SUMITOMO ELECTRIC

G657 fibres and how to splice them

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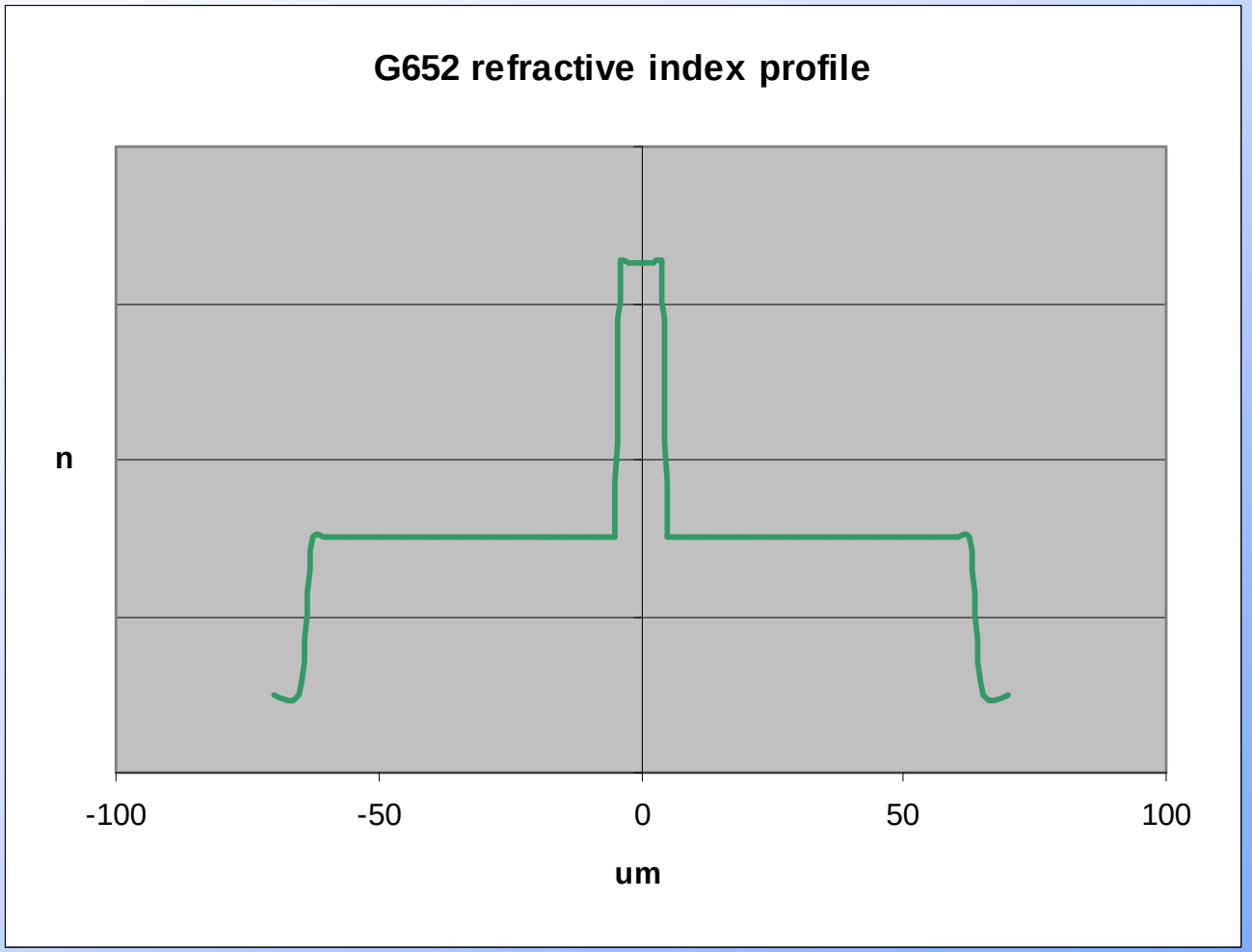
What is a G657 fibre?

- G657 is a new class of single mode fibre which can be bent more severely than normal G652 fibre without losing the signal.
- The ITU defines 4 classes of G657 fibre as below...
- G657A1
  - 10mm minimum bend radius, other specs as G652
- G657A2
  - 7.5mm minimum bend radius, other specs as G652
- G657B2
  - 7.5mm minimum bend radius, other specs may deviate from G652
- G657B3
  - 5mm minimum bend radius, other specs may deviate from G652

