

**STRATEGIC POLICY STATEMENT**

IEC/TC or SC 112	Secretariat GERMANY	Date 2007-12
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Please ensure this form is annexed to the Report to the Standardization Management Board if it has been prepared during a meeting, or sent to the Central Office promptly after its contents have been agreed by the committee.

Title of TC Evaluation and Qualification of Electrical Insulating Materials and Systems
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**A. Background**

TC 112 is responsible for standardizing Methods of Test for Electrical Insulating Materials and Electrical Insulation Systems.

**Scope**

To prepare International Standards covering methods of evaluation and qualification for electrical and electronic insulating materials and electrical insulation systems

Horizontal Safety Function: Test methods for resistance to tracking.

**Membership**

20 P-member: AT, BE, CA, CH, CZ, DK, FR, DE, IT, JP, NL, PL, PT, RO, RU, SE, CH, UA, UK, US, and

6 O-member: FI, RS, SK, ZA, ES, TH

**Liaison:**

Liaison to the following TC/SC is aimed at or still performed:

IEC/TC 2, IEC/TC 10, IEC/TC14, IEC/TC 15, IEC/SC17A, IEC/SC17B, IEC SC 34C IEC/TC 36, IEC/TC 42, IEC/SC 45A, IEC/TC55, IEC/TC 89, IEC/TC 96, IEC/TC 101, CIGRE/SC D1

**Publications:** 82

**Advisory Group :**

The Advisory Group for TC 112 consists of officers and convenors plus representatives from of liaison TCs/SCs of IEC and other international organizations (e.g. IEEE, CIGRE, ASTM)

**Scope AG**

- to highlight areas where TC 112 and the product committees could work together for the mutual commercial benefit of the industry
- to identify and make recommendations on the selection and establishment of projects and strategic goals, in accordance with market needs.
- to promote two way communications between representatives of TC 112, product TCs and other international organizations to facilitate cooperation and avoid duplication of work.
- to advise TC 112 on the existing and future needs of EIM and EIS content of product standards.
- to monitor changing technology with the goal of keeping TC 112 Standards up to date.
- not to duplicate the plenary meeting but to make constructive recommendations to TC 112

**Working Groups:**

- WG 1 Thermal Endurance (Convenor Prof. Montanari, IT)
- WG 2 Radiation (Convenor Mr. Dawson, UK)
- WG 3 Electrical Strength (Convenor Prof. Stimper, DE)
- WG 4 Dielectric / Resistive Properties (Convenor Mr. Haupt, DE)
- WG 5 Tracking (Convenor Dr. Winter, DE)
- WG 6 Systems (Convenor Dr. Densley, CA)

- WG 7 Statistics (Convenor Dr. Okamoto, JP)
- WG 8 Various Material Properties (Convenor Prof. Shimizu, JP).
- MT 9: JMT TC 112/TC 10 - Revision of IEC 60050-212 (1990-10)  
(Convenor Prof. Stimper, DE)
- MT 10: Maintenance of 62039 TR (Convenor Prof. Stimper, DE)
- PT 112-1: Test methods on space charge measurements (Convenor Prof. Smit, NL)

### System Approach for TC 112's Electrical Insulation System (EIS) activities

Component committees (IEC TC112 - role of a customer)	IEC TC 10	Fluids for Electrotechnical Application
	IEC TC 15	Solid electrical insulating materials
	IEC TC 55	Winding wires
Other system committees (IEC TC112 - the role of a supplier)	IEC TC 2	Rotating machinery
	IEC TC 14	Power Transformers
	IEC SC 17 A	High-voltage switchgear and controlgear
	IEC SC 17 B	Low-voltage switchgear and controlgear
	IEC SC 34 C	Auxiliaries for lamps
	IEC TC 36	Insulators
	IEC TC 61	Safety of household and similar electrical appliances
IEC TC 96	Small Power Transformers, Reactors, Power Supply Units and Similar Products for Low Voltage up to 1100 V	

#### B.1 Business environment

Solid electrical insulating materials cover the whole range of materials starting from glass and ceramic, sleeveings and press boards, films and laminates, mica products and tapes, and ending up with varnishes and resins. Insulating materials are used in the field of electrical power generation and distribution, in electrical motors and transformers, in all kind of electrical and electronic appliances and electrical equipment. Appropriate selection and methods of use of insulating materials enhance the reliability and safety of electrical equipment.

