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Pelton hydraulic turbines – Model acceptance tests

Turbines Pelton – Essais de réception sur modèle

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**PELTON HYDRAULIC TURBINES –
MODEL ACCEPTANCE TESTS**

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This first edition of IEC 63461 cancels and replaces the third edition of IEC 60193 published in 2019. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) the Pelton-specific requirements are being removed;
- b) the new standard is published as a stand-alone publication.

The text of this International Standard is based on the following documents:

Draft	Report on voting
4/460/CDV	4/483/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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PELTON HYDRAULIC TURBINES – MODEL ACCEPTANCE TESTS

1 Scope

This document applies to laboratory model tests of any type of Pelton hydraulic turbine.

This document applies to models of prototype machines with unit power greater than 5 MW. Full application of the procedures herein described is not generally justified for machines with smaller power. Nevertheless, this document can be used for such machines by agreement between the purchaser and the supplier.

This document excludes all matters of purely commercial interest, except those inextricably bound up with the conduct of the tests.

This document is concerned with neither the structural details of the machines nor the mechanical properties of their components, so long as these do not affect model performance or the relationship between model and prototype performances.

This document covers the arrangements for model acceptance tests to be performed on Pelton turbines to determine if the main hydraulic performance contract guarantees (see 9.2) have been satisfied.

It contains the rules governing test conduct and provides measures to be taken if any phase of the tests is disputed.

The main objectives of this document are:

- to define the terms and quantities used;
- to specify methods of testing and of measuring the quantities involved, in order to ascertain the hydraulic performance of the model;
- to specify the methods of computation of results and of comparison with guarantees;
- to determine if the contract guarantees that fall within the scope of this document have been fulfilled;
- to define the extent, content and structure of the final report.

The guarantees can be given in one of the following ways:

- guarantees for prototype hydraulic performance, computed from model test results considering scale effects;
- guarantees for model hydraulic performance.

Moreover, additional performance data (see Clause 10) can be needed for the design or the operation of the prototype of the hydraulic machine. Contrary to the requirements of Clause 8 related to main hydraulic performance, the information of these additional data given in Clause 10 is considered only as recommendation or guidance to the user (see 10.1).

Model acceptance tests are performed if the expected field conditions for acceptance tests (see IEC 60041:1991) would not allow the verification of guarantees given for the prototype machine.

It is important that the method for performance conversion from model to prototype be clearly defined in the main hydraulic performance contract.

This document can also be applied to model tests for other purposes, i.e. comparative tests and research and development work.

If model acceptance tests have been performed, field tests can be limited to index tests (see IEC 60041:1991).

If a contradiction is found between this document and any other document, this document prevails.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2186:2007, *Fluid flow in closed conduits – Connections for pressure signal transmissions between primary and secondary elements*

ISO 2533:1975, *Standard atmosphere*

ISO 4185:1980, *Measurement of liquid flow in closed conduits – Weighing method*

ISO 8316:1987, *Measurement of liquid flow in closed conduits – Method by collection of the liquid in a volumetric tank*

3 Terms, definitions, symbols and units

3.1 General

For the purposes of this document, the following terms, definitions, symbols and units apply. Specialized terms are explained where they appear.

Clarification of any term, definition or unit of measure in question shall be agreed to in writing by the contracting parties in advance of the test.

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3.2 Terms and definitions

3.2.1 point

value established by one or more consecutive sets of readings or recordings at unchanged operating condition and settings, sufficient to calculate the performance of the machine at this operating condition and these settings

3.2.2 test

collection of points and results adequate to establish the performance of the machine over a specified range of operating conditions