



SLOVENSKI STANDARD SIST EN 50341-2-19:2016

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Nadzemni električni vodi za izmenične napetosti nad 1 kV - 2-19. del: Nacionalna normativna določila (NNA) za Češko republiko (na podlagi EN 50341-1:2012)

Overhead electrical lines exceeding AC 1 kV - Part 2-19: National Normative Aspects (NNA) for CZECH REPUBLIC (based on EN 50341-1:2012)

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ICS:

29.240.20	Daljnovodi	Power transmission and distribution lines
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EUROPEAN STANDARD

EN 50341-2-19

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2015

ICS 29.240.20

English Version

Overhead electrical lines exceeding AC 1 kV - Part 2-19:
National Normative Aspects (NNA) for CZECH REPUBLIC
(based on EN 50341-1:2012)

This European Standard was approved by CENELEC on 2015-04-07.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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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

Contents

	Page
1	Scope 7
1.1	General 7
1.2	Field of application 7
2	Normative references, definitions and symbols 7
2.1	Normative references 7
2.2	Definitions 10
2.3	Symbols 10
3	Basis of design 12
3.2.2	Reliability requirements 12
3.2.5	Strength coordination 12
3.2.6	Additional considerations 12
4	Actions on lines 13
4.3	Wind loads 13
4.3.1	Field of application and basic wind velocity 13
4.3.2	Mean wind velocity 13
4.3.3	Mean wind pressure 13
4.4	Wind forces on overhead line components 13
4.4.1	Wind forces on conductors 13
4.4.2	Wind forces on insulator sets 14
4.4.3	Wind forces on lattice towers 15
4.4.4	Wind forces on poles 15
4.5	Ice loads 15
4.5.1	General 15
4.6	Combined wind and ice loads 16
4.6.1	Combined probabilities 16
4.6.2	Drag factors and ice densities 17
4.6.5	Wind forces on support for ice covered conductors 17
4.6.6	Combination of wind velocities and ice loads 17
4.7	Temperature effects 18
4.8	Security loads 18
4.8.1	General 18
4.8.2	Torsional loads 18
4.8.3	Longitudinal loads 19
4.9	Safety loads 19
4.9.1	Construction and maintenance loads 19
4.9.2	Loads related to the weight of linesmen 19
4.10	Forces due to short-circuit currents 19
4.11	Other special forces 20
4.11.1	Avalanches, creeping snow 20
4.11.2	Earthquakes 20
4.12	Load cases 20
4.12.1	General 20
4.12.2	Standard load cases 20
4.13	Partial factors for actions 22
5	Electrical requirements 25
5.3	Insulation coordination 25
5.4	Classification of voltages and overvoltages 25
5.4.2	Representative power frequency voltages 25
5.5	Minimum air clearance distances to avoid flashover 26

5.5.2	Application of the theoretical method in Annex E	26
5.5.3	Empirical method based on European experience	26
5.6	Load cases for calculation of clearances	27
5.6.2	Maximum conductor temperature	27
5.6.3	Wind loads for determination of electric clearances	27
5.6.4	Ice loads for determination of electric clearances	28
5.6.5	Combined wind and ice loads	29
5.7	Coordination of conductor positions and electrical stresses	30
5.8	Internal clearances within the span and at the top of support	30
5.9	External clearances	33
5.9.1	General	33
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	34
5.9.4	External clearances to crossing traffic routes	36
5.9.5	External clearances to adjacent traffic routes	38
5.9.6	External clearances to other power lines or overhead telecommunication lines	38
5.10	Corona effect	40
5.10.1	Radio noise	40
5.11	Electric and magnetic fields	40
5.11.1	Electric and magnetic fields under a line	40
5.11.2	Electric and magnetic field induction	40
5.11.3	Interference with telecommunication circuits	40
6	Earthing systems	41
6.1	Introduction	41
6.1.2	Requirements for dimensioning of earthing systems	41
6.1.3	Earthing measures against lightning effects	41
6.1.4	Transferred potentials	42
6.2	Ratings with regard to corrosion and mechanical strength	43
6.2.1	Earth electrodes	43
6.2.2	Earthing and bonding conductors	43
6.4	Dimensioning with regard to human safety	43
6.4.1	Permissible values for touch voltages	43
6.4.3	Basic design of earthing systems with regard to permissible touch voltage	43
7	Supports	44
7.3	Lattice steel towers	44
7.3.6	Ultimate limit states	44
7.3.7	Serviceability limit states	44
7.3.8	Resistance of connections	44
7.3.9	Design assisted by testing	44
7.4	Steel poles	45
7.4.6	Ultimate limit states (EN 1993-1-1:2005 – Chapter 6)	45
7.4.7	Serviceability limit states (EN 1993-1-1:2005 – Chapter 7)	45
7.4.8	Resistance of connections	45
7.4.9	Design assisted by testing	45
7.5	Wood poles	45
7.5.5	Ultimate limit states	45
7.5.6	Serviceability limit states	45
7.5.7	Resistance of connections	45
7.5.8	Design assisted by testing	46
7.6	Concrete poles	46
7.6.4	Ultimate limit states	46
7.6.5	Serviceability limit states	46

