



Field-testing procedure of

LANmark-7

Technical Paper
Nexans Cabling Solutions
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1 Introduction

The purpose of field 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 describe how to test LANmark-7 cabling systems and to validate the installation against the international standards ISO/IEC 11801:2002 and CENELEC EN 50173:2002. By doing so, the LANmark CLASS F warranty can be achieved.

If testing shows any 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 qualify for the Nexans warranty all Channels in an installation shall be tested, and all shall 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.

As the marginal test results are indicating that the result is within the range inaccuracy and tolerances of testers, Nexans recommends to treat a marginal FAIL as FAIL and marginal PASS results as 'PASS'.

For its warranty procedure Nexans will accept a marginal PASS and reject a marginal FAIL.

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 Class F links. The procedure is to be followed in case of applying for Nexans Certified System 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 cross connections, but does include the optional consolidation point.

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, PBX, video equipment). The channel includes the work area cord, the equipment cord and the cross-connection.

For LANmark-7 channel testing is recommended as few Permanent Link test heads are available.

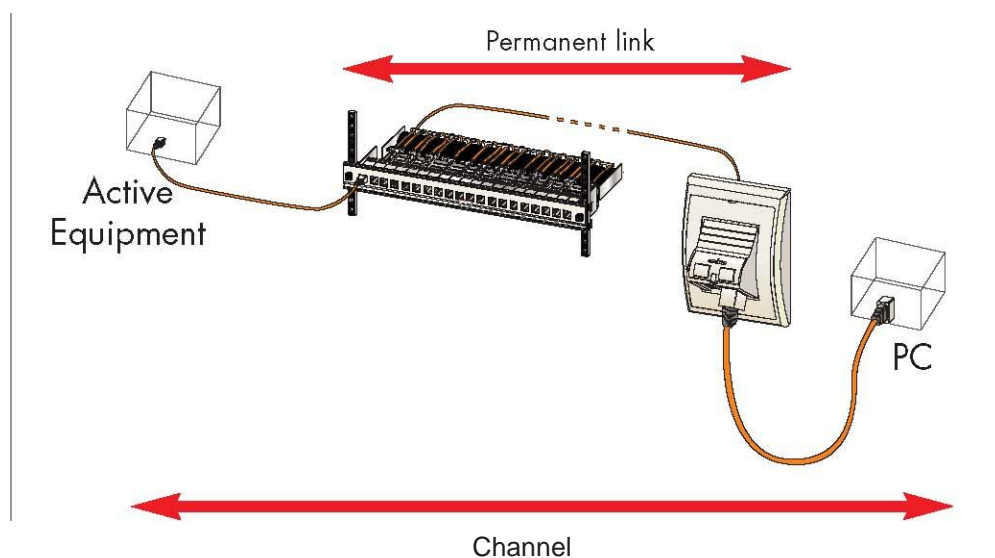


Figure 1: Model of Permanent Link and Channel testing

2.3 Category 7 and connecting hardware

Before you go to the test site, please make sure to prepare your tester in accordance to the correct standard. In the next paragraphs following issues are covered: - 'How the different installation models of Class F links can be tested?' and - 'Which specific models of test-equipment and test heads can be used.'

