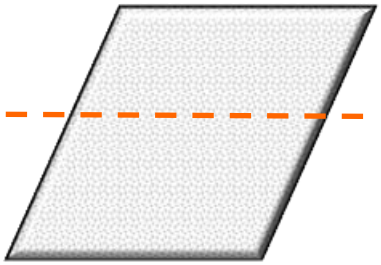
SCIENCE OF CLEANING FIBRE
BEST PRACTICE RECOMMENDATIONS

STICKLERS
When you need perfectly clean splices & connectors®

MOST EFFECTIVE METHOD FOR WIPING A FIBRE

Step 1:
Pull & fold a new wipe



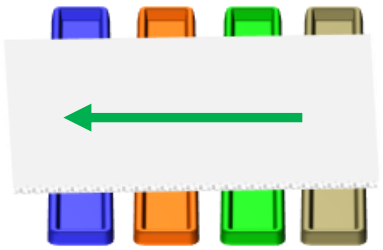
Step 2:
Apply the cleaning fluid

Step 3:
Wipe the fiber in single direction

- Avoid oversaturating the wipe
- Insert the fiber into the fold of the wipe after it has been stripped

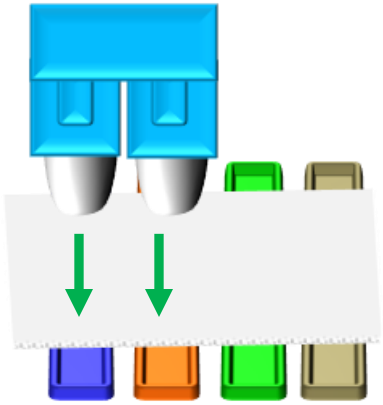
MOST EFFECTIVE METHOD FOR WIPING A FIBER

Step 1:
Pull a new wipe into the cleaning window



Step 2:
Wet one section of the wipe

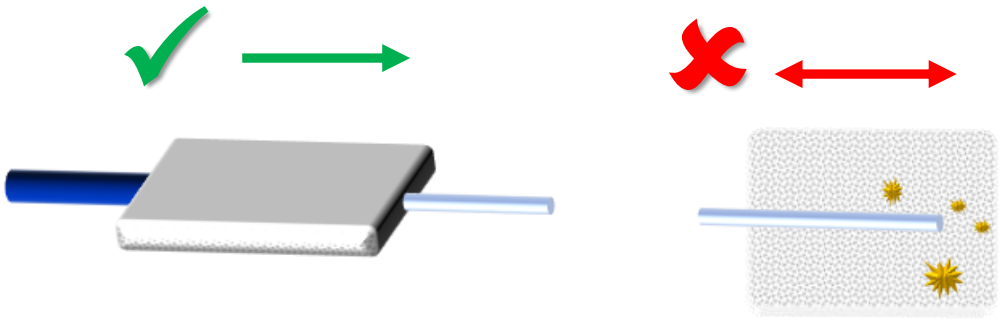
Step 3:
Place connector in wet section and wipe towards dry



- The cleaning fluid breaks up the contamination and dissipates electrostatic charges
- Using the coloured slots will avoid cross contamination when cleaning additional end faces on a wipe

REASON FOR SINGE DIRECTION WIPE

Wiping a fibre or connector back and forth will reapply the contamination you just took off.



Wiping a connector in Z-3 or a Figure 8 pattern will reapply the contamination you just took off.

RECOMMENDED OPTIONS FOR WIPING CONNECTORS

CLEANWIPES 90 Optical Grade Wipes
P/N: WFW

- Plastic protective tub with no roll hexagon can
- Use wipes for cleaning connectors & for cleaning fiber for splicing pigtails

Cassette CLEANCLICKER cleaner
P/N: CCWRC

- Microwoven fabric cleaning ribbon
- Manual advancement of cleaning ribbon
- Static dissipative medium in cleaning window

CLEANWIPES 640 Optical Grade Wipes
P/N: WCS640

- 8 slot cleaning window spaced for LC & SC duplex with static dissipative medium
- Plastic sealable box
- Use wipes for cleaning connectors & for cleaning fiber for splicing pigtails

Sticklers Cleaning Fluid
P/N: POC03M (3oz can)
P/N: POC 10M (10oz can)

- Can will not spill nor cross contaminate
- Use for wet-dry cleaning & fiber splicing

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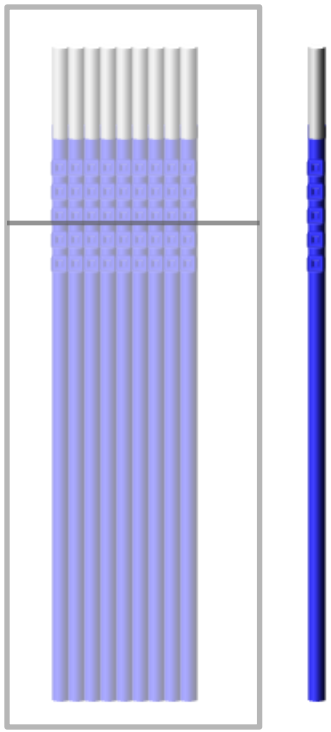
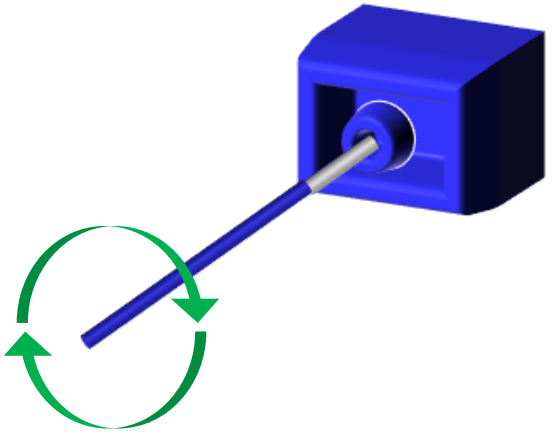
CLEANING IN ADAPTER CONNECTORS WITH STICKS

