

**Distribution Code Review Panel  
Meeting 59 – Thursday 10 March 2016**

**ENA P28 Working Group - Application of Recommendations and/or Limits Associated with  
Voltage Fluctuations to Network Operators**

(Paper by the Chair of the ER P28 Joint GCRP and DCRP Working Group)

1. Summary

ENA Engineering Recommendation (ER) P28 Issue 1 1989, *Planning limits for voltage fluctuations caused by Industrial, Commercial and Domestic Equipment in the United Kingdom*, is undergoing revision by a Joint Grid Code Review Panel and Distribution Code Review Panel Working Group (referred to as the 'P28 Working Group'). The P28 Working Group is formally seeking views from the Distribution Code Review Panel (DCRP) on whether assessments and/or emission limits related to voltage fluctuation in the proposed revision of ER P28 should apply to network operators not just customer connections? This paper summarises the background and the views being sought from the DCRP.

2. Background

The Terms of Reference (ToR) for the revision of ER P28 have been the subject of much debate concerning whether recommendations for limiting voltage fluctuations (both flicker and rapid voltage changes) should extend to network operators not just customer connections. The rationale for extending the scope of ER P28 would be to promote transparency and fairness with respect to limiting voltage fluctuations in the distribution network and that new customer connections are not subject to limitations that may not apply to network operators in a similar context.

Following correspondence and consultation with the previous Chair of the DCRP, the Terms of Reference (see Attachment 1) were revised on the basis that the revision of ER P28 would remain a customer facing document (i.e. for customer related connections), but that the door would be left open for recommendations to be applied to design/operation of network operators' own networks – recognising that the context and objectives of network operators may differ from those of customers.

Whilst this position has enabled the P28 Working Group to progress the review, issues have arisen during initial drafting, which are captured in section 3 (see below) and for which the views of the DCRP are sought.

3. Summary of Views Being Sought from the DCRP

The views of the DCRP are sought on the following key issues.

1. Whether the DCRP believe it is necessary to impose any common recommendations and/or limits on network operators with respect to voltage fluctuations - given their operating context and objectives may differ from those of customers?
2. If common recommendations and/or limits for network operators are deemed necessary, does the DCRP believe the revised ER P28 is an appropriate place to document them - given ER P28 is currently and is proposed to be a 'customer facing' document?
3. If the DCRP agree that ER P28 is not an appropriate place to document them, where do the DCRP believe recommendations and/or limits should be captured? For example: A separate Engineering Recommendation, Codes modifications in the Distribution Code or another alternative?

4. Current Position of the P28 Working Group

In light of the key issues and views of the DCRP being sought (see 3. above) the following position was agreed by the majority of the P28 Working Group members following exchange of correspondence and discussion at the last meeting of the Group in January 2016.

1. The revised ER P28 should continue to be used for setting planning levels and emission limits for assessment of customer connections to the public electricity system in the UK.
2. Although the intention is that the revised ER P28 will not impose any recommendations and/or limits on network operators (subject to contrary views of the DCRP) this would not preclude a network operator from unilaterally applying the limits and relevant recommendations in P28 for the design of their own networks should they wish.
3. The P28 Working Group will continue to consider what recommendations could/should apply to network operators based on those for customer connections in ER P28 - although any recommendations and/or limits will not form part of the revised ER P28 (subject to contrary views of the DCRP).
4. Compatibility levels for voltage fluctuations could be included, which network operators would expect to be maintained for particular systems/networks. These may need to be higher than the planning levels defined in P28.
5. The onus should be on the customer and connectee to demonstrate compliance with ER P28; this does not preclude network operators carry out verification by measurements/ assessments and providing advice in the case of non-conformance.

5. Conclusions

The views of the DCRP are being sought on whether common recommendations and/or limits, if any, with respect to voltage fluctuations should apply to network operators and where these recommendations and/or limits should be captured?

Subject to contrary views from the DCRP, the P28 Working Group will prescribe recommendations and limits that are intended to apply to new customer connections only.

In parallel, with drafting recommendations and limits for the revised ER P28, the P28 Working Group will consider and separately document any common recommendations and/or limits that the DCRP may wish to apply to the design/operation of distribution network operators' own networks.

