STRATEGIC BUSINESS PLAN (SBP)

IEC/TC OR SC:	SECRETARIAT:	DATE:
TC 112	**DE**	**2020-10-23**

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.

A. STATE TITLE AND SCOPE OF TC

Are there any new or emerging trends in technology that will impact the scope and work activities of the TC? Please describe briefly.

Do you need to update your scope to reflect new and emerging technologies? If yes, will these changes impact another TC's scope or work activities?

If yes, describe how these will impact another TC(s) and list the TC(s) it would impact

Title: Evaluation and qualification of electrical insulating materials and 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.

NOTE: An electrical insulating material has negligibly low electric conductivity, used to separate conducting parts at different electrical potentials. An electrical insulating system (EIS) is an insulating structure containing one or more electrical insulating materials together with associated conducting parts employed in an electrotechnical device.

B. MANAGEMENT STRUCTURE OF THE TC

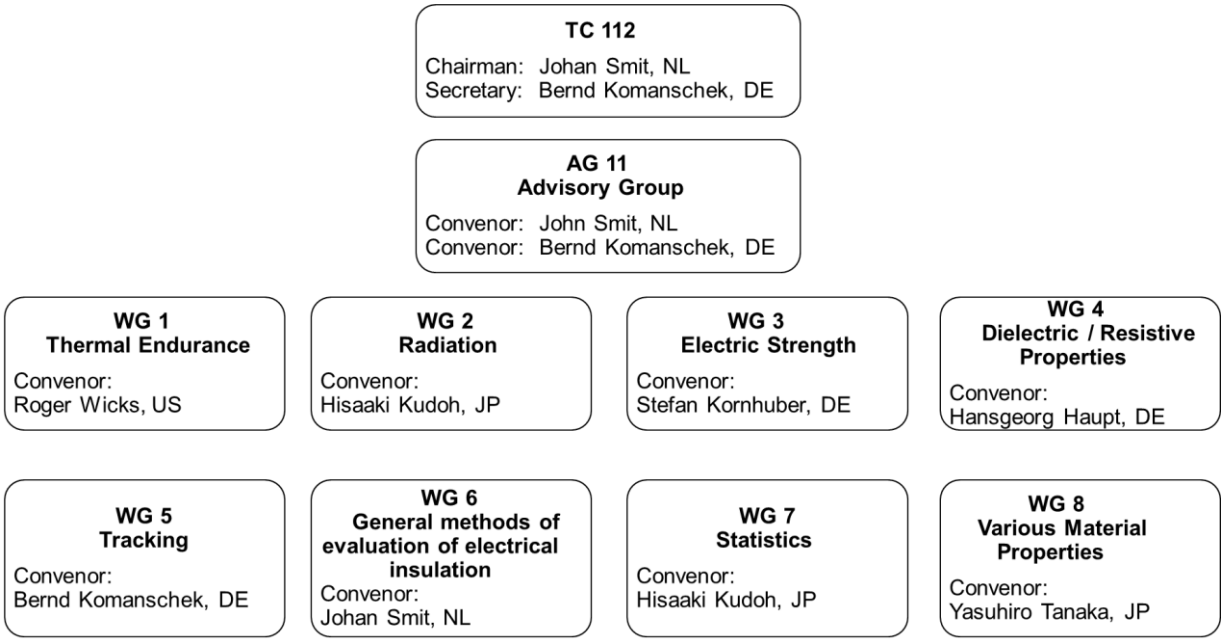
Describe the management structure of the TC (use of an organizational chart is acceptable) (should be integrated by CO automatically) and, if relevant (for example an unusual structure is used), provide the rationale as to why this structure is used.

Note: Check if the information on the IEC website is complete.

When was the last time the TC reviewed its management structure? Describe any changes made. When does the TC intend to review its current management structure? In the future, will the TC change the current structure, for example due to new and emerging technologies, product withdrawal, change in regulations etc. Please describe.

Make sure the overview includes:

- any joint working groups with other committees,
- any special groups like advisory groups, editing groups, etc.



Current projects are:

WG	Project IEC	Short description
1	60216-3	Instructions for calculating thermal endurance characteristics
1	60216-5	Determination of relative thermal endurance index (RTI) of an insulating material
1	60216-6	Determination of thermal endurance indices (TI and RTI) of an insulating material using the fixed time frame method
1	TR 60216-7-2	Results of the round robin tests to validate procedures of IEC TS 60216-7-1 by non-isothermal kinetic analysis of thermogravimetric data
2	60544-5	Procedures for assessment of ageing in service
3	TS 61934	Electrical measurement of partial discharges (PD) under short rise time and repetitive voltage impulses
4	62631-3-2	Surface resistance and surface resistivity
4	62631-3-1	Volume resistance and volume resistivity - General method

5	60587	Test methods for evaluating resistance to tracking and erosion
5	60112	Method for the determination of the proof and the comparative tracking indices of solid insulating materials
5	TR 62039	Selection guide for polymeric materials for outdoor use under HV stress
6	61857-33	Multifactor evaluation with increased factors at elevated temperature
6	61857-41	Specific requirements for electrical insulation systems for use in dry-type high-voltage transformers with operating voltages of 1kV and above
6	61857-42	Specific requirements for evaluation of an EIS used for road transportation applications
6	TR 61858-3	Clarification of EIM and auxiliary materials
8	TS 62836	Measurement of internal electric field in insulating materials - Pressure wave propagation method

Note: The information on the IEC website is complete with up-to-date projects.

