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Nadzemni električni vodi za izmenične napetosti nad 1 kV - 2-22. del: Nacionalna normativna določila (NNA) za Poljsko (na podlagi EN 50341-1:2012)

Overhead electrical lines exceeding AC 1 kV - Part 2-22: National Normative Aspects (NNA) for Poland (based on EN 50341-1:2012)

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29.240.20	Daljnovodi	Power transmission and distribution lines

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English Version

Overhead electrical lines exceeding AC 1 kV - Part 2-22: National Normative Aspects (NNA) for Poland (based on EN 50341-1:2012)

To be completed

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CENELEC

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

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European Foreword

1. The Polish Committee for Standardization (NC) is identified by the following address:

   Polski Komitet Normalizacyjny
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   Name of the relevant technical body: Komitet Techniczny nr 80 ds. “Ogólnych w Sieciach Elektroenergetycznych” (Technical Committee No 80 “for General Issues in Power Networks”).

2. The Polish NC has prepared this Part 2-22 (EN 50341-2-22) listing the Polish National Normative Aspects (NNA), under its sole responsibility, and duly passed it through the CENELEC and CLC/TC11 procedures.

   NOTE:

   The Polish NC also takes sole responsibility for the technically correct co-ordination of this NNA with EN 50341-1. It has performed the necessary checks in the frame of quality assurance / control. However, it is noted that this quality control has been made in the framework of the general responsibility of a standards committee under the national laws / regulations.

3. This NNA is normative in Poland and informative for other countries.

4. This NNA has to be read in conjunction with Part 1 (EN 50341-1). All clause numbers used in this NNA correspond to those of Part 1. Specific subclauses, which are prefixed “PL”, are to be read as amendments to the relevant text in Part 1. Any necessary clarification regarding the application of this NNA in conjunction with Part 1 shall be referred to the Polish NC who will, in co-operation with CLC/TC11, clarify the requirements.

   Where no reference is made in this NNA to a specific sub-clause, then Part 1 shall apply.

5. In case of “boxed values” defined in Part 1, amended values (if any), which are defined in this NNA, shall be taken into account in Poland.

   However, any boxed value whether in Part 1 or in this NNA, shall not be amended in the direction of greater risk in the Project Specification.

   NOTE:

   All national standards referred to in this Part 2-22 will be replaced by the relevant European Standards as soon as they become available and declared by the Polish NC to be applicable and thus reported to the secretary of CLC/TC 11.

1 Scope

1.1 General

(ncpt) **PL.1 Scope of application**

This NNA applies to designing and constructing of new overhead lines with nominal system voltages exceeding 1 kV AC.

"New overhead line" means a totally new line between two points, A and B, built up with new components.

The standard PN-EN 50341-1 (Part 1) with this NNA does not apply to modernisation, reconstruction and renovation of the existing lines, unless otherwise specified in the Project Specification.

1.2 Field of application

(ncpt) **PL.1 All Dielectric Self Supporting (ADSS) cables**

This NNA applies to All Dielectric Self Supporting (ADSS) cables only within the scope of their impact on the supports and minimum clearances which shall be taken as for insulated cable systems.

(ncpt) **PL.2 Telecommunication equipment**

This NNA relates to the telecommunication equipment mounted on the new overhead line supports.

2 Normative references, definitions and symbols

2.1 Normative references

(ncpt) **PL.1 General**

The following documents which are quoted partly or as a whole in this document are necessary for the application of this document. In case of non-dated references the last edition of the referred document (including all modifications) is applicable.

