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Vattenkraftmaskiner – Leveransprovning av små anläggningar

*Hydraulic machines –
Acceptance tests of small hydroelectric installations*

Som svensk standard gäller europastandarden EN 62006:2011. Den svenska standarden innehåller den officiella engelska språkversionen av EN 62006:2011.

Nationellt förord

Europastandarden EN 62006:2011

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 62006, First edition, 2010 - Hydraulic machines - Acceptance tests of small hydroelectric installations**

utarbetad inom International Electrotechnical Commission, IEC.

ICS 27.140

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Postadress: SEK, Box 1284, 164 29 KISTA
Telefon: 08 - 444 14 00. Telefax: 08 - 444 14 30
E-post: sek@elstandard.se. Internet: www.elstandard.se

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SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

**Hydraulic machines -
Acceptance tests of small hydroelectric installations
(IEC 62006:2010)**

Machines hydrauliques -
Essais de réception des petits
aménagements hydroélectriques
(CEI 62006:2010)

Hydraulische Maschinen -
Abnahmemessungen an Kleinwasserkraft-
Anlagen
(IEC 62006:2010)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 4/254/FDIS, future edition 1 of IEC 62006, prepared by IEC TC 4, Hydraulic turbines, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62006 on 2011-01-02.

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The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2011-10-02
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2014-01-02

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62006:2010 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60994	NOTE	Harmonized as EN 60994.
IEC 61116	NOTE	Harmonized as EN 61116.
IEC 61260	NOTE	Harmonized as EN 61260.
ISO 4373	NOTE	Harmonized as EN ISO 4373.
ISO 5167 series	NOTE	Harmonized in EN ISO 5167 series (not modified)

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60041	1991	Field acceptance tests to determine the hydraulic performance of hydraulic turbines, storage pumps and pump-turbines	EN 60041	1994
IEC 60193	-	Hydraulic turbines, storage pumps and pump-turbines - Model acceptance tests	EN 60193	-
IEC 60308	-	Hydraulic turbines - Testing of control systems	EN 60308	-
IEC 60609	Series	Hydraulic turbines, storage pumps and pump-turbines - Cavitation pitting evaluation	EN 60609	Series
IEC 60651	-	Sound level meters	EN 60651	-
IEC 61362	-	Guide to specification of hydraulic turbine control systems	EN 61362	-
ISO 1680	-	Acoustics - Test code for the measurement of airborne noise emitted by rotating electrical machines	EN ISO 1680	-
ISO 1940-1	2003	Mechanical vibration - Balance quality requirements for rotors in a constant (rigid) state - Part 1: Specification and verification of balance tolerances	-	-
ISO 3746	-	Acoustics - Determination of sound power levels of noise sources using sound pressure - Survey method using an enveloping measurement surface over a reflecting plane	EN ISO 3746	-
ISO 4412	Series	Hydraulic fluid power - Test code for determination of airborne noise levels	-	-
ISO 5168	-	Measurement of fluid flow - Estimation of uncertainty of a flow-rate measurement	-	-
ISO 7919-5	-	Mechanical vibration - Evaluation of machine vibration by measurements on rotating shafts - Part 5: Machine sets in hydraulic power generating and pumping plants	-	-
ISO 10816-3	-	Mechanical vibration - Evaluation of machine vibration by measurements on non-rotating parts - Part 3: Industrial machines with nominal power above 15 kW and nominal speeds between 120 r/min and 15 000 r/min when measured in situ	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ANSI/IEEE 810	-	Hydraulic Turbine and Generator Integrally Forged Shaft Couplings and Shaft Runout Tolerances	-	-