The TC 112 last reviewed its management structure in September 2015 and the following changes were implemented since then. The convenor of WG 1 Mr. Giancarlo Montanari retired and was replaced by Mr. Roger Wicks. The WG 7 convenor Mr. Okamoto also retired and Mr. Hisaaki Kudoh took over. JWG 12 was disbanded and documents will be handled by WG 3.

The Secretary Mr. Bernd Göttert retired and Mr. Bernd Komanschek was appointed on 2016-11.

The tenure of Chairman Mr. Roger Wicks, US ended 2018-09 and Mr. Johan Smit, NL was appointed.

It is not foreseen that the TC will have any major changes in its current structure due to new and emerging technologies, product withdrawals or changes in regulations.

C. BUSINESS ENVIRONMENT

Provide the rationale for the market relevance of the future standards being produced in the TC.

If readily available, provide an indication of global or regional sales of products or services related to the TC/SC work and state the source of the data.

Specify if standards will be significantly effective for assessing regulatory compliance.

Methods of Test for Electrical Insulating Materials (EIM) and Electrical Insulation Systems (EIS) covers testing of thermal endurance, electrical strength, radiation, resistance to tracking, dielectric and resistive properties, evaluation of electrical insulation systems, space charge measurements, partial discharge measurements. The whole range of materials and combinations with electric conductors (electrical insulation systems) starting from glass and ceramic, sleeving and press boards, films and laminates, mica products and tapes, and ending up with varnishes and resins are concerned. Insulating materials and systems are used in the field of electrical power generation, transmission 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.

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. TC 112 is developing the tools to make these EIS evaluations and cooperates with product TCs to assure the EIS qualification procedures are of relevance to specific products.

D. MARKET DEMAND

Provide a list of likely customers of the standards (suppliers, specifiers, testing bodies, regulators, installers, other TC/SC's etc.). Do not specify company names, only categories of customers.

Equipment TCs, manufacturers, and testing laboratories are using TC 112's standards to evaluate electrical insulation materials and systems to assure acceptable service life of existing and new/modified EIS, in new environments and when subjected to new or multifactor 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.

A relatively small number of manufacturers, the most important of which are multinationals, produce basic electrical insulating 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 10 billion US$ per year. Innovation is driven by manufacturers' efforts to better serve specific market segments. Standards of TC 112 are widely used all over the world. For example, test methods for thermal classification and resistance to tracking, especially for determining the TI and CTI respectively, are some of the most important tools for determining the suitability of electrical insulating systems and materials and thus some of the most important design criteria. Customers of TC 112 reside in all parts of the product life cycle, being insulating materials manufacturers, equipment manufacturers and specification, testing and user institutions.

E. TRENDS IN TECHNOLOGY AND IN THE MARKET

If any, indicate the current or expected trends in the technology or in the market covered by the products of your TC/SC.

Evaluation procedures of TC 112 are generic in nature and aren't easily affected by soft changes, so apart from maintenance a major part of the work in clause B resides. In particular the EIS concept serves the industry to evaluate if new substitutes, processing, or something new could influence product life. However, breakthroughs in material technology or by smarter systems will cause necessity to extend our specific publications to align with brand new concepts, conditions or legislation (e.g. compact design, cryogenic condition, banned materials). Major technological trends that potentially have an important impact on TC 112's work are:

- **New material/polymer formulations** which enter the market for electrical insulation systems call for fast screening methods to categorize fitness for use and compatibility testing.
- **New technology for nano-structured dielectrics** with exceptional thermal and electrical properties due to interfacial characteristics, which have to be tested.
- **High-temperature superconductor technology** applicable to power and medical industry requiring suitable **cryogenic electrical insulation systems** to be verified.
- **Development of biodegradable insulation fluids** replacing mineral oils currently used in liquid impregnated insulation systems e.g. in HV transformer and cables.
- **Replacement of SF_6** in medium and high voltage gas insulated switch gear banned by upcoming legislation; alternative gas insulation systems lack long term performance evaluation.
- **Development of high-performance materials, e.g. fibre reinforced polymers, natural esters**, requiring tests at elevated thermal, mechanical, electrical or chemical stresses.
- **Harsh operational work environments, in particular off-shore or corrosion conditions,** for which multifactor tests need further development.
- **Intermittent renewable power generation and consumption** causing varying thermal

loads and overloads of the EIS.

