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4/443/RM

2022-07-08

INTERNATIONAL ELECTROTECHNICAL COMMISSION

TECHNICAL COMMITTEE 4: Hydraulic turbines

Unconfirmed minutes of the hybrid meeting held in Kista/Stockholm, Sweden from 2022-06-15 (starting time: 9h00) to 2022-06-17 (ending time: 10h57)

Participants

NC/ organization	Last name	First name	Role	Participation
TC 4	Maruzewski	Pierre	Chair	In person
TC 4	Geraghty	Christine	Secretary	In person
TC 4	Williams	Ester	Assistant Secretary	Remote
Austria	Artner	Wolfgang	Head of Delegation	In person
Austria	Egretzberger	Markus	Delegate	In person
Austria	Hofbauer	Wolfgang	Delegate	In person
Canada	Bernard	Dominic	Delegate	In person
Canada	Lemay	Jean-Alexandre	Head of Delegation	In person
Canada	Sergerie	Francois	Delegate	In person
Canada	Thibault	Denis	Delegate	In person
Canada	Trudel	Alexandre	Convenor WG37	In person
Canada	Arseneault	Robert	Delegate	Remote
Canada	Cloutier	Eric	Delegate	Remote

NC/ organization	Last name	First name	Role	Participation
Canada	Currie	Andrew	Delegate	Remote
Canada	Iosfin	Jacob	Delegate	Remote
Canada	Lin	Sabrina	Delegate	Remote
Canada	Lord	André	Delegate	Remote
Canada	Proulx	Gilles	Delegate	Remote
China	Liu	Jie	Delegate	Remote
China	Pan	Luoping	Delegate	Remote
China	Qin	Daqing	Head of delegation	Remote
China	Wu	Zhiding	Delegate	Remote
China	Xie	Jiemin	Delegate	Remote
China	Xu	Jie	Delegate	Remote
China	Xu	Yongliang	Delegate	Remote
China	Zhou	Ye	Delegate	Remote
France	Badina	Carmen	Delegate	Remote
France	Breuil	Vincent	Delegate	In person
France	Girin	Philippe	Delegate	In person
France	Pajeau-Wassong	Nadine	Head of delegation	In person
France	Pascal	Florent	Delegate	In person
France	Foggia	Theophane	Delegate	Remote
France	Herbivo	Stéphane	Delegate	Remote
France	Zgainski	François-Xavier	Delegate	Remote
Germany	Faigle	Peter	Delegate	In person
Germany	Kuhn	Klaus	Head of delegation	In person
Germany	Jungkriterli	Alexander	Delegate	Remote

NC/ organization	Last name	First name	Role	Participation
Germany	Koutnik	Jiri	Delegate	Remote
Iran	Fahimi Hanzaee	Roshanak	Delegate	Remote
Italy	Matli	Giuliano	Delegate	Remote
Italy	Muciaccia	Fabio	Head of Delegation	Remote
Italy	Rizzacasa	Daniele	Delegate	Remote
Japan	Hamaoka	Yuji	Delegate	Remote
Japan	Wada	Toshiro	Head of delegation	Remote
Norway	Kjeldsen	Morten	Head of delegation	In person
Norway	Wedmark	Anders	Delegate	In person
Russia	Ustimenko	Aleksandr	Delegate	Remote
Russia	Zakharov	Alexander	Head of delegation	Remote
Sweden	Altzar	Peter	Delegate	In person
Sweden	Deborg	Jan	Delegate	In person
Sweden	Grahn	Ake	Delegate	In person
Sweden	Lövgren	Magnus	Expert	In person
Sweden	Nilsson	Magnus	Head of delegation	In person
Switzerland	Andolfatto	Loic	Delegate	In person
Switzerland	Nicolet	Christophe	Head of delegation	In person
Switzerland	Parkinson	Etienne	Delegate	In person
USA	Foust	Jason	Head of delegation	In person
Uruguay	Texeira	Ignacio	Observer	In person

