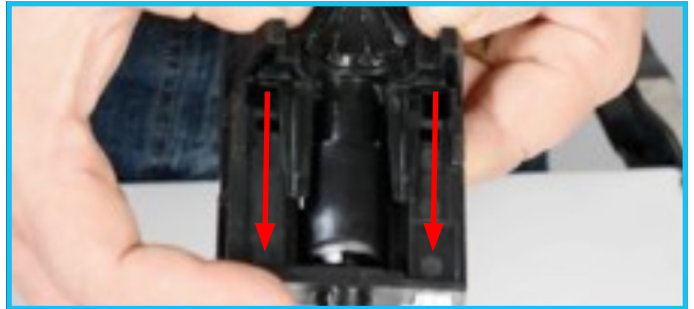


Figure 8.2

3. Engage the sealing wedge into the slots on the Apex base [figure 8.3].

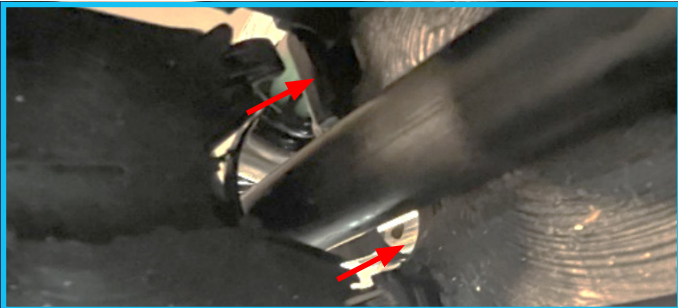


Figure 8.3

4. Depress the sealing wedge latch and slide towards the base [figure 8.4].



Figure 8.4

5. Push the sealing wedge down and release the latch to engage with the base.

6. Fully tighten the sealing wedge compression screw [figure 8.5].

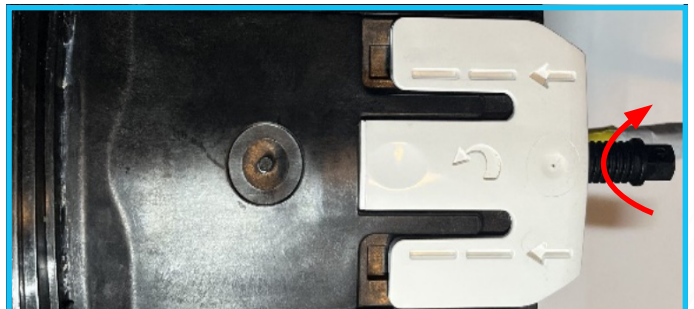


Figure 8.5

9

FIBRE ROUTING TO SPLICE TRAY (BUTT JOINT)

1. The APEX X2 is supplied with a clear plastic inner basket, this is not utilised for this installation. All fibre must be stored in the lower basket only. The inner basket can be listed by squeezing the release tabs **[figure 9.1]**.

