MINUTES

Name of the Committee	No. of Meeting	Day	Date	Time	Venue(Online)
Marine Energy Conversion Systems Sectional Committee, ETD 54	**03rd**	**Wednesday**	**23rd-October-2024**	**03.00 PM - 05.00 PM**	**Join from the meeting link** https://bismanak.webex.com/bismanak/j.php?MTID=m03005f25d6977719aa7656a5ee51298a Meeting number: 2514 289 4610 Password: ETD54

List of members attended the meeting is at Annexure –1 .

CHAIRPERSON: Dr. Purnima Jalihal MEMBER SECRETARY: Shri Ritwik Anand

ITEM 0 GENERAL

0.1 Welcome and Opening Remarks by the Chairperson

Dr. Purnima Jalihal, Chairperson of ETD 54, extended a warm welcome to the Committee members present at the meeting. She informed the members about the Government of India's initiatives to promote marine energy, with a particular focus on Ocean Thermal Energy Conversion (OTEC) systems, and requested the need for members to be proactively involved in standardization efforts in this area.

She further emphasized to the members the importance of sending their comments on the documents circulated for voting or review to BIS. This would ensure that, following committee discussions and with the Chairperson's approval, the unified views of the National Committee are conveyed to IEC rather than individual opinions.

Shri Ritwik Anand, Member Secretary ETD 54, welcomed all the members and requested the committee members to have thorough discussion on each and every agenda point and to arrive at useful conclusion.

The meeting started with a brief introduction of all members.

ITEM 1 CONFIRMATION OF THE MINUTES OF THE LAST MEETING

1.1 There being no comments, the minutes of the last meeting held on on 04.04.2024 were confirmed.

1.2 ACTION ARISING OUT OF THE PREVIOUS MEETING

SlNo	Subject	Decisionoflastmeeting/ Action/Remark	Decision of the committee
1	Title and Scope of the sectional committee	Committee recommended the change in the scope of ETD 54 as per information given below : Title: Marine Energy Conversion Systems Sectional Committee, ETD 54. Scope: To prepare standards for marine energy conversion systems. The primary focus will be on the conversion of wave, tidal ,thermal gradient and other marine energy forms~~and other water current energy~~ into electrical and other useful forms of energy. ~~although other conversion methods, systems and products are included.~~ a) terminology; b) management plans for technology and project development; c) performance measurements of marine energy converters; d) resource assessments; e) design and safety including reliability and survivability; f) deployment, commissioning, operation, maintenance, retrieval and decommissioning; g) electrical interface, including array integration and / or grid integration; h) testing laboratory, manufacturing and factory acceptance; i) additional measurement methodologies and processes. The recommendation of the committee will be placed before the next meeting of Electrotechnical Division Council(ETDC) .	Electrotechnical Division Council during its 26th meeting held on 12th July 2024 approved the recommendation of ETD 54. The committee noted the information . Chairperson also informed the committee that, during the recently held IEC TC 114 meeting, TC 114 discussed a similar approach regarding changes to the scope of their committee.
2	International activities	The committee took note of the list of published standards by IEC TC 114. It was decided that members will review the list and providesuggestions regarding the standards to be considered for adoption at the next committee meeting.	***See item 3***

ITEM 2 COMPOSITION OFMARINE ENERGY CONVERSION SYSTEMS SECTIONAL COMMITTEE, ETD 54

2.1 Committee noted the information regarding composition of the Sectional Committee, ETD 54 provided in Annex 1 of the agenda..

2.2 The Committee recommended to coopt Engineers India Ltd,Structural Engineering Research Centre(DrDr. Saptarshi Sasmal&Dr. P Harikrishna) in the committee .The committee also recommended co-opting ONGC as a member. Shri J.K. Jethani from MNRE agreed to provide the contact details of the relevant person at ONGC.

