

Draft Minutes of the Second Meeting of the ER P28 Joint GCRP and DCRP Working Group

10th February 2015

Held at the EIC, 10th Floor, 89 Albert Embankment, London, SE1 7TP

1. Welcome, Introductions

GE welcomed everybody to the second meeting of the ER P28 Joint GCRP and DCRP Working Group (WG) to review the case and proposed scope of review of ENA Engineering Recommendation P28 Planning Limits for Voltage Fluctuations caused by Industrial, Commercial and Domestic Equipment in the UK (P28).

Attendance, apologies and absences were noted (see Appendix A for Attendance List).

Round the table introductions were made.

It was noted that Simon Scarboro (SSc) from Western Power Distribution was deputising for Andrew Hood.

ACTION 2.0: Contact WG members who did not respond to meeting request reminding them of their obligation to attend and contribute to the review (MJC)

2. Address by the Chair

GE thanked the WG members for their contributions and summarised the decisions/outcomes from the inaugural meeting:

- Formal constitution of the WG
- Draft ToR commented upon - to be approved [at this meeting]
- Agreed the scope of review
- Agreed governance procedures of the WG to follow the CACoP, in principle
- Agreed the draft project plan
- Output from Phase 2 would be a report detailing the proposed changes to P28

The WG members were reminded that:

- Discussions are to be carried out in an open and transparent way, unless items were specifically noted as confidential
- They represent a broad spectrum of stakeholders and should engage in a full and fair discussion, being respectful of other views
- They should report back to all those organisations and individuals they represent

The purpose of this meeting was to consider two specific areas, accepting the answers would not necessarily be reached in this meeting:

- Limits
- Rapid Voltage Changes (RVC)

The WG members were tasked with:

- Reviewing the considerations presented in the briefing papers
- Discussing the likely impacts of the proposed changes, and

- Providing evidence to support the proposed modifications

3. Update/Actions from Last Meeting

The draft minutes from the last meeting were approved by the WG members for publication.

[Document Reference: P28 Meeting Minutes and Actions_09.12.14_v0.2_Draft_Issued]

GE presented an update on the actions from the last meeting.

[Document Reference: P28 Meeting Actions Update_04.02.15_Issued]

It was confirmed that ETR 117 was not published and is not relevant to the review of P28.

The WG discussed the supporting information for P28 and it was suggested that ETR 125 Voltage Dip Survey could be relevant to this review.

ACTION 2.1: Review ETR 125 Voltage Dip Survey to see if it is relevant to P28 and report back to the WG (GE)

ACTION 2.2: Prepare a paper listing the references quoted in the current P28 dividing them into obsolete, superseded and current (DC)

MH provided flicker measurements from solar power installations. Due to commercial sensitivity the WG agreed to treat these as Confidential and not to circulate or publish outside of the WG.

DC provided a draft diagram showing how P28 fits within the framework of other standards. It was agreed this would be developed and populated with Standards during the course of the P28 review.

DC agreed the outputs from the Electricity Council flicker program could be posted onto the P28 WG public webpage [<http://www.dcode.org.uk/dcrp-er-p28-working-group.html>].

ACTION 2.3: Post the outputs from the Electricity Council flicker program on to the P28 WG public webpage (GE)

The WG discussed whether the Electricity Council flicker program was still used. SSc thought it was and believed it uses the same P_{st} curves referenced in IEC 61000-3-3. It was agreed to review the outputs from the program, noting there were other more up-to-date software programs commercially available.

The consensus was that the DOS program should not be revised under this review.

ACTION 2.4: Review the outputs from DOS programming system (GE)

WG members were asked to confirm their areas of technical expertise and willingness to support certain technical aspects of the review. GE circulated a template for WG members to complete.

4. Terms of Reference (ToR)

GE presented the amended draft ToR.

[Document Reference: ER P28 WG_ToR_v1_Issued]

GE explained that amendments to the original draft have been identified in this document using a vertical line in the left margin of the document.

The WG discussed the applicability of P28 to planning of user connections. P28 looks at the considerations of connecting new equipment, not the operations of DNOs which are governed by other regulations. Therefore, given that the current issue of P28 refers to connecting *customer* equipment, it was agreed to change the wording in section 2 'Objectives', first paragraph, to read "...to assess voltage fluctuations and associated light flicker produced by potentially disturbing *user* equipment" (SSc).

