	SMB/7626/SBP
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	2022-05-13

INTERNATIONAL ELECTROTECHNICAL COMMISSION

STANDARDIZATION MANAGEMENT BOARD

SUBJECT

Strategic Business Plan (SBP) submitted by IEC TC 18, *Electrical installations of ships and of mobile and fixed offshore units*

BACKGROUND

The IEC TC 18 SBP is attached for consideration. It has been revised after the 18/1766/Q and it takes into account national comments submitted on a working draft per 18/1777/RQ.

ACTION

SMB is invited to approve the item below, using the IEC SMB Voting System **by 2022-06-10**.

Item 1: Approval of the Strategic Business Plan (SBP) submitted by TC 18

Note: The cover page of this SBP has been prepared by Marianna Kramarikova, Technical Officer responsible for the Technical Committee concerned and endorsed by the Director of Standardization.

SMB/7626/SBP

STRATEGIC BUSINESS PLAN (SBP)

IEC/TC OR SC:	SECRETARIAT:	DATE:
TC 18	**NORWAY**	**2022-05**

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 IEC Secretariat promptly after its contents have been agreed by the committee.

A. STATE TITLE AND SCOPE OF TC

A.1 SCOPE

To prepare standards for electrical installations and equipment of ships and of mobile and fixed offshore units, incorporating good practice and aligning as far as possible existing regulations and IEC Publications.

The standards will chiefly concern:

a) factors promoting the safety of ships and of mobile and fixed offshore units;

b) factors promoting safety of life;

c) factors promoting preservation of the environment.

The standards specify:

i. practical interpretation and implementation of the requirements of the International Convention on Safety of Life at Sea (IMO SOLAS), and International Convention on Mobile Offshore Drilling Unit (IMO MODU)

ii. documents for Authorities and Administrators to refer to in their regulations.

iii. a coherent set of requirements, based on recommended practices, to be used by owners, builders and appropriate organizations.

The standards also foster interchangeability of parts and ease the selection and procurement of equipment, including cables for transport of energy, signals and data, by indicating, as appropriate, IEC standards of ratings, types, dimensions, materials, quality, test methods, etc., whether or not these are influenced by regulations, and will thus facilitate interchanges between purchaser and supplier.

A.2 DATE OF ESTABLISHMENT OF THE TECHNICAL COMMITTEE AND A BRIEF HISTORICAL BACKGROUND

The IEC Committee of Action, during its meeting in Bellagio in 1927, decided to nominate a specific Advisory Committee to study the questions relating to the standardization of electrical installations in ships.

This decision was taken as a result of a proposal made by the Netherlands National committee to undertake the study. The British National committee was asked to act as Secretary and the President was authorized to designate the National Committees to be invited to take part in the work.

Subsequently, at a TC 18 meeting held in Bergamo in 1986, it was decided to enter work on the standardization of electrical installations in mobile and fixed petroleum units.

A.3 CURRENT TITLE, MAIN AND SUB-COMMITTEE

TC 18: Electrical installations of ships and of mobile and fixed offshore units

SC 18A: Electric cables for ships and mobile and fixed offshore units

B. **MANAGEMENT STRUCTURE OF THE TC**

Secretariat: Norway	**Chair:** United Kingdom
Subcommittees	
SC 18A	Electric cables for ships and mobile and fixed offshore units Maintenance team in charge of IEC 60092-350, -352, -360, -353, -354, -370, -376, -378 and -379
Advisory Groups	
AG 27	CAG - Chair's Advisory Group
Joint Working Groups	
JWG 28	Utility connections in port
JWG 31	Subsea electrical power equipment and systems
JWG 35	Maintenance team in charge of ISO/IEC 16315 Small craft — Electric propulsion system, linked to ISO TC 188/JWG 1 linked to ISO/TC 188
Maintenance Teams	
MT 2	Maintenance team in charge of IEC 60092-101, -201, -202, -401 and 504
MT 3	Maintenance Team in charge of IEC 60092-502
MT 6	Maintenance team in charge of IEC 60092-301, -302, -303, -304, -305, -306, -307, and -503
MT 18	Maintenance of IEC 61892 Series of standards
MT 21	Maintenance Team in charge of IEC 60533
MT 22	Maintenance Team in charge of IEC 60092-507
MT 24	Maintenance Team in charge of IEC 60092-501
MT 25	Maintenance team in charge of IEC 60092-506
MT 29	Maintenance Team in charge of IEC 61363-1
MT 30	Maintenance team in charge of IEC 60092-509
Project Teams	
PT 62742	Electrical and electronic installations in ships - Electromagnetic compatibility - Ships with a non-metallic hull
Working Groups	
WG 33 WG 34	Primary DC distribution system design architecture Maritime battery systems

C. Business Environment

TC 18 has an established formal relationship with the International Maritime Organisation (IMO).

