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

23rd April 2015

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

1. Welcome, Introductions

GE welcomed everybody to the third 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 B for Attendance List).

Round the table introductions were made including Martin Lee and Adrian Ellis both from SSE. SSE is the latest organisation to join the WG and Adrian Ellis is their nominated sitting member.

GE noted that Tony Sweet Heat Pump Association had left the organisation and the WG would be seeking new representation.

2. Address by the Chair

GE thanked the WG members for their responses and contributions and presented the agenda (see Appendix C for Agenda).
[Document reference: P28 WG_Paper_3_1_Agenda_P28 WG_Meeting 3_230415_v1]

The WG is halfway through the review, with the deliverable expected to be issued to the DCRP at the end of July 2015.

The WG was reminded to disseminate the discussions to other groups they represent and report back.

3. Update/Actions from Last Meeting

The draft minutes from the last meeting were approved by the WG members for publication subject to the following amendment:
[Document Reference: P28 WG_Paper_3_2_ P28 Meeting Minutes and Actions_10.02.15_v1]

ACTION 3.0: Update 10 February 2015 Minutes page 4 bullet point 6 from "Vnominal - 30% x Vnominal" to "Vnominal - 30%" as per KL (GE)

A number of minor amendments already highlighted in the document were also approved.

Following these amendments being made it was agreed the minutes were a fair and accurate account of the previous meeting and could be published in the public area of the DCode website.

GE presented an update on the actions from the last meeting.
[Document Reference: Presentation_P28 WG_Meeting 3_230415_v0.3]

See Appendix A for the Summary of Actions - specifically Summary of Completed Actions in Current Meeting which references the relevant paper attached to the actions below.

A summary of the decisions made from the completed actions is tabled below:

Action	Description	P28 WG Decision
2.1	Review of ETR 125 Voltage Dip Survey on UK Distribution Networks September 2005 • Good summary – mitigation techniques for voltage dips could be useful (KL) • Useful information - retain a reference to ETR 125 (JD) • Possibility of ETR 125 slowing progress on P28 (AH) • P28 document to be a document with concise pointed guidance with support from an ETR for technical reference (GE) • ETR 125 is a snapshot in time and would not be regularly updated but there is a potential issue of having to update P28 as a consequence (DC/ML)	Include ETR 125 as an informative reference only (i.e. it's on the radar but should not be referenced in the main body of P28), with the following caveat - subject to the impact on the programme & the benefits of incorporating updated aspects within P28
2.2	Prepare a paper listing the references quoted in the current P28 dividing them into obsolete, superseded and current • BS 125 is not required (ML) • ESI Std 35-1 looks at LTVS stage 3, only stage 2 is relevant for P28 (MH) • TS values for impedances/connections are not appropriate • Add a note it is the responsibility of the connection applicant to provide data to the Network Operator (FG). Should this be before or after commissioning (RB)? • The amber colour coding in the table means the reference could be or possibly should be referenced in P28 • ACE reports are legacy documents and should not be referenced in P28 (DC) • Software calculations are effected by IEC standards therefore harmonisation is needed i.e. data requirements are different between BS ENs and IEC standards (MH)	Do not include ENA TSs as normative references in P28 Reference relevant BS EN Standards (as opposed to IEC Standards) where they exist ACE reports are legacy documents and should not be referenced in P28
2.4	Review outputs from DOS programme system • Although WG is not using it, programme is still valid (GE)	DOS software programme is still valid but will not be updated
2.7 2.8	Are there stakeholders missing from the current P28 WG? • AMDEA (Association of Manufacturers of Domestic Appliances) did not respond to the invitation but would be a useful corresponding member (KL/AH)	Need to communicate with the wider world / consumers

	• Rural communities could be represented by the WI (ML) • CAB (Citizens Advice Bureau) is consulted by the ENA uses (DC) • Electricity Consumers Council (ML). Is this the same body as one of the other stakeholders? GE to check • Tata Steel was unaware of the existence of GC0076 until the last meeting so communication is important (MT) • DNOs use consumer groups – NFU (JD/AH), CLA (Country & Landowners Association) (JH)	

ACTION 3.1: Invite/follow up on consumer bodies becoming P28 corresponding members - AMDEA, NFU, CLA, WI, CAB (GE)