ITEM 3 DRAFT INDIAN STANDARDS UNDER PRINTING

The committee noted the information regarding the following standards currently under printing and established the following working groups to review each standard and suggest any India-specific changes that may be incorporated:

SI. No.	Doc No	TITLE	Working Group
1	ETD/54/24541 (Identical To: IEC 62600-1: 2020)	Marine energy Wave tidal and other water current converters Part 1: Vocabulary	All members of the committee provide inputs to Dr. Manasa Ranjan Behera, IIT Bombay.
2	ETD/54/24542 (Identical To: IEC TS 62600-2 2019)	Marine energy Wave tidal and other water current converters Part 2: Marine energy systems Design requirements	1. Dr. Manasa Ranjan Behera, IIT Bombay 2. Dr. Jaya Kumar Seelam , NIO Goa 3. Dr. Bhavya Manjeera Patruni ,NRDC 4. Representatives of NIOT
3	ETD/54/24543 (Identical To: IEC 62600-10-2021)	Marine Energy wave tidal and other water current converters Part 10 : Assessment of mooring system for marine energy converters MECS	1. Dr. Gomathinayagam 2. Mr. Ashwani Vishwanath ,NIOT
4	ETD/54/24544 (Identical To: IEC 62600-20-2019)	Marine Energy wave tidal and other water current converters Part 20 : Design and Analysis of an Ocean Thermal Energy Conversion OTEC plant General Guidance	1. Dr. S. Iniyan 2. Dr. V Jagadeesh Kumar , IIT Madras 3. Mr. Anuj Choudhary ,Shell Technology Centre 4. Dr. S. Sutha , Anna University, Chennai 5. Representative of NIOT
5	ETD/54/24545 (Identical To: IEC 62600-100-2012)	Marine Energy Wave Tidal and Other Water Current Converters Part 100 : Electricity producing wave energy converters - Power performance assessment	1. Dr. Jeevan Kumar Jethani, MNRE 2. Mr. M Saravanan , NIWE 3. Dr. V Jagadeesh kumar , IIT Madras 4. Mr. Biren Pattanaik ,NIOT

Link to download the IEC TC 114 standards below:

https://drive.google.com/drive/folders/11d3keYpUIYFdStKtVSQWoxEL-JcTrFZI

ITEM 4 INTERNATIONAL ACTIVITIES

4.1. Dr. Purnima Jalihal, Chairperson ETD 54 briefed the members about the recently held virtual meeting of IEC TC 114. She informed them of key projects relevant to India, such as the performance assessment of OTEC and small off-grid power energy devices etc. She further requested members to share their comments on the draft IEC standards circulated by BIS from time to time, so that an Indian viewpoint can be prepared based on members' input.

4.3 Review of the Projects under IEC TC 114 and designation of Indian experts:

The committee reviewed the below ongoing projects in IEC and nominated following experts :

SI. No.		IEC TC	Documents	Projects Name	Working Group	Experts Name
1.		TC 114	114/526/NP	PNW TS 114-526 ED1 Measurement and characterization of turbulence		
2.		TC 114	114/509/NP	IEC TS 62600-21 ED1 Electricity producing ocean thermal energy converters - Power performance assessment	PT 62600-21	1. Dr. Purnima Jalihal , NIOT 2. Mr. Ashwani Vishwanath , NIOT 3. Mr. Biren Pattanaik , NIOT
3.		TC 114	114/447/NP	IEC TS 62600-41 ED1 Measurement and characterization of biofouling accumulation	PT 62600-41	
4.		TC 114	114/448A/CD	IEC TS 62600-200 ED2 Marine energy - Wave, tidal and other water current converters - Part 200: Electricity producing tidal energy converters - Power performance assessment	MT 62600-200	
5.		TC 114	114/341/CD	IEC TS 62600-201 ED2 Marine energy - Wave, tidal and other water current converters - Part 201: Tidal energy resource assessment and characterization	MT 62600-201	1. Dr. Manasa Ranjan Behera, IIT Bombay. 2. Dr. Jaya Kumar Seelam , NIO Goa

Item 5 ANY OTHER BUSINESS

There being no further business, the meeting ended with a vote of the thanks to the chair.