In economic terms, the investment in the electrical equipment and installation on new ships and offshore-units, continues to increase in percentage of the overall value.

Ship owners, builders, insurers, classification societies and authorities are interested in consistent maritime standards for electrical installations, including ship and offshore cables. The IEC 60092 and IEC 61892 series of standards, as well as other standards prepared by TC 18, aim to support this demand.

For offshore units, there are complex installations, often combining both production and storage facilities, as in the so-called Floating Production, Storage and Offloading Facilities (FPSO). Arctic areas represent special challenges regarding the environmental conditions which add complexity to industry HSE practices.

Equipment and cable manufacturers comprise big multinational companies as well as many small and medium sized companies.

The major shipyards are in China, South Korea and Japan for bulk carriers, LNG, FPSO etc, while passenger vessels and cruise ships are mainly manufactured in Europe (Italy, Germany, Finland, France). Many yards are specialized, e.g., for building certain types of ships such as offshore supply and anchor handling vessels.

Offshore production platforms and FPSOs are sometimes built at yards far away from the location where they are to be installed and operated. This increases the need for international standards. Mobile drilling units are built at yards specialising in this type of units and according to generic performance specifications set by an owner. These performance requirements may at some point be assessed according to any actual legislative requirements valid on the location of operation, which may vary during the life of the unit.

Historically cable standards have been published by IEC and JIS (Japanese) for commercial vessels, while the offshore market has been driven by IEC, NEK (Norwegian), IEEE and BS standards among others. The cable manufacturers play an important role in the maritime sector.

D. Market Demand

The IEC 60092 series is referenced in The International convention – SOLAS (Safety of Life at Sea) set up by IMO. IEC 61892 series is referenced by the Code for Mobile Offshore Drilling Units (MODU Code), also set up by IMO.

SOLAS is applicable to all commercial seagoing ships of 500 gross tonnes and above, thus the standards are used extensively. For commercial ships below this level the mandatory requirements for electrical installation is usually set by the National Flag State Authority where the ship/unit is registered. Several authorities rely on the IEC 60092 and IEC 61892 series of when they develop broad experience base in exemplified use of TC 18 standards and the degree of acceptance by the international industry may support local Authorities to reduce their need to develop and maintain ‘home grown’ technical regulations.

The IEC 60092 and the IEC 61892 series of standards are employed world-wide by naval architects, marine engineering design and consulting companies, design houses, ship and offshore unit builders, cable manufacturers, electrical equipment manufacturers, installers, classification bodies, test houses, ship owners, operators and national and international authorities.

Within the offshore industry there is an increase in the number of applications that are non-hydrocarbon related. Several of the TC 18 standards may be applicable to these applications, such as the IEC 61892 series, IEC 63108 and subsea-standards.

TC 18 and SC 18A have representation from most of the industries and authorities that it serves. The standards are typically used to support marine regulation and are often quoted by National authorities and project specific contract documents to set minimum engineering performance level.

In US competing standards for equipment / materials are developed by Underwriters Laboratory (UL), National Electrical Manufacturers Association (NEMA), American Society for Testing and Material (ASTM) and American National Standards Institute (ANSI). Competing standards for installations on ships and mobile and fixed offshore units are primarily developed by the Institute of Electrical and Electronics Engineers (IEEE). In additions standards for installations on mobile and fixed offshore units are developed by the American Petroleum Institute (API).

As technology continues to advance there will remain a need for the TC/SC to produce new standards and to maintain the existing ones.

International energy companies and other stake holders active in the maritime business request standards for subsea electrical equipment.

E. Sustainable Development Goals

Indicate the work done within the TC/SC that contributes to the achievement of the United Nations Sustainable Development Goals (SDGs). Record applicable SDGs on the IEC reference sheet (available at https://www.iec.ch/SDG/, and offer specific information about how the TC/SC is addressing SDGs). Consider both direct and indirect impacts on the work of the TC/SC: see comparison matrices, justification forms & annual review documents for further details.