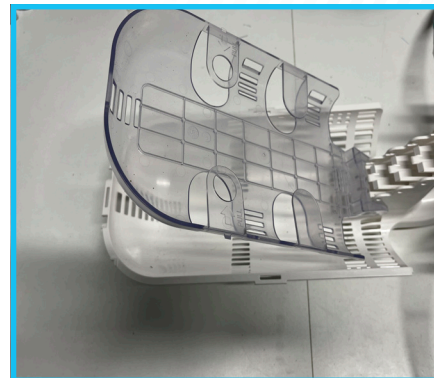


Figure 9.1

2. Lay the water blocking tape section of the cable into the slack basket **[figure 9.2]**.

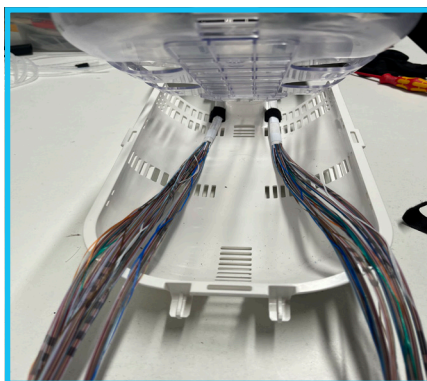


Figure 9.2

3. Secure the water blocking tape covered cable to the basket using velcro, do not over tighten **[figure 9.3]**.
w

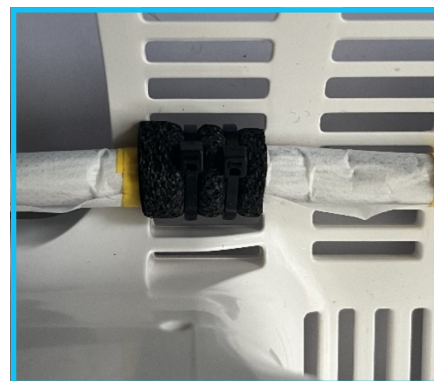


Figure 9.3

4. Loop the fibres to the opposite side of the slack basket **[figure 9.4]**.



Figure 9.4

5. Install 320mm of spiral wrap onto one unit bundle (72f). Position the spiral wrap at the slack basket tie point **[figure 9.5]**.



Figure 9.5

6. Secure the end of the spiral wrap using Velcro and cable ties. Three spiral wraps can be grouped together in one Velcro. **[figure 9.6]**.

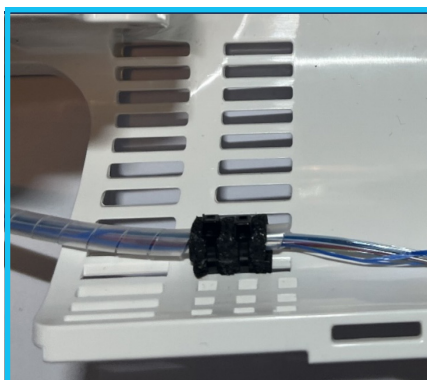


Figure 9.6

7. Route the spiral wrapped fibre to the first tray. Pass the fibres behind the splice tray spine as shown in **[figure 9.7]**. Secure to the splice tray using foam and two cable ties.

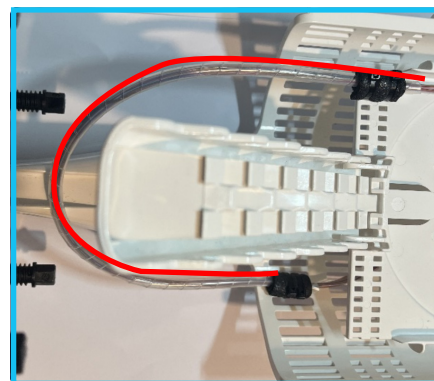


Figure 9.7

8. Repeat the same process for the second 432f cable, route the unit bundle to the opposite side of the splice tray [figure 9.8].

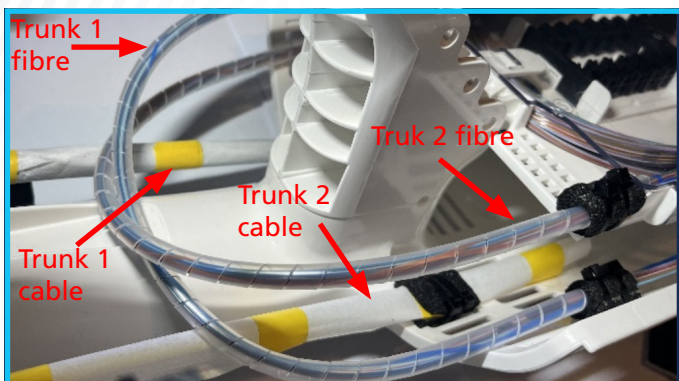


Figure 9.8

9. Continue the same process for each unit binder group in the cable. Each binder group is routed to a separate splice tray. 432f cable will require 6 splice trays [figure 9.9].

