Technical Paper | opticalCON® HYBRID MED

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Technical Paper – opticalCON **HYBRID MED**
Title: NTP14 V1

Subject:

Mechanical and optical tests applied to the opticalCON® transmission system for Pro Audio / Video industry purposes with main focus on changes in attenuation.

Optical performance is being examined with regard to attenuation and its variation vs. environmental and mechanical conditions.

This documentation describes the results of the test series conducted at Neutrik AG and University of Applied Sciences of Technology Buchs NTB.

The tests were carried out in accordance with the IEC-Standard main groups IEC 61753-1 and IEC 61300 as well as to Neutrik internal specifications.

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1 Change of Temperature

Object:

Variations in attenuation due to temperature changes.
The test was arranged with one NKO16M-XP-0-5 cable connected to 2x NO16FD-XP receptacles.

Test Set-Up:

Test procedure according to IEC 61300-2-22.
The test was realized in a temperature testing chamber type WEISS WK11-180/40.

Test cycles:	72 h	
Profile of temperature:	-25 °C to +70 °C	
Light source:	Kingfisher KI2824	
Power meter	Kingfisher KI2600GE	
Measuring wave lengths:	850 nm	multimode
Cable length:	5 m	

figure 1.a: Test set-up

Temperature Profile and Results:

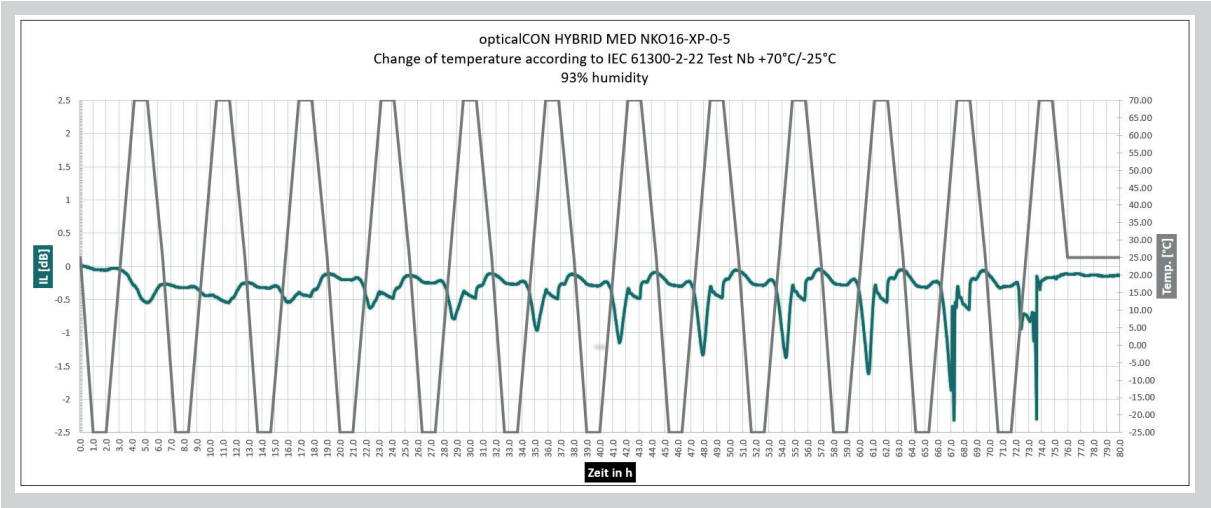

figure 1.b: Temperature profile and measurement results

The change of the attenuation varied from 0.1 dB to maximum 0.5 dB at a temperature range from +70 °C to + 10 °C within 72 hours. Higher attenuation values accured by temperatures down to -25 °C. These high values can be traced back by the effect of condensation of the lenses due to the temperature changes.

2 Cable Retention

Object:

Test of the cable retention efficiency. The opticalCON HYBRID MED cable NKO16M-XP-0-5 was exposed to tractive forces until the cable started to move.