(A-Dev) **PL.2 Normative references**

Reference	Title
PN-EN 1992-1-1:2008	Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings *Eurokod 2: Projektowanie konstrukcji z betonu -- Część 1-1: Reguły ogólne i reguły dla budynków*
PN-EN 1993-1-1:2006	Eurocode 3: Design of steel structures – Part 1-1: General rules and rules for buildings *Eurokod 3: Projektowanie konstrukcji stalowych -- Część 1-1: Reguły ogólne i reguły dla budynków*
PN-EN 1993-1-6:2009	Eurocode 3: Design of steel structures – Part 1-6: Strength and stability of shell structures Eurokod 3: Projektowanie konstrukcji stalowych -- Część 1-6: Wytrzymałość i stateczność konstrukcji powłokowych
PN-EN 1993-1-8:2006	Eurocode 3: Design of steel structures – Part 1-8: Design of joints Eurokod 3: Projektowanie konstrukcji stalowych -- Część 1-8: Projektowanie węzłów
PN-EN 1993-3-1:2008	Eurocode 3: Design of steel structures – Part 3-1: Towers, masts and chimneys – Towers and masts *Eurokod 3: Projektowanie konstrukcji stalowych -- Część 3-1: Wieże, maszty i kominy -- Wieże i maszty*
PN-EN 1997-1:2008	Eurocode 7: Geotechnical design – Part 1: General rules *Eurokod 7: Projektowanie geotechniczne -- Część 1: Zasady ogólne*

PN-EN 1997-1:2008/NA:2011	National Normative Aspects for Poland based on Eurocode 7: Geotechnical design – Part 1: General rules Załącznik krajowy do PN-EN 1997-1:2008 Eurokod 7: Projektowanie geotechniczne -- Część 1: Zasady ogólne
PN-EN 1090-1	Execution of steel structures and aluminium structures – Part 1: Requirements for conformity assessment of structural components *Wykonanie konstrukcji stalowych i aluminiowych -- Część1: Zasady oceny zgodności elementów konstrukcyjnych*
PN-EN 1090-2:2018-09	Execution of steel structures and aluminium structures – Part 2: Technical requirements for the execution of steel structures *Wykonanie konstrukcji stalowych i aluminiowych – Część 2: Wymagania techniczne dotyczące konstrukcji stalowych*
PN-EN 12843	Precast concrete products - Masts and poles *Prefabrykaty z betonu -- Maszty i słupy*
PN-EN 14229	Structural timber - Wooden poles for overhead lines *Drewno konstrukcyjne -- Słupy drewniane do linii napowietrznych*
PN-EN ISO 1461	Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods *Powłoki cynkowe nanoszone na stal metodą zanurzeniową -- Wymagania i metody badań*
PN-EN ISO 10684	Fasteners – Hot dip galvanized coatings *Części złączne -- Powłoki cynkowe nanoszone metodą zanurzeniową*
PN-B-02482:1983	Building foundations – Bearing capacity of piles and pile foundations *Fundamenty budowlane -- Nośność pali i fundamentów palowych*
PN-B-02483:1978	Large diameter bored piles – Specifications and tests *Pale wielkośrednicowe wiercone -- Wymagania i badania*
PN-B-03322:1980	Electric overhead lines – Foundations of supporting structures – Static calculations and design *Elektroenergetyczne linie napowietrzne -- Fundamenty konstrukcji wsporczych – Obliczenia statyczne i projektowanie*
PN-EN 61773	Overhead lines – Testing of foundations for structures *Elektroenergetyczne linie napowietrzne -- Badanie fundamentów konstrukcji wsporczych*
PN-E-06303:1998	Exposure of outdoor insulation to pollution and selection of insulators under polluted conditions *Narażenie zabrudzeniowe izolacji napowietrznej i dobór izolatorów do warunków zabrudzeniowych*
PN-EN 60071-1	Insulation co-ordination – Part 1: Definitions, principles and rules *Koordynacja izolacji -- Część 1: Definicje, zasady i reguły*
PN-EN 50182:2002	Conductors for overhead lines – Round wire concentric lay stranded conductors *Przewody do linii napowietrznych -- Przewody z drutów okrągłych skręconych współosiowo*

2.2 Definitions

List of definitions given in Part 1, in alphabetical order in Polish language, is given below.