CONTENTS

1	Scope.....	9
2	Normative references	9
3	Terms, definitions and schematic layout	10
3.1	Terms and definitions	10
3.2	Schematic layout of a hydroelectric installation	10
4	Nature and extent of guarantees.....	11
4.1	Grouping of classes A, B, C.....	11
4.1.1	General	11
4.1.2	Contract conditions.....	13
4.2	Scope of performance guarantee.....	13
4.2.1	General	13
4.2.2	Class A: Maximum power output.....	13
4.2.3	Class B: Index test	13
4.2.4	Class C: Turbine efficiency.....	13
4.2.5	Interpretation of losses	13
4.3	Scope of tests	14
4.3.1	Safety tests	14
4.3.2	Trial run and reliability tests.....	14
4.3.3	Performance test	14
4.4	Aptitude.....	15
4.5	Warranty	15
5	Safety tests (commissioning)	16
5.1	Pre-start tests	16
5.2	Closing devices	16
5.2.1	General	16
5.2.2	Intake gate or valve	17
5.2.3	Turbine inlet valve	17
5.2.4	Guide vanes (Francis and Kaplan turbines)	17
5.2.5	Needle valve and deflector (Pelton and Turgo turbines).....	18
5.3	First run operation and control.....	19
5.4	Bearing run at rated speed	19
5.5	Emergency shutdown (no load)	20
5.6	Electrical protection.....	20
5.7	Overspeed test.....	21
5.8	Runaway test	21
5.9	Overpressure, emergency trip and load rejection tests	22
5.9.1	General conditions	22
5.9.2	Testing the guide vanes or needle valves	23
5.9.3	Testing the turbine inlet valve	23
5.9.4	Testing the pressure relief valve	23
5.9.5	Pressure rise	23
5.10	Measured quantities	25
5.10.1	Pressure.....	25
5.10.2	Speed.....	25
5.10.3	Control components.....	25

6	Trial operating and reliability tests (commissioning).....	25
6.1	General.....	25
6.2	Temperature stability of rotating parts	25
6.2.1	General	25
6.2.2	Temperature guarantees	26
6.3	Speed controller system	26
6.3.1	General	26
6.3.2	Unit operating without regulation	26
6.3.3	Unit operating with a speed governor.....	27
6.3.4	Unit operating with a voltage governor.....	28
6.3.5	Unit operating with a controller	28
6.3.6	Measurements when testing the control system	28
6.4	Control of cam correlation	29
7	Performance guarantees and tests	29
7.1	General.....	29
7.2	Maximum generator (transformer) power output as a function of net head	30
7.2.1	Guarantee	30
7.2.2	Instrumentation.....	30
7.3	Index test	30
7.3.1	General	30
7.3.2	Index discharge measurement	31
7.3.3	Shape control	31
7.3.4	Index plant efficiency.....	32
7.3.5	Optimizing cam correlation	33
7.4	Turbine efficiency.....	33
7.4.1	Efficiency test by absolute discharge measurement.....	33
7.4.2	Efficiency test by thermodynamic method	34
7.5	Correcting the efficiency using the model curve.....	34
8	Computation of results and comparison to the guarantee.....	36
8.1	General.....	36
8.1.1	Site data.....	36
8.1.2	Measured values (readings)	36
8.1.3	Scale effect due to water temperature	37
8.1.4	Shifting of the plant characteristic.....	37
8.2	Power output.....	37
8.2.1	Plant power output measurement	37
8.2.2	Generator power output measurement.....	38
8.2.3	Turbine power output measurement.....	38
8.3	Relative turbine efficiency (index test).....	38
8.3.1	General	38
8.3.2	Relative discharge	38
8.3.3	Guarantee of the shape of the plant characteristics	39
8.3.4	Relative index plant efficiency	40
8.4	Absolute turbine efficiency	40
8.4.1	General	40
8.4.2	Absolute discharge	40
8.4.3	Guarantee of the plant efficiency and comparison to the results	40
9	Error analysis	40

9.1	General	40
9.2	Estimation of systematic (bias) uncertainties	41
9.2.1	General	41
9.2.2	Typical systematic uncertainties	41
9.2.3	Systematic uncertainty for turbines used to indicate discharge	42
9.3	Estimation of random (precision) uncertainties	42
9.3.1	Measurement at a single operation point	42
9.3.2	Measurement over a range of operating condition	44
9.4	Evaluation of the uncertainties	45
9.4.1	General	45
9.4.2	Head	45
9.4.3	Power output	47
9.4.4	Index test measurement	49
9.4.5	Efficiency test by absolute discharge measurement	51
9.4.6	Efficiency test by the thermodynamic method	51
10	Other guarantees	51
10.1	Cavitation	51
10.1.1	General	51
10.1.2	Measurement methods	52
10.1.3	Comparison with specified guarantees	52
10.2	Noise	53
10.2.1	General	53
10.2.2	Measurement methods	53
10.2.3	Comparison with specified guarantees	54
10.3	Vibration	54
10.3.1	General	54
10.3.2	Measurements and measurement methods	54
10.3.3	Comparison with specified guarantees	55
Annex A	(normative) Terms, definitions, symbols and units	56
Annex B	(normative) Head definition	64
Annex C	(normative) Method of speed measurements	77
Annex D	(normative) Power output measurement	78
Annex E	(normative) Methods of discharge measurement	82
Annex F	(informative) Plant condition	95
Annex G	(informative) Commissioning	97
Annex H	(informative) Performance test efficiency calculation	99
Annex I	(informative) Cam correlation test	106
Bibliography	109
Figure 1	– Schematic layout of a hydroelectric installation (water to wire system)	11
Figure 2	– Warranty period	16
Figure 3	– Vanes and blades servomotors force measurements (Kaplan on line)	17
Figure 4	– Evaluation of the guide vane (GV) closing characteristic	18
Figure 5	– Needle servomotor force	18
Figure 6	– Automatic start – Synchronization – No load test (Kaplan turbine)	19
Figure 7	– Emergency shutdown from no load test (Kaplan turbine)	20