NC/ organization	Last name	First name	Role	Participation
IEC Secretariat	Redgate	Andrew	Central Office	In person
IEC Secretariat	Soldato	Gary	Technical Officer	In person

1. Opening of the meeting and IEC Code of Conduct, welcome by the Chair and the host

The meeting was opened by TC4 Chair at 9h00 CEST. Mr. Pierre MARUZEWSKI (FR) welcomed Plenary Delegates and with Mr. Ingvar ERIKSSON of the Hosting Swedish National Committee, SEK Svensk Elstandard. Mr. Jan DEBORG (SE) proceeded to inform Delegates on the organization and various facilities available during the Plenary. Sponsors were invited to present themselves throughout the course of the meetings. The Chair shared a presentation (copy listed in Plenary Minutes Annexes available on the IEC site), noting the addition of Slovenia as a new P-member and thanking the previous TC4 leadership team of M. Jean-Paul RIGG (former Chair) and M. Robert ARSENEAULT (former Secretary), while introducing the new leadership team of Mrs. Christine GERAGHTY (Secretary) and Ms. Ester WILLIAMS (Assistant Secretary). He noted with thanks the hard work of all the members, experts and convenors, highlighting the recipients of the 1906 award from 2019 through 2021.

Roll call of participants

The TC4 Chair called on each individual country's Chief-Delegate to introduce themselves with the experts of their national teams attending the Plenary. Country Participants present included Austria, Canada, China, France, Germany, Italy, Japan, Norway, Russia, Sweden, Switzerland and USA. Observers from Iran and Uruguay were also present. P country member Czech Republic officially indicated that they could not be present but are considered having participated by correspondence. Each country then reported on the status of the hydroelectric Industry in their individual countries, with a copy of electronic format reports listed in Plenary Minutes Annexes available on the IEC site.

2. Approval of the agenda

The Stockholm Plenary draft agenda document 4/436A/DA received universal approval without any modification or addition.

3. Note the confirmation of the minutes of the meeting held in Milano

Milano Minutes (4/370/RM) were submitted, and no required modification was identified.

A motion to approve was proposed by Jean-Alexandre LEMAY (CA), seconded by Wolfgang ARTNER (AT), and unanimously supported by the Plenary Delegates.

4. Information from IEC Central Office

TC4 Technical Officer to IEC Central Secretariat Mr. Gary SOLDATO provided information on recent changes from the IEC CS (Central Secretariat). A copy is included in the Stockholm Plenary Annexes.

5. Update the Work Programme of TC 4 as displayed on the IEC website

5.1 WG14 Hydroelectric Power Plant Automation and Turbine Governing Systems

TC4 WG14 Convenor Mr. Wolfgang HOFBAUER (AT) provided an update on the activities of the WG. A copy of the presentation is included in the Stockholm Plenary Annexes.

5.2 WG18 Hydraulic machines, radial and axial – Methodology for performance transposition from Model to Prototype

TC4 WG18 Convenor Ms. Nadine PAJEAN-WASSONG (FR) provided an update on the activities of the WG. A copy of the presentation is included in the Stockholm Plenary Annexes.

5.3 WG25 Hydraulic machines – Small hydraulic turbines

TC4 WG25 Convenor Mr. Jiemin XIE (CN), participating via remote, provided an update on the activities of the WG. A copy of the presentation is included in the Stockholm Plenary Annexes. A request was made for additional experts to join the WG to provide more input to the development of the draft, to which 3 P-members (FR, IT & JP) offered to respond.

5.4 MT28 Revision of IEC 60041 Field acceptance tests to determine the hydraulic performance of hydraulic turbines, storage pumps and pump-turbines

TC4 MT28 Convenor Mr. Gilles PROULX (CA) provided an update on the activities of the MT. A copy of the presentation is included in the Stockholm Plenary Annexes.

5.5 MT29 Particle Erosion

TC4 MT29 Convenor Mr. Anders WEDMARK (NO) provided a brief verbal update on the MT. No activity has been necessary since the publication of IEC 62364:2019 ED2. The

MT welcomes any feedback on the implementation of the standard in preparation to review the status by the stability date in 2025.