2.4 Installation models

2.4.1 Two connector model: Interconnect -TO

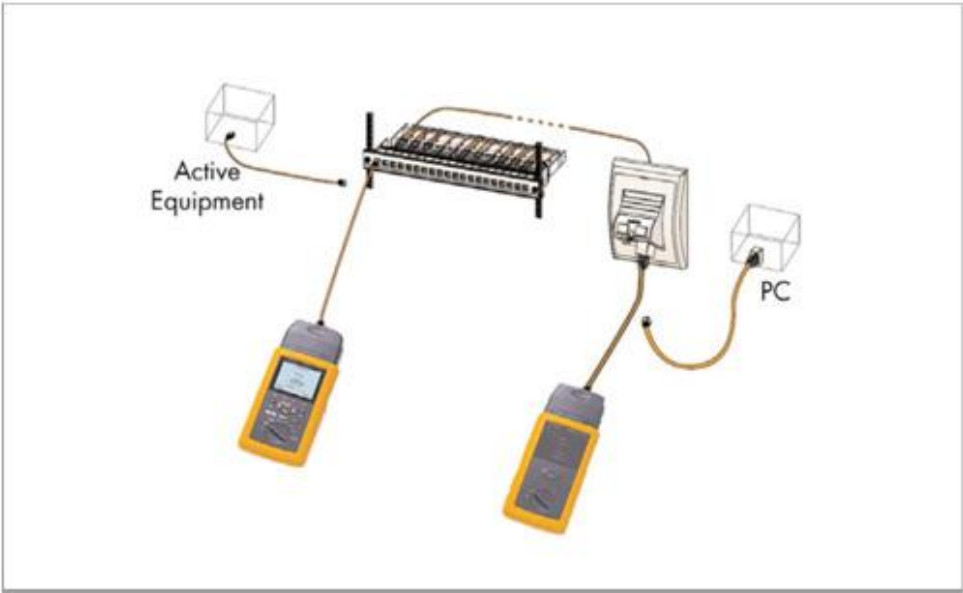


Figure 2.1: Testing at 2 connector Interconnect - TO model

Figure 2.1 shows the two-connector model as described in the standard. In this installation model Channel testing methods are recommended and can be applied with the available Class F test heads. A permanent link test is possible with certain testing equipment in limited testing configurations.

2.4.2 Three connector model: Cross connect – TO

The installation includes an Equipment cord consisting of a LANmark-7 patch cord which must be terminated using a Nexans N420.731 GG45 connector to represent the equipment ports. Testing in a 3 connector test model as shown in Figure 2.2 is mandatory to acquire a Class F Certified Systems Warranty on the complete installation (= 3 connector installation) under the condition that the correct test heads are used.

Note: If the channel specific Equipment cord has not been installed at the time of testing, the only option is to test the 2-connector installation - see Figure 2.1. However, with this test method only a Certified Systems Warranty on the 2-connector installation can be obtained from Nexans - which must be explained to the end user / consultant prior to commencing testing.