ACTION 2.5: Amend the ToR section 2 'Objectives', first paragraph, to read: "...produced by potentially disturbing *user* equipment" (GE)

Subject to this amendment there were no objections to issuing the ToR document as approved.

ACTION 2.6: Re-issue amended ToR to WG with a deadline date for any objections (noting no response will be taken as approval) (GE)

There was a discussion about the stakeholder groups represented in the WG and whether other *users* should be represented that have *sensitive loads*. For example, glass factories (MT/MH).

ACTION 2.7: Circulate the original list of 55 organisations contacted for the membership of P28 WG (GE)

ACTION 2.8: Review the stakeholders and comment whether members believe all key stakeholders are represented (All)

5. **Proposed Changes to ER P28**

GE tabled four areas for discussion:

- Applicability of limits for infrequent events and voltage changes
- Modern lamp types
- Energisation of transformers
- Relationship/impact on GCode and DCode requirements

5.1 **Applicability of Limits for Infrequent Events and Voltage Changes**

GE presented conclusions drawn from a review of CIGRE Brochure 449 and IEC 61000-3-7 on rapid voltage changes.

The WG discussed if there was a requirement to be more specific in defining 'frequent' and 'infrequent' events for step voltage changes.

DV referred to a forthcoming review of Electromagnetic Compatibility (EMC) Standards, PD IEC/TR 61000-3-6 and PD IEC/TR 61000-3-7, for which he has been proposed as a WG member. Part of the review will investigate the benchmarking of power quality with respect to RVC and flicker. This review could be relevant to the P28 WG. There is also a CIGRE WG investigating what severity indices should be used for RVCs.

ACTION 2.9: Review the ToR for the revision of PD IEC/TR 61000-3-6 and PD IEC/TR 61000-3-7 and any other CIGRE WGs. Report back to WG for next meeting (DV)

The WG discussed the $P_{st} = 1$ limit curve and whether this should be used to define limits of RVC.

DECISION: The WG agreed that given the reduction in the number of occurrences, the P_{st} curve was still the base of reference for RVC.

The WG discussed whether the P_{st} curve is relevant for all types of equipment (MT):

- National Grid has studied equipment immunity to voltage change. It has surveyed many documents and found no evidence that equipment would be effected by -12% voltage change. It found that if it occurred 7 times per day it would reach the 99% percentile. This model is used in Norway and Sweden. For conservative reasons this was reduced from 7 to 4 times per day in the GC0076 report (FG)
- National Grid found no guidance in published literature that any problems would occur for sensitive equipment when there is -12% step voltage change. A -12% voltage change for $n \leq 4$ is believed to be compliant with the ITIC curve (FG)
- There are proposed sensitivity indices for RVC reported in the CIGRE Paper 568 Transformer Energisation in Power Systems, which would need to be considered further (GE)
- The GCode and DCode differ in terms of the voltage change levels and the number of occurrences per day. It was agreed that equipment causing -6% voltage change infrequently would be outside the scope of a $P_{st} = 1$ criterion (SSc). It was noted that the DCode sets a precedent for exceeding the $P_{st} = 1$ curve limits. The WG should be mindful when setting limits to differentiate between fundamental frequency and other harmonics when talking about transients (DV)
- ETR 125 which looks at the ITIC curve found that other equipment more sensitive to low voltages could fail. It was thought that National Grid looked at maintenance and commissioning and not routine switching (SSc)
- The importance of the ITIC curve was discussed. The curve indicates that for a 30% voltage dip (i.e. $V_{nominal} - 30\%$) lasting up to 500 ms, there should be no interruption in the function of well-designed electronic equipment. However, it was noted that not all equipment is covered by the ITIC curve.

