

STN	Veterné energetické systémy Časť 25-6: Komunikácia na monitorovanie a riadenie veterných elektrární Triedy logických uzlov a triedy dát na monitorovanie podmienok	STN EN 61400-25-6 33 3160
------------	---	---

Wind energy generation systems - Part 25-6: Communications for monitoring and control of wind power plants - Logical node classes and data classes for condition monitoring

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. 07/17

Obsahuje: EN 61400-25-6:2017, IEC 61400-25-6:2016

Oznámením tejto normy sa od 20.01.2020 ruší
STN EN 61400-25-6 (33 3160) z júna 2011

125088

Úrad pre normalizáciu, metrológiu a skúšobníctvo Slovenskej republiky, 2017
Podľa zákona č. 264/1999 Z. z. o technických požiadavkách na výrobky a o posudzovaní zhody a o zmene a doplnení niektorých zákonov v znení neskorších predpisov sa slovenská technická norma a časti slovenskej technickej normy môžu rozmnožovať alebo rozširovať len so súhlasom slovenského národného normalizačného orgánu.

English Version

Wind energy generation systems -
Part 25-6: Communications for monitoring and
control of wind power plants - Logical node classes and data
classes for condition monitoring
(IEC 61400-25-6:2016)

Systèmes de production d'énergie éolienne -
Partie 25-6: Communications pour la surveillance et la
commande des centrales éoliennes - Classes de nœuds
logiques et classes de données pour la surveillance d'état
(IEC 61400-25-6:2016)

Windenergieanlagen -
Teil 25-6: Kommunikation für die Überwachung und
Steuerung von Windenergieanlagen - Klassen logischer
Knoten und Datenklassen für die Zustandsüberwachung
(IEC 61400-25-6:2016)

This European Standard was approved by CENELEC on 2017-01-20. 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, 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: Avenue Marnix 17, B-1000 Brussels

European foreword

The text of document 88/606/FDIS, future edition 2 of IEC 61400-25-6, prepared by IEC/TC 88 "Wind energy generation systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61400-25-6:2017.

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) 2017-10-20
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2020-01-20

This document supersedes EN 61400-25-6:2011.

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

Endorsement notice

The text of the International Standard IEC 61400-25-6:2016 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated :

IEC 61400-25 NOTE Harmonized in EN 61400-25 series.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61400-25-1	2006	Wind turbines - Part 25-1: Communications for monitoring and control of wind power plants - Overall description of principles and models	EN 61400-25-1	2007
IEC 61400-25-2	2015	Wind turbines - Part 25-2: Communications for monitoring and control of wind power plants - Information models	EN 61400-25-2	2015
IEC 61400-25-3	2015	Wind turbines - Part 25-3: Communications for monitoring and control of wind power plants - Information exchange models	EN 61400-25-3	2015
IEC 61400-25-4	2016	Wind energy generation systems - Part 25-4: Communications for monitoring and control of wind power plants - Mapping to communication profile	EN 61400-25-4	2017
IEC 61400-25-5	— ¹⁾	Wind energy generation systems - Part 25-5: Communications for monitoring and control of wind power plants - Conformance testing	EN 61400-25-5	— ¹⁾
IEC 61850-7-1	2011	Communication networks and systems for power utility automation - Part 7-1: Basic communication structure - Principles and models	EN 61850-7-1	2011
IEC 61850-7-2	2010	Communication networks and systems for power utility automation - Part 7-2: Basic information and communication structure - Abstract communication service interface (ACSI)	EN 61850-7-2	2010

1) To be published.

EN 61400-25-6:2017

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61850-7-3	2010	Communication networks and systems for power utility automation - Part 7-3: Basic communication structure - Common data classes	EN 61850-7-3	2011
ISO 13373-1	2002	Condition monitoring and diagnostics of machines - Vibration condition monitoring - Part 1: General procedures	-	-



INTERNATIONAL STANDARD



**Wind energy generation systems –
Part 25-6: Communications for monitoring and control of wind power plants –
Logical node classes and data classes for condition monitoring**





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2016 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.

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

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
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 corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

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 also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

65 000 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.

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: csc@iec.ch.