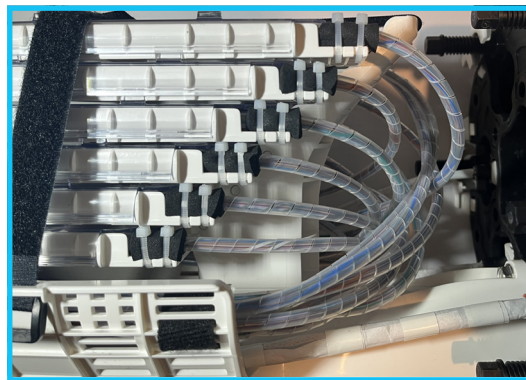


Figure 9.9

10

APEX X-2S SPLICE TRAY LAYOUT

432f routing in the splice tray

1. Fibres entering the left-hand side of the tray should loop 2 times (>1m) and enter the top left-hand side splice protector holders from the top position down [Figure 10.1].
2. Fibres entering the right-hand side of the tray should loop 2 times (>1m) and enter the top right-hand side splice protector holders from the top position down [Figure 10.2].
3. The lower splice protector holders are reserved for spur cables. Once spliced all fibres should bend upwards into the splice protector holders.
4. Once spliced the fibres should be positioned as shown in [figure 10.3].
5. If required, a small section of Spiral Wrap can be used to secure the fibres that pass between the splice holder chips [figure 10.4]

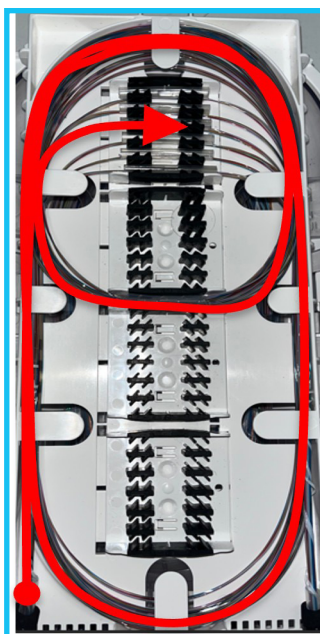


Figure 10.1

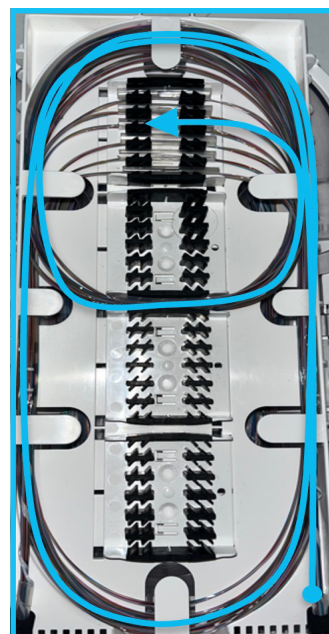


Figure 10.2



Figure 10.3

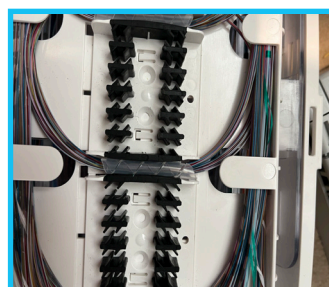


Figure 10.4

This section details the method of installing a 432f spur cable during the initial installation of the Apex, or as an addition. All images will show the trunk fibre cable pre-installed.

11

432F SPUR CABLE INSTALLATION

Note:

The 432f Spur is installed using the lower 3 splice trays only (Splice Trays 4, 5 and 6)

[figure 11.1]

