



**Field-testing  
procedure  
for**

***e*ssential 6**

**cabling systems**

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## **1 Introduction**

*The testing of Class E (Category 6) solutions is a longer and more involved process than for Class D (Category 5e). The purpose of testing is to validate the installation against both the requirements of the standards and the demands of the Nexans link warranty process.*

*This document serves to qualify the current testing requirements for Essential-6, solutions against the ISO/IEC 11801:2002. If testing throws up errors or failures in the results the information gathered should be used to identify the source of the problem so that the installer can rectify and re-test.*

*To pass testing for the Nexans link warranty all Permanent Links and/or Channels in an installation should be tested, and all should pass. You should agree with the client before starting the contract how to deal with marginal pass results, as they may not be aware that a marginal result may be because of the accuracy and tolerances of the tester.*

## 2 How to proceed ?

### 2.1 Introduction

This procedure is meant as a support tool for field-testing Essential-6 copper cabling networks. The definitions in the standard ISO/IEC 11801:2002 are applied into practical recommendations.

After describing some general definitions, the second half of this chapter is especially focused on measuring category 6/Class E networks.

The procedure is to be followed in case of applying for Nexans Link Warranty.

### 2.2 Permanent link testing vs. Channel testing

In the ISO standards two different ways of testing are described.

A **permanent link** is the fixed part of the cabling, which is tested after installation, these test results give information on installation quality. The permanent link extends from the patch panel in the cabinet to the telecommunications outlet at the user side.

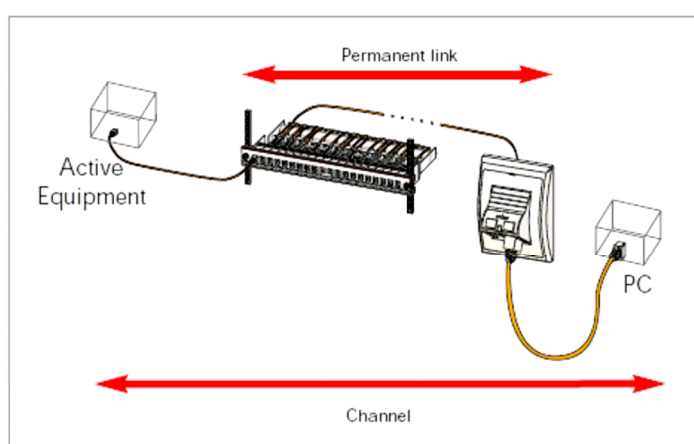


Figure 1: Model of Permanent Link and Channel testing

A **channel** represents the complete end-to-end path between the user equipment (PC, phone, video, printer...) and the active equipment at the cabinet side (switch, hub, PABX, video equipment...). The channel includes the work area cord and the equipment cord.

Both permanent link and channel can be measured with the current commercially available field testers.

In the next paragraphs following issues are covered: 'How the installation can be tested?' and 'Which specific models of test-equipment and test heads can be used.'

## 2.3 Installation model

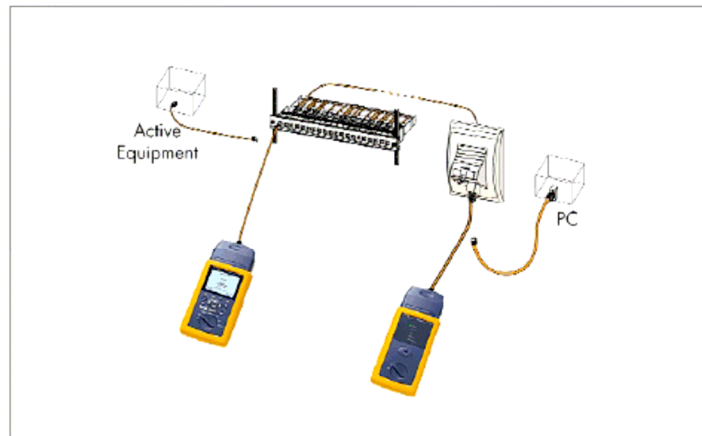


Figure 2.1 : Testing a permanent link in a 2 connector model

Figure 2.1 shows the two-connector model as described in the standard. In this installation model both Permanent Link testing and Channel testing methods can be applied. In case of Permanent Link testing, make sure the right test heads are used (see also chapter 4). In case of Channel testing make sure only Nexans Essential-6 patch cords<sup>1</sup> are used. When submitting the test results for the Nexans Link Warranty, the guarantee and warranty will be based on a two connector system model.

