

STN	Príručka na montážne postupy a tolerancie hydroelektrických strojov Časť 4: Vertikálne Kaplanove turbíny alebo propelerové turbíny	STN EN IEC 63132-4 08 5030
------------	---	--

Guidance for installation procedures and tolerances of hydroelectric machines - Part 4: Vertical Kaplan or propeller turbines

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 09/20

Obsahuje: EN IEC 63132-4:2020, IEC 63132-4:2020

131629

EUROPEAN STANDARD

EN IEC 63132-4

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2020

ICS 27.140

English Version

Guidance for installation procedures and tolerances of
hydroelectric machines - Part 4: Vertical Kaplan or propeller
turbines
(IEC 63132-4:2020)

Lignes directrices des procédures et tolérances
d'installation des machines hydroélectriques - Partie 4:
Turbine Kaplan ou à hélice verticales
(IEC 63132-4:2020)

Leitfaden für Installations-Prozeduren und -Toleranzen von
hydroelektrischen Maschinen - Teil 4: Vertikale Kaplan-
oder Propellerturbinen
(IEC 63132-4:2020)

This European Standard was approved by CENELEC on 2020-06-02. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 63132-4:2020 (E)**European foreword**

The text of document 4/383/FDIS, future edition 1 of IEC 63132-4, prepared by IEC/TC 4 "Hydraulic turbines" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 63132-4:2020.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-03-02
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-06-02

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 63132-4:2020 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 63132-1	NOTE	Harmonized as EN IEC 63132-1
IEC 63132-2	NOTE	Harmonized as EN IEC 63132-2
IEC 63132-3	NOTE	Harmonized as EN IEC 63132-3



IEC 63132-4

Edition 1.0 2020-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Guidance for installation procedures and tolerances of hydroelectric machines –
Part 4: Vertical Kaplan or propeller turbines**

**Lignes directrices des procédures et tolérances d'installation des machines
hydroélectriques –
Partie 4: Turbines Kaplan ou à hélice verticales**





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2020 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC -

webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.



IEC 63132-4

Edition 1.0 2020-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Guidance for installation procedures and tolerances of hydroelectric machines –
Part 4: Vertical Kaplan or propeller turbines**

**Lignes directrices des procédures et tolérances d'installation des machines
hydroélectriques –
Partie 4: Turbines Kaplan ou à hélice verticales**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 27.140

ISBN 978-2-8322-8104-8

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	6
4 Installation flowchart.....	6
4.1 Turbine embedded parts	6
4.2 Turbine mechanical parts.....	8
5 Steps.....	10
5.1 Turbine embedded parts	10
5.1.1 Step 1: Benchmarks set-up.....	10
5.1.2 Step 2: Primary embedded pipes and draft tube liner foundation installation.....	10
5.1.3 Step 3: Draft tube liner foundation embedment	10
5.1.4 Step 4: Draft tube liner foundation and workspace verification	11
5.1.5 Step 5: Handing over to installation	11
5.1.6 Step 6: Draft tube liner supports installation	11
5.1.7 Step 7: Draft tube liner installation.....	12
5.1.8 Step 8: Secondary embedded pipes installation around the draft tube liner.....	14
5.1.9 Step 9: Handing over to concreting phase.....	14
5.1.10 Step 10: Draft tube liner embedment	15
5.1.11 Step 11: Concrete voids testing	15
5.1.12 Step 12: Draft tube liner grout injection.....	16
5.1.13 Step 13: Handing over to installation	16
5.1.14 Step 14: Draft tube liner dimensional inspection after embedment	16
5.1.15 Step 15: Draft tube cone installation	17
5.1.16 Step 16: Stay ring supports installation.....	17
5.1.17 Step 17: Stay ring installation	17
5.1.18 Step 18: Pit liner(s) and/or servomotor base plates installation	19
5.1.19 Step 19: Secondary embedded pipes installation around the semi-spiral case	19
5.1.20 Step 20: Handing over to concreting phase.....	20
5.1.21 Step 21: Embedment of stay ring and concrete semi-spiral case construction.....	20
5.1.22 Step 22: Embedment up to generator floor.....	20
5.1.23 Step 23: Stay ring grout injection	21
5.1.24 Step 24: Handing over to installation	21
5.1.25 Step 25: Dimensional inspection of stay ring after embedment	21
5.1.26 Step 26: Stay ring machining	22
5.1.27 Step 27: Discharge ring and bottom ring installation	22
5.1.28 Step 28: Handing over to concreting phase.....	23
5.1.29 Step 29: Discharge ring embedment	23
5.1.30 Step 30: Handing over to installation	24
5.1.31 Step 31: Corrosion protection for embedded parts	24
5.1.32 Step 32: Turbine embedded parts complete.....	24
5.1.33 Step 33: Turbine mechanical parts Installation.....	24
5.2 Turbine mechanical parts.....	24