**Attachments**

[1] ER P28 Joint GCRP & DCRP Working Group, Terms of Reference, Version 2.2 Issued.

**ER P28 Joint GCRP & DCRP Working Group**

**Terms of Reference**

**1 Introduction**

The Energy Networks Association (ENA) is responsible for maintenance of Engineering Recommendation (ER) P28, *Planning Limits for Voltage Fluctuations Caused by Industrial, Commercial and Domestic Equipment in the United Kingdom*. P28 deals with the assessment of voltage fluctuations and associated light flicker produced by potentially disturbing equipment. P28 is referenced in both the Grid and Distribution Codes of Great Britain and is an 'industry standard' in this technical area.

As P28 Issue 1 was last published in 1989, the Grid Code Review Panel (GCRP) and the Distribution Code Review Panel (DCRP) of Great Britain (GB) have sanctioned the review of P28 by a joint Working Group of various key stakeholders and third parties that will be materially affected by any revision of the document.

This documents sets out the Terms of Reference for the ER P28 Joint GCRP & DCRP Working Group (subsequently referred to as the 'Working Group').

**2 Objective**

The objective of the P28 Working Group is to review the standards and processes employed by Distribution Network Operators (DNOs) and Transmission System Operators (TSOs) in GB to assess voltage fluctuations and associated light flicker produced by potentially disturbing user equipment.

The intention, for the time being, is that P28 will remain a 'customer facing' document and that overarching policies and limitations with respect to voltage fluctuation will be contained within the Distribution Code. Notwithstanding, the Working Group will consider the adequacy of requirements for limiting voltage fluctuation in DPC4 of the Distribution Code and will recommend any necessary changes to the DCRP; this could include what voltage fluctuation aspects of DPC4, in particular those in DPC4.2.3.2, could or should be incorporated within ER P28. Wherever possible, the Working Group will seek to harmonise related requirements/limits in the Grid Code, the Distribution Code and ER P28.

The Working Group will seek to be fair and even-handed in the application of requirements, taking into account the different operating context and objectives of users and network operators.

The initial output from the Working Group will be a report describing the changes to Engineering Recommendation P28 that are considered necessary.

The Working Group will be responsible for ensuring that changes considered necessary to ER P28:

- support the codes in the Grid and Distribution Codes;
- align with national and international Standards, as far as possible;
- reflect good practices;
- conform with legal and regulatory frameworks;
- are technically correct;
- are usable with confidence by industry stakeholders.

In developing its proposals the Working Group will consider the current performance of P28 (in terms of preventing flicker, voltage complaints and adverse impacts on operation of User's Equipment and network performance) and both the economic and technical case for change.

The Working Group will be mindful of changing technologies and their impact on recommendations in P28. The need for future reviews of P28, in light of foreseen changes to technology and Standards, and any time-bounding of recommendations will be considered.

### **3 Membership**

Membership will be open to nominated representatives from key stakeholders including DNOs, TSOs, Independent Distribution Network Operators (IDNOs), ENA, generators, equipment manufacturer trade associations, disturbing load connectees, independent technical experts, government, regulators and other third parties.

Membership will take the form of 'Sitting Members' and/or 'Corresponding Members'.

Changes to Membership of the Working Group will be sanctioned jointly by the GCRP and DCRP.

### **4 Scope of Review**

The scope of review of P28 will cover the following aspects.

#### **4.1 General**

- Update references and associated recommendations in P28, including standards.
- Consider whether it is appropriate to employ different standards and/or processes for transmission compared with distribution connections.
- Consider issues where P28 is unclear and provide guidance on interpretation (e.g. which fault level to consider).
- Consider voltage fluctuations from a wider network context and the adequacy of voltage fluctuation requirements in DPC4 of the Distribution Code.

#### **4.2 Standards**

- Consider whether there are standards that could be adopted/referenced (e.g. PD IEC/TR 61000-3-7) in anticipation of the implementation of EU Network Codes. Consideration will be given to reviewing IEEE Standards, where there is no appropriate National, European or International Standard.