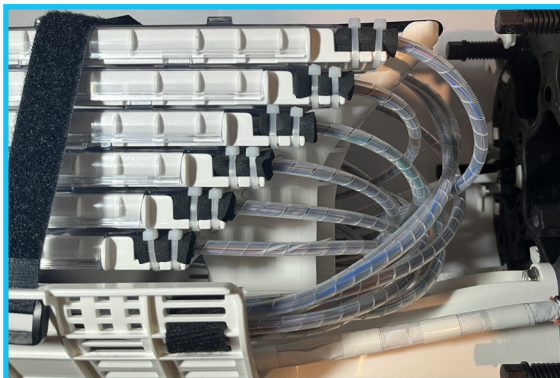


Figure 11.1

1. Install the 432f spur cable using cable port 4 following the standard cable installation procedure [figure 11.2].

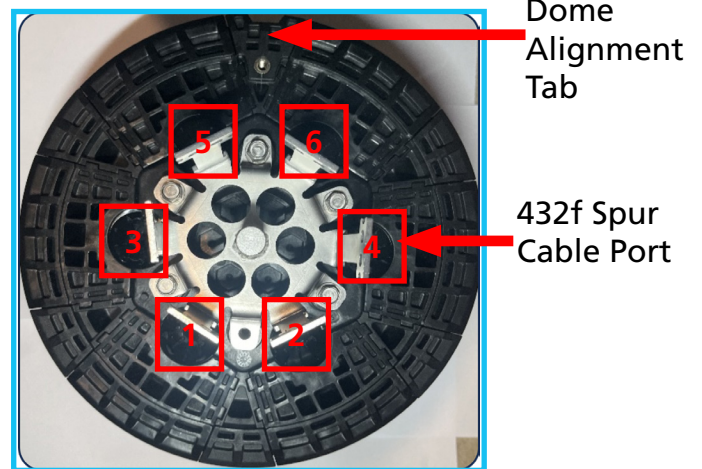


Figure 11.2

2. Attach the water blocking tape section to the basket using Velcro [figure 11.3].

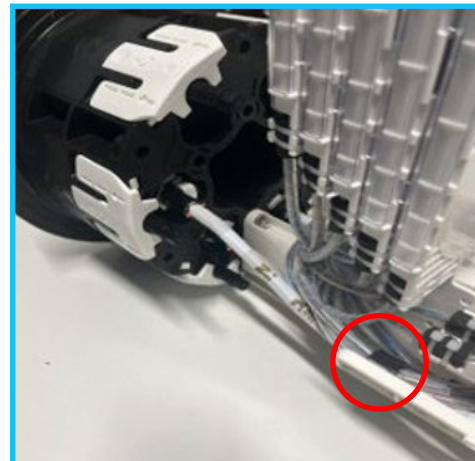


Figure 11.3

12

432F SPUR CABLE SLACK BASKET MANAGEMENT

1. Loop the Spur fibre around the basket, secure at the top using Velcro [figure 12.1].

Spur Cable Entry Point

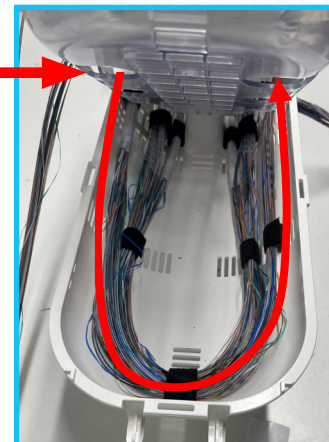


Figure 12.1

2. Separate the spur fibre into two sections, binder groups 1/2/3 and binder groups 4/5/6 .

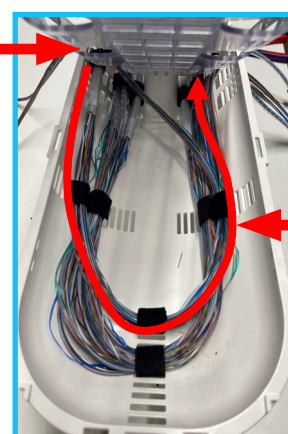
3. Add 350mm of spiral wrap to each spur binder group [figure 12.2].



Figure 12.2

4. Attach spur binder groups 1/2/3 using Velcro to the basket on the opposite side to the spur cable entry point [figure 12.3].

