



Field-testing procedure of

LANmark-6 10G *Cabling System*

Technical Paper
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1 Introduction

The testing of augmented Category 6/6a solution 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 warranty process.

This document serves to qualify the current testing requirements for LANmark-6 10G against the Standards. 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 warranty all 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 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 10G resp. category 6a networks.

The procedure is to be followed in case of applying for Nexans Certified Systems 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. It excludes work area cords, equipment cords and crossconnections, but also includes the optional consolidation point.

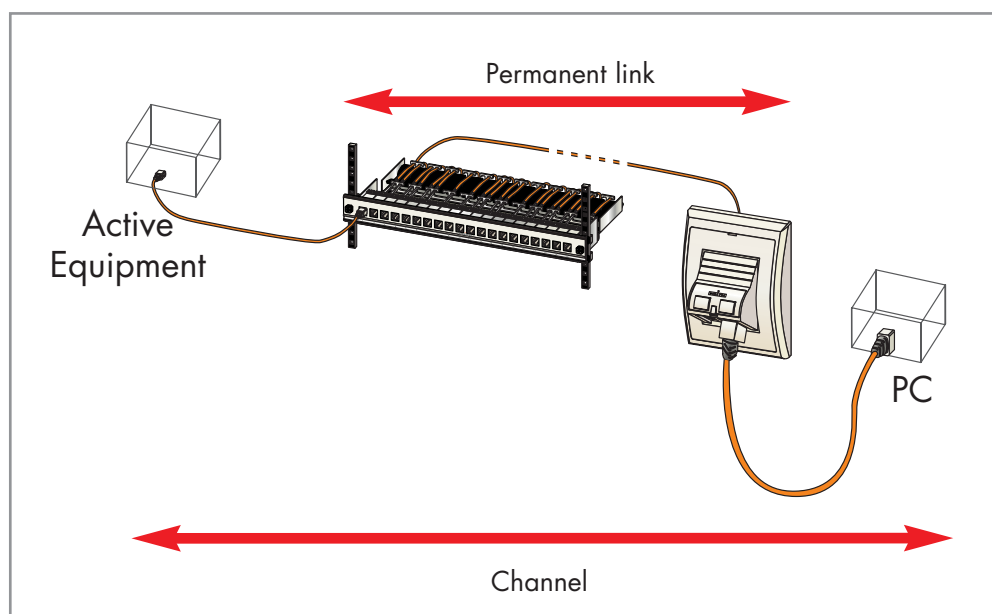


Figure 1: Model of Permanent Link and Channel testing

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, the equipment cord, and the cross-connection. Both permanent link and channel can be measured with the current commercially available field testers.

! A LANmark-6 10G system shall only be tested using Channel test adapters and LANmark-6 10G 500 Mhz Ultim patchcords. This is valid until further notice.

2.3 Category 6 and connecting hardware interoperability

All models should be installed according to the ISO/IEC 11801:2002 Standard respecting the maximum distance in relation to the calculated maximum lengths.

Any LANmark-6 10G system should be measured using LANmark-6 10G 500 MHz Ultim patchcords and channel testheads.

