

STN	<p>Vonkajšie elektrické vedenia so striedavým napäťím nad 1 kV Časť 2-18: Národné normatívne hľadiská (NNA) pre ŠVÉDSKO (založené na EN 50341-1: 2012)</p>	<p>STN EN 50341-2-18</p>
		33 3300

Overhead electrical lines exceeding AC 1 kV - Part 2-18: National Normative Aspects (NNA) for Sweden (based on EN 50341-1:2012)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola označená vo Vestníku ÚNMS SR č. 07/17

Obsahuje: EN 50341-2-18:2016

125125

Úrad pre normalizáciu, metrológiu a skúšobníctvo Slovenskej republiky, 2017

Podľa zákona č. 264/1999 Z. z. o technických požiadavkách na výrobky a o posudzovaní zhody a o zmene a doplnení niektorých zákonov v znení neskorších predpisov sa slovenská technická norma a časti slovenskej technickej normy môžu rozmnôžovať alebo rozširovať len so súhlasom slovenského národného normalizačného orgánu.

EUROPEAN STANDARD

EN 50341-2-18

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2016

ICS 29.240.20

English Version

**Overhead electrical lines exceeding AC 1 kV - Part 2-18:
National Normative Aspects (NNA) for Sweden (based on EN
50341-1:2012)**

Lignes électriques aériennes dépassant 1 kV en courant alternatif - Partie 2-18 : Aspects Normatifs Nationaux (NNA) pour la Suède (sur la base de l'EN 50341-1:2012)

This European Standard was approved by CENELEC on 2016-11-01. 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, 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.



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

Foreword	7
1 Scope	8
2 Normative references, definitions and symbols	8
2.1 Normative references	8
2.2 Definitions	11
2.3 Symbols	11
3 Basis of design.....	12
3.2 Requirements of overhead lines	12
3.2.2 Reliability requirements	12
3.6 Design values	13
3.6.2 Design values of an action	13
3.7 Partial factor method and design formula	13
3.7.3.2 Design situations related to permanent and variable actions	13
3.7.3.3 Design situations related to permanent, variable and accidental actions	14
4 Actions on lines.....	14
4.1 Introduction	14
4.3 Wind loads	14
4.3.4 Turbulence intensity and peak wind pressure	14
4.4 Wind forces on overhead line components	14
4.4.1 Wind forces on conductors	14
4.4.1.1 General	14
4.4.1.2 Structural factor	15
4.4.1.3 Drag factor	15
4.4.2 Wind forces on insulator sets	15
4.4.3 Wind forces on lattice towers.....	15
4.4.3.1 General	15
4.4.3.2 Method 1	15
4.4.3.3 Method 2	16
4.4.4 Wind forces on poles	16
4.5 Ice load	16
4.5.2 Ice forces on conductors	16
4.6 Combined wind and ice loads.....	18
4.6.2 Drag factors and ice densities	18
4.6.3 Mean wind pressure and peak wind pressure	18
4.6.4 Equivalent diameter D of ice covered conductor	18
4.7 Temperature effects.....	18
4.8 Security loads	19

