



Technical Paper |
opticalCON® MTP® 24

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Technical Paper – opticalCON MTP® 24

Title: NTP08

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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 60794 and IEC 61300 as well as to Neutrik internal specifications.

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1 Vibration

Object:

Examination of following components, receptacle NO24FDW-A, opticalCON MTP® NKO24* cable connector. The intention of the test was to determine their attenuation in a fiber optic system and the performance before, during and after the vibration test.

The test was carried out by an independent laboratory: NTB, "Interstaatliche Hochschule für Technik Buchs" division "Labor Mess- und Simulationstechnik" located in Buchs / Switzerland.

Test Set-Up:

For the vibration test 6 receptacles NO24FDW-A were mounted. The front side was mated with a NKO24M-A-0-15 opticalCON MTP® cable. The rear end was connected with the test instrument via precision measuring cables (fig. 2.a).

The applied test set-up complies with IEC 61300-2-1:2004.

Shaker:	Tira Power Amp. 5020	
Floor cloth:	Dytran 3136A (Serial Nr. 1313)	
Software:	SignalStar Vector (Version 2.3.989)	
Interface:	VL144x-R02	
Power Meter:	Kingfisher KI2824	
Light source (850nm):	Kingfisher KL2600GE	
Wavelength	850 nm	multimode
Frequency range:	10 – 55 Hz sinusoidal	
Amplitude displacement:	0.75 mm (1.5 mm p-p)	
Sweep rate:	1 oct/min	
Number of sweeps:	15	
Axis:	X, Y, Z	

After 15 cycles the receptacles were changed to the next axis without disconnecting the plugs to avoid any mismatching

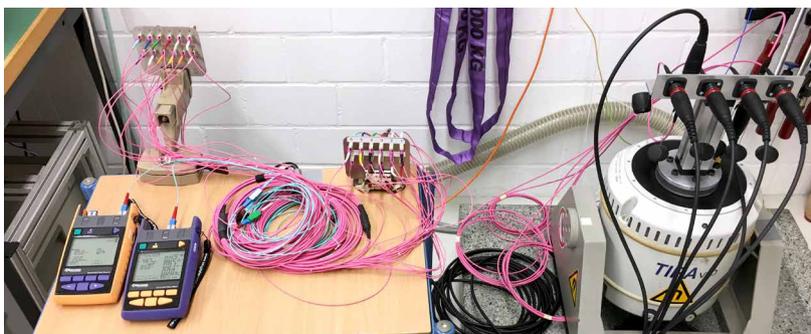


figure 1.a: Test set-up

Test Results:

Measurement during vibrations showed no variation in attenuation. The locking mechanism withstands this extreme vibration without any problems, i. e. no separation or functional deterioration occurred.