ACTION 2.10: Review distribution voltage levels and limits & immunity levels of LV equipment to determine what planning limits for RVC may be appropriate (SSc)

The WG discussed how the consideration of voltage step change could impinge on network operators through to a LV connectee:

- National Grid stated two relevant parameters – a 12% maximum voltage and a transfer coefficient. Using a GB simulation model and assuming the RVC bandwidth is within 50 Hz and using 6 bulk supply points, it has been estimated in 99% of cases the transfer coefficients would be as follows:
 - 0.9 for EHV to 132 kV
 - 0.8 for EHV to 33 kV
 - 0.6 for EHV to 11 kV
- SSc discussed the need to consider various scenarios of voltages and to study the effect of voltage dip caused by magnetisation inrush currents. FG pointed out that

12% voltage dip was the maximum limit on a single phase and would be higher than a voltage dip affecting three phases

ACTION 2.11: Provide further data on the application of transfer coefficients by National Grid (FG)

Members discussed the difficulty of specifying limits for individual equipment types and whether or not this WG should consider equipment performance in that level of detail (DV). However, P28 refers to more than just flicker, it also looks at protecting users' equipment (JD). It was noted that National Grid had considered equipment immunity in its study in line with IEC 61000-4-11 but immunity of protection systems had not been a main consideration (FG).

Any limits for RVC should be compatible with recognised standards, which users specify when purchasing equipment (MT).

ACTION 2.12: Obtain report on what equipment should be able withstand (ITIC curve) and for how long (IEC standards on equipment) and find out what other curves, if any, apply (GE)

The WG agreed it was best to use current P_{st} curves for flicker measurements. There would also be value in looking at the probability of a customer complaint and whether higher P_{st} planning limits could be considered at higher voltages.

In terms of documenting permissible voltage dip it was agreed:

- GCode would reference the revised P28 if RVC was satisfactorily documented in it (FG)
- It would be beneficial to have a common set of limits used by the GCRP and DCRP with P28 being the common reference for network operators and users (GE)
- To cover all fast electrical transients including those associated with transformer magnetising inrush

The WG agreed the proposed P28 should have two separate sections detailing recommendations for:

- RVC
 - Agreed that RVC should cover any voltage changes within 2 seconds and should not be prescriptive on the cause or applications (i.e. will include transformer magnetising inrush)
- Flicker Planning Limits

ACTION 2.13: Email GE a copy of the ElectroTech Concepts Diagram (SSc)

ACTION 2.14: Look at how the magnitude and time period of voltage dip translates down into customer voltage, with reference to the acceptability of GC0076 and the proposed P28. Look for possible constraints of legislation that DNO stakeholders are governed by (SSc/FG)

For infrequent events the P28 value of 3% was thought not to be valid for all voltage levels as the value of 3% voltage change comes from the $P_{st} = 0.5$ curve (no limit on occurrences), which make it difficult when considering the energisation of wind farms. The 10% voltage change set by the DCode for all but extremely infrequent events could be

considered to be too high, highlighting a disconnect between the two documents, which should be addressed (SSc).

With reference to PD IEC/TR 61000-3-7 Table 6, the WG believes that voltage limits should preferably be a specific value or in the case of a range of values, guidance needs to be given on what value should apply. FG stated that values in Table 6 were indicative and that P28 should align with IEC standards, where possible.

ACTION 2.15: Review standards to help define the acceptable level of voltage dip and the time period compatible with equipment immunity (DV)

The WG also discussed planning limits versus compatibility limits versus immunity levels. The rationale behind the application of planning limits and the assumptions regarding fault levels and reactances needs to be clearly defined (MH).

DECISION: It was agreed that P28 should focus on planning limits and standard procedure for assessing the acceptability of voltage fluctuations being a short document containing the agreed requirements with supplementary guidance incorporated in an ETR, where appropriate.

ACTION 2.16: Document aspects of P28 that are inconsistent when carrying out P28 assessments across different networks operators (JD)

ACTION 2.17: Summarise the differences in the application of P28 between different DNOs as experienced by Lightsource (MH)

Action 2.18: Refer any technical issues involving distributed generation that cannot be resolved to the DG Steering Group (GE)

ACTION 2.19: Email GE/DC a copy of the WPD report showing table of limits on voltages (SSc)

ACTION 2.20: Produce a paper reporting on WPD's position and whether a consensus of opinion can be reached in the PQ & EMC Group across the DNOs on how to address voltage (DC)

The discussion concluded that the P28 revision needs to provide:

- A clear definition of voltage levels and planning limits by voltage levels
- A clear consistent approach for assessing fluctuating voltage against planning levels, with a clear set of principles it is based on
- Concise guidance only and not require any detailed elaboration as to why
- The ultimate objective of having one document which satisfies the Grid Code and Distribution Code and all network operator - giving consistency and one common framework

The importance of including tripping of loads above 75 A was discussed. The need to include limits for re-connection of load and disconnection is difficult and will depend on the definition of normal planned operation as opposed to unplanned operation. However, limits should apply to normal operations involving disconnection and reconnection of load.