<sup>1</sup> For Essential-6 Channel testing use of Essential-6 Patch cords is required

## **3 What equipment is available to test for compliance?**

### **3.1 Level III tester**

Nexans strongly recommends the use of equipment with baseline accuracy that exceeds TIA level III, as indicated by independent laboratory testing.

Test equipment must be capable of certifying Class D and Class E links.

Nexans have endorsed a number of testers and configurations for use in validating the Essential-6 solution against the Warranty and performance requirements on installations.

The list includes:

1. Fluke DSP 4X00 series
2. Fluke DTX series
3. Fluke (Microtest) Omniscanner 2
4. Agilent Wirescope 350
5. Ideal Industries (Wavetek) LT-8600 series
6. Ideal Industries Lantek-6
7. Ideal Industries Lantek-7

### **3.2 Care of the Tester and leads**

The tester is an accurate piece of equipment and as such needs to be looked after. Please follow manufacturer recommendations for the care and maintenance of your tester. Have your tester calibrated at least once a year by the tester manufacturer.

The test leads are susceptible to wear and damage. Please follow manufacturer recommendations for the care and maintenance of your test leads and do not fold or exceed the bend radius of the test cables.

Do not allow the weight of the tester to be supported by the test lead.

Always put your tester on charge the day before it will be needed and then place it on charge overnight during the testing phase of the project.

### **3.3 Before you go to site**

The firmware update and the version of the software database on the tester are important. The firmware from the tester manufacturer provides the tester with the correct parameters to test and how to interact with the test head. The software database holds the test parameters and limits for the standards that you will be comparing the cabling installation against.

For all testers ensure you have the latest version of the tester firmware loaded, this can be obtained from the manufacturer of the test equipment Internet site along with the latest software and database which should also be loaded into the tester.

You must calibrate the tester local and remote ends to each other before you go to site.

For some testers you will also need to have the test leads calibrated onto the tester units.

This will improve the accuracy of the tester.

Make sure you have the latest version of the upload and diagnostic software on your PC on to which you will download the test results from the tester (available on Internet sites of the manufacturers).

Always download each day's worth of test results at the end of the day onto your PC.

Always put your tester on charge the day before it will be needed and then place it on charge overnight during the testing phase of the project.

## 4 How to configure the tester ?

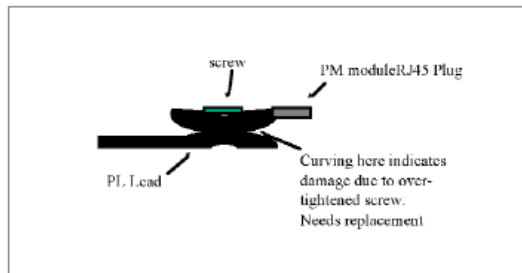
### 4.1 Fluke DSP 4x00 series

DSP-LIA101S

A method for testing Essential-6 is to use the Permanent Link Adapter with a swappable Personality Module PM06 or PM25. The PM06 can be used in both UTP and FTP environment. The PM25 can be used only in a UTP environment. The limits to be used in this configuration are the ISO/IEC 11801 Class E PL standard database limits for the Permanent Link.

General Testing 'Tips':

- Use the straps to hang up the tester. This leaves one hand free to press buttons and one hand to support the weight of the PL cable.
- Only tighten the screw attaching the PM module to the PL lead finger tight. Do not use a screwdriver. Look for any damage caused by overtightening.
- Failure to adequately support the weight of the PL cable or test lead may result in excessive load being applied to the RJ 45 jack or misalignment of the plug and jack during the test process. The consequences of this action may result in poor readings damage to the test lead or outlet and may invalidate Nexans product warranty.
- Use the DSP Field Cal tool (5 finger tool which looks like a set of PM's without the plugs) to set the PL leads into the tester before you start testing.



### 4.2 Fluke Omniscanner series

OMNI- Universal Link Adapter

A method for testing Essential-6 is to use the Omniscanner Universal Link Adapter with a Personality Module PM06 or PM25. The PM06 can be used in both UTP and FTP environments. The PM25 is only meant to be used in a UTP environment. The limits to be selected in this configuration are the ISO/IEC 11801 Class E PL standard database limits for the Permanent Link.

General Testing 'Tips':

- Use the straps to hang up the tester. This leaves one hand free to press buttons and one hand to support the weight of the PL cable.
- Only tighten the screw attaching the PM module to the PL lead finger tight. Do not use a screwdriver. Look for any damage caused by overtightening.
- Failure to adequately support the weight of the PL cable or test lead may result in excessive load being applied to the RJ45 jack or misalignment of the plug and jack during the test process. The consequences of this action may result in poor readings damage to the test lead or outlet and may invalidate Nexans product warranty.
- Use the OMNI Field Cal tool (5 finger tool which looks like a set of PM's without the plugs) to set the PL leads into the tester before you start testing.