ACTION 3.1a: Check whether the Electricity Consumers Council is represented by one of the other stakeholders (GE)

ACTION 3.2: Report back on which consumer organisations OFGEM consults with (MB)

2.9	Need to keep a brief on CIGRE WGs progress and to note which documents are being reviewed. It is likely DV will be one of the UK representatives for PD IEC/TR 61000-3-7	DV to report back to P28 WG on CIGRE WGs

ACTION 3.2a: Report back on CIGRE WGs progress noting which documents are being reviewed (DV)

2.10	Reviewing distribution voltage levels and limits & immunity levels of LV equipment to determine what planning limits for RVC may be appropriate will be a major part of P28 • SSc carried out research on what RVC is and its causes • Section 4 Impact on Customer Equipment – Immunity Levels is important. It shows outside of the ITIC curve there is susceptibility to RVC • This paper is not based on the ITIC curve • Page 4 Figure 4 - Example Variable Speed Drive (VSD) Voltage Tolerance Curves for Voltage Dips – Sensitive VSD is an assessment only – it is not definitive • Discussion followed on what type of voltage change was considered in Figure 2 - Example Voltage Tolerance Curves. Thought to be 3 phase (AH); if correct it is not valid for RVC (FG). FG contacted Siemens and ABB about Variable Speed Drive immunity to voltage dip – 81% of 380V is still OK. It comes down to whether there is sufficient DC voltage (JD). Problem with short term thermal issues (JD)	Voltage levels & limits of immunity levels are an important part of P28 and requires further discussion The no. of phases and type of voltage change considered is important to clarify

	• For drive performance the WG might need input from manufacturers via BEAMA. However, when transient voltage occurs the drives try compensate for loss of voltage and not thought to be a problem (FG) • Discussion around interpretation of DCode 10% voltage change - 10% difference is not a dip it is a steady state condition (ML) but it doesn't say anything about network operators (AH) • Need to define what is a normal event (MH) • Discussed applicability of 3 month limit • Discussed frequency of G59 protection – accepted as a normal switching operation but should the WG look at the probability of G59 protection operation (JD)? G59 can trip because of fault rate (topography) which means it is unpredictable and believed to be more than one per year (ML) • GE concluded in terms of limits the WG would need to consider RVC as a transient phenomenon and a steady state voltage change • GC0076 is a hard fast limit whereas P28 is about planning levels sitting below compatibility & immunity levels • FG suggested there are two options on how the DCode and GCode could be applied – connectee loads (DCode) or operator loads which includes assets owners and connectees (GCode) • Need to distinguish between planning, compatibility and emission levels (AH) and who is responsible for setting them (GE) • It is important to state a methodology for definitions used (JD) • GE concluded there is a difference in the interpretation of DCode – it is a technical interface document on how the network operators impact on users – it sets an upper limit. P28 is an interpretation of how it is achieved and what the user should do to achieve compliance	In terms of limits the WG needs to consider RVC as a transient phenomenon and as a steady state voltage change State a methodology for definitions used in P28. Be clear on the difference between DCode, GCode & P28 P28 should adopt same concept of Planning, Compatibility and Emission Levels and who is responsible for setting limits in each case

ACTION 3.3: Circulate FG's and SSc's comments on "P28 WG_Paper_3-14_Action 2.10_PlanningLimits for Rapid Voltage Changes rev1" (GE)

ACTION 3.4: Review and comment on "P28 WG_Paper_3-14_Action 2.10_ Planning Limits for Rapid Voltage Changes rev1"and give feedback (All)

ACTION 3.5: Add an agenda item for June meeting to discuss how GC0076 aligns with the Distribution Code and the Grid Code (GE)

ACTION 3.6: Seek clarity from the GCRP and DCRP as to what aspects of voltage fluctuation apply to either networks operators, users or both (GE)

