SLOVENSKI STANDARD
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Nizkonapetostne naprave za zaščito pred prenapetostnimi udari - Naprave za zaščito pred prenapetostnimi udari za specifične aplikacije, vključno z enosmernimi - 22. del: Izbira in načela za uporabo - Aplikacije pri vetrnih turbinah

Low-voltage surge protective devices - Surge protective devices for specific application including d.c. -- Part 22: Selection and application principles - Wind turbine applications

Überspannungsschutzgeräte für Niederspannung - Überspannungsschutzgeräte für besondere Anwendungen einschließlich Gleichspannung - Teil 22: Auswahl und nwendungsgrundsätze - Überspannungsschutzgeräte für den Einsatz in Windenergieanlagen

Parafoudres basse tension - Parafoudres pour applications spécifiques incluant le courant continu -- Partie 22: Principes de choix et d’application - Parafoudres connectés aux installations éolienne

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ICS:

27.180	Sistemi turbin na veter in drugi alternativni viri energije	Wind turbine systems and other alternative sources of energy
29.120.50	Varovalke in druga medtokovna zaščita	Fuses and other overcurrent protection devices

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TECHNICAL SPECIFICATION

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TECHNISCHE SPEZIFIKATION

CLC/TS 50539-22

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ICS 29.120.50

English version

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This Technical Specification was approved by CENELEC on 2009-10-30.

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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

Ref. No. CLC/TS 50539-22:2010 E

Foreword

This Technical Specification was prepared by the Technical Committee CENELEC TC 37A, Low voltage surge protective devices.

It was circulated for voting in accordance with the Internal Regulations, Part 2, Subclause 11.3.3.3 and was accepted as a CENELEC Technical Specification on 2009-10-30.

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

The following date was fixed:

– latest date by which the existence of the CLC/TS has to be announced at national level (doa) 2010-04-30

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1 Scope

This Technical Specification applies to surge protection of wind turbine generators and wind power systems.

Normative references are made to generic standards for lightning protection, low-voltage systems and high-voltage systems for machinery and installations and electromagnetic compatibility (EMC).

This Technical Specification defines requirements for selection and installation of surge protective devices for the power circuits. Some special information about particular testing are also included since there is not a current standard for testing surge protective devices for wind turbines.

2 Normative references

Void.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
LEMP protection measures system
LPMS
complete system of protection measures for internal systems against LEMP

[EN 62305-4:2006, Definition 3.9]

3.2
lightning current
i
current flowing at the point of strike

[EN 62305-1:2006, Definition 3.9]

3.3
lightning electromagnetic impulse
LEMP
electromagnetic effects of lightning current

NOTE It includes conducted surges as well as radiated impulse electromagnetic field effects.

[EN 62305-4:2006, Definition 3.4]

3.4
lightning protection level
LPL
number related to a set of lightning current parameter values relevant to the probability that the associated maximum and minimum design values will not be exceeded in naturally occurring lightning

NOTE Lightning protection level is used to design protection measures according to the relevant set of lightning current parameters.

[EN 62305-1:2006, Definition 3.38]

3.5
lightning protection system
LPS
complete system used to reduce physical damage due to lightning flashes to a structure

NOTE It consists of both external and internal lightning protection systems.

[EN 62305-1:2006, Definition 3.40]

3.6
lightning protection zone
LPZ
zone where the lightning electromagnetic environment is defined

NOTE The zone boundaries of an LPZ are not necessarily physical boundaries (e.g. walls, floor and ceiling).

[EN 62305-1:2006, Definition 3.35]

3.7
lightning stroke
single discharge in a lightning flash to earth

[EN 62305-1:2006, Definition 3.4, mod.]

3.8
metal installations
metal items in the structure, which may form a path for lightning current, such as the nacelle bed plate, elevator guide rails and wires, ladders, platforms and interconnected reinforcing steel

[EN 62305-3:2006, Definition 3.18, mod.]

3.9
natural component of LPS
conductive component installed not specifically for lightning protection which can be used in addition to the LPS or in some cases could provide the function of one or more parts of the LPS

NOTE Examples of the use of this term include:

- natural air-termination;
- natural down-conductor;
- natural earthing electrode.