Step 1:
Take stick from package



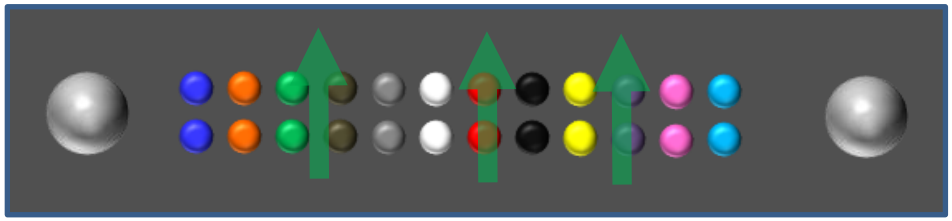
Step 2:
Tilt cab, pump & wet stick

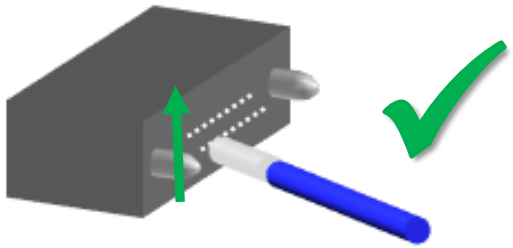
Step 3:
Insert stick and rotate 6x to 8x in same direction



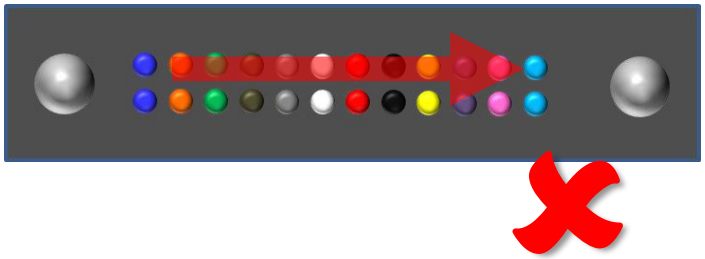
- Light push on the pump will dispense enough cleaning fluid for wetting the stick
- Taking out 1 stick at a time will prevent cross contamination unused sticks

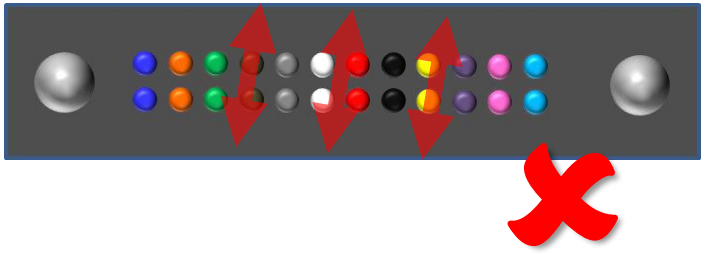
CLEANING MT FERRULES WITH STICKS





- Move the stick in a single direction from bottom to top
- Pushing contaminations across the array and going up and down will damage the fibre arrays





RECOMMENDED OPTIONS FOR WIPING CONNECTORS

CLEANSTIXX Optical Grade Sticks

- 50 sticks in a box
- Cleans in adapter connectors and socket termini
- Colour coded handle based on ferrule size

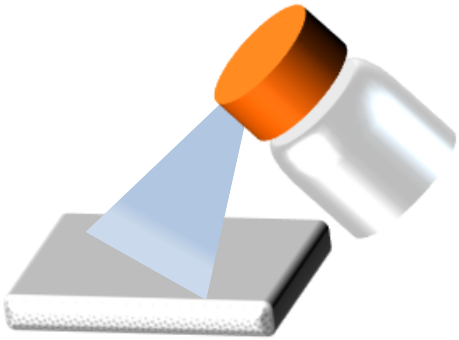
1.25mm	p/n	S12
1.6mm	p/n	S16
2.5mm	p/n	S25
MT	p/n	XMT
Recessed Tip	p/n	P25

Sticklers Cleaning Fluid
P/N: POC03M (3oz can)
P/N: POC 10M (10oz can)

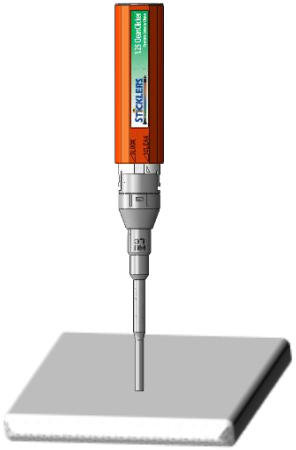
- Can will not spill nor cross contaminate
- Use for wet-dry cleaning & fiber splicing

