FLUKE networks

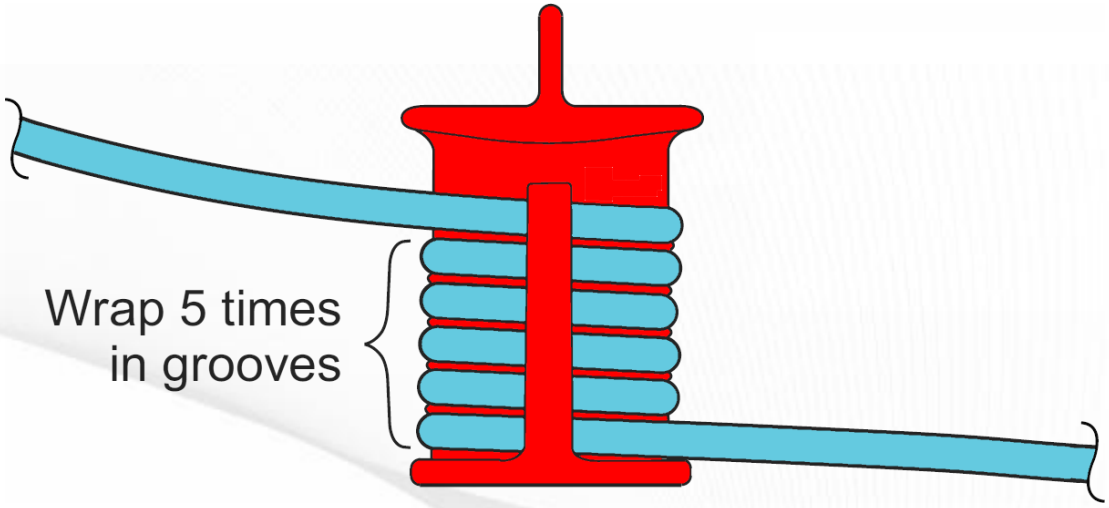
ENCIRCLED FLUX:

WHY IT'S REQUIRED FOR MULTIMODE OPTICAL FIBER TESTING

Presenter:
Carolyn Carter

MANDRELS

- Anyone who knows what this is?
- It's a mandrel?