5.6 WG30 Guide for Installation procedures of hydropower machines

TC4 WG30 Co-Convenors Mr. François SERGERIE (CA) and Yuji HAMOKA (JP), participating via remote, provided an update on the activities of the WG. A copy of the presentation is included in the Stockholm Plenary Annexes.

5.7 MT31 Turbine rehabilitation, life assessment and performance improvement

TC4 MT31 Convenor Mr. André LORD (CA), participating via remote, provided an update on the activities of the MT. A copy of the presentation is included in the Stockholm Plenary Annexes.

5.8 MT32 Revision of IEC 60193

TC4 Chair Mr. Pierre MARUZEWSKI (FR) informed the Plenary Delegates of the resignation of MT32 Convenor Mr. François AVELLAN (FR), and presented Ms. Monica Suarez (CH) as the proposed next Convenor of the MT. The proposal was unanimously accepted by the Plenary Delegates. A copy of the presentation is included in the Stockholm Plenary Annexes.

5.9 WG33 Preparation of IEC 62882/Ed1

TC4 WG33 Convenor Mr. Daqing QIN (CN), participating via remote, provided an update on the activities of the WG. A copy of the presentation is included in the Stockholm Plenary Annexes.

5.10 MT34 Joining and updating of publications IEC 60545 and 60805

TC4 MT34 Convenor Mr. Klaus KUHN (DE) provided an update on the activities of the MT. A copy of the presentation is included in the Stockholm Plenary Annexes.

5.11 WG35 Hydraulic turbines - Scale Effects to Pelton type

TC4 WG35 Convenor Mr. Loic ANDOLFATTO (CH) provided an update on the activities of the WG. A copy of the presentation is included in the Stockholm Plenary Annexes. A formal request was made for a mandate to proceed with revising the Pelton contents from the existing IEC 60193 standard, which was unanimously approved by the Plenary Delegates.

5.12 WG36 Calculation of hydraulic transients in hydropower turbine generator units

TC4 WG36 Convenor Mr. Christophe NICOLET (CH) provided an update on the activities of the WG. A copy of the presentation is included in the Stockholm Plenary Annexes. It was noted that participation from some experts had lapsed, and a request was made for additional experts from Japan to join the WG.

5.13 WG37 Hydraulic machines - IEC 63230 - Fatigue assessment of hydraulic turbine runners: from design to quality assurance

TC4 WG37 Co-convenor Mr. Denis THIBAUT (CA) provided an update on the activities of the WG. A copy of the presentation is included in the Stockholm Plenary Annexes. It was noted that participation from some experts had lapsed, and a request was made for additional experts from China and Japan to join the WG.

5.14 WG38 Mechanical vibration - Measurement and evaluation of machine vibration

TC4 WG38 Co-Convenor Mr. Luoping PAN (CN), participating via remote, provided an update on the activities of the WG. A copy of the presentation is included in the Stockholm Plenary Annexes. Concerns were raised by France regarding the creation of a new IEC standard versus improving the existing ISO standard. It was proposed for TC 4 leadership to approach ISO/TC 108/SC 2 about establishing a new JWG to revise the ISO standard instead, which was unanimously approved by the Plenary Delegates. A further proposal to reach out to IEC/TC 2 to establish a liaison in order to facilitate their contribution to the revision of the ISO standard was also unanimously approved by the Plenary Delegates.

5.15 MT39 Revision of IEC 60609-1 and IEC 60609-2 (Cavitation)

TC4 Chair Mr. Pierre MARUZEWSKI (FR) informed the TC of the response of MT39 Convenor Prof. Giorgio PAVESI (IT), and proposed Ms. Carmen BADINA (FR) as a Co-Convenor for the MT. A copy of the presentation is included in the Stockholm Plenary Annexes.

5.16 WG40 Technical Specifications for Digitalization of Operation and Maintenance in Hydropower Assets

TC4 WG40 Convenor Mr. Etienne PARKINSON (CH) provided an update on the activities of the WG. A copy of the presentation is included in the Stockholm Plenary Annexes. The proposal to split the initial draft into two parts was discussed by the Plenary Delegates but it was agreed to handle the decision via Q ballot at a later date.

