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DER Technical Forum

06 May 2025
1300

Welcome, Housekeeping and Introductions

Agenda

13:00	Welcome, Introductions and Acceptance of Agenda
13:05	Actions from previous meeting • DNOs' time to review submitted studies etc.
13:10	G99 Issue 2 published.
13:10	Short time paralleling 5 minute limit (MK)
13:30	IDNO/DNO responsibilities for generation connexions (MK)
13:40	P28 and transformer energization (S Sommerville)
13:55	EREP 28 update (MK)
14:05	Updated SAF (MK)
14:15	Minor discrepancies between G99 and Grid Code (MK)
14:25	Outstanding Forum issues
14:35	GC0117
14:45	EU Update
14:50	AOB
14:55	Next Meeting

Actions from previous meeting

Actions from the previous meeting

Issue 133

What time frames are DNOs allowed to comment on, and at what point are comments no longer justified. We have had a few cases of DNOs commenting on reports that are 12+ months old. At what point (and is there a mechanism) to say 'No' to the DNO.

DNOs are considering this and will report back in due course.

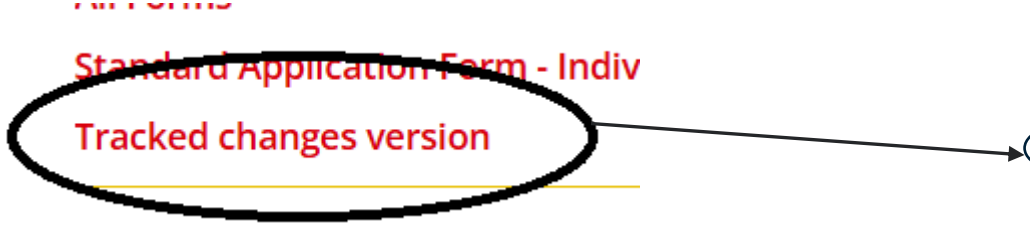
All other items are covered in the agenda.