Spur Cable Entry Point

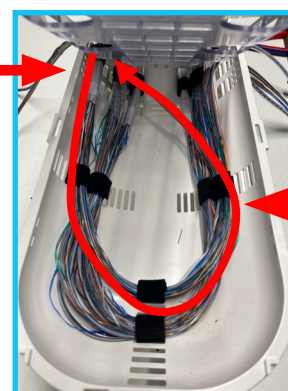


Spur Binders 1/2/3

Figure 12.3

5. Create a cross over loop with spur binder groups 4/5/6 and attach to the basket using Velcro. The fibre must be attached to the basket on the same side as the cable entry point [figure 12.4].

Spur Cable Entry Point



Spur Binders 4/5/6

Figure 12.4

13

432F SPUR CABLE SPLCIE TRAY ALLOCATION

The spur cable binders are allocated as shown in the table below [\[table 3\]](#).

Trunk 1 Binder	Spur Binder	Splice Tray (Count from top)
Brown	Blue	4
Slate	Orange	5
White	Green	6

Trunk 2 Binder	Spur Binder	Splice Tray (Count from top)
Brown	Brown	4
Slate	Slate	5
White	White	6

Table 3

14

432F SPUR CABLE SPLCIE TRAY INSTALLATION

The following instructions detail the installation of splice tray 6 (lowest). Repeat for splice trays 4 and 5 following the allocation table [\[table 3\]](#)

1. Pass the spiral wrap around the back of the splice tray stack [\[figure 14.1\]](#).

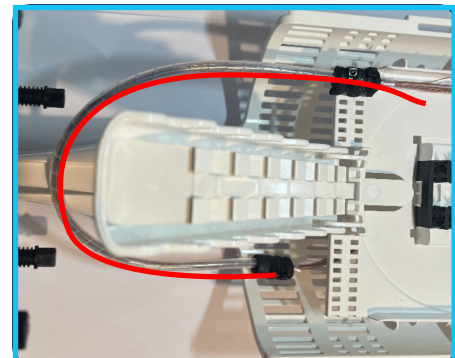


Figure 14.1

2. Attach the green binder group to the splice tray (right hand side) using foam and cable ties [\[figure 14.2\]](#).
3. Attach the white binder group to the bottom tray (left hand side) using foam and cable ties [\[figure 14.2\]](#).

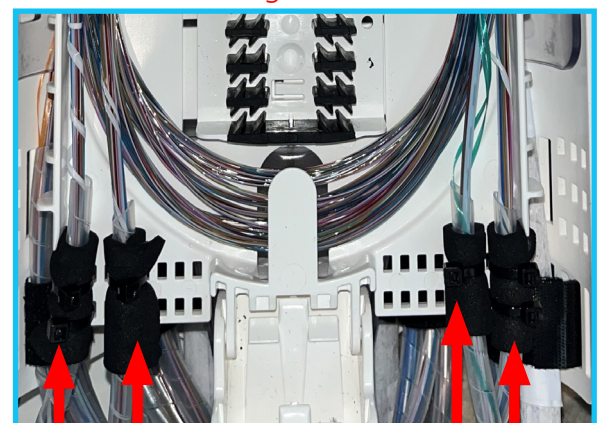


Figure 14.2

Trunk 1
Spur Cable
(White Binder)

Trunk 2
Spur Cable
(Green Binder)

15

432F SPUR CABLE SPLICE TRAY ROUTING

1.
Route **trunk 1** fibres clockwise to the upper 6 splice holders on the left-hand side of the splice tray. The fibre must bend up into the splice holders. Store 2 **loops** of fibre. [Figure 15.1]
2.
Route **trunk 2** fibres anti-clockwise to the second splice holder group on the right-hand side of the splice tray. The fibres must bend up into the splice holders. Store 2 **loops** of fibre. [Figure 15.2]
3.
Route the **spur** fibres (binders 1,2 or 3) anti-clockwise to the upper 6 splice holders on the right-hand side of the splice tray. The fibres must bend up into the splice holders. Store 2 **loops** of fibre. [Figure 15.3]
4.
Route the **spur** fibres (binders 4, 5 or 6) clockwise to the second splice holder group on the left-hand side of the splice tray. The fibres must bend up into the splice holders. Store 2 **loops** of fibre. [Figure 15.4]