WET-DRY CLEANING WITH A MECHANICAL CLEANER

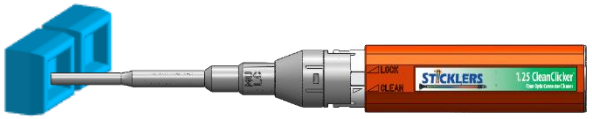
Step 1:
Wet an optical grade wipe



Step 2:
Wet an optical grade wipe



Step 3:
Insert the cleaner and engage



- Avoid oversaturating the cleaning tip
- Small amount of cleaning will loosen up contamination and dissipate electrostatic charge

RECOMMENDED OPTIONS FOR WIPING CONNECTORS

1.25mm CLEANCLICKER 400 Cleaner
P/N: CCM125

- Provides 400 engagements
- Cleans in adapter & LC, MU ARINC 801 assemblies plus the pin & socket of hardened 1.25mm FTTA assemblies
- Compact size is fits into confined spaces

2.5mm CLEANCLICKER 750 Cleaner
P/N: CCU250

- Provides 750 engagements & REFILLABLE
- Cleans in adapter & multiport drop enclosures & SC assemblies and drop cables

MPO CLEANCLICKER 600 Cleaner
P/N: CCMPO

- Provides 600 engagements
- Cleans in adapter & truck MPO assemblies

1.25mm CLEANCLICKER 750 Cleaner
P/N: CCU125

- Provides 750 engagements & REFILLABLE
- Cleans in adapter LC assemblies

CONNECTOR CLEANING AND SOURCES OF CONTAMINATION

REASON FOR CLEANING CONNECTORS:

- Mating dirty connectors will cause scratching and pitting ruining termini end faces
- Cleaning both end of mated connector pair before mating will extend service life of assemblies and ensure reliability of signals

COMMON SOURCES OF CONTAMINATION:

- Wear debris generated from moving parts when mating connectors
- Electrostatic charge caused by contact friction from dry cleaning processes
- Cross contaminated alcohol that has been diluted from atmospheric moisture, lint from paper based wipes, and broken cellular structure of foam tipped sticks

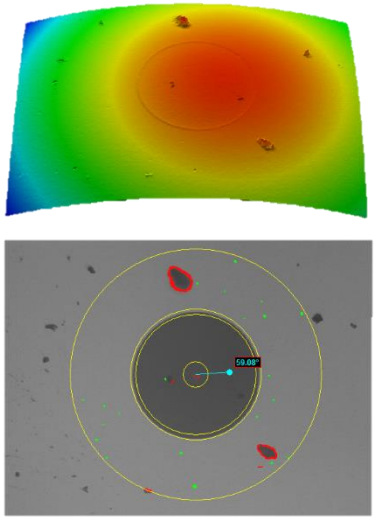


Image of dust contaminated end face courtesy of Promet Optics

INDUSTRY STANDARD: WHY IT MATTERS

Why should you use industry standards?

- Interoperability – working together with reliability
- Economies of Scale
- Open Market Access
- Drives Innovation
- Safety

What would happen if end users did not follow Industry standards?

- Products might not work as expected
- Inferior Quality
- Incompatibility with other equipment
- Redistricted to using proprietary sole sourced products

INDUSTRY STANDARD: IEC 61300-3-35

Fibre Optic Interconnecting Devices and Passive Components – Basic Test and Measurement

Procedures Part 3-35 Examination and Measurements – Fibre Optic Connector Endface Visual Inspection and Automated Inspection

SCOPE:

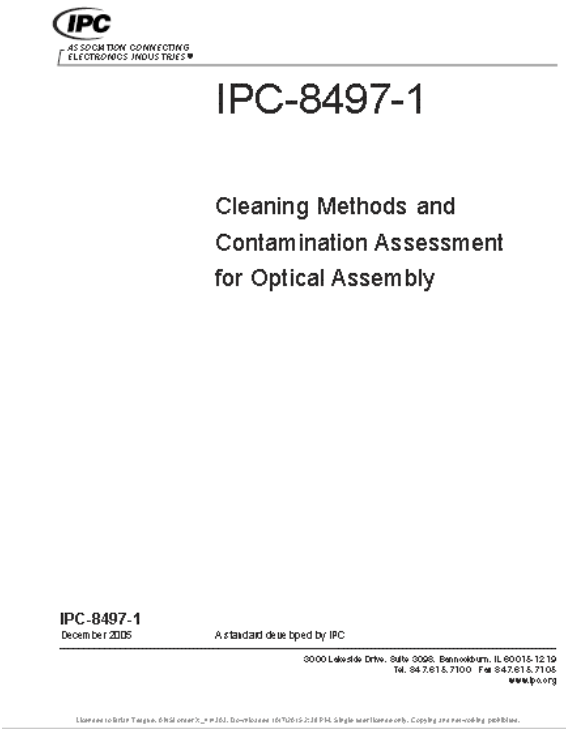
- Provides methods for quantitatively assessing the end face quality of a fiber optic connector
- Tells you what are allowable defects like scratches, pits and debris can be on ferrule end face without disrupting the optical performance
- The spec is written for applications using ≤ 2W power

INDUSTRY STANDARD: IPC 8497-1

Cleaning Methods and Contamination Assessment for Optical Assembly

SCOPE:

- Describe methods of inspecting and cleaning all optical interfaces so their interconnectivity does not result in loss of optical signal
- Also describes methods of contamination prevention.
- Target audience are Manufacturing Operators, Manufacturing Process Engineers, Quality Engineers and Field Systems Installers


IPC
ASSOCIATION CONNECTING ELECTRONICS INDUSTRIES

IPC-8497-1

Cleaning Methods and Contamination Assessment for Optical Assembly

IPC-8497-1
December 2005
A standard developed by IPC

3000 Lakeside Drive, Suite 309S, Bannockburn, IL 60015-1219
Tel: 847.615.7100 Fax 847.615.7105
www.ipc.org

Why should you care?