4.9	Safety loads	19
4.9.1	Construction and maintenance loads	19
4.12	Load cases.....	19
4.12.2	Standard load cases	19
4.13	Partial factors for actions	24
5	Electrical requirements.....	26
5.3	Insulation co-ordination.....	26
5.4	Classification of voltages and overvoltages.....	27
5.5	Minimum air clearance distances to avoid flashover	28
5.6	Load cases for calculation of clearances.....	30
5.8	Minimum internal clearances within the span and at the top of support.....	34
5.9	External clearances	39
5.9.1	General	39
5.9.2	External clearances to ground in areas remote from buildings, roads, etc.	40
5.9.3	External clearances to residential and other buildings	43
5.9.4	External clearances to crossing traffic routes.....	44
5.9.6	External clearances to other power lines or overhead telecommunication lines.....	46
5.9.7	External clearances to recreational areas (playgrounds, sports areas, etc.)	50
6	Earthing systems	51
6.1	Introduction	51
6.1.3	Earthing measures against lightning effects.....	51
6.1.4	Transferred potentials.....	51
6.2	Ratings with regard to corrosion and mechanical strength	51
6.2.1	Earth electrodes.....	51
6.2.2	Earthing and bonding conductors.....	52
6.4	Dimensioning with regard to human safety	52
6.4.3	Basic design of earthing systems with regard to permissible touch voltage	52
6.4.4	Measures in systems with isolated neutral or resonant earthing	54
7	Supports.....	54
7.1	Initial design considerations.....	54
7.2	Materials	54
7.2.1	Steel materials, bolts, nuts and washers, welding consumables	54
7.2.6	Wood	54
7.3	Lattice steel towers	55
7.3.1	General	55

7.3.3	Materials	55
7.3.6	Ultimate limit states.....	55
7.3.6.1	General	55
7.3.6.3	Tension, bending and compression resistance of members	55
7.3.6.4	Buckling resistance of members in compression	55
7.3.8	Resistance of connections.....	56
7.4	Steel poles	56
7.4.1	General	56
7.4.6.1	Ultimate limit states, General.....	56
7.4.8.1	Connections, Basis	56
	7.4.8.2 Bolts (other than holding-down bolts)	56
7.5	Wood poles	56
7.5.1	General	56
7.5.3	Materials	57
7.5.5	Ultimate limit states.....	57
7.5.5.2	Calculation of internal forces and moments	57
7.5.5.3	Resistance of wood elements.....	57
7.5.5.4	Decay conditions	58
7.5.7	Resistance of connections.....	58
7.5.8	Design assisted by testing	58
7.6	Concrete poles.....	58
7.6.1	General	58
7.6.2	Basis of design	59
7.6.3	Materials	59
7.6.4	Ultimate limit states.....	59
7.6.5	Serviceability limit states	59
7.6.6	Design assisted by testing	60
7.7	Guyed structures.....	60
7.7.3	Materials	60
7.7.4.1	Ultimate limit states, Basis.....	60
7.7.4.2	Calculation of internal forces and moments	60
7.7.4.3	Second order analysis	60
7.7.6	Design details for guys	61
7.8	Other structures	61
7.9	Corrosion protection and finishes	65
7.9.2	Galvanising	66
7.9.3	Metal spraying	66
7.9.6	Use of weather-resistant steels	66
7.9.7	Protection of wood poles	66

7.10	Maintenance facilities	67
7.10.3	Safety requirements.....	67
8	Foundations	67
8.1	Introduction	67
8.2	Basis of geotechnical design	68
8.2.2	Geotechnical design by calculation	68
8.2.3	Design by prescriptive measures	69
8.2.4	Load tests and tests on experimental models	70
8.3	Soil investigation and geotechnical data	71
8.4	Supervision of construction, monitoring and maintenance	72
9	Conductors and earth-wires.....	72
9.1	Introduction	72
9.2	Aluminium based conductors.....	73
9.2.1	Characteristics and dimensions.....	73
9.2.3	Conductor service temperatures and grease performance.....	73
9.2.5	Corrosion protection	73
9.2.6	Test requirements.....	74
9.3	Steel based conductors	74
9.3.1	Characteristics and dimensions.....	74
9.3.3	Conductor service temperatures and grease characteristics	74
9.3.4	Mechanical requirements	74
9.4	Copper based conductors.....	74
9.5	Conductors and ground wires containing optical fibre telecommunication circuits	75
9.5.1	Characteristics and dimensions.....	75
9.5.3	Conductor service temperatures	75
9.5.4	Mechanical requirements	75
9.6	General requirements	76
9.6.2	Partial factor for conductor	76
9.6.4	Sag - tension calculations.....	76
9.8	Selection, delivery and installation of conductors	79
10	Insulators	79
10.2	Standard electrical requirements	79
10.7	Mechanical requirements.....	80
10.10	Characteristics and dimensions of insulators	80
10.16	Selection, delivery and installation of insulators	80
11	Hardware	81
11.2	Electrical requirements	81