INTERNATIONAL STANDARD



**Wind energy generation systems –
Part 25-6: Communications for monitoring and control of wind power plants –
Logical node classes and data classes for condition monitoring**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 27.180

ISBN 978-2-8322-3723-6

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	9
2 Normative references	10
3 Terms and definitions	10
4 Abbreviated terms	12
5 General	14
5.1 Overview	14
5.2 Condition monitoring information modelling.....	14
5.3 Coordinate system applied for identifying direction and angles	15
5.4 Operational state bin concept	16
5.4.1 General	16
5.4.2 Example of how to use active power as an operational state.....	16
6 Logical nodes for wind turbine condition monitoring.....	16
6.1 General.....	16
6.2 Logical nodes inherited from IEC 61400-25-2.....	17
6.3 Wind turbine condition monitoring logical node WCON	17
6.3.1 General	17
6.3.2 CDCs applicable for the logical node WCON	18
7 Common data classes for wind turbine condition monitoring	18
7.1 General.....	18
7.2 Common data classes defined in IEC 61400-25-2	18
7.3 Conditions for data attribute inclusion	18
7.4 Common data class attribute name semantic	19
7.5 Condition monitoring bin (CMB)	20
7.6 Condition monitoring measurement (CMM)	21
7.7 Scalar value array (SVA).....	22
7.8 Complex measurement value array (CMVA).....	23
8 Common data class CMM attribute definitions	24
8.1 General.....	24
8.2 Attributes for condition monitoring measurement description.....	25
8.2.1 General	25
8.2.2 Condition monitoring sensor (trd).....	25
8.2.3 Shaft identification (shfld) and bearing position (brgPos)	30
8.2.4 Measurement type (mxType)	31
Annex A (informative) Recommended mxType values	33
A.1 General about tag names and datanames of the WCON Class.....	33
A.2 Mapping of measurement tags to mxTypes	33
A.2.1 General	33
A.2.2 Scalar values (MV)(Descriptors)	33
A.2.3 Array measurements (SVA) – Frequency domain.....	33
A.2.4 Array measurements (SVA) – Time domain	33
A.3 mxType values.....	33
Annex B (informative) Application of data attributes for condition monitoring measurement description for measurement tag naming.....	37

B.1	General.....	37
B.2	Naming principle using the data attributes in CMM CDC	37
B.3	Examples	38
Annex C	(informative) Condition monitoring bins examples	39
C.1	Example 1: One dimensional bins	39
C.2	Example 2: Two dimensional bins	40
C.3	Example 3: Two dimensional bins with overlap	42
Annex D	(informative) Application example	45
D.1	Overview of CDCs essential to IEC 61400-25-6	45
D.2	How to apply data to CDCs	45
D.3	How to apply an alarm	47
Bibliography	49
Figure 1	– Condition monitoring with separated TCD/CMD functions.....	8
Figure 2	– Schematic flow of condition monitoring information	9
Figure 3	– Reference coordinates system for the drive train.....	15
Figure 4	– Active power bin concept	16
Figure 5	– Sensor angular orientation as seen from the rotor end	29
Figure 6	– Sensor motion identification	29
Figure 7	– Sensor normal and reverse motion.....	30
Figure 8	– Principle of shaft and bearing identification along a drive train	31
Figure B.1	– Naming principles for trd data attribute	37
Figure C.1	– Bin configuration example 1.....	40
Figure C.2	– Bin configuration example 2.....	42
Figure C.3	– Bin configuration example 3.....	44
Figure D.1	– Linkage of the CDCs.....	45
Table 1	– Abbreviated terms applied	13
Table 2	– Coordinate system and wind turbine related characteristics.....	15
Table 3	– LN: Wind turbine condition monitoring information (WCON).....	18
Table 4	– Conditions for the presence of a data attribute	19
Table 5	– Common data class attribute name semantic.....	20
Table 6	– CDC: Condition monitoring bin (CMB)	21
Table 7	– CDC: Condition monitoring measurement (CMM)	22
Table 8	– CDC: Scalar value array (SVA).....	23
Table 9	– CDC: Complex measurement value array (CMVA).....	24
Table 10	– Data attributes used for measurement description	25
Table 11	– Sensor identification convention for “trd” attribute.....	25
Table 12	– Abbreviated terms for “trd” – “location” description	26
Table 13	– Sensor type code	28
Table 14	– Reference code for sensor sensitive axis orientation	29
Table 15	– Gearbox shaft and bearing identification.....	31
Table A.1	– Examples of applicable mappings from tag to MxType	34
Table B.1	– Examples of Tag names and corresponding short datanames	38

Table C.1 – CMB example 1	39
Table C.2 – CMB data object example 1	39
Table C.3 – CMB example 2	41
Table C.4 – CMB data object example 2	41
Table C.5 – CMB example 3	43
Table C.6 – CMB data object example 3	43
Table D.1 – Object overview	46
Table D.2 – Name plate (LPL).....	46
Table D.3 – CDC example: Condition monitoring measurement (CMM)	47
Table D.4 – CDC example: Condition monitoring bin (CMB).....	47
Table D.5 – CDC example: Alarm definition (ALM).....	48
Table D.6 – LN example: Alarm container definition	48

INTERNATIONAL ELECTROTECHNICAL COMMISSION

WIND ENERGY GENERATION SYSTEMS –**Part 25-6: Communications for monitoring and control of wind power plants – Logical node classes and data classes for condition monitoring**

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 61400-25-6 has been prepared by IEC technical committee 88: Wind energy generation systems.

