



R&M faked 'E-2000 / LSH' connectors
Findings after testing according IEC standards

Version 1808

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Summary

The faked sample kits got tested according IEC standards and specifications.

Findings:

- No one of the sample kits fulfilled even one of the test blocks
- Some sample kits are highly likely to fail and cause network interruptions
- We found both connector design and quality of assembling generate the bad results

Not recommended

Sampling and test procedure



- All sample kits were purchased directly from the distributor
 - each sample kit comprise at least 10 APC assemblies and 10 APC adapters
- All samples were cleaned according to regulations before the tests
- All pictures, diagrams and graphs are available in the released-for-external-use-test report

Sources

Definition:

'Source' means faked R&M labeled E-2000 components which likely got produced in the same injection molding tool.

Emerged in:

Source	WEU	SEE	NEE	SWE	Asia	Latam
A	X					
B	X					
C			X			
D					X	
E			X			

RESULTS & FINDINGS

Rating of test methods

- Some IEC test procedures only assess the individual component (connector or adapter). The results of these tests qualify only the individual components and are suitable to compare identical products from different manufacturers.
- The following tests are particularly suitable for the evaluation of a plugged optical fiber connection in terms of longevity and reliability:
 - Temperature change (→ quality of raw material and design)
 - random mated IL, random mated RL (→ precision of ceramic parts, design)

Reliability and longevity of the fiber optic connection are essential for R&M.

FAILS could have a bad effect to...

Test	Push & Pull ability	Longterm Behavior	Maintenance Behavior	High Power Ability (> 0.5W)	Fire Behavior
Visual inspection		x			
Ferrule length		x	x		
Interferometry	x			x	
Connector surface	x	x	x	x	
IL random	x		x		
RL random	x		x		
Flexing (assembly)		x	x		
Cable retention		x	x		
Adapter strength		x	x		
Adapter bending moment		x	x	x	
Ferrule compression force		x	x	x	
Temperature change		x			
Flammability					x

FAILS could be generated by...

Test	Quality level of material used	Quality of polishing process	Quality of ferrule used	Quality of tuning process	Quality of component design
Visual inspection	X				
Ferrule length		X			
Interferometry		X	X	X	
Connector surface		X			
IL random		X	X	X	
RL random		X	X	X	
Flexing (assembly)					X
Cable retention	X				X
Adapter strength	X				X
Adapter bending moment	X				X
Ferrule compression force		X			X
Temperature change	X				x
Flammability	X				

Visual Inspection

	Inspection	Testgroup				
Test	Description	A	B	C	D	E
IEC 61300-3-1 Ed 2.0 (09-2005)	Visual inspection	fail	fail	fail	fail	fail
IEC 61754-15 Ed. 2.0 (06-2009)	Ferrule length / dimension	fail	fail	fail	fail	fail



Visual inspection:

- different colors / non-accurate single parts generates 'gaps' after assembling
- damages of plastic housing after plug in / plug out
- scratches and big particles



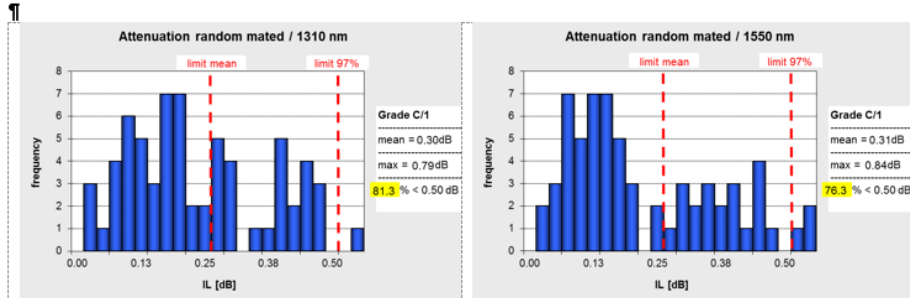
Dimension / Ferrule length:

- to short / to long ferrules → could affect long term stability of connection

Optical Tests

Test	Optical Tests	Testgroup				
		A	B	C	D	E
IEC-61300-3-47 Ed. 1.0 (07-2014)	Interferometry	fail	fail	fail	fail	fail
IEC-61300-3-3-35 Ed- 2-0 (06-2015)	Connector surface inspection	fail	fail	fail	fail	fail
IEC-61300-3-3 Ed. 3.0 (03-2009)	Active monitoring in attenuation	done	done	done	done	done
IEC-61300-3-34 Ed. 3.0 (12-2008)	IL random mated	fail	pass	fail	fail	fail
IEC-61300-3-3-6 Ed. 3.0 (12-2008)	RL random mated	fail	fail	fail	fail	fail

IL-mean=-0.31 dB, 76.3% IL ≤ 0.50 dB



Test-FAIL... Seitenumbruch

Test-parameter
Wavelength/s; 1310-nm-and-1550-nm

Requirements
RL ≤ -60 dB

Results
Group A
Max. RL value = -40.5 dB; 22% RL > -60 dB -- Test-FAIL.