- **Hidden factors of influence, e.g.** power electronics or switching operations potentially causing transients accelerating EIS degradation.
- **Introduction of DC equipment over all voltage ranges** from low voltage appliances (batteries, photovoltaics) to long distance underground/submarine cabling, overhead lines and VSC technology up to ultra-high voltages, at all levels requiring verified DC insulation systems and DC PD phenomena.
- **Measurement procedures for DC related properties** such as conductivity, space charge formation and electrical breakdown strength under multifactor stresses (TEMA).
- **Electrification of the transportation industry** requiring adaptation of test methods for thermal/electrical endurance over exposure times appropriate to the automotive work environment.
- **Future industry trend to monitor product condition from fabrication to lifelong service,** with sensor technologies and property statistics kept within requirements, to be defined.
- **Advanced diagnostic techniques** becoming part of EIS test procedures, e.g. modern partial discharge detection methods in time and phase domains with pattern recognition.
- **Trend towards more circularity**, leading to other choices of combinations of materials and (eco)designs (e.g. transformers). Compatibility test requirements in case recycled materials are used in new products ask for attention.
- **Increasing sustainability, environmental concerns and carbon-footprint legislation** bringing about EIS changes of which minor and major status of modifications impacts need to be qualified.

F. SYSTEMS APPROACH ASPECTS (REFERENCE - AC/33/2013)

Does your TC/SC have a need for a systems approach?

If so:

- Will the Systems work be in a single TC or in multiple TCs?
- Will a Systems Evaluation Group (SEG), Systems Committee (SyC), or Systems Resource Group be required?
- Is your TC/SC work of relevance to ISO?
- Is or are there fora or consortia working in parallel to IEC? Is there a chance to integrate this work in your TC/SC?

This should not only be restricted to the customer/supplier relationships with other TC/SCs indicating types of co-operation (e.g. liaisons, joint working groups) but be of a more generic nature.

If there is no need for a systems approach as outlined in AC/33/2013, is it intended a TC would not be requested to report on general systems approach considerations such as customer/supplier relationships, liaisons, joint WGs, etc. as referenced in the system approach matrix illustrated in slide 14 of the presentation attached to AC/37/2006?

An EIS is an integrated part of a product or system, therefore its testing is not an evaluation of the total product. The latter remains subject to the responsible product TC. With the EIS-concept as building blocks of any electrical equipment, TC 112 fulfils in general a role to assure insulation reliability and safety in the given operating environment of a product. In that regard TC 112 has a horizontal function to support product committees as supplier of generic and applied standards. As shown in the table below, TC 112 operates as supplier and as customer to specialized or basic TC's, thereby liaising with other organizations. TC 112 is also monitoring the system committees SyC on LVDC and the advisory committee ACEA on environmental aspects.

TC 112 relationships:

Component committees (IEC TC 112 - role of a customer)	IEC TC 10	Fluids for Electrotechnical Application
	IEC TC 15	Solid electrical insulating materials
	IEC TC 55	Winding wires
	IEC TC 89	Fire hazard testing
	IEC TC 101	Electrostatics
Other system committees (IEC TC 112 - the role of a supplier)	IEC TC 2	Rotating machinery
	IEC TC 14	Power Transformers
	IEC SC 17A	High-voltage switchgear and controlgear
	IEC SC 121A	Low-voltage switchgear and controlgear
	IEC SC 34C	Auxiliaries for lamps
	IEC TC 36	Insulators
	IEC SC 45A	Instrumentation, control and electrical power systems of nuclear facilities
	IEC TC 96	Transformers, Reactors, Power Supply Units and combinations thereof
Other committees	IEC TC 109	Insulation coordination for low voltage equipment
	IEC TC 42	High-Voltage and high-current testing techniques
	CIGRE SC D1	Materials and emerging test techniques
	ISO TC 61 SC 2	Plastics - Mechanical properties
	ISO TC 22SC 32	Road vehicles - Electrical and electronic components and general system aspects

G. CONFORMITY ASSESSMENT

With reference to clause Clause 33 of Part 2 of the ISO/IEC directives, are all you publications in line with the requirements related to conformity assessment aspects?

Will the TC/SC publications be used for IEC Conformity Assessment Systems (IECEE, IECEx, IECQ, IECRE)?

Will any of your standards include test specifications, reproducible test requirements, and test methods?

Are there likely to be special conformity assessment requirements generated by any standards projects? If yes, list which projects.

All of TC 112 publications are in line with the requirements related to conformity assessment aspects and suitable to be used for IEC Conformity Assessment Systems. TC 112 standards include test specifications, reproducible test requirements and test methods.

H. 3-5 Year Projected Strategic Objectives, Actions, Target Dates

Strategic Objectives 3-5 years	Actions to support the strategic objectives	Target Date(s) to complete the actions
Future IEC 62631-3-12: Dielectric and resistive properties of solid insulating materials – Determination of resistive properties (DC Methods) – Volume resistance and volume resistivity, method for casting resins	Strategic direction on DC methods, supported by WG4.	Expected 2023
Future IEC xxxxx: Test method for compatibility of construction materials with electrical insulating liquids	New strategic direction on compatibility, supported by WG6.	Expected 2024
PWI 112-8 ED1 Future IEC TS 62101 Ed.2: Electrical insulation systems - Short-time evaluation of combined thermal and electrical stresses - Applications with expected operating life less than 5000 hours	Pending preparation of NP, supported by WG6.	Expected 2025
Note: The progress on the actions will be reported in the RSMB.		