5.17 WG41 Technical Specification for Black Start of Hydropower Plant

TC4 WG41 Convenor Mr. Zhiding WU (CN), participating via remote, provided an update on the activities of the WG. A copy of the presentation is included in the Stockholm Plenary Annexes.

6. Review of stability dates

TC4 Secretary Mrs. Christine GERAGHTY (CA) presented the current list of stability dates for the current publications of the TC and proposed that those which were due in 2022 be updated to 2024. This proposal was unanimously accepted by the Plenary Delegates.

Publication Number	Title	Stability Date	WG / MT
IEC 60041:1991 ED3	Field acceptance tests to determine the hydraulic performance of hydraulic turbines, storage pumps and pump-turbines	2022	28
IEC 60193:2019 ED3	Hydraulic turbines, storage pumps and pump-turbines - Model acceptance tests	2022	32
IEC 60308:2005 ED2	Hydraulic turbines - Testing of control systems	2024	14
IEC 60545:2021 ED2	Guidelines for commissioning and operation of hydraulic turbines, pump-turbines and storage pumps	2025	34
IEC 60609-1:2004 ED1	Hydraulic turbines, storage pumps and pump-turbines - Cavitation pitting evaluation - Part 1: Evaluation in reaction turbines, storage pumps and pump-turbines	2022	39
IEC 60609-2:1997 ED1	Cavitation pitting evaluation in hydraulic turbines, storage pumps and pump-turbines - Part 2: Evaluation in Pelton turbines	2022	39
IEC 60994:1991 ED1	Guide for field measurement of vibrations and pulsations in hydraulic machines (turbines, storage pumps and pump-turbines)	2022	38
IEC 61116:1992 ED1	Electromechanical equipment guide for small hydroelectric installations	2025	25
IEC 61362:2012 ED2	Guide to specification of hydraulic turbine governing systems	2024	14
IEC TR 61364:1999 ED1	Nomenclature for hydroelectric powerplant machinery	2022	25
IEC TR 61366-1:1998 ED1	Hydraulic turbines, storage pumps and pump-turbines - Tendering Documents - Part 1: General and annexes	2022	25
IEC TR 61366-2:1998 ED1	Hydraulic turbines, storage pumps and pump-turbines - Tendering Documents - Part 2: Guidelines for technical specifications for Francis turbines	2022	25
IEC TR 61366-3:1998 ED1	Hydraulic turbines, storage pumps and pump-turbines - Tendering documents - Part 3: Guidelines for technical specifications for Pelton turbines	2022	25
IEC TR 61366-4:1998 ED1	Hydraulic turbines, storage pumps and pump-turbines - Tendering Documents - Part 4: Guidelines for technical specifications for Kaplan and propeller turbines	2022	25

Publication Number	Title	Stability Date	WG / MT
IEC TR 61366-5:1998 ED1	Hydraulic turbines, storage pumps and pump-turbines - Tendering Documents - Part 5: Guidelines for technical specifications for tubular turbines	2022	25
IEC TR 61366-6:1998 ED1	Hydraulic turbines, storage pumps and pump-turbines - Tendering Documents - Part 6: Guidelines for technical specifications for pump-turbines	2022	25
IEC TR 61366-7:1998 ED1	Hydraulic turbines, storage pumps and pump-turbines - Tendering Documents - Part 7: Guidelines for technical specifications for storage pumps	2022	25
IEC 62006:2010 ED1	Hydraulic machines - Acceptance tests of small hydroelectric installations	2022	25
IEC 62097:2019 ED2	Hydraulic machines, radial and axial - Methodology for performance transposition from model to prototype	2023	18
IEC 62256:2017 ED2	Hydraulic turbines, storage pumps and pump-turbines - Rehabilitation and performance improvement	2023	31
IEC 62270:2013 ED2	Guide for computer-based control for hydroelectric power plant automation	2023	14
IEC 62364:2019 ED2	Hydraulic machines - Guidelines for dealing with hydro-abrasive erosion in Kaplan, Francis and Pelton turbines	2025	29
IEC TS 62882:2020 ED1	Hydraulic machines - Francis turbine pressure fluctuation transposition	2022	33
IEC 63132-1:2020 ED1	Guidance for installation procedures and tolerances of hydroelectric machines - Part 1: General aspects	2024	30
IEC 63132-2:2020 ED1	Guidance for installation procedures and tolerances of hydroelectric machines - Part 2: Vertical generators	2024	30
IEC 63132-3:2020 ED1	Guidance for installation procedures and tolerances of hydroelectric machines - Part 3: Vertical Francis turbines or pump-turbines	2024	30
IEC 63132-4:2020 ED1	Guidance for installation procedures and tolerances of hydroelectric machines - Part 4: Vertical Kaplan or propeller turbines	2024	30
ISO 20816-5:2018 ED1	Mechanical vibration - Measurement and evaluation of machine vibration - Part 5: Machine sets in hydraulic power generating and pump-storage plants	2022	30

