

July 14th, 2022

Acceptance Requirements

Fiber Optic Systems Revised 07/2022

Alexander Kölbel
+49 6190 8880 - 40
alexander.koelbel@datwyler.com

Dätwyler IT Infra GmbH, Auf der Roos 4-12, 65795 Hattersheim, Germany

T +49 6190 8880-0, F +49 6190 8880-80, info.itinfra.de@datwyler.com, www.ITinfra.datwyler.com

Dätwyler IT Infra GmbH, Lilienthalstraße 17, 85399 Hallbergmoos, Germany

T +49 811 998633-0, F +49 811 998633-30, info.itinfra.de@datwyler.com, www.ITinfra.datwyler.com

Dätwyler IT Infra GmbH, Niederlassung Österreich, Liebermannstraße A02 403, 2345 Brunn am Gebirge, Austria

T +43 1 8101641-0, F +43 1 8101641-35, info.itinfra.at@datwyler.com, www.ITinfra.datwyler.com

Managing Directors: Susanne Keller-Petri, Ralf Klotzbücher

HRB 84724, Amtsgericht Frankfurt am Main, UST-ID-Nr. DE128947927 / ATU63707901

Content

1 Scope	3
2 General requirements	3
3 Approved measuring instruments	3
4 Calibration of measuring instruments / measuring adapter	3
5 Increase of the reflection loss	3
6 Permitted attenuation values for installation sections	4
6.1 Permanent link with spliced single-mode installations	4
6.2 Permanent link with spliced multimode installations	4
6.3 Permanent link with pre-assembled single-mode installations	5
6.4 Permanent link with pre-assembled multi-mode installations	5
7 Measuring direction	6
8 Connectors of the test setup	6
9 Test cables	6
10 Visual inspection	6
10.1 Cleaning connectors and connectors end faces	6
10.2 Broken connectors	6
11 Documentation / measurement results	6
12 Approved test setups	7
12.1 Test cords	8
12.2 Length of test cords	8
13 Alternative measurement: test with OTDR	9
13.1 Approved test setup	9
13.2 Test cable (launch and tail cord)	9

1 Scope

The following acceptance requirements apply to the measurement of permanent links with single and multi-mode optical fibres (SM and MM).

The system warranty is only granted for installation sections with known components (Datwyler components).

2 General requirements

The installation route includes the permanently installed route including the connector transitions, without patch and connection cables.

The acceptance of installation links (permanent links) must be carried out according to the current DIN ISO / IEC 14763-3.

The measured values must be submitted in the original format of the measuring device manufacturer.

The measurement data must be loaded onto the Datwyler Sharefile system. The regional upload link of the Datwyler Sharefile system is indicated in the registration form.

3 Approved measuring instruments

For testing installation routes, power meters and OTDR (Optical Time Domain Reflectometer) have been approved.

All measuring instruments that comply with the guidelines of DIN ISO / IEC 14763-3 are approved for the measurements. The same applies to the necessary use of encircled fluxes in the measurement of multimode fibres.

4 Calibration of measuring instruments / measuring adapter

The meter must be calibrated regularly by the service of the manufacturer. The last calibration has to be carried out within the past 15 months before the date of the acceptance measurements. It is not allowed to use measuring adapters, which are exceeding the permissible number of mate cycles according to the manufacturer.

5 Increase of the reflection loss

The use of an immersion liquid in the connector to increase the reflection attenuation is generally prohibited (for the entire system)!

6 Permitted attenuation values for installation sections

6.1 Permanent link with spliced single-mode installations



A spliced single-mode installation lines consists of:

Datwyler FO cable, spliced on both sides on Datwyler 19 "splice boxes.

The following parameters apply to the spliced OS2 solution:

Attenuation of the fibre:	α	0.36 dB / km @ λ 1310 nm
	α	0.23 dB / km @ λ 1550 nm

Maximum value of the splice attenuation:	α_s	0.10 dB
--	------------	---------

Maximum attenuation of the connector:	α_{c1}	0.50 dB *
---------------------------------------	---------------	-----------

* The attenuation of plug-in connections in the data centre environment is subject to greater demands, which must be obtained before the acceptance test.

