

This is a preview of "BS EN 50341-2-22:202...". [Click here to purchase the full version from the ANSI store.](#)



**BSI Standards Publication**

## **Overhead electrical lines exceeding AC 1 kV**

---

Part 2-22: National Normative Aspects (NNA) for  
Poland (based on EN 50341-1:2012)

This is a preview of "BS EN 50341-2-22:2022...". [Click here to purchase the full version from the ANSI store.](#)

## National foreword

This British Standard is the UK implementation of EN 50341-2-22:2022. It supersedes BS EN 50341-2-22:2016, which is withdrawn.

This standard, together with the following list of National Normative Aspect standards, supersedes BS EN 50423-3:2005 and BS EN 50341-3:2001.

Country Code	Origin	Ref
AT	Austrian National Committee	BS EN 50341-2-1:2022
BE	Belgian National Committee	BS EN 50341-2-2:2019
CH	Swiss National Committee	* BS EN 50341-2-3
DE	German National Committee	BS EN 50341-2-4:2019
DK	Danish National Committee	BS EN 50341-2-5:2017
ES	Spanish National Committee	BS EN 50341-2-6:2017
FI	Finnish National Committee	BS EN 50341-2-7:2015
FR	French National Committee	BS EN 50341-2-8:2017
GB	British National Committee	BS EN 50341-2-9:2017+A1:2018
GR	Greek National Committee	* BS EN 50341-2-10
IE	Irish National Committee	* BS EN 50341-2-11
IS	Iceland National Committee	BS EN 50341-2-12:2018
IT	Italian National Committee	BS EN 50341-2-13:2017+A1:2017
LU	Luxemburg National Committee	No NNA available
NL	Nederland's National Committee	BS EN 50341-2-15:2019
NO	Norwegian National Committee	BS EN 50341-2-16:2016
PT	Portuguese National Committee	* BS EN 50341-2-17
SE	Swedish National Committee	BS EN 50341-2-18:2016
CZ	Czech National Committee	BS EN 50341-2-19:2015
EE	Estonian National Committee	BS EN 50341-2-20:2018
PL	Polish National Committee	BS EN 50341-2-22:2022
SK	Slovak National Committee	BS EN 50341-2-23:2016
RO	Romanian National Committee	BS EN 50341-2-24:2019

BS EN 504243-3:2005 and BS EN 50341-3:2001 will be withdrawn upon publication of the rest of the series.

This is a preview of "BS EN 50341-2-22:202...". [Click here to purchase the full version from the ANSI store.](#)

The UK participation in its preparation was entrusted to Technical Committee PEL/11, Overhead Lines.

A list of organizations represented on this committee can be obtained on request to its committee manager.

### **Contractual and legal considerations**

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2022  
Published by BSI Standards Limited 2022

ISBN 978 0 539 21906 7

ICS 29.240.20

### **Compliance with a British Standard cannot confer immunity from legal obligations.**

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 May 2022.

### **Amendments/corrigenda issued since publication**

Date	Text affected
------	---------------

---

This is a preview of "BS EN 50341-2-22:202...". [Click here to purchase the full version from the ANSI store.](#)

This is a preview of "BS EN 50341-2-22:2022...". [Click here to purchase the full version from the ANSI store.](#)

## EUROPÄISCHE NORM

March 2022

ICS 29.240.20

Supersedes EN 50341-2-22:2016 and all of its amendments and corrigenda (if any)

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

To be completed

This European Standard was approved by CENELEC on 2022-01-12. 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**

This is a preview of "BS EN 50341-2-22:202...". [Click here to purchase the full version from the ANSI store.](#)