This standard will make sure your suppliers are manufacturing and shipping you a quality product.

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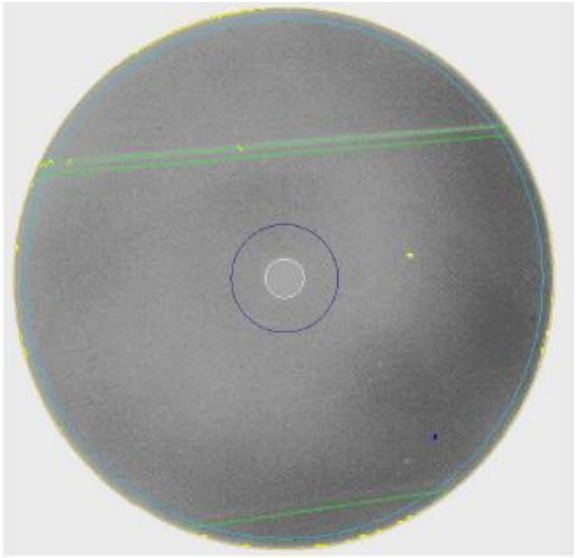
INDUSTRY STANDARD: IEC 61300-3-35 SCRATCH VS DEFECT

Section 3 Measurement defines scratches and defects

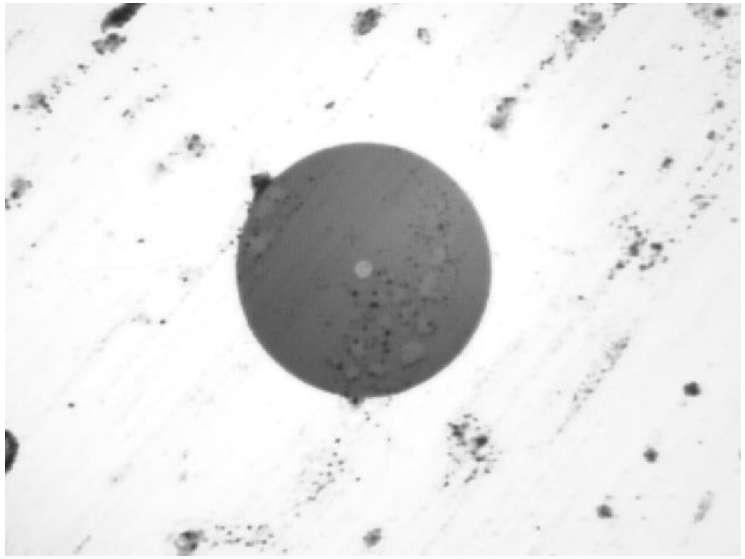
Scratch:

Permanent linear surface feature



Defect:

All non linear features including particulates, other debris, pits, chips, edge chipping



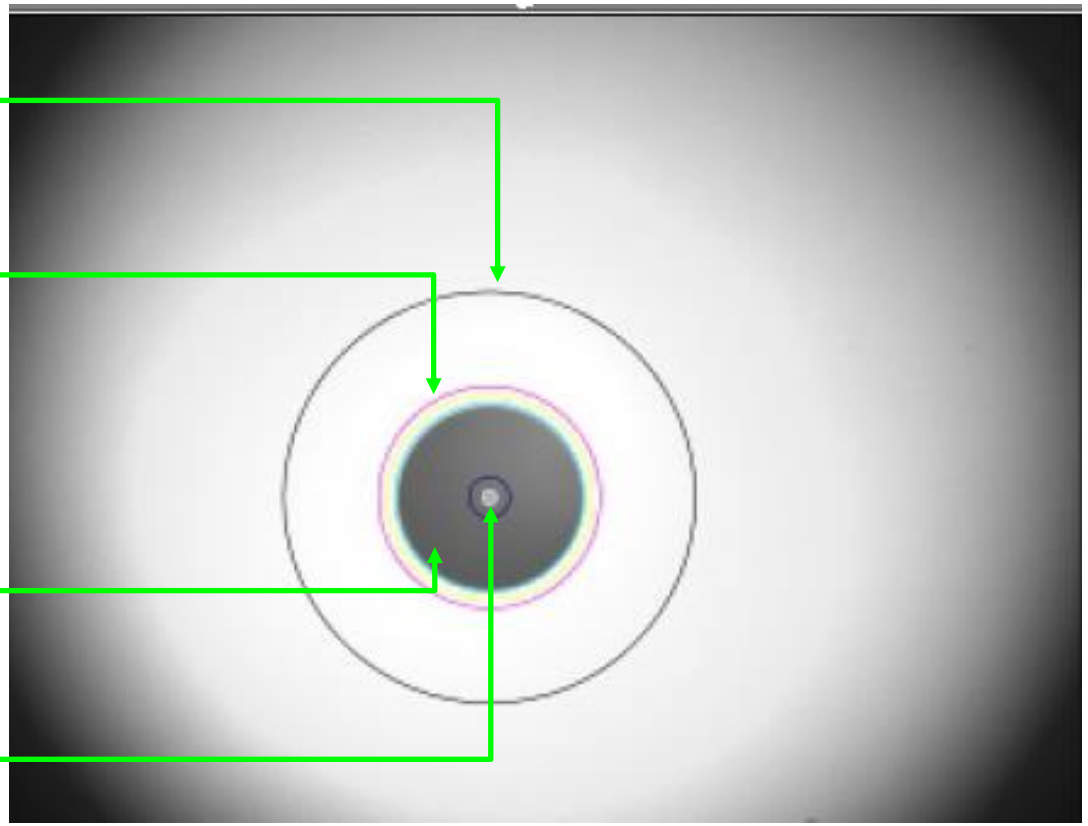
INDUSTRY STANDARD: IEC 61300-3-35 ZONES EXPLAINED

