

STRATEGIC ROAD MAP

ELECTRO TECHNICAL DIVISION COUNCIL (ETDC)

1 INTRODUCTION

- 1.1** The Strategic Road Map of the Council (ETDC) has been developed as a document that would reflect its vision of National Standardization in the field of electro-technology and provide a broad standardization strategy roadmap with a five-year perspective. The aim is to align the standardization work with the needs of the current business environment and allow sectional committees to prioritize amongst different projects, identify the benefits expected from the availability of Indian Standards, and ensure adequate resources for their development. It covers an up-to-date overview of the Division Council's work that would form the basis for the Sectional Committees working under the Division Council to develop their respective standardization plan which can be shared with all interested stakeholders.
- 1.2** An Indian Standard embodies the essential principles of national openness and transparency, consensus, and technical coherence. These principles are required to be safeguarded over the lifecycle of standards development in the sectional committees, represented by all interested parties and supported by a public comment phase.
- 1.3** The road map covers the following main objectives and strategies taking into consideration the economic, social, regulatory, sustainability or other environments in which the Division Council operates.
 - a) To provide a national framework for the development of unambiguous and reliable market/society driven standards in the areas of electrotechnology
 - b) To provide a platform of developing technological edge, necessary to enable the domestic industry to be able to compete at international levels and facilitate developing necessary regulatory framework
 - c) To support the national objective of achieving self-reliance the need for national and international trade maintaining self-reliance as a national priority
 - d) To review the standards for their efficacy and relevance to market / societal needs for their continuance or revision/amendment.
 - e) To emphasize safeguards in the areas affecting the environment, health, and safety for overall community benefits.

2 BUSINESS ENVIRONMENTS OF THE DIVISION COUNCIL

Factors affecting business environment

The following political, economic, technical, regulatory, legal, and social dynamics describe the business environment of the industry sector covering the scope of ETDC, and they may

influence how the relevant standards development processes are conducted and the content of the resulting standards:

2.1 Legal and Policy Framework

2.1.1 Electricity sector of India is governed by the provisions laid down in the Electricity, Act, 2003. Regulations published by the Central Electricity Authority (CEA) are statutory in nature and have to be complied with. Energy Conservation Act, 2001 provides for the need for energy conservation in the electrical sector and a suitable framework for that. National Electricity Policy, National Electricity Plan, National Tariff Policy are a few of the policies and plan frameworks providing a direction to the development of the electricity sector. Utilities are obliged for universal service obligation and maintain the Standard of Performance to supply reliable and quality power. Utilities need to strictly follow standards and regulations issued by CEA and enforced by Utilities as well as Public Sector Undertakings (PSUs) and other stakeholders. Many PSUs such as NTPC, PGCIL have their own stringent supplier qualification norms which need to be complied with to be able to seek business relationship with them.

BIS Act 2016 and subsequent BIS Conformity Assessment Rules, 2018 defines wide variety of product conformity assessment schemes. These are used by various ministries such as Department for Promotion of Industry and Internal Trade (DPIIT, Ministry of Commerce and Industry, MoCI), Department of Heavy Industry (DHI) to mandate Quality Control Orders (QCO). The electrical manufacturing industry consists of products and systems such as switchgears, relays, meters, transformers, etc. as well as complex distribution and control systems built using these components. These products are sold both to utilities businesses as well as to common consumers. Manufacturing of low voltage electrical systems need to follow various regulations by Ministry of Commerce and Industry (DPIIT), Department of Heavy Industry (DHI), Bureau of Energy Efficiency (BEE) etc.

For consumer appliances, BEE have mandatory licensing for energy efficiency. Indian Standards serve as the basis of these policies, and regulations published by different authorities. Many times, these standards need to be clarified / interpreted in the context of local conditions such as availability of testing infrastructure to facilitate smoother implementation of regulatory provisions and various orders. The experience gained out of this implementation, need to be integrated back as amendments to standards, technical guidelines, technical reports by the BIS. Thus, both are complementary to each other.

2.1.2 Government is taking Make in India (MII) initiatives and Aatma Nirbhar Bharat Abhiyan (meaning self-reliant India). The Industry has to rise to the expectations and help in making India self-reliant in the field of electro-technology also. The industries should be able to meet not only the domestic demand but India should emerge as a manufacturing hub, to meet the global needs and provide economy of scale in the Industry. Generation of employment will be the added outcome of the various measures of self-reliance efforts.

2.2 Domestic Scenario

2.2.1 The Indian electrical equipment industry, over Rs 1,79,023 crores (approx. USD 25.43bn) in 2019-20, comprises of two segments - generation equipment (boilers, turbines, generators) and transmission & distribution (T&D) and allied equipment like transformers, cables, rotating machines, transmission lines, switchgears, capacitors, energy meters, instrument transformers, surge arrestors, stamping and lamination, insulators, insulating material, industrial electronics, indicating instruments, winding wires, etc. The Small and Medium Enterprises contribute around 45% of the given Industry Size.

India is the third-largest producer and second-largest consumer of electricity in the world and had an installed power capacity of 379.13 GW as of February 2021. The generation equipment sector is around 9.90% of the total industry, while the T&D equipment sector is the rest 90.10%. The industry is 7.73% of the manufacturing sector in terms of value and 1.23% of the Gross Domestic Product (GDP). It also provides direct and indirect employment to 1.5 million people and over 5 million across the entire value chain. The industry exported INR 60,698 crores (approx. USD 8.62 billion) worth of electrical equipment in 2019-20.

The industry has a diversified, mature and strong manufacturing base, with robust supply chain, fully equipped to meet domestic demand and any capacity addition. A rugged performance design of domestically manufactured electrical equipment has evolved over the years to meet the tough network demand in the country. The industry is fully geared up to meet the demand arising out any infrastructural development plan of the country.