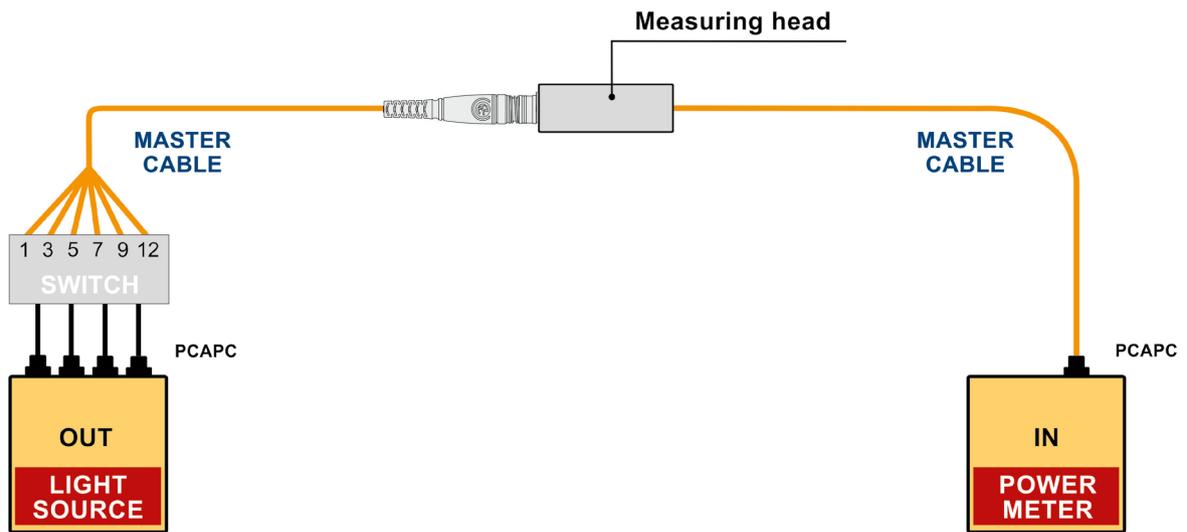


figure 1.b : reset to zero attenuation

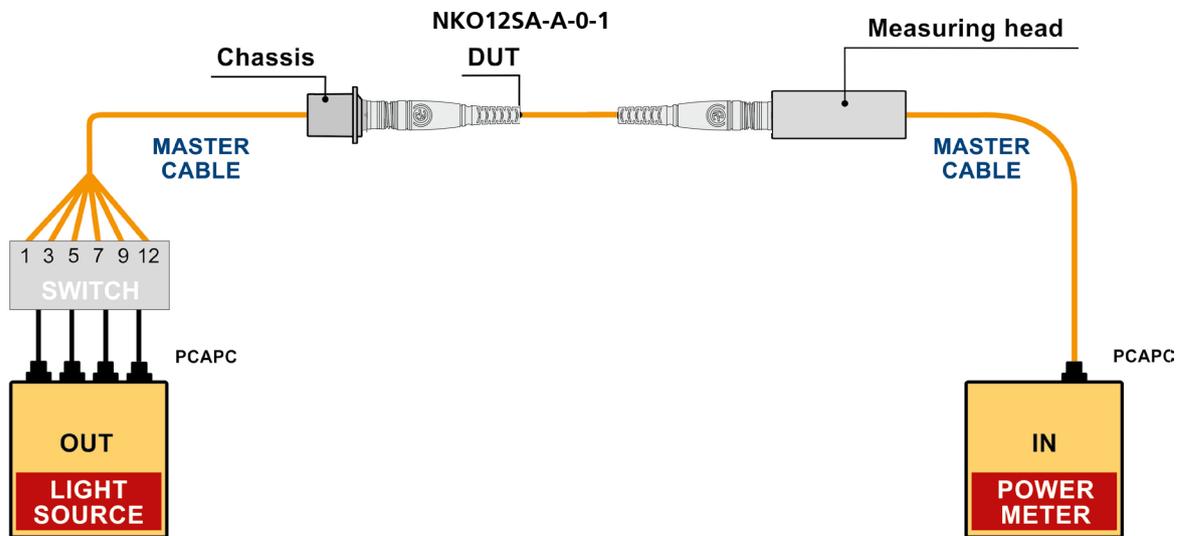


figure 1.c: Simplified measuring arrangement

Object:

Examination of the sealing dust cover SCNO-FDW-A to analyze the performance and mechanical durability during defined vibration cycles.
 The applied test set-up complies with IEC 61300-2-1:2004.



figure 1.d: Test set-up

Vibration Severity:

Shaker:	Brüel&Kjaer Mini Shaker Type 4810 and Neutrik Frequency Generator
Frequency range:	10 Hz – 18 kHz
Amplitude displacement:	1.75 mm (3.5 mm peak-peak) @ 40 Hz
Test components:	NO12FDW-A (opticalCON MTP® chassis) SCNO- FDW-A (sealing dust cover)
Axis:	X, Y, Z

Test Results:

No reasonable mechanical degradation of the sealing dust cover during and after vibration test.



figure 1.e: Front side of shaker



figure 1.f: Side view of shaker

2 Change of Temperature

Object:

Variations in attenuation due to temperature changes.

The test was arranged with a multi mode cable NKO24M-A-O-15 and MTP® 24 coupler NAO24MW-A.

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:	96 h	
Profile of temperature:	-25 °C to +70 °C	
Light source:	Kingfisher KI2824	
Power meter	Kingfisher KI2600GE	
Launching cables:	0.9 mm precision fibres	
Measuring wave lengths:	850 nm	multi mode
Cable length:	15 m	



figure 2.a: Test set-up

Temperature Profile and Results:

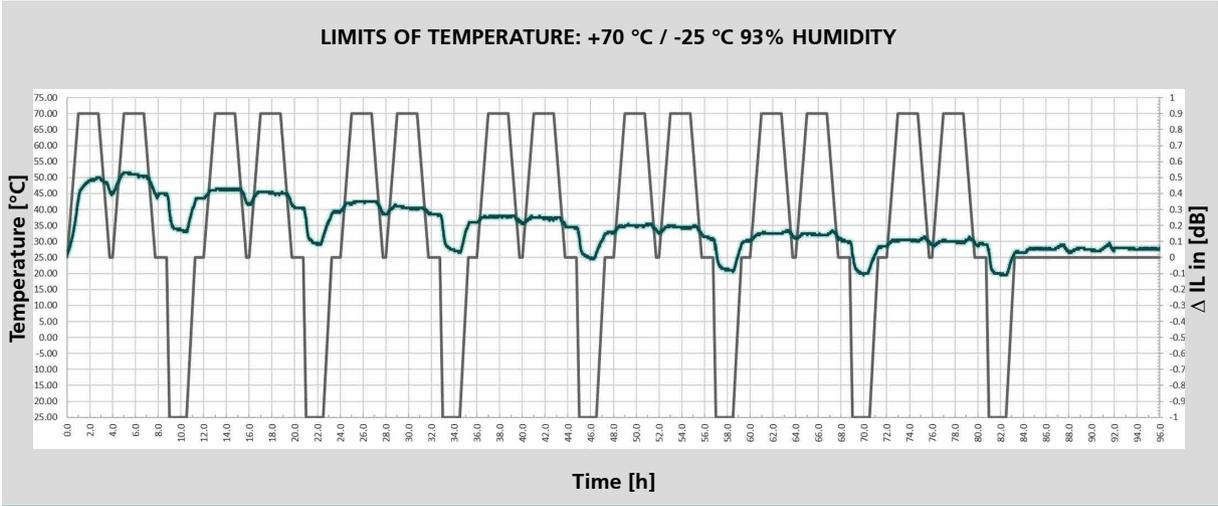


figure 2.b: Temperature profile and measurement results

The change of the attenuation over four fibers and eight connections varied from 0.1 dB to maximum 0.6 dB within 96 hours. The values are in the Neutrik’s attenuation and return loss limits and for field application with temperature variations suitable.

3 Cable Retention

Object:

Test of the cable retention efficiency. The opticalCON MTP® cables NKO24* were 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:	NKO24M-A-0-15

Results:



figure 3.a: Test set-up



figure 3.b: Detailed measuring set-up

The opticalCON MTP® cable is tested and approved for min. 600 N and 60 sec. readjustment without any quality and function adverse effects.

4 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:	NKO24M-A-0-15
1st part of test:	front side of connector protected by a dirt protection (SCNO24MX-A) (protection cap is supplied with each assembled opticalCON cable)
2nd part of test :	no additional connector protection

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
Plug fixation:	small wire



figure 4.a: Test set-up "Impact"

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

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	yes	1.0	5	no visible abrasion, full function
4	no	1.5	5	no visible abrasion, full function

Table 5.b

After several impact tests on different heights (1.0 - 1.9 m) the opticalCON MTP® 24 connector doesn't indicate any visual abrasion or mechanical damages.

5 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:	10'000
Mass of weight:	10 N
Flexing angle:	$\pm 90^\circ$
Flexing speed:	ca. 37 cycles/min
Light source:	Kingfisher KI2824
Power meter:	Kingfisher KI2600-GE
Launching cables:	0.9 mm precision fibers
Wavelength:	850 nm
Test cable:	NKO24M-A-0-15

Results:

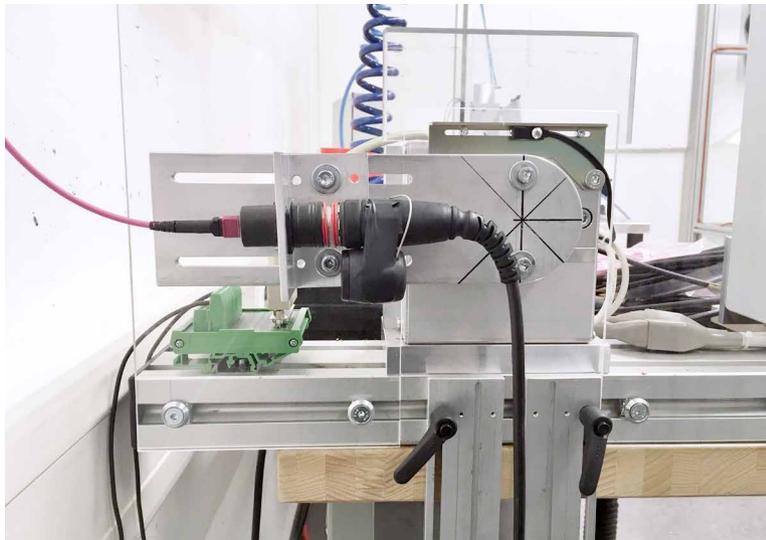


figure 5.a: Test set-up

- a) Change in attenuation over all 24 multi mode Fibers < 0.20 dB
- b) Mechanical cable damage at 10'000 cycles: no damage

6 Mating Durability

Object:

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

Test parameter:

NKO24M-A-0-15 (multi mode 24 fibers)

Test Set-Up:

Test procedure according to IEC 61300-2-2 in combination with IEC 61300-3-4 figure 4 with mode filter as defined in table 3 for multimode.