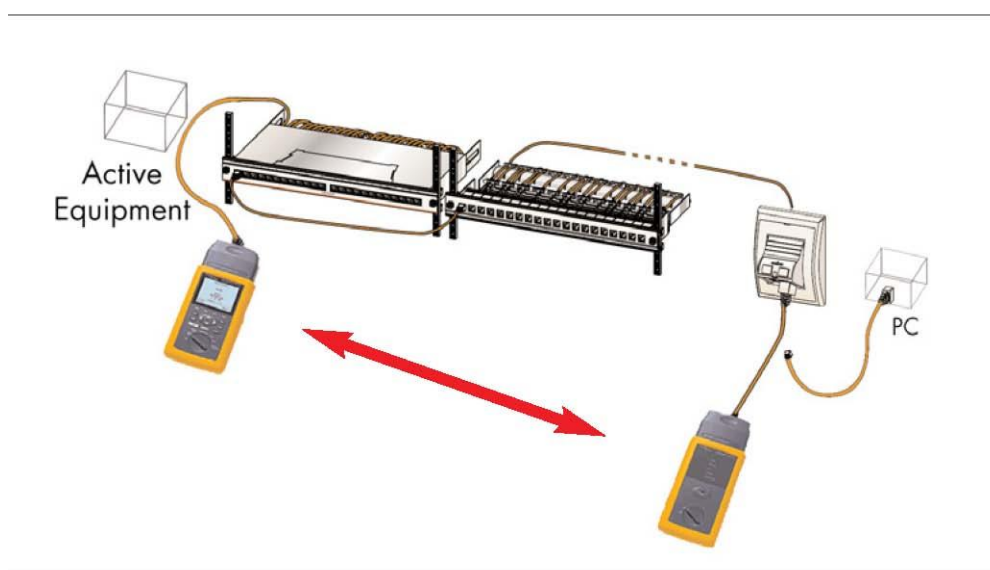


Figure 2.2: Testing at 3 connector Cross connect - TO model

2.4.3 Three connector model: Interconnect - CP - TO

The installation includes a Consolidation Point lead consisting of a LANmark-7 patch cord which must be terminated using a Nexans N420.731 GG45 connector connecting the Consolidation Point (CP) to the Telecommunication Outlet (TO).

Testing in a 3 connector test model as shown in Figure 2.3 is mandatory to acquire a Class F Certified Systems Warranty on the complete installation (= 3 connector installation) under the condition that the correct test heads are used.

Note: If the channel specific Consolidation cord has not been installed at the time of testing, the only option is to test the 2-connector installation - see Figure 2.1. However, with this test method only a Certified Systems Warranty on the 2-connector installation can be obtained from Nexans - which must be explained to the end user / consultant prior to commencing testing.

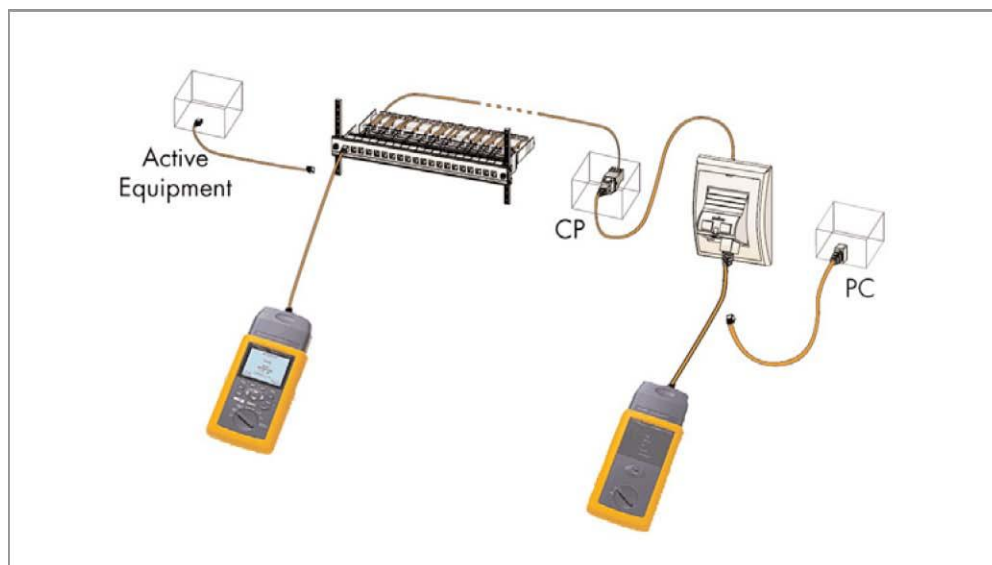


Figure 2.3: Testing at 3 connector Interconnect - CP - TO model

2.4.4 Four connector model: Cross connect - CP – TO

If LANmark-7 patch cords are used to cross connect the patch panels, testing as a 4-connector test model is mandatory to acquire a Nexans Certified Systems Warranty on the complete installation (= 4 connector installation). The installation includes a Consolidation point lead and an Equipment cord consisting of a LANmark-7A patch cord which must be terminated using a Nexans N420.731 GG45 connector connecting the Consolidation Point (CP) to the Telecommunication Outlet (TO) and the Cross Connect panel representing the ports on the equipment. Testing in a 4 connector test model as shown in Figure 2.4 is mandatory to acquire a Class F Certified Systems Warranty on the complete installation (= 4 connector installation) under the condition that the correct test heads and test limits are used.