6.2 Permanent link with spliced multimode installations



A spliced multi-mode installation lines consists of:

Datwyler FO cable, spliced on both sides on Datwyler 19 "splice boxes.

The following parameters apply to the spliced OM3 and OM4 solution:

Attenuation of the fibre:	α	2.7 dB/km @ λ 850 nm
	α	0.7 dB/km @ λ 1300 nm

Maximum value of the splice attenuation:	α_s	0.10 dB
--	------------	---------

Maximum attenuation of the connector:	α_{c1}	0.50 dB*
---------------------------------------	---------------	----------

* The attenuation of plug-in connections in the data centre environment is subject to greater demands, which must be obtained before the acceptance test.

6.3 Permanent link with pre-assembled single-mode installations



A pre-assembled single mode installation consists of:
Datwyler FO cable, pre-assembled on both sides, plugged in Datwyler 19" Breakout boxes.

The following parameters apply to the pre-assembled single-mode solution:

Attenuation of the fibre:	α	0.36 dB/km @ λ 1310 nm
	α	0.23 dB/km @ λ 1550 nm
Maximum attenuation of the connector:	α_{c1}	0.50 dB*

*The attenuation of plug-in connections in the data centre environment is subject to greater demands, which must be obtained before the acceptance test.

6.4 Permanent link with pre-assembled multi-mode installations



A pre-assembled multi-mode installation consists of:
Datwyler FO cable, pre-assembled on both sides, plugged in Datwyler 19" Breakout boxes.

The following parameters apply to the pre-assembled OM3 and OM4 solution:

Attenuation of the fibre:	α	2.7 dB/km @ λ 850 nm
	α	0.7 dB/km @ λ 1300
Maximum attenuation of the connector:	α_{c1}	0.50 dB*

* The attenuation of plug-in connections in the data centre environment is subject to greater demands, which must be obtained before the acceptance test.

7 Measuring direction

Power Meter:

The measurement has to be done in both optical windows (SM: 1310 and 1550nm, MM: 850 and 1300nm).

Measuring an installation section with a power meter is sufficient from one direction.

OTDR:

The measurement has to be done in both optical windows (SM: 1310 and 1550nm, MM: 850 and 1300nm).

The measurement of an installation section with OTDR is sufficient from one direction. If negative losses (gainers) occur, measurement from both directions is required.

8 Connectors of the test setup

All used connectors of the referencing test setup have to have reference quality.

The reference FO-connectors have to be of the same type used in the cabling to be tested.

9 Test cables

The FO connectors of the test cables must have reference quality. The test cables used must have fibres with the same core diameter as the fibres of the installation to be measured.

When measuring multimode optical fibres, the excitation conditions according to Encircled Flux must be observed.

10 Visual inspection

Prior to each measurement, all connectors (measuring object and measuring cable) must be checked in accordance with IEC 61300-3-35.

Each time the connection is changed, a new visual inspection is required.

10.1 Cleaning connectors and connectors end faces

If contamination is detected during visual inspection, the connector end faces must be cleaned in accordance with DIN IEC / TR 62627-01.

The effectiveness of the cleaning must be checked and the cleaning repeated if necessary.

10.2 Broken connectors

Broken connectors have to be replaced.

11 Documentation / measurement results

The results of the measured installation sections shall be made available in electronic form in the original format of the measuring device manufacturer.