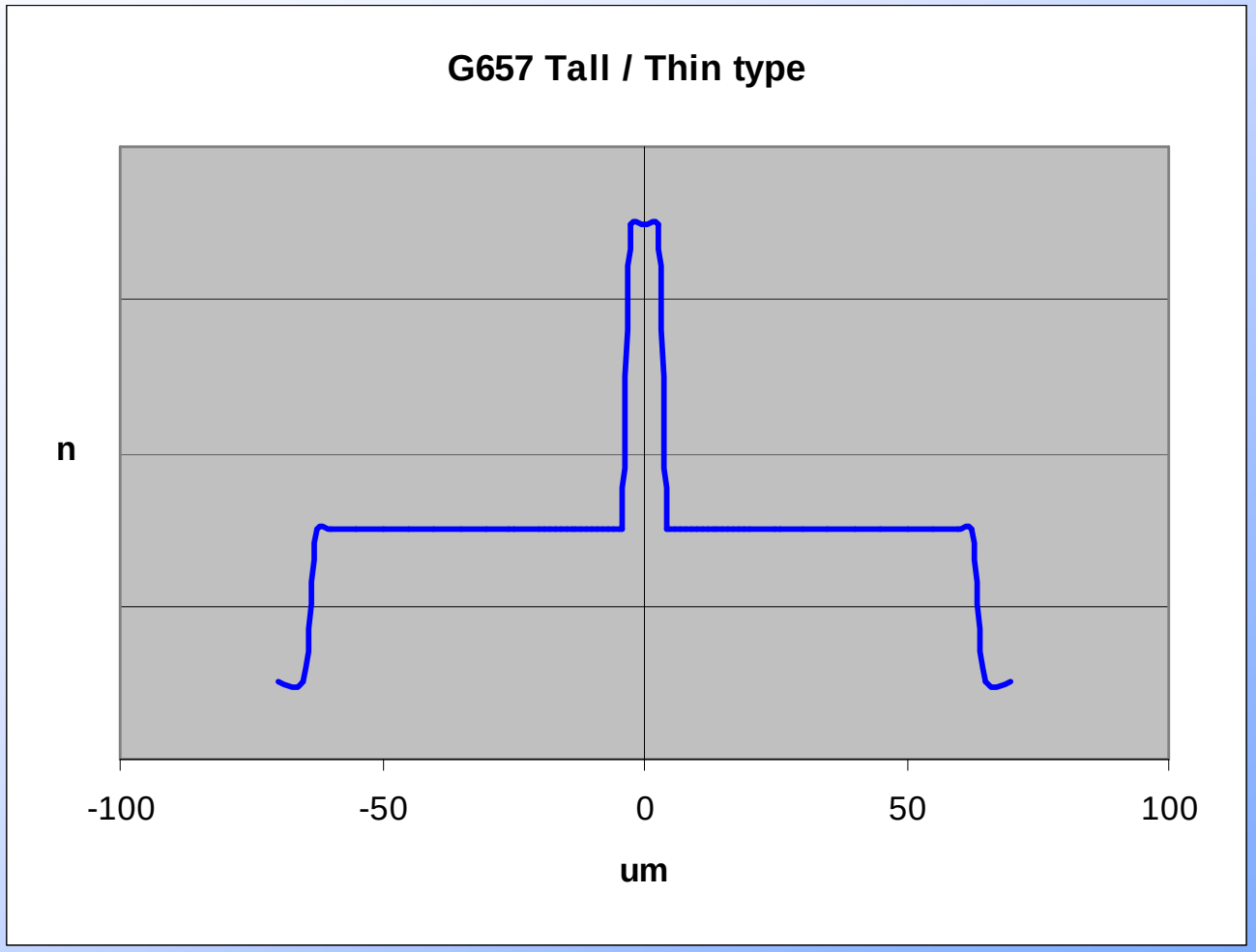
How does a G657 fibre work?

- G657A fibres have a design similar to G652D
  - may have a slightly taller, thinner core
- G657B fibres adopt different designs to G652
  - Trench around the core
  - Trench and ring around the core
  - Voids around the core
- The structure around the core changes the power distribution and more strongly guides the light

