European energy regulators’ view on EN 50160 and highlights of the 4th CEER Benchmarking Report on Quality of Electricity Supply

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• European Energy Regulators’ view on the revised EN 50160

• 4th Benchmarking Report on Quality of Electricity Supply
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• European Energy Regulators’ view on the revised EN 50160

• 4th Benchmarking Report on Quality of Electricity Supply
European Energy Regulators

• CEER – Council of European Energy Regulators
  – The overall aim is to facilitate the creation of a single, competitive, efficient and sustainable internal market for gas and electricity in Europe.

• ERGEG – European Regulators’ Group for Electricity and Gas
  – ERGEG is an advisory group of independent national regulatory authorities to assist the European Commission in consolidating the Internal Market for electricity and gas.
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• 4th Benchmarking Report on Quality of Electricity Supply
Stakeholders’ general view

- What to be defined as satisfactory level of quality of supply may differ between various stakeholders, including:
  - Distribution and transmission system operators
  - End-users
  - Equipment manufacturers

- Regulator
  - Aims at ensuring a quality that is beneficial for the society as a whole
  - Take into account all public and private interests
Interpretation of today’s limits in EN 50160 as regards slow supply voltage variations
Source:
Mr Helge Seljeseth, CEER workshop on Voltage quality standards, Milan September 29th 2006 and ERGEG (2006)
EN 50160

EUROPEAN STANDARD
NORME EUROPEENNE
EUROPÄISCHE NORM

September 2007

EN 50160

Voltage characteristics of electricity supplied by public distribution networks

Caractéristiques de la tension fournie par les réseaux publics de distribution
Merkmale der Spannung in öffentlichen Elektrizitätsversorgungsnetzen

The European Standard was approved by CENELEC on 2004-06-01. CEN/CEI members are bound to comply with the 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 Central Secretariat or to any CEN/CEI member.

The European Standard exists in three official versions (English, French, German). A version in any other language has been produced by translation under responsibility of a CENELEC member into its own language and informed to the Central Secretariat. In case of divergence between the official versions, the official versions shall apply.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Sweden, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC
European Committee for Electrotechnical Standardization
Commission Européenne de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

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Ref. No. EN 50160:2007 E

Brekke-Norway RT2b
Revision of EN 50160

- What seems to be improved?

**ERGEG Public Consultation Paper, ref E06-EQS-09-03**

- Improve definitions and measurement rules
- Limits for voltage variations
  - avoid “95%-of-time” clause
  - avoid long time intervals for averaging measured values
- Enlarge the scope to HV and EHV
- Avoid ambiguous indicative values for voltage events
  - Classification of voltage dip/swell severity
- Consider duties and rights for all parties involved
- Introduce limits for voltage events according to network characteristics
- Develop the concept of power quality contracts

Brekke-Norway RT2b
Slow voltage variations

Slow voltage variations

10 min mean: $U < 207$ V in 3.5% of the time.
1 min mean: $U < 207$ V in 28.5% of the time.

Supply Voltage Variations

Solutions at national levels:

• **Norway**
  - LV: 1 min mean values ±10% 100% of the time

• **Hungary**
  - LV: 10 min mean values ±7.5% 95% of the week
  - LV: 10 min mean values ±10% 100% of the time
  - LV: 1 min mean values ±15% 100% of the time

• More details can be found in the:
  4th Benchmarking Report on Quality of Electricity Supply
Slow voltage variations

• ERGEG Conclusions Paper
  – 95%-of-time should be increased to 100%-of-time
  – Retaining 10 min averaging interval implies necessary to set limits for faster phenomena
  – Every customer should have the same treatment; i.e. special treatment for long lines etc should be removed
  – For MV levels – limits shall refer to declared voltage level

• New EN 50160 (simplified)
  – Should not exceed ±10 % under normal operating conditions
  – Test method:
    99 % of the week all 10 min mean values shall be within ±10 %
    100 % of the time all 10 min mean values shall be within ±15 %

• This is an important step in the right direction, but so far only with regard to 95%-of-time clause.
  – Hence limits for dips and swells must be considered.
Further work on EN 50160

• Further revisions of EN 50160 should in the next steps focus on:
  – Short Circuit Power – mini TF 5 established
    • Key element when evaluating voltage quality
    • Rapid voltage changes, including improved definition
  – Limits for faster phenomena - mini TF 7 established
    • Voltage dips and swells
  – Evaluate and develop limits for HV(/EHV) networks
    • In particular for harmonics
  – Harmonisation and standardisation of continuity indicators will as a first step form a new Technical Report
## Cooperation CEER - CENELEC

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Brekke-Norway RT2b
Conclusions Part 1