The top ten export destinations for the Indian electrotechnical industry in 2019-20 (value wise from largest to smallest) were USA, Bangladesh, United Arab Emirates, Germany, Nigeria, United Kingdom, France, Indonesia, Singapore and Nepal which testifies to the quality and value of Indian manufactured electrical equipment. Major exported products (value wise from largest to smallest) were Industrial Electronics, Rotating Machines, Switchgear and Control gears, Power Projects, Cables, Transformers, Custom Built Products, Capacitors, Turbines, Insulators, Winding Wires, Measuring & Indicating Instruments, Electrical Lamps, Conductors, Boilers, Transmission Line Towers and Generators.

Source: India Power Industry Report July 2017 by IBEF, IEEMA inputs

2.2.2 Due to wide range of applications of electrotechnology, skills required to manufacture, as well as to maintain these products and solutions over its long lifecycle are diverse and are source to huge employment opportunities. The utilities and electrical products and solutions manufacturing industry constitute the largest sources of employment generation in the country. The sector provides value-added services as well as valued jobs.

2.3 International Scenario

- 2.3.1** Use of Electrotechnology is one of the building blocks of 2nd, 3rd and 4th industrial revolution onwards. Over past two centuries, manufacturing of electrotechnology products has matured across many countries. This is obvious, from that the intense competition in this sector not only from domestic but international firms as well. The Indian market for electrical appliances is often flooded with cheap and 'questionable quality products' from neighbouring countries which is adversely affecting the industry as well as economy. Developing the relevant guidelines for implementing global best practices in manufacturing while meeting relevant product safety, electrical efficiency standards can help in making our products globally competitive.
- 2.3.2** In Public Procurement Orders issued by Government of India, particular preference to Make in India products has been mandated by various Ministries under the Umbrella order of the Department for Promotion of Industry and Internal Trade (DPIIT), Government of India. This is expected to provide required thrust in local product development.
- 2.3.3** The International Electrotechnical Commission (IEC)/ The International Organization for Standardization (ISO) standards [The IEC and ISO are both independent, non-governmental, not-for-profit organizations that develop and publish fully consensus-based International Standards. The members of the two organizations include government, private and public-private entities] remained the benchmark International Standard followed by many countries. Indian Standard development process should take IEC/ISO standard as a base wherever available to address the market access conditions of the domestic and international market. In certain cases, where challenges of cheap but substandard products are relevant, these standards can be improved upon to ensure stricter product safety, energy efficiency norms. BIS as a member of IEC/ISO, has the access rights to all committees to participate during standards development process as well as has access to their published and draft standards. BIS also has signed Memorandum of Understanding (MoU) with other SDOs such as IEEE, The European Committee for Standardization (CEN)/ The European Committee for Electrotechnical Standardization (CENELEC) it authors standards that satisfy industry and legislative requirements for electric and electronic goods sold in Europe (CENELEC), Underwriters Laboratories (UL) which can be leveraged and understand work being done in these forums.
- 2.3.4** Conformity to standards is an essential market access condition at international level. For better understanding of the technical nuances addressed in these standards, active participation in the standard-making process at international level is essential. This will help domestic industry in developing their technological edge and will help country achieve its objective of self-reliance. However, to achieve that, our industry must realize the importance of standard for trade for their growth. At an overall level, process of developing standards is time consuming and demands additional resource allocation. To ensure active participation we need to identify key steps to build a large pool of professionals backed by their respective business. We may prioritize a few sectors at divisional level and then each sectional committee can target participation IEC/ISO sub committees and start working on to build pool of professionals.

2.4 Challenges in implementation – Careful analysis of the existing portfolio of standards developed by ETDC would reflect that about 46% of them are product standard and 19% are Test method. A peculiar standardization-related challenge is, there is no or little awareness about requirements from standards or how to access these standards, as a result, goods of substandard quality are placed/sold on the market. On the other hand, select industries with focus on exports, are looking for standards from target markets. Therefore, as a whole raising awareness about standards is a big challenge.

Another implementation related challenge is related to availability and quality of testing infrastructure. This challenge becomes acute for products / systems which need higher voltages and generally need testing at foreign laboratories. This means allocations of limited R&D budgets towards premium markets. Typical outcomes due to such limitations are follower approach by domestic industry. For domestic industry, with scarce engineering budgets and limited in-house resources are forced to compromise on quality rather than providing innovative solutions.

There are many incentive schemes available by Department of Science and Technology, Government of India (DST), Managed Service Providers (MSPs) may also be used to create cluster level testing infrastructures to actively drive in-house research. ETDC should invite senior officers from relevant line ministries to guide work plans of sectional committees. These interactions can help line ministries to increase budget allocation to upgrade/augment state-of-the-art testing infrastructure.

2.5 R&D and innovation: Generally, standardization work follows R&D which has been commercialized by mainstream industry. The Standard development process can only be sustainable if it is properly backed by in-depth R&D. International standards capture the minimum consensus views about the state-of-the-art at the time of writing standards. So, sectional committees should play an active role in creating awareness about the details about the latest changes in current standards, new areas of standardization, the future direction of technology to overcome challenges related to access to latest knowledge faced by domestic industry.

Sectional committees can engage more closely with relevant industry associations

- to seek nominations from willing companies to participate in international SDO work plans
- to propagate the concept of development of standard with ownership concept from the industry.

Experts from industry may be encouraged to come forward with new work item proposal and drive the standard development process. These steps will provide an excellent opportunity, to take up India specific issues while international standards are being formulated. These simple steps will go long way in achieving our objective of 'Make in India' and Atmanirbhar Bharat Abhiyan.