### 4.3 Fluke DTX series

DTX-PLA001 universal permanent link adapter

A method for testing Essential-6 is to use the DTX-PLA001 universal permanent link adapter with a Personality Module PM06 or PM25. The PM06 can be used in both UTP and FTP environments. The PM25 is only meant to be used in a UTP environment. The limits to be selected in this configuration are the ISO/IEC 11801 Class E PL standard database limits for the Permanent Link.

General Testing 'Tips':

- Use the straps to hang up the tester. This leaves one hand free to press buttons and one hand to support the weight of the PL cable.
- Only tighten the screw attaching the PM module to the PL lead finger tight. Do not use a screwdriver. Look for any damage caused by overtightening.
- Failure to adequately support the weight of the PL cable or test lead may result in excessive load being applied to the RJ45 jack or misalignment of the plug and jack during the test process. The consequences of this action may result in poor readings damage to the test lead or outlet and may invalidate Nexans product warranty.
- Use the OMNI Field Cal tool (5 finger tool which looks like a set of PM's without the plugs) to set the PL leads into the tester before you start testing.

### 4.4 Agilent Wirescope 350

The configuration accepted by Nexans for the Agilent Wirescope 350 tester uses a test head Link Test Probe (N2604A-10x) with a patchcord type test lead. This product set is subject to wear in the test cord, which should be monitored closely and looked after during its life. Eventually errors and miss readings will occur as the lead wears. The limits to use with this configuration are the limits for ISO Class E and can be found on the Agilent website.

### 4.5 Ideal LANtek 6 & 7

The configuration accepted by Nexans for the Lantek 6 & 7 testers uses a Basic Link test head with a patch cord type test lead. This product set is subject to wear in the test cord, which should be monitored closely and looked after during its life. Eventually errors and miss readings will occur as the lead wears. The limits to use with this configuration are the limits for ISO Class E and can be found on the Ideal web site.

### 4.6 Ideal LT6800 series

The configuration accepted by Nexans for the Wavetek 8600 and 8601 testers uses a Basic Link test head with a patch cord type test lead. This product set is subject to wear in the test cord, which should be monitored closely and looked after during its life. Eventually errors and miss readings will occur as the lead wears. The limits to use with this configuration are the limits for ISO Class E and can be found on the Ideal website.

## 4.7 Selecting the right cable type

When setting up your tester you should pay attention to the tester set up and the NVP (Nominal Velocity of Propagation) for the cable under test. This setting will determine the length and skew parameters and will therefore affect the results obtained. Some testers set themselves to pre-set or default settings each time they are switched on. You therefore must check this and configure the tester according to the cable datasheet for the product you are testing. Generally for Nexans cabling systems, the values to be used are:

Commercial cable name	NVP
Nexans <b>Essential 6</b> U/UTP	70
Nexans <b>LANmark-6</b> F1/UTP	0,72
Nexans <b>LANmark-6</b> F2/UTP	0,69

## 5 Understanding the test results

### 5.1 What the test results show

One can only hope that first time of testing a link the results will show a pass with headroom. However the first thing most testers will show is a wire map failure. As there is an insertion life on tester heads and leads a number of installers make use of a more basic test tool which just checks for wire mapping before running with a full set of tests for Cat 6. This releases the tester for use elsewhere and saves on head wear.

If a failure is detected then make use of the tester diagnostics to locate the problem. Some of the later testers come with analysis software and tools that will locate the problem to a point along the length of the cable or at the termination.

The treatment of marginal asterisked (\*) results should be clarified with the client in advance.

Due to the known experience of tester inaccuracies due to test head variations it is our experience that results are usually on the pessimistic side. Nexans will therefore consider a \*PASS as acceptable within the warranty.

A \*FAIL however should be investigated and is not acceptable.

### 5.2 What to do with the result - Certification

In order to obtain the Nexans Link Warranty we will ask you to save the test results in their typical database format and keep them save and accessible at the end-users site. In case of product faults we will ask for the test results of the links concerned.

- Upload and Save results – Which file format?

Fluke DTX, DSP, OMNI: \*.flw

Ideal Industries Lantek: \*.zip (all files part of the full database of the project)

Agilent Wirescope: \*.mdb

It is preferable to save the test results with plots, if they are available on your tester, as re-certification of test result is only possible if plots are saved.