Test Set-Up:

The applied test procedure is referred to IEC 61300-2-4.

Tension test device:	Mecmesin MultiTest 2.5i (0 - 1'000 N)
Light Source:	Kingfisher KI2824
Power Meter:	Kingfisher KI2600-GE
Cable type:	NKO16M-XP-0-5

Test Results:

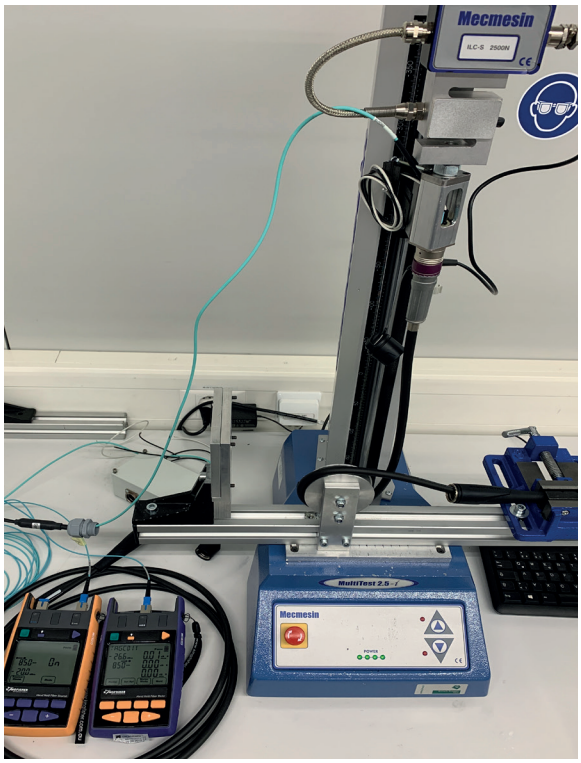

figure 2.a: Test set-up

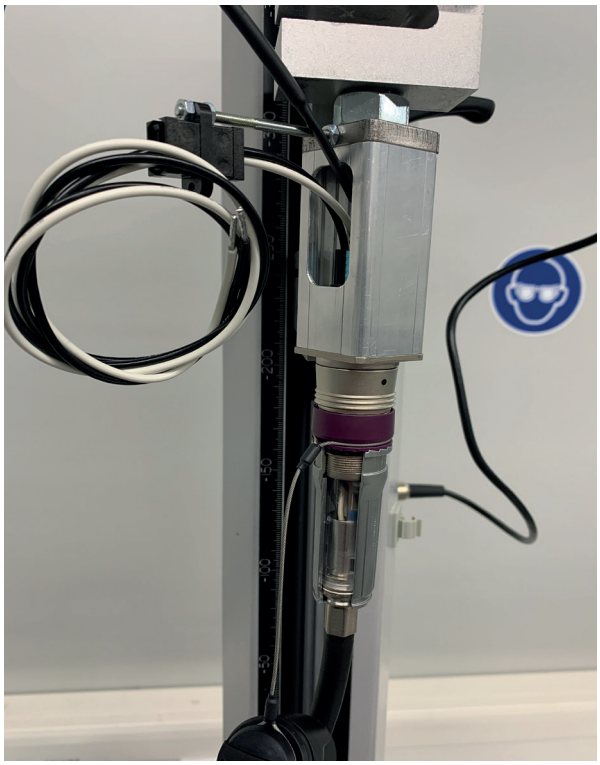

figure 2.b: Detailed measuring set-up

The opticalCON HYBRID MED cable is tested and approved for min. 500 N and 60 sec. readjustment without any quality and function adverse effects.

3 Impact

Object:

The impact test is performed to show possible deformations or plug malfunction of the internal mechanism due to heavy mechanical exposure.

Test Set-Up:

The applied test procedure is referred to the IEC 61300-2-12 Method A pendulum drop.