No.	Definition	Item number in Part 1	
1	safety	2.2.	79
2	earth fault	2.2.	27
3	effect of action	2.2.	37
4	element	2.2.	39
5	purpose	2.2.	68
6	magnetic flux density	2.2.	57
7	exclusion limit probability of a variable	2.2.	41
8	impedance to earth of an earthing system	2.2.	51
9	composite insulator	2.2.	15
10	combination of actions	2.2.	11
11	structure	2.2.	87
12	support (tower)	2.2.	88
13	temporary line	2.2.	102
14	voltage difference	2.2.	109
15	highest system voltage	2.2.	49
16	touch voltage	2.2.	103
17	step voltage	2.2.	85
18	earth potential rise	2.2.	29
19	nominal system voltage	2.2.	59
20	unavailability	2.2.	106
21	reliability (electrical)	2.2.	74
22	reliability (structural)	2.2.	75
23	resistance (structural)	2.2.	76
24	characteristic resistance	2.2.	6
25	design resistance	2.2.	19
26	design working life	2.2.	23
27	frequently occupied area	2.2.	47
28	action	2.2.	1
29	dynamic action	2.2.	24
30	quasi – static action	2.2.	69
31	permanent action	2.2.	64
32	static action	2.2.	84
33	free action	2.2.	46
34	fixed action	2.2.	44
35	accidental action	2.2.	2

No.	Definition	Item number in Part 1	
36	variable action	2.2.	108
37	clearance	2.2.	9
38	internal clearance	2.2.	52
39	external clearances	2.2.	42
40	reference period	2.2.	73
41	return period	2.2.	78
42	security	2.2.	80
43	component	2.2.	14
44	electric field	2.2.	38
45	magnetic field	2.2.	56
46	equipotential bonding	2.2.	40
47	earth surface potential	2.2.	31
48	transferred potential	2.2.	104
49	earth fault current	2.2.	28
50	current to earth	2.2.	18
51	sparkover	2.2.	83
52	conductor (of an overhead line)	2.2.	16
53	earth wire	2.2.	35
54	optical groundwire, OPGW	2.2.	61
55	earthing conductor	2.2.	33
56	covered conductor	2.2.	16.1
57	bonding conductor	2.2.	4
58	optical conductor, OPCON	2.2.	60
59	load case	2.2.	55
60	resistance to earth of an earth electrode	2.2.	77
61	soil resistivity	2.2.	82
62	load arrangements	2.2.	54
63	system with resonant earthing	2.2.	100
64	system with isolated neutral	2.2.	97
65	system with low-impedance neutral or phase earthing	2.2.	99
66	system with low-impedance neutral earthing	2.2.	98
67	support, terminal (dead end)	2.2.	94
68	support, tension	2.2.	93
69	support, tangent	2.2.	92
70	support, angle	2.2.	89
71	support, section	2.2.	90
72	anti-cascading tower	2.2.	3

No.	Definition	Item number in Part 1	
73	support, suspension	2.2.	91
74	glu-lam wood poles	2.2.	48
75	Project Specification	2.2.	67
76	limit state (structural)	2.2.	53
77	ultimate limit state	2.2.	105
78	serviceability limit state	2.2.	81
79	potential grading	2.2.	65
80	system (electrical)	2.2.	96
81	system (mechanical)	2.2.	95
82	design situation	2.2.	20
83	earthing system	2.2.	34
84	corona	2.2.	17
85	failure (structural)	2.2.	43
86	maintenance	2.2.	58
87	earthing	2.2.	32
88	earth electrode	2.2.	26
89	foundation earth electrode	2.2.	45
90	earth rod	2.2.	30
91	horizontal earth electrode	2.2.	50
92	potential grading earth electrode	2.2.	66
93	box values	2.2.	5
94	characteristic value of an action	2.2.	8
95	characteristic value of a material property	2.2.	7
96	combination value for an action	2.2.	13
97	design value of an action	2.2.	22
98	design value of a material property	2.2.	21
99	effective field strength	2.2.	36
100	partial factor for an action	2.2.	62
101	partial factor for a material property	2.2.	63
102	combination factor for an action	2.2.	12
103	reduction factor for a three phase line	2.2.	71
104	coefficient of variation	2.2.	10
105	strength	2.2.	86
106	radio interference	2.2.	70
107	television interface	2.2.	101
108	unreliability (structural)	2.2.	107
109	overhead insulated cable system	2.2.	16.2