Note: If the channel specific Equipment cord and Consolidation cord has not been installed at the time of testing, the only option is to test the 2-connector installation - see Figure 2.1. However, with this test method only a Certified Systems Warranty on the 2-connector installation can be obtained from Nexans - which must be explained to the end user / consultant prior to commencing testing.

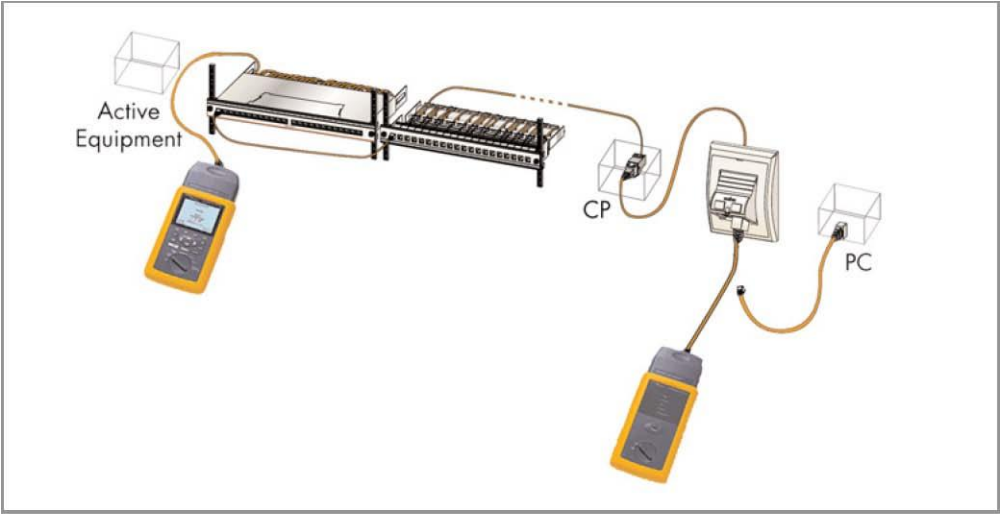


Figure 2.4: Testing at 4 connector Cross connect – CP –TO model

2.4.5 Summary

2 connectors Interconnect - TO	3 connectors Cross connect - TO	3 connectors Interconnect - CP - TO	4 connectors Cross connect - CP - TO
CH/PL	CH/PL as 2 connector + CH Equipment cord	CH/PL	CH/PL as 3 connector + CH Equipment Cord

- Class F:
- CH= Channel Measurement
 - PL= Permanent Link Measurement

3 What equipment is available to test for compliance?

3.1 Certified Level IV testers

Test equipment must be capable of certifying Class F links and test adapters must be approved by Nexans.

Nexans strongly recommends the use of equipment with baseline accuracy that exceeds ISO/IEC 61935-1/Ed.2 (8-2005) Level IV, as indicated by independent laboratory testing.

Nexans have endorsed **6** testers and configurations for use in validating the LANmark 7 / Class F solutions against the Warranty and performance requirements on installations.

At present these are:

- 1. Ideal Industries LanTek-II 1000**
- 2. Psiberdata WireXpert WX4500-FA**
- 3. JDSU NGC-4500 Certifier40G**
- 4. Agilent WireScope Pro**
- 5. Fluke DTX 1800**
- 6. Ideal LanTEK 7/7G**

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.

3.1.1 Care of the Tester and leads

Cabling Field testers are 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 a new test job and place both units on charge overnight during the testing phase of the project.