- b) Consider whether BS EN 61000-3-3 and BS EN 61000-3-11 are effective at controlling flicker for multiple LV installations.
- c) Consider whether other technical standards or recommendations would need to change as a result of any change to P28.

#### 4.3 Limits

- a) Consider whether the planning limits for voltage fluctuations and flicker are adequate or acceptable, in particular for infrequent switching events and rapid voltage changes.
- b) Consider whether changes are necessary because of the new range of lighting technologies.
- c) Consider whether transformer magnetising inrush should be within the scope of P28
- d) Consider requirements for guidance on the application of P28 and data requirements for use in models/calculations of flicker severity, in particular, data accuracy and any initial conditions to be used.

#### 4.4 Evaluation of background levels

- a) Clarify the interpretation of measured background values and what duration of measurement is appropriate.
- b) Consider how to progress with flicker measurements where a new substation is not yet built (i.e. how is the background level at a new substation best estimated?)

#### 4.5 'First-come, first-served' versus allocation of rights

- a) Consider the process used to allocate the limits described in P28 between different users in similar areas including whether 'first-come, first-served' is the appropriate way of allocating limits or whether there are alternative methods (e.g. equal rights as per PD IEC/TR 61000-3-7) that can be justified.
- b) Consider how 'competing' applications are dealt with and how changes to customers' requirements may impact on their right to produce voltage fluctuations and flicker.
- c) Research whether other countries have moved from 'first-come, first served' to 'equal rights' and consider whether any lessons can be learned.

#### 4.6 Other technical issues

- a) Develop proposals to update P28 to fully cover the variety of equipment now commonly encountered.
- b) Consider the best approach to co-ordinate 'outages' between transmission and distribution systems under fault level consideration (e.g. one transmission Supergrid transformer out at the same time as one distribution 132 kV feeder).

c) Consider how to treat situations where Planning Levels are exceeded.

## **5 Facilitation**

Facilitation and secretariat support for the Working Group will be provided by the ENA and their nominated representative.

The Facilitator will ensure that the Working Group follows governance procedures as set down by the GCRP and DCRP. This includes general compliance with the principles set out in the Code Administrators Code of Practice (CACOP) to facilitate transparency in Code Modification processes and help protect the interests of small market participants and consumers.

## **6 Meetings**

Meetings of the Working Group will be chaired by a joint GCRP and DCRP appointed representative. The Chair shall liaise closely with the Facilitator to ensure the Working Group operates effectively and efficiently.

Nominations for the position of Deputy Chair will be sought from Sitting Members of the Working Group. If appropriate, nominations for Deputy Chair will be reviewed by the GCRP and DCRP prior to appointment.

Sitting Members will be invited to attend meetings of the Working Group; Corresponding Members will not normally be invited to attend meetings but will be invited to comment on all other aspects under consideration by the Working Group. External parties, such as technical specialists, may be invited to attend and contribute to meetings on an exceptional basis; stakeholders will be able to object to attendance by any external party.

Sitting Members will be expected to attend meetings of the Working Group on a regular basis. A stakeholder, who has 'Sitting Membership' of the Working Group will be allowed to send a substitute representative to meetings of the Working Group, where the nominated representative is unable to attend. The substitute representative will be appropriately qualified and experienced to contribute to the meeting(s) of the Working Group. Where attendance at a meeting is not possible, the Sitting Member will send their apologies sufficiently in advance together with details of their substitute representative for acceptability by the Secretariat.

Regular meetings of the Working Group will be held, not less than once every three months. An agenda and arrangements for each meeting will be notified generally one month in advance by the Facilitator of the Working Group together with details of any proposal to invite external parties to the meeting. Additional meetings may be held when the majority of Members agree there is an essential requirement.

## **7 Liaison with Other Panels and ENA Working Groups**

It is essential that the review of ER P28 is coordinated with the work of the GCRP and DCRP and other ENA Working Groups.

Minutes from meetings and regular updates on the progress of the Working Group will be prepared and circulated by the Working Group Facilitator to other Panels and ENA Working Groups, as appropriate.