ANNEXURE-1

(*Attendance ofETD 54*)

SI.No.	Organization	Member Name	Member Email
1.	National Institute of Ocean Technology, Chennai	Dr. Purnima Jalihal (*Chairperson*)	purnima@niot.res.in
2.	Bureau of Indian Standards, New Delhi	Shri Ritwik Anand (Member Secretary)	eetd@bis.gov.in
3.	Anna University, Chennai	Dr. S. Sutha	sutha_mani@hotmail.com
4.	CSIR-National Institute of Oceanography , Goa	Dr. Jaya Kumar Seelam	jay@nio.res.in
5.	Indian Institute of Technology Bombay, Mumbai	Dr. Manasa Ranjan Behera	manasa.rb@iitb.ac.in
6.	Indian Institute of Technology Madras, Chennai	Dr. V Jagadeesh kumar	vjkumar@ee.iitm.ac.in
7.	Ministry of Earth Sciences, New Delhi	Dr. Mithila Verma	mverma.moes@nic.in
8.	Ministry of New and Renewable Energy, New Delhi	Shri Jeevan Kumar Jethani	jethani.jk@nic.in
9.	National Institute of Ocean Technology, Chennai	Shri Biren Pattanaik	biren@niot.res.in
		Shri Ashwani Vishwanath	ashwani@niot.res.in
10.	National Institute of Wind Energy, Chennai	Shri M Saravanan	saravanan@niwe.res.in
11.	National Research Development Corporation, Department of Scientific & Industrial Research, Ministry of Science & Technology, New Delhi	Dr. Bhavya Manjeera Patruni	bhavya.p@nrdc.in
12.	Shell Technology Centre, Bangalore	Shri Anuj Choudhary	anuj.choudhary@shell.com
13.	In Personal Capacity	Dr. S. Iniyan	iniyan777@hotmail.com

ANNEXURE -2

(Scope , Structure and Program of Work of IEC TC 114)

Title :- Marine energy - Wave, tidal and other water current converters.

Scope : To prepare international standards for marine energy conversion systems.

The primary focus will be on conversion of wave, tidal and other water current energy into electrical energy, although other conversion methods, systems and products are included.

Tidal barrage and dam installations, as covered by TC 4, are excluded.

The standards produced by TC 114 will address:
- terminology;
- management plans for technology and project development;
- performance measurements of marine energy converters;
- resource assessments;
- design and safety including reliability and survivability;
- deployment, commissioning, operation, maintenance, retrieval and decommissioning;
- electrical interface, including array integration and / or grid integration;
- testing laboratory, manufacturing and factory acceptance;
- additional measurement methodologies and processes.

Structure of IEC TC 114 :

Label	Title
Project Team	
PT 62600-41	Measurement and characterization of biofouling accumulation
Maintenance Teams	
MT 62600-2	Design requirements for marine energy systems
MT 62600-10	Assessment of mooring system for marine energy converters (MECs)
MT 62600-40	Acoustic characterization of marine energy converters
MT 62600-100	Power performance assessment of electricity producing wave energy converters
MT 62600-101	Wave energy resource assessment and characterization

MT 62600-103	Guidelines for the early stage development of wave energy converters: Best practices and recommended procedures for the testing of pre-prototype scale devices
MT 62600-200	Power performance assessment of electricity producing tidal energy converters
MT 62600-201	Tidal energy resource assessment and characterization
Advisory Groups	
AG 1	CAG - Chair's Advisory Group
AG 2	Publication alignment support
Ad-Hoc Groups	
ahG 10	Electrical power quality requirements for wave, tidal and other water current energy converters
ahG 12	River power performance
ahG 13	River resource assessment
ahG 14	OTEC Guidance
ahG 15	Measurement of mechanical loads
ahG 17	Marine energy - Wave, tidal and other water current converters - Part 4: Standard for establishing qualification of new technology
ahG 18	Early stage development of tidal energy converters

