SMB/3737/R

STRATEGIC POLICY STATEMENT

IEC/TC or SC	Secretariat	Date
TC 4	Canada	2008-04-10

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.

Title of TC
Hydraulic Turbines

A. Background

TC 4 is responsible for the preparation, periodic review and updating of standards and technical reports covering the design, manufacturing and rehabilitation, commissioning, installation, testing, operation and maintenance of hydraulic machines including turbines, storage pumps and pump-turbines of all types as well as related equipment.

TC 4 is responsible for twelve (12) main existing Standards and Guides. Eight different Working Groups are currently active in the development of new standards and maintenance of existing standards.

TC4 maintains liaisons with other TC's, ISO and IEEE regarding Vibrations, Large Flow Measurement and Monitoring and Control.

Thirteen (13) of the eighteen (18) "P" countries actively participated, together with one observer, in the Vancouver Plenary Meeting held Sept 10-12, 2007, mobilizing the efforts of 48 active members from around the world, not including invited technical experts.

B. Environment

B.1 Business environment

As per International Energy Outlook 2007, renewable energy installed capacity is expected to increase by about 40 percent over the next 25 years, most of it from new large-scale hydroelectric projects in Asia and Central/South Americas.

Even in North America and Europe, where most of the hydraulic machinery sector had been driven by unit rehabilitation in the last decades, new projects are emerging. Formerly, new installations were delayed by extensive and complex regulatory procedures.

Considering the urgent need for clean renewable energy, hydroelectricity might reappear as the most efficient and reliable and particularly the most durable of all sources of green energy wherever available. Utilities benefit of the extended life of existing installations, some of them being ready for a second century of efficient service.

After years of downsizing and amalgamation, the industry has renewed with sustained activity and relative profitability which should facilitate the growth of a new generation of experts. Thanks to the extensive use of numerical simulations, the performance of hydraulic machinery has never been so remarkable, although corresponding changes, fast track realizations and low cost global sourcing of material may still result in occasional problems.

New engineering staff, whose number is growing as expected in front of the variety and importance of engineering challenges, must rely upon up-to-date standards and technical

reports.

Their participation in the activities of the IEC TC4 is favored. However, the chronic overload of most of them, that appears to be worse than the same overload of their predecessors, is a permanent obstacle to their active participation in Working Groups.

B.2 Market demand

TC 4 standards on model and site tests are more than ever used by all parties, manufacturers, consultants and end users, although they not always reflect the available manufacturing and testing technology. Maintenance groups shall provide the necessary adjustments.

Considerable emphasis has been given to performance with both very large size units and excellence in up-rating activities. In the case of large-scale projects, even minor efficiency improvements are worth considerable development and testing. For up-ratings, most of the investment is justified by performance improvements alone and these improvements must be predicted and verified with accuracy.

The effectiveness of incentives for performance achievement is directly related to the accuracy of manufacturing and performance measurement precision. Standards must incorporate the newly available manufacturing methods and measuring tools.

Performance prediction must also incorporate the real condition of the hydraulic machinery from the best manufacturing techniques already available for new runners to the real and sometimes rough condition of existing components. The inter-relation of both types of hydraulic condition requires considerable effort by experts. Sound decisions and contractual relationship between plant operators, engineers and suppliers will be considerably simplified when measurements methods and step-up formulae with prototype surface condition will have been validated.

Standards on cavitation evaluation have no equivalent and are widely applied, with different degrees of severity. Cavitation reduction has made giant steps with new design methods, and numerically controlled manufacturing tools. Limits for cavitation erosion have been adapted to new capabilities but particle erosion is not covered by any standard. Particle erosion remains an obstacle to productivity in certain regions of Asia and South America, where most of the new developments are located. New standards will have to deal with erosion rates, coating effectiveness, erosion guarantee evaluation and unit availability.

Vibration and stability problems remain a real concern to plant operators of Francis and pump turbines, both for up-ratings and new units. ISO/IEC Standards should reflect these concerns.

Standards have been updated for speed control systems specification and testing. Unit and plant control systems face rapid and constant evolution, both on the hardware side and in communication.

