

Information document explaining the intention and rationale for having a standard for Í Recurrent test and test after repairÍ on electrical devices

Why is it needed to have a standard for Í recurrent test and test after repairÍ for electrical devices additional to product standard

Product standards are for type-testing, describing the design criteria of electrical devices which should be proven by applying a combination of stress and destructive tests. In addition, product standard specifies that these tests are carried out under certain environmental conditions. These laboratory conditions cannot be guaranteed whilst testing electrical devices in-service. Therefore, measurements requiring certain environmental conditions can only be applied consistently with difficulty and are therefore not suitable for use during in-service testing of equipment. An additional aspect is that equipment could potentially be damaged during test applications and can face a potential danger to person(s) and surrounding.

Another aspect of the design process of electrical devices is to ensure the safety of the equipment during its expected useful life. The selection of methods and materials should contribute in this way.

One approach would be to modify product standards to make the requirements for protection against electric shock and protection against fire much more rigorous to further reduce the risk of failure during the product life cycle but clearly this would place a huge burden on equipment designers and manufacturers and no doubt increase costs for everyone in the chain. Equipment designers can never predict the behaviour of the user and it would be a much more sensible and cost effective approach to introduce formal guidance on risk based inspection and testing during the equipment life cycle.

As far as possible, a consensus is required to harmonise the assessment of the safe operation and testing of electrical devices whilst respecting local requirements and meeting increasing demands for risk management. It is therefore necessary to describe tests beyond those of the type testing and to provide a uniform and unambiguous means of assessing the equipments safety whilst maintaining the relation to product standard and minimising the risk of hazard to the person conducting the assessment.

The challenge with introducing recurrent test requirements into product standards is that they will focus on the requirements for the products covered within the scope of that particular standard. The person carrying out recurrent testing would then need access to all product standards covering the range of equipment to be inspected and tested. A more holistic approach is required and this is why National Standards and Codes of Practice evolved giving general guidance on recurrent testing.

All these aspects were considered during the creation of IEC 62638.

IEC 62638 was primarily defining the requirements for ensuring the effectiveness of the protective measures of electrical devices in case of recurrent testing and after repair whilst respecting the product standard design criteria and providing means of safer and easier working practise to those persons involved in assessing the safety of electrical devices

In addition, IEC 62638 provides means to assess the aging process of electrical devices through structured and regular inspections.

A selection of test procedures, test methods and test intervals which shall be used during the expected useful life of electrical devices is described herein and includes the verification of the effectiveness of the protective measures by measuring (where applicable)

- Visual inspection
- the resistance of the protective earth conductor
- the Insulation resistance between mains live and earth and/or isolated accessible conductive parts
- the Protective earth leakage current
- the touch current of accessible conductive parts
- the Voltage level of SELV / PELV

Benefits of having a standard for recurrent test and test after repair:

- Improved safety during the lifetime of an electrical device
- Reduced deaths and injuries due to electric shock and burns
- Reduced fire damage to property
- Improved feeling of security
- Improved electrical comfort and quality of life
- Reduced energy costs
- Increased property values
- Reduced insurance costs

Addressees and their interest in a standard for recurrent test and test after repair

Addressees	Interest
Manufacturer of electrical devices	<ul style="list-style-type: none"> • Description of appropriate test methods • Referencing to a standard not producing new test methods • Application of consistent test methods • Set of test methods to verify the condition of the equipment during the useful life under normal condition without destruction • Global test methods and test equipment
Manufacturer of testing equipment	<ul style="list-style-type: none"> • To develop measuring equipment which provides all the necessary test methods in one test instrument • To have unique test methods worldwide
Authorities	<ul style="list-style-type: none"> • To provide guidance in case of an existing law • No additional expertise is necessary to proof adequacy of test methods • To provide uniform testing of electrical devices for all responsible organizations
Suppliers of electrical devices	<ul style="list-style-type: none"> • To provide the necessary technical data for recurrent tests • To ensure there have been no damages during transport • To ensure the safety of the equipment after installation
Responsible organizations	<ul style="list-style-type: none"> • Guidance to fulfill existing national laws • To have unique test methods for each electrical device • Achieve the equivalent safety level as in product standards • To have a guidance for recurrent tests of electrical devices without specified test methods • To provide uniform tests for electrical devices from different manufacturers
Service personnel (internal and external)	<ul style="list-style-type: none"> • To provide uniform testing of electrical devices • To have a guidance for recurrent tests of electrical devices without specified test methods • Guidance to fulfill existing national laws • To have unique test methods for each electrical devices • Achieve the equivalent safety level as in product standard

Í Recurrent test and test after repairÍ are already established by many manufacturers worldwide and are best practice in many countries like

Germany

national Standard DIN VDE 0701/0702
national law %Betriebssicherheitsverordnung+(= code of practice)
Requirement from company insurance

Netherlands

national standards NEN 3140

Austria

national standards ÖVE 8701
national law to do periodic inspection on electrical devices

UK

Electricity at Work Regulations
Code of practice

In the UK there is evidence (published by the London Fire Service) to show that the largest cause of fires in commercial premises is faulty electrical equipment and mains cables. This has a devastating effect on businesses and their employees. There is clear evidence that electrical equipment that has been type tested and tested during manufacture can become unsafe whilst in service suggesting that product standards do not always result in equipment that remains safe throughout it's working life.

Australia and New Zealand

Code of practice
National standard AS/NZS 3760 - In-service safety inspection and testing
of electrical equipment.

Poland

Reference to DIN VE 0701-0702 or UK Code of practice

Czech Republic

"Recurrent test and test after repair+are established in the Czech Republic by the
Czech national standard CSN 33 1600 ed. 2:2009
Similar standard STN 33 1610 is used in the Slovak Republic.

Swiss

National paper Info 3024b from electro swiss - Reference to DIN VE 0701-0702

Recommendation

Today it is best practice to maintain the electrical devices which are used in a professional way by a service department by a manufacturer or by a service organization. But unfortunately it is often unclear what to do because manufacturers do not advice and product standard say nothing about maintenance and service.

Annex:

In typical domestic, public and industrial environment there are electrical devices made according to many different product standards, with substantial differences in type test and routine test procedures. For in-service/ field testing it would be difficult even for a skilled technician to select proper test procedure because of the many different product standards. On the other hand the dangers, hazards, common faults and safety measures are similar regardless of the type of product.

Clearly there are differences between limit values across the range of product standards but we must look at the problem in the context of detecting problems that may occur during a product life cycle and not the limits for type approval testing. In the case of recurrent testing, a repeatable and consistent approach is of much greater value than absolute precision of measurement.

Personal experience from a colleague from US:

I had a personal experience I'd like to share. My clothes dryer was installed in my home. Perfect and passed all factory tests. After a short period of time (weeks) I noticed while removing clothes and touching my forearm to the metal drum I felt shock sensation. I looked inside the cabinet and noticed the drum was rubbing against a mains wire and rubbed off the insulation. Wow! I thought, how would a non-engineer home owner and/or the typical serviceman deal with this.

In addition, this may not be pertinent to the issue at hand, but I disagree with IE-2 in 85/453/RVD. Anytime someone disassembles electrical equipment, no matter what the reason, factory safety integrity is compromised. You never know when a wire will be broken loose or pinched etc.