# White Paper
# Why Test?

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"Why Test?" is a question which is often asked, especially when copper infrastructure cabling is the subject. Some see it as an unnecessary burden when the cost of labour and materials is continuing to rise in the industry and the profit and margins are getting smaller. However, most installation contracts will require testing either in its own right (proof of specification), or to satisfy warranty application requirements.

Infrastructure cabling is first manufactured as a series of components and then installed to form the system. The installation of the components has a great affect on the performance of the system so can really be considered as a continuation of the manufacturing process. The components, cables and connecting hardware etc, are manufactured in a factory using various machines and processes. As this is a production line, batch testing lends itself very well to the sample size of testing. The testing will include the materials to manufacture the cable and connecting hardware and performance testing. In the case of the cable, the properties of the plastics and copper to be used – purity, composition and so on will be checked. Once the items are manufactured the testing of the cable will include physical measurement of the geometry of the conductor, pair twist, thicknesses of materials and then a performance test against the cable component standard. Additionally, the performance standards will lead into other requirements such as flammability etc.. Reputable manufacturers will often back this up with testing of the components by third party independent test laboratories of their premier products. Giving the installer and clients further confidence in the system.

Routine tests carried out are material and electrical parameter testing. They are tested against a series of limits defined by standards. These limits and specific parameters are designed so that they ensure the support of various applications and that the cabling and connecting hardware is suitable in the environment intended for the installation. The various categories of performance are designed to support different applications. Usually the standards will state the minimum category (or class) for the specific application. This means that by testing to the category or class it can be shown that all of the specified applications will be supported. Furthermore, when future applications are developed that can utilise existing categories, no further testing is required.

Manufacturers will test the products to ensure the required levels of quality and performance are met. They can then be assured that if during installation the guidelines and practices are followed the system will perform.

**test** n. a procedure intended to establish the quality, performance, or reliability of something.

The installation company tests for a number of reasons including:

- Manufacturer's warranty
- Good practice
- Contractual

More often than not, to register an installation for a manufacturer's warranty, a level of testing will be required. This, along with following the installation guidelines and standards, shows compliance to the performance standards. The installer has demonstrated that at the conclusion of the installation that the installed system met the specified standard. This is pertinent to showing compliance to the contract. In simple terms, if for example, the contract is to install 1,000 Class E Links, then supplying test results for these links (with the correct cable ID and to the correct Class) shows compliance of the contract.

For the manufacturer the testing carried out by the installer defines the links that require a warranty. It is a record of the performance on completion of the job and defines the liability that is undertaken by the warranty.

The installer's test results are important for the client as confirmation that the installed links are of the specified standard. The client can then create the channels needed to support applications during the life of the system. Occasionally the client may have specific applications that are in need of particular levels of performance. The test results supplied by the installer are useful for selecting specific, or combinations, of links that will best support the needs. In some instances clients will carry out testing of configured channels to confirm the specific performance.

The types of tests can be simplified to Component, Link and Channel. Broadly speaking these are for the different parties involved.

- **Components** – tested by manufacturer

- **Link (Permanent Link)** – tested by the installer as this is the part of the infrastructure that is not changed

- **Channel** – tested by the client if desired for specific applications. More commonly used for fault finding during the operation

Following the Permanent Link installation and testing, individual channel testing is not required by the client if the channels are formed using compliant connecting cords within the parameters of the standards for a channel configuration. Where channel testing may be useful is as a fault finding tool if there is an issue with the network during the operation. By testing the configured channel it may be determined whether the issue is with the infrastructure cabling, network design or operation.

Different infrastructure cabling test equipment is available. The permanent link testing and channel testing can be carried out by the same equipment using different adapters. What is important to assure the validity of the tests is to use test equipment that meets the standards for installation testing and models recognised by the manufactures warranty application conditions. Well looked after test equipment will deliver the most accurate test results. Looking after the test equipment includes having a valid calibration carried out in accordance with the manufacture's specification and time scales. Typically this is by a manufacturer approved

facility on an annual basis. Calibration is the procedure of adjusting the test equipment to ensure that it is measuring the parameters to within the tolerances defined by the standard. Calibration, of any equipment, is normally carried out by checking the measurements against a more accurate piece of equipment. Infrastructure cabling test equipment has the added complication of measuring many different parameters across a range of frequencies. Calibration needs to be of all parameters across the frequency range, with adjustments made, where necessary to the hardware or software settings. To make it easy for all parties to determine that the calibration of the test equipment is valid, the calibration date is recorded in the electronic test result file. The calibration facility will also add a sticker to the unit as a reminder to the operator. If the calibration date shown in the test result file is out of date, the tests are invalid.

In summary, testing shows that the infrastructure cabling meets the standard and will therefore support the relevant applications. The test results are best stored electronically in the tester manufacturer's format as they can be correctly interrogated to check that – all links have been tested, to the correct standard, by equipment that is within calibration. Testing proves that the cabling system works to the category/class that is stated.

*This White Paper has been produced by Simon Robinson, Product Manager on behalf of Excel.*

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