Publication of IEC TC 114

S.No	IEC Number	Title	Scope
1.	**IEC TS 62600-1:2020**	Marine energy - Wave, tidal and other water current converters - Part 1: Vocabulary	**IEC TS 62600-1:2020 defines the terms relevant to ocean and marine renewable energy. For the purposes of this Technical Specification, sources of ocean and marine renewable energy are taken to include wave, tidal current, and other water current energy converters. This Technical Specification is intended to provide uniform terminology to facilitate communication between organizations and individuals in the marine renewable energy industry and those who interact with them.**
2.	**IEC TS 62600-2:2019**	Marine energy - Wave, tidal and other water current converters - Part 2: Marine energy systems - Design requirements	**IEC TS 62600-2:2019 provides design requirements to ensure the engineering integrity of wave, ocean, tidal and river current energy converters, collectively referred to as marine energy converters. Its purpose is to provide an appropriate level of protection against damage from all hazards that may lead to catastrophic failure of the MEC structural, mechanical, electrical or controlsystems. This document provides requirements for MEC main structure, appendages, seabed interface, mechanical systems and electrical systems as they pertain to the viability of the device under site-specific environmental conditions. This document applies to MECs that are either floating or fixed to the seafloor or shore and are unmanned during operationalperiods. In addition to environmental conditions, this document addresses design conditions (normal operation, operation with fault, parked, etc.); design categories (normal, extreme, abnormal and transport); and limit states (serviceability, ultimate, fatigue and accidental) using a limit state design methodology.**
3.	**IEC TS 62600-3:2020**	Marine energy - Wave, tidal and other water current converters - Part 3: Measurement of mechanical loads	**IEC TS 62600-3:2020 describes the measurement of mechanical loads on hydrodynamic marine energy converters such as wave, tidal and other water current converters (including river current converters) for the purpose of load simulation model validation and certification. This document contains the requirements and recommendations for the measurement of mechanical loads for such activities as site selection, measurand selection, data acquisition, calibration, data verification, measurement load cases, capture matrix, post-processing, uncertainty determination and reporting. This document also defines the requirements for full-scale structural testing of subsystems or parts with a special focus on full-scale structural testing of marine energy converter rotor blades and for the interpretation and evaluation of achieved test results. This document focuses on aspects of testing related to an evaluation of the structural integrity of the blade. The purpose of the tests is to confirm to an acceptable level of probability that the whole installed production of a blade type fulfils the design assumptions.**
4.	**IEC TS 62600-4:2020**	Marine energy - Wave, tidal and other water current converters - Part 4:	**IEC TS 62600-4:2020 specifies the requirements of the technology qualification process for marine renewable technologies. Technology Qualification is a process of providing evidence and arguments to support claims that the technology under assessment will function reliably in a**