Contents	Page
European foreword .....	6
<b>1 Scope .....</b>	<b>7</b>
<b>1.1 General .....</b>	<b>7</b>
<b>1.2 Field of application .....</b>	<b>7</b>
<b>2 Normative references, definitions and symbols .....</b>	<b>7</b>
<b>2.1 Normative references.....</b>	<b>7</b>
<b>2.2 Definitions .....</b>	<b>9</b>
<b>3 Basis of design .....</b>	<b>12</b>
<b>3.2 Requirements of overhead lines .....</b>	<b>12</b>
<b>3.2.2 Reliability requirements .....</b>	<b>12</b>
<b>3.2.3 Security requirements .....</b>	<b>13</b>
<b>3.2.8 Durability.....</b>	<b>13</b>
<b>3.6 Design values.....</b>	<b>13</b>
<b>3.6.2 Design value of an action.....</b>	<b>13</b>
<b>4 Actions on lines.....</b>	<b>13</b>
<b>4.3 Wind loads .....</b>	<b>13</b>
<b>4.3.1 Field of application and basic wind velocity .....</b>	<b>13</b>
<b>4.3.2 Mean wind velocity .....</b>	<b>15</b>
<b>4.3.3 Mean wind pressure .....</b>	<b>15</b>
<b>4.3.5 Wind forces on any overhead line component .....</b>	<b>15</b>
<b>4.4 Wind forces on overhead line components .....</b>	<b>16</b>
<b>4.4.1 Wind forces on conductors .....</b>	<b>16</b>
<b>4.4.1.1 General .....</b>	<b>16</b>
<b>4.4.1.2 Structural factor .....</b>	<b>16</b>
<b>4.4.1.3 Drag factor.....</b>	<b>16</b>
<b>4.4.2 Wind forces on insulator sets .....</b>	<b>16</b>
<b>4.4.3 Wind forces on lattice towers .....</b>	<b>16</b>
<b>4.4.3.1 General .....</b>	<b>16</b>
<b>4.4.3.2 Method 1 .....</b>	<b>17</b>
<b>4.4.4 Wind forces on poles.....</b>	<b>17</b>
<b>4.5 Ice loads .....</b>	<b>17</b>
<b>4.5.1 General.....</b>	<b>17</b>
<b>4.5.2 Ice forces on conductors .....</b>	<b>19</b>
<b>4.6 Combined wind and ice loads .....</b>	<b>19</b>
<b>4.6.2 Drag factors and ice densities .....</b>	<b>19</b>
<b>4.6.3 Mean wind pressure and peak wind pressure .....</b>	<b>19</b>
<b>4.6.6 Combination of wind velocities and ice loads.....</b>	<b>19</b>
<b>4.6.6.1 Extreme ice load <math>I_T</math> combined with a high probability wind velocity <math>V_{IH}</math> .....</b>	<b>19</b>
<b>4.6.6.2 Nominal ice load <math>I_3</math> combined with low probability wind velocity <math>V_{IL}</math>.....</b>	<b>20</b>
<b>4.7 Temperature effects.....</b>	<b>20</b>
<b>4.8 Security loads .....</b>	<b>20</b>
<b>4.8.1 General.....</b>	<b>20</b>
<b>4.9 Safety loads .....</b>	<b>20</b>
<b>4.9.2 Loads related to the weight of the linesman .....</b>	<b>20</b>
<b>4.10 Forces due to short-circuit currents .....</b>	<b>20</b>
<b>4.12 Load cases .....</b>	<b>20</b>

This is a preview of "BS EN 50341-2-22:2022...". [Click here to purchase the full version from the ANSI store.](#)

4.12.1	General.....	20
4.12.2	Standard load cases .....	21
4.13	Partial factors for actions.....	23
5	Electrical requirements .....	23
5.3	Insulation co – ordination.....	23
5.5	Minimum air clearance distances to avoid flashover.....	24
5.6	Load cases for calculation of clearances .....	24
5.6.2	Maximum conductor temperature .....	24
5.6.3	Wind loads for determination of electric clearances .....	25
5.6.3.2	Nominal wind loads for determination of internal and external clearances .....	25
5.6.3.3	Extreme wind loads for determination of internal clearances.....	25
5.6.4	Ice loads for determination of electric clearances.....	25
5.6.5	Combined wind and ice loads .....	25
5.8	Internal clearances within the span and at the top of support .....	25
5.9	External clearances .....	32
5.9.1	General.....	32
5.9.2	External clearances to ground in areas remote from buildings, roads, etc. ....	34
5.9.3	External clearances to residential and other buildings .....	36
5.9.4	External clearances to line crossing traffic routes .....	38
5.9.5	External clearances to adjacent traffic routes .....	40
5.9.6	External clearances to other power lines or overhead telecommunication lines .....	41
5.9.7	External clearances to recreational areas (playgrounds, sport areas, etc.) .....	43
6	Earthing systems .....	43
6.1	Introduction.....	43
6.1.1	Purpose .....	43
6.1.3	Earthing measures against lightning effects .....	43
6.2	Ratings with regard to corrosion and mechanical strength.....	44
6.2.2	Earthing and bonding conductors .....	44
6.4	Dimensioning with regard to human safety .....	44
6.4.3	Basic design of earthing systems with regard to permissible touch voltage .....	44
7	Supports .....	44
7.3	Lattice steel towers.....	44
7.3.1	General.....	44
7.3.5	Structural analysis .....	44
7.3.6	Ultimate limit states.....	45
7.3.6.1	General .....	45
7.3.6.3	Tension, bending and compression resistance of members.....	45
7.3.6.4	Buckling resistance of members in compression.....	45
7.3.7	Serviceability limit states.....	45
7.3.8	Resistance of connections.....	46
7.3.9	Design assisted by testing.....	46
7.4	Steel poles.....	46
7.4.1	General.....	46
7.4.5	Structural analysis (EN 1993-1-1:2005 – Chapter 5).....	46