- ☐ **GOAL 1:** No Poverty
- ☐ **GOAL 2:** Zero Hunger
- ☐ **GOAL 3:** Good Health and Well-being
- ☐ **GOAL 4:** Quality Education
- ☐ **GOAL 5:** Gender Equality
- ☐ **GOAL 6:** Clean Water and Sanitation
- ☒ **GOAL 7:** Affordable and Clean Energy
- ☐ **GOAL 8:** Decent Work & Economic Growth
- ☐ **GOAL 9:** Industry, Innovation & Infrastructure
- ☐ **GOAL 10:** Reduced Inequality
- ☐ **GOAL 11:** Sustainable Cities and Communities
- ☐ **GOAL 12:** Responsible Consumption & Production
- ☒ **GOAL 13:** Climate Action
- ☒ **GOAL 14:** Life Below Water
- ☐ **GOAL 15:** Life on Land
- ☐ **GOAL 16:** Peace, Justice Strong Institutions
- ☐ **GOAL 17:** Partnerships to achieve the Goals

F. Trends in Technology and in the Market

F.1 Technology

As the electrical efficiency requirements of modern ships continue to increase there is a trend to higher operating voltages for power consumers, propulsion and machinery auxiliaries. Reliable semiconductor devices in power electronics are rapidly changing the way marine and offshore power systems can be designed and operated.

Currently the most important technical developments in the shipbuilding and offshore industry relate to the extensive and increasing use of computer hardware and software control and monitoring systems resulting in distributed machinery control and the introduction of additional and more sophisticated passenger/crew safety systems including addressable fire alarm and low-level lighting systems, also passenger and crew address systems. Problems are already being seen with complex systems on board vessels where the advances in complexity have outstripped the ability of the builders and operators to understand and deal with the systems installed.

Autonomous ships are in operation in several locations. It is expected that this type of operation will need to be considered during the design stage of the electrical installation.

Emerging technologies, such as the possible future use of IOT products on ships, create new challenges for both EMC and Cyber Security.

There is also an increasing awareness of the dangers of fire and the consequences of fire spread and the dangers of smoke. For these reasons, fire performances such as flame retardant, fire resistance, low smoke, no corrosion and halogen free materials are more requested, both for electrical equipment in general and for cables.

The system effects of electromagnetic disturbances and interference between interconnected systems are increasingly being addressed. A new and larger extent of such initiatives are exemplified by the increasing number of ships/units connected to shore-grid.

A reduction of greenhouse gas emissions from ships is on the agenda of IMO. This may lead to more efficient power generation and distribution systems. Hybrid solutions including renewables will require improved and modified standards. TC 18 maintains a lead role in the development of technical requirements for DC primary distribution in marine units.

In the maritime industry the use of variable speed drives (VSD) for supply of large pumps and compressors is now common. Also, the use of subsea equipment is more common, which is challenging as few international standards are available. Per 2022 TC 18 has produced one dual logo standard (IEC/IEEE 61886-1) for subsea penetrators and connectors. Other projects are planned such as subsea power transformers, motors and switchgear.

Fibre optics is becoming common. However, neither TC 18 nor SC 18A have developed any standards dealing with fibre optics, but their use is referenced in several TC 18 publications. Photovoltaic technology is becoming more common for use on unmanned platforms and other offshore structures.

F.2 Market

The IMO goal to reduce CO_2, SOX and NOx emissions from ships is causing a rethink in the industry. The marine sector is looking to optimize operational performance and utilisation of new technologies to address these environmental issues. The scope for improvement is huge, varying between simple improvements such as reducing operational speeds to implementing hybrid propulsion technologies and/or adding renewables to the energy mix.

Ships with Dynamic Positioning or other types of ships/units with larger variations in power consumption may have significant advantages utilizing new technology for “peak shaving” purposes. The demand for batteries and DC systems on this kind of vessels is therefore rapidly increasing driven by cost gains in better fuel savings and in some countries, subsidies by Authorities. Fuel cells and various energy storage technologies are being introduced on a large scale. Hybrid systems with various sources of energy are demonstrated, such as LNG and Hydrogen with batteries and other energy storage systems being essential design components.

For ferries, especially on shorter routes, batteries as the only main source of energy is introduced. Due to short stops, charging of the batteries can be a challenge as the capacity of the onshore grid may not be sufficient to allow rapid charging. This can in some cases be solved by battery packs onshore, which are rapidly discharged and charges the battery on the vessel, during the short quayside stop for the ferry. This market development also leads to potential large investments on shore.