Contact resistance measurement according to IEC 60512-2.

Mating cycles:	2'500	
Launching:	Kingfisher KI2824	light source
	Kingfisher KI2600-GE	power meter
Microscope:	enlarged x 200	
Measuring cables:	0.9 mm precision fibres	
Measuring wave lengths:	850 nm	multi mode
DUT cable length:	15 m	multi mode

Results:

2'500 cycles (lifetime test):

The visual inspection didn't show any reasonable degradation from the condition of the fiber (scratches, soil remains, outbreaks, etc.)

The functionality from the shutters as well as the locking mechanism is warranted.

During measuring procedure there are no significant variations.

MEASURING	BEFOREE LIFETIME TEST [dB]	AFTER LIFETIME TEST [dB]
Return Loss	> 45	> 45
Insertion Loss	< 0.58	< 0.42

2'500 cycles - Lifetime test



figure 6.a: measuring setup for lifetime test

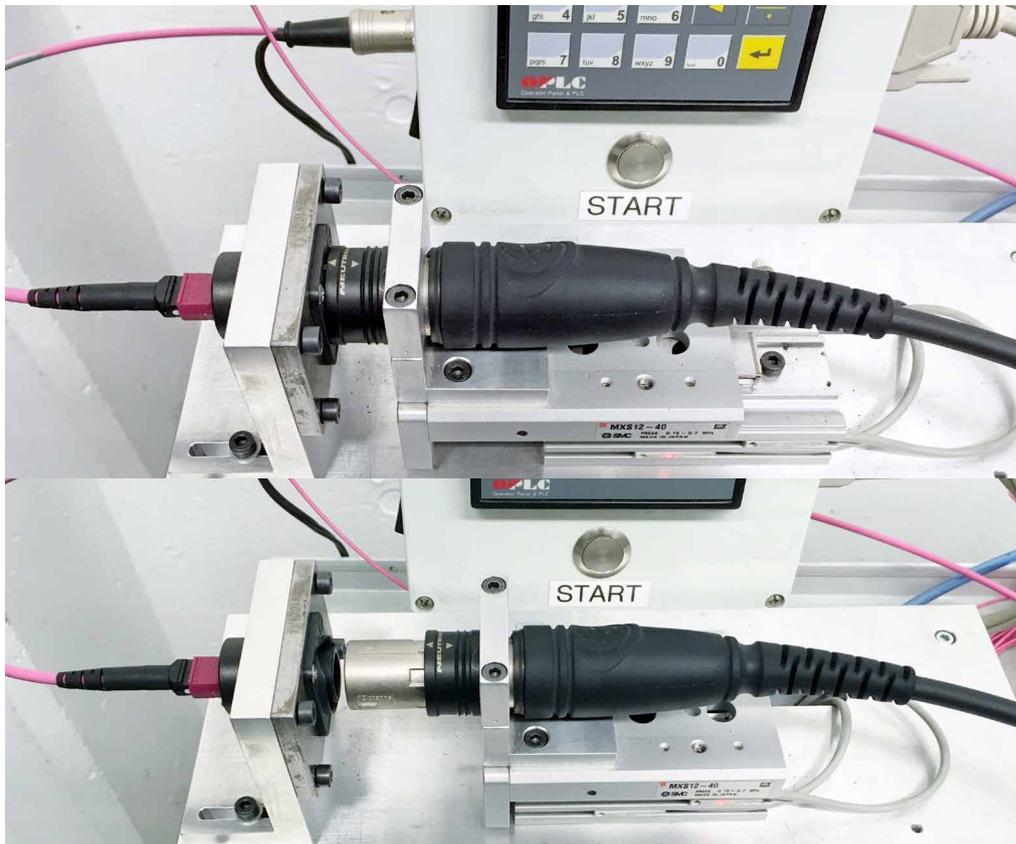


figure 6.b: fixture for 2'500 mating cycles

Fiber condition before the test

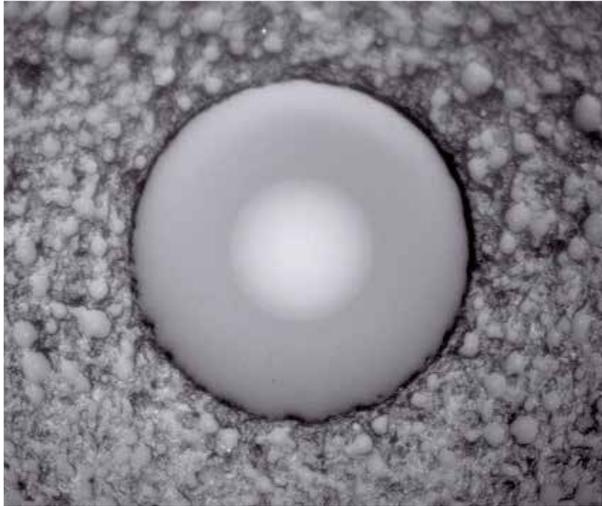


figure 6.c: Fiber condition before test

Fiber condition after the test

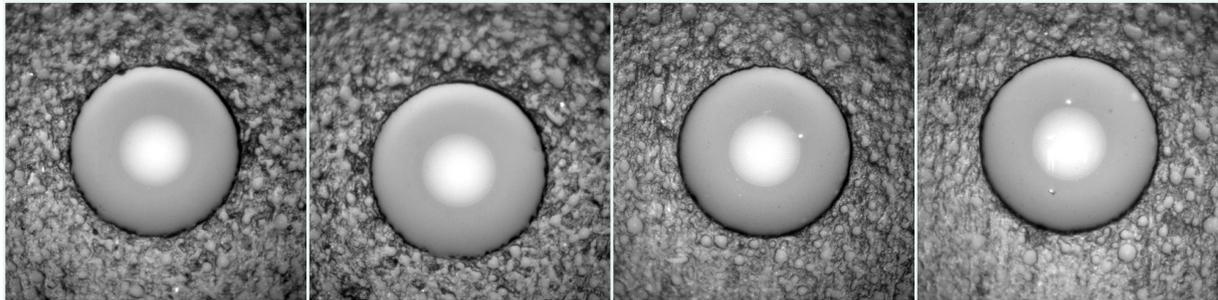


figure 6.d: Fiber condition after test

- no visual degradation on all channels.
- no recenable soil remains or scratches.

Mechanical condition after the test



figure 6.e: MTP® 24 cable connector after test

No mechanical degradations on the opticalCON MTP® cable connector and proper functionality of the shutter and locking mechanism.

Liechtenstein (Headquarters)