2.6 Efforts need to be made that the environmentally benign and also biodegradable products are promoted as raw material for manufacturing of electrical goods. Efforts are also required

to develop the facilities for safe disposable and recycling/reuse of storage batteries, solar panels, wind turbine blades and various other structural parts of electrical plant and machinery. Objective should also be to incorporate in relevant standards aspects related to principle of circular economy/sustainability.

3 BENEFITS EXPECTED FROM THE WORK OF DIVISION COUNCIL

- 3.1** Standards developed by ETDC are primarily related to product performance as well as to materials, processes, used during product realization. They specify requirements and test methods which serve as the basis of objective assessment of process and product. The standards enable the liberalization of trade and adoption of safer practices as basis for consumer protection in electro-technology. The standards also derive the merits from the standards of other Divisional Councils.
- 3.2** Standards impose exacting demands on industry in terms of metrology, accurate calibration of measuring equipment, management systems, safety, product quality and the performance during new product development. The iterative testing process facilitates deeper insights about either as planned results or deviations., These testing cycles provide additional information about complexity due to application of standards related different aspects of the same product e.g. EMI/EMC [Electromagnetic compatibility (EMC) is the ability of electrical equipment and systems to function acceptably in their electromagnetic environment, by limiting the unintentional generation, propagation and reception of electromagnetic energy which may cause unwanted effects such as electromagnetic interference (EMI) or even physical damage in operational equipment], ambient temperature, safety, etc. The test results give the basis for comparison vis-à-vis standard requirements and thereby provide requisite information to support appropriate decision making by consumers. The diversity of the published standards on electro-technology include these demands and all the indications are relevant to the continued prosperity of the market.
- 3.3** Sectional Committees under ETDC are structured to develop the specifications and test methods for the variety of electro-technical products and processes. In recognition of this responsibility, the work programme includes standards that pertain to practically the whole supply chain from the raw materials to the final product. The standards developed meets the requirement of the product at various stages i.e. from production to end use and disposable/recycling.
- 3.4** Standardized test procedures for evaluation of product, process and performance are tools used to enable the development of international trade and increase market access. Although in-house specifications may be set by brands, the use of harmonized national test protocols reduce the need for duplicate testing in a world where requirement of different users are met. Adoption of standards and other best practices ensures safe and secure operation of the products, minimize down time and breakdowns.

- 3.5** Special publications like National Electrical Code (NEC) of India and the electrical related chapters in National Building Code of India add another value to the standard formulation. NEC especially deals with the electrical systems and installation beyond the utility system and is helpful in creating awareness about safe electrical practices and encouraging electrical installations based on safe and sound principles.

4 STAKEHOLDERS REPRESENTATION

- 4.1** The Electrotechnical Division Council (ETDC) and all its Sectional Committees are adequately represented by all important stakeholders in a balanced way. They include manufacturers, consumer care organizations, utilities, independent testing bodies, scientific and technical organizations, academic and research institutions, Government, and Regulatory bodies etc. In some cases, eminent scientific persons with established credentials have also been given representation in personal capacities. The composition of each Sectional Committee is reviewed every three years by the Division Council based on their participation in the work of the committee. The recommendations of the sectional committees on co-options and withdrawals are also considered and approved by the Division Council. In addition specific expert group from industry/academia/other stakeholders are also formed on the basis of need in the form of Panel/WG to work on development of specific standard or technology.
- 4.2** Each Sectional Committee works in close liaison with its liaison committees and in line with the relevant ISO technical committees, IEC Committees etc. The list of such committees are given in **Annex A**.
- 4.3** In order to encourage participation in the committee meetings, it is ensured that meetings are organized at a place that would ensure maximum participation. The meetings are also organized through video conferencing to avoid travel by the members. Meeting notices and Agendas are circulated well in advance and followed up.

5 KEY OBJECTIVES

5.1 Defined Objectives of Electro-technical Division Council (ETDC)

- a) To formulate standards within the scope of Council.
- b) To develop Indian Standards on input material, performance requirements, test methods for electrical products and appliances for wider use in power sector, home and factory installations, transport applications, storage devices, consumer appliances etc.
- c) To adjust the existing programme of work in line with national policies and objectives..
- d) To keep standards relevant and up to date in line with international standards and emerging need of the sector and consumers.
- e) To make standards more relevant to the needs of the users keeping focus on sustainability.

- f) To continue working in close liaison with ISO/IEC and other standards formulation bodies
- g) To harmonize the standards with international and national developments and Regulations.

5.2 Identified Strategies to Achieve the Defined Objectives of ETDC

ETDC will employ the following strategies to satisfy the preceding objectives.

- a) Continually monitor the structure of the Division to accurately reflect the changing work programme and the needs of the industries as well as the consumers and the concerned parties.
- b) Establish the priority of work items within Sectional Committees and Panels.
- c) Give priority to the timely circulation of documents and adherence to target dates.
- d) Limit physical meetings to when necessary and encourage further use of virtual meetings and the electronic distribution of documents.
- e) To continue working in close liaison with ISO/IEC and other standards formulation bodies and the other liaison committees to avoid repetition and conflict.
- f) Publication of standards in time.
- g) Improve engagement at IEC level by presenting India specific views during standard formulation.

5.3 Strategic Objectives

5.3.1 Sustainable Value Chain

The procurer has focus on the short-term profits. Industry must attempt to meet the consumer's expectations. One of the key objectives of the road map shall be to ensure development of sustainable electrical products. It is crucial that we start working on this aspect as well, to be able to achieve a competitive electrical product value chain. Standards are required to promote sustainability across electrical value chain. Many products are manufactured by medium and small enterprises (MSME) sector, their viability must be ensured. Formulating a standard which is easier to implement will boost the adoption of standards.