Group B
Max. RL value = -52.8 dB; 1% RL > -60 dB -- Test-FAIL.

Group C
Max. RL value = -43.5 dB; 100% RL > -60 dB (after ferrules orientation adjustment) -- Test-FAIL.

Mechanical tests

Test	Mechanical tests Description	Testgroup				
		A	B	C	D	E
IEC-61300-2-42 Ed. 3.0 (02-2014)	Static side load (pigtailed)	n.a.	n.a.	fail	fail	n.a.
IEC-61300-2-44 Ed. 3.0 (07-2013)	Flexing	fail	fail	fail	fail	fail
IEC-61300-2-4 Ed. 1.0 (06.1996)	Cable retention test	fail	fail	pass	fail	fail
IEC-61300-2-6 Ed. 1.0 (12-2010)	Adapter strength	pass	pass	pass	pass	pass
IEC-61300-2-7 Ed. 2.0 (05-2013)	Adapter bending moment	pass	pass	pass	pass	pass
IEC-61300-3-22 Ed. 2.0 (12-2010)	Ferrule compression force	fail	pass	fail	fail	n.a.

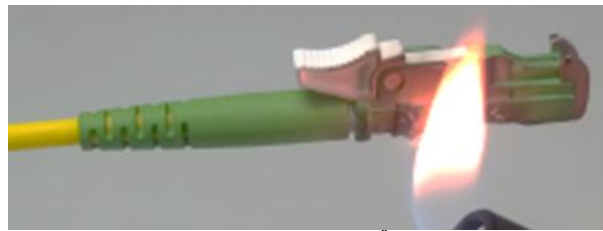


2-mm-patch-cables

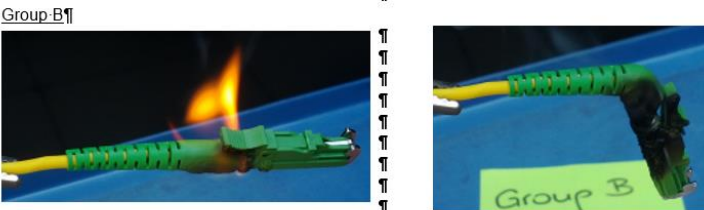
1550-nm	Ch1	Ch2	Ch3	Ch4
max-ΔIL-[dB]	0.47	broken	0.25	0.29

Environmental tests

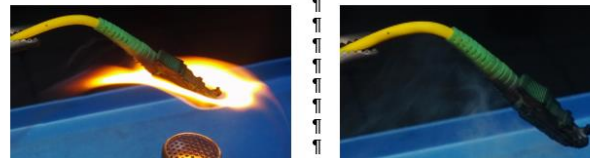
Test	Environmental tests	Testgroup				
		A	B	C	D	E
IEC 61300-2-22 Ed. 2.0 (02.2007)	Change of temperature	fail	fail	fail	fail	fail
IEC 60332-1 / -2 Ed. 1.0 (2004)	Flammability test	fail	fail	fail	fail	fail



R&M



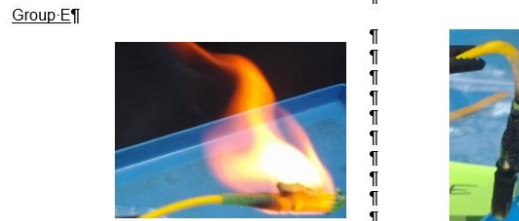
The-Group-B-burn-shortly-and-melt-[]



The-Group-D-is-self-extinguishing, however produce a terrible-smell. -
Absolutely-not-recommended-for-indoor-installation-[]



The-Group-C-burn-shortly-and-produce-a-dense-white-smoke-[]



Group-E-burns-shortly, the-start-melting-and-produce-a-terrible-smell-[]
Absolutely-not-recommended-for-indoor-installation-[]



Rating of sources tested

Danger to fail with...

Source	Push & Pull ability	Longterm Behavior	Maintenance Behavior	High Power Ability (> 0.5W)	Fire Behavior
A	Red	Orange	Red	Red	Red
B	Orange	Orange	Orange	Red	Red
C	Red	Orange	Red	Red	Red
D	Red	Orange	Red	Red	Red
E	Red	Orange	Red	Red	Red
Legend	No problem	Critical	Dangerous		

'Better Connected' with R&M

- best 'Push-Pull ability'
 - tuning / consequent Grade-policy
 - premium ferrules
 - 100% control during assembling process
- best 'Long term behavior'
 - product design
 - materials used
 - system warranty
- best 'Maintenance behavior'
 - mechanical robustness of components (product design & materials used)
- best 'High Power ability'
 - tuned Grade B / Grade A assemblies
 - mechanical robustness of components (product design & materials used)
 - 100% control during assembling process
- best 'Fire behavior'
 - materials used

Additional information sources

- R&M microsite 'faked E-2000 connectors'
- R&M microsite 'better connected' (Release November 2018)

Questions?