STRATEGIC BUSINESS PLAN (SBP)

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
MEASURING EQUIPMENT FOR ELECTRICAL AND ELECTROMAGNETIC QUANTITIES

A Background
TC 85 was transferred from SC 13B (Electrical Measuring Instruments) and established in 1983. In 1992, the original TC 66 was absorbed by TC 85; while a new subcommittee, SC 66E, was established that later become TC 66 that had the responsibility for the measuring, control and laboratory equipment.

The scope of TC85 is to prepare international standards for equipment, systems, and methods used in the fields of measurement, test, recurrent test, monitoring, evaluation, generation and analysis of steady state and dynamic (including temporary and transients) electrical and electromagnetic quantities, as well as their calibrators. Such equipment includes devices for testing the safety of power distribution systems and connected equipment, devices for monitoring the power distribution systems, electrical measuring transducers, signal generators, recorders together with their accessories.

NOTE: Product safety aspects are covered by TC 66.

B Business Environment

B.1 General
The business environment has gone through fundamental changes in recent years.

Most of the measuring instruments or their functions that are used for the measurement of electrical and electromagnetic parameters are more integrated into automatic measurement-control or continuous monitoring-control systems as parts/modules of the system than has been done previously.

The scope of TC 85 addresses not only single functional instruments but also multi-functional instruments or systems (the measuring system and the measuring-control system, for instance).

The business on which TC 85 focuses its attention has already evolved from, but still maintaining an effort in generation, measurement and calibration of basic electromagnetic quantities (which were used mainly in the lab) into the measuring and monitoring of electrical and electromagnetic quantities of power distribution systems which are relevant for electrical safety, for protective measures and/or for electrical performance.

Communication interfaces for remote data acquisition and exchanging information have become increasingly important.

Worldwide market:

- For measuring instruments covered by IEC 60051: the estimated worldwide market is higher than 80 M€. It is used by over 50 companies mainly in Asia/Pacific (China and Japan).
  Geographic segmentation of the instruments: 60% Asia/Pacific, 40% Europe and America.

- For equipment covered by IEC 61557: it is used by over 40 companies mainly in Asia/Pacific, America and Europe.

- The worldwide market for products covered by IEC 61557-12 is between 100 M€ and 200 M€.
  Geographic segmentation of the products: 33% Asia/Pacific, 33% Europe, 33% America.

- The worldwide market for other IEC 61557 standards should be at least 50 M €.

- For Power Quality Instruments (PQI) covered by IEC 62586: the estimated worldwide market is at least 40 M€. It is used by over 20 companies mainly in Asia/Pacific, America and Europe.
Geographic segmentation of the instruments: 20% Asia/Pacific, 30% Europe and 50% America. The market growth and the regional demand for PQI are coming from “power quality assessment” applications.

- The equipment, waveform recorders, covered by the IEC 60469 and the in-progress IEC 62754, have an estimated 2012 world market of 890 M€ with an expected growth to 1.5 B€ by 2019. The America, Asia-Pacific, and European markets are nominally equal, with about 10 % of the market being attributed to other regions.
- The IEC 62792 describes methods for measuring the output of electroshock weapons, the market of which exceeds 80 M€ annually and includes American, European, and Asia-Pacific markets.

B.2 Market demand

Definition and evaluation for the performance of the equipment supported by the TC85 should be standardized to facilitate not only their global trading, the choice of end-users in terms of performances, safety, interpretation of the indications, but also the advancement of technology.

Standards developed and maintained by TC 85 are globally recognized and used:

- by industry for the basic maintenance of industrial equipment to ensure safe operation;
- in power distribution systems for testing and monitoring of protective measures and for predictive diagnoses;
- by electrical utilities to ensure supply of quality power and to reduce power pollution;
- by laboratories, testing and calibration laboratories;
- for legal metrology purposes;
- for educational purposes;
- by governments to improve the "health and safety at work".

Through the agreement with CENELEC, the TC-85-developed standards are generally adopted as European Standards (EN).

Some of the standards are listed in compliance with the European Directives (LVD and EMC).

IEC 61557 series are used for IECEE-CB scheme.

Some of the current publications, such as IEC 60051, IEC 60359, IEC 61187 and IEC 61557, are being cited by TC/SCs (e.g. mainly TC 13, TC 45, TC 64, TC 65, etc.) in their publications as normative references.

Power Quality and Power Monitoring Systems operate very similarly to Quality Management Systems in companies. They are independent from Operation-, Control- and Management Systems and are supervising all activities and electrical assets/ equipment in a corresponding grid. Therefore, such systems can be used as “early warning systems” and are a must to analyze faults and to identify the corresponding reasons.

New IEC 62586 is widely used for devices that are used to ascertain Power Quality parameters in power supply systems and cited in many TC/SCs concerned. The devices may be installed:

- inside a substation;
- at the interface point between the installation and the network, in order to check the compliance to the connection agreement with a network operator;
- at the point of common coupling to assess the level of Power Quality;
- inside the installation to make Power Quality surveys.
Following the up-to-date technology/demands, a revised version of IEC 60688 specifies further requirements relating to transducers whose main application is in electrical power engineering and telemetry systems.