The increase in the size of vessels and of the installed electrical load leads to use of higher voltage systems. The return to electric propulsion systems coupled with the advances in solid state power devices and the need for variable speed auxiliary drives has led to more strict control of EMC, which is reflected in the extensive updating of the TC’s EMC standard. All together this increases the relative value/cost of the electrical installation and its components compared to the total value of the vessel/unit.

Related to the environment the marked is not only affected by the demand for reducing CO2 and NOx. The awareness of disturbing the life at sea is also increasing. Shipping and offshore industry has moved closer to arctic areas and other areas at sea are e.g., categorized as vulnerable to operations. This affects the market either by reduced activity, or the need for specially designed units and equipment to be able to operate within these special areas. Electro technology is one key factor to solve many of these challenges.

The trend of connecting vessels to shore grid, either for cold ironing, “hotel duty” or for charging of batteries, affects the quality of the electrical parameters in the shore-grid. This EMC issue is one of the biggest concerns of the grid-owners. The marked may respond to the introduction of EMC requirements by investing in equipment to reduce such emissions.

Offshore wind energy is an increasing marked driven by the demand for clean energy and subsidies from some Authorities. These installations will often be permanently connected to shore grid but may also function off-grid as supply to an offshore unit (islanded operation) under any applicable Petroleum Safety Authority rules.

With the development of windfarms at sea, and the introduction of all-electric ships to maintain these windfarms, the necessity arises for charging possibilities at sea

F.3 Environmental aspects

TC18 is primarily concerned with the installation of electrical equipment, the ultimate disposal of the installation on board the ship or offshore unit is beyond the scope of the committee. However, TC 18 is aware of that regulation in different countries focus on the restrictions on the usage of hazardous materials, substances and processes.

SC 18A is primarily concerned with the manufacturing of shipboard and offshore cables.

However, the committees are conscious of the need to protect the environment and thus strive to ensure that the standards developed consider the selection of materials and avoid introducing requirements that could cause local or global pollution.

TC 18 is active within several projects to support the demand for new technology to reduce emissions. Examples of this are standards for the connections of ships/units to shore and standards for DC-distribution, which are necessary when utilizing batteries and fuel cells. Offshore units are also being permanently connected to shore which is also considered by TC 18.

G. Systems approach aspects (See Directives Part 1 Annex SP)

There is currently no participation from TC 18 officers or experts in SEG or SyC work

The work of TC 18 is of interest to ISO, IEEE, IMO and IOGP in several aspects. Some liaisons are established in this respect.

Liaisons may be reviewed at the TC 18 pages: LINK

H. Conformity Assessment

The standards published are currently not used for conformity assessment by any of the IEC certification schemes (IECEE, IECEx, IECQ, IECRE)

However, the TC 18 standards contain test requirements and may be used for conformity assessment.

TC 18 standards are referenced by Classification society rules and international conventions set up by IMO

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
Prepare a more user-friendly set of standards for ships	Revise all standards in the IEC 60092-series taking into account the Systems Approach Philosophy.	Target date: 2025
Reduce the time to develop TC 18 deliverables and improve the consistency of the content	Continue the use of web-meetings in conjunction with physical meeting. Conveners to form smaller task forces within the WGs with over 10 members. Convenors to file MoM at the Collaboration platform website for each meeting	Target date: 2022
Increase awareness of TC 18 publications	Secretary to develop and maintain a TC 18 newsletter	Target date: 2022
	Further develop the PAS currently published into a standard for DC-distribution systems, which will allow for the efficient connection to various sources of energy	Target date: 2024

To address autonomous vessels	Identify reference to standards from other committees follow closely the work of IMO" in the actions to support in relation of the line "to address autonomous vessels	Target date: 2024
To address IOT	Identify reference to standards from other committees	Target date: 2024
To address Cyber security	Identify reference to standards from other committees	Target date: 2024
To address fuel cells	Identify reference to standards from other committees	Target date: 2023
To address battery technology	To publish a standard for maritime battery systems	Target date: 2022

Note: The progress on the actions should be reported in the RSMB.

J. USEFUL LINKS TO THE TC 18 WEBSITE

TC 18 home page

TC 18 work programme

SC 18A home page

IEC DIRECTIVES

Name and signature of the secretary

Arild Røed