



IEC/TC OR SC: 2	SECRETARIAT: United Kingdom	DATE: September 2018
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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.

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

Rotating Machinery

TC 2 was the first product committee of IEC. Initially named 'Advisory Committee No.2 – Specification of electrical machines', it covered both rotating machines and transformers. In 1939, the Committee of Action (now the SMB) agreed to the proposal that Section B of Advisory Committee 2, which dealt with transformers, should be known as Advisory Committee 14 and Advisory Committee 2 from that date was limited to rotating machines excluding those specifically made for traction vehicles (mainly electric railroads and electric cars).

TC 2's standards portfolio is both large and mature, with approximately 50 publications. Much of the current work programme is devoted to the maintenance of these publications. The portfolio includes those standards, which originally were developed by the former sub-committees of TC 2.

The present scope of TC 2 is to prepare International Standards and Technical Specifications for rotating electrical machines without limitations of voltage, output or dimensions with the exception of the following:

- Traction motors within the scope of TC 9: Electric railway equipment;
- Motors and generators within the scope of TC 69: Electric road vehicles and electric industrial trucks;
- Motors and generators for use in cars and commercial vehicles;
- Motors and generators for use in aeronautics or space applications.

Formal liaisons exist within IEC with TC8, TC22/SC22G, TC31, TC65, TC112 and SC121A. Formal liaisons exist within ISO with TC70, TC108/SC5, TC115.

TC2 decided in its plenary meeting in Mai 2018 to establish new liaisons with ISO TC117 (Fans) and ISO TC118 (Compressors).

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.

TC2 has decided long ago to disband all subcommittees. All work related to new standards will be handled in working groups, of which there are currently six:

- WG 12 Rating, performance and general support
- WG 28 Performance as determined by tests
- WG 31 Efficiency classes
- WG 32 Measurement of stator end winding vibration at form wound windings
- WG 33 Specific technical requirements for hydro generators
- WG 34 AC adjustable speed rolling mill main motor

Maintenance of existing standards will be done in maintenance teams (MT), of which there are currently ten:

- MT 2 Noise emission
- MT 3 Terminal markings
- MT 5 Mechanical Ix configurations
- MT 6 Turbo generators
- MT 7 Vibration
- MT 9 Converter fed AC motors
- MT 10 Qualification, tests and diagnostics of winding insulation systems
- MT 12 Excitation systems for synchronous machines
- MT 13 Refurbishment
- MT 14 Brushes and brush-holders for electrical machinery

Additionally, there is a joint working group (JWG14) with TC 65 (Energy Efficiency in Industrial Automation).

A new collaboration with TC8 is currently being formed and TC2 will become a member of the new JWG10.

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.

Rotating electrical machines are the subject of International trade, which relies on a comprehensive portfolio of International Standards against which machines can be purchased, manufactured, tested and inspected. The low failure rate of machines in service provides objective evidence of the success of TC 2 in this area.

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.

As more than 90% of all electricity worldwide is generated by rotating electrical machines and more than 50% of all electricity worldwide is converted back into mechanical energy by electrical motors, there is, seen in the medium term, a continuously high market demand for both, motors and generators. During recent years, the demand for rotating electrical machines is still rising except for a steep decrease in the last financial and economic crisis and a steep increase in the years 2010 and 2011 back and exceeding the values prior to the crisis. The increasing emphasis on using energy more efficiently leads to laws, regulations and a market demand for electrical motors with premium efficiency and to an increasing percentage of variable speed applications for electrical machines.

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.

The market for DC motors continues to shrink as many have been replaced by converter fed AC motors.

The fast-moving technology of converter drives is reflected in the latest edition of IEC TS 60034-25 (2014-10) dealing with machines supplied from frequency converters.

The effect of repetitive voltage spikes of short rise-time generated by converters on insulation systems is dealt with by MT 10, who are currently revising IEC 60034-18-41 and IEC 60034-27-5 for insulation systems with random wound windings and have finished IEC 60034-18-42 (2017-06) for insulation systems with form-wound windings. Other topics in this area the off-line measurements of partial discharges, which is covered in IEC 60034-27-1 (2017-12).

