

## INTRODUCTION

This document addresses vendors (manufacturers, suppliers), operators, owners, planners, and designers of wind power plants as well as system integrators and utility companies operating in the wind energy market. IEC 61400-25 is intended to be accepted and to be used world-wide as the international standard for communications in the domain of wind power plants.

IEC 61400-25 has been developed in order to provide a uniform communications basis for the monitoring and control of wind power plants. It defines wind power plant specific information, the mechanisms for information exchange and the mapping to communication protocols. In this regard the standard defines all details required to connect wind power plant components in a multi-vendor environment and to exchange the information made available by a component. This is done by definitions made in this document or by reference to other commonly used standards.

The wind power plant specific information models the crucial and common process data and meta-data of a wind power plant. Process information is hierarchically structured and covers for example common process information found in the rotor, generator, converter, grid connection and the like. The data may be simple (value, timestamp, and quality) or more comprehensive (adding more meta data, for example engineering unit, scale, description, short hand reference, statistical and historical information of the process value). All information of a wind power plant defined in this standard is name tagged – it defines a comprehensive name space. A concise meaning of each signal is given. The standardised wind power plant information can be easily extended by means of a name space extension rule.

All process and meta data can be exchanged by corresponding services like get, set, publish-subscribe (report), logging, and control. Access to the meta-data (including configuration information with regard to the wind power plant information model and services and communication stacks) provides the so-called self-description of a device. The self-description could also be contained in an XML based configuration file. The references include commonly applied standards like XML, ISO 9506 (MMS), SOAP, OPC XML-DA, IEC 60870-5-104, DNP3, and TCP/IP.

This standard allows SCADA systems to communicate with wind turbine controllers from multiple vendors. The standardised self-description (contained either in a XML file or retrieved online from a device) can be used to configure SCADA applications. Standardisation of SCADA applications are excluded in IEC 61400-25 but standardised common wind turbine information provides means for re-use of applications and operator screens for wind turbines from different vendors. From a utility perspective unified definitions of common data minimise conversion and re-calculation of data values for evaluation and comparison of all their wind power plants.

The standard can be applied to any wind power plant operation concept, i.e., both in individual and integrated operations. The application area of IEC 61400-25 covers all components required for the operation of wind power plants, i.e., not only the wind turbine, but also the meteorological system (reference wind mast), the electrical system, and the wind power plant management system. The wind power plant specific information in IEC 61400-25 excludes information associated with feeders and substations. Substation communication is covered within the IEC 61850 series of standards.

IEC 61400-25 puts an end to the communication difficulties arising from the wide variety of protocols, labels, semantics etc. thus offering the possibility to manage different wind power plants independently of the vendor. It enables components from different vendors to easily communicate with other components, at any location, at any time. Object-oriented data structures makes the engineering and handling of huge amounts of information provided by wind power plants less time-consuming and more efficient. Scalability, connectivity, and interoperability can be maximised to reduce cost and needed man power.

This standard is a basis for simplifying the contracting of the roles the wind turbine and SCADA systems have to play. The crucial part of the wind power plant information, the information exchange methods, and the communication stacks are standardised. They build a basis to which procurement specifications and contracts could easily refer.

This document is organised in nine clauses. Clauses 1 to 5 offer an introductory orientation. Clause 1 describes the scope of IEC 61400-25. Clause 2 communicates the normative references taken into account for developing the standard. Clause 3 defines specific terms used in this document. Clause 4 lists and describes the used abbreviations. Clause 5 provides a general overview of the objectives, users, context, model and modelling approach of IEC 61400-25, and introduces three examples of application topologies illustrating the communication structures that are possible in practice.

NOTE 1 Readers familiar with the wind power plant application domain and with the general modelling of information may skip clause 5.

Clause 6 provides details on the standard model for wind power plant information. Clause 7 provides details on the functions and services needed for the information exchange, and clause 8 describes the mapping to communication protocols needed to exchange relevant information. Clause 9 provides content on conformance testing. The annexes specify the communication profiles used for the complete implementation of the information and information exchange models.

NOTE 2 This standard uses capital letters and the font type Tahoma to identify standardised names (e.g., WGEN for wind turbine generator).

INTERIMS NOTE 1 (for CD review only) The annexes reference four alternative specifications on protocol stacks (IEC 61850-8-1, IEC 60870-5-101/104, web services/OPC XML-DA, and DNP3). Due to the market relevance of the four protocol stacks the Project Team 25 of IEC TC 88 has agreed to incorporate all four into the first Committee Draft: The National Committees of TC 88 decide on the final set of mappings to be included into the standard IEC 61400-25.

INTERIMS NOTE 2 (for CD review only) The wind power plant information model contains those information models that have been proposed by the members of IEC TC 88 PT 25. Additional wind power plant information models are still under consideration (not incorporated in this committee draft):

- a. Condition monitoring. May be included if a generic wind power plant information model can be defined.
- b. WPP control (Absolute Power Constraint, Balance Control, Gradient Control, Delta Control, Reactive Power and Voltage Control. and Frequency Control)

At the time of the release of this CD knowledge to define a complete common information model for WPP control is still being developed.

National committees are requested provide their opinion on the inclusion of these additional wind power plant information models.

INTERIMS NOTE 3 (for CD review only) Due to the comprehensive content of IEC 61400-25 it has been proposed to publish the content of IEC 61400-25 in three separate documents for different audiences, users, and readers:

- a. Clauses 1 to 5 (for all)
- b. Clauses 6 to 8 (for people involved in applications – in turbine and SCADA system)
- c. Annexes (for implementers of core software)

The Committee Draft has been published in one document for easier distribution and commenting.