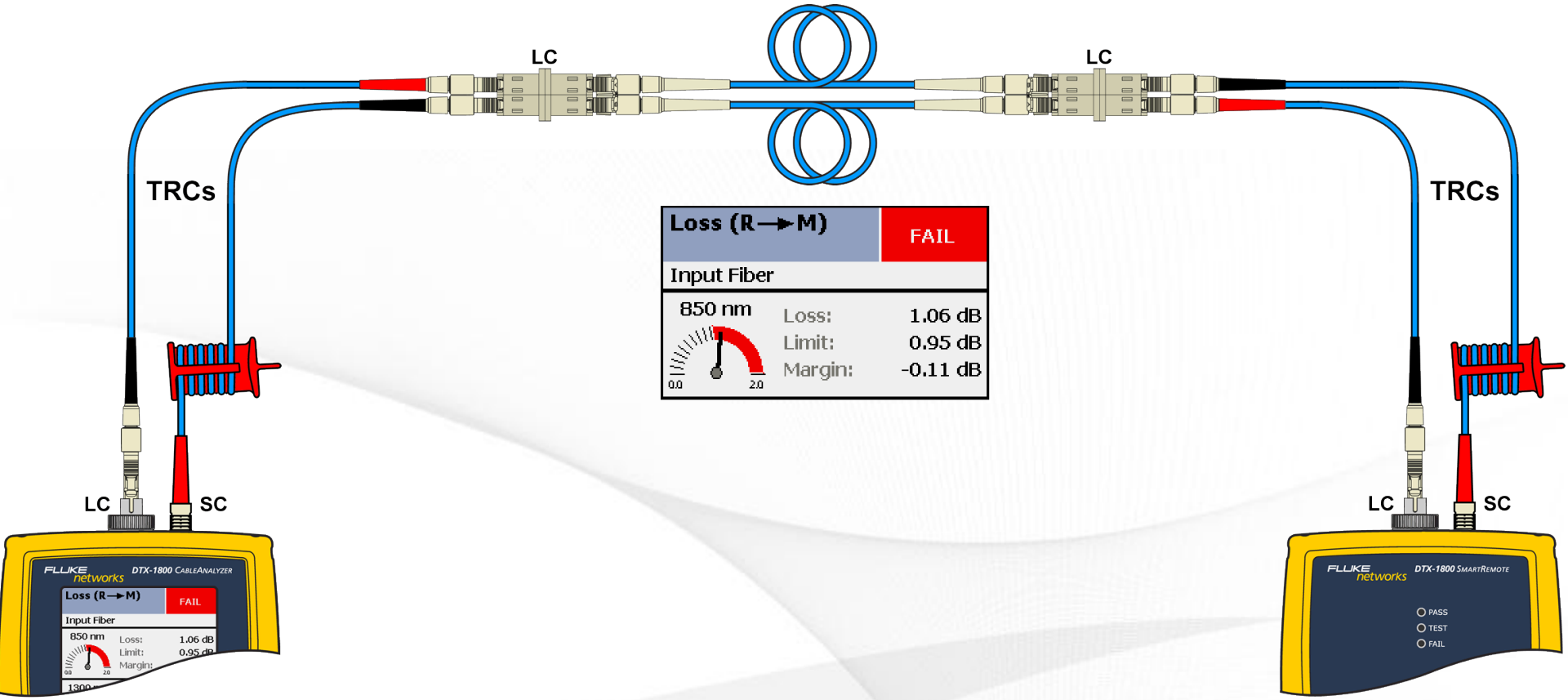


DIFFERENT METHODS TO CONTROL LAUNCH CONDITIONS

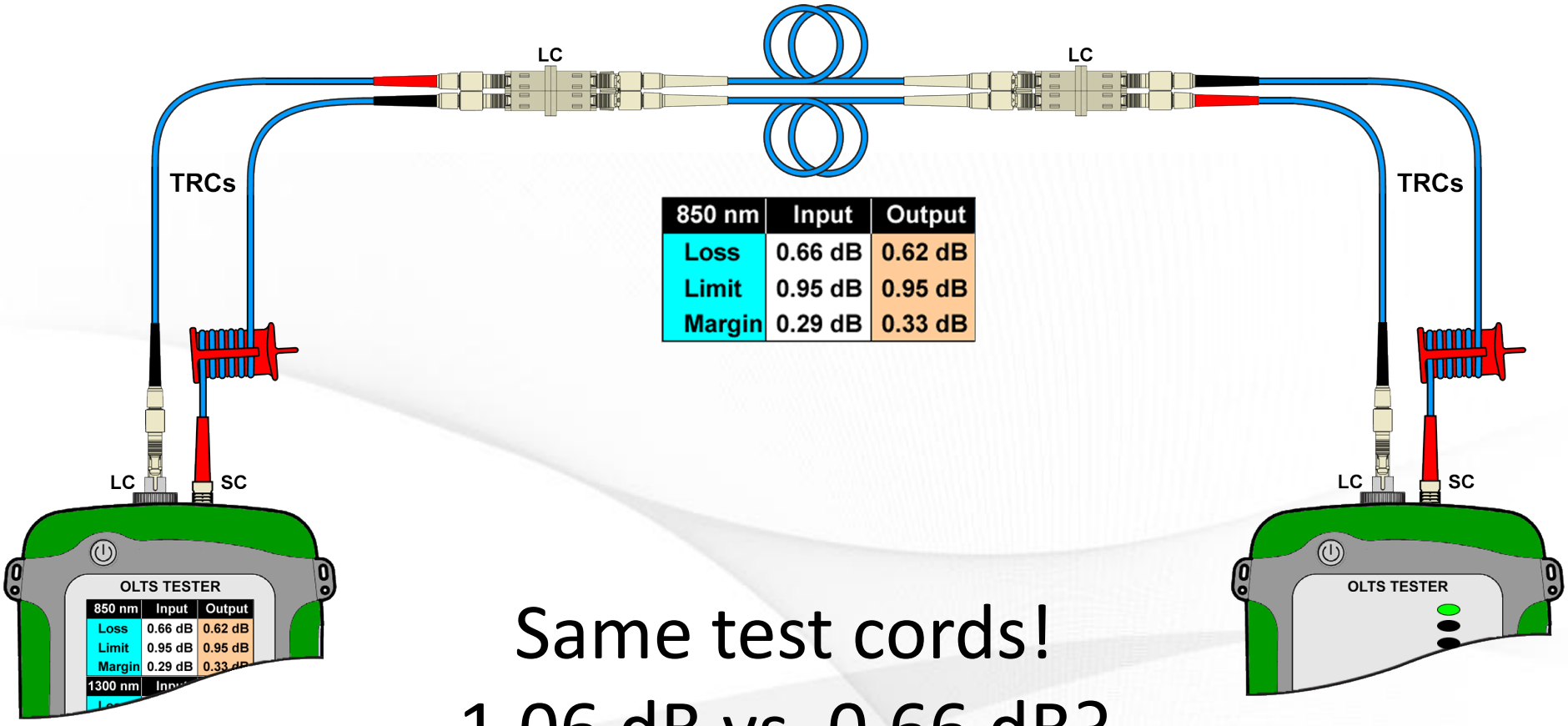
ENCIRCLED FLUX

LAUNCH CONDITIONS

- Test equipment #1, loss is 1.06 dB



- Test equipment #2, loss is 0.66 dB



Same test cords!

