BSI Standards Publication

Overhead electrical lines exceeding AC 1 kV

Part 2-13: National Normative Aspects (NNA) for
ITALY (based on EN 50341-1:2012)

bsi.

National foreword

This British Standard is the UK implementation of EN 50341-2-13:2017, including amendment A1:2017. It supersedes BS EN 50341-2-13:2017, which is withdrawn.

The text of CENELEC amendment A1:2017 has been provided in its entirety at the beginning of this document. BSI's policy of providing consolidated content remains unchanged; however, in the interest of expediency, in this instance BSI have chosen to the collate the relevant content at the beginning of this document.

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
BE	Belgian National Committee	BS EN 50341-2-2
CH	Swiss National Committee	BS EN 50341-2-3
DE	German National Committee	BS EN 50341-2-4:2016
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 50341-2-9:2015
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
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
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 50341-2-20:2015
PL	Polish National Committee	BS EN 50341-2-22:2016

Country Code	Origin	Ref
SK	Slovak National Committee	BS EN 50341-2-23:2016

BS EN 50423-3:2005 and BS EN 50341-3:2001 will be withdrawn upon publication of the rest of the series.

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 secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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

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Date	Text affected
31 March 2018	Implementation of CENELEC amendment A1:2017

EUROPEAN STANDARD **EN 50341-2-13:2017/A1**

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English Version

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

This amendment A1 modifies the European Standard EN 50341-2-13:2017; it was approved by CENELEC on 2017-05-17.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Italy

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2. The Italian NC has prepared this Part 2-13/A1 (EN 50341-2-13/A1) listing the Italian National Normative Aspects Amendment 1 (NNA/A1) under its sole responsibility and duly passed this document through the CENELEC and CLC/TC 11 procedures.

   NOTE: The Italian NC takes sole responsibility for the technically correct co-ordination of this EN 50341-2-13/A1 with Part 2-13 (EN 50341-2-13:2017) and with Part 1 (EN 50341-1:2012). It has performed the necessary checks in the frame of quality assurance/control. However, it has been 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/A1 is normative in Italy and informative for other countries.

4. This NNA/A1 shall be read in conjunction with Part 2-13 and Part 1. All clause numbers used in this NNA/A1 correspond to those of Part 2-13 and Part 1. Specific sub-clauses that are prefixed “IT” are to be read as amendments to the relevant text in Part 1 and Part2-13. Any necessary clarification regarding the application of NNA/A1 in conjunction with Part 2-13 and Part 1, shall be referred to the Italian NC who will, in co-operation with CLC/TC 11, clarify the explanations.

   Where no reference is made in this NNA/A1 to a specific sub-clause, then Part 1 shall apply.

5. In case of “boxed values” defined in Part 1, in Italy amended values (if any), which are defined in this NNA/A1, shall be taken into account.

   However no “boxed value” either defined in Part 1 or in this NNA/A1, can be modified in the direction of increased risk in the Project specifications.

6. The Italian National standards/regulations related to overhead electrical lines exceeding 1 kV AC are listed in subclause 2.1/IT.1 Part 1.

   NOTE: All national standards referred to in this NNA/A1 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.

Load type 2 (snow)

Regions: Valle d'Aosta, Piemonte, Liguria, Lombardia, Trentino Alto Adige, Emilia Romagna, Friuli Venezia Giulia, Veneto e Marche, Abruzzo, Molise, Toscana (with exclusion of the provinces of Livorno and Grosseto), Umbria, Lazio (with exclusion of the provinces of Viterbo, Roma and Latina), Campania (with exclusion of the provinces of Napoli and Caserta), Puglia (with exclusion of the provinces of Brindisi and Lecce), Basilicata, Calabria (with exclusion of the province of Reggio Calabria):

Snow density ρ_1 = 500 kg/m³

S_k =24 mm for $a_s \leq 600$ m

S_k =24 + 20 (a_s - 600)/1000 mm for $a_s > 600$ m.