2.11	Provide further data on the application of transfer coefficients by National Grid • The paper shows how the level of disturbance propagates down the system • It was agreed it would be better to have a national agreed set of transfer coefficients • Disturbance going up the system is not an issue as it is negligible due to higher fault levels (FG) • KL/GE suggested getting some real data for a sanity check on the model – agreed to do it in Phase 3 of review • GC0076 revision has gone through two rounds of consultation. The revised Category 2 requirement in GC0076 is now the same as P28 requirement	It is only voltage disturbances going down the network systems that is relevant A national agreed set of transfer coefficients is the best way forward Actual data would be studied in Stage 3 Revision to support transfer coefficients
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 • ITIC curve is a good basis for general evaluation of sensitive equipment • It is based on USA voltages and frequencies • Other research suggests VSD, relays and come contactors may have lower immunity to RVC than ITIC curve • The curve in IEC 61000-3-7 is not the same as Figure 4 in P28 – this will need to be addressed (ML)	The curve in IEC 61000-3-7 is not the same as Figure 4 in P28 – this will need to be addressed

ACTION 3.7: Report back on the differences between ITIC Curve and Semi F47 Curve which looks at voltage sag immunity (KL/GE)

2.17	Summarise the differences in the application of P28 between different DNOs as experienced by Lightsource • Network operators use different parameters therefore P28 should be clear on which parameters should be defined and modelled • Definitions of POC, PCC and POS are required • It was agreed PCC should only be used as this is where other customers see disturbance • Inrush – Remanence P28 needs to consider the conditions for remanence and the values for remanence • FG thought work had already been done on this and will identify the CIGRE brochure on remanence • DC said the PQ&EMC WG are looking at limits so it would be useful to ask them to comment on MH paper	P28 should include clear guidelines for network modelling (i.e. common framework) It was agreed PCC should only be used as this is where other customers see disturbance P28 needs to consider the conditions for remanence and the values for remanence

ACTION 3.8: Identify CIGRE brochure on Remanence (FG)

ACTION 3.9: Ask PQ&EMC WG to comment on Mark Horrocks report "P28 WG_Paper_3_11a_Action 2.17_WPD Clarifications Rev 3_Comments Back From the Consultants" and report back to P28 WG (DC)

2.21	Review conditions in terms of scope of P28 – what it says now and what it should include in the future • The WG to review and comment on the paper "P28 WG_Paper_3-20_Action 2.21_Conditions in P28_v0.1_Working" prepared by GE	Needs further review

ACTION 3.10: Review and comment on "P28 WG_Paper_3-20_Action 2.21_Conditions in P28_v0.1_Working" (All)

2.25	Investigate the justification to change the allocation of rights • Refers to the system capacity being used to define allocation of rights – it is difficult to determine an allocation • Network capacity as defined by IEC is not workable (FG) • Need to evaluate background levels (JD/FG)	It is difficult to determine an allocation of rights. To be developed/discussed further in Meeting no.4

ACTION 3.11: Review and comment on "P28 WG_Paper_3-13_RE P28 Meeting Actions - Allocation of Rights" (All)

2.26	Investigate whether there is a common reporting methodology for customer voltage complaints in Ofgem • There is not a common reporting methodology • No complaints about flicker were found	
2.27	DNO stakeholders to investigate power/supply quality complaints and report back summary of findings • General conclusion by Northern Powergrid there is nothing to suggest there is a problem with P28 flicker (RB) • Overall customer complaints are falling however this trend is not being reflected in power quality complaints possibly due to the growth in power electronic devices (RB) • SPEN intend to add a new load related category for flicker complaints to their complaints statistics (KL)	There is no evidence that complaints about voltage fluctuation / flicker have increased in recent years

4. Terms of Reference (ToR)

GE presented the latest draft ToR
[Document Reference: ER P28 WG_ToR_v2.2_Working]

GE explained that Mike Kay DCRP Chair had expressed concerns about the ToR being restricted to disturbances caused by *user* equipment [as agreed at the previous P28 meeting]. GE had subsequently spoken to SSc, JD and Mike Kay to reach a consensus of opinion. GE summarised the main changes:

- The intention for the time being is that P28 should remain a customer facing document
- The WG will consider the adequacy of requirements for limiting voltage fluctuation in DPC4 of the DCode 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 WG will seek to harmonise related requirements/limits in the GCode, the DCode and ER P28 rather than write a new set
- The WG 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

GE asked the WG to review and comment on the working paper.