7.6.6	Design assisted by testing	46
7.7	Guyed structures	46
7.7.4	Ultimate limit states	46
7.7.5	Serviceability limit states	47
7.9	Corrosion protection and finishes	47
7.9.1	General	47
7.10	Maintenance facilities	47
7.10.1	Climbing	47
7.10.2	Maintainability	47
7.10.3	Safety requirements	47
8	Foundations	47
8.1	Introduction	47
8.2	Basis of geotechnical design (EN 1997-1:2004 – Section 2)	47
8.2.2	Geotechnical design by calculation	47
8.3	Soil investigation and geotechnical data (EN 1997-1:2004 – Section 3)	47
9	Conductors and earth-wires	48
9.1	Introduction	48
9.2	Aluminium based conductors	48
9.2.2	Electrical requirements	48
9.2.3	Conductor service temperatures and grease characteristics	49
9.2.4	Mechanical requirements	49
9.2.5	Corrosion protection	49
9.2.6	Test requirements	49
9.3	Steel based conductors	50
9.3.1	Characteristics and dimensions	50
9.3.3	Conductor service temperatures and grease characteristics	50
9.3.4	Mechanical requirements	50
9.3.5	Corrosion protection	51
9.3.6	Test requirements	51
9.4	Copper base conductors	51
9.5	Conductors and ground wires containing optical fibre telecommunication circuits	51
9.5.1	Characteristics and dimensions	51
9.5.2	Electrical requirements	51
9.5.3	Conductor service temperatures	51
9.5.4	Mechanical requirements	51
9.6	General requirements	52
9.6.2	Partial factor for conductors	52
9.6.3	Minimum cross-sections	52
9.6.4	Sag – tension calculations	52
10	Insulators	52
10.1	Introduction	52
10.4	Pollution performance requirements	52
10.5	Power arc requirements	53
10.7	Mechanical requirements	53
10.10	Characteristics and dimensions of insulators	53
10.11	Type test requirements	54
10.11.1	Standard type tests	54
10.11.2	Optional type tests	54
11	Hardware	54
11.1	Introduction	54
11.6	Mechanical requirements	54
12	Quality assurance, checks and taking-over	55

Annex H/CZ (informative).....	55
Installation and measurements of earthing systems	55
H.2 Basis for the verification	55
H.2.2 Resistance to earth.....	55
H.3 Installation of earth electrodes and earthing conductors.....	55
H.3.1 Installation of earth conductors.....	55
H.4 Measurements for and on earthing systems	55
H.4.4 Determination of the earth potential rise	55
H.4.5 Reduction factor related to earth wires of overhead lines	56
Annex M/CZ (informative).....	56
Geotechnical and structural design of foundations	56
M.1 Typical values of the geotechnical parameters of soils and rocks	56
M.1.3 Symbols, definitions and units of some ground parameters	56
M.3 Sample semi-empirical models for resistance estimation	62
M.3.1 Geotechnical design by calculation	62
Annex S/CZ (informative).....	63
Map of icing zones in the Czech Republic	63

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[SIST EN 50341-2-19:2016](https://standards.iteh.ai/catalog/standards/sist/b33673b0-1178-4900-9525-5f9c4b2772eb/sist-en-50341-2-19-2016)

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Foreword

1. The Czech National Committee (NC) is identified by the following address :
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Czech Republic
2. The Czech National Committee has prepared this Part 2–19 (EN 50341-2-19) listing the Czech National Normative Aspects (NNA) under its sole responsibility and duly passed this document through the CENELEC and CLC/TC11 procedures.