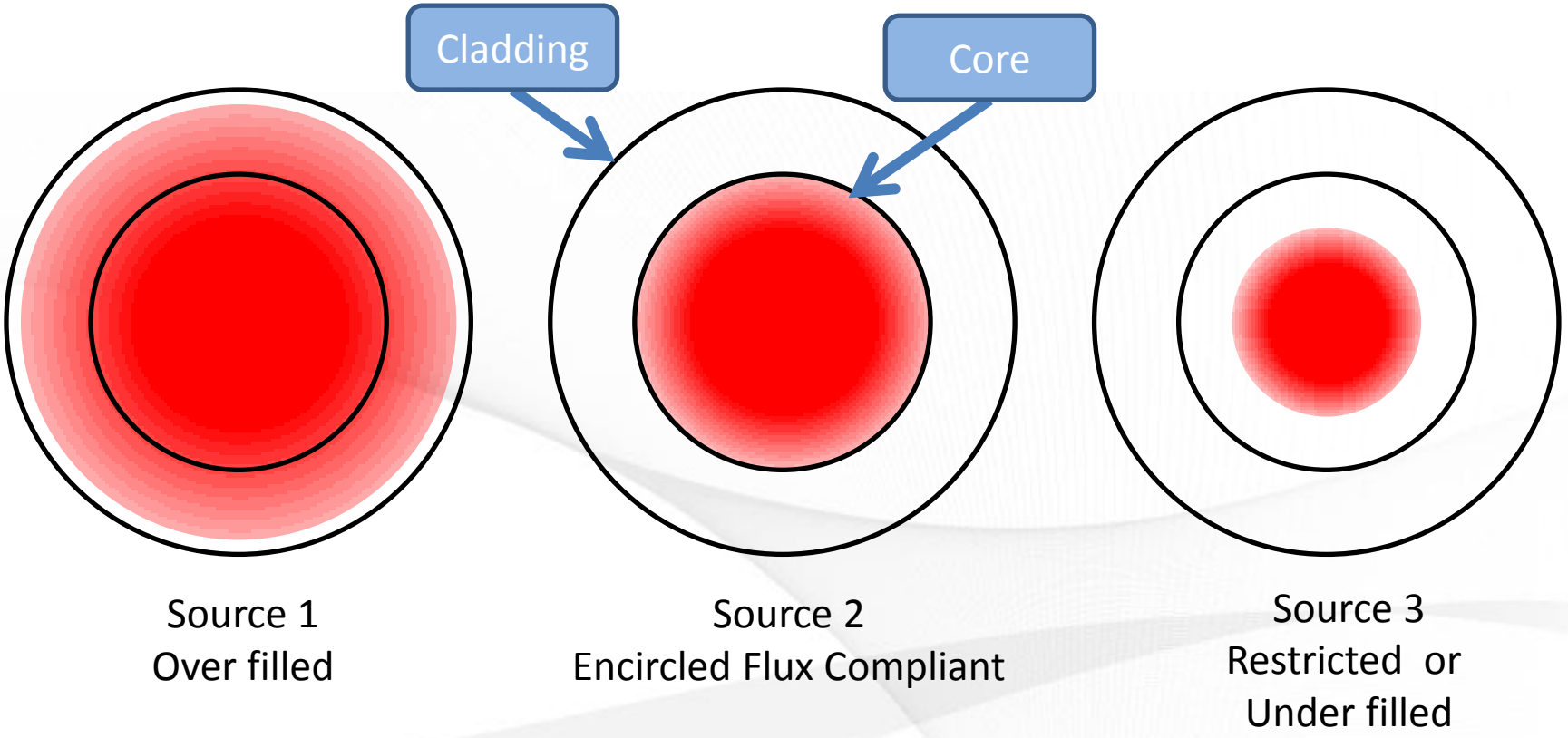
1.06 dB vs. 0.66 dB?