11.2.2	Requirement applicable to current carrying fittings	81
11.6	Mechanical requirements.....	81
11.7	Durability requirements.....	82
11.14	Selection, delivery and installation of fittings	82
12	Quality assurance, Checks and taking-over.....	83
12.2	Checks and taking-over	83
Annex E	Electrical requirements	84
E.2	Insulation co-ordination.....	84
Annex G	Earthing systems	84
G.2	Material constants	84
Annex J	Lattice steel towers	84
J.5	Design resistance of bolted connections	84
Annex K	Steel poles	84
K.6	Design of holding-down bolts - Table K.2	84
Annex M	Geotechnical and structural design of foundations	85
M.1	Typical values of the geotechnical parameters of soils and rocks	85
M.2.3	Calculation of R_s	85
M.2.4	Analytical evaluation of R_d	85

European foreword

- 1 The Swedish National Committee (NC) is identified by the following address:
 SEK Svensk Elstandard - TK11 Overhead Lines
 Box 1284
 SE-164 29 KISTA
 Telephone no.: +46 8 444 14 00
 Facsimile no.: +46 8 444 14 30
 E-mail sek@elstandard.se
- 2 The Swedish NC has prepared this Part 2-18 of EN 50341, listing the Swedish national normative aspects (NNA), under the sole responsibility, and duly passed it through the CENELEC and CLC/TC 11 procedures.
- NOTE The Swedish NC also takes the sole responsibility for the technically correct co-ordination of this EN 50341-2-18 with EN 50341. It has performed the necessary checks in the frame of quality assurance/control. It is noted however that this quality assurance/control has been made in the framework of the general responsibility of a standard committee under the national laws/regulations.
- 3 This NNA is normative in Sweden and informative in 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 "SE", 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 Swedish NC who will, in co-operation with CLC/TC 11 clarify the requirements.
 When no reference is made in this NNA 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 this NNA shall be taken into account in Sweden.
 However, any boxed value, whether in Part 1 or in this NNA, shall not be amended in the direction of greater risk in a Project Specification.
- 6 The national Swedish standards / regulations related to overhead electrical lines exceeding 1 kV (AC) are listed in subclause 2.1/SE
- NOTE All national standards referred to in this NNA will be replaced by the relevant European Standards as soon as they become available and are declared by the Swedish NC to be applicable and thus reported to the secretary of CLC/TC 11.

1 Scope

(ncpt)

SE.1 Application to existing overhead lines

This Part 2-18 is applicable for new overhead lines only and not for existing lines.

(A-dev)

SE.2 Maintenance, rebuilding or extension of an overhead line

Measures related to maintenance of the electrical installation shall fulfill the legislation in force when it was erected. In the case of a rebuilding or extension of an electrical installation (overhead line), the regulations in force shall be applied for the rebuilding or extension. (ELSÄK-FS 2008:1)

(ncpt)

SE.3 Replacement

This Part 2-18 replaces the Swedish Standards SS-EN 50341-3-18, edition 1 and SS-EN 50423-3-18, edition 3.

(ncpt)

SE.4 Optical ground wire (OPGW) and optical phase conductor (OPCON)

This Part 2-18 is applicable for installation of OPGW and OPCON, also known as OPPC, in overhead lines in Sweden.

(ncpt)

SE.5 All dielectric self supporting optical cable (ADSS) and optical attached cable (OPAC)

This Part 2-18 is applicable for installation of ADSS and OPAC in overhead lines in Sweden.

NOTE The allowable electrical field for the ADSS cable should be taken into consideration when the conductor configuration is determined.

