SLOVENSKI STANDARD
SIST EN 50341-2-13:2018

01-februar-2018

Nadzemni električni vodi za izmenične napetosti nad 1 kV - 2-13. del: Nacionalna normativna določila (NNA) za Italijo (na podlagi EN 50341-1:2012)

Overhead electrical lines exceeding AC 1 kV - Part 2-13: National Normative Aspects (NNA) for ITALY (based on EN 50341-1:2012)

Lignes électriques aériennes dépassant 1 kV en courant alternatif - Partie 2-13: Aspects normatifs nationaux (NNA) pour l'ITALIE (basés sur l'EN 50341-1:2012)

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ICS:

29.240.20	Daljnovodi	Power transmission and distribution lines

SIST EN 50341-2-13:2018 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50341-2-13

January 2017

ICS 29.240.20

English Version

Overhead electrical lines exceeding AC 1 kV - Part 2-13: National Normative Aspects (NNA) for ITALY (based on EN 50341-1:2012)

Lignes électriques aériennes dépassant 1 kV en courant alternatif - Partie 2-13: Aspects normatifs nationaux (NNA) pour l'ITALIE (basés sur l'EN 50341-1:2012)

This European Standard was approved by CENELEC on 2016-12-13.

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, 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

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European foreword

1. The Italian National Committee (NC) is identified by the following address:

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Italy
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Committee 11/7 – Overhead electrical lines
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2. The Italian NC has prepared this Part 2-13 (EN 50341-2-13) listing the Italian National Normative Aspects (NNA) under its sole responsibility and duly passed it through the CENELEC and CLC/TC 11 procedures.

   NOTE: The Italian NC 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 already made in the framework of the general responsibility of a standards committee under the national laws/regulations.

3. This NNA is normative in Italy 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 "IT", 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 Italian 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 Italy.

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

6. The national Italian standards/regulations related to overhead electrical lines exceeding 1 kV (AC) are listed in subclause 2.1/IT.1 and 2.1/IT.2.

   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 Italian NC to be applicable and thus reported to the secretary of CLC/TC 11.

1 Scope

1.1 General

(ncpt) **IT.1 New overhead line**

This NNA (National Normative Annex) is only applicable to all new overhead lines equipped with bare conductors, covered conductors or cables, with voltages above 1kV AC. This standard is not applicable to overhead lines pre-existing before its coming into force and shall not be applied to maintenance or reconductoring; the standard can be applied in case of significant modifications of existing lines.

1.2 Field of application

(ncpt) **IT.1 Field of application**

This standard specifies the general safety requirements, clarifies the actions that shall be carried out in the project and their relevant combinations, defines the characteristics of materials, products and any other aspects relevant to safety of electrical overhead lines as reported in the following clause 2. With reference to structural safety aspects, in absence of specific indications, and as an integration to this standard, the dispositions reported in “Norme tecniche sulle costruzioni” apply (see subclause 2.1).

For what concerns structural aspects this standard applies also to D.C. overhead lines.

For details concerning the application of this standard to telecommunication systems involving optical fibres either incorporated in or wrapped around earth-wires or conductors or suspended from overhead line supports, reference should be made to the Project Specifications.

2 Normative references, definitions and symbols

2.1 Normative references

(A-dev) **IT.1 National normative laws, government regulations**

List of Law Decrees, Ministerial Decrees, Decrees of the President of the Minister’s Council:

- In the following text the new Italian Technical Standard, reported in the Ministerial Decree 14.01.2008 promulgated in force of article 5, subsection 2 of Law Decree 28 May 2004 n. 136 turned into law 27.07.2004 n. 186 and the articles 52 e 83 of D.P.R. 06.06.2001, n. 380, contained the “*Testo Unico delle disposizioni legislative e regolamentari in materia edilizia*” will be referred as “*Norme tecniche sulle costruzioni*”.
- Decree of the President of the Ministers’ Council, 23 April 1992.

  Limiti massimi di esposizione ai campi elettrico e magnetico generati alla frequenza industriale nominale (50 Hz) negli ambienti abitativi e nell’ambiente esterno.

  Maximum limits of exposure to power frequency (50 Hz) electric and magnetic fields in inhabited buildings and external environment.
- Decree of the Ministers of Public Works and of Internal Affairs, 16 January 1996.

  Technical standard related to “*Criteri generali per la verifica di sicurezza delle costruzioni e dei carichi e sovraccarichi*”.