LIGHT SOURCE LAUNCH CONDITIONS

- Multimode launch conditions have a significant effect on the loss measurement uncertainty
- Encircled Flux (EF) is the final piece in the puzzle to reducing measurement uncertainty in the field
- It is a “new” definition of modal launch conditions of a light source
- This definition is more stringent than previous definitions such as MPD or CPR

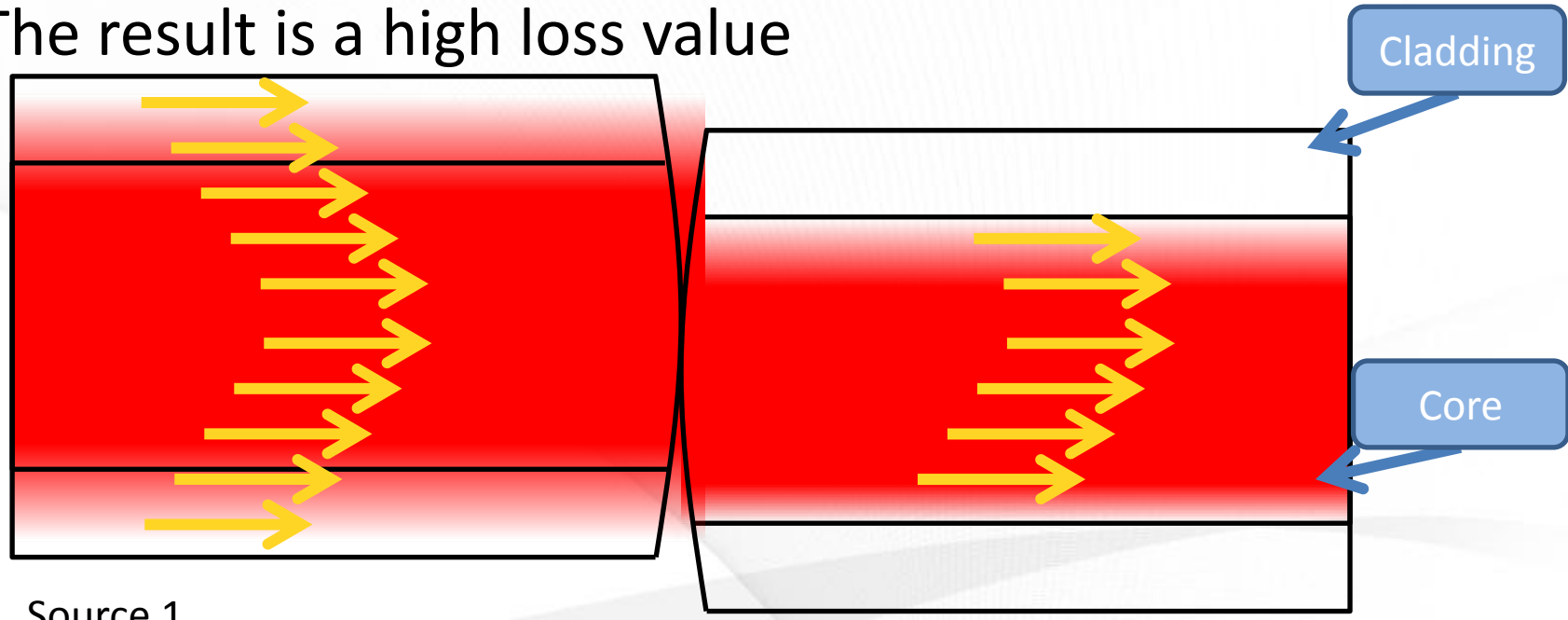
WHAT IS A LAUNCH CONDITION?

- The light source's launch condition determines how and where the light is distributed within the fiber.