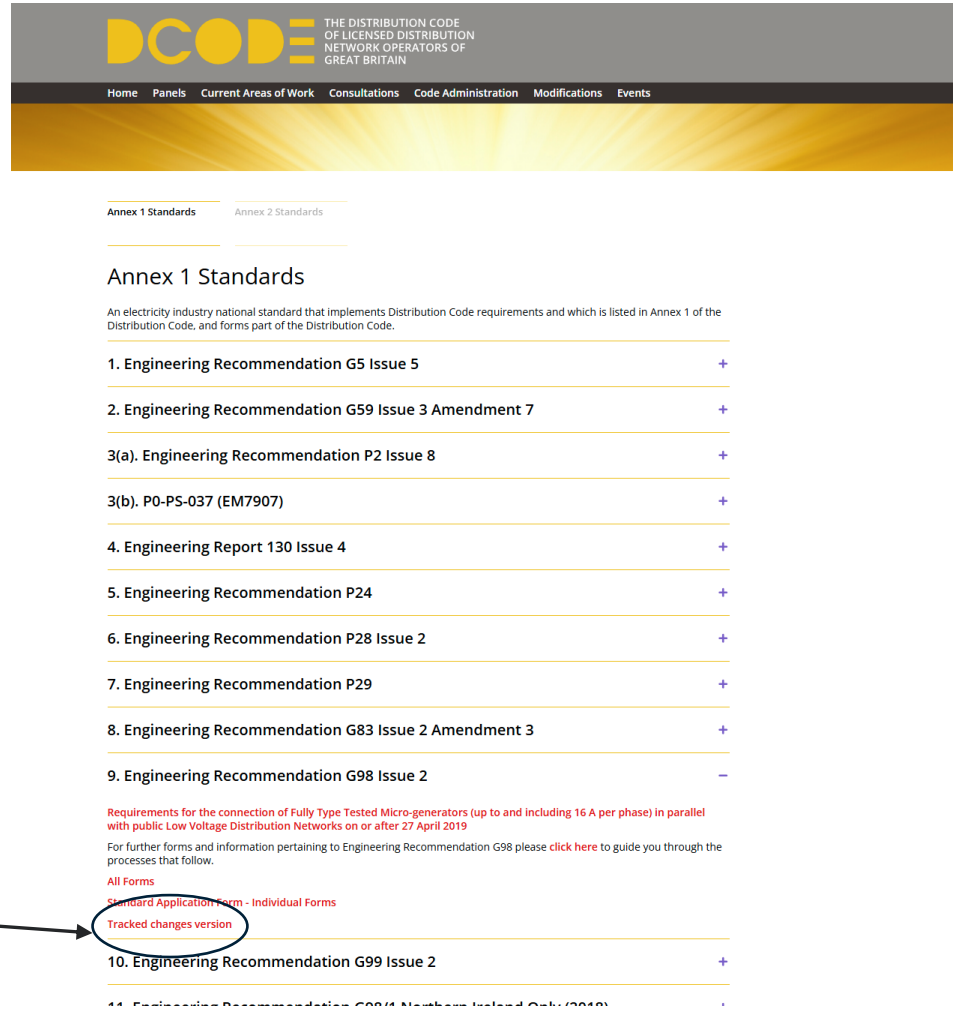
EREC G98 & G99

Both were approved by Ofgem and published as Issue 2 on 10 March.

They are available on the Distribution Code website.

Both are accompanied by tracked change word versions showing the changes from the last amendment of Issue 1.





Short term paralleling

OM3 – 5 minute per month limit

The challenge:

"*My feedback and what I am hearing from some of the consultants and EPC contractors I am working with is that the 5 minutes is insufficient to be able to thoroughly test an emergency diesel generator on load. What we tend to drive for is a longer test period (45 – 60 minutes), on a monthly basis. The feedback I received is that this is fast becoming a non-negotiable with the DNOs and there seems to be have been a tightening of attitudes around this issue.*

Often due to the voltage level the overall plant is connected at, the EDG would need to be categorised as a type D unit if needing to be classified as long term parallel (OM2). The issue is that as far as I am aware, no manufacturers offer a type D compliant unit for this type of operation.

What is therefore happening is that load banks are being installed for testing purposes. This means that both the robustness of the test is compromised (as a different independent breaker is used) and power is wasted with associated environmental impact. I know both of these outcomes are a concern for all parties."

OM3 time limit - 5 mins per month

5 mins per month is a long standing G59 requirement based on the risk of an islanding event not happening during the five minutes.

It is also a sensible check on a Generator gaming the requirements – ie to remove the incentive to operate an inadequately specified generator commercially.

The RfG copied our requirements:

Art 3 2(b) power-generating modules that were installed to provide back-up power and operate in parallel with the system for less than five minutes per calendar month while the system is in normal system state. Parallel operation during maintenance or commissioning tests of that power-generating module shall not count towards the five-minute limit;

Note the second sentence could be argued to permit the sort of testing operation referred to in the challenge.

OM3 time limit - 5 mins per month

G99 text:

9.6.3.3. As the design requirements for a Power Generating Module operating in this mode are relaxed compared with those for long term parallel operation, it is necessary for the DNO to specify a maximum frequency and duration of short term parallel operation, to manage the risk associated with the relaxed design requirement. Therefore the Power Generating Module may be permitted to operate in parallel with the Distribution Network for no more than 5 minutes in any month, and no more frequently than once per week. If the duration of parallel connection exceeds this period, or this frequency, then the Power Generating Module shall be considered as if it is, or can be, operated in long term parallel operation with islanding mode (ie OM2). An alternative frequency and duration may be agreed between the DNO and the Generator taking account of particular site circumstances and Power Generating Module design. An electrical time interlock should be installed to ensure that the period of parallel operation does not exceed the agreed period. The timer should be a separate device from the changeover control system such that failure of the auto changeover system will not prevent the parallel being broken.

OM3 time limit - 5 mins per month

It seems disproportionate to (a) force the regular use of load banks and (b) cause an OM3 PGM to meet Type D requirements.