NEUTRIK AG, Im alten Riet 143, 9494 Schaan
T +423 237 24 24, F +423 232 53 93, neutrik@neutrik.com

Germany / Netherlands / Denmark / Austria

Neutrik Vertriebs GmbH, Felix-Wankel-Strasse 1, 85221 Dachau, Germany
T +49 8131 28 08 90, info@neutrik.de

Great Britain

Neutrik (UK) Ltd., Westridge Business Park, Cothey Way
Ryde, Isle of Wight PO33 1 QT
T +44 1983 811 441, sales@neutrik.co.uk

France

Neutrik France SARL, Rue du Parchamp 13, 92100 Boulogne-Billancourt
T +33 1 41 31 67 50, info@neutrik.fr

USA

Neutrik USA Inc., 4115 Taggart Creek Road, Charlotte, North Carolina, 28208
T +1 704 972 30 50, info@neutrikusa.com

Japan

Neutrik Limited, Yusen-Higashinohonbashi-Ekimae Bldg., 3-7-19
Higashinohonbashi, Chuo-ku, Tokyo 103
T +81 3 3663 47 33, mail@neutrik.co.jp

Hong Kong

Neutrik Hong Kong LTD., Suite 18, 7th Floor Shatin Galleria
Fotan, Shatin
T +852 2687 6055, neutrik@neutrik.com.hk

China

Ningbo Neutrik Trading Co., Ltd., Shiqi Street, Yinxian Road West
Fengjia Villiage, Hai Shu District, Ningbo, Zhejiang, 315153
T +86 574 88250488 800, neutrik@neutrik.com.cn

India

Neutrik India Pvt. Ltd., Level 3, Neo Vikram, New Link Road,
Above Audi Show Room, Andheri West, Mumbai, 400058
T +91 982 05 43 424, anklesaria@neutrik.com

Associated companies

Contrik AG

Steinackerstrasse 35, 8902 Urdorf, Switzerland
T +41 44 736 50 10, contrik@contrik.ch

H. Adam GmbH

Felix-Wankel-Straße 1, 85221 Dachau, Germany
T +49 08131 28 08-0, info@adam-gmbh.de



www.neutrik.com