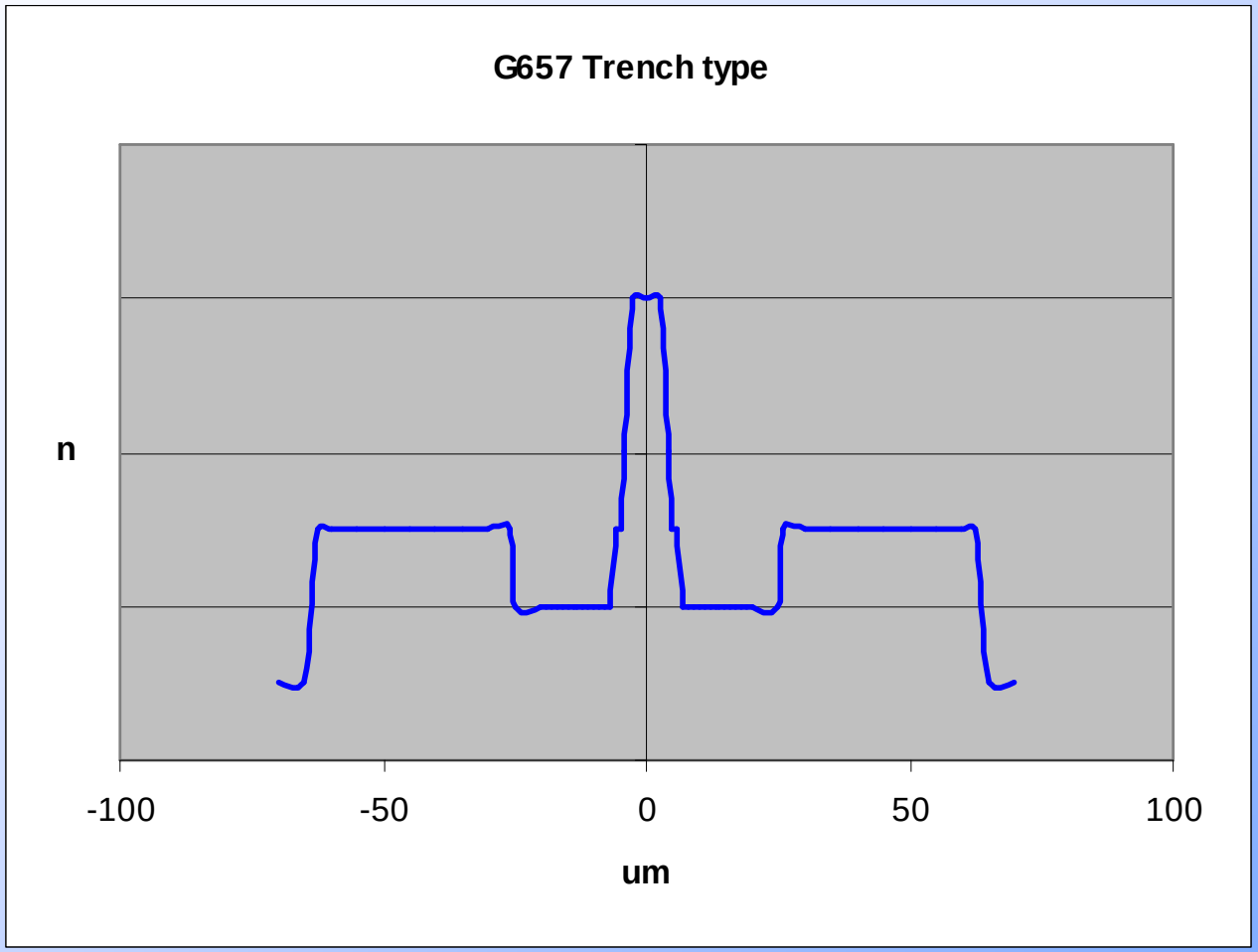
G652 refractive index profile



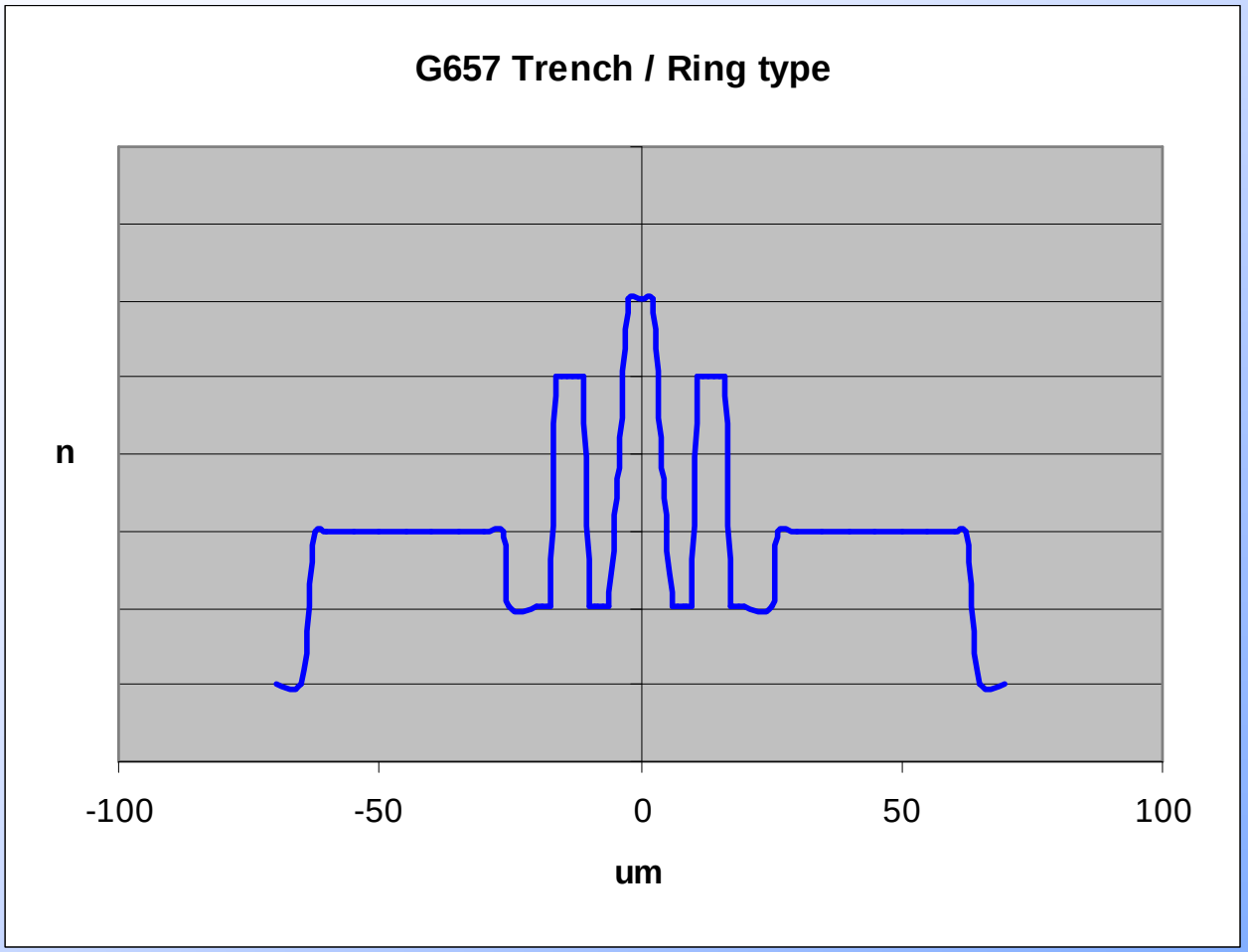
G657 - taller thinner core design



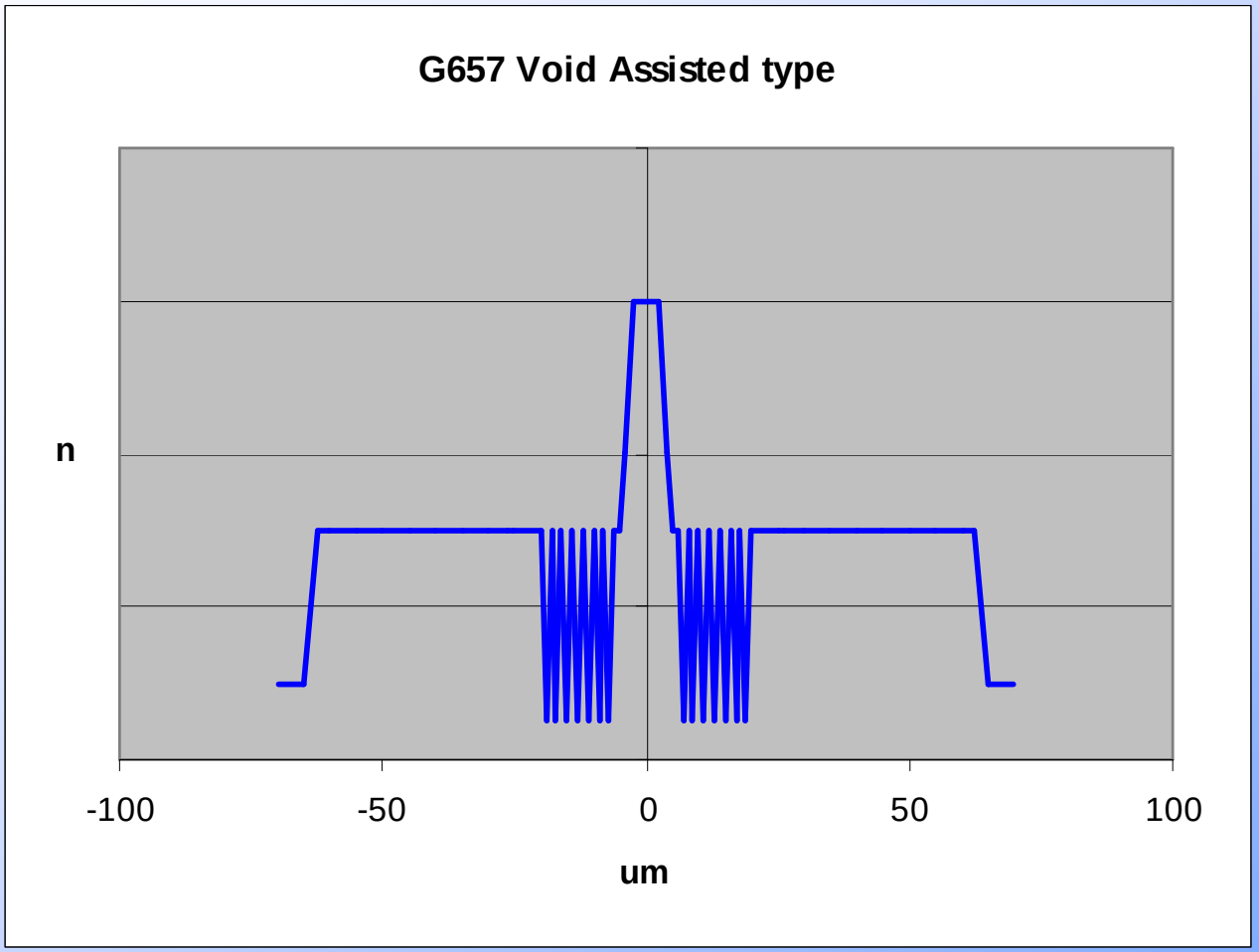
G657 – trench around the core design



G657 – ring + trench around the core design



G657 – voids around the core design



Who makes these fibres?

- Sumitomo PureAccess Ultra released 2004
  - Pioneering design with a tall, very thin core
  - 7.5mm allowable bend radius
  - Released before ITU defined “G657”
  - Poor G652 compatibility due to MFD mismatch
  - No longer in production
- Sumitomo PureAccess released 2004