– Decree of the President of the Ministers' Council, 8 July 2003.

"*Fissazione dei limiti di esposizione, dei valori di attenzione e degli obiettivi di qualità per la protezione della popolazione dalle esposizioni ai campi elettrici e magnetici alla frequenza di rete (50 Hz) generati dagli elettrodotti*".

Prescription of the exposition limits, attention values and quality objectives for the protection of people from the expositions to electrical and magnetic fields at power frequency (50 Hz).

(ncpt) **IT.2 National technical standards**

List of Standard:

–CEI 103-6 (1997-12)

Protezione delle linee di telecomunicazione agli effetti dell'induzione elettromagnetica provocata dalle linee elettriche vicine in caso di guasto.

Protection of telecommunication lines against harmful effects produced by power lines in fault conditions

–CEI 7-1 (1997-09)

Norme per conduttori di rame e leghe di rame per linee elettriche aeree.

Requirements for copper and copper-alloy conductors for electrical overhead lines.

–CEI 7-2 (1997-09)

Norme per conduttori di alluminio, alluminio-acciaio, lega di alluminio, e lega di alluminio-acciaio per linee elettriche aeree.

Requirements for all aluminium, aluminium-steel reinforced, all aluminium alloy and aluminium alloy-steel reinforced conductors for electrical overhead lines.

–CEI 7-6 (1997-04)

Norme per il controllo della zincatura a caldo per immersione su elementi di materiale ferroso destinati a linee e impianti elettrici.

Requirements for checking hot galvanizing by immersion on ferrous components used in lines and electrical installations.

–CEI 7-10 (1997-09)

Norme per conduttori di acciaio rivestito di rame a filo unico ovvero cordati destinati a linee di telecomunicazione ed a linee di trasporto energia.

Requirements for copper clad steel conductors, single wire and stranded, for telecommunication and power lines.

–CEI 7-11 (1997-09)

Norme per conduttori di acciaio rivestito di alluminio a filo unico e a corda per linee elettriche aeree.

Requirements for aluminium clad steel conductors, single wire and stranded, for electrical overhead lines.

–Guida CEI 36 (1997-10)

Resistenza meccanica residua di elementi di catene di isolatori di vetro o di ceramica per linee aeree dopo il danneggiamento meccanico della parte isolante.

Residual strength of insulators units of glass or ceramic materials for overhead lines after mechanical damage of dielectric.

–CEI EN 50443 (2012-12)

Effetti delle interferenze elettromagnetiche sulle tubazioni causate da sistemi di trazione elettrica ad alta tensione in corrente alternata e/o da sistemi di alimentazione ad alta tensione in corrente alternata.

Effects of electromagnetic interference on pipelines caused by high voltage a.c. electric traction system and/or high voltage a.c. power supply system.

–CEI UNI EN ISO/IEC 17065 (2012-12) (CEI 501-22) ex EN 45011

Valutazione della conformità - Requisiti per organismi che certificano prodotti, processi e servizi.

Conformity assessment – Requirements for bodies certifying products, processes and services.

2.2 Definitions

(A-dev) **IT.1 Reference wind speed V_b**

In this standard, the reference wind speed is referenced as V_b and is in agreement with Eurocodice 1991-1-4 and “Norme tecniche sulle costruzioni”.

2.3 Symbols

(A-dev) **IT.1 Reference wind speed V_b**

V_b mean wind speed in agreement with Eurocodice 1991-1-4 and “Norme tecniche sulle costruzioni”. Reference 4.3 IT1 (A-dev).

3 Basis of design

3.1 Introduction

(ncpt) **IT.1 Design philosophy and approach**

The design philosophy of the Italian overhead lines shall be based on the limit state criterion of Eurocodes 1, 2, 3, 5, 7, 8.

The specific design approach to be used shall be specified in the Project Specifications.

3.2 Requirements of overhead lines

3.2.2 Reliability requirements

(ncpt) **IT.1 Reliability of overhead lines**

In compliance with EN 50341-1 and in accordance with past experiences, the reliability of overhead lines shall be as follows:

– Level 1: 50-years return period.

Higher reliability levels can be indicated in the Project Specifications.

4 Actions on lines

4.1 Introduction

(ncpt) **IT.1 Action on overhead lines**

Actions on overhead lines are due to the wind load, to the tensile load of conductors and earth-wires on angle supports, or, in case of breakage of conductors or earth-wires, to the weight of the components, to the weight of ice

or snow formations on conductors or earth-wires, to the temperature effects, to erection and maintenance loads and to seismic events. The combination of the above actions is made according to the criteria indicated in the following in order to meet the required reliability of the lines.