The key issues are managing the risk of an event during parallel operation, and disincentivising non-compliant commercial operation.

DNOs suggest using the existing G99 text, and insisting on normal G99 interface protection to mitigate the islanding risk, and limit the running time to an agreed maximum time per month.

There is still a slight risk that the 45 or 60 minutes could be run over a triad peak etc – which would have a commercial benefit to the Generator – but this is probably not relevant.

The lack of frequency response is not an issue, unless many OM3 generators are running at a particular point in time, and there is a frequency event.

The risk mitigations also need to consider earthing and harmonics.

OM3 time limit - 5 mins per month

Possible G99 text:

9.6.3.3. As the design requirements for a Power Generating Module operating in this mode are relaxed compared with those for long term parallel operation, it is necessary for the DNO to specify a maximum frequency and duration of short term parallel operation, to manage the risk associated with the relaxed design requirement. Therefore the Power Generating Module may be permitted to operate in parallel with the Distribution Network for no more than 5 minutes in any month, and no more frequently than once per week.

If the duration of parallel connection needs to exceed~~s~~ this period, or this frequency, then an alternative duration and frequency of up to 1 hour per month and no more frequently than once per week may be agreed between the DNO and the Generator, taking account of particular site circumstances and Power Generating Module and installation design. In these cases the Power Generating Module shall be considered as if it is, or can be, operated in long term parallel operation with islanding mode (ie OM2) and hence comply with all the relevant OM2 requirements of this EREC G99. Under these agreements the DNO shall waive the requirements of sections 11, 12 or 13 of EREC G99 as appropriate to the Type of Power Generating Module concerned, although the DNO will specify any reactive power and voltage control requirements in the Connection Agreement. Periods of operation in parallel with the Distribution Network for longer than 5 minutes shall be agreed with the DNO in advance with the intent of avoiding periods of high national generation. ~~An alternative frequency and duration may be agreed between the DNO and the Generator taking account of particular site circumstances and Power Generating Module design~~. An electrical time interlock sh~~ould~~all be installed to …

OM3 time limit - 5 mins per month

Apart from any discussion today on this, it would be useful to have any further thoughts or feedback on the proposal.

We suggest we seek comments on the proposed text before the end of May.

IDNO/DNO responsibilities for generation connexion

Issue 134

Q

Where a connexion is made to an IDNO network, what is the division of responsibility between the DNO and IDNO for G5 and P28 compliance issues?

A

- G99 is the complete responsibility of the connecting DNO/IDNO. G99 might benefit from a sentence somewhere around Section 2 to state this – noting that a downstream DNO needs to apply under DCUSA 42.9 to the upstream DNO for permission to connect generation. We will add this to the list for a future update.
- P28 and G5 are also the responsibility of the connecting DNO, but the upstream DNO does have a duty to co-operate in a timely manner (EREC P27 and ETR 122) if necessary to allow the downstream DNO to fulfil its connexion obligations to its customer.

Transformer Energization

Stephen Sommerville’s presentation

Update on EREP 28

Background

The Guidance development started in Q1 2023 following numerous stakeholder queries re the interpretation of EREC P28.

These queries covered a range of topics relating to rapid voltage changes, flicker, step change values and connection assessments.

The development of EREP P28 aims to concentration on these topics.

EREP 28 is a new engineering report intended to be an application guide for EREC P28 Issue 2; it is not intended to be document listed in the Distribution Code's annexes.

The ENA ran a consultation on the draft EREP 28 in February 2025, with feedback sought from both the DCRP and the DER Technical Forum.

Consultation responses and next steps

There was significant interest in the consultation and a large number of detailed comments have been received.

The following key issues were identified from the consultation:

- There is a perception that there is a lack of supporting calculation for statements regarding high/low fault levels, high/low X/R ratios, well-tuned and poorly tuned controller, etc.
- The outcomes from the BESS/P28 discussions at the DER TF in 2022/23 are not clearly reflected.
- Examples provided in the guidance may benefit from being revised.
- The process for assessing simultaneous BESS swings—both for voltage step changes and flicker—may benefit from further clarification.