3.2 Test Adapters and limits

1. IDEAL Industries LanTEK II 1000



Channel adapters

-  0012-00-00667 (GG45 CLASS FA Channel Adapter) LANTEKGG45KIT
- GG45 8C Measurement Cord Category 7A Screened LSZH 2m Orange (N900.67A)

Permanent Link

- GG45 Permanent-Link-Adapter (0012-00-0650 /N900.976)

Limits

- ISO/IEC 11801 Channel CLASS F
- EN 50173 Channel CLASS F

Software Version: Firmware 2.7 or higher

2. Psiber Data Wirexpert 4500

Channel adapters

-  WX_AD_GGARJCH2 (GG45 CLASS FA Channel Smart Probe)
- GG45 8C Measurement Cord Category 7A Screened LSZH 2m Orange (N900.67A)

Limits

- ISO/IEC 11801 Channel CLASS F
- EN 50173 Channel CLASS F



Software Version: 3.9 or higher

3. JDSU NGC-4500 Certifier40G



Channel adapters

-  NGC4500GGARJCH2 (GG45 CLASS FA Channel Adapter)
- GG45 8C Measurement Cord Category 7A Screened LSZH 2m Orange (N900.67A)

Limits

- ISO/IEC 11801 Channel CLASS F
- EN 50173 Channel CLASS F

Software Version: 3.9 or higher

4. **AGILENT Technologies** Wirescope Pro

Channel

- N2644A-107 (GG45 CLASS F Channel Smart Probe)
- GG45 8C Measurement Cord Category 7A Screened LSZH 2m Orange (N900.67A)

Permanent Link

- N2644A-106 (Nexans Class F PL Smart Probe)


Limits

- ISO/IEC 11801 CLASS F
- EN 50173 CLASS F



5. **FLUKE Networks** DTX 1800

Channel

-  DTX-CHA012S GG45 Channel Adapter
- GG45 8C Measurement Cord Category 7A Screened LSZH 2m Orange (N900.67A)

Permanent Link

- DTX-PLA012 GG45 Permanent Link adapter

Limits


- ISO/IEC 11801 CLASS F
- EN 50173 CLASS F



6. IDEAL Industries LanTEK 7/7G



Channel

-  Category 7/7A GG45 Channel Adapter (0012-00-5475X) part of 1019-00-1100 GG45 Testing Kit
- GG45 8C Measurement Cord Category 7A Screened LSZH 2m Orange (N900.67A)

Permanent Link

- GG45 Permanent-Link-Adapter (0012-00-0650 /N900.976)

Limits

- ISO/IEC 11801 CLASS F
- EN 50173 CLASS F

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3.3 Selecting the correct cable type

When setting up your tester you should pay attention to the correct cable selection and the NVP (Nominal Velocity of Propagation) for the cable under test. This setting will determine the length 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 or refer to the NVP value printed on the cable outer jacket. Generally for Nexans cabling systems, the values to be used are:

Commercial cable name	NVP value
LANmark-7 S/FTP 600MHz	0.80
LANmark-7A S/FTP 1000 MHz	0.80
LANmark-7A 1200 S/FTP 1200 MHz	0.80
LANmark-7A 1500 S/FTP 1500 MHz	0.80

3.4 Before you go to site

For all testers ensure you have the latest version of the tester firmware loaded, the update can be obtained from the manufacturer Internet site along with the latest software and limits database which should also be loaded into the tester. 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, afterwards place it on charge overnight during the testing phase of the project.

4. Understanding the test results

4.1 What the test results show

We would all like that at 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 CLASS F. 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. Nexans consider a *PASS as acceptable for warranty certification. 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 including the original test results file to warranty.ncs@nexans.com. This warranty application form can be freely downloaded from the Nexans LANsystems website www.nexans.com/LANsystems

- Upload and Save – Which file format?

Ideal LanTEK 7/7G: create a backup zip file using LANTEK Reporter
or *.sdf using DataCENTER

Ideal LanTEK II 1000: *.sdf using Ideal DataCENTER

PSIBER Data Wirexpert 4500: *.prz using ReportXpert

JDSU NGC-4500 Certifier40G: *.prz using ReportXpert

Fluke DTX-1800: *.flw using Fluke Linkware

Agilent Wireshcope Pro: *.sdf using Scopedata Pro II

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

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