Test cable:	NKO16M-XP-0-8
1st part of test:	NKO16M-XP-0-8 with mated protection caps
2nd part of test :	NKO16M-XP-0-8 with unmated protection caps

Parameters of Test:

Distance from centre of rotation:	2.25 m
Number of drops:	5
Height of falling:	1.0 – 1.9 m
Ground:	steel plate, thickness 25 mm

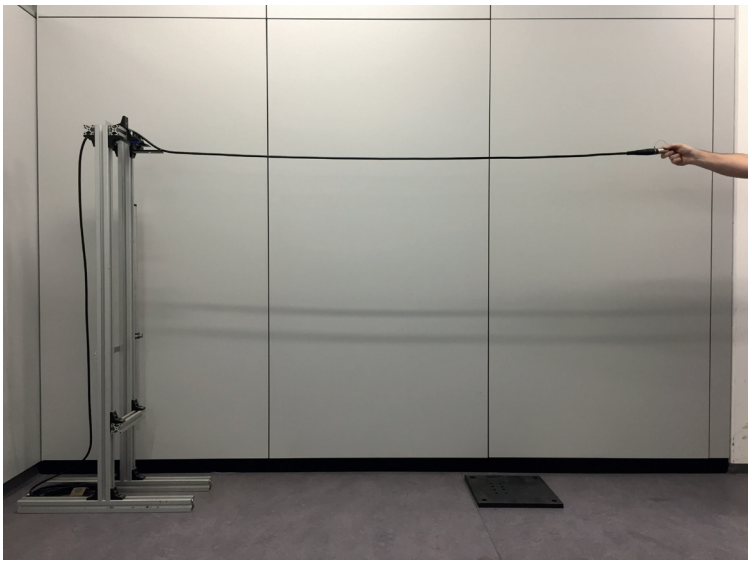

figure 3.a: Test set-up

Impact test with different heights (1.0 - 1.9 m) and steel plate.

Test Results:

TEST #	with cap	drop heigh [m]	drops	result
1	yes	1.0	5	no visible abrasion, full function
2	yes	1.9	5	no visible abrasion, full function
3	no	1.0	5	minimal visible abrasion, full function
4	no	1.9	5	minimal visible abrasion, full function

table 3.a: Test results

After several impact tests on different heights (1.0 - 1.9 m) the opticalCON HYBRID MED connector doesn't indicate critical mechanical damages and is working properly.

4 Flexing

Object:

Variations of attenuation and mechanical damage of fiber optic cable due to a defined flexing procedure.

Test Set-Up:

Measurement of attenuation before, during and after flexing cycles.
Test procedure according to IEC 61300-2-44 in combination with IEC 61300-3-4.

Test cycles:	20’000
Mass of weight:	10 N
Flexing angle:	± 90 °C
Flexing speed:	ca. 37 cycles/min
Light source:	Kingfisher KI2824
Power meter:	Kingfisher KI2600-GE
Launching cables:	NKOB16M4-XP-0-1
Wavelength:	850 nm
Test cable:	NKO16M-XP-0-5

Results:

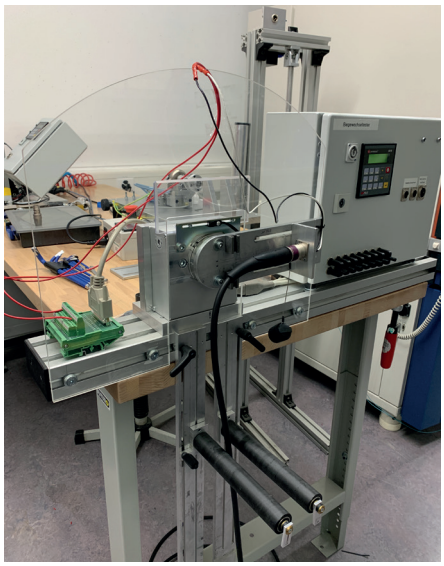

figure 4.a: Test set-up

Change in attenuation over all < 0.30 dB. No mechanical cable damage at 20.000 cycles visible.