It was agreed that tap changer voltage variation is considered as a voltage fluctuation and must comply with limits in P28.

It was agreed to include limits for voltage swells as well as dips. Although voltage swells were not believed to be a problem, guidance on compatibility of equipment with voltage swells was deemed to be useful (JD/KL).

The WG agreed the importance of having a clear definition of normal operating conditions such that frequent events would fall within the limits. It was also agreed to state that abnormal conditions are outside the scope of this review. Requirements in the Electricity, Safety Quality and Continuity Regulations (ESQCR) should underpin any consensus (SSc). Consequently, the P28 revision should not prescribe what an infrequent event is but make it a conditional value instead (GE).

Note – the term ‘abnormal conditions’ should be used instead of ‘emergency conditions’ (i.e. fault restoration). It is important that terminology aligns with IEC, where possible (MK).

ACTION 2.21: Review conditions in terms of scope of P28 – what it says now and what it should include in the future (GE)

5.2 Modern Lamp Types

GE presented conclusions from CIGRE Brochure 449 concerning flicker and its effect on modern lamp types.

The WG observed there were some effects present in modern lighting from flicker. Page 12 of Leonardo Energy Application Note [P28 WG Paper 2-6] states that LED and modern lighting are more susceptible to flicker; this conflicts with CIGRE Paper 449. The WG would need to resolve the contradiction and identify what is correct.

The WG also discussed dimmer switches and LED lighting – there have been some problems in Australia possibly due to harmonic distortion (DV). It is unclear whether these problems are the result of poor manufacturing quality or response to voltage fluctuation.

ACTION 2.22: Prepare a paper of published literature research on modern lighting and flicker (JH)

ACTION 2.23: Email the paper on flicker and modern lighting written by Professor from Finland to GE (RB)

It would be useful to look at IEC 61000-2-2 which defines compatibility levels for low frequency disturbances (SSc).

The initial view of the WG indicated there were no drivers for flicker severity levels to change at LV levels. Compatibility levels have been well defined but there is scope to review planning levels (DV).

The number of customer complaints from connectees arising from not being connected to networks because of high background levels of flicker could be a driver to change the current ‘first come first served’ allocation system.

The connection process for wind turbines includes connectee’s flicker calculations based on the Power Quality report provided by the wind turbine manufacturer in accordance with IEC 61400-21(JD).

Flicker issues identified in rural areas could be largely attributed to direct-on-line starting of heat pumps without first notifying the network operators (JH/KL). The ability to detect who

is causing high background levels of flicker would need to be established in any change to the current allocation system.

The WG discussed the possibility of setting a low level of emission $P_{st} < 0.5$ for direct connection to avoid getting into problems and exceeding planning levels (JH). However there is a school of thought that says disturbing loads will always effect flicker and will need to be conditionally connected (KL).

A problem has been identified with obtaining flicker background levels (JD). The DNOs believe there is a balance of risk versus cost of providing this data. The practicality of providing background levels in distribution networks will need to be considered.

Difficulties of planning coordination should be less for flicker compared with harmonics as effects are largely additive. It should be possible to identify a low level of flicker that could be accepted without problems.

There needs to be a fair and more consistent approach for allocating planning levels based on load/levels for different customers. However where P_{st} levels exceed planning limits, it would be difficult attribute this to individual customers, making the allocation of rights according to size of load difficult to police. One way to overcome this would be to measure current variations at some point (KL/JD/DV).

FG noted Annex C of IEC 61000-3-7 looked at the stages for connections and how to ensure re-allocation of global contributions and planning levels (flicker transfer coefficient). CIGRE Paper C4.106.2010 also covers emission limits and allocation.

Apportionment of rights could follow the principles of G5. Further evaluation is required.

The current P28 refers to the aggregation of different sources. A balanced view is required for the case to change allocation of rights and it was agreed the WG needs more information before it is able to decide on the approach to take. One benefit of changing would be the ability to move planning limits closer towards compatibility limits (reduced error margin).

ACTION 2.24: Investigate whether G5 allocation of rights contains the principles to translate to flicker? (GE)

ACTION 2.25: Investigate the justification to change the allocation of rights (FG/GE)

Western Power Distribution advised it is monitoring all of its 33 kV bulk supply points for harmonics and the same could be done for flicker (SSc).