Next Steps

- The ENA's P28 workgroup is still working through the comments, and expects to conclude in May/June 2025
- It is hoped to publish EREP 28 in Q3 2025.

SAF Update

SAF Amendments

The following issues have been corrected:

- A text box was repeating its contents 20 pages ahead – sterilising it.
- Some of the radio buttons were not mutually exclusive
- The text box to collect information against the “other” on p17 was missing.
- Note 3 on p18 has been rewritten, and to correct the firm/non-firm terminology.
- Note 3 also explains that the maximum active power output of a PGM will be greater than the Registered Capacity when operating above minimum power factor.

The revised SAF was published 24/04.

Grid Code v G99 – minor discrepancies

Minor omissions from G99 cf the Grid Code

Grid Code Modification GC0171 (WG consultation closed 20/04) has identified two minor discrepancies:

The fault ride through simulation requirements of ECP.A.3.5.1 (iii) (for SPGMs) and (iv) (for PPMs) are not replicated in C.7.5.2 in G99. These simulations are for balanced faults with four different combination of retained voltages and fault duration.

An additional 4% voltage step change, in addition to the original 1% and 2%, has been introduced into ECP.A.6.5.4. this is missing from C.9.4.4 in G99.

These omissions are not seen as critical or urgent, but GC0171 states that these should be added to G99 at the next opportunity to remove an unnecessary discrepancy between the Grid Code and G99.

These have been added to the list of non-urgent future amendments to G99.

Previous Issues

Outstanding Issues – for details see appendix 1:

Registered Capacity – 112 – hoping we can close this now – both the DG Guides and the SAF have been updated to help remove scope for confusion.

BESS connexions – issues 113, 114, 127 – ideally EREP P28 will resolve these.

G100 – 131 – see next slide

132 – Fault Current Interrupters – still pending.

G100 issues from 07/10 DER TF

No additional issues with G100 have been received.

DNOs agree that there is some minor terminology related to HV connected sites that could be improved.

There are a couple of other points raised, particularly the mandatory requirement for back-up protection at HV, and the use of protection in lieu of a full Customer Export or Import Limitation Scheme, which are not simple and which DNOs are still considering.

It was hoped that the issues could be resolve via revising the G100 guide – but this is now less certain.

GC0117

GC0117 – alignment of Large, Medium and Small across GB

This was submitted to Ofgem on 14 May 2024

The three main options are:

- The baseline (ie existing arrangements unchanged)
- The original proposal (ie Large starts at 10MW in all of GB)
- WAGCM1 – extending the E&W arrangements (including Medium PSs) to GB

A majority of the Workgroup voted for the baseline.

The Grid Code Review Panel members' votes on the proposals were split, with no consensus.

Ofgem held a consultation on their "minded to" position in March, and expect to publish their final decision on 30 May (delayed again from 07 May).

EU Update

EU Update

Little change from our last update.

Progress with the NC RfG 2.0 and NC DC 2.0 is slowing down.

The Commission seem to accept that for heat pumps and EVs it would make sense to add the new requirements, especially compliance verification, to the existing CE/Ecodesign and vehicle homologation regulations respectively.

The underlying technical requirements are unlikely to change, and when they are enacted, will drive the EU market for heat pumps and EVs to implement these technical requirements.

NESO is aware of these developments and is considering the implications for GB.

Worth noting that there is a significant new obligation in RfG 2.0 for PGMs to be grid forming – certainly all Type Cs and Ds. Although this has been contentious, it might well be that the recent Iberian disruption strengthens the perceived need for these new requirements.