Improving **electrical energy efficiency** ($E^3$) means first to measure or monitor electrical quantities: you can't change what you don't know; you can’t know what you don’t measure.

Energy Efficiency projects are based on permanent and continuous measurement and monitoring.

The TC 85 plans to remain active in this field.

**Participation in TC 85 work:**

Participation is mainly by members coming from manufacturers and calibration institutes for measuring, analysis, monitoring and testing, instrument.

TC 85 is lacking direct participation from representatives of the end users, the utility companies and the legal metrology bodies, although they have made contributions through the National Committees. For an efficient development, TC 85 needs necessary resources and support from National Bodies.

A larger representation from manufacturers and users being engaged in Condition Monitoring and Predictive Diagnoses for electrical equipment connected to electricity distribution networks would be desirable.

Achievement in TC 85 in recent years is owed to the experts mainly from the following companies of member countries:

- LEM Norma GmbH (AT), Qualitrol Company (BE), Laborelec (BE), HBS (CN), Chint (CN), Bender GmbH (DE), BEHA Amprobe GmbH (DE), Gossen Metrawatt (DE), Siemens (DE), Kocos Power Grid (DE), AFEI Sistemas y Automatizacion, S.A. (ES), Schneider Electric (FR), Socomec Group (FR), Chauvin Arnoux Group (FR), EDF (FR), Megger (GB), Fluke (GB), TECTRA d.o.o. (HR), Metrel (SI), Power Standards Lab. (US), NIST (US), etc..

**B.3 Trends in technology**

The advanced functionality measuring, monitoring, and testing equipment and instrumentation becomes possible by using the latest achievements in electronic information and communication technologies. These new technologies may affect the way requirements and testing methods are specified. The most important trends are the following:

- extended use of electronic technologies, like digital signal processing, mixed signal circuits and firmware, which may have to be updated during the life of the equipment;

- changes in network conditions and EMC environments due to the growing use of non-linear loads, power lines and radio communications. On the one hand, these changes require advanced measurement instruments, methods, and analyses to measure power and power quality parameters including dynamic quantities. On the other hand, better protection is needed against undue influences.

- an increased use of interoperable communication and IT technologies, including an increased interaction and integration of systems that were formerly discrete and separated, will be common to most of the Smart Measuring technologies.
The major drivers for waveform recorder market are increasing analog bandwidth, modularity, improvements in the user interface, interoperability, and system intelligence.

The needs for on line Condition Monitoring are bringing TC 85 into Substation Automation System based on IEC 61850.

The transducers covered by new IEC 60688 have been improved by new concepts and designs that use digital data acquisition and relevant software.

In low-voltage distribution IT systems, it is important to locate the first insulation fault as soon as possible.

Also, to monitor the required performance of power distribution systems, it becomes more important to measure different electrical parameters due to:

• installation standards evolutions, for instance, over current detection is now a new requirement for the neutral conductor due to harmonic content;

• technological evolutions (electronic loads, electronic measuring methods, etc.);

• end-users’ needs (cost saving, compliance with aspects of building regulations, etc.);

• safety and continuity of operation of power distribution systems;

• in the field of energy metering, sustainable development requirements where energy measurement, for instance, is recognized as an essential element of energy management, part of the overall drive to reduce carbon emissions and to improve the commercial efficiency of manufacturing, commercial organizations and public services;

• more complex leakage current that are expected in distribution systems and in appliances and devices that will have influence on the protective measures.

The standards produced by TC 85 must be sufficiently flexible to adapt to improvements in manufacturing processes, architectures, materials, and innovations, in order to comply with the user requirements.

B.4 Market trends

The development of electrical measuring technology has to adapt continuously to new requirements in power distribution systems. The following are factors which may affect, to a certain extent, the future work of TC 85:

• Changing requirements from the applications;

• Increasing demand on reliability;

• Changes in the lifecycle of measuring equipment;

• Changes in the EMC environment;

• New communication technology;

• Advancement of electronic and manufacturing techniques. This may affect the way requirements are specified and tests are performed;

• The assurance of a quality supply of power or to reduce power pollution;

• The assurance that repaired electrical equipment operate properly afterwards safely and can be used by workers or users without impairment to their safety or health at all times;

• The Increase in the use of software inside measuring instruments;

• More functions in measuring equipment are beyond the current scope of TC 85.

TC 85 should consider further expanding its attention to measuring systems for on-line Condition Monitoring and Predictive Diagnoses of smart transmission and transformation equipment.
TC 85 is considering whether to address condition monitoring for Electric Vehicle charging station/system and photovoltaic systems.

Although the standards developed by TC 85 are not the core standards for Smart Grid or Electric Vehicle charging system, some of the TC 85 standards have been playing an important supporting role for Condition Monitoring and Predictive Diagnoses, for example, the on-line measuring and monitoring of electrical safety or the protective measures in power distribution systems.

B.5 Ecological environment

Electronic measuring equipment may have shorter life cycles due to functional obsolescence. Some types of equipment may contain batteries and other hazardous materials. Therefore, use of hazardous materials and safe disposal will become an issue to be addressed.