  - 10mm allowable bend radius
  - Released before ITU defined “G657”
  - Now classed as G657A1
  - More than 6M km delivered

Who makes these fibres?

Design	Producer	G657A1	G657A2	G657B2	G657B3
Tall/thin core	Sumitomo	PureAccess			
Tall/thin core	Corning	SMF-28e XB			
Tall/thin core	OFS	AllWave Flex			
Tall/thin core	Prysmian	CasaLight			
Trench	Sumitomo				PureAccess R5
Trench	Draka	BendBright	BendBright^{XS}		BendBright Elite
Trench + ring	OFS				EZ-Bend
Voids	Corning				ClearCurve
Voids	Prysmian			CasaLight Plus	
Voids	Prysmian				CasaLight Xtreme

What are the issues in splicing these fibres?

- MFD mismatch with G652
  - Increased loss when MFD is not the same as G652D
- Mode profile mismatch with G652
  - Non-Gaussian mode profiles (power distribution)
- Different melting point to G652
  - Dopants or Voids can alter the melting point
- Evolving designs
  - Manufacturers are still improving their G657 fibre designs. Changes to their design can affect splice-ability

Using a fixed v-groove splicer

- Fixed v-groove splicers cannot image the core
- They “don’t care” the core differs from a G652
- The only consideration is the correct melting point

- How to splice using T-25e or T-66?
  - Choose SMF Standard program
  - Make an Arc Test
  - Start splicing