2.3.1 Two connector model: Interconnect - TO

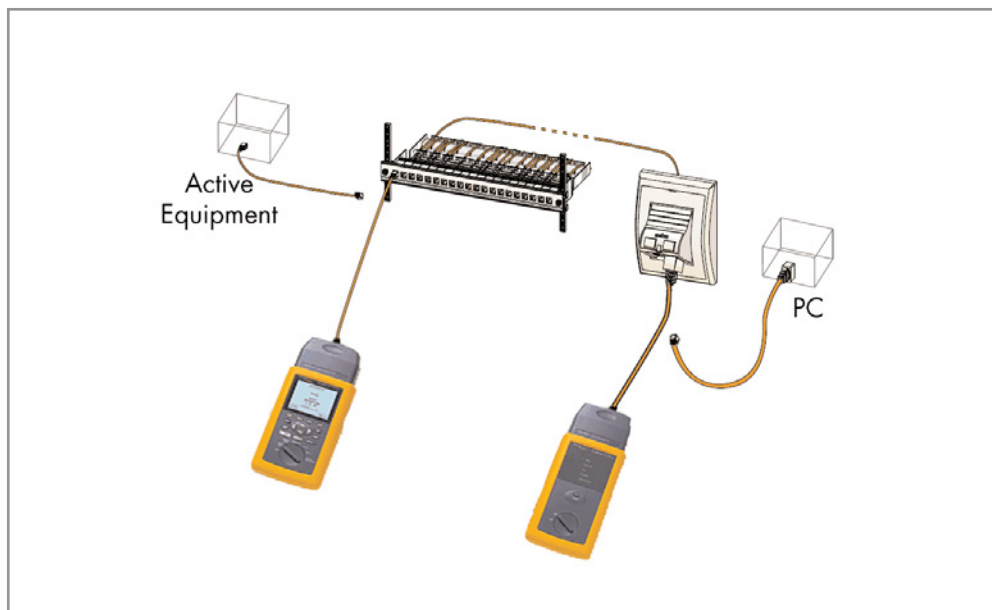


Figure 2.1 : Testing in a two connector model

Figure 2.1 shows the two-connector model as described in the standard.

For Channel testing make sure only Nexans LANmark-6 10G 500MHz Ultim Patch Cords are used In combination with Channel Adapters.

When submitting the test results for the Nexans Certified System Warranty, the guarantee and warranty will be based on a two connector channel model..

2.3.3 Three connector model : Interconnect - CP - TO

Option 1

The installation is done with Nexans LANmark-6 10G 500 Mhz Ultim pre-terminated 'single ended' patch cords to connect the Consolidation Point (CP) with the Terminal Outlet (TO)
Testing in a two connector test model as described in 2.4.1 will do to acquire a Certified Systems Warranty on the complete installation (= three connector installation).

Option 2

If the LANmark-6 10G 500 Mhz Ultim single ended patch cord is manually terminated on the Terminal Outlet (TO), then the full installation has to be measured using LANmark-6 10G 500 Mhz Ultim patch cords.

! The termination of the LANmark-6 10G 500 Mhz Ultim single-ended patch cord must be done with N420.667G connectivity for stranded wire in combination with LANmark-6 10G components.

When one of these options is chosen the Certified Systems Warranty on the three connector system model can be obtained, when the test results are submitted together with the filled in Nexans Warranty application form including other required documents.

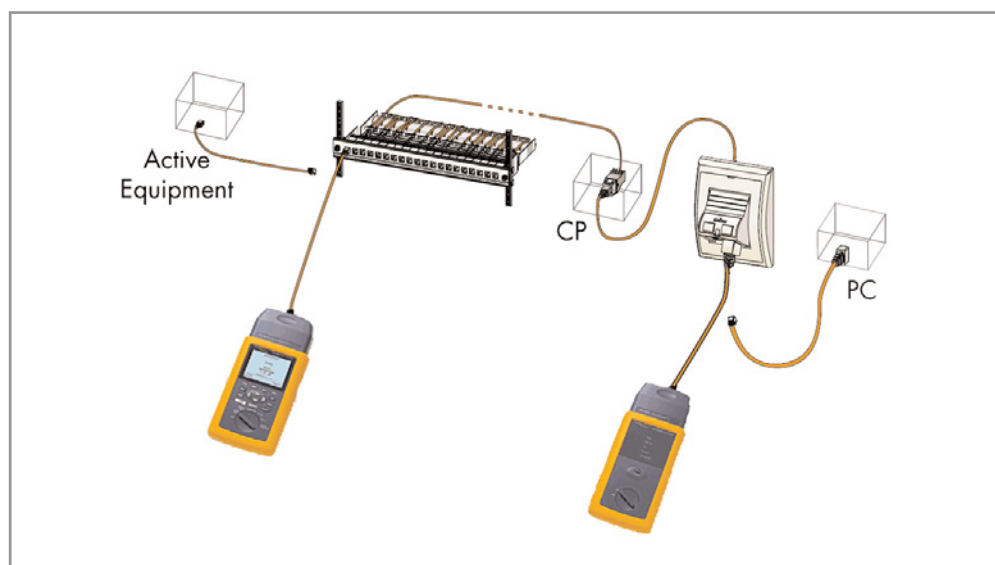


Figure 2.3 : Testing at three connector Interconnect - CP -TO model

Note: An alternative way of testing is to test as a two-connector installation from the Patch Panel to the Consolidation Point (CP) ignoring the conditions mentioned in option 1 of this paragraph. (With these test results only a Certified Systems Warranty on the two connector installation can be obtained.)