OVERFILLED LOSS

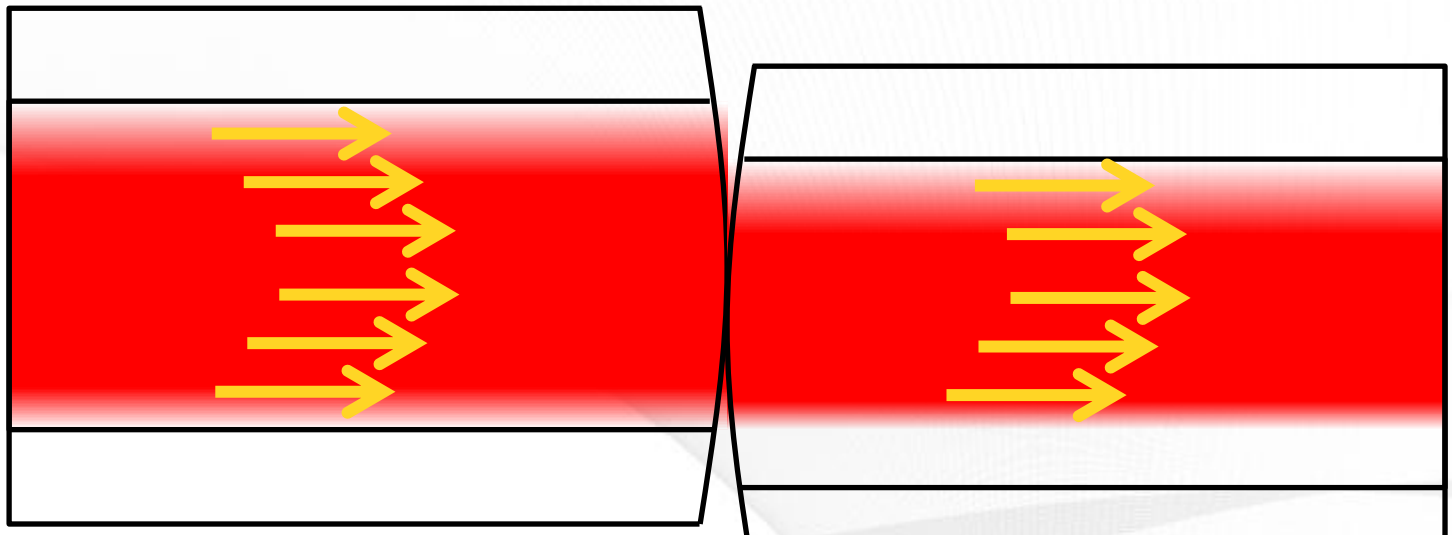
- An overfilled launch puts too much power in the cladding and higher order modes
- This power gets removed at the first connection
- The result is a high loss value



Source 1
Over filled

ENCIRCLED FLUX LOSS

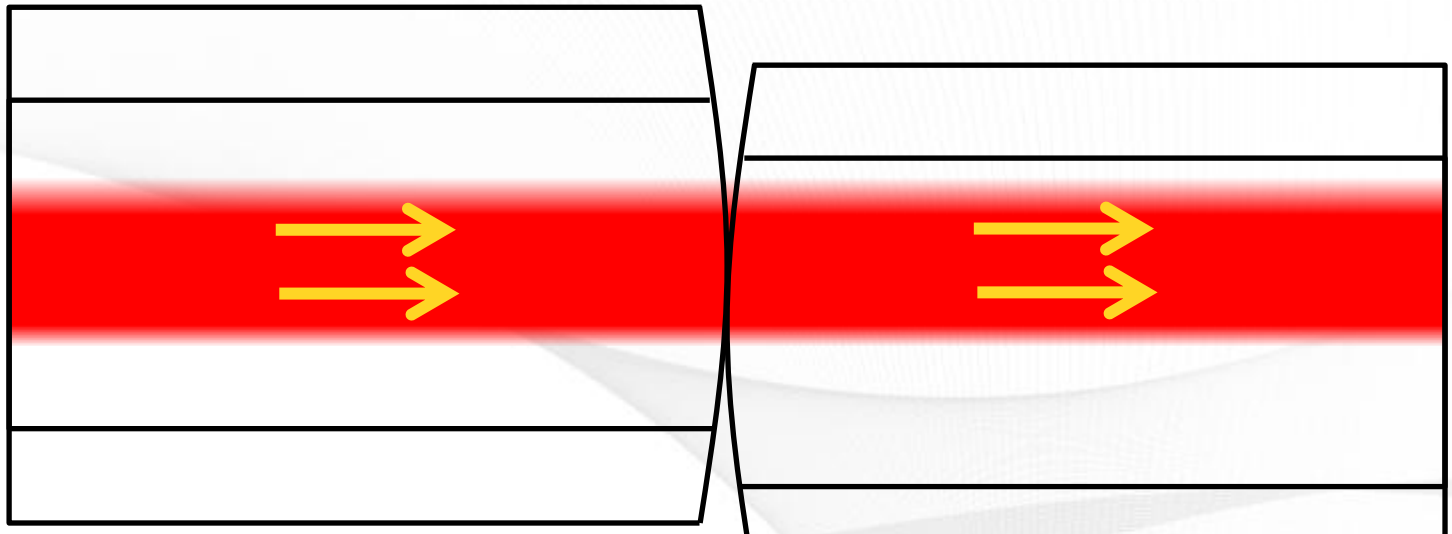
- An EF launch puts the right amount of light into the higher order modes
- The result is a correct loss value



Source 2
EF Compliant

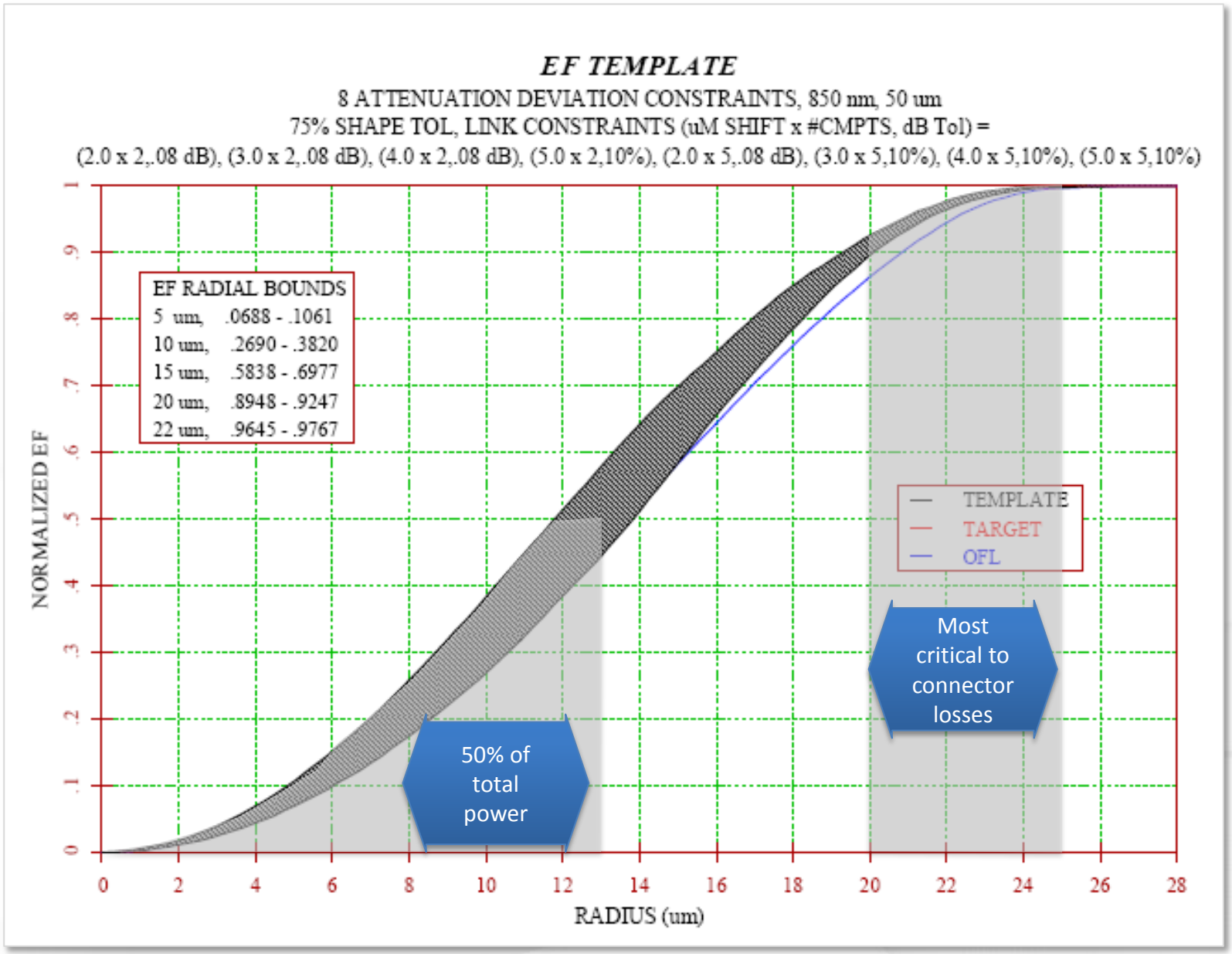
UNDER FILLED LOSS

- An under filled launch puts too little power in the higher order modes
- This power does not get removed at the connections
- The result is a low loss value