ACTION 3.12: Email P28 WG the revised Terms of Reference "ER P28 WG_ToR_v2.2_Working" (GE)

ACTION 3.13: Review and comment on the revised Terms of Reference "ER P28 WG_ToR_v2.2_Working" (All)

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.

5. Proposed Changes to ER P28

GE tabled two areas for discussion:

- Standards
  - Applicability of IEC Standards
  - Applicability of IEEE Standards
- Evaluation of Background Levels

There followed a 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.

5.1 Standards

GE gave a brief overview on:

- Standards - Applicability of IEC Standards:
  - Effectiveness of BS EN 61000-3-11 in relation to multiple installation
    - The first edition of this BS EN 61000-3-11 considered the eventuality of multiple connections of similar high power equipment to be low probability
    - Recent experiences suggests in some local cases this is not the case (e.g. heat pumps)
    - It is believed this will not be addressed in pending issue of BS EN 61000-3-11
  - Effectiveness of BS EN 61000-3-3 in relation to multiple installations
    - This issue is not currently addressed in BS EN 61000-3-3 and will not be for some time
    - Any practical experiences of same equipment in different installations causing common disturbances

- Standards –Applicability of IEEE Standards
    - IEEE 1453-2011
        - IEEE 1453. Recommended Practice —Adoption of IEC 61000-4-15:2012, Electromagnetic compatibility (EMC) —Testing and measurement techniques —Flicker meter —Functional and design specifications
    - IEEE P1564 Draft
        - Characterises voltage sag (dip) performance
        - Promotes 5 step approach from actual measurements to system indices
        - Recommended single event indices calculated in accordance with IEC 61000-4-30
    - IEEE 1346
        - Recommended Practice for Evaluating Electric Power System Compatibility with Electronic Process Equipment
        - Contour chart for representing voltage dips

GE summarised that from an initial review, IEEE Standards would appear to be of limited value given the trend for them to reference and adopt certain IEC Standards.

MH presented a paper “View on Flicker Limits for ER P28”
[Document reference: P28 WG_Paper_3-17_Agenda Item 5_Flicker P28]

IEC limits seem very reasonable whereas American standards were not helpful. MH recommended the WG did not use them for this review.

MH stated the WG should consider RVC. EMC studies carried out by CIGRE show that new electrical devices are more resilient to voltage dips and that 10% is the standard and this review should look to harmonise these effects.

It is also recommended that P28 should give guidance on how to treat sympathetic inrush.

The amount of remanence is a difficult area to consider – should it be worse case or probability based? It could cost a significant amount of money to meet worse case requirements.

There are two aspects of remanence to consider (GE):

- Distribution
    - CIGRE WG has produced an analysis covering this area (FG)
- Modelling

MH explained that Lightsource are energising a number of sites in June 2015. The objective is to monitor the voltage fluctuation at these sites. Discussed point on wave switching - the issue being unless there is lots of de-energisation and re-energisation then the study results may not be meaningful. It was suggested it may be useful for this WG to collect data to understand realistic voltage dips associated with remanence.

GE concluded the value of remanence could be overly pessimistic and resulting in a higher voltage dip than actually occurs. Clarity is needed in P28 on how remanence should be treated in network models.

The WG needs to be mindful that different software can give different results using the same data, which has occurred with transformer modelling (RB).

JD concluded that DNOs want to know what the minimum criteria is for an acceptable study in a P28 voltage dip study. The WG should review the CIGRE WG work published on remanence and how it relates to what happens in practice (GE/FG).

ACTION 3.14: Send out Lightsource plan for energising a no. of sites for monitoring purposes during June 2015 (MH). P28 WG to consider whether it would be useful for this WG to collect data (All)

ACTION 3.14a: Circulate the CIGRE WG paper on remanence (FG)

GB from ENW presented a summary on applicability of IEC standards
[Document Reference: P28 WG_Paper_3-19_Agenda Item 5_ENW}