Zone D - Contact Zone
130µm to 250 µm

Zone C – Adhesive Zone
120µm to 130 µm

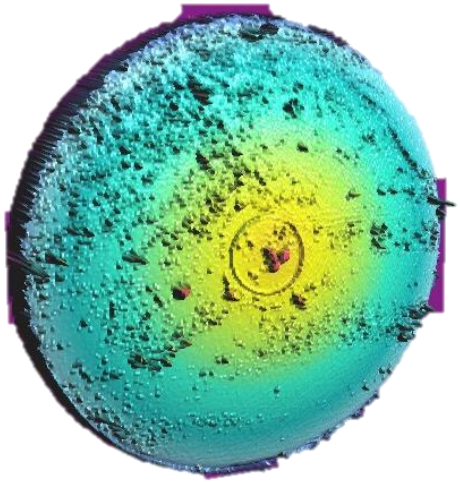
Zone B – Cladding Zone
120µm to 25 µm Singlemode
120µm to 65 µm Multimode

Zone A – Core Zone
25µm to 0 µm Singlemode
65µm to 0 µm Multimode

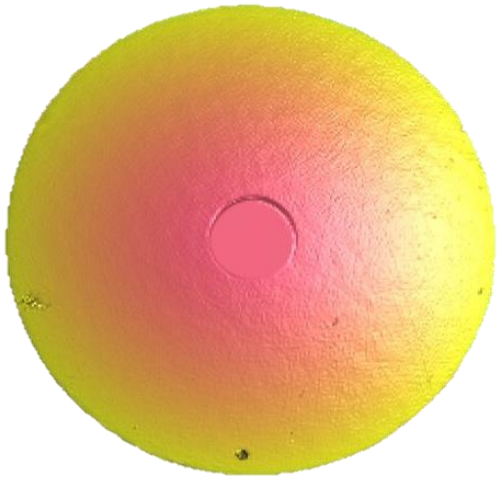


INDUSTRY STANDARD: IEC 61300-3-35 PROCESS EXPLAINED

Connector A

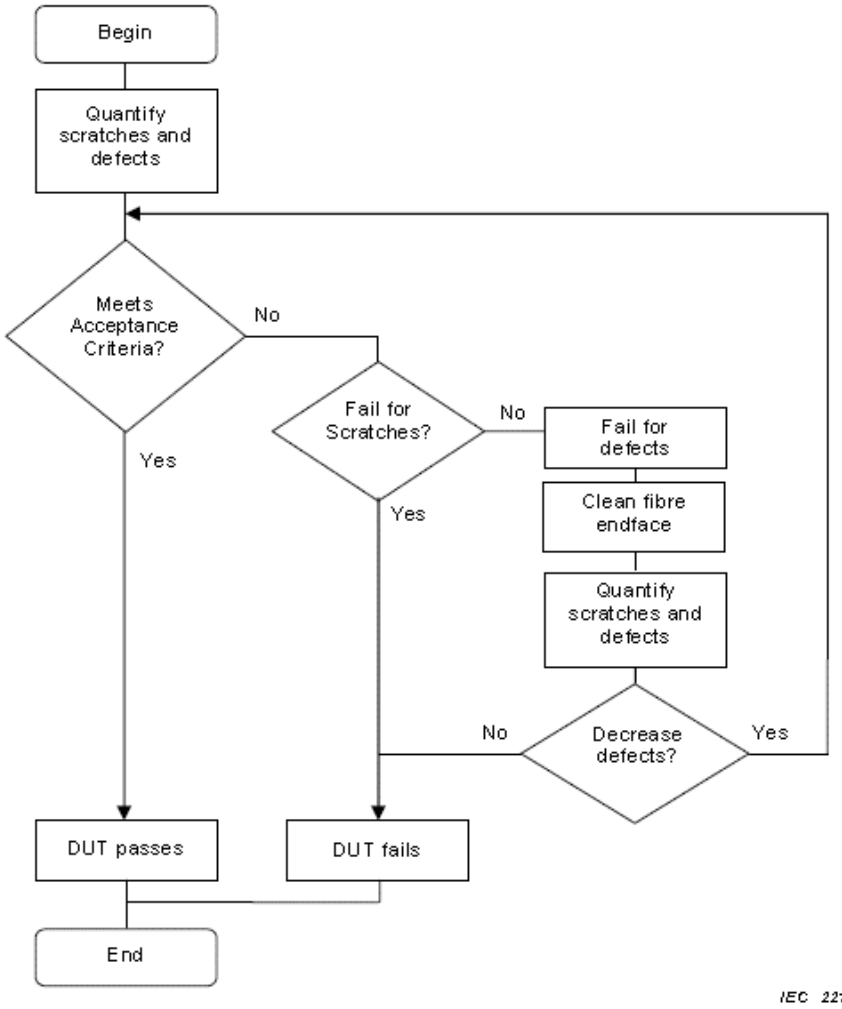


Connector B



- Mating a clean connector to a connector with hard dust or connector wear debris will create scratches and pits on both connector surfaces
- Dust particles break apart during the mating and migrate towards the apex of the ferrule