In Sweden, flicker emission rights are shared rather than on a first come first served basis (P28). Flicker emission of wind farms cannot exceed $P_{st} < 0.35$ and $P_{lt} < 0.1$ at 150 kV regardless of existing flicker background measurements (JD). A similar reduction of flicker severity at higher levels could be considered for direct connection.

Other points of discussion covered load diversion schemes and their impact on flicker at LV. Also that heat pumps may need to be treated separately in P28 (JH).

The WG agreed it was important to look at voltage complaints to see if these were increasing in number and whether they were significant or not. It was not clear if there is a common reporting system across all of the DNOs which could make it difficult to quantify how many of the complaints were due to flicker (JD/SSc).

Ofgem may hold central summary figures on voltage complaints - this would need to be verified. Given the potential confidentiality issues obtaining a broad view would have to suffice (MB).

ACTION 2.26: Investigate whether there is a common reporting methodology for customer voltage complaints in Ofgem (MB)

ACTION 2.27: DNO stakeholders to investigate power/supply quality complaints and report back summary of findings (RB/KL)

The WG agreed there was scope within this review to incorporate the concept of flicker transfer co-efficients through different voltage levels.

The WG agreed there was scope to explore whether measured values of P_{st} are regularly exceeding $P_{st} = 1$ and whether P_{st} levels at MV and HV should be increased. There was a consensus to increase planning levels at HV/EHV.

ACTION 2.28: Obtain approval to share information from National Grid to support whether measured values of P_{st} are regularly exceeding $P_{st} = 1$ whether P_{st} levels at MV and HV should be increased (FG)

The WG agreed that P28 should continue to use the current flickermeter standard but there is a user perception of increasing flicker at MV to consider.

5.3 Energisation of Transformers

GE presented conclusions from CIGRE Brochure 568 and the differences between r.m.s. voltage drop and temporary overvoltages (TOVs) that occur because harmonic inrush currents resonate with system components.

Summary of points discussed:

- The application of point-on-wave switching to reduce magnitude of voltage change
- The importance of how remanence is treated (MH)
- Differences in the conditions DNOs stipulate for modelling the energisation of transformers

Western Power Distribution stated it considers energisation at minimum fault level and maximum remanence - 3% limit very conservative with 50% probability of exceedance. A 6% limit with probability of exceedance could be considered.

The WG agreed there was scope to look at a probabilistic approach to transformer energisation involving two considerations:

- Absolute maximum voltage dip not to be exceeded
- % probability exceedance

The WG agreed that magnetising inrush should be treated the same as other transients (RVCs). This is the case in National Grid GC0076.

It was agreed that routine switching of transformers will need to meet planning levels.

5.4 Relationship/impact on GCode and DCode requirements

Figure 4 of ER P28 Issue 1 suggests step voltage changes of 3% can be tolerated every 10 minutes without causing Pst emissions >0.5. This is different to IEC 61000-3-7 and the Grid Code which suggests between 6 minutes and 30 minutes is acceptable.

- In light of the above finding, the WG agreed to a magnitude and period of time/frequency approach for infrequent voltage changes

The WG discussed whether there was a need to change Stage 1 assessment limits in P28:

- It was agreed that the review should also look at the approach currently used in the three stages of P28, in particular, how they differ and to look at the approach taken by in IEC Standards

6. Summary of Proposals and Actions

It was agreed that any proposed modifications arising from discussions in item 5 would be summarised in these meeting minutes. The summary is provided below.