No.	Definition	Item number in Part 1	
110	earth	2.2.	25
111	reference earth (remote earth)	2.2.	72

Definitions given below are supplementary to Part 1, Subclause 2.2.

(ncpt) **PL.1 Nominal line voltage**

Nominal voltage of the system in which the line can operate.

(ncpt) **PL.2 Design temperature of the phase conductor**

The phase conductor temperature used to determine the sag of the conductor for calculating clearances to ground and crossed objects (in Tables of Chapter 5 determined as “Maximum conductor temperature” in reference to phase conductors).

(ncpt) **PL.3 Permissible continuous service temperature**

Temperature at which the conductor can continuously work without deterioration of material properties.

(ncpt) **PL.4 Basic tension**

The horizontal conductor tension at a temperature of +10 °C.

(ncpt) **PL.5 Line restriction**

Set of additional measures implemented on line sections in order to ensure enhanced safety of the crossed objects.

Restriction levels I, II and III are specified.

(ncpt) **PL.6 Conductor bouncing**

A sudden momentary change of the position of the conductor as a result of ice falling off from the conductor.

(ncpt) **PL.7 Pole tip load**

Notional force applied horizontally at a specified distance “d” from the top of the pole. The value of pole tip load is such that its effects in terms of bending moment at the base of the pole is equivalent to the effect of the design loads.

(ncpt) **PL.8 Crossing**

A location of the line where the orthogonal projections of line conductors and another object on a horizontal plane coincide or cross with each other, or the horizontal clearance of the line to the object is less than the clearance specified in the respective clauses of the NNA.

3 Basis of design

3.2 Requirements of overhead lines

3.2.2 Reliability requirements

(ncpt) **PL.1 Reliability levels**

Unless otherwise specified in the Project Specification, the reliability level is determined as follows:

- Level 1 – temporary lines,
- Level 2 – all lines except temporary and special lines,

– Level 3 – special lines according to the Project Specification.

(ncpt) **PL.2 Temporary lines**

The seasonal factor c_{season} shall be taken as 1.

For temporary lines installed for a period between May and September, the ice load need not be taken into consideration.

3.2.3 Security requirements

(ncpt) **PL.1 Additional partial factor**

The Project Specification may introduce the additional partial factor used for the values of the effects of actions for all load cases according to 4.12.2.

NOTE:

It is recommended to apply additional partial factor, so-called factor for the expected consequences of failure, in case of supports of lines directly exporting power from generating units, multi-circuit lines (over 2 circuits) and lines running over forests.

3.2.8 Durability

(ncpt) **PL.1 Environmental corrosion**

The Project Specification shall specify the atmospheric-corrosivity category for the area which the line traverses.

3.6 Design values

3.6.2 Design value of an action

(ncpt) **PL.1 Partial factors**

The partial factors γ_I, γ_W, γ_G, γ_{A1}, γ_{A2} shall be applied to the characteristic values of the actions. The γ_P partial factor for safety load cases (Table 4.12.2/PL.2, Load case 6) shall be applied to the action effect of the characteristic values of the actions, i.e. to the conductor tension.

4 Actions on lines

4.3 Wind loads

4.3.1 Field of application and basic wind velocity

(ncpt) **PL.1 Reference height above ground**

Rules given in Part 1, p. 4.3 related to the wind loads on overhead line components are applicable for any reference height above ground.

(snc) **PL.2 Map of wind load zones**

Wind load zones are shown in Figure 4.3.1/PL.1.