SLOVENSKI STANDARD
SIST EN 50160:2011/A1:2015

01-april-2015

Značilnosti napetosti v javnih razdelilnih omrežjih - Dopolnilo A1

Voltage characteristics of electricity supplied by public electricity networks

Merkmale der Spannung in öffentlichen Elektrizitätsversorgungsnetzen

Caractéristiques de la tension fournie par les réseaux publics de distribution

Ta slovenski standard je istoveten z: **EN 50160:2010/A1:2015**

ICS:

29.240.01	Omrežja za prenos in distribucijo električne energije na splošno	Power transmission and distribution networks in general

SIST EN 50160:2011/A1:2015 **en,fr**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50160:2010/A1

January 2015

ICS 29.020

English Version

Voltage characteristics of electricity supplied by public electricity networks

Caractéristiques de la tension fournie par les réseaux publics de distribution

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This amendment A1 modifies the European Standard EN 50160:2010; it was approved by CENELEC on 2014-09-30. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 amendment 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.

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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

Foreword

This document (EN 50160:2010/A1:2015) has been prepared by CLC/TC 8X "System aspects of electrical energy supply".

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2015-09-30
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2017-09-30

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Add the following annex to EN 50160:2010:

Annex ZA
(informative)
A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN-CENELEC national member.

This European Standard does not fall under any Directive of the EU.

In the relevant CEN-CENELEC countries, these A-deviations are valid instead of the provisions of the European Standard until they have been removed.

Clause	Deviation
	Norway *The Norwegian Regulation No 1557 of 30 November 2004 on quality of supply in the Norwegian power system* shall contribute to ensure a satisfactory quality of supply in the Norwegian power system and a social rational operation, expansion and development of the power system. This includes taking into account public and private interests affected. All deviations below are given according to this regulation and the requirements are stricter than the current edition of the EN 50160. The various parties' responsibility for rectifying the situation when problems occur may differ from case to case. This regulation applies to those who wholly or partially own, operate or use electrical installations or electrical equipment that are connected within the Norwegian power system, and who pursuant to the Energy Act is designated transmission system operator. This regulation does not apply in Norwegian territorial waters, to direct-current voltage installations or to railway installations in Norway with a frequency of 16 2/3 Hz.
3.17	The following definition applies for rapid voltage changes: **Rapid voltage changes:** A change of the voltage rms value within ± 10 % of the agreed voltage level and which occur more rapid than 0,5 % of the agreed voltage level per second. Rapid voltage changes are expressed as the steady state and the maximum voltage change given respectively by: $\%U_{steadystate} = \frac{\Delta U_{steadystate}}{U_{agreed}} \cdot 100\%$ $\%U_{\max} = \frac{\Delta U_{\max}}{U_{agreed}} \cdot 100\%$, where $\Delta U_{\text{steadystate}}$ is the steady state voltage change due to a voltage change characteristic, $\Delta U_{\max}$ is the maximum voltage difference during a voltage change characteristic, and U_{agreed} is the agreed voltage level (i.e. the nominal or the declared). A voltage change characteristic is the time function of the rms voltage change evaluated as a single value for each successive half period between zero-crossings of the source voltage between time intervals in which the voltage is in a steady state condition for at least 1 second. The voltage is in a steady state condition when the rms value is in between ± 0,5 % of the agreed voltage rms level.

<table>
<tr><td>4.2.1,
5.2.1,
6.2.1</td><td>The frequency for systems with synchronous connection to an interconnected system shall normally be within 50 Hz ± 0,1 Hz for 100 % of the time. For systems with no synchronous connection to an interconnected system, the frequency shall normally be within 50 Hz ± 2 % for 100 % of the time.</td></tr>
<tr><td>4.2.2.1</td><td>The supply voltage variations shall be within ± 10 % of the nominal voltage at all supply terminals in the low voltage network.</td></tr>
<tr><td>4.2.2.2</td><td>All 1 min mean values of the supply voltage shall be within ± 10 % of the nominal voltage 100 % of the time at all supply terminals in the low voltage network.</td></tr>
<tr><td>4.2.3.1,
5.2.3.1,
6.2.3.1</td><td>Rapid voltage changes shall be within the following limits at all supply terminals 100 % of the time:
<table>
<tr><th rowspan="2">RVCs</th><th colspan="2">Maximum frequency per 24 hours period</th></tr>
<tr><th>$0{,}23 \leq U_N \leq 35$</th><th>$35 < U_N$</th></tr>
<tr><td>$\Delta U_{steadystate} \geq$ 3 %</td><td>24</td><td>12</td></tr>
<tr><td>$\Delta U_{max} \geq$ 5 %</td><td>24</td><td>12</td></tr>
</table>
Rapid voltage changes due to earth faults or short circuits in the network, inrush current from transformers, back feeding after faults and necessary operation couplings to uphold a satisfactory quality of supply as a whole, are not embraced by the limits given in the table.</td></tr>
<tr><td>4.2.3.2,
5.2.3.2,
6.2.3.2</td><td>The flicker severity shall be within the following limits at all supply terminals 100 % of the time:
<table>
<tr><th></th><th>$0{,}23 \leq U_N \leq 35$</th><th>$35 < U_N$</th><th>Time interval</th></tr>
<tr><td>Short-term flicker, P_{st} [pu]</td><td>1,2</td><td>1,0</td><td>95% of the week</td></tr>
<tr><td>Long-term flicker, P_{lt} [pu]</td><td>1,0</td><td>0,8</td><td>100% of the time</td></tr>
</table></td></tr>
<tr><td>4.2.4,
5.2.4,
6.2.4</td><td>The negative phase sequence component of the supply rms voltage shall not exceed 2 % of the positive phase sequence component as 10 min mean values for 100 % of the time at all supply terminals.</td></tr>
<tr><td>4.2.5,
5.2.5</td><td>The Total Harmonic Distortion (THD) shall not exceed 8 % and 5 % as a mean value over 10 min and one week respectively for 100 % of the time at all supply terminals. Limits for individual harmonics included in Table 1 and Table 4 in this standard shall apply for 100 % of the time at all supply terminals. In addition; “odd harmonics, not multiple of 3”, above the harmonic order of 25 shall not exceed 1 % as 10 min mean values; “odd harmonics, multiple of 3”, above the harmonic order of 21, shall not exceed 0,5 % as 10 min mean values. “Even harmonics” above the harmonic order of 24 shall not exceed 0,5 %.</td></tr>
<tr><td>6.2.5</td><td>The Total Harmonic Distortion (THD) shall not exceed 3 % as 10 min mean values for 100 % of the time at all supply terminals. The individual harmonics shall not exceed the limits given in the following table as 10 min mean values 100 % of the time at all supply terminals.
<table>
<tr><th colspan="4">Odd harmonics</th><th colspan="2" rowspan="2">Even harmonics</th></tr>
<tr><th colspan="2">Not multiples of 3</th><th colspan="2">Multiples of 3</th></tr>
<tr><th>Harmonic order h</th><th>Uh [%]</th><th>Harmonic order h</th><th>Uh [%]</th><th>Harmonic order h</th><th>Uh [%]</th></tr>
<tr><td>5
7, 11
13, 17
19, 23
25
>25</td><td>3.0
2.5
2.0
1.5
1.0
0.5</td><td>3
9
15, 21
> 21</td><td>3.0
1.5
0.5
0.3</td><td>2
4
6
> 6</td><td>1.5
1.0
0.5
0.3</td></tr>
</table></td></tr>
</table>