Load type 3 (snow)

Regions: Toscana (provinces of Livorno e Grosseto), Lazio (provinces of Viterbo, Roma and Latina); Campania (provinces of Napoli and Caserta), Puglia (provinces of Brindisi and Lecce), Sardegna, Calabria (province of Reggio Calabria), Sicilia:

Snow density ρ_1 = 500 kg/m³

S_k = 0 mm for $a_s \leq 600$ m

S_k = 20 + 15 (a_s - 600) /1000 mm for $a_s > 600$ m

with:

Load type 2 (snow)

Regions: Valle d'Aosta, Piemonte, Liguria, Lombardia, Trentino Alto Adige, Emilia Romagna, Friuli Venezia Giulia, Veneto, Marche, Abruzzo, Molise, Toscana (with exclusion of the provinces of **Pisa**, Livorno and Grosseto), Umbria, Lazio (with exclusion of the provinces of Viterbo, Roma and Latina), Campania (with exclusion of the provinces of Napoli and Caserta), Puglia (with exclusion of the provinces of Brindisi and Lecce), Basilicata, Calabria (with exclusion of the **provinces** of **Vibo Valentia and** Reggio Calabria):

Snow density ρ_1 = 500 kg/m³

S_k =24 mm for $a_s \leq 600$ m

S_k =24 + 20 (a_s - 600)/1000 mm for $a_s > 600$ m.

Load type 3 (snow)

Regions: Toscana (provinces **of Pisa**, Livorno **and** Grosseto), Lazio (provinces of Viterbo, Roma and Latina); Campania (provinces of Napoli and Caserta), Puglia (provinces of Brindisi and Lecce), Sardegna, Calabria (**provinces** of **Vibo Valentia and** Reggio Calabria), Sicilia:

Snow density ρ_1 = 500 kg/m³

S_k = 0 mm for $a_s \leq 600$ m

S_k = 20 + 15 (a_s - 600) /1000 mm for $a_s > 600$ m

Replace:

(snc) **IT.1 Temperature effects**

For the calculation of the tensile load on conductors and earth-wires, and of related forces transmitted to supports, as well as for geometrical verifications of height above ground for electrical clearances and insulating distances, the temperatures below reported shall apply:

a) EDS temperature (Every Day Stress) is 15°C: in this condition, in absence of wind, the tensile load of conductors shall not be greater than 25% of the breakage load.

On the basis of specific project conditions, to limit wind vibration effects, special attention should be paid to laying conditions when the parameter value (the ratio, between the horizontal tension and the mass per linear meter of conductor = 2000 m) is exceeded. Criteria and conditions of installation should be defined in project specifications.

with:

(snc) **IT.1 Temperature effects**

For the calculation of the tensile load on conductors and earth-wires, and of related forces transmitted to supports, as well as for geometrical verifications of height above ground for electrical clearances and insulating distances, the temperatures below reported shall apply:

a) EDS temperature (Every Day Stress) is 15°C: in this condition, in absence of wind, the tensile load of conductors shall not be greater than 25% of the **breaking** load.

On the basis of specific project conditions, to limit wind vibration effects, special attention should be paid to laying conditions when the **catenary constant** (the ratio, between the horizontal tension and the mass per linear meter of conductor) **exceeds a value of** 2000 m. Criteria and conditions of installation should be defined in project specifications.

3 Modifications to 4.8 Security loads

Replace:

(ncpt) **IT.1 Breaking of conductors case**

For conductors supported by suspension insulator sets, the differential loads shall be calculated taking into consideration the swing of the string. For calculating the actions due to a broken conductor (single o in a bundle) on a support, the maximum tensile load of the section inside which the supported is included can be used.

with:

(ncpt) **IT.1 Breaking of conductors case**

For conductors supported by suspension insulator sets, the differential loads **can** be calculated taking into consideration the swing of the string. For calculating the actions due to a broken conductor (single o in a bundle) on a support, the maximum tensile load of the section inside which the supported is included can be used.

With reference to figures in subclause 4.2.10.2 of EN 50341-1 § 4.2.10.2 for the determination of load cases 2b, 2c, 2d, the following reduction factors due to ice load I_T apply:

$\alpha = 0,5 \quad \alpha_1 = 0,3 \qquad \alpha_2 = 0,7 \qquad \alpha_3 = 0,3 \qquad \alpha_4 = 0,7$

For longitudinal bending scheme, if necessary, and if so indicated in the project specifications, the case of $\alpha_1 = 0$, $\alpha_2 = 1$ in absence of wind can also be considered; this load case represents the “slope” condition which should be applied only to supports placed at the peak of the hills/mountains and which separate line sections on opposite slopes.

with:

With reference to figures in subclause **4.12.2** of EN 50341-1 for the determination of load cases 2b, 2c, 2d, the following reduction factors due to ice load I_T apply:

$\alpha = 0,5 \quad \alpha_1 = 0,3 \qquad \alpha_2 = 0,7 \qquad \alpha_3 = 0,3 \qquad \alpha_4 = 0,7$

For longitudinal bending scheme, if necessary, and if so indicated in the project specifications, the case of $\alpha_1 = 0$, $\alpha_2 = 1$ in absence of wind can also be considered; this load case represents the “slope” condition which should be applied only to supports placed at the peak of the hills/mountains and which separate line sections on opposite slopes.

5 Modifications to 5.8 Internal clearances within the span and at the top of the tower

Replace:

(A-dev) **IT.1 Clearances calculations**

The clearances, in general, shall be calculated as follows.

In the design of the towers, the following minimum air clearance shall be maintained:

Table 5.8/IT.1 – Minimum air clearances

Minimum air clearances	Unit	
Minimum distance between conductor within the span among points susceptible of approach: this spacing is reduced to D_{pp} in case of points not susceptible of approaching each others	m	$k \cdot \sqrt{(f + I_k)} + D_{pp}$
Minimum distance between conductor and earth-wire within the span	m	$k \cdot \sqrt{(f + I_k)} + D_{el}$
Minimum clearance between live metal parts and earthed metal parts with wind speed V = 7,5 m/s	m	$k_1 \cdot D_{el}$
Minimum clearance between live metal parts and earthed metal parts of suspension towers with max swing (wind speed with return period of 3 years)	m	$D_{50Hz\_p\_e}$

Where:

still air;

I_k is the length, in metres, of that part of any insulator set swinging orthogonal to the line direction; in case of different swinging amplitudes on both supports of the span, the medium value shall be assumed;

k is a coefficient equal to 0,6 for homogeneous aluminium or aluminium alloy conductors, and equal to 0,5 for the other conductors;

k_1 is a coefficient assumed equal to 0,75;

D_{pp} is the minimum clearance voltage dependent (phase-phase), in metres, according to EN 50341-1;

D_{el} is the minimum clearance voltage dependent (phase-earth), in metres, according to EN 50341-1.

$D_{50Hz\_p\_p}$ is the minimum air clearances (phase-phase) in metres, voltage dependent**,** required to prevent a disruptive discharge at power frequency voltages corresponding to distances of Table 5.5 of EN 50341-1; for overhead lines with voltages ≤ 45 kV, a distance of 0,17 x U_n/45 (m) shall be assumed*;*

$D_{50Hz\_p\_e}$ is the minimum clearance (phase-earth) in metres, voltage depending, required to withstand power frequency voltage, corresponding to the distances of Table 5.5 of EN 50341-1; for overhead lines voltage ≤ 45 kV, a distance of 0,11 x U_n/45 (m) shall be assumed.

These distances are not suitable for performing live works.

In case of supports where the conductors are secured by means of tension insulators, V-chains on transversal plane, or post insulators, *Ik* shall be assumed equal to 0 (*Ik* = 0); moreover, for overhead lines voltage ≤ 45 kV equipped with post insulators, the resulting values from the above formulas shall be reduced by 30 %.

The above mentioned minimum distance formulas shall not apply to spans of lines where $f + I_k > 40$ m.

In such cases it is merely necessary that the spacing, in metres, between the conductors are not less than:

(3,8 + D_{pp}) m for aluminium or aluminium alloy conductors;

(3,2 + D_{pp}) m for other conductors.

The previous requirements are not applicable to conductor in bundles or to single sub-conductors of the same bundle.

For loading case 1a of subclause 4.2.10.2, but with a conductor temperature of 15°C, the spacing d, in metres, shall not be less than $D_{50Hz\_p\_e}$; for overhead lines voltage with voltages ≤ 45 kV, a distance if 0,11 x U_n/45 (m) is assumed.

At conductor temperature of 15°C, with a wind speed of 7,5 m/s, the spacing d, in metres, shall not be less than $k_1 \times D_{el}$ with $k_1 = 0{,}75$.