This second edition cancels and replaces the first edition published in 2010. This edition constitutes a technical revision.

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

- a) Major restructuring of the datamodel to accommodate needed flexibility.
- b) UFF58 format is no longer used.
- c) Access to data is now using the standard reporting and logging functions.
- d) Recommendations for creating datanames to accommodate needed flexibility have been defined.

The text of this standard is based on the following documents:

FDIS	Report on voting
88/606/FDIS	88/611/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.

As the title of technical committee 88 was changed in 2015 from *Wind turbines* to *Wind energy generation systems* a list of all parts of the IEC 61400 series, under the general title *Wind turbines* and *Wind energy generation systems* 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.

A bilingual version of this publication may be issued at a later date.

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.

INTRODUCTION

The IEC 61400-25 series defines information models and information exchange models for monitoring and control of wind power plants. The modelling approach (for information models and information exchange models) of IEC 61400-25-2 and IEC 61400-25-3 uses abstract definitions of classes and services such that the specifications are independent of specific communication protocol stacks, implementations, and operating systems. The mapping of these abstract definitions to specific communication profiles is defined in IEC 61400-25-4¹.

This document defines an information model for condition monitoring information and explains how to use the existing definitions of IEC 61400-25-2 as well as the required extensions in order to describe and exchange information related to condition monitoring of wind turbines. The models of condition monitoring information defined in this document may represent information provided by sensors or by calculation.

In the context of this document, condition monitoring means a process with the purpose of observing components or structures of a wind turbine or wind power plant for a period of time in order to evaluate the state of the components or structures and any changes to it, in order to detect early indications of impending failures. With the objective to be able to monitor components and structures recorded under approximately the same conditions, this document introduces the operational state bin concept. The operational state bin concept is multidimensional in order to fit the purpose of sorting complex operational conditions into comparable circumstances.

Condition monitoring is most frequently used as a predictive or condition-based maintenance technique (CBM). However, there are other predictive maintenance techniques that can also be used, including the use of the human senses (look, listen, feel, smell) or machine performance monitoring techniques. These could be considered to be part of the condition monitoring.

Condition monitoring techniques

Condition monitoring techniques that generate information to be modelled include, but are not limited to, measured or processed values such as:

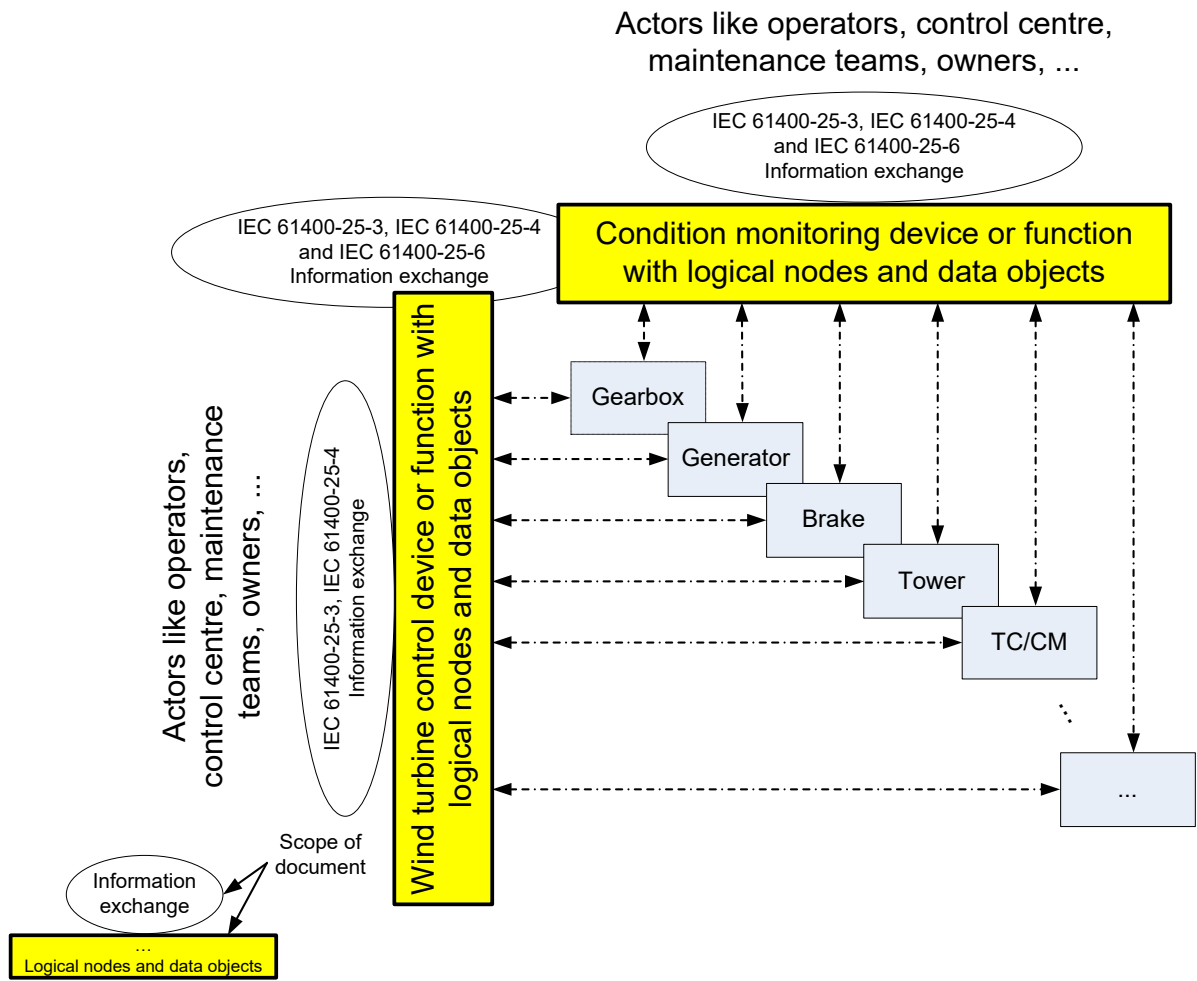
- a) vibration measurements and analysis;
- b) oil debris measurement and analysis;
- c) temperature measurement and analysis;
- d) strain gauge measurement and analysis;
- e) acoustic measurement and analysis.

Components and structures can be monitored by using automatic measurement retrieval or via a manual process.

Condition monitoring devices

The condition monitoring functions may be located in different physical devices. Some information may be exposed by a turbine controller device (TCD) while other information may be exposed by an additional condition monitoring device (CMD). Various actors may request to exchange data values located in the TCD and/or CMD. A SCADA device may request data values from a TCD and/or CMD; a CMD may request data values from a TCD. The information exchange between an actor and a device in a wind power plant requires the use of information exchange services as defined in IEC 61400-25-3. A summary of the above is shown in Figure 1.

¹ To be published.



IEC

Figure 1 – Condition monitoring with separated TCD/CMD functions

The state of the art in the wind power industry is a topology with separated devices for control and condition monitoring applications. Based on this fact, the information and information exchange modelling in the present document is based on a topology with a TCD and a CMD.

IEC 61400-25-6 represents an extension of the IEC 61400-25 series focussing on condition monitoring.

WIND ENERGY GENERATION SYSTEMS –

Part 25-6: Communications for monitoring and control of wind power plants – Logical node classes and data classes for condition monitoring

1 Scope

This part of IEC 61400-25 specifies the information models related to condition monitoring for wind power plants and the information exchange of data values related to these models.

NOTE Conformance to IEC 61400-25-6 presupposes in principle conformance to IEC 61400-25-2, IEC 61400-25-3 and IEC 61400-25-4.

Figure 2 illustrates the information flow of a system using condition monitoring to perform condition based maintenance. The figure illustrates how data values are refined and concentrated through the information flow, ending up with the ultimate goal of condition based maintenance; actions to be performed via issuing work orders to maintenance teams in order to prevent the wind power plant device to stop providing its intended service.