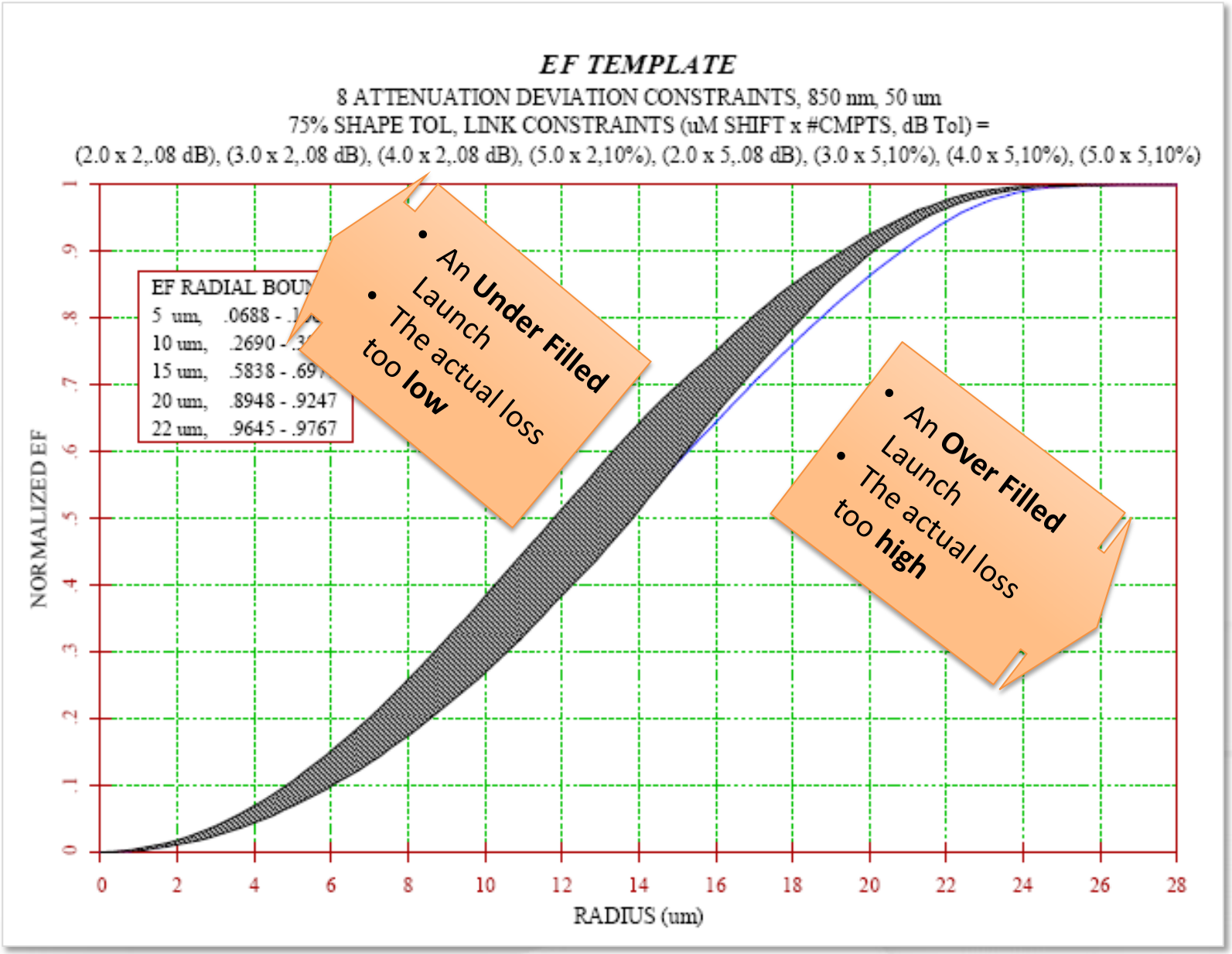


Source 3
Under filled

HOW DOES THE TEMPLATE WORK?

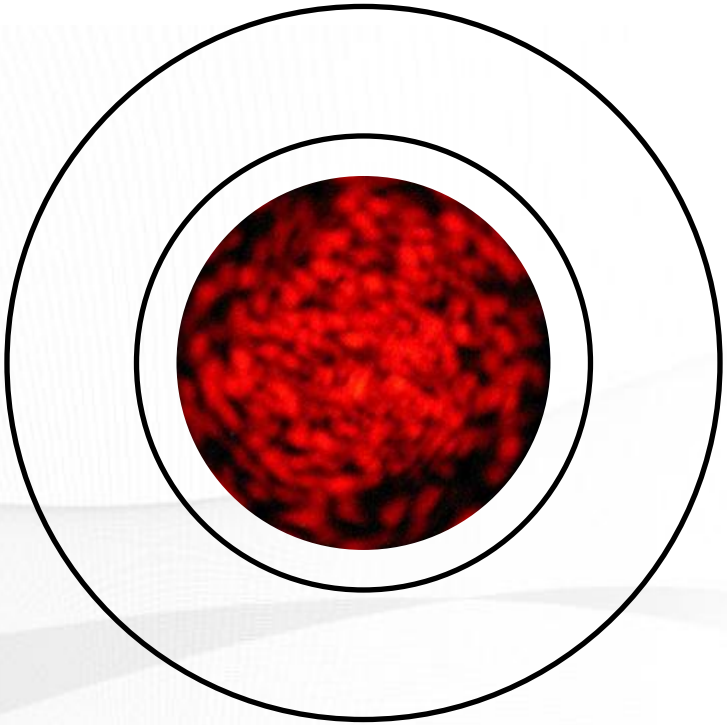


HOW DOES THE TEMPLATE WORK?