[EN 62305-3:2006, Definition 3.15]

3.10
surge
transient wave appearing as overvoltage and/or overcurrent caused by LEMP

NOTE Surges caused by LEMP can arise from (partial) lightning currents, from induction effects in installation loops and as residual surges downstream of SPD.

[EN 62305-1:2006, Definition 3.34, mod.]

3.11
surge protective device
SPD
device that is intended to limit transient overvoltages and divert surge currents. It contains at least one non-linear component

[EN 61643-11:2002, Definition 3.1]

3.12
voltage protection level
U_P
parameter that characterises the performance of the SPD in limiting the voltage across its terminals, which is selected from a list of preferred values. This value shall be greater than the highest value of the measured limiting voltages

[EN 61643-11:2002, Definition 3.15]

4 General

Due to the increased numbers of Wind Turbines that are used nowadays more data regarding losses and damages due to lightning strikes are available. From these data it is clearly that surge protection is an important issue and shall be carefully examined during the design and construction of a Wind Farm. The purpose of this document is to outline the main protection issues to prevent damages due to lightning focusing on the internal lightning protection system and more particularly to the selection and application of surge protective devices that shall be used.

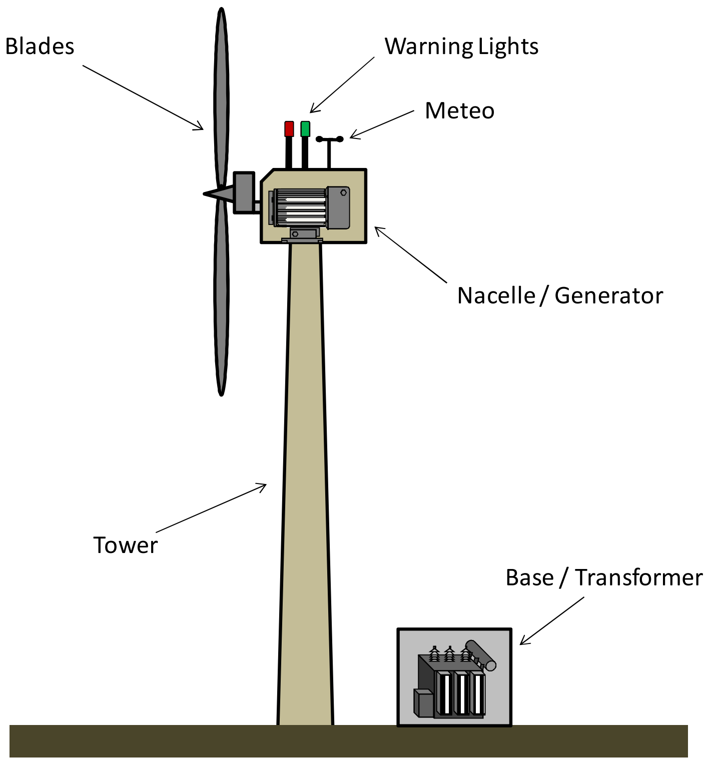
5 Equipment to be protected

The main electrical equipments that can be found, but not limited, in a wind turbine are the following:

- generator;
- frequency converter;
- driver control(s);
- wind turbine control panel(s);
- LV site of transformer including LV switchgear;
- HV site of transformer including HV switchgear;
- auxiliary circuits (i.e. warning lights).

