Please ensure this form is annexed to the Report to the Standardization Management Board if it has been prepared during a meeting, or sent to the Central Office promptly after its contents have been agreed by the committee.

A. **STATE TITLE AND SCOPE OF TC**

**Fuel cell technologies**

“To prepare international standards regarding fuel cell (fc) technologies for all fc types and various associated applications such as stationary fc power systems for distributed power generators and combined heat and power systems, fcs for transportation such as propulsion systems (see note below), range extenders, auxiliary power units, portable fc power systems, micro fc power systems, reverse operating fc power systems, and general electrochemical flow systems and processes.

NOTE: Projects with applications in the field of road vehicles will be coordinated with iso tc 22 and its relevant scs using the cooperation modes defined in the iso/iec directives.”

The current Scope is flexible enough to include new trends and technologies

B. **MANAGEMENT STRUCTURE OF THE TC**

IEC TC 105 held its first plenary meeting in Frankfurt/Main in 2000 with the aim of developing safety and performance related standards for fuel cell appliances. The scope of IEC TC 105 has regularly been reconsidered and amended to reflect the demands of the business and technological environment in which IEC TC 105 operates to ensure that it continues to meet the demands of the industry sectors it serves.

Management structure:

- Chair
- Secretary
- Chair Advisory Group to advise the Chair on the orientations of the TC and specific actions to achieve WGs objectives
- WGs for elaborating international standards and Technical Specifications
- AHGs to draft NWIPs and/or to develop strategies
- JWG with TC 21 for flow batteries
- Liaison officers

Due to the flexible structure WGs, AHGs can be establish to deal with new demands
C. BUSINESS ENVIRONMENT

Commercialization in stationary applications, transportation applications or as portable power applications has already taken off. It is therefore important to elaborate International Standards at this early stage in order to facilitate commercialization and international trade, and harmonize and ease approval procedures for fuel cell units. On the other hand, there is a strong need for not restricting further development of the relatively young technology.

TC 105 standards are elaborated at an early stage to avoid purely national standards and to facilitate commercialization and international trade, and to harmonize and ease approval procedures for fuel cell units.

Worldwide market (sales for 2025) – estimated by the experts of the TC 105 community vague estimations expect that for fuel cells the worldwide market is several billion US Dollar. Geographic segmentation could be: 40 % Asia/Pacific, 25 % North America, 25 % Europe (EU), and 10 % other regions.

Safety standards, in particular for use and storage of FC systems in closed areas will be significantly effective for assessing regulatory compliance. Safety standards are implemented as in Europe as harmonized standards to give presumption of conformity under European law.

D. MARKET DEMAND

IEC TC 105 standards are intended to cover the market demand of:

- Component, sub-system and fuel cell suppliers
- Fuel cell and system installers
- Fuel cell and system manufacturers
- Testing and certification bodies
- Regulators, authorities, approval organizations
- Original equipment manufacturers.

E. TRENDS IN TECHNOLOGY AND IN THE MARKET

Trends in technology

Fuel cell technologies are relatively new and fast developing technologies which are being commercialized. New technologies, components and materials are appearing and quickly developing on a global basis. Upcoming all-electric systems for power trains of transportation systems (ground vehicles, ships and aircrafts) can use fuel cell technologies ideally as their main power source. Fuel cell systems can extend the operating period of batteries and super supercapacitors. An increasing need for off-grid systems and small-scale (co)generators with ever stricter requirements can be met with fuel cell systems. Rapid developments in grid infrastructures and off takers call for more intelligent and flexible systems, for which fuel cells are eminently suitable in combination with other energy storage systems. Fuel cells can also support renewable technologies such as wind turbines and photovoltaic by providing power and energy when the renewable resource is not available or it is not enough to feed the load or coupling to the electrical energy system or even by converting excess power produced by these renewable power generators into hydrogen or synthetlic fuels through reversed operation of the fuel cell module.