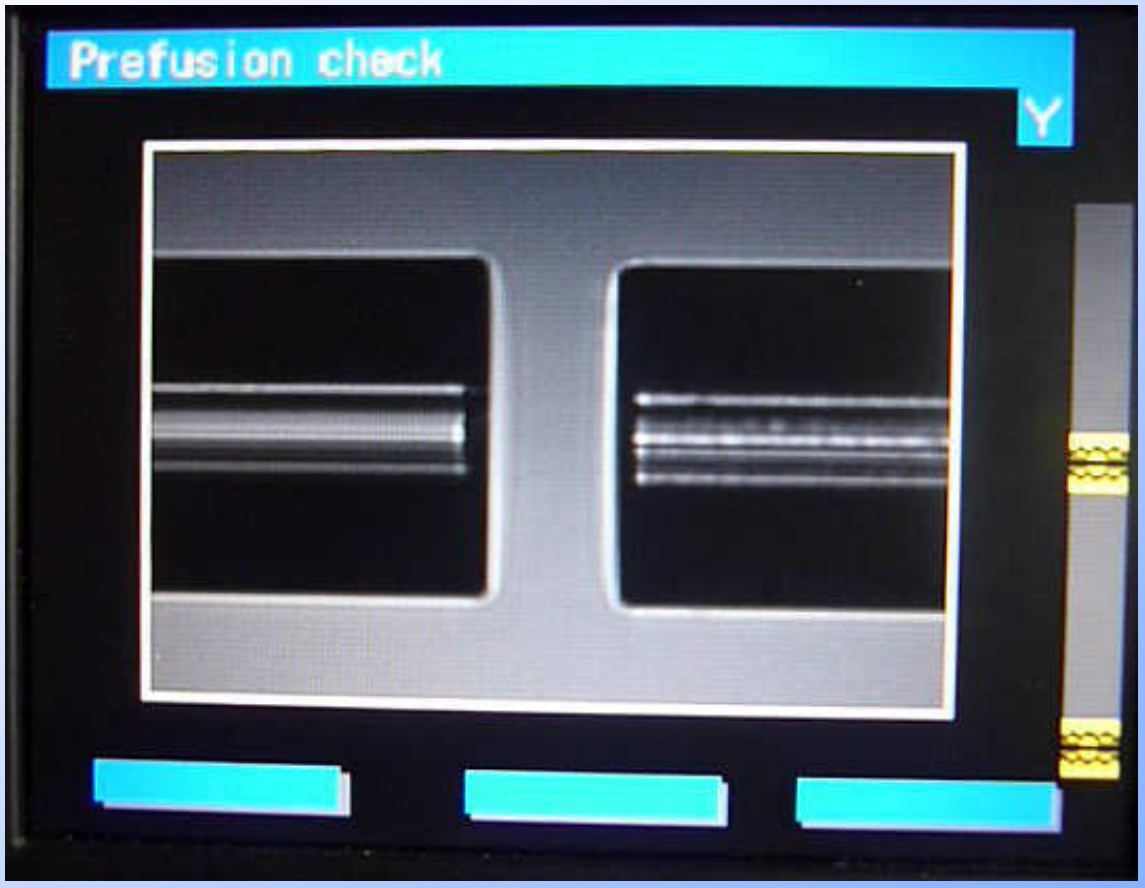
Using a core aligning splicer

- Core aligning splicers must process the core image to make a core alignment
- Extra structure around the core can distort or shield the core image
- G657B core images usually differ from a G652 core and may need a special processing algorithm.

Using a Sumitomo T-39 splicer

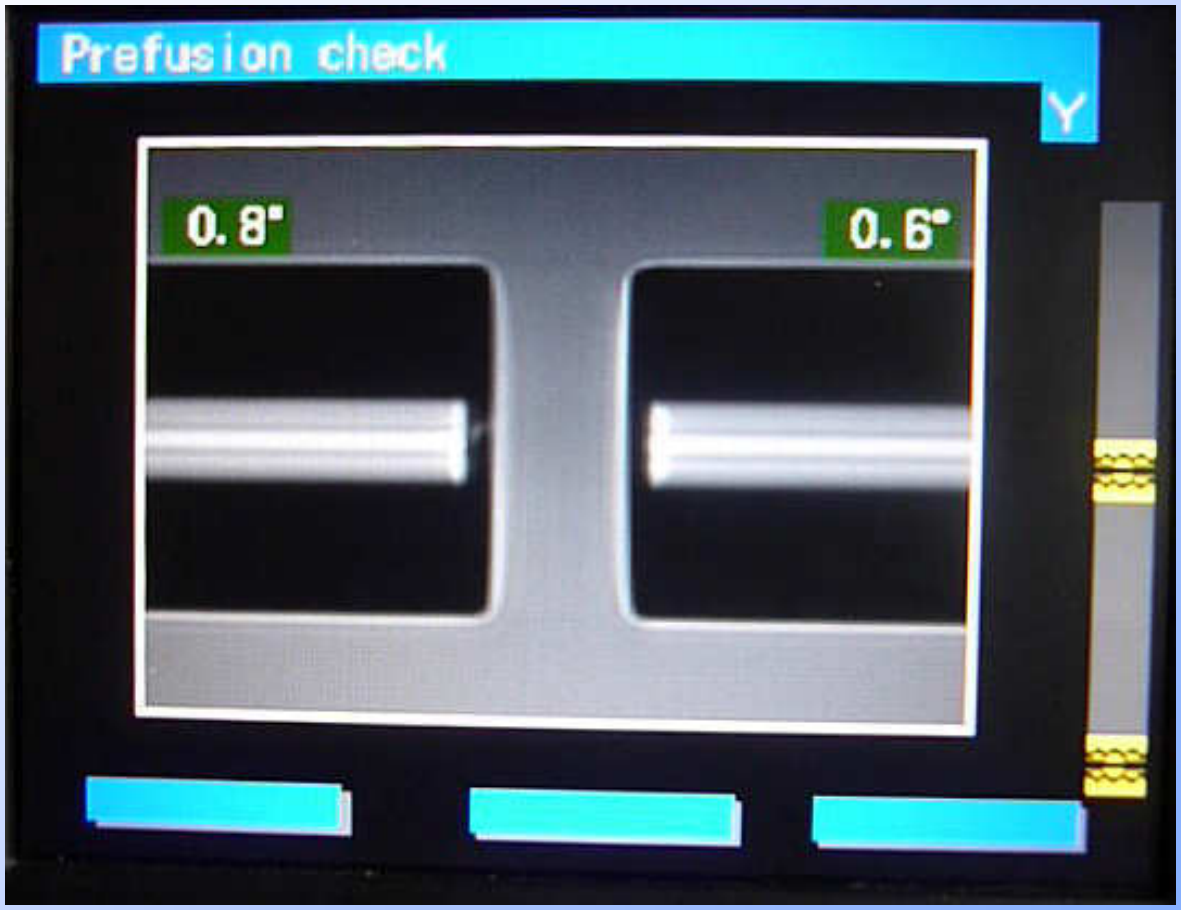
- Sumitomo has worked with other fibre manufacturers to create & test splice programs for commonly available G657 fibres
- T-39 has core alignment splice programs for EZ-Bend, ClearCurve / CasaLight and BendBright
- T-39 also includes an Adaptive Alignment mode, designed to handle future designs.