Item	Proposed Modification	Information to Support Change
	1. Applicability of limits	
1.1	Remove reference to the Electricity Council flicker program	P28 needs to be more generic to include other modern software tools that model flicker severity
1.2	Extend scope to include compatibility of voltage fluctuation with sensitive equipment and loads	Flicker perception is becoming less of a problem for modern lamp types (CIGRE Brochure 449) and sensitive equipment/loads may be the limiting factor in setting planning limits for voltage fluctuation
1.3	Consider the inclusion of appropriate severity indices for RVC	Need to consider work being carried out in IEC Standards committees for calculating severity of RVC which aligns with P _{st} approach
1.4	Include the concept of transfer coefficients and different planning limits at different voltage levels	Align with the methodology in IEC Standards to allow for attenuation of flicker down through voltage levels
1.5	New recommendations for assessing/limiting RVC to include all electrical transients (regardless of source) up to 2 second duration	Customers are perceptible to RVCs including those of very short duration but high magnitude
1.6	Extend scope to voltage fluctuation (dip and swell) to routine disconnection and reconnection of loads	Voltage swells can damage sensitive equipment and planning limits need to be set
1.7	Ensure modifications align with IEC standards, wherever possible	There is a significant body of work collected in IEC standards that could be complied with
1.8	Consider increases in planning limits at LV	Given setting of limits at higher voltage levels, the application of transfer coefficients between voltage levels and reduced flicker sensitivity of modern lamp types may mean higher levels of P _{st} are acceptable
1.9	Adopt a probabilistic approach to the energisation of transformers with a maximum limit and % probability of exceedance	The current deterministic approach may be unnecessarily restrictive and costly for DG applications
	2. Relationship impact on DCode and GCode requirements	

2.1	Add clear definitions/parameters for frequent events, infrequent events (under P28) and normal operating conditions	A clear assessment framework is required on assessment and limits for RVC to ensure alignment between the GCode and DCode
2.2	Develop new recommendations for assessment and limits for RVCs (envelope of durations and magnitudes) separate from flicker assessment and limits	Given the GCode and DCode address RVC guidance is required in P28 for assessment and planning purposes

7. Project Plan

GE presented the project plan.

[Document reference: ENA_EREC_P28_Ph1_PID_v1_Issued]

This document is the operating guide for the WG and it will be updated and kept as a live document through the review/revision process.

The WG was asked to review the document and send comments back to GE. Following approval by the WG, the project plan will be sent to the GCRP and DCRP for final approval.

There was further discussion on the Electricity Council software tool – the project plan should state that subject to review of outputs, the Electricity Council software tool would not be reviewed under this project, noting there are other tools available that carry out the same function including Power Factory. This does not preclude development of the Electricity Council software tool outside the P28 review process, should the industry require it (SSc/DV).

ACTION 2.29: Amend PID –

- **Page 14 bullet point BS EN 61000-3-3 replace “a further test is required” with “further *consideration* is required” (GE)**
- **Page 14 bullet point Electricity Council software programme more detail is needed (GE)**
- **Page 15 bullet point Electric Vehicles replace “classed as unconditional connections” with “classed as *conditional* connections” (GE)**

ACTION 2.30: Review PID and send back comments to GE by 27 February 2015 (All)

8. General Management/Administration

Arrangements for general management and administration were confirmed and the key observations were noted as below.

8.1 On-line Repository Requirements

- Public access
 - Now set-up and hosted by ENA on the DCRP website
 - Being administered on behalf of the WG by the ENA Secretariat
 - Provides access to all approved outputs from WG (see <http://www.dcode.org.uk/areas-of-work/>)
- Working Group secure access
 - It is proposed to use the ENA projects portal (under development)
 - Interim step is to use the secure password protected file sharing area now being hosted on Dropbox, where files are encrypted and password protected

ACTION 2.31: Remove members email addresses from WG membership document posted on the public area of the DCRP website (GE)

Due to corporate IT policies a number of the WG members could not access files via the Dropbox link provided – KL, FG, PJ and MT.

ACTION 2.32: Investigate setting up and migrating the working files from Dropbox onto a new page on the ENA website (GE)

ACTION 2.33: Resend the Dropbox link to GB (GE)

8.2 Consultation Process

The WG was informed about the following governance processes that need to be complied with.

- Current References
 - DCRP Constitution and Rules - Standard Procedure 1
 - Electricity Networks and Futures Group (ENFG) Document Review/Approval Process (v3 Revision November 2013)
- Proposed Processes
 - Interfaces with Working Group now incorporated into revised ENFG Document Review/Approval Process
 - No initial public consultation proposed for development of ER P28 revision
 - Regulatory authorities, trade associations and IET will be given early opportunity to comment of draft P28 revision
 - Working Group will draft consultation paper for agreement by the GCRP and DCRP
 - Public consultation will only take place following acceptance of the modifications by the ENFG and joint agreement by the GCRP and DCRP

8.3 Support Requirements

The WG was reminded about the following support requirements being provided.