A relatively small number of manufacturers, the most important of which are multinational, produce basic materials which are sold through local and regional distributors and fabricators. The materials and user technologies are well-established and globally similar. The market for these insulating materials exceeds 1000 Million US\$ per year. Innovation is driven by manufacturers' efforts to better serve specific market segments.

Electrical insulation systems are generally the limiting component in establishing service life. This service life is a critical performance parameter for users in determining the economic viability of equipment. Currently there is limited consistency between manufacturers and almost no correlation between different equipment. TC112 is developing the tools to make these EIS evaluations, but needs greater product TC understanding and involvement to apply the general procedures to specific products.

#### B.2 Market demand

The standards of TC112 are widely used in the IEC. For example test methods for resistance to tracking, especially for determining the CTI, are one of the most important tools for determining the suitability of electrical insulating materials and thus one of the most important design criteria.

Customers of TC112 reside in all parts of the supply chain, but are primarily insulating materials manufacturers, equipment manufacturers and certain materials specifiers.

Since the standards in the range of TC112 are widely used, regular maintenance is necessary. The successive development of new materials or improved properties of materials require additionally a

continuous monitoring of the market in order to offer the appropriate standards. Equipment TCs, manufacturers, and testing laboratories will use TC 112 standards to evaluate insulation systems to assure acceptable service life of new/modified EIS, in new environments and when subjected to new stresses. The demand for these evaluations comes from the ultimate users who consider service life an essential parameter when purchasing new equipment. It is essential to the user that EIS be evaluated using the same basic test procedure for all products. System tests are essential e.g. in the case of high value products or for life evaluation. These tests are usually performed using models of the whole product or models of part of the product. In some cases parts of the product may be used as a model. Electrical Insulation systems are elements of according products.

#### **B.3 Trends in technology and trade**

The world facing an increasing demand for electrical products is steadily growing with many industries merging. The trade is becoming more global and therefore TC112 is facing the increasing demand of international standardisation of its scope products. Most important insulation uses are relatively similar throughout the world, with frequent development of specialized variants of existing insulation materials and components. Markets and technology are relatively stable. Because engineering knowledge is widely communicated, international trade in equipment using electrical insulation products covered by standards in the scope of TC112 is widespread and will likely continue. However, many important materials are proprietary to one or a few large multinational manufacturers and are made predominantly in a few countries and shipped throughout the world. This factor underscores the users' desire that the product meets widely-accepted standards with minimum testing and qualification costs. The use of electronic switching in control equipment may result in accelerated degradation of the insulation. This loss of service life has not been acceptable to users of many products; in other products there has been insufficient time to witness excessive failures. Much work is being done to identify these ageing mechanisms. TC 112 is providing leadership in this area and is urgently working toward the development and application of test procedures for evaluation of these complex phenomena in impacted products. Historically equipment manufacturers have done most of the EIS evaluation for service life. Material manufacturers and testing laboratories are now assuming much of this evaluation process and strive for more cost effective and generalized test procedures.

#### **B.4 Ecological environment**

Manufacturers are pressed to reduce waste, volatile solvents, and toxic chemicals, since most insulating materials use petrochemicals, polymers, and persistent, often toxic raw materials and intermediates. Standards developed in the scope of TC112 consider this wherever possible. TC112 strongly supports IEC Guide 109. TC 112 writes testing and evaluation procedures. As such, impact on the environment is not a primary concern

### **C. Work programme**

#### **C.1 Current work**

IEC 60050-212 Ed. 2.0

International Electrotechnical Vocabulary - Chapter 212: Insulating solids, liquids and gases

IEC 60216-5 Ed. 3.0

Electrical insulating materials - Thermal endurance properties - Part 5: Determination of relative thermal endurance index (RTE) of an insulating material

PWI IEC 60544-5 Ed. 2.0

Electrical insulating materials - Determination of the effects of ionizing radiation - Part 5: Procedures for assessment of ageing in service