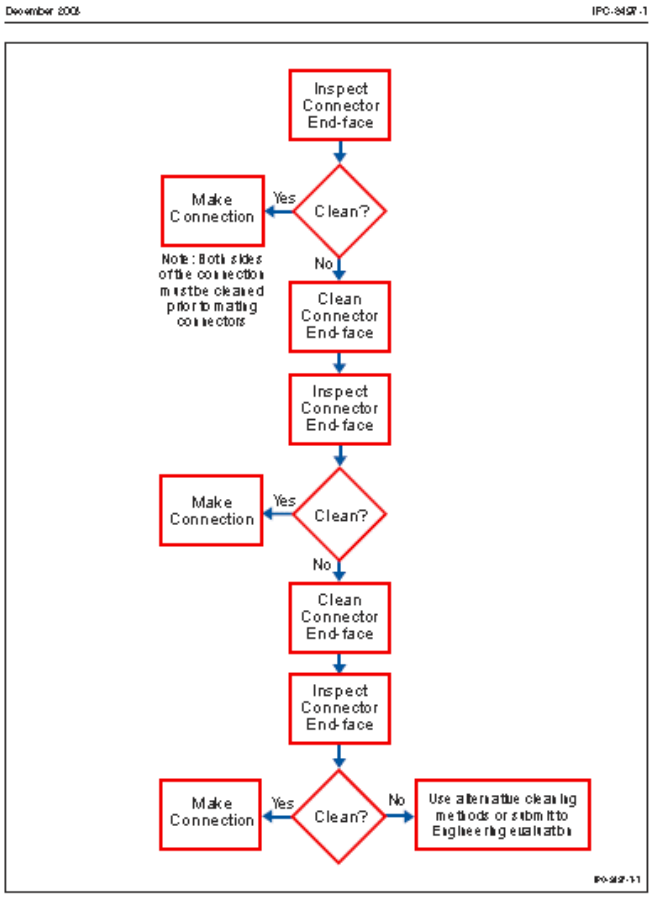
INDUSTRY STANDARD: IEC 61300-3-35 PROCESS EXPLAINED



- The flow chart is from Section 5.3 Inspection Procedure
- The best practice before mating the connector pair is to:
  1. Inspect
  2. Clean if Necessary
  3. Re Inspect
- It is important to do **BOTH** connectors

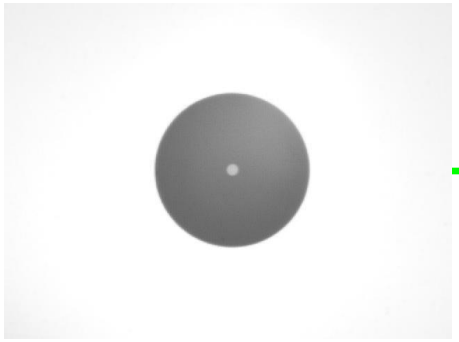
INDUSTRY STANDARD: IPC 8497-1 PROCESS EXPLAINED

- The flow chart is from
  Figure 4.1 Connector End-Face Inspection Row
- Recommends inspect, clean and re inspect
- IPC uses the three strikes before changing cleaning methodology

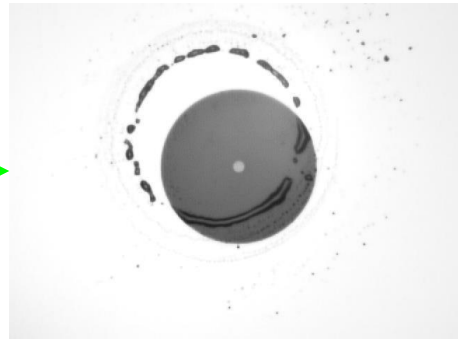


BEST PRACTICE: CLEAN BOTH CONNECTORS

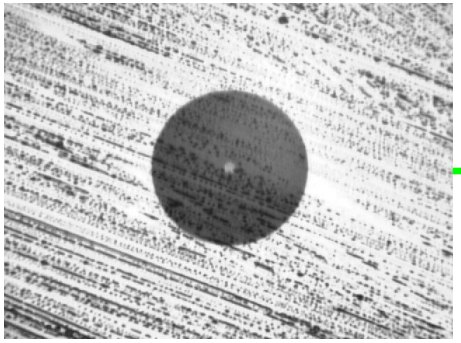
Connector A



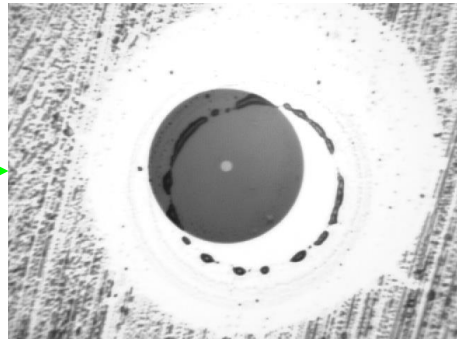
Connector A



Connector B



Connector B



The images show what happens when a clean connector (A) is mated to contaminated connector (B)

If you only clean one connector, you **cross contaminate** both connectors.