*Stability dates due in 2022 indicated in red, to be updated to 2024

7. Review of P-members participation

IEC Directives Part 1, 2014, states that a technical committee secretariat shall notify the Chief Executive Officer if a P-member of that technical committee has been persistently inactive and has failed to contribute to 2 successive technical committee meetings, either by direct participation or by correspondence and has failed to appoint any experts to the technical work, or has failed to vote on questions formally submitted for voting within the technical committee or subcommittee.

Plenary Delegates reviewed **4/437/INF** (copy available in Annexes of Stockholm Minutes) Active Participation of P-members in the Work of TC 4 and noted with thanks the continuing participation of all members, without concern.

8. Review of the liaisons

Internal Liaison

IEC TC 57 Power systems management and associated information exchange
IEC TC 114 Marine energy - Wave, tidal and other water current converters

Liaison ISO

ISO/TC 30 Measurement of fluid flow in closed conduits
ISO/TC 108 Mechanical vibration, shock and condition monitoring
ISO/TC 108/SC 2 Measurement and evaluation of mechanical vibration and shock as applied to machines, vehicles and structures
ISO/TC 113 Hydrometry

Liaison A

CIGRE/SC A2 Conseil International des Grands Réseaux Électriques
IAPWS International Association for the Properties of Water and Steam

Liaison D

IEEE/Power Energy Society/Energy Development & Power Generation Committee

Plenary Delegates reviewed list of existing liaisons (above) and noted the potential to establish new liaisons with the following:

- ISO/TC 339 Small hydropower plants
- CCH4
- VGB

9. Review of the Strategic Business Plan

TC 4 Chair Mr. Pierre MARUZEWSKI (FR) presented his revisions to the Strategic Business Plan, as distributed in advance of the Stockholm Plenary Meeting for delegate approval. A copy of the presentation is included in the Stockholm Plenary Annexes.

10. Any other business

Mr. Morten Kjeldsen (NO) presented an initial proposal for a potential new work item and requested input to refine the proposal for submission in September. A copy of the presentation is included in the Stockholm Plenary Annexes. It was noted that the proposal might fit with the current project under development in WG33. A specific meeting will be scheduled with the Convenor of WG33 to further consider this option. If it were to be proposed as a separate document, a TS or TR may be more appropriate initially than an International Standard.

A question was raised regarding the withdrawal of 4/438/NP, to which the Chair gave background on the correspondence received from TC 2 indicating that the subject of the proposal was more appropriate to the scope of that committee rather than TC 4. Mr.

Christophe NICOLET (CH) suggested that a standard on variable speed for pump turbines specifically, separate from generators under TC 2, might still be needed. This was noted for further consideration by TC 4.

The issue of robustness was raised by Mr. Jan DEBORG (SE) for TC 4 consideration for future work.

11. Date and place of the next meeting

TC4 has received a formal invitation to have its next Plenary Meeting in Lyon, France, from June 9th to 14th, 2024. This was unanimously accepted by TC 4.