The following parameters have to be specified in the documentation to be submitted:

- Identification of the measured permanent links
- Tester (Type and manufacturer)
- Serial number and state of calibration
- Nominal wavelength
- Details of the measured permanent link (length, fibre type, refractive indices)

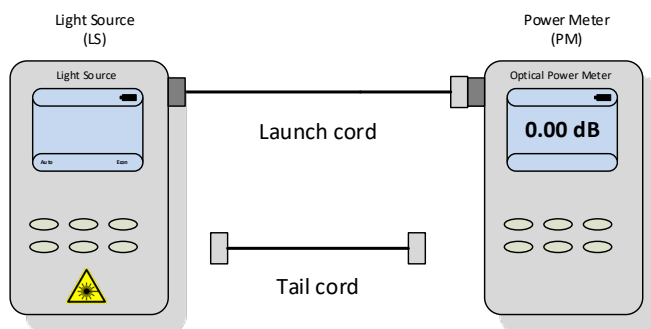
System warranty

- Documentation of the Datwyler products used
- the measurement result
- date of test
- name of the testing person

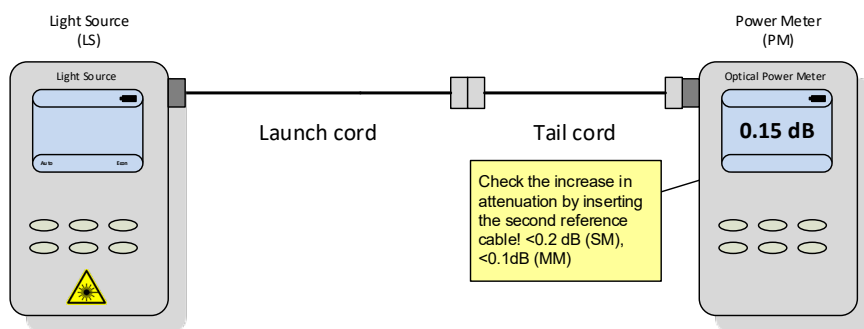
12 Approved test setups

For testing with a power-meter, only the following test setup is permitted:
„1-Cord reference method“

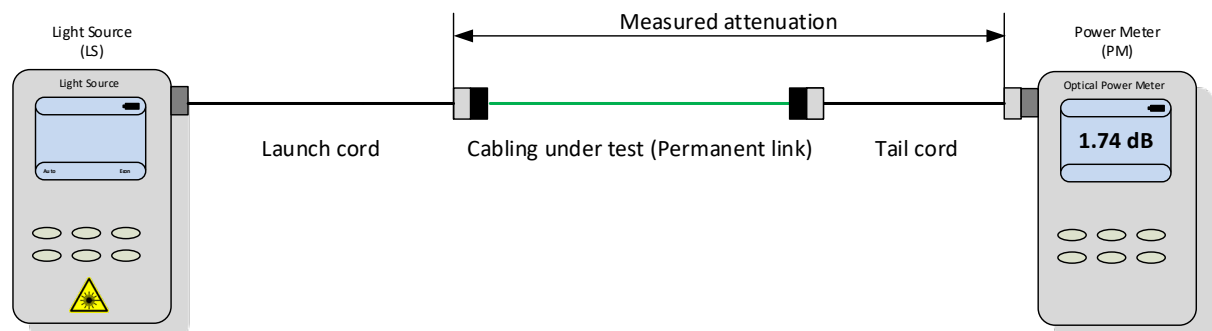
Step 1 Reference measurement P0:



Step 2 Test measurement:



Schritt 3 Prüfmessung P1:



Using the Launch Cords, a zero balance of the test setup must be made. With a test measurement with connected Launch Cord and Tail Cord the attenuation increase by the Tail Cord is to be examined. An increase in attenuation up to 0.2 dB (SM) or 0.1 dB (MM) is permitted.

For test measurement P1, the Permanent Link to be tested must be inserted between the Launch Cord and the Tail Cord. The test leads must remain connected to the light source (LS) or power meter (PM) during link measurements. The measurement P1 must be recorded in dB.

In order to avoid incorrect measurements as far as possible, the reference measurement P0 and the test measurement have to be checked in each case after max. 250 measurements. For measured deviations of ≥ 0.1 dB, the measuring cables must be replaced. Each time the measuring devices are restarted, they must be referenced again.

12.1 Test cords

The used test cords must have reference quality. The employed test cords must have fibres with the same core diameter/beam diameter as the fibres of the installation to be measured. The test cords include Launch Cord (as used for multimode with encircled flux method) and Tail Cord.