- BS EN 61000-3-3 and BS EN 61000-3-11
  - ENW has introduced a process for assessing heat pump connections based on equipment compliance with these standards. This follows the approach of most other DNOs. In principle this process looks attractive and should allow for a relatively quick assessment of type tested equipment. However, volumes of retrofit heat pump applications have been very low and so the process has not been tested. Potential issues which are anticipated are:
    - Multiple applications in close proximity on the network – the cumulative effect is not considered by these standards
    - Process is reliant on customers providing sufficient information in the connection application. The small numbers of applications received so far have been deficient in technical data
- IEC 61400-21 Wind Turbines
  - Measurement and assessment of power quality characteristics of grid connected wind turbines. The principles set out in this document have been trialled by ENW and found to be very useful. If the equipment is type tested with data available to ENW, the assessment is quick and can be automated in a spreadsheet. The detail contained within this standard should be considered for inclusion in the revision of P28. A lot of the current deficiencies of P28 such as wind farm energisation are covered in this standard.

There is not a good algorithm for heat pumps and KL commented that heat pumps with direct on-line connection have caused major problems. GE noted that as P28 is setting limits for networks, it would be appropriate for the WG to look at new equipment that may cause voltage fluctuation issues including heat pumps.

The Stage 1 assessment review is based on product standards which is only useful for LV not MV, HV or EV - there needs to be a supplement to the existing Stage 1 (FG). It does not work for IEC 61000-3-3. Stage 1 assessment only applies to individual appliances which could mean the whole system does not comply. There are no issues with flicker with single installations.

ACTION 3.15: Report back on how P28 Review fits in with the work being done in LCT (Low Carbon Technologies) WG with reference to voltage disturbance of multiple equipment, where individual items of equipment can be connected unconditionally and the impact caused by the whole system (KL)

ACTION 3.16: Look at compliance with BS EN 61000-3-3 and whether there are wider issues from an aggregation point of view for individual appliances (AH)

Obtaining a value based on impedance for Stage 2 would be appropriate - this is the approach used in BS EN 61000-3-11 i.e. not a simple pass or fail (ML). However this standard is lagging behind what is actually happening and the current revision of BS EN 61000-3-11 will be normative only (DC).

Although the WG sees no problem with the current approach, it concluded it would to need to consider whether the stage by stage approach is still valid and if so it would then be appropriate to look at the requirements for each stage against its normative standards requirements. The P28 agreed to carry out a paragraph by paragraph review of P28 Stage 1 requirements. In addition, Stage 2 may be an appropriate starting point for considering multiple connections. Consideration should also be given to the problem of aggregation of appliances.

5.2 Evaluation of Background Levels

GE gave a brief overview on:

- Current practices
  - Methods are defined in IEC 61000-4-15 and IEC 61000-4-30
  - Class A measurements to IEC 61000-4-30 are recommended for evaluation of emission levels
- Alignment of P28 with IEC Standards
  - Determine which phase should be measured or all phases?
  - Should minimum measurement times (i.e. one week or two operating cycles as specified in Clause 4.2.2 of PD IEC/TR 61000-3-7)?
  - Define how background levels should be subtracted from measurements?
  - Can background levels below a minimum value be neglected (i.e. Pst< 0.35 in Appendix E.3.2 of PD IEC/TR 61000-3-7)
- Measurements for new substations/networks
  - Should background levels for new substations be based on transfer coefficients from higher voltage levels?

ENW policy is to take measurements over a week using a Dranetz recorder to evaluate background levels (GB).

ACTION 3.17: Send feedback to GE's PowerPoint presentation on Proposed Changes to P28 (slides 27-29) (All)

- **Standards – Applicability of IEE Standards**
- **Standards – Applicability of IEEE Standards**
- **Evaluation of Background Levels**

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	P28 should consider the combined impact of multiple connections of LV disturbing equipment (i.e. heat pumps)	Requirements for multiple installations is being considered by CENELEC (BS EN 61000-3-11)
2	P28 should include guidance on how to treat 'sympathetic inrush'	A new area not previously considered in P28
3	P28 should provide guidance on assumptions about remanence for modelling voltage fluctuation	Transformer inrush not specifically considered in previous version of P28

4	P28 should consider guidance on assessing the aggregation of appliances not covered in the Stage 1 assessment	

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.

8. General Management/Administration

Arrangements for general management and administration have not changed since the previous meeting and given the time constraints this section was omitted from the meeting except to note the WG secure access area on the ENA website is under development. It will not use https:// which will assist those members of the WG who are unable to access Dropbox. GE will issue the link and login details when it is operational.