PWI IEC 61244-1 TS Ed. 2.0

Amendment 1 to IEC 61244-1: Determination of long-term radiation ageing in polymers - Part 1: Techniques for monitoring diffusion-limited oxidation

IEC 61857-1 Ed.3.0 – Maintenance review

Electrical insulation systems - Procedures for thermal evaluation - Part 1: General requirements - Low-voltage

IEC 61857-21Ed. 3.0

Electrical insulation systems - Procedures for thermal evaluation - Part 21: Specific requirements for general-purpose models - Wire-wound applications

IEC 61857-22 Ed. 2.0 – Maintenance review

Electrical insulation systems - Procedures for thermal evaluation - Part 22: Specific requirements for encapsulated-coil model - Wire-wound electrical insulation system (EIS)

IEC 61858- Ed. 3.0

Electrical insulation systems - Procedures for thermal evaluation - Part 22: Specific requirements for encapsulated-coil model - Wire-wound electrical insulation system (EIS)

IEC 61251 Ed. 2.0

Electrical insulating materials - A.C. voltage endurance evaluation – Introduction

PWI IEC 61934 TS Ed. 2.0

Electrical insulating materials and systems - Electrical measurement of partial discharges (PD) under short rise time and repetitive voltage impulses

PWI 15E-2 Ed. 1.0

Analytical test methods for relative thermal endurance testing of electrical insulating materials

PWI 15E-3 Ed. 1.0

To establish a revised series of standards, dealing with the determination of dielectric and resistive material properties comprehensively

PWI 112-1 TR Ed. 1.0

Test methods on space charge measurements

PWI 112-2 TR Ed. 1.0

Incomplete data statistics

PWI-112-3 TR Ed. 1.0 -

Calibration of space charge measuring equipment.

PWI 112-4 Multimedia Version IEC 60505

#### **C.2 Resources/infrastructure needed**

TC 112 has an Advisory Group to coordinate activities within IEC with representation from other committees. The AG needs participation from equipment TCs. It would be advantageous to have also users represented.

All working groups need more active experts.

TC112 cooperates with CIGRE D1.

The principal need is for more experts from materials users to supplement the experts representing materials manufacturers, to broaden the focus of standards projects.

TC 112 continues to solicit participation from Product/Equipment TCs. This is essential for a Horizontal Standards.

IEC procedures for Committees who develop Horizontal Standards need to be expanded:

1. to recognize the contribution that Equipment TCs must make in the development of standards essential to their products.

2. so that committees with horizontal standards are routinely informed of all projects and product standards containing elements within the scope of that Committee.

A liaison category is needed, which requires impacted equipment/product Committees to appoint Observers to monitor and help guide the work of the Committee and then report back to their Product/Equipment Committee.

#### **D. Future work**

TC 112 envisions cooperation with Product TCs (using EIM and EIS) in applying the principles of TC 112 standards to their product standards. This will enable TC 112 to develop horizontal standards for the evaluation of service life performance for IEC products.

When a Product TC does not address evaluation of their EIM or EIS (and the market expresses a need), TC112 will consider taking the lead in forming a JWG (with cooperation from the impacted TC) for developing such a standard. The thrust for this type of cooperation originates with the Advisory Group.