12.2 Length of test cords

Launch Cord:

- length: 2 m to 5 m

Tail Cord:

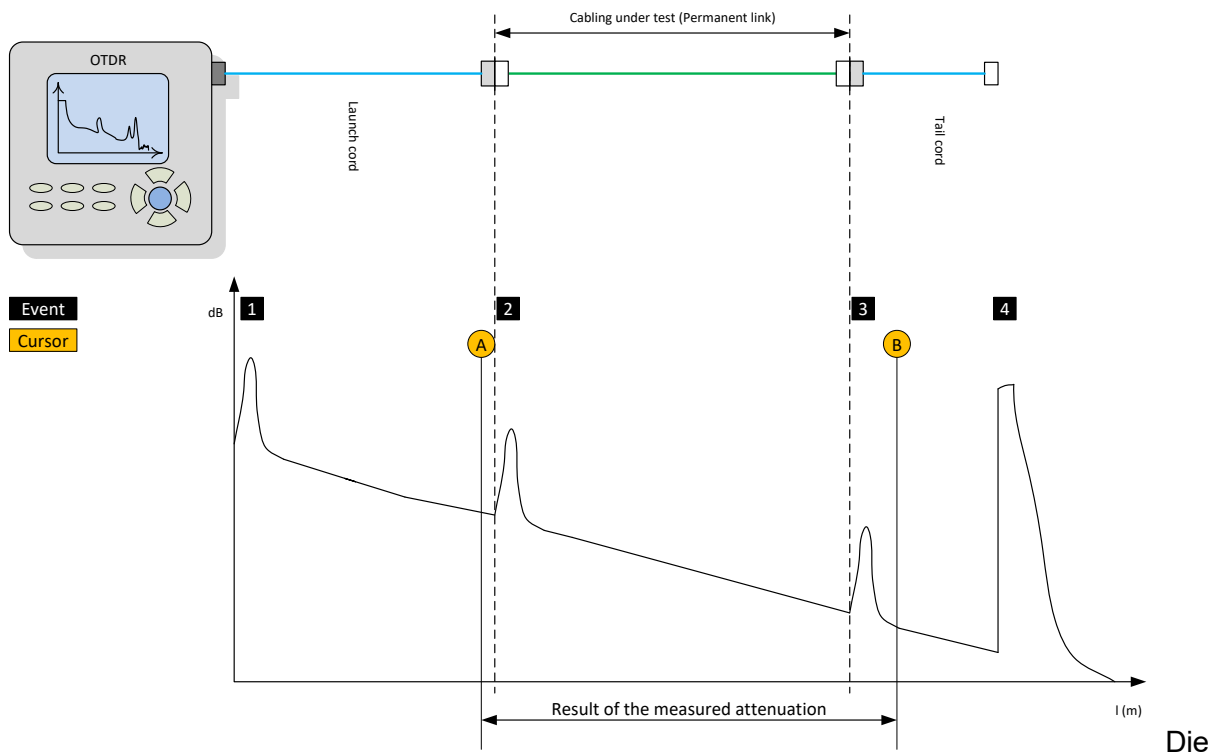
- length: 2 m to 5 m

For Launch Cord and Tail Cord, pre-assembled patch cords have to be used with suitable reference connectors suitable for connection to the cabling under test and / or compatible with the measurement devices.

13 Alternative measurement: test with OTDR

13.1 Approved test setup

For the measurement with OTDR measuring instruments, only the test with launch- and tail cords is permitted. For measuring installations with OTDR measuring instruments, the following test setup must be followed.



Settings for the OTDR measuring device can be found in DIN ISO / IEC 14763-3 Annex C.

13.2 Test cable (launch and tail cord)

Launch and tail cords must be longer than the attenuation dead zone of the OTDR, but at least 150m (SM) or 75m (MM).

For launch and tail cord, pre-assembled measuring cables are to be used with suitable reference connectors.

Spliced cable pigtails are not allowed.