It was noted that, following three plenaries in Europe (2018, 2022 and 2024), the 2026 plenary should be held elsewhere.

12. Close of the meeting

The TC 4 Plenary Meeting was officially closed at 10h57 CEST on Friday, June 17th, 2022 with efficient and excellent contributions from delegates, experts and convenors. The Chair expressed deep appreciation on behalf of TC4 for the superb efforts of the Sweden hosting organization which made for a highly successful and memorable Plenary Meeting in Kista/Stockholm.

ANNEX A – List of Presentations IEC TC4 Plenary 2022 Kista/Stockholm

(as found in IEC Collaboration Platform) – Circulated as 4/444/MTG

- 4(Stockholm)01a – Opening Presentation from Chair
- 4(Stockholm)01b – Austria Country Report 2022
- 4(Stockholm)01b – Canada Country Report 2022
- 4(Stockholm)01b – China Country Report 2022
- 4(Stockholm)01b – France Country Report 2022
- 4(Stockholm)01b – Germany Country Report 2022
- 4(Stockholm)01b – Italy Country Report 2022
- 4(Stockholm)01b – Japan Country Report 2022
- 4(Stockholm)01b – Norway Country Report 2022
- 4(Stockholm)01b – Russia Country Report 2022
- 4(Stockholm)01b – Sweden Country Report 2022
- 4(Stockholm)01b – Switzerland Country Report 2022
- 4(Stockholm)01b – USA Country Report 2022
- 4(Stockholm)04 – IEC Central Office Presentation
- 4(Stockholm)05.01 – WG14 Report to 2022
- 4(Stockholm)05.02 – WG18 Report 2022
- 4(Stockholm)05.03 – WG25 Report 2022
- 4(Stockholm)05.04 – MT28 Report 2022
- 4(Stockholm)05.06 – WG30 Report 2022
- 4(Stockholm)05.07 – MT31 Report 2022
- 4(Stockholm)05.08 – MT32 Report 2022
- 4(Stockholm)05.09 – WG33 Report 2022
- 4(Stockholm)05.10 – MT34 Report 2022
- 4(Stockholm)05.11 – WG35 Report 2022
- 4(Stockholm)05.12 – WG36 Report 2022
- 4(Stockholm)05.13 – WG37 Report 2022
- 4(Stockholm)05.14 – WG38 Report 2022
- 4(Stockholm)05.15 – MT39 Report 2022
- 4(Stockholm)05.16 – WG40 Report 2022
- 4(Stockholm)05.17 – WG41 Report 2022
- 4(Stockholm)09 – Strategic Business Plan Chair Revision
- 4(Stockholm)10 – Other Business – Potential NP Presentation
- 4(Stockholm)11 – Invitation to 2024 Plenary – France

ANNEX B – DECISION LIST – 2022 Stockholm Plenary Meeting

No.	Decision	Action	Target date
1	Approval of draft agenda document 4/436A/DA without modification or addition.	Completed	June 15, 2022
2	Approval of the 2018 Milano Plenary Minutes, without changes.	Completed	June 15, 2022
3	Approval of appointment of new Convenor for MT32, Ms. Monica SUAREZ (CH).	Completed	June 15, 2022
4	Approval of mandate requested by WG35 to revise the Pelton contents from the existing IEC 60193 standard.	Completed	June 16, 2022
5	Approval of establishment of JWG with ISO/TC 108/SC 2 to revise ISO 20816-5.	TC 4 leadership to approach ISO/TC 108/SC 2	September 30, 2022
6	Approval of appointment of Co-Convenor for MT39, Ms. Carmen BADINA (FR).	Completed	June 16, 2022
7	Approval to update stability dates from 2022 to 2024.	Completed	June 17, 2022
8	Approval of revisions to the Strategic Business Plan.	Completed	June 17, 2022
9	Acceptance of proposal for 2024 Plenary Meeting to be held in Lyon, France.	Completed	June 17, 2022

Note: All ballots were approved unanimously by the P-members in attendance (either in person and by virtual attendance) at the TC 4 Plenary.