The trend towards energy efficient motors continues with new motor technologies, mainly synchronous machines (both converter fed and line start), now entering the mass market. This is covered in the standards for testing IEC 60034-2-3 (new edition currently prepared by WG28) and classification IEC 60034-30-2 (2017-12). A new guideline for energy efficient motors and drives (IEC/TS 60034-31) is in preparation.

TC2 felt that for the purpose of optimizing not just the motor, but the whole drive train including the application, a liaison with several ISO TCs would be beneficial. This is mainly ISO TC115 (Pumps), IEC TC117 (Fans) and ISO TC118 (Compressors). The liaison with ISO TC115 has already been established and the chairman will contact the other two groups asap. This work is done in close cooperation with IEC ACEE (Advisory Committee on Energy Efficiency).

As a consequence of the physical interrelation that increasing the efficiency class usually requires an increase in the size of a motor and consequently also of the locked-rotor apparent power,

WG12 has prepared a revision of IEC 60034-12 (2016-11) that defines the starting performance of three-phase cage induction motors. As the starting performance is highly interrelated to the specifications of low-voltage switch gear, this work is done in close liaison with SC121A (former SC17B) and also at the WG level.

Another consequence of energy efficient motors, the physical dimensions of the motors need to be considered. For this reason, WG12 is given the task to review the long-standing standards for mechanical dimensions of electric motors, namely IEC 60072-1 and the further parts of this series.

Besides legal requirements, the market is significantly influenced by the extremely volatile price for rare earth permanent magnets (PM). On the one hand, PM machines have by their physical principle better efficiency and torque density than electrically excited synchronous machines or induction motors. On the other hand, high efficiency values can be achieved by electrically excited synchronous machines or induction machines as well as in the case of more active material (i. e. copper and iron). The consequence is that the market price for PM material has a high impact on the economically preferable motor technology and thus the size and weight of electrical machines.

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?

As rotating electrical machines, the scope of TC2, are mainly a component to be used in systems, TC2 seeks close cooperation with bodies such as SC22G responsible for the respective systems. Standards and Technical Specifications such as IEC TS 60034-25, IEC 60034-18-41 or IEC 60034-18-42 reflect the influence of the PDS on the rotating electrical machines and define the requirements resulting from the PDS for the design of the machine.

TC2's relationships with other IEC and ISO committees are as follows:

Committees that use standards produced by TC2	IEC TC22/SC22G	Semiconductor power converters for adjustable speed electric drive systems
	IEC TC31	Equipment for Explosive Atmospheres
	ISO TC 115	Pumps
	ISO TC 108/SC 5	Condition monitoring and diagnostics of electrical equipment

Committees that produce standards used by TC2	IEC TC22/SC22G	Semiconductor power converters for adjustable speed electric drive systems
	IEC TC 112	Evaluation and qualification of electrical insulating materials and systems
	ISO TC 108/SC 2	Mechanical vibration and shock
Other committees that produce standards similar to TC2 to be in liaison with for technical consistency	IEC SC121A	Low-voltage switchgear and control gear
	IEC TC8	Voltage and frequency on the power interface

Besides the exchange of documents, liaison officers have been appointed for those committees, who actively participate in their work and report to TC2.
TC2 will actively continue to promote the establishment of liaisons to other committees.

G. CONFORMITY ASSESSMENT

With reference to clause 33 of Part 2 of the ISO/IEC directives, are all your 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.

Currently, no IEC TC2 publications are used for IEC Conformity Assessment Systems.

TC2 has a number of standards that include test specifications, test requirements and test methods, for example IEC 60034-2-1 and IEC 60034-2-3 for the determination of losses and energy efficiency and many more.

There is activity by PSC WG5 of IECEE (GMEE = Global Motor Energy Efficiency) to implement a global motor efficiency testing certificate. However, this activity is currently progressing slowly and it cannot be foreseen if there is enough public interest to support an IECEE conformity assessment procedure in this field.

H. HORIZONTAL ISSUES

Indicate here how the TC/SC deals with horizontal issues such as energy efficiency, environmental aspects, safety, security...

Provide information on the interaction with SMB Advisory Committees, if applicable.

Ecological Environment

The design of rotating electrical machines has traditionally been one of conservatism because of the high customer expectations that the machine they have purchased will enjoy a long life in service. It is however becoming important to consider the overall design of the machine, particularly with regard to increased efficiency, reduction of noise emission and reduction of the amount of materials used. As mentioned above, these goals are partly conflicting (i. e. increased

efficiency and reduced amount of material). Similarly, the effect on the environment of gases generated by impregnation and insulation materials during fabrication and refurbishing has to be considered.