2.3.4 Four connector model : Crossconnect - CP - TO

Important: In a four connector model a maximum of two connectors at each side should be respected as mentioned in the standard. In this model of installation Nexans recommend two options of testing:

Option 1

a. The installation is done with LANmark-6 10G 500 Mhz Ultim pre-terminated patch cords (Pre-Term Copper

Assemblies) of Nexans to connect the active equipment and to connect the Consolidation Point (CP) with the Terminal Outlet (TO) and

b. LANmark-6 10G 500 Mhz Ultim patch cords of Nexans are used to cross connect the patch panels. Then testing in a two connector test model as described in 2.4.1 will do to acquire a Nexans Certified Systems Warranty on the complete installation (= four connector installation).

Option 2

The LANmark-6 10G 500 Mhz Ultim single ended patch cords are manually terminated on the patch panel and on the Terminal Outlet (TO)

Then the full channel has to be measured, see figure 2.4. Only Channel testing will do, under the same conditions as described in the previous paragraphs.

! The termination of the LANmark-6 10G 500 Mhz Ultim single-ended patch cord can only be done with N420.667G connectivity for stranded wire in combination with LANmark-6 10G components.

When one of these options is chosen the Certified Systems Warranty on the 4 connector system model can be obtained, when the test results are submitted together with the filled in Nexans Warranty application form and other required documents are included.

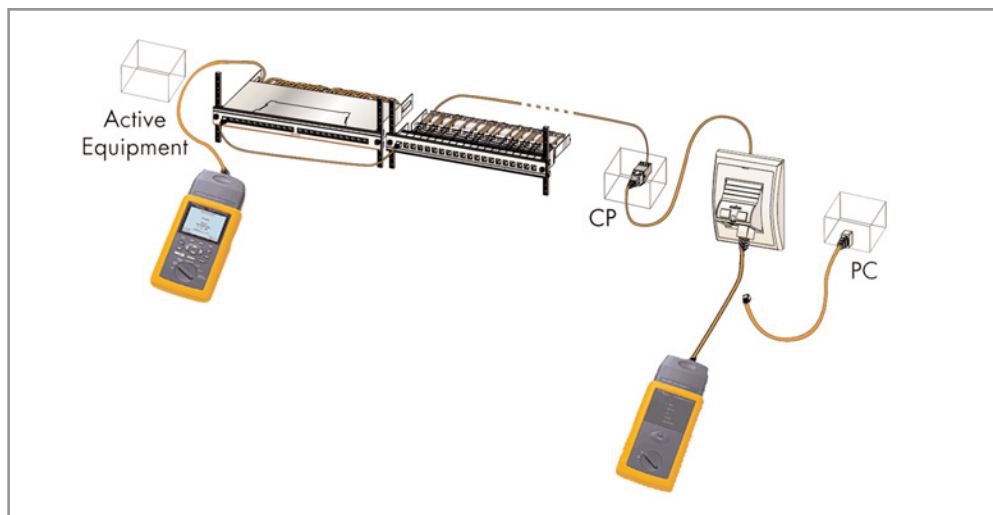


Figure 2.4 : Testing at four connector Cross connect -CP - TO model
(Only Channel Testing possible)

Note: An alternative way of testing is to test as a two-connector installation from the Patch Panel to the Consolidation Point (CP) ignoring the conditions mentioned in option 1 of this paragraph. (With these test results only a Certified Systems Warranty on the two connector installation can be obtained.)