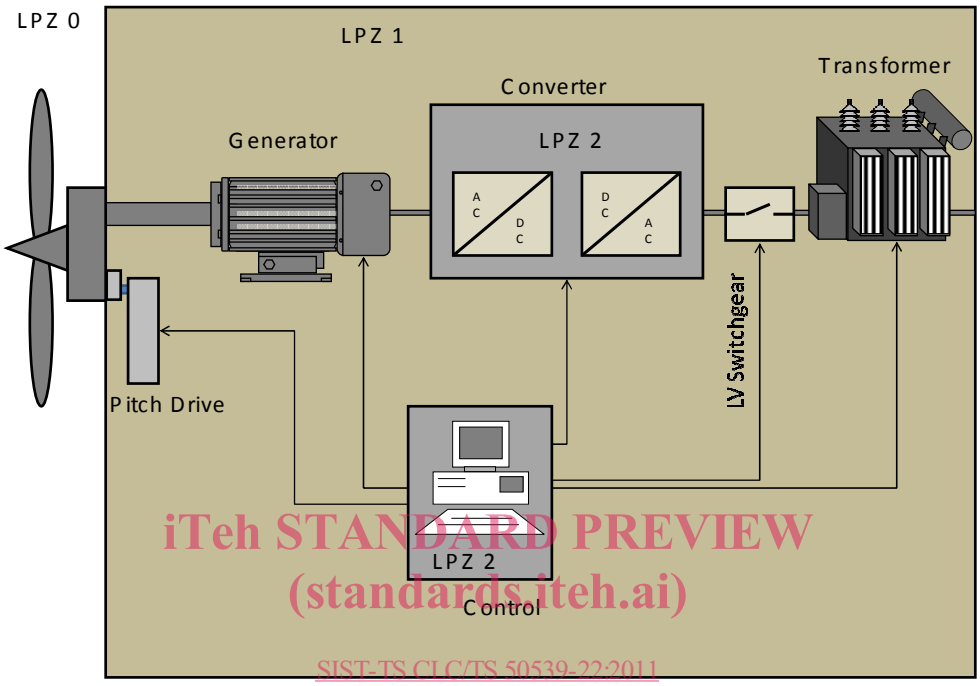
6 Configuration of a typical wind turbine

Based on the basic equipment that a typical wind turbine is composed of, a guide for installation and selection of power SPDs is presented. The SPDs in principle should be selected according to the LPZ principle and to the required voltage protection level of the under protection equipment. The figure below describes the main equipment that a wind turbine generator is composed of.

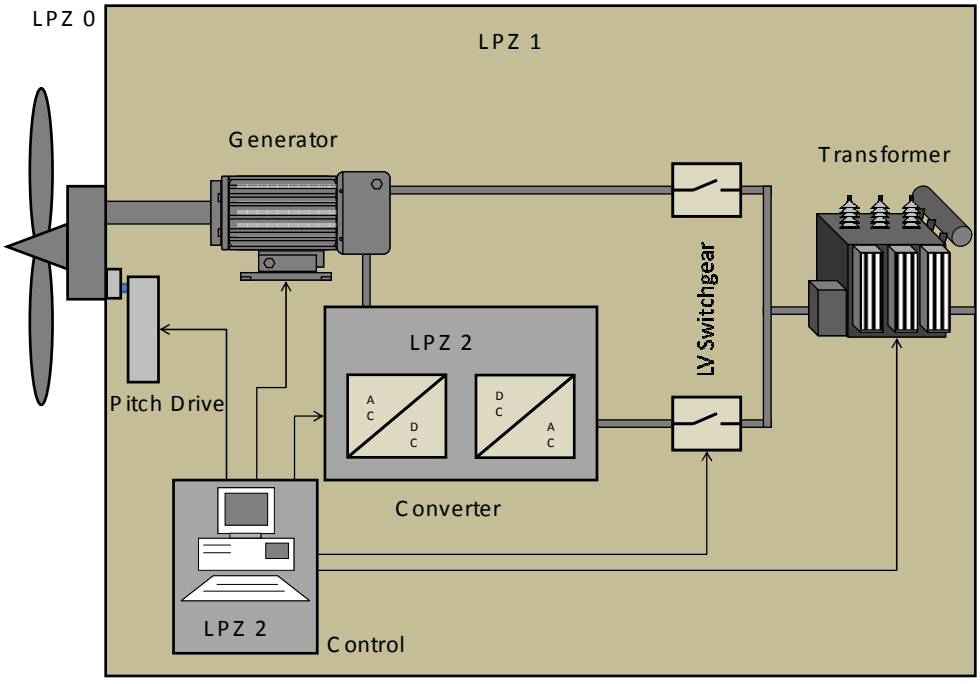


Figures 1 – Example of typical wind turbine configuration

There are two basic designs of wind turbines, which may require a different surge protection approach due to their electrical wiring configuration. The first one is the direct drive turbine, where the generator output is directly connected to the frequency converter and the second design is the doubly fed turbine (some time called double fed), which the generator has two outputs, one directly connected to the LV switchgear and a second output which is connected to the frequency converter. This difference requires also a different surge protection approach. However the protection scheme for a double fed wind turbine generator system is also applicable for a direct drive.



Figures 2 – Direct drive turbine



Figures 3 – Doubly fed turbine