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TÜV SÜD Guide to Safety Testing

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Introduction

Thank you for choosing TÜV SÜD, you have chosen to test your products in one of the UK's most advanced testing facilities.

This document is provided to assist preparation with your upcoming Electrical Safety Testing/Assessment at TÜV SÜD. It highlights the key information that is required before the assessment along with some explanation of the testing to be conducted and the typical time scales for completing the testing and issuing reports and certificates.

Should you have any questions about the safety testing being conducted by TÜV SÜD please do not hesitate to contact your Project Manager (PM) who will be happy to explain your test requirements in more detail.

This guide is designed to help you prepare for your upcoming test programme. It is your responsibility to ensure that you follow the guidance document and prepare all the necessary documentation in advance of the scheduled test start date.

This will ensure the testing is carried out efficiently as possible, and will help prevent unnecessary delays and potential additional charges. While this guide will facilitate your testing with us, it will not guarantee that your product will pass the test programme.

Overview of Safety Testing

Generally safety standards, whether you are applying the Low Voltage Directive for CE marking or at a higher level for international approval (e.g. CB scheme, NRTL Certification or other Global Market Access requirements) require some type of testing.

The key principles of safety, for which we are assessing your product against, are generally considered as:

- Electric shock hazards
- Energy hazards
- Heat and fire hazards
- Mechanical hazards
- Chemical hazards
- Radiation hazards

The safety testing which TÜV SÜD will be conducting for you, will need to consider one or more of these aspects. The specific test standard will provide guidance as to how these requirements are met.

On occasions the test standards are not always easy to understand and therefore we use the IEC (the

International Scheme for approving electrical products) decision and interpretation sheets for guidance.

These guides are agreed processes for particular tests or requirements so that a consistent approach is followed throughout test houses around the world.

It is important to note that safety standards look for compliance of a product under both normal and single fault conditions. Therefore, it may be a requirement to apply tests to your product which could be damaging. If you are concerned about this aspect, please contact your PM who can explain your options.

Before Testing Begins

Once you have placed an order, you will be assigned a PM. They will advise you of the next available dates for testing (unless this has been previously agreed).

We will then require:

- **Working sample(s) that can be loaded in the worst-case condition** - where the product case or assembly is likely to be distorted or destroyed when opened an additional sample will be required that has undergone final assembly i.e. prior to welding or gluing.
- **Representative load (if applicable)**
- **Circuit diagram(s), Parts list(s) / BOM**
- **User, installation, service manual(s)**
- Approval documentation for safety critical components
- Samples of safety critical components (including unpotted/unvarnished components)
- UL 94 Flammability listings for all plastics, PCB material etc.
- Samples of components which are likely to be damaged during fault testing, e.g. fuses, voltage regulators
- Samples of transformers that employ thermal fuse protection if used in the product
- Specifications/details for critical parts (e.g. batteries, protection circuits etc.)
- Brief description of operation

NOTE: The key items which will allow us to start testing are highlighted in bold above, without these we will be unable to begin the test programme.

Although it is not essential that all the information is available at the start of testing, without this data it is likely that we cannot fully complete your testing, which will cause delays and could incur further costs.

What tests do we carry out on your product?

The full assessment of your product combines dynamics tests, physical inspection and documentation review.

The dynamic tests include:

- **Input Current** – A check to ensure that the measured current or power does not exceed the marked ratings of the equipment.
- **Thermal Tests** – This involves inserting thermocouples into the equipment to ensure key components or insulations do not exceed the allowed limits.
- **Single Fault Tests** – Single faults are applied to the system one at a time to ensure that the equipment remains safe. This covers a broad range from blocking air vents, stopping fans to short circuiting of insulation and transformers.
- **High Voltage Tests** – A high voltage is applied across insulation barriers to ensure that breakdown does not occur. In some cases, this is conducted before and after humidity pre-conditioning.
- **Touch Current measurements** – Ensures that no high currents are accessible to users or operators.

The inspection part of the assessment includes:

- **Markings** – A review of the products markings to ensure that they are durable and contain all of the required information in the correct location.
- **Instruction Manual** – A review of the manual to ensure that the required safety warnings are included, along with any other required user information.
- **Creepage and Clearances** – Distances between hazardous parts and earth and hazardous parts and secondary parts are measured to ensure they are within the requirements of the test specification.
- **Components** – It is checked that components are being used correctly and within their safe operating parameters. The datasheets and third-party approvals are required for the components for this section of the assessment to be conducted fully. (see critical components section below.)
- **Mechanical** - Tests are carried out as per the requirements of the test standard to ensure that hazardous parts are not accessible.
- **Radiation** – Any UV or hazardous sources are assessed for their required approvals and to ensure they are within safe levels for their application.

Safety Critical Components (What they are and what data we require for these)

One of the main causes of delays in a project is safety critical component approval, so it is very important you understand what these are and why we need this data and most importantly what can or cannot be accepted.

What is a “safety critical component”?

Generally, a safety critical component is a component which, if changed, could affect the safety of the product.

Commonly these are mains powered components but, in many cases can also be secondary components.

Safety standards require that safety critical components are previously approved to their relevant EN or IEC standard (if submitting for North America, UL or CSA approvals will also be required). This ensures that each of these components have been tested to their component relevant standards which capture testing and assessment e.g. endurance and loading that would not be assessed under the end product assessment.

By reviewing the relevant third-party approval data we can verify that individual components have been tested by a competent (ISO 17025 accredited) test laboratory and they have the particular test standard on their scope of approval.

Critical Component FAQs

Q. Is a manufacturers Declaration of Conformity (DoC) acceptable as approval evidence?

A. No, a DoC does not provide evidence that the component has been assessed by a third-party ISO 17025 accredited test laboratory.

However, if this is the only evidence available for this component we can include this data within the report, but we are unable to endorse the compliance of this component. Provided you are willing to take on the responsibility for this specific component then we can make a statement to this effect within the report.

NOTE: This route cannot be accepted for IECCE CB or NRTL certification where full third-party approval data is mandatory to prove compliance.

Q. What if no manufacturers’ DofC or other evidence can be obtained, and I cannot find a suitable alternative part?

A. In some cases, standards allow for components to be assessed in end use application. However, this would require additional in application testing which would not be included in the original quotation unless discussed at this point. There are exceptions to this and some components cannot be covered in this way due to the types of testing required for example fuses and switches.

Q. I have a plastic enclosure which is UL94 approved but has no European equivalent, what do I do?

A. The UL, IEC and EN test methods for material flammability are almost identical. Therefore, for plastic parts UL data is acceptable.

Safety Testing - Work Flow Chart