5.3.2 Raw Materials

Unless good quality of raw materials is available, the product may not be economical. Continuous supply of raw materials needs to be ensured to keep the costs within limits and timely availability of product.

5.3.3 Widening the Product Base for Exports:

5.3.3.1 Standards must develop/evolve with time suiting to varied needs. Adapting product range to meet the new demands will enable industries to access the wider markets including exports. Improving the acceptability of our needs during standards development process is a key to success.

5.3.4 *Holistic Approach for Growth of Complete electrical product Value Chain*

Domestic as well as international market both are equally important. Meeting cost and quality expectations will allow entry to market. At the same time, timely delivery and robustness of the product increases the acceptability. Standards must incorporate such performance parameters and trustworthy tests for the same. There should be traceability of the test results.

5.3.5 *Standards as Technical Barriers to Trade*

The Technical Barriers to Trade Agreement (TBT) tries to ensure that Regulations, Standards, Conformity Assessment procedures do not create unnecessary obstacles to trade. One country adopts various compulsory or non-compulsory technical limited measures, such as technical regulations, standards and eligible evaluation procedure to authenticate import of products and their technology, sanitation quarantine, product packing and label, which can improve products' technical demand, increase importing difficulty and limit import finally. These measures become the barriers for other countries' products to enter this country's market freely. In the context of Govt effort on self-reliance and to support domestic industry, standardisation process may need to be examined in terms of adding specific need of the country in product standard so that these are adequately tested and certified before import. It is necessary to carefully examine such provisions by the technical committees which should be incorporated if the standard is being made based on International Standard.

5.3.6 Our competing partners are making use of non-tariff barriers to restrict flow of goods from India. We should also work on identifying standards as suitable non-tariff barriers for protecting domestic industry's interests by restricting imports in large quantities. Required guidelines issued by the Government imposing restrictions on import should be critically examined by each Sectional Committee.

5.3.7 *Integration of Indian Standards in Curricula of Technical Courses*

Integration of standards into different levels of technology education has surfaced as a critical issue. BIS proposes to promote integration of Indian Standards in curricula of technical courses. Presently, engineering students use few of the basic standards like drawing codes, concrete, and steel design codes, etc. in their studies. In order to make the student and teaching fraternity aware of the importance of standards in their profession, standards particularly those related to terms and glossaries, test methods, safety, installation codes and important products related to electro-technology, special courses may be designed for possible integration in the curricula of technical degrees. Appropriate initiatives should be taken in collaboration with concerned authorities for making necessary changes.

6 IMPLEMENTATIONS OF THE STRATEGIC ROAD MAP

6.1 The strategic road map of ETDC shall be implemented in the next five years and the progress to be monitored periodically in terms of measurable parameter identifiable against each item. Focused approach towards development of action plans, key milestones, defined tasks, and timelines with necessary resources along with availability of testing infrastructure and testing guidelines to realize the desired benefits must be adopted. The implementation of this Road Map should address the following points to achieve the targeted benefits. This will enable India to establish itself as a major international player.

6.2 One Nation, One Standard

6.2.1 There should be one common standard for a product or service as a method for test and/or as basis for conformity assessment. Standards in India are being developed by multiple organizations in addition to BIS. This diversity is welcome, and it is not desirable to force every organization into a single mold. This will also strengthen the standardization work by allowing these organizations to align their interests, reduce overlaps and combine their efforts for realizing common national objectives. A comprehensive action plan should be taken up so that standards developed by other Standard Developing Organizations may be adopted as Indian Standards following due process with a view to achieve ultimate objective of “One nation, One standard”. While adopting this approach, we may consider those standards which are being developed for exclusive use by the concerned organization like RDSO, Defense at a later time.

In so far as mandatory implementation of Standards is concerned there should not be multiplicity of requirements by different organisations and the product tested once need not be subjected to testing and regulatory requirements by multiple organisations, multiple times. This is necessary for effective and smooth implementation of the National Standard. Regulations may be brought by any organisations, but it should necessarily follow the National Standard in totality including the performance and efficiency, safety parameters for the product system etc. All Technical wings of concerned ministries shall be necessarily consulted while bringing any standard/regulation in the electrotechnical domain.

6.2.2 The Standard may indicate certain clauses as mandatory such as those related to productsafety and others as optional to be chosen between manufacturer and user to suit the specific use case. The mandatory clauses can be used as the provisions of statutory/regulatory requirements and optional clauses may serve as guidelines for characteristics such as performance, measurement etc. The statutory/regulatory bodies will work out the modalities to keep such requirements/guidelines in the public domain for easy accessibility.

6.3 Eliminate Multiplicity of Standards Across Division Council

Suitable mechanism to be developed to minimize duplication of work and align standards related to multiple aspects related to the same product/service by other sectional committees under various Division Councils. One way to go ahead with this is by putting all relevant information on the status of current standards and ongoing projects on the net (web). In addition, committees need to nominate representatives to participate in other relevant committees to facilitate open flow of information among various committees in BIS / SDOs to avoid overlap of work. BIS should also make internal mechanism to review such subjects which may fall under the domain of multiple divisions.