2.3.5 Summary

System	2 connectors Interconnect - TO	3 connectors Cross connect TO	3 connectors Interconnect CP - TO	4 connectors Cross connect CP - TO
LANmark-6 10G	CM	CM	CM	CM

3 What equipment is available to test for compliance?

3.1 Certified Level IV testers

The LANmark-6 10G product line is designed to support 10GBASE-T/IEEE 802.3an application.

Providing that:

- A.** The installation is installed in accordance with the relevant national regulations, for example EN 50174 in Europe and ANSI/TIA/EIA 568 in the USA.
- B.** Tested to the Channel IEEE 802.3an, TIA/EIA TSB155 or ISO E TR24750 limits.

Nexans Cabling Solutions will issue a LANmark-6 10G Channel performance Guarantee and a 25 Year Component Warranty including 10GBASE-T application support.

Additional performance guarantees can be obtained provided that:

- 1.** The installation is designed and installed in accordance with the **“Design Guidelines for LANmark-6 10G cabling system”** document available from www.nexans.com/lansystems

Tested to the Class EA ISO 11801 Amendmend 1.1 Draft 3N 1324.

Nexans Cabling Solutions will issue a LANmark-6 10G CLASS EA ISO 11801 Amendmend 1.1 Draft 3N 1324 Channel performance Guarantee including 10GBASE-T application support and a 25 Year Component Warranty

OR

- 2.** The installation is designed and installed in accordance with the **“Design Guidelines for LANmark-6 10G cabling system”** document available from www.nexans.com/lansystems

Tested to the TIA/EIA Augmented CAT6 Channel as specified in PN-3-4426-AD10.1 draft 6.0

Nexans Cabling Solutions will issue a LANmark-6 10G Channel performance Guarantee including 10GBASE-T application support and a 25 Year Component Warranty

The following testing guidelines are to be adhered to: -

- All lines must be installed so that the maximum fixed link distance is 90m.
- All personnel must be competent with the operation of the chosen tester and be familiar with the manufacturers operating manual.

In order to meet the requirements of the standards only level IV testers may be used. At the present these are:

Following firmware revisions must be applied.

1. Fluke DTX 1800
 - Software Revision v1.3
 - RJ45 Channel-adapter (DTX-CHA 001)
2. Ideal Industries LANTEK 6A / LANTEK 7 / LANTEK 7G
 - Firmware Version 2.101
 - High Performance RJ45 Channel Adapter (0012-00-0656)

Following Limits and testheads must be chosen for testing LANmark-6 10G systems:

Tester	Adapter	Limit
LANTEK 6A/7/7G	0012-00-0656 	10Gbase-T - 802.3an C6 10GbE TSB155 / ISO E TR24750
		TIA/EIA Augmented CAT6 Cat6A 500 Draft 6.0
		ISO 11801 CLASS E _A ISO Ea 500 Dr 1173
DTX 1800	DTX-CHA001 	10GBASE-T - 802.3an TSB155CH / ISO TR24750
		TIA/EIA Augmented CAT 6 ISO 11801 CLASS E _A
		TIA Cat6A CH dr 6.0 ISO Class EA Ch 25N1255

! Please check regularly our website if you have the latest version of this paper.

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

3.3 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 data sheet for the product you are testing. Generally for Nexans cabling systems, the values to be used are:

Commercial cable name	NVP
Nexans LAN mark-6 10G F/UTP	0,66
Nexans LAN mark-6 10G F1/UTP	0,67
Nexans LAN mark-6 10G F/FTP	0,80
Nexans LAN mark-7 S/FTP	0.80
Nexans CAT 7 S/FTP	0.80

4 Understanding the test results

4.1 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 6a. 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.

4.2 What to do with the result – Warranty Certification

When submitting results for the Nexans Warranty, a 'Nexans Warranty application form' for the site has to be filled in and submitted to your local Nexans unit. This warranty application form can be obtained from your local Nexans contact or from our website www.nexans.com/lansystems and click on warranty.

- Upload and Save – Which database format?

Fluke DTX 1800 series: *.flw

Ideal Industries LANTEK-7: Zip package including database files

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

! Each tester must be yearly calibrated by the manufacturer and a copy of the certificate must be included in the Nexans Warranty request.



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