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

8.2 Consultation Process

The following governance processes that need to be complied with are summarised below.

- 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 following support requirements are 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

- Definitions for MV/HV and EHV (KL)
  - The need for clear concise definitions in P28 has already been discussed during the meeting
- Proposed changes in membership (GE)
  - An email has been received from Sridhar Sahukari representing Energy UK as a Sitting Member and Dong Energy as a Corresponding Member confirming he is stepping down. GE is writing to Energy UK expressing concern and the need for a replacement to be nominated before the resignation could be accepted
  - Adrian Ellis is SSE's new Sitting Member
  - Tony Sweet has left the Heat Pump Association
  - GTC (iDNO) has agreed to provide a corresponding member for the WG Saeed Ahmed with David Overman and Aravin Vythilingam to be added to the circulation list
- Invitation to Doble (MH)
  - It would be useful to invite a Consultant with detailed knowledge of P28 studies to the next meeting
  - Suggestions included Muhammad Ali from TNEI Services (RB) or Doble Engineering who could present on Transformers and Remanence (MH). Also check with DV to see if he has an involvement in such studies

ACTION 3.18: Liaise with MH, RB, JD and DV about inviting a Consultant with detailed knowledge of P28 studies to a WG meeting (GE)

- Progress on GC0076 (FG)
  - The GCRP is meeting on 20th May where the revision of GC0076 could be approved

ACTION 3.19: Update the P28 WG with the outcome of GCRP meeting mid-May on GC0076 progress (FG)

10. Date for Future Meetings

The following dates have previously been agreed for future meetings:

- 18th June 2015
- 3rd September 2015
- 4th November 2015

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).

Appendix A

ER P28 Joint GCRP & DCRP Working Group Meeting No.3

Summary of Actions from Current Meeting

Item	Action	Who	Due by
3.0	Update 10 February 2015 Minutes page 4 bullet point 6 from "Vnominal - 30% x Vnominal" to "Vnominal - 30%" as per KL	GE	08.05.15
3.1	Invite/follow up on consumer bodies becoming P28 corresponding members - AMDEA, NFU, CLA, WI, CAB	GE	15.05.15
3.1a	Check whether the Electricity Consumers Council is represented by one of the other stakeholders	GE	15.05.15
3.2	Report back on which consumer organisations OFGEM consults with	MB	15.05.15
3.2a	Report back on CIGRE WGs progress noting which documents are being reviewed	DV	Ongoing
3.3	Circulate FG's and SSc's comments on "P28 WG_Paper_3-14_Action 2.10_Planning Limits for Rapid Voltage Changes rev1" f	GE	01.05.15
3.4	Review and comment on "P28 WG_Paper_3-14_Action 2.10_ Planning Limits for Rapid Voltage Changes rev1"and give feedback	All	15.05.15
3.5	Add an agenda item for June meeting to discuss how GC0076 aligns with the Distribution Code and the Grid Code	GE	28.05.15
3.6	Seek clarity from the GCRP and DCRP as to what aspects of voltage fluctuation apply to either networks operators, users or both	GE	28.05.15
3.7	Report back on the differences between ITIC Curve and Semi F47 Curve which looks at voltage sag immunity	GE/KL	15.05.15
3.8	Identify CIGRE brochure on Remanence	FG	01.05.15
3.9	Ask PQ&EMC WG to comment on Mark Horrocks report "P28 WG_Paper_3_11a_Action 2.17_WPD Clarifications Rev 3_Comments Back From The Consultants" and report back to P28 WG	DC	Next Meeting
3.10	Review and comment on "P28 WG_Paper_3-20_Action 2.21_Conditions in P28_v0.1_Working"	All	15.05.15
3.11	Review and comment on "P28 WG_Paper_3-13_RE P28 Meeting Actions - Allocation of Rights"	All	15.05.15
3.12	Email P28 WG the revised Terms of Reference "ER P28 WG_ToR_v2.2_Working"	GE	24.04.15
3.13	Review and comment on the revised Terms of Reference "ER P28 WG_ToR_v2.2_Working"	All	15.05.15
3.14	Send out Lightsource plan for energising a no. of sites for monitoring purposes during June 2015. P28 WG to consider whether it would be useful for this WG to collect data	MH All	15.05.15 28.05.15
3.14a	Circulate the CIGRE WG paper on remanence	FG	28.05.15
3.15	Report back on how P28 Review fits in with the work being done in LCT (Low Carbon Technologies) WG with reference to voltage disturbance of multiple equipment, where individual items of equipment can be connected unconditionally and the impact caused by the whole system	KL	15.05.15