AOB and next meeting

Appendix – historic Forum issues

Outstanding Issues – 1

No	Issue	Assumed Status
112	A common issue that keeps coming up is Registered Capacity vs design install and grid agreements. I have a specific case where the G99 and connection agreement is for 9MW, the developer undersized the inverters slightly. So it can only produce 8.5MW (in round numbers) whilst operating in the 0.95 lag/lead range. This is what is shown when we do the G99 study, and we noted this shortfall. So the question arises, of what happens to the site now and what can it do. Specifically, 1) Is it's new official RC 9MW or 8.5MW ie do they retain their original agreed capacity, or is this list back to the DNO? This is a common sticking point, taking the above example it cannot meet the 9MW required, but they may upgrade an inverter later to give them more MVAr headroom and it could then operate at 9MW. 2) If the DNO doesn't want/need them to operate across the 0.95 lag/lead range can they then operate at 9MW active power and say unity or 0.98pf. In this case they are producing their official R, but their system design does not meet the required G99 standard for a 9MW site.	This is an issue that does re-appear from time to time. We have attempted to deal with it in the past in issues 40, 80 and 83. We went through it with slides at the 7 June 2022 DER TF. DNOs have summarized how they specify maximum capacities and power factors in their connexion agreements. We propose that we incorporate the material from the 7 June 2022 meeting into the next version of the DG guides. The SAF has also been updated in April 2024 to help reduce the scope for confusion

Outstanding Issues – 2

No	Issue	Assumed Status
113	P28 has the usual classifications of frequent events, infrequent events (4 per month) and very infrequent events (1 per 3 month)…. what should we be assessing a storage system performing a dynamic containment service as? The UK grid is reasonably stable, at the moment, but with more conventional plant dropping out, the power swings are going to get a bit more sever, and the DC type services will be getting worked more often. Classing it as a very infrequent event probably isn't realistic, but what about infrequent events? I could see that it is possible that you could get to around the 4 events per month, although probably not at the full power swing.	This is a good point, and one that probably would benefit from a consistent consideration by DNOs. It might be sensible to base the frequency on the observed incidence of frequency excursions, over the last 18 months say, that trigger a specific level of response from such services. The response level might be set locally, and the P28 "frequency of event" set by the historic track of frequency excursions triggering that level of response. This can be calculated from the information NGESO publish monthly. This should be picked up as part of ongoing work to develop a common approach to BESSs between the DNOs. However, note that in the BESS discussions on 18/11 it was pointed out that the 3% limit essentially applies at any time once the transients have died away, so for BESS power swings the 3% probably applies in all cases, irrespective of frequency of event. The DNOs work on reviewing customers' issues with P28 should pick thi

Outstanding Issues – 3

No	Issue	Assumed Status
114	We have concerns relating the voltage step change for Battery Energy Storage Systems (BESS) when the systems are designated for fast frequency response. A number of network operators define step change to be full declared export to full declared import for real power P and for reactive power Q. The FFR contracts do not have a contracted obligation to reverse the direction of reactive power flow and no obligation to match the fast MW response with a MVAr response. When importing, there is no obligation to operate at a particular power factor only to operate within a +/-0.95 range. If a full MW ramp has occurred, it is reasonable to assume the system is under stress. To reverse Q at this point would be the worst of all strategies at it would exacerbate the stress of the system by introducing an unnecessary voltage step. It is likely that EFR or FFR BESS is located at a point with a high X/R ratio (close to a BSP or GSP). Therefore a unit change in Q would have at least 10x the impact on at the voltage step that of a unit change in P. This Q reversal condition appears to be based on a false assumption about the default behaviour of inverters under FFR. We believe it is a matter for the customer to demonstrate through simulation the voltage step change under power reversal. It is a matter for the customer to produce a reactive power strategy that meets the constraints of the D Code and the connection offer. Confirmation of the simulation can be done via commissioning tests with frequency injection for smaller steps. The imposition of this requirement distorts the market by essentially limiting the capacity of a BESS scheme to around half the capacity of other technologies thus creating hidden barrier to the penetration of the technology. The customer should demonstrate how they meet the voltage step change challenge through modelling and if necessary to verify through commissioning demonstration, not for the network operator to impose a control philosophy.	To be picked up in the BESS sessions