The above requirements shall not apply to any insulation spark gaps for coordination.

with:

In the design of the towers, the following minimum air clearance shall be maintained:

Table 5.8/IT.1 – Minimum air clearances

Minimum air clearances	Unit	
Minimum distance between conductor within the span among points susceptible of approach: this spacing is reduced to D_{pp} in case of points not susceptible of approaching each others	m	$k \cdot \sqrt{(f + I_k)} + D_{pp}$
Minimum distance between conductor and earth-wire within the span	m	$k \cdot \sqrt{(f + I_k)} + D_{el}$
Minimum clearance between live metal parts and earthed metal parts with wind speed V = 7,5 m/s	m	$k_1 \cdot D_{el}$
Minimum clearance between live metal parts and earthed metal parts of suspension towers with max swing (wind speed with return period of 3 years)	m	$D_{50Hz\_p\_e}$
Minimum clearance between live metal parts and earthed metal parts of suspension towers with max swing (wind speed with return period of 3 years)	m	$D_{50Hz\_p\_e}$

Where:

f is the sag, in metres, of the conductor at a temperature of +15°C in still air;

I_k is the length, in metres, of that part of any insulator set swinging orthogonal to the line direction; in case of different swinging amplitudes on both supports of the span, the medium value shall be assumed;

k is a coefficient equal to 0,6 for homogeneous aluminium or aluminium alloy conductors, and equal to 0,5 for the other conductors;

k_1 is a coefficient assumed equal to 0,75;

D_{pp} is the minimum clearance voltage dependent (phase-phase), in metres, according to EN 50341-1;

D_{el} is the minimum clearance voltage dependent (phase-earth), in metres, according to EN 50341-1.

$D_{50Hz\_p\_p}$ is the minimum air clearances (phase-phase) in metres, voltage dependent**,** required to prevent a disruptive discharge at power frequency voltages corresponding to distances of Table 5.5 of EN 50341-1; for overhead lines with voltages ≤ 45 kV, a distance of 0,17 x U_n/45 (m) shall be assumed*;*

$D_{50Hz\_p\_e}$ is the minimum clearance (phase-earth) in metres, voltage depending, required to withstand power frequency voltage, corresponding to the distances of Table 5.5 of EN 50341-1; for overhead lines voltage ≤ 45 kV, a distance of 0,11 x U_n/45 (m) shall be assumed.

These distances are not suitable for performing live works.

insulators, V-chains on transversal plane, or post insulators, Ik shall be assumed equal to 0 (Ik = 0); moreover, for overhead lines voltage ≤ 45 kV equipped with post insulators, the resulting values from the above formulas shall be reduced by 30 %.

The above mentioned minimum distance formulas shall not apply to spans of lines where $f + I_k > 40$ m.

In such cases it is merely necessary that the spacing, in metres, between the conductors are not less than:

(3,8 + D_{pp}) m for aluminium or aluminium alloy conductors;

(3,2 + D_{pp}) m for other conductors.

The previous requirements are not applicable to conductor in bundles or to single sub-conductors of the same bundle.

For loading case 1a of subclause **4.12.2**, but with a conductor temperature of 15°C, the spacing *d*, in metres, shall not be less than $D_{50Hz\_p\_e}$; for overhead lines voltage with voltages ≤ 45 kV, a distance if 0,11 x U_n/45 (m) is assumed.

At conductor temperature of 15°C, with a wind speed of 7,5 m/s, the spacing *d*, in metres, shall not be less than k_1 x D_{el} with k_1 = 0,75.

The above requirements shall not apply to any insulation spark gaps for coordination.

6 Modifications to 8.2.2 Geotechnical design by calculation

Replace:

8.2.1 Geotechnical design by calculation

with:

8.2.2 Geotechnical design by calculation

7 Modifications to 9.6.2 Partial factor for conductors

Replace:

IT.1 Mechanical resistance of the joints

In spans where joints are installed, the electrical resistance of conductor shall not be increased; the mechanical resistance of the joints shall not be lower than 90 % of the mechanical resistance of conductor.

with:

IT.1 Mechanical resistance of the joints

In spans where joints are installed, the electrical resistance of conductor shall not be increased; the mechanical resistance of the joints shall not be lower than **95 %** of the mechanical resistance of conductor.

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EUROPEAN STANDARD **EN 50341-2-13**

EUROPÄISCHE NORM

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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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 50341-2-13:2017 E

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

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   E-Mail cei@ceinorme.it.

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.

1.1 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*”.