WHAT ABOUT A VCSEL LAUNCH?

- A VCSEL is a type of multimode 850nm laser
- Like most lasers it is typically underfilled
- All lasers suffer from what is commonly called speckle
- Speckle causes a non-uniform launch condition
- Loss measurements may be noisy due to speckle
- Standard do NOT allow VCSELs for multimode fiber certification



AN LED IS REQUIRED FOR MM TESTING

Excerpt from TIA-526-14B and IEC 61280-4-1

5.2.2 Spectral characteristics

The spectral width of the light source shall meet the requirements of Table 3 when measured in accordance with IEC 61280-1-3.

Table 3 – Spectral requirements

Centroidal wavelength nm	**Spectral width range, full width at half maximum** nm
850 ± 30	30[a] to 60
1 280 – 1 350	100[a] to 140
[a] The minimum of the spectral width range applies to LSPM methods only.	

VCSELs and other lasers have very small spectral widths, only an LED can meet this requirement

NOW PUBLISHED: TIA-TSB-4979

- Titled:
  - Practical Considerations for Implementation of Multimode Launch Conditions in the Field
- TSB = Telecommunications System Bulletin
  - Not an official standard
  - An advisory document
  - Chances are will end up in ANSI/TIA-568-D.3
- Helps users understand Encircled Flux and the options for implementing it

FLUKE networks®

EF MYTHS

- **It's expensive**
  - **FALSE**!
  - Any new tester should be EF compliant out of the box with minimal increase in cost

- **You have to purchase separate modules for 50/62.5 μm**
  - **FALSE**!
  - The Fluke Networks CertiFiber Pro comes in a Multimode configuration which gives you both 50/62.5 μm multimode in one module
  - Other testers require 2 separate modules to cover both forms of multimode (50 μm and 62.5 μm)

- **Encircled Flux is not required by standards yet**

  - **FALSE**!
  - Encircled Flux launch conditioning has been required in the standards since October 2010
  - CertiFiber Pro is the first EF field tester
  - Before CertiFiber Pro, EF testing was limited to the lab instrumentation

- **Encircled Flux isn't required since it doesn't make a big difference in results**
  - **FALSE**!
  - Under filled sources such as VCSELs will under report the loss by a large margin so you may pass that should fail
  - Be aware that testers differ from manufacturer to manufacturer and all of them may not be standards compliant!

HOW TO BECOME ENCIRCLED FLUX COMPLIANT

CERTIFIBER PRO OLTS

- CertiFiber Pro Optical Loss Test Set
  - Encircled Flux compliant out of the box
  - Singlemode , Multimode, Quad modules
  - Built-in VFL
  - Auto Pass/Fail analysis

- Innovative New Features
  - 3 sec Autotest
  - Guided set-reference wizard
  - Dual wavelength measurement on single fiber
  - Integrated USB inspection camera

- If you currently own DTX-MFM, DTX-GFM, DTX-MFM2 or DTX-GFM2

- Become EF compliant with either:

- CertiFiber Pro or DTX-EFM2

CERTIFIBER PRO VS DTX-EFM2

	 DTX-EFM2	 CFP-100-Q
ISO/IEC 14763-3 EF Compliant	X	X
Set Reference Wizard		X
EF Test Reference Cords Included	X	X
Test Time	12 sec	3 sec
Automated Fiber Inspection Option		X
Dual Wavelength Single Fiber Test		X
Combined SM + MM Module		X
Fails Negative Loss		X
Modular Versiv Platform		X
ProjX Management System		X
Cable ID Length	25 characters	60 characters
Touchscreen Display		X
LinkWare Live Compatible		X

INTERCHANGEABLE MODULES

Fiber Certification
Certifiber Pro

Copper Certification
DSX-5000

OTDR Certification
OptiFiber Pro

FI-7000
FiberInspector Pro

QUESTIONS

THANK YOU

For more information:

Download the Encircled Flux whitepaper

www.flukenetworks.com/ef

Visit CertiFiber Pro's website

www.flukenetworks.com/CertiFiberPro