• The European Energy Regulators have a consolidated view on the CENELEC EN 50160.
• International standards can be a good tool in order to complement national regulations only when they are satisfactory from a regulatory point of view.
• The European energy regulators cooperates with CENELEC and relevant stakeholders in order to improve necessary international standards.
• A current revised EN 50160 contains several improvements; however, further work is indeed needed.
Content

• Introduction

• European Energy Regulators’ view on the revised EN 50160

• 4th Benchmarking Report on Quality of Electricity Supply
4th BR

• Three main chapters
  – Contains information from 27 countries within the EU and EEA (Malta and Bulgaria missing)

• Continuity of supply
  – Introduction, monitoring, indicators, audits, analysis, exceptional events

• Voltage quality
  – Introduction, ongoing work, regulation, surveys on costs, monitoring systems and data

• Commercial quality
  – Introduction, Connection, Customer care, Technical service, Metering and billing, regulations/standards, market opening
Some conclusions
- Continuity of Supply

• Monitoring schemes
  – Long interruptions - all countries reported
  – Short interruptions – about half of the countries reported
  – Transients interruptions – two of the countries reported

• Indicators
  – Harmonisation envisaged for the purpose of benchmarking between countries

• Voltage levels monitored
  – LV (16), MV (21), HV/EHV(21) and Transmission (14)
Unplanned interruptions ex exceptional events

**Figure 2.1** Unplanned Interruptions Excluding Exceptional Events; Minutes Lost Per Year (1999-2007)

**Figure 2.2** Unplanned Interruptions Excluding Exceptional Events; Number of Interruptions Per Year (1999-2007)
Unplanned interruptions - all events

**Figure 2.5** Unplanned interruptions including all events: minutes lost per year (1999-2007)

**Figure 2.6** Unplanned interruptions including all events: number of interruptions per year (1999-2007)
Some conclusions
– Voltage Quality

• Countries should consider monitoring voltage quality continuously and publish results regularly.
  – Dissemination of experiences and harmonisation is envisaged
  – Workshop on voltage quality monitoring
• Mandatory individual verification of voltage quality to customers
• 6 countries reported actual voltage quality data
• 11 countries reported monitoring schemes for voltage quality
• Continued cooperation with CENELEC and further revisions of the EN 50160
Thank you for your attention!

www.energy-regulators.eu

Mark your diary for the World Forum on Energy Regulation IV
October 18-21, 2009
Athens, Greece

www.worldforumiv.info
Extra
Regulators’ documents on voltage quality

Important documents:

• Third CEER Benchmarking Report on Quality of Electricity Supply
• Towards Voltage Quality Regulation
  – An ERGEG Public Consultation paper
  – Evaluation of comments received
  – An ERGEG Conclusions Paper
• Service Quality Regulation in Electricity Distribution and Retail
  – Joint effort by CEER and FSR
• 4th CEER Benchmarking Report on Quality of Electricity Supply

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CEER view on the use of EN 50160

• CEER is not satisfied with the today’s content of EN 50160 and cooperates with CENELEC in order to revise this standard in a consensual way.

• The decision from CEER to participate in the process for a revision of the EN 50160 is based on a widely supported understanding that when available and suitable, international technical norms can be the best tool to complement national regulations.

• The EN 50160 can be used as a satisfactory basis for national voltage quality regulations only if certain improvements are made. The alternative to using proper international standards is for National Regulators to issue national requirements on voltage quality, which a few countries already have done.
CEER/ERGEG view

ERGEG Public Consultation Paper, ref E06-EQS-09-03
Recommendations to CENELEC for improving EN 50160

- Improve definitions and measurement rules
- Limits for voltage variations
  - avoid “95%-of-time” clause
  - avoid long time intervals for averaging measured values
- Enlarge the scope to HV and EHV
- Avoid ambiguous indicative values for voltage events
  - Classification of voltage dip/swell severity
- Consider duties and rights for all parties involved
- Introduce limits for voltage events according to network characteristics
- Develop the concept of power quality contracts
CEER/ERGEG view

ERGEG Conclusions Paper ref E07-EQS-15-03
A “road map” for the revision of EN 50160, inter alia:

• Restates the principles given in the public consultation paper
• ERGEG considers that the structure of the revised EN 50160 should be adaptable to the differences among the European countries. The rationale of the future EN 50160 could be:
  – to give harmonized definitions compatible with IEC norms for homogeneous measurements, monitoring, etc.;
  – to give homogeneous “responsibility-sharing curves” (or “indicative compatibility curves”) between network operators and customers, especially for voltage dips and swells, in order to allow a homogenous usage of electrical products all over Europe;
  – to avoid vague indicative and non-binding values for voltage events; such values should be left to an Informative Annex or in Technical reports that can be easily updated;
  – to set uniform limits for voltage variations and for other phenomena (harmonics, flicker etc), but some countries may have better limits.

• Provisions that apply for 100% of the time
• Stronger involvement of customers in the process

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