The successful work of WG31 responsible for the standardization of efficiency classes and WG28 responsible for the respective testing procedures shows that ecological issues have been one of the major guidelines for the further development of TC2 standards in recent years. In order to keep standardization in both fields in line with each other and to avoid contradictions, both WGs have met in conjunction with each other recently. As soon as the current work has been done, WG31 will be disbanded and the task of maintaining the standards will be handled over to WG28.

All working groups and maintenance teams of TC 2 are asked, when drafting documents, to address relevant requirements covering the complete lifecycle of the equipment or installation including manufacturing, supply, all aspects of use within the scope, and disposal.

I. 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
Maintenance of the publication portfolio taking into consideration new developments and market trends	Update old standards on brushes, brush holders and sliprings by the MT14 (several target dates up to 2020) IEC 60136 Ed 3 target date 07-2020, IEC 60773 Ed 2 target date 01-2020.	2020
Maintenance of the publication portfolio taking into consideration new developments and market trends	Update of 60034-18-32 target date 02-2021 (Functional evaluation of insulation systems for form-wound windings of large machines) and IEC 60034-9 revision agreed in Shanghai (Noise limits) with target date of 2021.	2021
Maintenance of the publication portfolio taking into consideration new developments and market trends	Update of IE 60034-27-5 (Off-line partial discharge tests on winding insulation of rotating electrical machines during repetitive impulse voltage excitation) with target date 09-2019;	2019
Maintenance of the publication portfolio taking into consideration new developments and market trends	Revision of IEC 60072-1 was agreed to address important aspects related to the increasing use of converter-fed motors and of high efficiency motors, by WG12, WG28 and MT10, respectively, target date: 2021.	2021
Increased activities in the field of converter supplied motors of all sizes	Tight cooperation with SC22G; maintenance of IEC 60034-18-41	2019
Energy efficiency to define methods for determining the	New edition for IEC 60034-2-3 to determine additional losses due	2019

efficiency of motors and variable speed drive systems and efficiency classes	to converter supply with target date 09-2019. Development of the new IEC 60034-31 efficiency guide,	
Note: The progress on the actions should be reported in the RSMB.		

Refer to Annex A – Action Plan

Annex A: Action Plan

The main activity of TC2 will be the maintenance of its publication portfolio taking into consideration new developments and market trends.

Increased activities are to be expected in the field of converter supplied motors of all sizes. In particular, the interface problems between the converter and motor require further intensive research to improve understanding of the effect on the motors caused by the rapid progress of converter technology (as well as semiconductor components and control methods). This field covers problems of performance (pulsating torques, losses etc.), environmental effects (noise emission) and operational reliability (bearing currents, winding stress etc.).

In addition, the increasing importance of energy efficiency will require activities in the fields related to motors and their applications, mainly pumps, fans, compressors and conveyor drives. Naturally, a complex subject like this cannot be handled by TC2 alone, so TC2 will provide all necessary support for related projects.

Most important are:

1. The maintenance of: IEC 60034-1, which was published 2017 and is not currently in the WP; IEC 60034-2-3 target date 09-2019; IEC 60034-18-41 target date 05-2019; IEC 60034-27-5 target date 09-2019; and IEC 60072-1 not in the WP, revision was agreed in Shanghai, which will address important aspects related to the increasing use of converter-fed motors and of high efficiency motors, by WG12, WG28 and MT10, respectively, target date: 2021.
2. The maintenance of: IEC 60034-14, which was published in 2018 and is not currently in WP (Mechanical vibrations); update of IEC 60034-9 not in the WP, revision agreed in Shanghai (Noise limits) , target date: 2021
3. Finish the update of 60034-18-32 target date 02-2021 (Functional evaluation of insulation systems for form-wound windings of large machines).
4. Establish a liaison with IEEE to work on the update of IEC 60034-16-2 and -3 both have a target dates of 09-2019 for excitation systems for large synchronous machines.
5. Update old standards on brushes, brush holders and sliprings by the MT14 (several target dates up to 2020) IEC 60136 Ed 3 target date 07-2020, IEC 60773 Ed 2 target date 01-2020