Actions on lines due to ice, snow and wind loads with higher values than those reported in the following paragraphs can be prescribed in the Project Specification on the base of experimental data due to field observations with sufficient statistical numerosity.

4.3 Wind loads

4.3.1 Field of application and basic wind velocity

(A-dev) **IT1 Wind load acting on overhead line**

Wind load acting on overhead line components is based on the reference wind speed, defined in the following subclause, by applying factors that take into account gust wind phenomena, the terrain roughness and the height above ground.

(A-dev) **IT.2 Reference wind speed**

The reference wind speed, V_b, is defined as the maximum value, with a return period of 50 years, of the mean wind speed, in m/s, over a period of 10 min at a height of 10 m above the ground, on a terrain with exposition category II, as defined in "*Norme tecniche sulle costruzion*i" and according to table 4.1 of EN 50341-1.

The reference wind speed, as a function of site and of altitude above sea level shall be evaluated according to the specifications in the "*Norme tecniche sulle costruzioni*".

In order to calculate the wind speed for different return periods "Table B.1 - Conversion factors for different return periods of wind speed" of EN 50341-1 shall be applied, where:

V_T is the extreme wind speed with return period T;

V_{50} is the extreme wind speed with return period of 50 years.

The reference wind speed V_b is obtained from maps in 3.3.2 of "*Norme tecniche sulle costruzioni*".

Each zone is characterized by maximum mean wind speed per hour, defined as follow:

$V_b = V_{b,0}$ for $a_s \leq a_0$

$V_b = V_{b,0} + k_a(a_s - a_0)$ for $a_s > a_0$

Where a_s is the effective height above sea level in [m].

Values for $V_{b,0}$, K_a *and* a_0 are reported in Table 3.3.I of "*Norme tecniche sulle costruzioni*". For altitudes a_s > 1500 m, except for local conditions, properly documented and proven, it is assumed a_s = 1500 m.

The zoning is represented in Figure 4.3/IT.2 (equivalent to Figure 3.3.1 of "*Norme tecniche sulle costruzioni*").

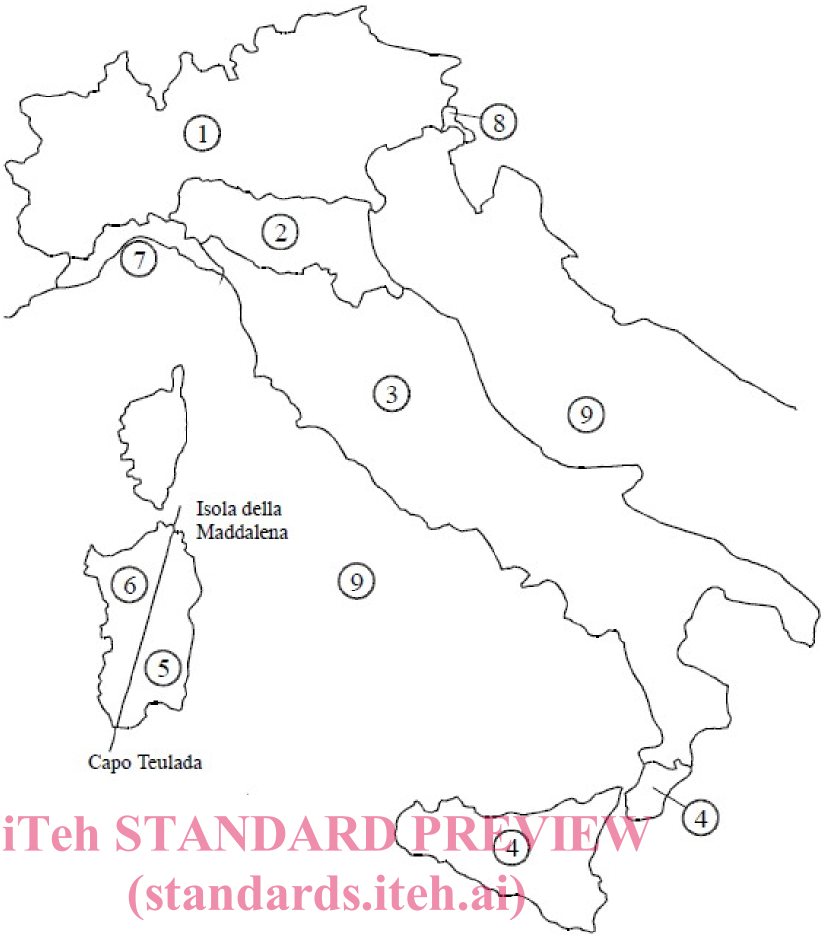

Figure 4.3/IT.2

(A-dev) **IT.3 Exposition category of the site**

For the evaluation of the terrain roughness of the site and of the necessary parameters for the calculation of wind action, reference shall be made to *"Norme tecniche sulle costruzioni"*.