5 Mating Durability

Object:

The mating durability test was carried out to show variations in attenuation after lifetime.

Test parameter:

NKO16M-XP-0-5

Test Set-Up:

Test procedure according to IEC 61300-2-2 in combination with contact resistance measurement according to IEC 60512-2.

Mating cycles:	10.000	
Launching:	Kingfisher KI2824	light source
	Kingfisher KI2600-GE	power meter
Measuring cables:	NKOB16M4-XP-0-1	
Measuring wave lengths:	850 nm	multimode
DUT cable length:	5 m	multimode

Durability Results:

10.000 cycles (lifetime test):

The functionality from the lenses as well as the locking mechanism is warranted.
During measuring procedure there were no significant variations.

MEASURING	BEFORE LIFETIME TEST [dB]	AFTER LIFETIME TEST [dB]
Return Loss	> 25	> 25
Insertion Loss	< 0.9	< 0.9

table 5.a: Measurement results

10.000 cycles - Lifetime test

figure 5.a: Measuring setup for lifetime test

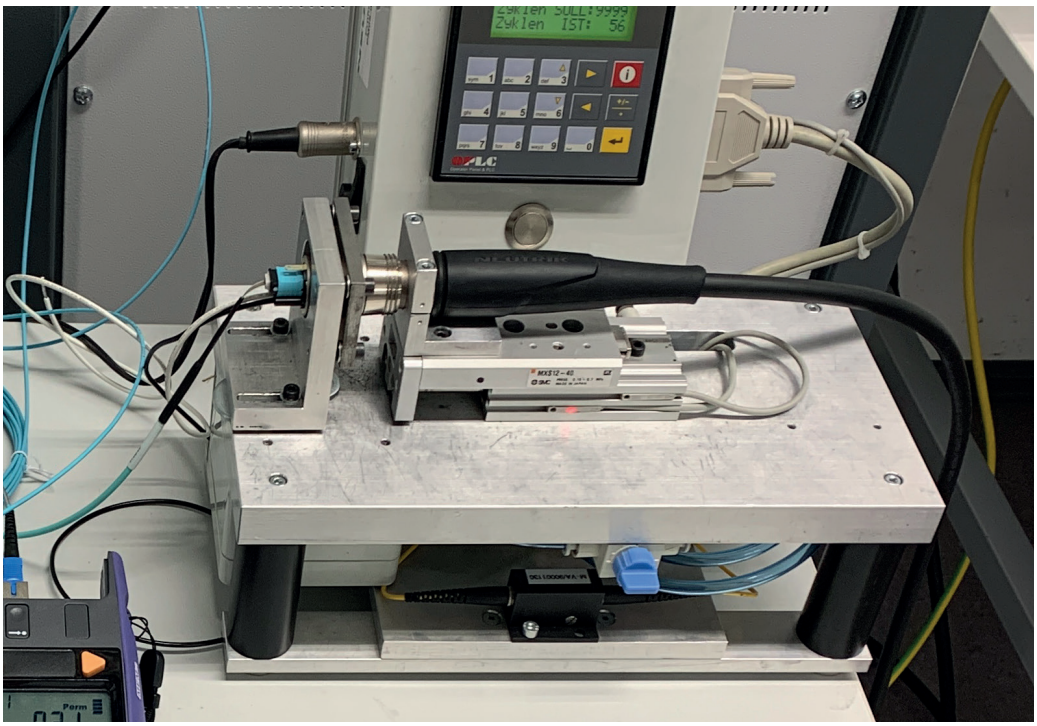

figure 5.b: Fixture for 10.000 mating cycles

6 Contact Resistance

Object:

Initial value and variation of contact resistance.

Test parameter:

NKO16M-XP-0-5

Test Set-Up:

Test procedure according to IEC60512-2 test 2a.