Trunk 1 Fibres

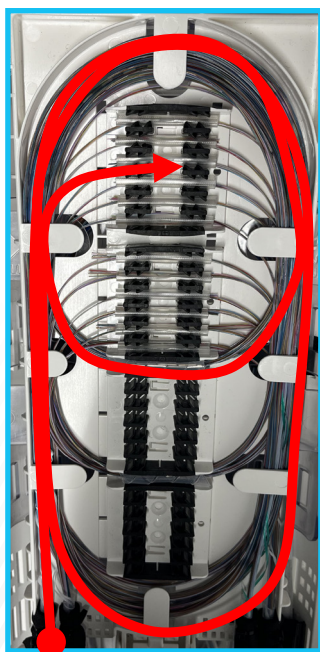


Figure 15.1

Trunk 2 Fibres

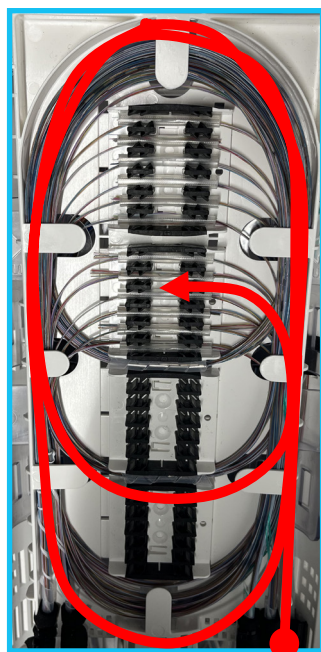


Figure 15.2

Spur Fibres
Binders 1/2/3



Figure 15.3

Spur Fibres
Binders 4/5/6

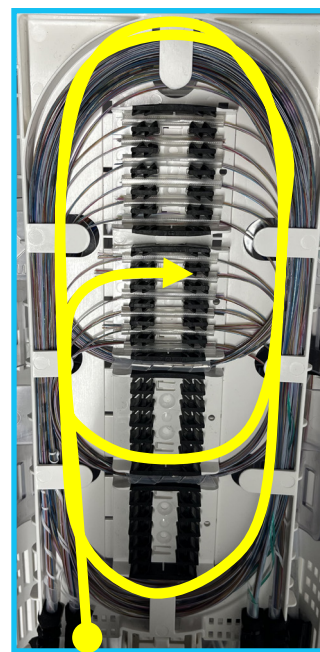


Figure 15.4

16

432F SPUR CABLE SPLICING

Splice the spur cable as shown in the images below [Figure 16.1 / Figure 16.2]