6.4 Harmonization of Standards

- 6.4.1** The adoption of standards is theoretically voluntary, but in order to stay relevant in the global market place, the adoption of international standard that is commonly understood in all countries fosters voluntary support of one standard as a basic necessity of trade. India can play a leading role in fostering alignment of standards in Asian region which can facilitate exchange of goods and help in regional trade. By working to include special requirements related to use of products under environmental conditions like that of India, as part of international standards itself, can help in bridging the gaps in standardization process felt amongst various countries.
- 6.4.2** Harmonization may be defined as standards on the same subject approved by different standardizing bodies, that establish interchangeability of products and services or mutual understanding of test results or information provided according to these standards. The harmonized standards might have differences in presentation. Sometimes, the term equivalent standards are used to cover the same concept as harmonized standards. There should be enough clarity in use of terms.
- 6.4.3** Total harmonization may be possible in certain cases, such as glossaries, symbols, codes, basic standards, test methods, etc. In case of Product standards, it may not be always possible to have complete harmonization as the requirement under Indian conditions which may differ say more stringent requirements for certain parameters. More awareness about Global relevance toolbox provided by IEC may support our sectional committees with appropriate tools towards how to include national requirements in international standards itself.
- 6.4.4** In cases, where total harmonization is not possible, the aim should be to see that the Indian standard incorporates the requirements of international/regional or other standards without giving rise to significant. Suitable steps may be followed for complete harmonization or alignment so that there does not arise any conflict with the requirements of the International/regional/overseas standard. The steps of harmonization may include the following:
- a) Identify the subject (extreme focus on thrust areas)
 - b) Identify International standards in the above areas (i.e. ISO, IEC etc)
 - c) Identify other regional standards
 - d) Identify overseas standards of countries with whom India has large volume of trade or expects larger volume.

6.5 Compliance to Code of Good Practice for the Preparation, Adoption and Application of Standards

India is a member on the WTO and therefore, it has become obligatory for all standardizing bodies within the country to abide by the code of good practice for the preparation, adoption and application of standards. The general and substantive provisions in this regard has been as an **Annex B** to this document.

6.6 Alert System for Standardization

An effective national alert system will be required to gear up the preparedness of various economic sectors towards any change in trade or technical requirements. This will enable them to retain their competitiveness and at the same time allow India to maintain/improve its position in the world market. This system will also consider the implications on environment, health and safety aspects. The ETDC may develop suitable mechanism for effective monitoring and will be in constant touch with industry/associations, chambers of commerce, non-government organizations (NGOs), Union/State Governments, union/state governments etc. Broadly, this alert system will

- a) Identify economic sectors on the implications of trade and technical changes for future trade in order to retain the competitive edge;
- b) forewarn the rapid technological obsolescence; and
- c) avoid delay leveraging the current opportunities.

6.7 Thrust Area

The Division Council should identify the broad areas of priority in which standardization work need to take place, linking this to the trends in business, technologies, innovations, government policies, environmental, social aspects, sustainability and the market needs including ~~and~~ the need for involvement in International/Regional standardization. Some of the potential thrust areas are listed in **Annex C**.

6.8 Human Resource Development

There is a need to progressively increase the rate of generation of high quality skilled human resource at all levels of standardization. For building up the human resource base in relevant areas, the technical committee members be encouraged to undergo specialized trainings being organized by the Bureau of Indian Standards (BIS) and other specialized bodies. They must be provided significantly greater opportunities in international participation as well as for higher education. The officers of BIS involved in standardization may also be encouraged to skill enhancement programmes organized by outside organizations in various technological sectors. Schemes for training towards enhancement in skills should be a continuous process.

The officials involved in standardization from other organizations should also be provided suitable incentives. Specific scheme can be developed in collaboration with Government agencies like DST, Department of Personnel and training (DOPT) for encouraging participation in standardization process.

6.9 Review of Standards

- 6.9.1** The large existing library of over 1800 standards under the responsibility of ETDC and its Sectional Committees needs regular review/confirmation/amendment/revision, to ensure currency. Together with a current programme in development of new standards, this is having the cumulative effect of creating an overflow. Adequate priority is required for this activity and a time bound action plan need to be devised by each sectional committees for in depth review of each standard which are more than 5 years old. This situation may well create a few competing priorities, displace essential planning and disrupt the planned and orderly progress of standards development but may keep pace with the rapid technological developments.
- 6.9.2** The Road Map would form the basis for the Sectional Committees under ETDC to frame their individual Standardization Plans. The list of existing sectional committees under ETDC along with their scope is given in **Annex A**.

7 REVIEW OF PLAN

The Strategic Road Map of the ETDC shall be approved by the Council. The plan be reviewed from time to time to evaluate the progress as well to formulate new strategies to deal with new challenges. It shall also be reviewed in every meeting of the ETDC which is normally held once in a year. Any changes proposed shall be discussed in the meeting and approval of the Council shall be obtained before incorporation. All stakeholders shall also recommend appropriate actions required for further progress and to analyze whether new situations call for any strategic revision for treading on new opportunities.

ANNEX A
LIST OF SECTIONAL COMMITTEES UNDER ETDC ALONG WITH SCOPE AND
ITS LIAISON COMMITTEES IN LINE WITH THE RELEVANT ISO TECHNICAL
COMMITTEES, IEC COMMITTEE

Sl. No	SC NO	SC NAME	SCOPE	CORRESPONDING ISO/TC/SC IEC/TC	MEMBERSHIP & VOTING STATUS
1	ETD 1	BASIC ELECTROTECHNICAL STANDARDS AND POWER QUALITY	To prepare standards of general and common nature in the field of electrotechnology, such as voltages, current ratings, power quality and frequency, quantities and units, nomenclature, graphical symbols, basic marking and general requirements for enclosures of equipment.	TC01	P
				TC03	O
				SC3C	O
				TC8	P
				TC25	O
			TC70	O	
2	ETD 02	SOLID ELECTRICAL INSULATING MATERIALS AND INSULATING SYSTEMS	To prepare standards: a) on solid electrical insulating materials. b) on guiding principles and on the philosophy of evaluation of insulation systems in general c) for functional test programmes and methods intended for evaluation of possible insulation systems and their suitability for use in electrical equipment. d) for classification of insulation systems based upon their capability to withstand the complex of the most important service determined by the conditions of the use of insulation in equipment.	TC 15	O
				TC112	P
3	ETD 03	FLUIDS FOR ELECTROTECHNICAL APPLICATIONS	To prepare product specifications, test methods as well as maintenance and use guides for liquid and gaseous dielectric. Also to prepare specifications and maintenance and use guides for lubricants and control fluids for turbines, generators and control systems as well as to assist in the preparations of test methods for such fluids.	TC 10	P
4				TC 36	P