This is a preview of "BS EN 50341-2-22:2022...". [Click here to purchase the full version from the ANSI store.](#)

7.4.6	Ultimate limit states (EN 1993-1-1:2005 – Chapter 6).....	46
7.4.6.1	General .....	46
7.4.7	Serviceability limit states (EN 1993-1-1:2005 – Chapter 7) .....	46
7.4.8	Resistance of connections .....	47
7.4.8.2	Bolts (other than holding-down bolts) .....	47
7.4.9	Design assisted by testing .....	47
7.5	Wood poles .....	47
7.5.1	General.....	47
7.5.5	Ultimate limit states.....	47
7.5.5.3	Resistance of wood elements .....	47
7.6	Concrete poles .....	47
7.6.1	General.....	47
7.6.3	Materials.....	47
7.6.4	Ultimate limit states.....	48
7.6.5	Serviceability limit states.....	48
7.10	Maintenance facilities .....	48
7.10.3	Safety requirements .....	48
7.11	Loading tests .....	48
7.12	Assembly and erection .....	48
8	Foundations.....	49
8.1	Introduction.....	49
8.2	Basis of geotechnical design (EN 1997-1:2004 – Section 2).....	49
8.2.2	Geotechnical design by calculation.....	49
8.2.4	Load tests and tests on experimental models.....	50
8.3	Soil investigation and geotechnical data (EN 1997-1:2004 – Section 3).....	50
8.4	Supervision of construction, monitoring and maintenance (EN 1997-1:2004 – Section 4) .....	51
9	Conductors and earth-wires.....	52
9.2	Aluminium based conductors .....	52
9.2.3	Conductor service temperatures and grease characteristics.....	52
9.3	Steel based conductors .....	52
9.3.3	Conductor service temperatures and grease characteristics.....	52
9.5	Conductors and ground wires containing optical fibre telecommunication circuits .....	53
9.5.3	Conductor service temperatures .....	53
9.6	General requirements .....	53
9.6.2	Partial factor for conductors.....	53
10	Insulators.....	54
10.4	Pollution performance requirements .....	54
10.5	Power arc requirements.....	54
10.7	Mechanical requirements .....	55
11	Hardware.....	55
11.6	Mechanical requirements .....	55
12	Quality assurance, checks and taking-over .....	55
Annex J (normative)	Angles in lattice steel towers.....	56
J.2	General .....	56
J.3	Tension resistance of angles connected through one leg (see 7.3.6.2) .....	56



This is a preview of "BS EN 50341-2-22:202...". [Click here to purchase the full version from the ANSI store.](#)

<b>Annex K (normative) Steel poles</b> .....	<b>57</b>
<b>K.2 Classification of cross sections (EN 1993-1-1:2005 – 5.5)</b> .....	<b>57</b>
<b>K.4 Resistance of circular cross sections</b> .....	<b>57</b>
<b>Annex M (informative) Geotechnical and structural design of foundations</b> .....	<b>58</b>
<b>M.2 Sample analytical models for uplift resistance calculation</b> .....	<b>58</b>
<b>M.2.2 Calculation of <math>R_w</math></b> .....	<b>58</b>

This is a preview of "BS EN 50341-2-22:202...". [Click here to purchase the full version from the ANSI store.](#)

### European Foreword

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

Polski Komitet Normalizacyjny  
ul. Świętokrzyska 14  
00-050 Warszawa  
Polska  
phone: +48 22 55 67 591  
e-mail: [intdoc@pkn.pl](mailto:intdoc@pkn.pl)

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.

This is a preview of "BS EN 50341-2-22:202...". [Click here to purchase the full version from the ANSI store.](#)

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