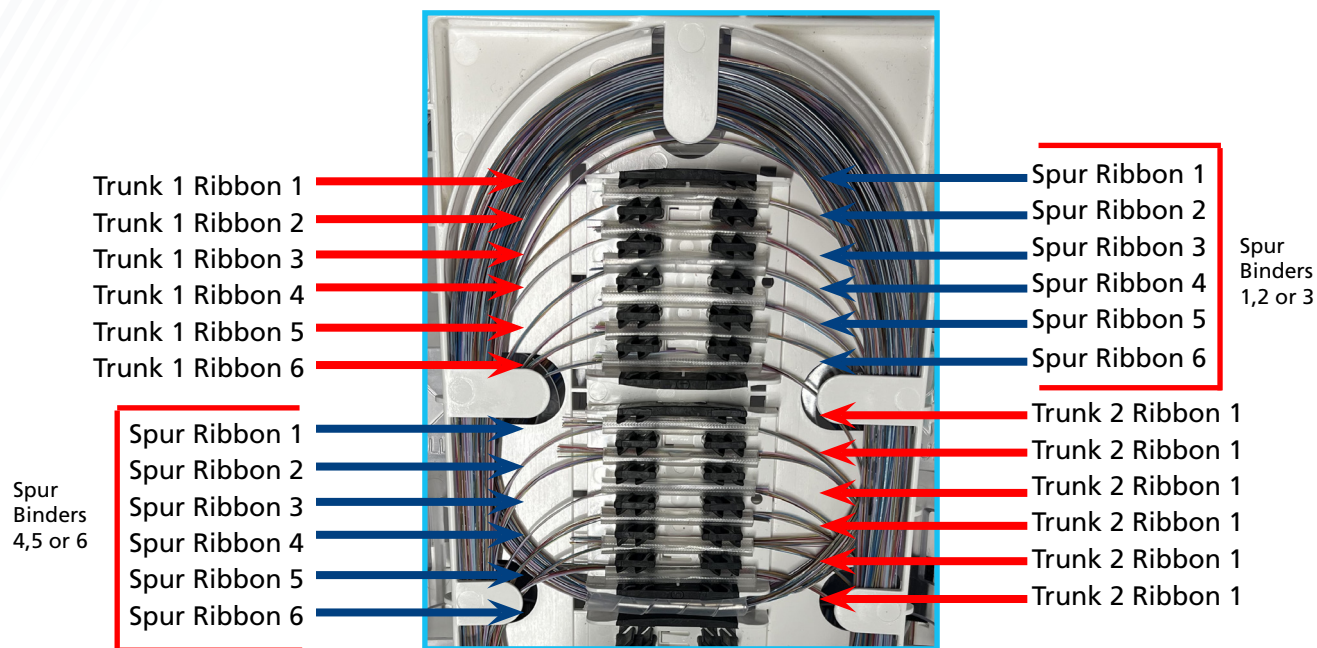


Figure 16.1

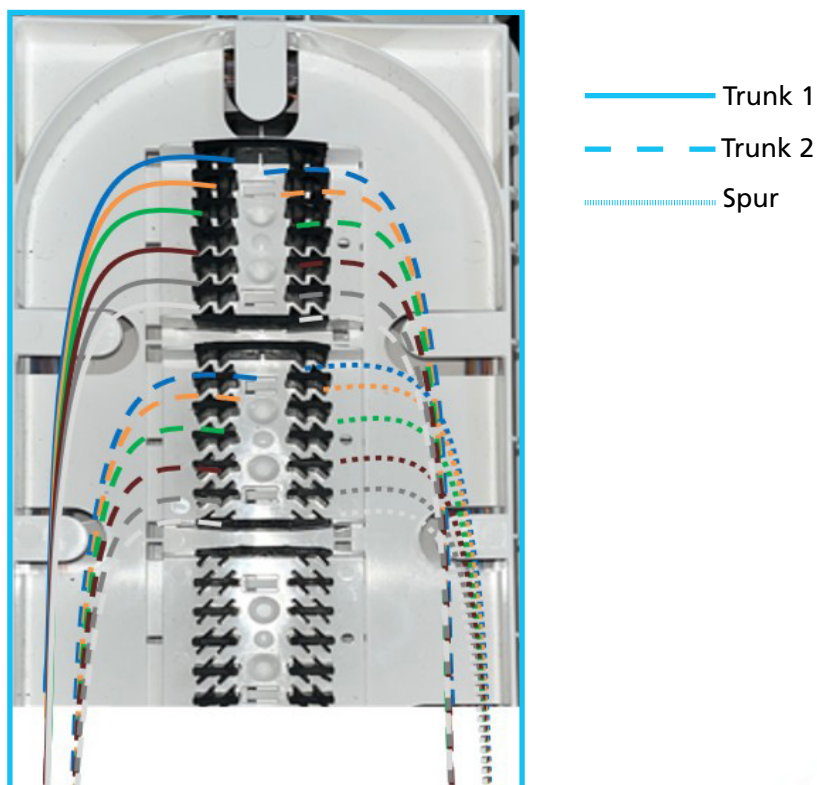


Figure 16.2

17

TRAY LABELS

Using permanent marker, label each splice tray with the cable identification number [Figure 17.1]. For spur cables, add the cable number to the side of the tray on the same side that the cable enters the basket, as shown in [Figure 17.2].



Figure 17.1



Figure 17.2