NOTE The Czech National Committee also takes sole responsibility for the technically correct co-ordination of this EN 50341-2-19 with EN 50341-1. It has performed the necessary checks in the frame of quality assurance/control. However, it is noted that this quality assurance/control has been made in the framework of the general responsibility of The Czech National Committee under the national laws/regulations.

3. This EN 50341-2-19 is normative in the Czech Republic and informative for other countries.
4. This EN 50341-2-19 has to be read in conjunction with EN 50341-1, hereinafter referred as Part 1. All clause numbers used in Part 2–19 correspond to those of Part 1. Specific subclauses which are prefixed CZ are to be read as amendments to the relevant text in Part 1. Any necessary clarification regarding the application of Part 2–19 in conjunction with Part 1 shall be referred to the Czech Office for Standards, Metrology and Testing that will, in co-operation with CLC/TC11, clarify the requirements. When no reference is made in Part 2–19 to a specific subclause, then Part 1 applies.
5. In the case of “boxed values” defined in Part 1, amended values (if any) which are defined in Part 2–19 shall be taken into account in the Czech Republic.
However, any “boxed values” whether in Part 1 or Part 2-19, shall not be amended in direction of greater risk in the Project Specification.
6. The national Czech standards/regulations, regarding overhead lines exceeding 1 kV AC, are listed in 2.1/CZ.2 and 2.1/CZ.3.

NOTE All national standards referred to in this Part 2–19 will be replaced by the relevant European Standards as soon as they become available and are declared by the Czech Office for Standards, Metrology and Testing to be applicable and thus reported to the secretary of CLC/TC11.

1 Scope**1.1 General****(ncpt) CZ.1 New overhead line**

The new overhead line is considered a brand new electric overhead line with nominal voltage exceeding 1 kV AC, between the points A and B.

The new branch line of the existing overhead line shall be considered a new overhead line except for a junction support for which the specific requirements shall be defined in the Project Specification.

The extent of application of this standard in respect of reconstruction, relaying and extension of existing overhead lines shall be determined in the Project Specification. Simultaneously, the Project Specification shall determine, which of the previous national standards shall be used and to what extent they shall be used for the project in question.

1.2 Field of application**(ncpt) CZ.1 Field of application**

The requirements of this standard shall be adopted, where applicable (e.g. requirements on loads, external clearances, etc.), for telecommunication cables as well.

In case of overhead line under the design stage, parties concerned shall agree the extent of the application of this standard.

Overhead line under construction may be completed according to standards valid during the design stage of the line. The parties concerned shall agree any possible application of certain clauses of this standard.

(ncpt) CZ.2 Installation of telecommunication equipment on supports

Provisions of this standard also apply to the telecommunication equipment and devices (aerials, dish antennas, etc.) which are installed on individual supports of overhead power lines, especially in terms of wind and ice loads on such installed equipment. Design and installation has to respect requirements of the utility operating the line in question. The design of such telecommunication equipment has to incorporate such technical solutions and such precautions, which shall allow safe access and maintenance of both a power line and telecommunication equipment, and which shall provide protection of persons performing repairs or maintenance of the power line and/or telecommunication equipment against electric shock and protection of telecommunication equipment and attached installations against the influence of the power line (short-circuits, switching and lightning overvoltages etc.).

2 Normative references, definitions and symbols**2.1 Normative references****(ncpt) CZ.1 General**

National laws, Government regulations and other binding regulations are included in following 2.1/CZ.2. International and national standards quoted in EN 50341-2-19 and not included in 2.1 EN 50341-1 are included in 2.1/CZ.3.