	ETD 06	ELECTRICAL INSULATORS AND ACCESSORIES	To prepare standards regarding insulated bushing, insulators for overhead lines, insulators for sub-stations and jointing accessories which are integral parts of insulators	SC 36A	O
5	ETD 7	LOW VOLTAGE SWITCHGEAR & CONTROLGEAR	To prepare standards for switchgear and controlgear such as circuit breakers, switches, contactors, starters, disconnectors, bus bars, fuse combination units and semiconductor connectors and any switchgear assemblies for voltages upto and including 1 000 V ac or 1 200 V dc	TC 121	P
				SC 121A	P
				SC 121B	P
				SC 23 E	P
6	ETD 8	HIGH VOLTAGE SWITCHGEAR AND CONTROLGEAR	To prepare standards for switchgear and controlgear; such as circuit breakers, switches contactors, starters, disconnectors, busbars and any switchgear assemblies for voltages more than 1000 V ac	TC 17	P
				SC 17A	P
				SC 17C	P
7	ETD 9	POWER CABLES	To prepare standards for electric cables and their accessories, without limitations of voltage, current or form of construction but excluding cables for telecommunications and electronic equipment and such other cables as fall within the scope of other committees	TC 20	P
8	ETD 10	PRIMARY CELLS AND BATTERIES	To prepare standards for cells and batteries particularly those relating to the specification, checking of their dimensions and characteristics and to provide guidance on matters of safety	TC 35	P
9	ETD 11	SECONDARY CELLS AND BATTERIES	To prepare standards for all rechargeable cells and batteries (starter batteries, stationary batteries, traction batteries etc.)	TC 21	P
				SC 21A	P
10	ETD 12	MEASURING EQUIPMENT FOR BASIC ELECTRICAL QUANTITIES	To prepare standards for direct and indirect acting analogue and digital indicating and recording instruments and their accessories, also transducers having electrical inputs and outputs for measuring electrical quantities by any method on direct current and alternating current at distribution system frequencies and their harmonics To prepare standards for primary reference apparatus, operating on direct current and alternating current at distribution frequencies and	TC85	O

			their harmonics for the purpose of measurement, traceability and intercomparison		
11	ETD 13	EQUIPMENT FOR ELECTRICAL ENERGY MEASUREMENT AND LOAD CONTROL	To prepare international standards for equipment for electrical energy measurement, tariff - and load control, customer information, payment, local and/or remote data exchange, using electromechanical and/or electronic, technologies for applications ranging from electrical energy generation to residential. The standards may include requirements and test methods to cover mechanical, environmental, electrical, safety, metrology dependability aspects as well as functional requirements and data models	TC 13	P
12	ETD 14	ELECTRICAL WIRING ACCESSORIES	To prepare standards for electrical wiring accessories ; such as lamp holders, switches, plugs and socket- outlets, connecting devices and conduits and their accessories for electrical installations	TC 23 SC 23A SC 23B SC 23G SC 23H SC 23J	O O P O O O
13	ETD 15	ROTATING MACHINERY	To prepare standards on rotating electrical machines like induction, synchronous, motors, generators, dc machines and turbines including carbon brushes for electrical machines (with the exception of traction machines and rotating machinery coming under the purview of other Committees)	TC 2 TC 4 TC 5 ISO/TC 43- SC1	P P O P
14	ETD 16	TRANSFORMERS	To prepare standards on power and distribution transformers, reactors, onload tap changers, etc, without limitation on voltage or power. Transformer accessories and voltage stabilizers, testing transformers and furnace transformers are included. (Instrument transformers, welding transformers and traction transformers are excluded)	TC 14 TC 96	P P
15	ETD 18	INDUSTRIAL PROCESS MEASUREMENT AND CONTROL	To prepare standards for systems and elements used for industrial process measurement and control concerning continuous and batch processes To coordinate the standardization of those features of related elements which affect suitability for integration into such systems operating with electrical, pneumatic, hydraulics	TC 27 TC 65 SC 65A SC 65B	O P P P

			mechanical or other systems of measurements and/or control		
16	ETD 19	HIGH VOLTAGE ENGINEERING	To prepare standards for high voltage testing techniques and for different types of tests belonging there to such as high voltage ac, dc and impulse tests and high current impulse tests, definitions and basic principles of insulation coordination and insulation levels To prepare application guides recommending the insulation levels in relation to possibilities of over-voltage protection devices. The work also includes formulation of standards for clearances and creepage distances	TC 28	P
				TC 42	P
				TC 109	O
17	ETD 20	ELECTRICAL INSTALLATIONS	To prepare standards for safety and related matters in designing, erection and maintenance of electrical installations from the point of view of safety and good practice that would, amongst other things, promote compatibility between such standards and those concerning the equipment installed. The work includes electrical installations in buildings for different occupancies and outdoor sites of temporary or permanent nature and also installations in the ships	TC18	O
				SC 18A	O
				TC 64	P
				TC 73	O
				TC 81 TC 106	O -
18	ETD 21	ELECTRIC WELDING EQUIPMENT	To prepare standards on the construction, performance, testing and safety requirements for electric welding equipment and accessories for both arc and resistance type	TC 26	O
				ISO/TC 44	O
19	ETD 22	ELECTRICAL APPARATUS FOR EXPLOSIVE ATMOSPHERES	To prepare guidelines and requirements for electrical apparatus for use where there is a hazard due to the possible presence of ignitable gas, vapour liquid particles or dust in the atmosphere.	TC 31	P
				SC 31G	O
				TC 31J	P
20	ETD 23	LAMPS AND RELATED EQUIPMENTS	To prepare Indian Standards for all types of electric lamps (including LED), caps, control gear and their auxiliaries (luminaires excluded)	TC 34	P
				SC 34A	P
				SC 34 B	P
				SC 34C	P
21	ETD 25	LIFTS AND ESCALLATORS	To prepare standards and codes of practice for electrically operated lifts and escalators, including equipment and components	ISO/TC 178	P