Outstanding Issues – 4

No	Issue	Current Status
127	There is a requirement in ENA P28/2 (Although fairly sketchily defined) that we are supposed to consider what happens if a generator trips under full load conditions at different power factors ie 0.95 lag, unity and 0.95 lead. We have had a fairly large number of these sites come up that have a problem on them, and when we carry out the studies, we get a fail (ie the SVC is greater than +/-3%). When we hit this point there isn't really much we can do to help, as the SVC results are really just a function of the MW, MVAr flow and system strength – the only option is to constrain the generator MW output if it is at a problem PF – this causes headaches for developers Some general thoughts would be • A generator tripping on full load conditions would be relatively unusual – although with G99 LoM protection I guess it can and does happen, so I can see why its there. • Is it really realistic to consider it against minimum (outage) fault condition? • Should the developer really be doing this and finding problems - it is such a simple assessment the DNO should really do this, and check before issuing an offer. In reality just a simple loadflow of before and after.	DNOs broadly agree that the DNO should undertake these checks early in the application process. It is appropriate (and necessary in P28) to consider outages. To be investigated further as part of the refinement of BESS processes.

Outstanding Issues – 5

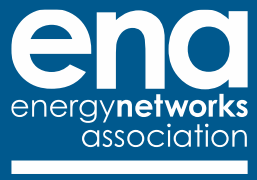
No	Issue	Current Status
131	A number of G100 interpretation issues.	DNOs agree that there is some minor terminology related to HV connected sites that could be improved. There are a couple of other points raised, particularly the mandatory requirement for back-up protection at HV, and the use of protection in lieu of a full Customer Export or Import Limitation Scheme, which are not simple and which DNOs are still considering. It was hoped that the issues could be resolve via revising the G100 guide – but this is now less certain.
132	Brigham Hart would like: • An update on the NIA funded EDGE-FCLi project between NGED (WPD) and GridON • An update on progress in moving to BaU since publication of final report in June 2022 • Is there anything delaying adoption • To know the position of other DNOs on this and other fault current limiting technology • To understand the ENA's engagement in adoption or approval of this technology?	Under research by stakeholders and DNOs

Outstanding Issues – 6

No	Issue	Current Status
133	What time frames are DNOs allowed to comment on, and at what point are comments no longer justified. We have had a few cases of DNOs commenting on reports that are 12+ months old. At what point (and is there a mechanism) to say 'No' to the DNO.	DNOs are considering this request.
134	Where a connexion is made to an IDNO network, what is the division of responsibility between the DNO and IDNO for G5 and P28 compliance issues.	It is the DNO to which a customer is connected who is responsible for all issues of Distribution Code (and G99, G5, P28 etc) compliance. In the case of a connexion to a IDNO network, the IDNO has the following responsibilities: G99 The IDNO is responsible for all aspects of G99. There will be no contact between the customer and the upstream DNO. The IDNO does need to apply for permission from the DNO for the connexion to be made (DCUSA 42.9). G5 The IDNO is responsible for all aspects of G5 compliance in relation to the connexion (G5 4.2 and G97 4.1). The IDNO and upstream DNO will co-operate if necessary on the exchange of relevant harmonic data (G97 5.2). P28 The IDNO is responsible for all aspects of P28 compliance.

Outstanding Issues – 7

No	Issue	Current Status
135	My feedback and what I am hearing from some of the consultants and EPC contractors I am working with is that the 5 minutes is insufficient to be able to thoroughly test an emergency diesel generator on load. What we tend to drive for is a longer test period (45 – 60 minutes), on a monthly basis. The feedback I received is that this is fast becoming a non-negotiable with the DNOs and there seems to be have (been a tightening of attitudes around this issue. Often due to the voltage level the overall plant is connected at, the EDG would need to be categorised as a type D unit if needing to be classified as long term parallel (OM2). The issue is that as far as I am aware, no manufacturers offer a type D compliant unit for this type of operation. What is therefore happening is that load banks are being installed for testing purposes. This means that both the robustness of the test is compromised (as a different independent breaker is used) and power is wasted with associated environmental impact. I know both of these outcomes are a concern for all parties.	



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