		Specification for establishing qualification of new technology	**target operating environment within specific limits and with an acceptable level of confidence. The Technology Qualification process is also assumed in IEC TS 62600-2:2019. The objective of this document is to provide the necessary practices and technical requirements, regarding technology qualification methodology, to support the needs of the IECRE certification process for marine renewables energy systems. Technology Qualification may be performed at the beginning of the certification process to identify the uncertainties, novelties, and modes of failure, mechanisms of failure, risks and risk control measures. In addition, Technology Qualification will identify the standards that are applicable, to what extent and what adaptation to the technology is required to address the risks. The Technology Qualification Plan is the deliverable arising from this process and it will provide all necessary actions to achieve certification.**
5.	**IEC TS 62600-10:2021**	Marine energy - Wave, tidal and other water current converters - Part 10: Assessment of mooring system for marine energy converters (MECs)	**IEC TS 62600-10:2021 provide uniform methodologies for the design and assessment of mooring systems for floating Marine Energy Converters (MECs) (as defined in the TC 114 scope). It is intended to be applied at various stages, from mooring system assessment to design, installation and maintenance of floating Marine Energy Converters plants. This document is applicable to mooring systems for floating Marine Energy Converters units of any size or type in any open water conditions. Some aspects of the mooring system design process are more detailed in existing and well-established mooring standards. The intent of this document is to highlight the different requirements of Marine Energy Converters and not duplicate existing standards or processes. This document defines rules and assessment procedures for the design, installation and maintenance of mooring system with respect to technical requirements for floating marine energy converters.**
6.	**IEC TS 62600-20:2019**	Marine energy - Wave, tidal, and other water current converters - Part 20: Design and analysis of an Ocean Thermal Energy Conversion (OTEC) plant - General guidance	**IEC TS 62600-20:2019 establishes general principles for design assessment of OTEC plants. The goal is to describe the design and assessment requirements of OTEC plants used for stable power generation under various conditions. This electricity may be used for utility supply or production of other energy carriers. The intended audience is developers, engineers, bankers, venture capitalists, entrepreneurs, finance authorities and regulators. This document is applicable to land-based (i.e. onshore), shelf-mounted (i.e. nearshore seabed mounted) and floating OTEC systems. For land-based systems the scope of this document ends at the main power export cable suitable for connection to the grid. For shelf-mounted and floating systems, the scope of this document normally ends at the main power export cable where it connects to the electrical grid.**
7.	**IEC TS 62600-30:2018**	Marine energy - Wave, tidal and other water current converters - Part 30: Electrical power quality	**IEC TS 62600-30:2018(E) includes: definition and specification of the quantities to be determined for characterizing the power quality of a marine energy (wave, tidal and other water current) converter unit; measurement procedures for quantifying the characteristics of a marine energy (wave, tidal and other water current) converter. The measurement procedures are valid for a single marine**

		requirements	**energy converter (MEC) unit (or farm) with three-phase grid or an off-grid connection. The measurement procedures are valid for any size of MEC unit.**
8.	**IEC TS 62600-40:2019**	Marine energy - Wave, tidal and other water current converters - Part 40: Acoustic characterization of marine energy converters	**IEC TS 62600-40:2019 provides uniform methodologies to consistently characterize the sound produced by the operation of marine energy converters that generate electricity, including wave, current, and ocean thermal energy conversion. This document does not include the characterization of sound associated with installation, maintenance, or decommissioning of these converters, nor does it establish thresholds for determining environmental impacts. Characterization refers to received levels of sound at particular ranges, depths, and orientations to a marine energy converter.** **The scope of this document encompasses methods and instrumentation to characterize sound near marine energy converters, as well as the presentation of this information for use by regulatory agencies, industry, and researchers. Guidance is given for instrumentation calibration, deployment methods around specific types of marine energy converters, analysis procedures, and reporting requirements.**
9.	**IEC TS 62600-100:2012**	Marine energy - Wave, tidal and other water current converters - Part 100: Electricity producing wave energy converters - Power performance assessment	**IEC/TS 62600-100:2012(E) provides a method for assessing the electrical power production performance of a Wave Energy Converter (WEC), based on the performance at a testing site. Provides a systematic method which includes:** **- measurement of WEC power output in a range of sea states;** **- WEC power matrix development;** **- an agreed framework for reporting the results of power and wave measurements.**
10.	**IEC TS 62600-101:2015**	Marine energy - Wave, tidal and other water current converters - Part 101: Wave energy resource assessment and characterization	**IEC TS 62600-101:2015(E) establishes a system for estimating, analysing and reporting the wave energy resource at sites potentially suitable for the installation of Wave Energy Converters (WECs). This Technical Specification is to be applied at all stages of site assessment from initial investigations to detailed project design.**
11.	**IEC TS 62600-102:2016**	Marine energy - Wave, tidal and other water current converters - Part 102: Wave energy converter power performance assessment at a second location using measured assessment data	**IEC TS 62600-102:2016(E) describes the required methods and the required conditions to determine the power performance of the Wave Energy Converter 2 (WEC 2) in Location 2, possibly at a different scale and with configuration changes to accommodate the new site conditions, in all cases based on measured power performance of WEC 1 in Location 1. This technical specification allows for assessment at Location 1 or Location 2 based on limited/incomplete data material, as long as this is accompanied by a validated numerical model or physical model and assessment of the uncertainty involved.**
12.	**IEC TS 62600-**	Marine energy -	**IEC TS 62600-103:2018(E) is concerned with the sub-**