Improvements are always made on parameters that are measured and monitored. By providing accurate measurement on the use of electric energy, measuring equipment contributes to improve energy efficiency and power quality (for reducing power pollution) and sparing use of natural resources—consequently—will contribute to the reduction of pollution.

As some of measuring devices are continuously powered, low power consumption is also important.

A liaison with IEC/TC 111 in the elaboration of environmental requirements may be useful.

C System approach aspects

TC 85 will actively continue to promote the establishment of liaisons with other committees; cooperation with system committees is still in our focus.

Component committees

IEC/TC 13: Electrical energy measurement and control
IEC/TC 38: Instrument transformers
IEC/TC 61: Safety of household and similar electrical appliances
IEC/TC 62: Electrical equipment in medical practice
IEC/SC 65A: System aspects
IEC/TC 66: Safety of measuring, control and laboratory equipment
IEC/SC 77A: EMC - Low frequency phenomena
IEC/TC 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology

System committees

IEC/TC 13: Electrical energy measurement, tariff- and load control (potential customer)
IEC/SC 23E: Circuit-breakers and similar equipment for household use
IEC/TC 44: Safety of machinery - Electrotechnical aspects
IEC/TC 64: Electrical installations and protection against electric shock
IEC/TC 69: Electric road vehicles and electric industrial trucks
IEC/TC 82: Solar photovoltaic energy systems
IEC/SC 121A: Low-voltage switchgear and controlgear

Other committees


D Objectives and strategies (3 to 5 years)

Keep TC 85 standards up to date to reflect changes in market demands, new technologies, user requirements, and the environment, without sacrificing stability and to keep these standards synchronized with the development of horizontal standards, such as EMC standards, standards for safety, reliability aspects and specific communication requirements.

Efforts should be made to determine the role that the TC 85 should play in relevant IEC Smart Grid activities and DC installations activities managed by IEC.
List the equipment or their standards that are relevant with on-line Condition Monitoring and Predictive Diagnoses. In particular, effort should be applied to condition monitoring of smart transmission and transformation equipment and to Electric Vehicle charging systems.

A better coordination between TC 85 and TC 38 should be ensured, so that the market needs should be addressed, e.g. needs regarding specific sensors used in Power Metering applications.

New parts of IEC 61557 standard related to “monitoring protective measures” need to be developed (e.g. the relays used in installation to monitor over and under voltage, over and under current, over and under frequency or phase sequence would fit under the scope of this standard series).

TC 85 should keep on playing a major role in the development of standards for systems and instruments used for the measurement, test, recurrent test, monitoring, evaluation, generation and analysis of steady state and dynamic (including temporary and transients) electrical and electromagnetic quantities relevant to the market of measuring and monitoring of protective measures in electrical installations and of Energy Efficiency.

Seek more involvement of new market players (e.g. representatives of the end users and of the legal electrical metrology bodies) and new National Bodies in the standardization work.

Respond to needs for improved and new standards in a timely manner, by further reducing the cost and the time to publication. Use fast track standardization wherever possible and reducing these to less than 3 years for each new TC 85 standard developed.

WG 20 needs to think about launching a work aiming at defining measuring functions in close cooperation with TC 13 and SC 77A.

Consider the development of new technologies such as those dealing with e-commerce (based on IEC/SC 3D works on Product data and properties for information exchange).

**E Action plan**

WG 8 will continue to develop new parts of standards within its scope (“monitoring protective measures”), e.g. the relays used in installations to monitor over- and under voltage, over- and under current, over- and under frequency or phase sequence which would fit under the scope of this standard series. IEC 61557-16, IEC 61557-8 and IEC 61557-9 were published in December of 2014. The project IEC 62638 (Recurrent test and test after repair of electrical equipment) was cancelled due to the appeal from US NC, since no consensus and no progress on the project were achieved.

WG 20 has published IEC 62586-1(Power quality measurement in power supply systems - part 1: Power Quality Instruments (PQI)) and IEC 62586-2 (Functional tests and uncertainty requirements) in 2014. Due to upcoming evolution of IEC 61000-4-30, maintenance of these two standards may start early 2015. IEC 60359 and IEC 61557-12 are to be revised as soon as possible within WG 20.

A New Work Item Proposal related to Monitoring and measuring systems used for data collection, gathering and analysis has been circulated and approved.

MT18 has published IEC 60469 (Transitions, pulses and related waveforms - terms, definitions and algorithms) in 2013. Revision should be considered in 2016 and done in collaboration with the IEEE TC-10.

PT 62754 is working on IEC 62754 (Computation of Waveform Parameter Uncertainties) which is expected to be published before on in 2016.

MT 23 is responsible for the revision of IEC 60051 series, which will be probably completed by the end of 2016.

**F Useful links to IEC web site**

IEC/TC 85 dashboard includes the TC/SC Officers, Scope, Liaisons, WG/MT/PT structure, Membership, Publications issued along with their stability dates, and Work Program.

Name or signature of the secretary

Bo CHEN