- Provided by ENA Secretariat
 - Organisation and facilitation of WG meetings
 - Preparation of meeting agendas
 - Taking and distributing meeting minutes/actions
 - Preparation of briefing papers and documents
 - Preparation and distribution of WG reports and documentation
 - Collation of incoming data and responses
- Provided by Working Group Members
 - Preparation of papers
 - Response to papers
 - Specialist technical support
 - Incoming/field data

There were no other support requirements identified.

9. AOB

The importance of keeping the review/revision process to programme was noted (SSc).

The WG should align its work with relevant IEC documents, where possible. To ensure this happens the WG was reminded to make use of committees linked to ENA, other WGs members attend and their BSI counterparts. It was noted that DC already has an action to cover this.

10. Date for Future Meetings

The following dates were agreed for future meetings:

- 23rd April 2015 (already set up)
- 18th June 2015 (already set up)
- 3rd September 2015 (new)
- 4th November 2015 (new)

NOTES

1. The current membership, ToR, agenda, papers and previous minutes with this meeting can be found on the DCode website (see <http://www.dcode.org.uk/dcrp-er-p28-working-group.html>).

Summary of Actions from Current Meeting

Item	Action	Responsibility	Due by
2.0	Contact WG members who did not respond to meeting request reminding them of their obligation to attend and contribute to the review	(MJC)	
2.1	Review ETR 125 Voltage Dip Survey to see if it is relevant to P28 and report back to the WG	(GE)	
2.2	Prepare a paper listing the references quoted in the current P28 dividing them into obsolete, superseded and current	(DC)	
2.3	Post the outputs from the Electricity Council flicker program on to the P28 WG public webpage	(GE)	
2.4	Review the outputs from DOS programming system	(GE)	
2.5	Amend the ToR section 2 'Objectives', first paragraph, to read: "...produced by potentially disturbing user equipment"	(GE)	
2.6	Re-issue amended ToR to WG with a deadline date for any objections (noting no response will be taken as approval)	(GE)	
2.7	Circulate the original list of 55 organisations contacted for the membership of P28 WG	(GE)	
2.8	Review the stakeholders and comment whether members believe all key stakeholders are represented	(All)	
2.9	Review the ToR for the revision of PD IEC/TR 61000-3-6 and PD IEC/TR 61000-3-7 and any other CIGRE WGs. Report back to WG for next meeting	(DV)	
2.10	Review distribution voltage levels and limits & immunity levels of LV equipment to determine what planning limits for RVC may be appropriate	(SSc)	
2.11	Provide further data on the application of transfer coefficients by National Grid	(FG)	
2.12	Obtain report on what equipment should be able withstand (ITIC curve) and for how long (IEC standards on equipment) and find out what other curves, if any, apply	(GE)	
2.13	Email GE a copy of the ElectroTech Concepts Diagram	(SSc)	
2.14	Look at how the magnitude and time period of voltage dip translates down into customer voltage, with reference to the acceptability of GC0076 and the proposed P28. Look for possible constraints of legislation that DNO stakeholders are governed by	(SSc/FG)	
2.15	Review standards to help define the acceptable level of voltage dip and the time period compatible with equipment immunity	(DV)	
2.16	Document aspects of P28 that are inconsistent when carrying out P28 assessments across different networks operators	(JD)	
2.17	Summarise the differences in the application of P28 between different DNOs as experienced by Lightsource	(MH)	

Item	Action	Responsibility	Due by
2.18	Refer any technical issues involving distributed generation that cannot be resolved to the DG Steering Group	(GE)	
2.19	Email GE/DC a copy of the WPD report showing table of limits on voltages	(SSc)	
2.20	Produce a paper reporting on WPD's position and whether a consensus of opinion can be reached in the PQ & EMC Group across the DNOs on how to address voltage	(DC)	
2.21	Review conditions in terms of scope of P28 – what it says now and what it should include in the future	(GE)	
2.22	Prepare a paper of published literature research on modern lighting and flicker	(JH)	
2.23	Email the paper on flicker and modern lighting written by professor from Finland to GE	(RB)	
2.24	Investigate whether G5 allocation of rights contains the principles to translate to flicker?	(GE)	
2.25	Investigate the justification to change the allocation of rights	(FG/GE)	
2.26	Investigate whether there is a common reporting methodology for customer voltage complaints in Ofgem	(MB)	
2.27	DNO stakeholders to investigate power/supply quality complaints and report back summary of findings	(RB/KL)	
2.28	Obtain approval to share information from National Grid to support whether measured values of Pst are regularly exceeding Pst = 1 whether Pst levels at MV and HV should be increased	(FG)	
2.29	Amend PID – <ul style="list-style-type: none"> o Page 14 bullet point BS EN 61000-3-3 replace “a further test is required” with “further consideration is required” o Page 14 bullet point Electricity Council software programme more detail is needed o Page 15 bullet point Electric Vehicles replace “classed as unconditional connections” with “classed as conditional connections” 	(GE)	
2.30	Review PID and send back comments to GE by 27 February 2015	(All)	
2.31	Remove members email addresses from WG membership document posted on the public area of the DCRP website	(GE)	
2.32	Investigate setting up and migrating the working files from Dropbox onto a new page on the ENA website	(GE)	
2.33	Resend the Dropbox link to GB	(GE)	