(A-dev) **IT.4 Exposure coefficient C_e**

Referring to 3.3.7 of "*Norme tecniche sulle costruzioni*", the calculation of the exposure coefficient C_e is made on the base of the following parameters:

- the height above ground of the construction. For overhead lines "*z*" means the height above ground of the different components (such as supports, fitting, insulators, conductors, earth-wires);
- the terrain topography, with the related topography coefficient C_t;
- the exposition category of the site.

  In the absence of specific analyzes which take into account the wind direction and the effective roughness and topography of the terrain surrounding the structure, for heights above ground of the structure no more than $z = 200\ m$, it is given by the following formulas to be applied based on a comparison between the height of the structure and z_{min} as defined below:

$$\begin{cases} C_e(z) = k_r^2 \cdot C_t \cdot \left[7 + C_t \cdot \ln\left(\frac{z}{z_0}\right) \right] \cdot \ln\left(\frac{z}{z_0}\right) & z \geq z_{\min} \\ C_e(z) = C_e(z_{\min}) & z < z_{\min} \end{cases}$$

where:

z is height above ground of the structure (of the related component),

C_t is topography coefficient, typically set to 1,

k_r, z_0, $z_{\min}$ are coefficients defined as function of exposition category of site, depending on exposure area and terrain roughness class according to Table 3.3.II of "*Norme tecniche sulle costruzioni*". In particular $z_{\min}$ indicates the minimum height of the construction for a given exposition category.

According to 4.2 of EN 1991-1-4, reference is made to exposition category of site II, whose characteristics are reported in Table 4.3/IT.4, conforming to Table 3.3.II of "*Norme tecniche sulle costruzioni*".

Table 4.3/IT.4 – Characteristics of exposition category II

Exposition category of the site	k_r	z_0 [m]	$z_{\min}$ [m]
II	0,19	0,05	4

In Figure 4.3/IT.4 (corresponding to figure 3.3.3 of "*Norme tecniche sulle costruzioni*") the exposition coefficient trend for each exposition category is indicated as a function of the height of the construction.

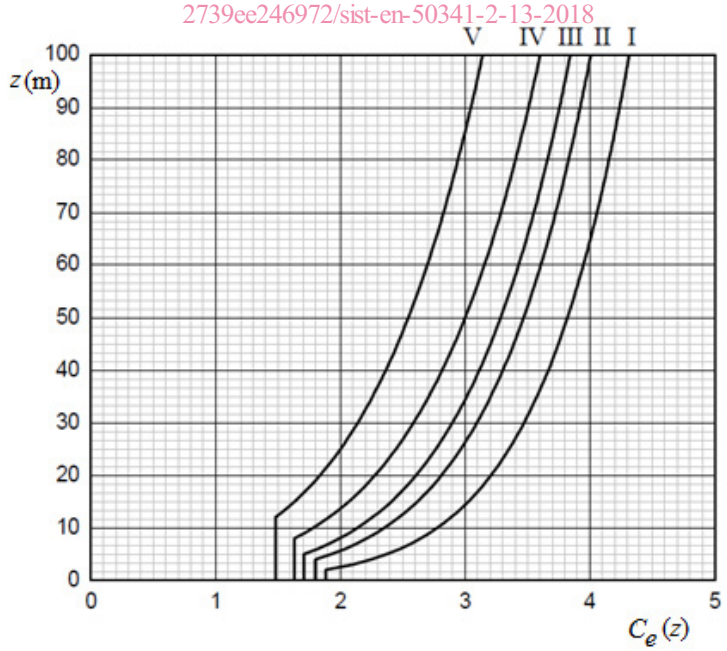

Figure 4.3/IT.4

By multiplying V_b by square root of C_e it is possible to obtain the peak speed (extreme wind) at the height of the structure.