Item	Action	Who	Due by
3.16	Look at compliance with BS EN 61000-3-3 and whether there are wider issues from an aggregation point of view for individual appliances	AH	15.05.15
3.17	Send feedback to GE's PowerPoint presentation on Proposed Changes to P28 (slides 27-29) • Standards – Applicability of IEE Standards • Standards – Applicability of IEEE Standards • Evaluation of Background Levels	All	15.05.15
3.18	Liaise with MH, RB, JD and DV about inviting a Consultant with detailed knowledge of P28 studies to a WG meeting	GE	01.05.15
3.19	Update the P28 WG with the outcome of GCRP meeting mid-May on GC0076 progress	FG	28.05.15

Summary of Outstanding Actions from Previous Meetings

Item	Action	Who	Due by
2.8	Review the stakeholders and comment whether members believe all key stakeholders are represented	(All)	28.05.15
2.16	Document aspects of P28 that are inconsistent when carrying out P28 assessments across different networks operators	(JD)	28.05.15
2.18	Refer any technical issues involving distributed generation that cannot be resolved to the DG Steering Group	(GE)	Ongoing
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)	28.05.15
2.22	Prepare a paper of published literature research on modern lighting and flicker	(JH)	28.05.15
2.23	Email the paper on flicker and modern lighting written by professor from Finland to GE *Update: RB has emailed twice with no response*	(RB)	28.05.15
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)	28.05.15
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

Summary of Completed Actions in Current Meeting

Item	Action	Who
1.0	Email MJC a list of other Groups that sitting members are a member of	(All)
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 See Doc Ref: P28 WG_Paper_3_3_EA_ET_ETR_125_1	(GE)

Item	Action	Who
2.2	Prepare a paper listing the references quoted in the current P28 dividing them into obsolete, superseded and current See Doc Ref: P28 WG_Paper_3-16_Action 2.2_Status of References in P28_v0.1_Working	(DC)
2.3	Post the outputs from the Electricity Council flicker program on to the P28 WG public webpage See: http://www.dcode.org.uk/dcrp-er-p28-working-group.html	(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" See Doc Ref: ER P28 WG_ToR_v2.2_Working	(GE)
2.6	Re-issue amended ToR to WG with a deadline date for any objections (noting no response will be taken as approval) *Update: revised again v2.2. See agenda item 4 April meeting*	(GE)
2.7	Circulate the original list of 55 organisations contacted for the membership of P28 WG See Doc Ref: P28 WG_Paper_3_4_Action 2.8_ENA_EREC_P28_Revision_Ph1_List of Stakeholders_v05_Draft	(GE)
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 progress to WG for next meeting See Doc Ref: P28 WG_Paper_3_5a_Action 2.9_CIGRE WGs Relevant to P28 & P28 WG_Paper_3_5b_Action 2.9_TORJWGC440CIREDRevisionstoIECTechnicalReports610003X	(DV)
2.10	Review distribution voltage levels and limits & immunity levels of LV equipment to determine what planning limits for RVC may be appropriate See Doc Ref: P28 WG_Paper_3-14_Action 2.10_PLANNING LIMITS FOR RAPID VOLTAGE CHANGES rev1	(SSc)
2.11	Provide further data on the application of transfer coefficients by National Grid See Doc Ref: P28 WG_Paper_3-15_Action 2.11_P28 WG Report-v00-2015-04-23	(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 See Doc Ref: ITIC Curve is a modified version of the CBEMA power acceptability curve	(GE)
2.13	Email GE a copy of the ElectroTech Concepts Diagram See Doc Ref: P28 WG_Paper_3_7_Action 2.13_Example Dip Sensitivity Curves	(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 See Doc Ref: P28 WG_Paper_3-14_Action 2.10_PLANNING LIMITS FOR RAPID VOLTAGE CHANGES rev1	(SSc/FG)
2.15	Review standards to help define the acceptable level of voltage dip and the time period compatible with equipment immunity See Doc Ref: P28 WG_Paper_3_8_voltage_tolerance	(DV)