	103:2018	Wave, tidal and other water current converters - Part 103: Guidelines for the early stage development of wave energy converters - Best practices and recommended procedures for the testing of pre-prototype devices	**prototype scale development of wave energy converters. It includes the wave tank test programmes, where wave conditions are controlled so they can be scheduled, and the first large-scale sea trials, where sea states occur naturally and the programmes are adjusted and flexible to accommodate the conditions. This document describes the minimum test programmes that form the basis of a structured technology development schedule.**
13.	**IEC TS 62600-200:2013**	Marine energy - Wave, tidal and other water current converters - Part 200: Electricity producing tidal energy converters - Power performance assessment	**IEC/TS 62600-200:2013(E) provides the following items: - a systematic methodology for evaluating the power performance of tidal current energy converters (TECs) that produce electricity for utility scale and localized grids; - a definition of TEC rated power and rated water velocity; - a methodology for the production of the power curves for the TECs in consideration; - a framework for the reporting of results.**
14.	**IEC TS 62600-201:2015**	Marine energy - Wave, tidal and other water current converters - Part 201: Tidal energy resource assessment and characterization	**IEC TS 62600-201:2015(E) establishes a system for analysing and reporting, through estimation or direct measurement, the theoretical tidal current energy resource in oceanic areas including estuaries (to the limit of tidal influence) that may be suitable for the installation of arrays of Tidal Energy Converters (TECs).**
15.	**IEC TS 62600-202:2022**	Marine energy - Wave, tidal and other water current converters - Part 202: Early stage development of tidal energy converters - Best practices and recommended procedures for the testing of pre-prototype scale devices	**IEC TS 62600-202:2022 specifies the development stages of Tidal Energy Converters up to the pre-prototype scale (Stages 1 to 3). It includes the hydraulic laboratory test programs, where environmental conditions are controlled so they can be scheduled, and the first scaled system open-water trials, where combinations of tidal currents, wind and waves occur naturally and the programs are adjusted and flexible to accommodate these conditions. This document describes the minimum test programs that form the basis of a structured technology development schedule.**
16.	**IEC TS 62600-300:2019**	Marine energy - Wave, tidal and other water current converters - Part	**IEC TS 62600-300:2019 provides: · A systematic methodology for evaluating the power performance of river current energy converters (RECs) that produce electricity for utility scale and localized grids;**

		300: Electricity producing river energy converters - Power performance assessment	**· A definition of river energy converter rated capacity and rated water speed;** **· A methodology for the production of power curves for the river energy converters in consideration; and** **· A framework for the reporting of results.**
17.	**IEC TS 62600-301:2019**	Marine energy - Wave, tidal and other water current converters - Part 301: River energy resource assessment	**IEC TS 62600-301:2019 provides:** **· Methodologies that ensure consistency and accuracy in the determination of the theoretical river energy resource at sites that may be suitable for the installation of River Energy Converters (RECs);** **· Methodologies for producing a standard current speed distribution based on measured, historical, or numerical data, or a combination thereof, to be used in conjunction with an appropriate river energy power performance assessment;** **· Allowable data collection methods and/or modelling techniques; and** **· A framework for reporting results.**