Figure 8 – Runaway test (Kaplan turbine)	21
Figure 9 – Emergency shutdown due to an electrical fault.....	22
Figure 10 – Emergency shutdown due to a mechanical fault	23
Figure 11 – Emergency shutdown due to the governor failure	24
Figure 12 – Evaluation of the maximum overpressure	24
Figure 13 – Temperature stability, recording at no load up to stable conditions	26
Figure 14 – Speed governor check at no load	27
Figure 15 – Maximum power output: procedure to compare measured power output at actual net head to the guarantee.....	30
Figure 16 – Comparison of the shape of the turbine characteristic to the guarantee.....	32
Figure 17 – Example of an optimized switch band for 1 and 2 turbine operation.....	33
Figure 18 – Efficiency test: procedure to compare guaranteed turbine efficiency to the prototype measurement results, including the overall uncertainties	34
Figure 19 – Hill chart – Showing head loss examples with one and two units in operation using the same penstock.....	35
Figure 20 – Shifting of the performance curves	37
Figure 21 – Variation of factor k and exponent x on turbine index efficiency.....	39
Figure 22 – Random uncertainties of a single operation point, example for penstock pressure variation and fluctuation	43
Figure 23 – Detection of outlier errors: example to find out offset and reading errors by plotting in linear and logarithmic form with the same data.....	44
Figure 24 – Example of scattered points with function of second order	44
Figure 25 – Scattered points smoothed by individual fitting on adjacent sections	45
Figure 26 – Overall uncertainty of head for free water level for low head turbines	46
Figure 27 – Overall uncertainty of head in a closed conduit	47
Figure 28 – Estimated overall uncertainties of the discharge by index measurement versus full scale differential pressure	50
Figure 29 – Operation range and cavitation limits	52
Figure A.1 – Transient pressure fluctuation at the turbine high pressure reference section, when a specified load is suddenly rejected	61
Figure A.2 – Transient pressure fluctuation at the turbine high pressure reference section, when a specified load is suddenly accepted.....	62
Figure B.1 – High pressure reference and measuring sections.....	65
Figure B.2 – Measuring section at tail water.....	66
Figure B.3 – Measuring section at draft tube.....	66
Figure B.4 – Definition of measuring sections	67
Figure B.5 – Kaplan turbine with horizontal shaft	68
Figure B.6 – Kaplan turbine with vertical shaft	68
Figure B.7 – Francis open flume turbine with vertical shaft	69
Figure B.8 – Francis turbine with horizontal shaft.....	69
Figure B.9 – Francis turbine with vertical shaft, with stagnation probe	70
Figure B.10 – Francis turbine with horizontal shaft with pressure on suction side.....	70
Figure B.11 – Pelton turbine with horizontal shaft	71
Figure B.12 – Pelton turbine with vertical shaft	71
Figure B.13 – Turgo turbine with horizontal shaft	72
Figure B.14 – Turgo turbine with vertical shaft	72