5.2.1	Step 1: Turbine embedded parts complete.....	24
5.2.2	Step 2: Turbine runner support structure installation.....	24
5.2.3	Step 3-1: Turbine runner assembly.....	25
5.2.4	Step 3: Turbine runner installation.....	25
5.2.5	Step 4: Guide vanes installation.....	26
5.2.6	Step 5: Outer head cover installation.....	26
5.2.7	Step 6: Turbine shaft installation.....	27
5.2.8	Step 7: Turbine runner and shaft coupling.....	27
5.2.9	Step 8: Inner head cover installation.....	27
5.2.10	Step 9: Shaft seal housing assembly.....	28
5.2.11	Step 10: Guide bearing housing assembly.....	29
5.2.12	Step 11: Regulating ring installation.....	29
5.2.13	Step 12: Servomotors installation.....	29
5.2.14	Step 13: Guide vanes links and levers installation.....	30
5.2.15	Step 14: Turbine shaft free.....	30
5.2.16	Step 15: Generator installation.....	31
5.2.17	Step 16: Turbine and generator shafts coupling.....	31
5.2.18	Step 17: Unit alignment.....	32
5.2.19	Step 18: Kaplan oil head installation.....	33
5.2.20	Step 19: Shaft seal final installation.....	33
5.2.21	Step 20: Turbine guide bearing assembly and adjustment.....	34
5.2.22	Step 21: Guide vane apparatus final adjustment.....	34
5.2.23	Step 22: Remaining turbine parts installation completion.....	34
5.2.24	Step 23: Cleaning, painting and inspection before initial tests.....	35
5.2.25	Step 24: Turbine mechanical parts complete.....	35
5.2.26	Step 25: Commissioning.....	35
	Bibliography.....	36
	Figure 1 – Generic installation flowchart – Vertical Kaplan or propeller turbine embedded parts.....	7
	Figure 2 – Generic installation flowchart – Vertical Kaplan or propeller turbine mechanical parts.....	10
	Figure 3 – Draft tube liner installation.....	13
	Figure 4 – Draft tube liner embedment plan.....	15
	Figure 5 – Stay ring installation.....	19
	Figure 6 – Discharge ring and bottom ring installation.....	23
	Figure 7 – Outer head cover alignment.....	26
	Figure 8 – Inner head cover installation.....	28
	Figure 9 – Turbine shaft free.....	31
	Table 1 – Concentricity and junction.....	14
	Table 2 – Stay-ring elevation, level and pararellism.....	18
	Table 3 – Level.....	22
	Table 4 – Concentricity, level and elevation.....	30
	Table 5 – Runner measurements.....	32
	Table 6 – Shaft measurements.....	33

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**GUIDANCE FOR INSTALLATION PROCEDURES AND
TOLERANCES OF HYDROELECTRIC MACHINES –**
Part 4: Vertical Kaplan or propeller turbines**FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 63132-4 has been prepared by IEC technical committee 4: Hydraulic turbines.

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

FDIS	Report on voting
4/383/FDIS	4/393/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 63132 series, published under the general title *Guidance for installation procedures and tolerances of hydroelectric machines*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

GUIDANCE FOR INSTALLATION PROCEDURES AND TOLERANCES OF HYDROELECTRIC MACHINES –

Part 4: Vertical Kaplan or propeller turbines

1 Scope

The purpose of this this part of IEC 63132 is to establish, in a general way, suitable procedures and tolerances for the installation of a vertical Kaplan or propeller turbine. This document presents a typical assembly and whenever the word “turbine” is used in this document, it refers to a vertical Kaplan or propeller turbine. There are many possible ways to assemble a unit. The size of the machine, design of the machine, layout of the powerhouse or delivery schedule of the components are some of the elements that could result in additional steps, the elimination of some steps and/or assembly sequences.

It is understood that a publication of this type will be binding only if, and to the extent that, both contracting parties have agreed upon it.

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

The tolerances in this document have been established upon best practices and experience, although it is recognized that other standards specify different tolerances.

Wherever this document specifies that documents, drawings or information is supplied by a manufacturer (or by manufacturers), each individual manufacturer will furnish the appropriate information for their own supply only.

2 Normative references

There are no normative references in this document.

koniec náhľadu – text ďalej pokračuje v platenej verzii STN