B.3 Trends in technology and trade

Considerable emphasis is now given to machines offering excellent performance (efficiency, cavitation, stability) over a wide range of specific hydraulic energy and discharge. Particle erosion resistance is also a growing concern in many countries. Designs of the new generation were born from the new requirements and increased capacity of numerical tools for Computational Fluid Dynamics and particular attention shall be paid to their application and validation. Design and manufacturing requirements have to become more stringent.
At the same time, manufacturing has been dispersed and relocated, sometimes far away from expertise centers. Subcontractors with no particular expertise are being used. Traditional specialized suppliers, formerly involved in the turbine technology, are being replaced by new-comers. Good standards and guides will maintain the quality level, which this combination of new technological needs and that dispersion of expertise might compromise.

B.4 Ecological environment

Hydroelectric energy is clean energy and is again being recognized as such. Naturally, the new developments must correspond to population priorities. Careful environmental studies generally place hydroelectric projects as one of the best compromises between a massive energy demand and minimal impacts. Large projects in particular, with careful consideration of environmental constraints, are now receiving a much better acceptance from a public quite concerned by climatic changes.

Environmental studies and mitigation measures regarding population relocation and participation, fish friendly installations, flood and sediment control are now carefully analyzed, in both rehabilitation works and new projects. All these efforts are leading to an improved perception by a better informed public regarding some large scale hydroelectric projects and are creating increased confidence in future projects.

In many countries, at least for most of those that rely on electricity for an urgent development, economically feasible hydroelectric resources remain significant as compared to the hydropower under construction in active regions. For all these regions, hydroelectricity is viewed as an excellent development opportunity.

C. Work programme

C.1 Current work

The complete work programme is accessible on IEC web site.

C.2 Resources/infrastructure needed

Experts active in WG and present at Plenary meetings consider that their involvement in TC4 should represent a few hundred hours per year. These figures are less and less easy to insert within the current activities of experts.
Information systems have not yet reached the efficiency of face-to-face discussions. The good attendance to the Plenary Meeting, also an opportunity for Working Groups to meet, reflects the opportunity for many active engineers to fulfil this role of international expert that they are sometimes forced to neglect for months. Government support is essential to alleviate corresponding expenses.
Information systems, as used for official circulation of documents, must remain particularly friendly to occasional users, both as a source of documentation and transmission.

C.3 Safety aspects (only for committees which do not have a reference to safety in their scope)

D. Future work

The involvement of China in most working groups of the IEC-TC4 is now a fact since the Beijing meeting and the expertise gained through the large Chinese Hydroelectric Projects is particularly important. Efforts are being made to involve India and major South-American countries as Participating Countries, having in mind the activity and considerable potential of these zones and, at least, the particular importance of the new Working Group on abrasive erosion for most of these countries.

Tide and river stream energy is emerging with good potential for hydraulic rotating machinery. A corresponding need for stream turbine standards will have to be considered within the largest scope of ocean energy device systems for which TC114 was recently created.

Guides that would enhance the reliability of hydraulic turbo-machinery, should be made available rapidly to respond simultaneously to recent technological challenges and moves in the industrial structure.

Finally, erection tolerances need to be standardized, preferably in conjunction with TC2, since the industry has now largely integrated hydraulic and electrical machinery supplies and installation.

E. Maintenance cycle				
Publication no.	**Date of publication**	**Review date**	**Maintenance result date**	**Responsibility (Maintenance Team)**
60041	1991	2009	2010	MT 28
60193	1999	2008	2010	23
60308	2005	2012	2015	14
60545	1976	2009	2010	
60609-1	2004	2008	2009	27
60609-2	1997	2008	2009	
60805	1985	2009	2010	
60994	1991	2009	2010	
61116	1992	2010	2012	
61362	1998	2008	2009	14
61364	1999	2008	2010	
61366-1	1998	2008	2010	
61366-2	1998	2008	2010	
61366-3	1998	2008	2010	
61366-4	1998	2008	2010	
61366-5	1998	2008	2010	
61366-6	1998	2008	2010	
61366-7	1998	2008	2010	
62256	2008	2010	2012	
62270	2004	2008	2009	

Name or signature of the secretary

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