BEST PRACTICE: CLEAN YOUR TEST GEAR AND TIPS

- Most inspection scopes and loss test sets use metal adapters
- The insertion of metal tips during the testing process will generate wear debris

CLEANING OPTIONS MATRIX

	Dusters	Cassettes and Dry wipes	Solvent Only	Solvent and Wipes	Sticks Only	Solvent and Sticks	Mechanical Cleaners	Machines
Patchords	Y	Y	N	Y	Y	Y	Y	Y
In Adapters	Y	N	Y	N	Y	Y	Y	Y
Transceiver lens	Y	N	Y	N	Y	Y	Y	Y
Alignment sleeves	Y	N	Y	N	Y	Y	N	Y
Dust caps	Y	N	Y	N	Y	Y	N	Y

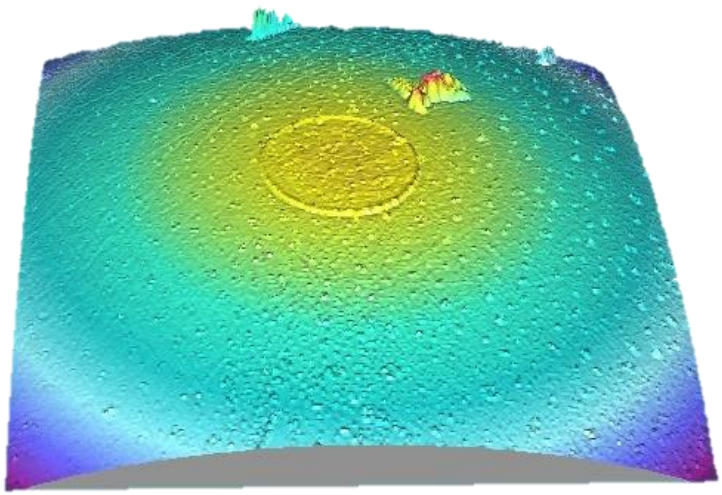
The table is based on Table 7.1 from the IPC 8497-1

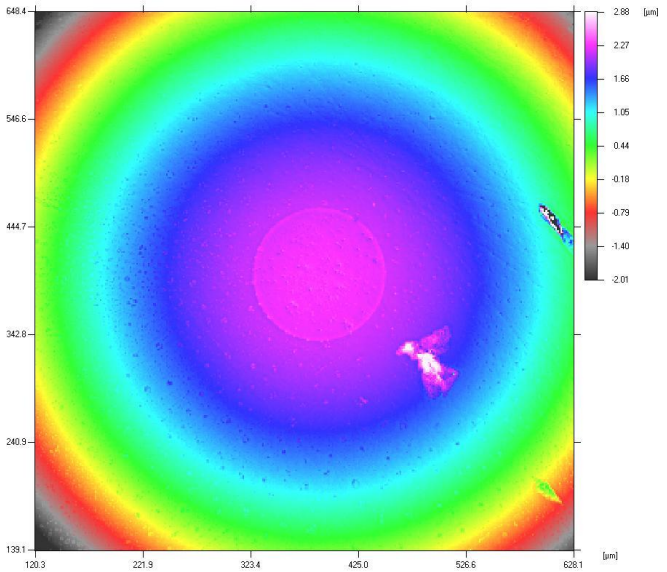
WET DRY CLEANING CONNECTORS

- Cleaning fluid increases the local humidity level allowing static to dissipate
- Avoid hygroscopic fluids and containers that draw in air to avoid cross-contamination
- Pre-saturated wipes are vulnerable to contamination from packing materials
- Use fast-evaporating and high-purity cleaning fluids with optical grade wipes