2 Normative references, definitions and symbols

2.1 Normative references

(A-dev)

SE.1 National normative laws, government regulations

Reference	Title
ELSÄK-FS 2008:1	Elsäkerhetsverkets föreskrifter om hur starkströmsanläggningar ska vara utförda <i>The Swedish National Electrical Safety Board - Regulations regarding design, and erection of electrical installations</i>
ELSÄK FS 2008:3	Elsäkerhetsverkets föreskrifter om innehavarens kontroll av elektriska starkströmsanläggningar och elektriska anordningar <i>The Swedish National Electrical Safety Board - Regulations regarding supervision of the electrical installation by the possessor</i>
SFS 2009:22	Starkströmsförordning <i>The Swedish Government - Ordinance concerning electrical installations</i>
BFS 2011:10 - EKS	Boverkets föreskrifter och allmänna råd om tillämpning av europeiska konstruktionsstandarder (eurokoder) <i>Swedish National Board of Housing, Building and Planning: Application of the European design standards</i>

NOTE If there is associated amendment instructions to the documents listed above, they shall be included.

(ncpt)

SE.2 National normative standards referred to in this NNA

Reference	Title
SS-EN 335:2013	Träskydd - Definitioner och tillämpning av användningsklasser - Massivt trä och träbaserade produkter <i>Durability of wood and wood-based products — Use classes: definitions, application to solid wood and wood-based products</i>
SS-EN 351-1:2007	Träskydd – Träskyddsbehandlat massivt trä – Del 1: Klassificering och upptagning av träskyddsmedel <i>Durability of wood and wood-based products – Preservative-treated solid wood – Part 1: Classification of preservative penetration and retention</i>
SS-ISO 965-4	Metriska ISO-gängor för allmän användning – Gängtoleranser - Del 4: Gränsmått för varmförzinkade utvändiga gängor avsedda för användning tillsammans med invändiga gängor gängade till toleranskvalitet H eller G efter förzinkning <i>ISO general purpose metric screw threads - Tolerances - Part 4: Limits of sizes for hot-dip galvanized external screw threads to mate with internal screw threads tapped with tolerance position H or G after galvanizing</i>
SS-EN 1090-2:2008	Utförande av stål- och aluminiumkonstruktioner – Del 2: Stälkonstruktioner <i>Execution of steel structures and aluminium structures – Part 2: Technical requirements for steel structures</i>
SS-EN 1999-1-1:2007	Eurokod 9 : Dimensionering av aluminiumkonstruktioner – Del 1-1: Allmänna regler <i>Eurocode 9: Design of aluminium structures - Part 1-1: General structural rules</i>
SS-EN ISO 4892-3:2013	Plast - Metoder för exponering i artificiellt ljus - Del 3: UV lysrör (ISO 4892-3:2013) <i>Plastics - Methods of exposure to laboratory light sources - Part 3: Fluorescent UV lamps (ISO 4892-3:2013)</i>
SS-EN 10164:2005	Stålprodukter med förbättrade deformationsegenskaper i tjockleksrikningen - Tekniska leveransbestämmelser <i>Steel products with improved deformation properties perpendicular to the surface of the product - Technical delivery conditions</i>
SS-EN 10204:2005	Metalliska varor - Typer av kontrolldokument Metallic products - Types of inspection documents
SS-EN ISO 10684:2004	Fästelement – Varmförzinkning av fästelement <i>Fasteners – Hot dip galvanized coatings</i>
SS-EN 13670:2009	Betongkonstruktioner – Utförande <i>Execution of concrete structures</i>
SS-EN 60060	Högspänningsprovning <i>High-voltage test techniques</i>
SS 11 23 18	Aluminium och stål – Lina till friledning – Kontinuerlig krypprovning <i>Aluminium and steel – Stranded conductors for overhead lines – non-interrupted creep testing</i>
SS 424 05 02	Isolatorer – Stödisolatorer av pinntyp för friledningar <i>Insulators – Pin insulators for overhead lines</i>
SS 424 05 21	Stödisolator av massiv typ för friledningar <i>Line post insulators</i>
SS 424 05 31	Isolatorer - Stagisolatorer <i>Insulators - Stay insulators</i>