ClearCurve x ClearCurve on T-39



- Before the cleaning arc, the voids shield the core

ClearCurve x ClearCurve on T-39



- The voids are collapsed by the cleaning arc

ClearCurve x ClearCurve on T-39

- The completed splice

ClearCurve measurement issues

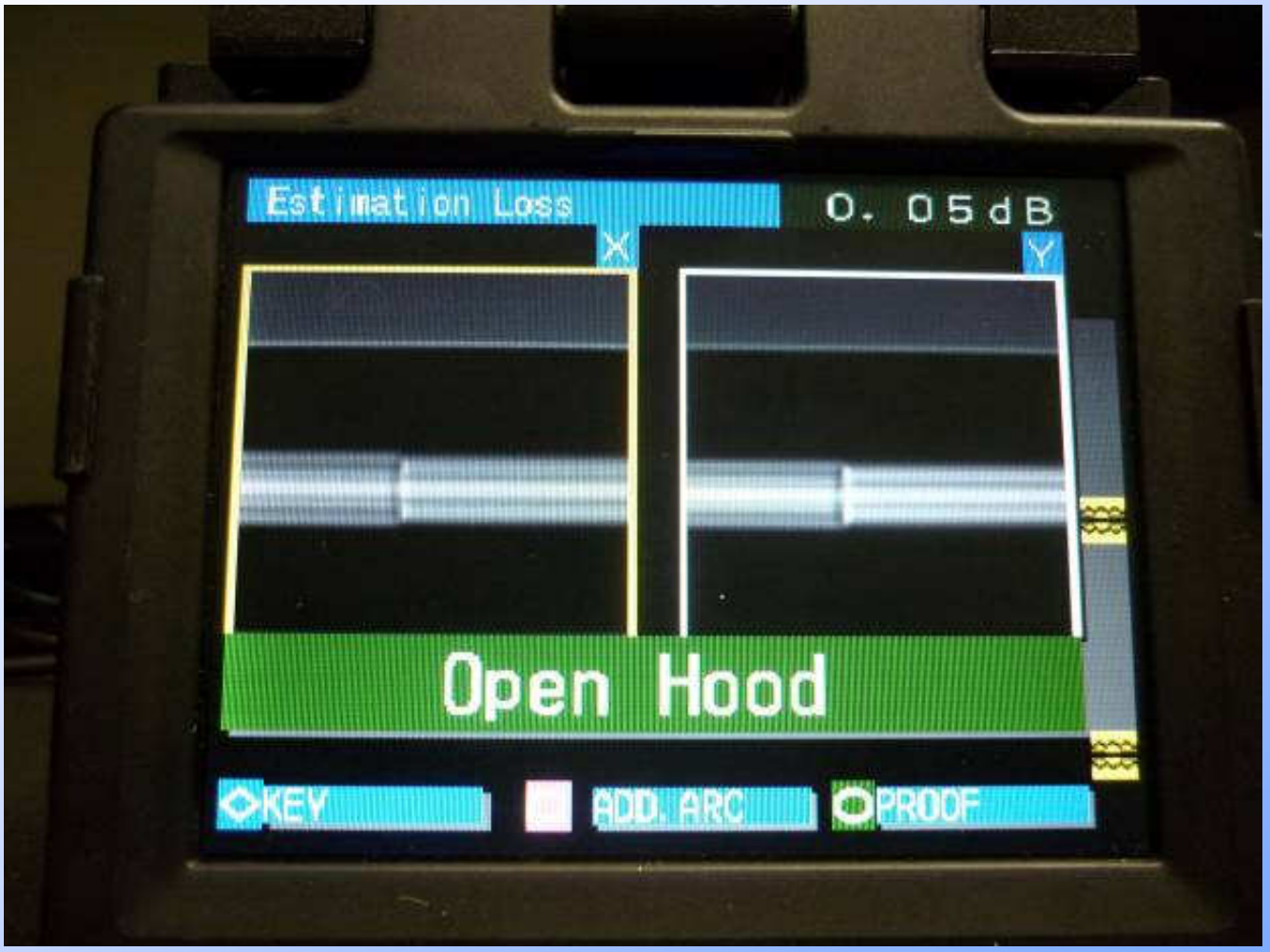
- OTDR measurement of ClearCurve splices can be sensitive to measurement conditions
- May see incorrectly high insertion loss at 1310nm when using short (10m) launch fibre
- Problem solved by using a long (1km) launch fibre