22	ETD 28	SOLAR PHOTOVOLTAIC ENERGY SYSTEMS	To prepare standards for systems of photovoltaic conversion of solar energy into electrical energy and for all the elements in the entire photovoltaic energy systems In this context, the concept photovoltaic energy systems includes the entire field from light input to solar cell and including the interface with the electrical system(s) to which energy is supplied	TC 82	P
23	ETD 29	POWER CAPACITORS	To prepare standards for power capacitors such as series and shunt capacitors for power systems, self-healing and non-self-healing power capacitors with metallized dielectric, ac motor capacitors, capacitors for inductive heating plants, voltage grading capacitors, coupling capacitors, energy storage capacitors etc.	TC 33	P
24	ETD 30	SURGE ARRESTERS	To prepare standards on surge arresters and their accessories, application guide for surge arrestors for different locations	TC 37	P
				SC 37A	O
				SC 37B	O
25	ETD 31	POWER ELECTRONICS	To prepare standards regarding equipment and their components for electronic power switching. To prepare standards for electrical appliances for household and similar purposes, including associated controls.	TC22	P
				SC22E	O
				SC22G	O
26	ETD 32	ELECTRICAL APPLIANCES	To prepare standards for electrical appliances for household and similar purposes, including associated controls	TC 59	P
				SC 59A	O
				SC 59C	P
				SC 59D	P
				SC 59F	O
				SC 59L	P
				TC 61	P
				SC 61B	O
				SC 61 C	P
				SC 61 D	P
				SC 61H	O
SC 61J	O				
TC 72	O				
27	ETD 33	WINDING WIRES	To prepare standards for wires for electrical winding irrespective of conductor material, shape or type of covering taking into account the needs in the fields of electrotechnology	TC 55	P

28	ETD 34	INSTRUMENT TRANSFORMERS	To prepare standards and application guides for instrument transformers	TC 38	P
29	ETD 35	POWER SYSTEMS RELAYS	To prepare standards for power systems relays including those incorporating solid state devices, also taking into account combination of relays and devices to form schemes for power systems including controlequipment associated with that protection	TC 94	O
				TC 95	P
30	ETD 36	TOOLS AND EQUIPMENT FOR LIVE WORKING	To prepare standard on electrical and mechanical characteriistics as well as reliability requirements for tools and equipment used in connections with work on energized electrical systems	TC 78	O
31	ETD 37	CONDUCTORS AND ACCESSORIES FOR OVERHEAD LINES	To prepare standards for conductors and accessories for overhead power lines and codes of practice for the design, installation and maintainance or overhead power lines	TC 7	P
				TC 11	P
32	ETD 39	FUSES	To prepare standards regarding specification for all types of fuses, with the object of determining The characteristics which are essential in specifying the conditions for installation and operation of the fuses The requirements to be met by the fuses and the tests designed to ascertain their compliance with such requirements as well as the proceduresto be followed for these tests c) Markings To prepare for these fuses standards, standard values of: Characteristics, rated voltages, currents and breaking capacities: Dimensions in connections with the fixing and interchangeability of high voltage and low voltage fuses	TC 32	P
				SC 32A	P
				SC 32B	P
33	ETD 40	HVDC POWER SYSTEMS	To prepare standards and guidelines on equipment and performance of high- voltage d.c(HVDC) Transmission Systems	SC 22F	O
				TC 115	P
34	ETD 42	WIND TURBINES	To prepare Indian standards for wind turbines that convert wind energy into electrical energy. These standards address design requirements, engineering integrity, measurement techniques and test procedures. Their purpose is to provide a basis for design, quality assurance and certification. The standards are concerned with	TC 88	P

			all subsystems of wind turbines, such as mechanical and internal electrical systems, support structures and control and protection systems. They are intended to be used together with appropriate Indian Standards.		
35	ETD 43	STANDARDIZATION OF ENVIRONMENTAL ASPECTS FOR ELECTRICAL AND ELECTRONIC PRODUCTS	To prepare the necessary guidelines, basic standards, in the environmental area, in close cooperation with product committees, which remain autonomous in dealing with the environmental aspects relevant to their products; To liaise with product committees in the elaboration of environmental requirements of product standards in order to foster common technical approaches and solutions for similar problems and thus assure consistency in standards.	TC 111	P
36	ETD 44	SAFETY OF MACHINERY	Standardization in the field of the application of electro-technical equipment and systems to machinery (including a group of machines working together in a coordinated manner, excluding higher-level systems aspects) not portable by hand while working, but which may include mobile equipment. The equipment covered commences at the point of connection of the electrical supply to the machinery. Standardization of interfaces (excluding local area networks and field-bus) between control equipment and the electro-technical equipment of machinery. Standardization of electro-technical equipment and systems relating to the safeguarding of persons from hazards of the machinery, its associated equipment and the environment. To coordinate with ISO/IEC on all matters concerning the safety of machinery.”	TC 44	P
37	ETD 46	GRID INTEGRATION	To prepare standards in the field of Grid Integration comprising of LT (ON Grid, Off Grid and Hybrid with and without storage), HT and EHT for all capacities	TC 8A	
38	ETD 47	RAILWAY ELECTRIC TRACTION EQUIPMENT	To prepare Indian Standards for the railwaysfield which includes rolling stock, fixed installations, management systems (including	TC 9	O