The set of standards included in 2.1 EN 50341-1 under a common title of Eurocodes is valid in the Czech Republic including the Czech National Application documents related to relevant standards, unless EN 50341-1 and/or these Czech National Normative Aspects (EN 50341-2-19) specify otherwise.

NOTE Some EN, IEC, ISO and CISPR International Standards and publications implemented as Czech National Standards – ČSN EN, ČSN IEC, ČSN ISO and ČSN CISPR – include informative notes and informative annexes useful in the Czech Republic.

(A-dev) **CZ.2 National laws, government decrees and other binding rules of law**

Reference	Title
114/1995 Sb.	Zákon o vnitrozemské plavbě <i>Inland Navigation Act</i>
222/1995 Sb.	Vyhláška ministerstva dopravy o vodních cestách, plavebním provozu v přístavech, společné havárii a dopravě nebezpečných věcí <i>Regulation of the Ministry of Transport on Waterways, Navigable operation in Harbors, Common collapse and the transport of dangerous goods</i>
1/2008 Sb.	Nařízení vlády o ochraně zdraví před neionizujícím zářením <i>Decree of the government on health protection against non-ionizing radiation</i>
458/2000 Sb.	Zákon o podmínkách podnikání a o výkonu státní správy v energetických odvětvích a o změně některých zákonů (energetický zákon) <i>Act on Conditions of Enterprise and on Performance of State Administration in Power Industries and on Alteration of Certain Acts (Energy Act)</i>
FMPE 994/11:1981 FMD 621/1981-SM	Dohoda o postupu při interferenčním ovlivnění zabezpečovacího zařízení celostátních drah zařízeními elektrizační soustavy <i>The agreement on the common practice on interference influence of state railway security equipment by electricity system devices</i>

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(ncpt) **CZ.3 Standards**

Reference	Title
ČSN EN 1991-1-4:2007	Eurokód 1: Zatížení konstrukcí – Část 1-4: Obecná zatížení – Zatížení větrem (Národní příloha NA pro ČR, Mapa větrných oblastí) <i>Eurocode 1: Action on structures. Part 1-4: General actions – Wind Actions (National Annex NA for the Czech Republic, Wind zone map)</i>
ČSN EN 1991-1-4 NA:2013	
ČSN 33 2040:1993	Elektrotechnické předpisy. Ochrana před účinky elektromagnetického pole 50 Hz v pásmu vlivu zařízení elektrizační soustavy. <i>Electric engineering regulations. Protection against effects of the electromagnetic fields 50 Hz in the zone of influence of electric power system device</i>
ČSN 33 2160:1993	Elektrotechnické předpisy. Předpisy pro ochranu sdělovacích vedení a zařízení před nebezpečnými vlivy trojfázových vedení vn, vvn a zvn <i>Electric engineering regulations. Rules for the protection of telecommunication lines and equipment against dangerous influences of three-phase high voltage, very high voltage and ultra high voltage lines</i>
ČSN 33 2165 ed.2:2014	Elektrotechnické předpisy. Zásady pro ochranu ocelových izolovaných potrubí uložených v zemi před nebezpečnými vlivy venkovních trojfázových vedení a stanic vvn a zvn <i>Electric engineering regulations. Principles for protection of buried insulated steel pipelines against dangerous effects of very high voltage overhead lines and very high voltage stations</i>