Figure B.15 – Crossflow turbine with horizontal shaft, with draft tube	73
Figure B.16 – Crossflow turbine with horizontal shaft, without draft tube	73
Figure B.17 – Specifications for static pressure taps	74
Figure B.18 – Example: discharge versus guide vane opening	76
Figure C.1 – Overspeed and runaway	77
Figure D.1 – Typical losses of a synchronous generator	79
Figure D.2 – Asynchronous generator: typical power factor and slip factor	80
Figure D.3 – Power measurement using the two wattmeter method	80
Figure D.4 – Power measurement using the three wattmeter method	81
Figure E.1 – Typical arrangements of acoustic transducers	84
Figure E.2 – Arrangement for pressure time method	85
Figure E.3 – Example of pressure-time diagram for a uniform conduit	86
Figure E.4 – Example of pressure-time diagram for a non-uniform conduit	86
Figure E.5 – Example of pressure-time diagram for a combination of uniform and non-uniform conduits between several sections	87
Figure E.6 – Location of taps for differential pressure method of discharge measurement	93
Figure E.7 – Location of taps for differential pressure measurement of discharge in a bulb turbine	93
Figure E.8 – Location of taps for Winter-Kennedy method of discharge measurement through a turbine equipped with a steel spiral case	94
Figure H.1 – Comparison of measured index efficiency with the guaranteed values	105
Figure I.1 – Index measurement to optimize the efficiency	107
Figure I.2 – Two dimensional cam correlation	108
Table 1 – Scope of classes A, B, and C	12
Table 2 – Maximum runaway speeds (n_{RUN}) expressed as a percentage of rated speed	21
Table 3 – Performance test parameters	29
Table 4 – Index discharge measurement methods	31
Table 5 – Site data	36
Table 6 – Systematic uncertainties at full load	41
Table 7 – Systematic uncertainties of discharge versus turbine opening	42
Table 8 – Overall uncertainties of the shape of turbine characteristics with respect to the guaranteed efficiency	49
Table 9 – Data used in Figure 28	51
Table 10 – Limits for cavitation damage	53
Table A.1 – Density of water	62
Table E.1 – Selection of flow measurement method	82
Table E.2 – Evaluation of the penstock factor with estimation of the systematic uncertainty	91
Table H.1 – Plant index efficiency guarantee	99
Table H.2 – Transformer data	100
Table H.3 – Data measurements (not all tests included)	101
Table H.4 – Calculation of results	102

HYDRAULIC MACHINES – ACCEPTANCE TESTS OF SMALL HYDROELECTRIC INSTALLATIONS

1 Scope

This International Standard defines the test, the measuring methods and the contractual guarantee conditions for field acceptance tests of the generating machinery in small hydroelectric power installations. It applies to installations containing impulse or reaction turbines with unit power up to about 15 MW and reference diameter of about 3 m. The driven generator can be of synchronous or asynchronous type.

This International Standard contains information about most of the tests required for acceptance of the hydraulic turbine such as safety approval tests, trial operating and reliability tests, as well for verification of cavitation, noise and vibration conditions, if required.

This standard represents the typical methods used on smaller hydroelectric installations, and is divided into three classes as follows (see Table 1 for more detail):

Class A	Normal test program (panel measurement) To determine the maximum power output of the installation.	Default
Class B	Extended test program To determine the performance characteristics of the installation.	Recommended
Class C	Comprehensive test program To determine the absolute efficiency of the installation.	Optional

NOTE All classes contain safety tests, trial operating tests, and reliability tests.

This standard gives all necessary references for the contract in order to execute the test, evaluate, calculate and compare the result to the guarantee for all the classes A, B and C.

The manufacturer or consulting engineer is responsible for ensuring that standardized connections are installed for performing these tests. This standard does not cover the structural details of a hydroelectric installation or its component parts.

2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 60041:1991, *Field acceptance tests to determine the hydraulic performance of hydraulic turbines, storage pumps and pump turbines*

IEC 60193, *Hydraulic turbines, storage pumps and pump-turbines – Model acceptance tests*

IEC 60308, *Hydraulic turbines – Testing of control systems*

IEC 60609 (all parts), *Hydraulic turbines, storage pumps and pump-turbines – Cavitation pitting evaluation*

IEC 60651, *Specification for sound level meters*

IEC 61362, *Guide to specification of hydraulic turbine control systems*

ISO 1680 *Acoustics – Test code for the measurement of airborne noise emitted by rotating electrical machinery*

ISO 1940-1:2003, *Mechanical vibration – Balance quality requirements for rotors in a constant (rigid) state – Part 1: Specification and verification of balance tolerances*

ISO 3746, *Acoustics – Determination of sound power levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane*

ISO 4412 (all parts), *Hydraulic fluid power – Test code for determination of airborne noise levels*

ISO 5168, *Measurement of fluid flow – Procedures for the evaluation of uncertainties*

ISO 7919-5, *Mechanical vibration – Evaluation of machine vibration by measurements on rotating shafts – Part 5: Machine sets in hydraulic power generating and pumping plants*

ISO 10816-3, *Mechanical vibration – Evaluation of machine vibration by measurements on non-rotating parts – Part 3: Industrial machines with nominal power above 15 kW and nominal speeds between 120 r/min and 15 000 r/min when measured in situ*

ANSI/IEEE 810, *Hydraulic Turbine and Generator Integrally Forged Shaft Couplings and Shaft Runout Tolerances*