Item	Action	Who
2.17	Summarise the differences in the application of P28 between different DNOs as experienced by Lightsource See Doc Ref: P28 WG_Paper_3_11a_Action 2.17_WPD Clarifications Rev 3_Comments Back From The Consultants	(MH)
2.19	Email GE/DC a copy of the WPD report showing table of limits on voltages See Doc Ref: P28 WG_Paper_3_11_Action 2.19_WPD Clarifications Rev 3	(SSc)
2.21	Review conditions in terms of scope of P28 – what it says now and what it should include in the future See Doc Ref: P28 WG_Paper_3-20_Action 2.21_Conditions in P28_v0.1_Working	(GE)
2.24	Investigate whether G5 allocation of rights contains the principles to translate to flicker? See Doc Ref: P28 WG_Paper_3-13_RE P28 Meeting Actions - Allocation of Rights	(GE)
2.25	Investigate the justification to change the allocation of rights See Doc Ref: P28 WG_Paper_3-13_RE P28 Meeting Actions - Allocation of Rights	(FG/GE)
2.26	Investigate whether there is a common reporting methodology for customer voltage complaints in Ofgem See Doc Ref: P28 WG Paper_3-21_Action 2.26 Ofgem	(MB)
2.27	DNO stakeholders to investigate power/supply quality complaints and report back summary of findings See Doc Ref: P28 WG Paper_3-22_Action 2.27 NPg Voltage Complaints	(RB/KL)
2.29	Amend PID – 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” See Doc Ref: ENA_EREC_P28_Ph1_PID_v2_Working	(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)

Appendix B

ER P28 Joint GCRP & DCRP Working Group Meeting No.3

Attendance List
23rd April 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
Martin Lee	ML	SSE
Adrian Ellis	AE	SSE
Steve Mould	SM	UKPN
Andrew Hood	AH	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
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
Davor Vujatovic	VandA Engineering Services
Gareth Evans	OFGEM
Tony Headley	BEAMA
Sridhar Sahukari	Energy UK

Absences:

Tony Sweet	Heat Pump Association *Note: Secretariat confirmed TS has left the organisation*

Appendix C

ER P28 Joint GCRP & DCRP Working Group Meeting No.3
Thursday 23rd April 2015, 10:30 – 15:30
Agenda

1.	Welcome, introductions	**DC/GJE**	**10:30**
2.	Address by the Chair	**GJE**	
3.	Update/actions from last meeting • Review/approval of meeting notes • Update on actions	**GJE/ALL**	
4.	Terms of Reference (ToR) • DCRP comments and proposed changes	**GJE/ALL**	

5.	Proposed changes to ER P28
	• Standards
	  • Appropriate Standards framework and list of normative references
	  • Applicability of IEC Standards
	  ➢ IEC/TR 61000-3-7
	  ➢ IEC 61000 EMC series and status of CIGRE Working Groups
	  ➢ Effectiveness of BS EN 61000-3-3 and BS EN 61000-3-11 in relation to multiple installations
	  ➢ New equipment (IEC 61400-21 for Wind Farms and PV Inverters)
	  • Applicability of IEEE Standards
	  • Standards for equipment immunity (flicker and rapid voltage change)
	• Evaluation of Background Levels
	  • Review current practices (instruments and methods)
	  • Problems with flicker limits being exceeded under Stage 2 assessment
	  • Estimated measurements for new substations
	  • Applicable Standards
	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.
		GJE/ALL	

6.	Summary of proposals and actions	**GJE/DC**	
7.	Project plan	**GJE**	
8.	General management/administration • On-line repository requirements • Consultation process • Support requirements	**GJE**	
9.	AOB • Definitions for MV/HV and EHV (KL) • Proposed changes in membership (GE) • Invitation to Doble (MH)	**ALL**	
10.	Future meetings • Dates • Agenda items		**15:30**