Reference	Title
ČSN 34 1530:2010	Drážní zařízení – Elektrická trakční vedení železničních drah celostátních, regionálních a vleček <i>Railway applications – The catenary for electrified railways</i>
ČSN 730810:2009	Požární bezpečnost staveb – Společná ustanovení <i>Fire protection of buildings - General requirements</i>
ČSN 73 6133:2010	Návrh a provádění zemního tělesa pozemních komunikací <i>Road earthwork - Design and execution</i>
EN 13501-1:2007 +A1:2009	Požární klasifikace stavebních výrobků a konstrukcí staveb – Část 1: Klasifikace podle výsledků zkoušek reakce na oheň <i>Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.</i>
EN 13501-5:2005 +A1:2009 + AC:2008-09	Požární klasifikace stavebních výrobků a konstrukcí staveb - Část 5: Klasifikace podle výsledků zkoušek střech vystavených vnějšímu požáru <i>Fire classification of construction products and building elements - Part 5: Classification using data from external fire exposure to roofs tests</i>
EN 50522	Uzemňování elektrických instalací AC nad 1 kV <i>Earthing of power installations exceeding 1 kV AC.</i>
ČSN EN 61936-1:2011	Elektrické instalace nad AC 1 kV – Část 1: Všeobecná pravidla (Národní příloha NA – odrušení vedení a rozvedení vn, vvn a zvn – přípustné meze vf šumu) <i>Power installations exceeding 1 kV AC – Part 1: Common rules (National Annex NA – Disturbance elimination for lines and substations of high voltage, extra high voltage and ultra high voltage – allowed high-frequency noise limits</i>
EN 62305-3	Ochrana před bleskem – Část 3: Hmotné škody na stavbách a nebezpečí života <i>Protection against lightning – Part 3: Physical damage to structures and life hazard</i>
EN ISO 14688-1:2002 +A1:2013	Geotechnický průzkum a zkoušení – Pojmenování a zařizování zemin – Část 1: Pojmenování a popis <i>Geotechnical investigation and testing - Identification and classification of soil - Part 1: Identification and description</i>
EN ISO 14688-2:2004 +A1:2013	Geotechnický průzkum a zkoušení - Pojmenování a zařizování zemin - Část 2: Zásady pro zařizování <i>Geotechnical investigation and testing - Identification and classification of soil - Part 2: Principles for a classification</i>
EN ISO 14689-1:2003	Geotechnický průzkum a zkoušení - Pojmenování a zařizování hornin - Část 1: Pojmenování a popis <i>Geotechnical investigation and testing - Identification and classification of rock - Part 1: Identification and description</i>
EN 206	Beton - Specifikace, vlastnosti, výroba a shoda <i>Concrete - Specification, performance, production and conformity</i>

(ncpt) **CZ.4 Other publications**

Reference	Title
The Ministry of Transport TP-76 (updated in 2009)	Ministerstvo dopravy - Technické podmínky – Geotechnický průzkum pro pozemní komunikace – část A: Zásady geotechnického průzkumu <i>Ministry of transport - Technical conditions – Geotechnical investigation for roads – part A: The principles of geotechnical investigation</i>
ČSN 73 1001:1988 (withdrawn 1.4.2010)	Zakládání staveb. Základová půda pod plošnými základy <i>Foundation of structures. Subsoil under shallow foundations</i>
ČSN 73 3050:1987 (withdrawn 1.3.2010)	Zemné práce. Všeobecné ustanovenia <i>Earth works. General requirements</i>
CIGRE TB 207:2002	CIGRÉ technical brochure N° 207 “Thermal behaviour of overhead conductors”
CIGRE TB 273:2005	CIGRÉ technical brochure N° 273 “Overhead conductor safe design tension with respect to Aeolian vibrations”

2.2 Definitions(ncpt) **CZ.1 span**

part of a line between attachment points of a *conductor* on two consecutive *supports* (IEV 466-03-01)

NOTE This definition is included for the reason that the English word “span” corresponds with the Czech conversion used in ČSN IEC 50 (466) which means “a span length”

(ncpt) **CZ.2 overhead telecommunication line and equipment**

wire or cable line and telecommunication equipment leading above ground and outside buildings and transmitting information via electromagnetic waves

(ncpt) **CZ.3 aluminium based conductor**

bare *conductor* made of round or shaped wires being concentric lay stranded with alternating directions of stranding, with grease or not, produced of materials or various materials according to one of following alternatives

- aluminium wires
- aluminium alloy wires
- combination of aluminium wires and aluminium alloy wires
- combination of aluminium wires and steel zinc coated wires
- combination of aluminium wires and aluminium clad steel wires
- combination of aluminium alloy wires and steel zinc coated wires
- combination of aluminium alloy wires and aluminium clad steel wires

(ncpt) **CZ.4 steel based conductor**

bare *conductor* made of round or shaped wires being concentric lay stranded with alternating directions of stranding, with grease or not, produced of materials or various materials according to one of following alternatives

- steel zinc coated wires
- aluminium clad steel wires

2.3 Symbols(ncpt) **CZ.1 Symbols**

Symbols which are contained in EN 50341-2-19 and are not contained in EN 50341-1, or which are contained in EN 50341-2-19 also with a different meaning than in 2.3 EN 50341-1, are included below.