Measuring Instrument: Sourcetronic ST2521

Test Results:

CONTACT RESISTANCE		
	measured average value	conditional value
initial		
power	1.8 mΩ	< 7 mΩ
after 10.000 cycles		
power	4.7 mΩ	< 10 mΩ

Table 6.a: Contact resistance values

7 Dielectric Strength

Object:

The dielectric strength was checked in unmated condition.
The combination of contact to contact and contact to shell was judged.

Test Set-Up:

Test procedure according to IEC 60512-2 test 4a

Measuring Instrument:	Sefelec DMG 50

Test Results:

DIELECTRIC STRENGTH		
	measured average value	conditional value
Power contact - Housing	2.3 kVAC	> 2.3 kVAC

Table 7.a: Dielectric strength values

8 Insulation Resistance

Object:

The insulation restistance of the HYBRID MED connector was checked.

Test Set-Up:

Test procedure according to IEC 60512-2 Test 3a

Measuring Instrument:	Sefelec DMG 50
Maximum measurable isolation resistance:	100 GΩ
Test Parameter:	test voltage 500 V DC

Test Results:

The measuring results were all in the defined range.

9 Cleaning Resistance

Object:

Testing the long term cleaning resistance of the HYBRID MED connector.

Test Set-Up:

The opticalCON HYBRID MED connectors were cleaned 5 times a day over a long term period of 100 days. In each case one connector was cleaned with one commonly used cleaning agent of the medical business.

TEST OBJECT	CLEANING AGENT	CLEANING INTERVALS
Connector 1	Orosept VK Concentrate	500 times
Connector 2	Aquasonic 100	500 times
Connector 3	Kleen Ultra Glas Cleaner	500 times

Table 9.a: Test setup

Before:

After:

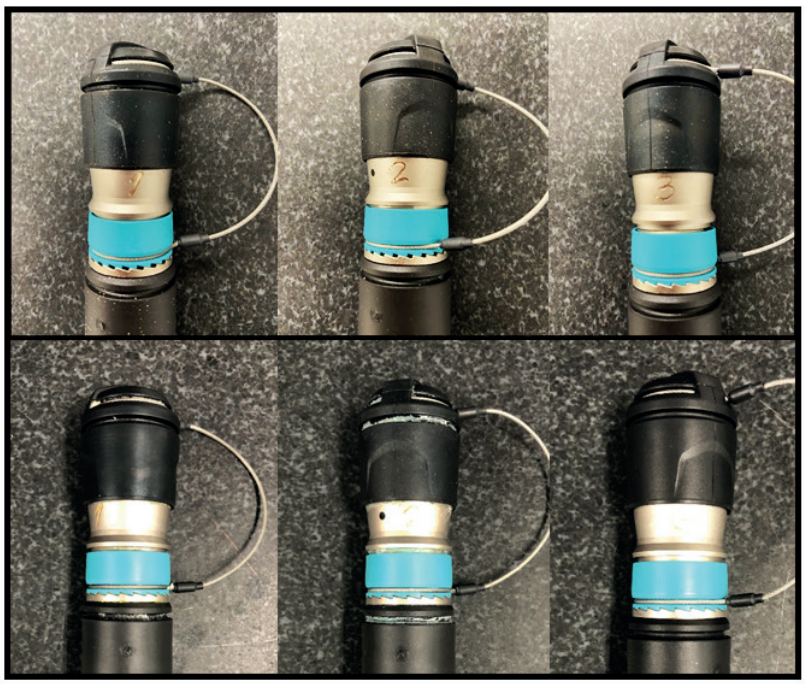

figure 9.a: Before - after comparison

Test Results:

After the long term period of 100 days the opticalCON HYBRID MED connector didn`t indicate any ware or damage by the use of the cleaning agents. The results were sufficient and therefore the test was not continued for a second period.

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