<b>E. Maintenance cycle</b>				
<b>Publication no.</b>	<b>Date of publication</b>	<b>Review date</b>	<b>Maintenance result date</b>	<b>Responsibility (Maintenance Team)</b>
IEC 60050-212 Ed.1.0	1990-10	UNDER REVISION	2007	JMT9
IEC 60085 Ed.3.0	2004-06	UNDER REVISION	2008	WG 6
IEC 60093 Ed.2.0	1980-01	2008	2010	WG 4
IEC 60112 Ed.4.0	2003-01	2012	2015	WG 5
IEC 60167 Ed.1.0	1964-01	2008	2010	WG 4
IEC 60212 Ed.2.0	1971-01	2007	2010	WG 1
IEC 60216-1 Ed.5.0	2001-07	2008	2011	WG 1
IEC 60216-2 Ed.4.0	2005-08	2013	2015	WG 1
IEC 60216-3 Ed.2.0	2006-04	2011	2013	WG 1
IEC 60216-4-1 Ed.4.0	2006-01	2013	2015	WG 1
IEC 60216-4-2 Ed.1.0	2000-07	2013	2015	WG 1
IEC 60216-4-3 Ed.1.0	2000-04	2013	2015	WG 1
IEC 60216-5 Ed.2.0	2003-01	UNDER REVISION	2008	WG 1
IEC 60216-6 Ed.2.0	2006-05	2008	2010	WG 1
IEC 60243-1 Ed.2.0	1998-01	2009	2012	WG 3
IEC 60243-2 Ed.2.0	2001-02	2007	2010	WG 3
IEC 60243-3 Ed.2.0	2001-07	2007	2010	WG 3
IEC 60250 Ed.1.0	1969-01	2007	2010	WG 4
IEC 60343 Ed.2.0	1991-01	2009	2012	WG 4
IEC 60345 Ed.1.0	1971-01	2009	2012	WG 4
IEC 60377-1 Ed.1.0	1973-01	2010	2012	WG 4
IEC 60377-2 Ed.1.0	1977-01	2010	2012	WG 4
IEC 60426 Ed.2.0	2007-01	2010	2012	WG 8
IEC 60450 Ed.2.1	2007-07	2011	2013	WG 8
IEC 60493-1 Ed.1.0	1974-01	2009	2012	WG 7
IEC 60505 Ed. 3.0	2004-10	2010	2012	WG 6
IEC 60544-1 Ed.2.0	1994-05	2008	2010	WG 2
IEC 60544-2 Ed.2.0	1991-08	2009	2012	WG 2
IEC 60544-4 Ed.2.0	2003-07	2009	2012	WG 2
IEC 60544-5 Ed.1.0	2003-02	2006	2009	WG 2
IEC 60587 Ed.3.0	2007-05	2008	2010	WG 5
IEC 60589 Ed.1.0	1977-01	2009	2012	WG 8
IEC 61006 Ed.2.0	2004-01	TBW	2010	WG 8
IEC 61074 Ed.1.0	1991-09	TBW	2008	WG 8
IEC 61234-1 Ed.1.0	1994-03	2011	2013	WG 8
IEC 61234-2 Ed.1.0	1997-09	2011	2013	WG 8
IEC 61244-1 TS Ed.1.0	1993-10	2009	2011	WG 2
IEC 61244-2 TS Ed.1.0	1996-02	2010	2012	WG 2
IEC 61244-3 TS Ed.2.0	2005-12	2008	2010	WG 2
IEC 61251 TS Ed.1.0	1993-09	UNDER REVISION	2008	WG 3
IEC 61302 Ed.1.0	1995-04	2011	2013	WG 5
IEC 61621 Ed.1.0	1997-09	2011	2013	WG 5
IEC 61624 TS Ed.1.0	1997-04	TBW	2008	WG 1
IEC 61857-1 Ed. 2.0	2004-11	2007	2009	WG 6

<b>Publication no.</b>	<b>Date of publication</b>	<b>Review date</b>	<b>Maintenance result date</b>	<b>Responsibility (Maintenance Team)</b>
IEC 61857-21 Ed. 2.0	2004-08	2007	2009	WG 6
IEC 61857-22 Ed. 1.0	2002-08	2007	2009	WG 6
IEC 61858 Ed.2.0	2004-11	2007	2009	WG 6
IEC 61934 TS Ed. 1.0	2006-04	2010	2012	WG 3
IEC 61956 TS Ed.1.0	1999-10	2007	2010	WG 8
IEC 62039 TR Ed. 1.0	2007-03	2009	2011	MT 10
IEC 62062 TR Ed.1.0	2002-01	TBW	2010	WG 5
IEC 62068-1 Ed. 1.0	2003-07	2007	2010	WG 3
IEC 62101 TS Ed. 1.0	2005-12	2009	2011	WG 6
IEC 62114 Ed.1.0	2001-10	TBW	2008	WG 6
IEC 62392 TR Ed. 1.0	2006-11	2010	2012	WG 8
IEC 62332 TS Ed. 1.0	2005-09	2009	2011	WG 6
IEC 62539 Ed. 1.0	200707	2010	2012	WG 7

Note – TBW – To be withdrawn

Name or signature of the secretary

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