Symbol	Signification	References
b_{emp}	Minimum clearance between conductors within the span according to empirical formula	5.8/CZ.3
c_{emp}	Constant in empirical formula for the minimum clearance between conductors within the span	5.8/CZ.3
D_{el1}	Minimum clearance required to prevent a disruptive discharge between phase conductor and external object at earth potential during fast front and slow front overvoltages (external clearance)	5.5.3/CZ.1
D_{el2}	Minimum clearance required to prevent a disruptive discharge between phase conductor and support structure during fast front and slow front overvoltages (internal clearance)	5.5.3/CZ.1
D_{el3}	Minimum clearance required to prevent a disruptive discharge between phase conductor in window of a support and support structure during fast front and slow front overvoltages (internal clearance)	5.5.3/CZ.1
D_{el4}	Minimum clearance required to prevent a disruptive discharge between phase conductor and earth wire during fast front and slow front overvoltages (internal clearance)	5.5.3/CZ.1
D_{tr}	Horizontal distance of a tree trunk from the most endangered conductor	5.9.2/CZ.2
f	Conductor sag under specified conditions	5.8/CZ.3
g_c	Self-weight of a conductor per unit length	5.8/CZ.3
H_{tr}	Height of a tree	5.9.2/CZ.2
h_s	Pole height above ground	7.6.5/CZ.2
h_{c_tr}	Height of the most endangered conductor above the horizontal plane of the tree base	5.9.2/CZ.2
h_{pc}	Mean height of phase conductors of a given circuit on a support	4.4.1.1/CZ.2
I_{R50}	Extreme reference ice load per conductor unit length at 10 m height above ground with return period $T = 50$ years	4.5.1/CZ.3
K_h	Height factor for the ice load	4.5.1/CZ.3
K_{ic}	Local condition factor for the ice load	4.5.1/CZ.3
k_{emp} , k_{emp_r}	Factor depending on weight and diameter of a conductor and on mutual position of both conductors	5.8/CZ.3 5.8/CZ.4
L_{ins}	Vertical length of that part of insulator set which may swing in the direction perpendicular to the line	5.8/CZ.1
m_{ins}	Mass of the insulator set	5.8/CZ.5
r	Horizontal distance between the attachment point of a shorter insulator set and the point in a span, where the distance between conductors is checked	5.8/CZ.1
t_i	Ice thickness on a conductor with a diameter of 30 mm according to the actual load combination	4.6.2/CZ.2
U_{rwLI}	Required withstand voltage for lightning impulse	5.3.1/CZ.1
U_{rwSI}	Required withstand voltage for switching impulse	5.3.1/CZ.1
U_{rw50Hz}	Required withstand voltage for power frequency overvoltage	5.3.1/CZ.1
V_2	Wind velocity with return period of 2 years	4.6.6.1/CZ.1
w	Probability factor	H.4.4/CZ.1

z_a	Depth of geotechnical soil investigation below the foundation base	8.3/CZ.1
α_{TSL}	Reduction factor of ice load for torsional security loads	4.8.2/CZ.1
α_{LSL}	Reduction factor of ice load for longitudinal security loads	4.8.3/CZ.2
δ	Angle describing mutual position of both conductors	5.8/CZ.3
φ	Insulator set swing angle	5.8/CZ.5
γ_R	Partial factor for resistance (EN 1997-1, Design approach 2)	8.2.2

3 Basis of design

3.2.2 Reliability requirements

(ncpt) CZ.1 Reliability level of permanent lines

Reliability level 1 (Return period of climatic action 50 years) is considered, unless a higher reliability level is specified in the Project Specification.