Summary of Outstanding Actions from Previous Meetings

1.0	Email MJC a list of other Groups that sitting members are a member of	(All)	
1.8	Include in the draft Agenda, issued 1 month ahead of the meetings, any invitation to include a technical guest	(GE)	Ongoing
1.17	Email relevant documentation and circulation list to the Secretariat (GE cc MJC) who will act as coordinator to disseminate information to WG members	(All)	Ongoing

Appendix A

ER P28 Joint GCRP & DCRP Working Group Meeting No.2

Attendance List

10th February 2015 EIC Office, London

Attendees:

Name	Initials	Company
Geraldine Bryson	GB	ENW
Peter Johnston	PJ	NIE
Roshan Bhattarai	RB	Northern Powergrid
Ken Lennon	KL	SP Energy Networks
Steve Mould	SM	UKPN
Simon Scarboro	SSc	WPD
Forooz Ghassemi	FG	National Grid
Mark Horrocks	MH	Lightsource
James Hoare	JH	Renewable Energy Association
Mark Thomas	MT	TataSteel
Joe Duddy	JD	RES Group
Davor Vujatovic	DV	Vanda Engineering Services
Mark Kilcullen	MK	Department of Energy & Climate Change
Matthew Ball	MB	OFGEM
David Crawley	DC	ENA
Gary Eastwood	GE	Threepwood Consulting Ltd
Michelle Chambers	MJC	Threepwood Consulting Ltd

Apologies:

Peter Thomas	Nordex
Gareth Evans	OFGEM
Andrew Hood	WPD
Sridhar Sahukari	Energy UK

Absences:

Tony Headley	BEAMA
Tony Sweet	Heat Pump Association

Appendix B

ER P28 Joint GCRP & DCRP Working Group

Meeting No.2

To be held at EIC, 10th Floor, 89 Albert Embankment London, SE1 7TP
on Tuesday, 10th February 2015, 10:30 – 15:30

Agenda

Fire Procedure

1.	Welcome, introductions	DC/GJE	10:30
2.	Address by the Chair	GJE	
3.	Update/actions from last meeting <ul style="list-style-type: none"> • Review/approval of meeting notes • Update on actions 	GJE/All	
4.	Terms of Reference (ToR)	GJE/All	
5.	Proposed changes to ER P28 <ul style="list-style-type: none"> • Applicability of limits for <ul style="list-style-type: none"> ○ infrequent switching events and voltage changes (energisation and tripping of large loads) ○ modern lamp types (i.e. perception of flicker) ○ continuous voltage changes and separate transient large step changes (probabilistic versus deterministic approach) ○ energisation of transformers and impact of transformer inrush current (appropriateness of Table 6 in IEC 6100-3-7) ○ point-on-wave switching • Relationship/impact on DCODE and GCODE requirements <ul style="list-style-type: none"> ○ Definition and alignment of 'frequent' and 'infrequent' events ○ Review Grid Code developments regarding GC0076 Grid Code Limits On Rapid Voltage Changes <p>NOTE: Detailed discussion of issues, adequacy of current scope/requirements and proposed changes to ER P28 arising from the above - including availability of information/data to support proposed change and impact on stakeholders.</p>	ALL	
6.	Summary of responses and actions	GJE/DC	
7.	Project plan	GJE	
8.	General management/administration <ul style="list-style-type: none"> • On-line repository requirements • Consultation process • Support requirements 	GJE	
9.	AOB	ALL	
10.	Dates for future meetings <ul style="list-style-type: none"> • Dates • Agenda items 		15:30