- If the splice “looks good” but the OTDR loss is high, suspect the OTDR measurement set-up

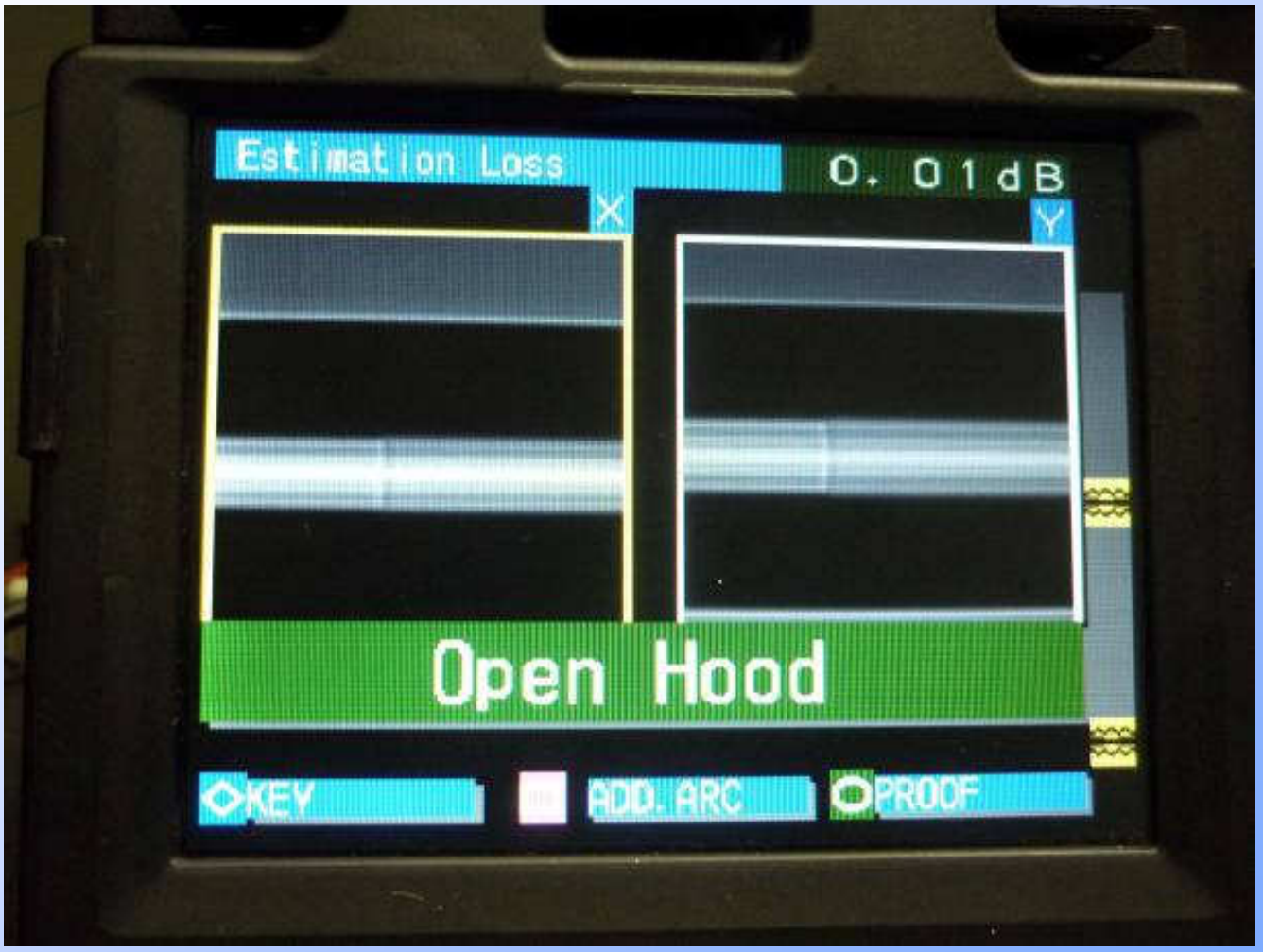
EZ-Bend x G652 on T-39

BendBright^{XS} x G652 on T-39

BendBright-Elite x G652 on T-39



BendBright^{XS} x BendBright-Elite on T-39



PureAccess-R5 x PureAccess-R5 on T-39

PureAccess-R5 x G652 on T-39