Market trends

Fuel cell appliances contribute to reduce the impact on the environment and climate. The Hydrogen Council released during COP 23 (November 2017) a study of the hydrogen market by 2050 with 2030 milestones. Hydrogen should represent 18% of the worldwide primary energy, 2.5 Trillion USD of annual sales and save annually 6 Giga Tons of CO2 while creating 30 million of jobs. Fuel cells should reach a market share of 65% for the forklifts, 40% of vans and minibuses, 35% of coaches and buses, 22% of trucks, 14% of trains and trams, 5% of planes,
4% of power generation and 17% of building heating and power. The consequence of these market trends will be that IEC TC 105 fosters its activities to increase worldwide applicability of its standards encouraging National Committees to actively contribute to the IEC TC 105 standardization work and to implement these International Standards identically at national and regional levels.

F. Systems approach aspects (Reference - AC/33/2013)

IEC TC 105 takes care that the fuel cell standards are duly developed taking the system approach into account to assure that all borderline and interfaces of internationally standardized fuel cell products are compatible with other internationally standardized products/systems used in conjunction with these fuel cell systems.

TC 105 will contribute to

- SyC Smart cities
- SyC Smart energies
- IEC/TC 120 Electrical Energy Storage (EES) Systems
- ISO/TC 197 Hydrogen technologies
- ISO/TC22/SC37 Electrically propelled vehicles
- CLC/TC6 Hydrogen in energy systems
- TC 8 Systems aspects for electrical energy supply
- IEC/TC 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology
- ISO/TC110: Industrial trucks

G. Conformity Assessment

The standards are in line with the ISO/IEC Directives and IEC supplement.

TC 105 monitors the development of IECRE and will seek for contact with the Technical Officers of IECRE.

TC 105 standards are focusing on include test specifications, reproducible test requirements, and test methods.

H. 3-5 Year Projected Strategic Objectives, Actions, Target Dates

<table>
<thead>
<tr>
<th>Strategic Objectives 3-5 Years</th>
<th>Actions to Support the Strategic Objectives</th>
<th>Target Date(s) to Complete the Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>To consider the standardization need for fuel cell systems and their interaction with the different types of electric storages (as e.g. batteries, flywheels etc.) and to exchange with activities on electrical propulsions as e.g. FCEVs.</td>
<td>JWG with IEC/TC 21 and liaison with IEC/TC 120 Liaison with UN ECE GTR 13 should be requested</td>
<td>on-going 6 months</td>
</tr>
<tr>
<td>To ensure that all relevant safety requirements are taken into account that the standards can be used by regulators</td>
<td>Guideline for the harmonization of safety aspects in the different parts of IEC 62282 series and to include an informative annex in the safety</td>
<td>on-going</td>
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standards indicating which hazards have been dealt with.

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>To ensure that all relevant installation requirements are taken into account that the standards can be used by regulators</td>
<td>Guideline for the harmonization of installation aspects in the different parts of IEC 62282 series</td>
<td>on-going</td>
</tr>
<tr>
<td>To ensure that the standards contain performance measurement procedures that lead to results acceptable to regulators</td>
<td>To develop a Guideline for the harmonization of performance aspects in the different parts of IEC 62282 series</td>
<td>first edition exists To be updated On-going</td>
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<tr>
<td>To provide a package of safety standards for micro fuel cells for all relevant fuels</td>
<td>WG 8 is working on standards for indirect corrosive compounds and indirect water reactive compounds.</td>
<td>on-going</td>
</tr>
<tr>
<td>To standardize fuel cell systems of all technologies for distributed generation. This also includes combined heat and power systems (CHPs)</td>
<td>WG 12 and liaison with IEC/TC 5</td>
<td>on-going</td>
</tr>
<tr>
<td>To consider the standardization need for fuel cell systems and their interaction with electrical loads.</td>
<td>WG 13 was founded 3 years</td>
<td></td>
</tr>
<tr>
<td>To consider the standardization need for fuel cell systems and their interaction with all-electric systems on board ships, trains, aircraft, UAVs and special vehicles.</td>
<td>monitoring the market to consider NWIPs on Hybrid FC systems for safety and performance.</td>
<td>on-going</td>
</tr>
<tr>
<td>To consider the standardization need for fuel cell systems and their hybridization with heat engines as e.g. gas turbines or Stirling engines on a longer term.</td>
<td>monitoring the market</td>
<td>on-going</td>
</tr>
<tr>
<td>To consider the standardization need for micro fuel cell systems and their interaction with electric storages, especially for medical technology, industrial service, logistic areas and the automotive sector.</td>
<td>monitoring the market</td>
<td>on-going</td>
</tr>
</tbody>
</table>

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