(ncpt) CZ.2 Reliability level of temporary lines

Depending on their life duration, the return period of climatic actions for temporary lines, with duration less than 1 year, may be reduced due to the shorter exposure to climatic effects. Return periods of climatic loads and additional information is given in the following Table 3/CZ.1.

Table 3/CZ.1 – Return periods for temporary lines

Life duration	Return period (years)
≤ 3 days	2 ^{a) c)}
≤ 3 months (but > 3 days)	5 ^{b) c)}
≤ 1 year (but > 3 months)	10 ^{b) c)}
NOTES a) For lines, installed for nominal duration of 3 days, it is possible to take into account the meteorological forecast for the given site b) For temporary lines with duration more than 3 days, it is not recommended to use basic mean wind speed lower than 20 m/s. c) Ice loads need not to be considered, provided the line is installed only in the season, when ice accretion does not occur. This period starts on 1 st April and ends on 1 st November.	

3.2.5 Strength coordination

(ncpt) CZ.1 Strength coordination

Only strength coordination for the above-ground part of steel structure of lattice tower stub is specified in this standard (see 7.3.6.1/CZ.3). Additional requirements may be given in the Project Specification.

3.2.6 Additional considerations

(ncpt) CZ.1 Additional considerations

Any further specific requirements, e.g. installation of aircraft warning spheres, night aircraft warning markers, fittings preventing biological pollution of insulators, fittings for bird protection etc., shall be specified in the Project Specification.

4 Actions on lines**4.3 Wind loads****4.3.1 Field of application and basic wind velocity****(ncpt) CZ.1 Basic wind velocity, wind zone map**

The territory of the Czech Republic is divided into five wind zones, for which different basic wind velocities $V_{b,0}$ are defined, as shown in Table 4/CZ.1. Wind zones are shown on Wind zone map of the Czech Republic, that is a part of the National Annex of ČSN EN 1991-1-4:2007 and a part of English version of the National Annex of ČSN EN 1991-1-4 NA ed.A:2013. More accurate information on wind zone borders may be provided by Czech Hydrometeorological Institute.

Based on long-term experience of transmission or distribution system operators, certain locations may be in the Project Specification classified into a wind zone with higher basic wind velocity $V_{b,0}$.

Table 4/CZ.1 – Basic wind velocities $V_{b,0}$

Wind zone	I	II	III	IV	V
Basic wind velocity $V_{b,0}$ (m/s)	22,5	25	27,5	30	36 ^{a)}
a) Basic wind speed in a given location inside wind zone V shall be specified by a corresponding branch office of Czech Hydrometeorological Institute					

4.3.2 Mean wind velocity

(ncpt)

CZ.1 Wind directional factor

Mean wind velocity in the Czech Republic is independent of wind direction. The value of wind directional factor $c_{dir} = 1,0$ shall be used.

(ncpt)

CZ.2 Orography factor

The value of orography factor $c_o = 1,0$ shall be used, unless otherwise specified in the Project Specification.

(ncpt)

CZ.3 Mean wind velocity for lines with nominal voltage up to 45 kV

For elements associated with supports with nominal voltage up to 45 kV and with a maximum height of 24 m, the value of mean wind velocity $V_h(h)$, calculated at 10 m height above ground is considered.

4.3.3 Mean wind pressure

(ncpt)

CZ.1 Air density

The air density ρ in formula for calculation of mean wind pressure at a reference height h according to 4.3.3 is taken as $1,25 \text{ kg/m}^3$ independently of air temperature and altitude H .

4.4 Wind forces on overhead line components**4.4.1 Wind forces on conductors****4.4.1.1 General**

(ncpt)

CZ.1 Wind force on conductor, transferred to a support

When calculating the wind force on conductor, apart from using a method given in 4.4.1.1, it is possible to use an alternative calculation method, where the total wind force on conductor, transferred to a support, is specified as a sum of halved wind forces acting on conductor in both adjacent spans. The values of peak pressure $q_p(h)$ and structural factor for the conductor G_c are calculated separately for both adjacent spans, while reference height of conductor above ground h for corresponding span is given as an arithmetic average of the reference heights h on supports, delimiting the span, specified in 4.4.1.1/CZ.2.