Reference	Title
SS 424 08 06	Linor av hård förzinkad ståltråd för luftledningar - Fe140-linor <i>Hard zinc-coated steel wire strands for overhead lines – Fe140 wire strands</i>
SS 424 08 11	Tråd av aluminiumlegering för linor för friledningar - AlMgSi-tråd <i>Aluminium alloy wire for stranded conductors for overhead line – AlMgSi wire</i>
SS 424 08 12	Linor av aluminiumlegering för friledningar – AlMgSi-linor <i>Aluminium alloy stranded conductors for overhead line – AlMgSi-conductor</i>
SS 424 08 13	Tråd av aluminiumlegering för linor för friledningar - Al 59-tråd <i>Aluminium alloy wire for stranded conductors for overhead line – Al 59 wire</i>
SS 424 08 14	Linor av aluminiumlegering för friledningar - Al 59-linor <i>Aluminium alloy stranded conductors for overhead line – Al 59-conductor</i>
SS 424 12 50	Najning <i>Ties</i>
SS 424 12 51	Förformad najningsspiral <i>Preformed ties</i>
SS 436 02 61	Luftledningskorsningar - Högspänningssledning (friledning), högst 52 kV, över allmän väg <i>Overhead line crossings - High voltage overhead line for max 52 kV above public road</i>
SS 436 02 62	Luftledningskorsningar - Högspänningssledning (friledning), högst 52 kV, över allmän väg - Trädsäkert korsningsspann <i>Overhead line crossings - High voltage overhead line for max 52 kV above public road - Crossing span safe for falling trees</i>
SS 436 02 63	Luftledningskorsningar - Högspänningssledning (friledning), högst 52 kV, över järnväg - Trädsäkert korsningsspann <i>Overhead line crossings - High voltage overhead line for max 52 kV above railway - Crossing span safe for falling trees</i>
SS 436 02 65	Luftledningskorsningar - Högspänningssledning (hängspiralkabel utan skärm), 1-24 kV, över allmän väg <i>Overhead line crossings - High voltage overhead line (self-supporting aerial cable without shield) 1-24 kV above public road</i>
SS 436 02 66	Luftledningskorsningar - Högspänningssledning (hängspiralkabel utan skärm), 1-24 kV, över järnväg <i>Overhead line crossings - High voltage overhead line (self-supporting aerial cable without shield) 1-24 kV above railway</i>
SS 436 02 80	Luftledningskorsningar - Högspänningssledning (metallskärmad hängkabel eller metallskärmad hängspiralkabel), 1-24 kV, över allmän väg <i>Overhead line crossings - High voltage overhead line (suspension cable with metal sheath) 1-24 kV above public road</i>
SS 436 02 81	Luftledningskorsningar - Högspänningssledning (metallskärmad hängkabel eller metallskärmad hängspiralkabel), 1-24 kV, över järnväg <i>Overhead line crossings - High voltage overhead line (suspension cable with metal sheath) 1-24 kV above railway</i>

(ncpt)

SE.3 National informative documents referred to in this NNA

Reference	Title
NTR Dokument 3: 2013	Nordiska Träskyddsrådet – Nordiska regler för kvalitetskontroll av impregnerat trå – Del 1: Furu och andra lätt impregnerbara barrträdsrag The Nordic Wood Preservation Council – Nordic requirements for quality control of preservative treated wood – Part 1. Pine and other permeable softwoods
Korrosionsinstitutet Bulletin nr 97	Riktlinjer för användning av rosttröga stål - Korrosionstekniska synpunkter Guidelines for use of weathering steel - Corrosion technical aspects
Korrosionsinstitutet Bulletin No. 94	Rosttröga stål i byggnader Weathering steel in buildings

koniec náhľadu – text ďalej pokračuje v platenej verzii STN