			<p>communication, signalling and processing systems) for railway operation, their interfaces and their ecological environment.</p> <p>These standards cover railway networks, metropolitan transport networks (including metros, tramways, trolleybuses and fully automated transport systems) and magnetic levitated transport systems.</p> <p>These standards relate to systems, components and software and they will deal with electrical, electronic and mechanical aspects, the latter being limited to items depending on electrical factors.</p> <p>These standards deal with electromechanical and electronic aspects of power components as well as with electronic hardware and software components</p>		
39	ETD 48	STANDARDIZATION IN THE FIELD OF UHV AC TRANSMISSION SYSTEMS	Standardization in the field of AC transmission technology at 1000 kV and above, comprising systems-oriented guidance such as that for planning, design aspects, technical requirements, construction, commissioning, reliability, availability, operation and maintenance, processes for specifying requirements and demonstrating whether the required performance of UHV systems is assured.	TC 122	P
40	ETD 49	Illumination engineering and luminaires (New Committee)	To prepare Indian Standards for luminaires (including luminaires for use in hazardous area, aviation lighting, emergency lighting etc.) and codes of practice for interior/exterior lighting	SC 34 D	P
41	ETD 50	LVDC Power Distribution Systems	To prepare standards on : LVDC System Requirements, Safety and Installation Guidelines LVDC products including electrical wiring accessories and Applications c) Integration of DC Infrastructure Non Traditional Distribution Networks/Microgrids	SyC LVDC	P
42	ETD 51	Electrotechnology in Mobility	To prepare Indian Standards for electrotechnical aspects of totally or partly electrically propelled road vehicles	TC 69	P
43	ETD 52	Electrical Energy Storage Systems	Standardization in the field of grid integrated Electrical Energy Storage Systems.	TC 120	P

44	ETD 53	Standardization of the Management of Assets in Power Networks	Standardization in the field of standardised tools, technique and frameworks (common language and common metrics with consistent approach), for coordinated lifetime management of assets within which a wide variety of power system assets can be managed, working closely with asset management system committees and power system equipment committees.	TC 123	P
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ANNEX B

CODE OF GOOD PRACTICE FOR THE PREPARATION, ADOPTION AND APPLICATION OF STANDARDS

- B-1** The standardizing body shall ensure that standards are not prepared, adopted or applied with a view to, or with the effect of, creating unnecessary obstacles to international trade.
- B-2** Where international standards exist or their completion is imminent, the standardizing body shall use them, or the relevant parts of them, as a basis for the standards it develops, except where such international standards or relevant parts would be ineffective or inappropriate, for instance, because of an insufficient level of protection or fundamental climatic or geographical factors or fundamental technological problems.
- B-3** With a view to harmonizing standards on as wide a basis as possible, the standardizing body shall, in an appropriate way, play a full part, within the limits of its resources, in the preparation by relevant international standardizing bodies of international standards regarding subject matter for which it either has adopted, or expects to adopt, standards. For standardizing bodies within the territory of a Member, participation in a particular international standardization activity shall, whenever possible, take place through one delegation representing all standardizing bodies in the territory that have adopted, or expect to adopt, standards for the subject matter to which the international standardization activity relates.
- B-4** The standardizing body within the territory of a Member shall make every effort to avoid duplication of, or overlap with, the work of other standardizing bodies in the national territory or with the work of relevant international or regional standardizing bodies. They shall also make every effort to achieve a national consensus on the standards they develop. Likewise the regional standardizing body shall make every effort to avoid duplication of, or overlap with, the work of relevant international standardizing bodies.
- B-5** Wherever appropriate, the standardizing body shall specify standards based on product requirements in terms of performance rather than design or descriptive characteristics.
- B-6** The work programme shall for each standard indicate, in accordance with any ISONET rules [International Standards Information Network called ISONET]. The classification relevant to the subject matter, the stage attained in the standard's development, and the references of any international standards taken as a basis. No later than at the time of publication of its work programme, the standardizing body shall notify the existence thereof to the ISO/IEC Information Centre in Geneva.

ANNEX C THURST

AREAS FOR FOCUSED

APPROACH

1. Basic Standards on Electrotechnology
2. Power Quality
3. Safety of Electrical Installations
4. Low Voltage and High Voltage Switchgear
5. Cables and wire
6. Wiring accessories
7. Energy Meters
8. Lighting
9. Electrical Housing Appliances
10. Rotating machinery
11. Transformers
12. E-Mobility
13. Energy Storage
14. Renewable Energy Sources and grid integration
15. Low Voltage Direct Current/Electricity Access
16. Power electronics
17. Industrial Automation incl. cybersecurity
18. Efficiency improvement in all sectors
19. LT & HT Capacitors
20. Instrument Transformers
21. Gas Insulated equipment & Sub-stations
22. Surge Arresters
23. Vertical transportation in building sector
- 24. Sustainability**
- 25. Graphene and electrotechnical applications**
- 26. Digitalization of the electrotechnical infrastructure**
- 27. LVDC (Low Voltage Direct Current)**
- 28. Energy Transition**
- 29. Smart Homes**
30. Net Zero Energy Buildings (homes, offices, specialty buildings)