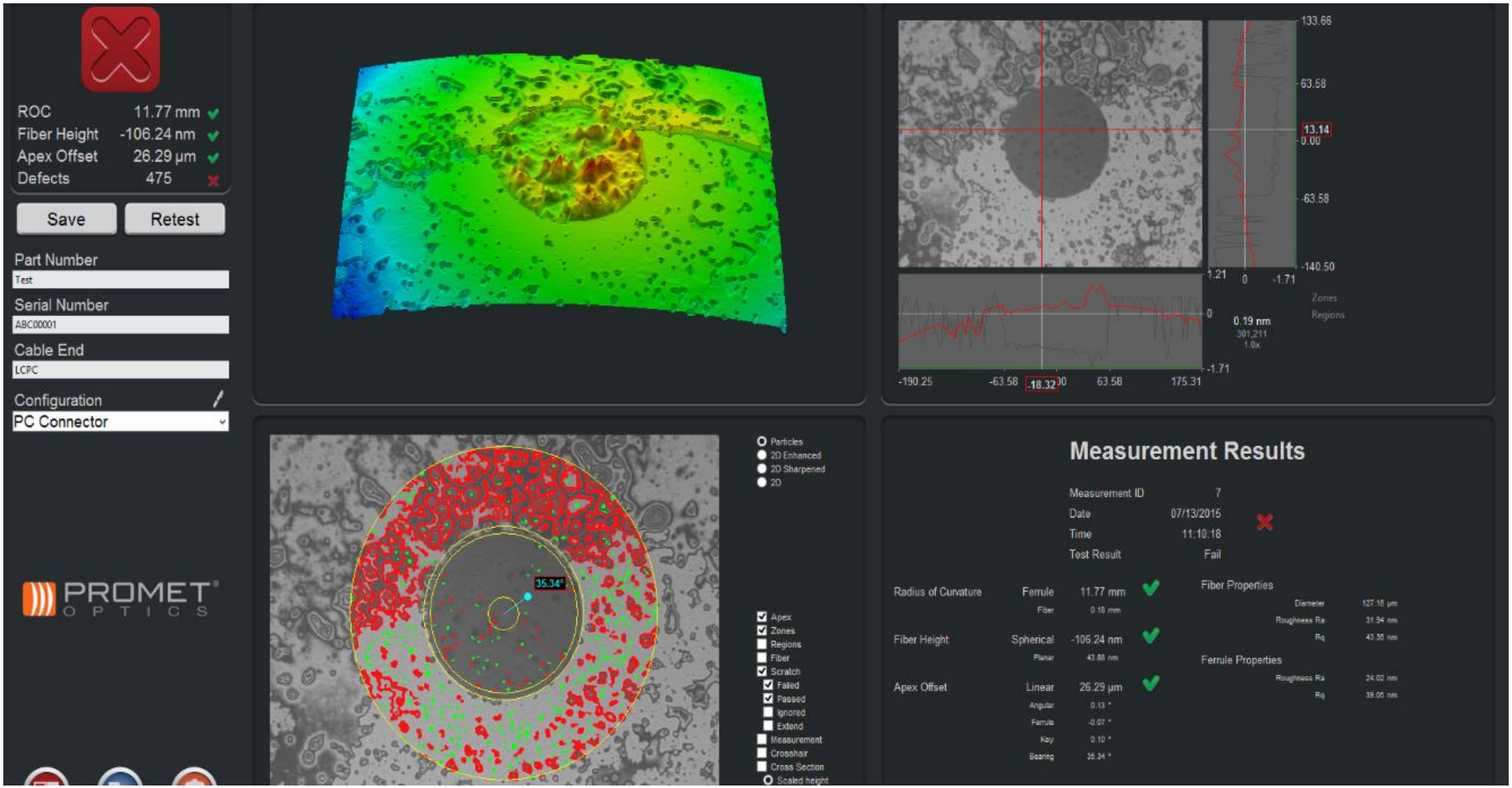
ISSUES WITH IPA

- IPA is hygroscopic meaning it attracts water molecules
- Alcohol dispersers pull in the air during the pump action
- Very flammable with high vapor pressure





ISSUES WITH IPA



CASE FOR USING STICKS AND CLEANING FLUID

1. **CLEANING PERFORMANCE:**
   - The use of cleaning fluid breaks up heavy oils and residue contamination
   - The strands in the cleaning tip create a capillary action which wicks up contamination from the end face
2. **ELMINATION OF ELECTROSTATIC CHARGE EFFECT:**
   - The cleaning fluid becomes the dissipative medium that eliminates the electrostatic charge on the ferrule and connector housing
   - Cleaning with a moisten cleaning stick does not create an electrostatic charge during the wiping process
   - The cleaning stick's tip makes contact with the socket wall during the rotation process which dissipates the electrostatic charge
   - Using the cleaning fluid will ensure compliance to IEC 8497-1 Sect 10

CASE FOR USING STICKS AND CLEANING FLUID

3. LARGEST EFFECTIVE CLEANING REGION:

- The cleaning stick's tip diameter is able to reach contamination that resides in the outer regions of the ferrule end face
- Removing contamination from end face periphery significantly reduces particle migration

LIMITATIONS OF ALL MECHNICAL CLEANERS:

- Dry wiping causes an electrostatic charge from the contract friction between the cleaner's cleaning strand flowing across the ferrule end face
- Wet-dry cleaning is ineffective because the cleaning strand wicks up on both sides of the cleaning strand requiring multiple engages
- The cleaning tip outer diameter is reduced to prevent contact with socket walls that would interfere with the cleaning strand flow
- The effective region is < Ø0.6mm for Ø1.25mm ferrule

4 QUESTIONS FOR SELECTING A CLEANING OPTION

1. What kind of contamination have connectors been exposed to?	2. What are conditions like at the work site?
▪ Residues/dust particles/both ▪ Light or severe contamination level ▪ Material degradation	▪ Ventilation/air flow ▪ Flammability concerns ▪ Operating & storage conditions ▪ Air quality ▪ Atmospheric dust & moisture levels
3. How do the solvents need to be transported ?	**4. What are regulatory requirements?**
▪ Need for air shipment ▪ Hazmat restrictions ▪ No-spill/no-leak containers	▪ DOT, restrictions ▪ RoHS, GHS & REACH compliance ▪ Substance & chemical restrictions

BEST PRACTICE SUMMARY

Best Practices for Cleaning Fluids:

- Use hermetically sealed containers to avoid cross contamination
- Less is more – Dispense just enough to clean a connector

Best Practices for Sticks & Swabs:

- Rotate stick at least 6X in a single direction
- Limit force to about the same pressure you would use for a writing pen
- Never excessively scrub the end face to prevent scratching with wear particulates

Best Practices for Wiping Connectors:

- Wipe connectors in a single direction
- Always wipe MT based connectors (i.e MPO) in a single direction vertical direction
- Tilt end face for APC so the 8˚ angle is touching the wipe

General Best Practices:

- Never look directly into a connector with the bare eye
- Inspect, clean if necessary & re-inspect
- Reusing wipes & sticks causes cross contamination

For More Information Contact:

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