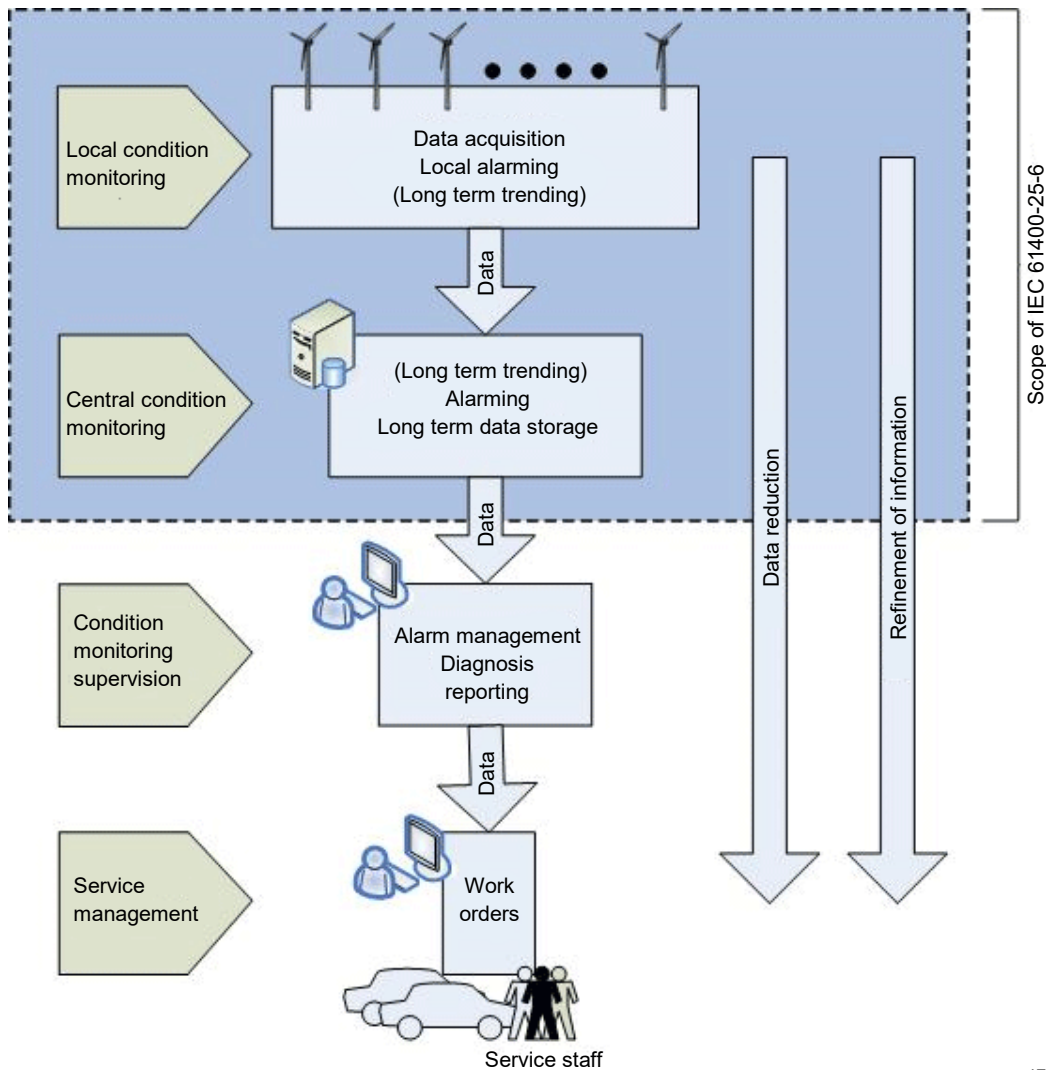


Figure 2 – Schematic flow of condition monitoring information

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.

IEC 61400-25-1:2006, *Wind turbines – Part 25-1: Communications for monitoring and control of wind power plants – Overall description of principles and models*

IEC 61400-25-2:2015, *Wind turbines – Part 25-2: Communications for monitoring and control of wind power plants – Information models*

IEC 61400-25-3:2015, *Wind turbines – Part 25-3: Communications for monitoring and control of wind power plants – Information exchange models*

IEC 61400-25-4:2016, *Wind energy generation systems – Part 25-4: Communications for monitoring and control of wind power plants – Mapping to communication profile*

IEC 61400-25-5:—2, *Wind energy generation systems – Part 25-5: Communications for monitoring and control of wind power plants – Conformance testing*

IEC 61850-7-1:2011, *Communication networks and systems for power utility automation – Part 7-1: Basic communication structure – Principles and models*

IEC 61850-7-2:2010, *Communication networks and systems for power utility automation – Part 7-2: Basic information and communication structure – Abstract communication service interface (ACSI)*

IEC 61850-7-3:2010 *Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes*

ISO 13373-1:2002, *Condition monitoring and diagnostics of machines – Vibration condition monitoring – Part 1: General procedures*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN