

G5/4 Review Group

A Joint GCRP/DCRP Working Group

Notes from 3rd Working Group Meeting, 10 May 2011 Held at Honiley Court, Warwick

Present

G Stein	National Grid Company (Chair)
S Scarbro	Western Power Distribution/Central Networks
S Barker	Siemens/GAMBICA
D Jones	Electricity North West
E Partal	National Grid Company
J Morrell	CE Electric
S Wijesinghe	RWE Innogy
D Crawley	ENA
L Mackay	UK Power Networks
A Mason	REPower
G Bathurst	TNEI
J Smart	Scottish & Southern Energy
G Brown	ABB
M Whiteman	Danfoss
C Forbes	Danfoss
A Mason	REPower
A Shafiu	Siemens/BEAMA

1 Welcome and introductions

The Chairman welcomed Members, who introduced themselves.

2 Notes/actions from last meeting

- a. The notes of the previous meeting were reviewed and agreed to be accurate, apart from correction of G Brown's representation on behalf of GAMBICA rather than BEAMA.
- b. Actions: covered by Agenda items.

3 Allocation of Rights

G Stein gave a presentation as a summary of the discussion so far. A subjective examination of IEC 61000-3-6 compared with the requirements of G5/4-1 and ETR 122 had concluded that in the case of LV and MV, equal rights were problematic (noting that in the case of LV some situations already equated to equal rights). For HV and EHV, both approaches have pros and cons.

The view of the group so far was that the case to changing to a full equal rights approach had not been made. At EHV and HV the group were open to possibilities for change but were less positive of the case at LV and MV.

Action: G Stein to supply an update to GCRP/DCRP.

Discussion around a move to equal rights included the following;

- The problem of how do deal with speculative enquiries
- Who will “police” connections? Will it be the DNO/TNO?
- The effect of subsequent changes to the network
- How to separate at a particular location parties generating harmonic currents (the importance of background level measurement/ fixed monitoring was noted)
- The effect of geography and historic factors, implying that it should be up to the TNO/DNO to decide on the approach
- The effect of recently changing technology, for example HVDC
- What action to take when all available headroom had been used up
- Noted that ETR 122 does contain some information on how NO’s should deal with harmonic problems.
- Noted also that G5/4-1 does not contain a diversity factor as there was in G5/3, although ETR122 still refers to co-incidence factor.

Members agreed that so far the examination of the process did not produce an obvious answer. Dealing separately with individual cases helped, but the resulting decisions may appear arbitrary to an outside party.

Action: All Members who are able, to enquire and feedback to the group on experience of the application of the IEC approach in other countries.

G Stein wished to see some quantitative analysis starting with some case studies at transmission level and asked for volunteers from manufacturers or other interested parties. Information on capital costs and costs of solutions/assessment was needed.

Action: G Stein to initiate work on examples applicable to transmission. G Bathurst and A Shafiu to provide further technical input.

4 Exchange of Information during the Assessment and Design Process

S Wijesinghe presented this paper which concerned how to exchange information for windpower connection between the developer and the network operator in a timely and appropriate manner. The paper set out the information required, the timescales with which it was currently provided and a proposal for establishing maximum lead times.

Some discussion took place on the reasons for the current timescales.

It was noted that in some cases, lead times could be protracted due to the time taken to acquire land and planning consent. If outages were required to make measurements, or to modify equipment in order to obtain reliable measurements, this would also add to lead times.

It was noted that providing information too early could lead to problems later on, either due to measurement data being inadequate or to subsequent system or design changes.

S Scarbro reported a large number of recent applications for PV installations at 33kV.

Some members expressed nervousness about setting rigid limits for timescales. Members also discussed whether this proposal was within the scope of the group. It was concluded that it would be preferable to keep G5/4 as a technical document.

Provision of filters was discussed. AM reported that filtering was currently only needed in typically 1 in 10 to 1 in 20 projects, although this could increase in the future due for example to longer cable connections being required.

G Stein noted that National Grid was not entitled to pass on all the information required to do a complete assessment to a third party in an unprocessed form, as this would include data provided by generators and network owners. Preliminary and/or representative data could be provided as long as there was an understanding between the parties of what this meant.

Action: G Stein, S Wijesinghe to discuss how to take forward the issue of data exchange and report on progress at the next meeting.

5 Location of Filters

A Mason gave a presentation, taking as its scenario the addition of 20-30MW onto the distribution network. It was likely that developers would make a small risk provision for harmonic mitigation within the project.

The case study considered the possible effects of providing remote mitigation measures, including:

- Where should mitigation be placed (DNO/Private network)? DNO members felt that if at a DNO location it should be considered part of the DNO network.
- The problems of gaining operational access to another owner's network, including what happens if the filters trip off the system for any reason
- If on DNO network, the difficulty for the DNO in predicting the cost
- Monitoring communications and interface with SCADA

It was noted that in theory, remote mitigation was permitted by G5/4-1 although in practice it was not used and as such had not been tested as a solution.

The conclusion reached was that remote mitigation was not ruled out but was likely to be used for special cases only for the above reasons. A separate assessment of the usefulness of remote mitigation would probably be needed for EHV and HV/LV. It was decided that the group would not discuss this subject further at the moment.

6 Subgroup Update

6.a Proposal to establish short-term limits for fluctuating loads

L Mackay gave a presentation based on his paper of 29 March 2011 "Assessment of Traction Loads" highlighting text in G5/4-1 sub-clauses 4.1 and 6.1 and contrasting

the differences between long term and short term limits. He had prepared a graph based on 3 second measurements of individual harmonics at a traction supply point as a basis for discussion.

It was noted that some short term compatibility limits are given in IEC 61000-2-2 and 61000-2-12. If short term limits are to be established it is necessary to establish a measurement method. The subgroup's proposal for fluctuating loads was to set limits for both long term levels (using the present criteria) and short term levels.

In discussion, members were of the view that short term levels rarely caused problems, although perhaps traction supplies might merit further work as demonstrated by the presentation. The use of a 3s measurement interval may be problematical due to the effects of motor starters, although it was noted that the 3s comes from IEC 61000-4-7.

Generally it was agreed to concentrate on traction supplies and exclude equipment that was not causing a problem at the present time.

Action : L Mackay to develop further with the subgroup, taking into account the discussion.

6.b Review of G5/4-1 Planning and Compatibility Levels

L Mackay gave a further presentation on this item. It was noted that neither IEC nor CENELEC standards specified compatibility levels at voltages over 33kV. It was also noted that the levels in EN50160 and 61000-2-12 were different.

Compatibility levels in G5/4-1 had been set by Network Operators and at high voltage levels the planning level and compatibility levels tended to be equal. The subgroup had proposed a piece of work which would set consistent operating margins above the planning levels.

In discussion it was agreed that, as equipment other than that owned by the Network Operator was never connected above 33kV, there was probably no need for G5/4 to specify compatibility levels over this voltage level.

Action: Subgroup to discuss further and prepare a proposal.

G Brown gave a presentation which included re-drafting of certain sections of G5/4-1 including tables of planning levels, work done by S Scarbro on minimum measurement periods, updating standards references, a new Stage 1 table based on maximum permissible current emissions per MVA of fault level for equipment over 16A/phase, a new paragraph on even and triplen harmonics and deleting reference to harmonics over 25th.

In discussion it was agreed that the "typical/default" fault levels needed re-examination, particularly at 20kV where a more typical level would be 100MVA. Rather than consider a "default" value it may be possible to include a transformer size.

Action: G Brown to revise tables in line with discussion and to add guidance on when to consider triplen harmonics.

S Scarbro presented bar graphs which compared results from taking different measurement periods. These demonstrated that values can vary by +/- 15% from the actual average value. There was therefore a case for adding guidance that measurements over one week may not be sufficient. More fixed monitoring would be useful in this area, but there was an associated cost.

6.c Proposed IFI work packages

D Jones presented information on two proposed packages which were being discussed and taken forward by the ENA R&D Committee. Package 1 was to investigate an acceptable approach to monitoring to give an optimum technical and economic solution for Network operators. Package 2 was an investigation of whether or not it was necessary to evaluate harmonics above 50th. Three companies had been invited to tender for the work and had all responded positively.

In discussion, it was agreed that if the G5/4-1 group should decide that extra work was necessary, this should be separate from the two proposed work packages. Members supported the work proposed in both packages.

Action: D Jones to inform the ENA R& D Committee of the support of the G5/4-1 group for both IFI work packages.

6.d Treatment of connection applications in marginal situations

E Partal had circulated a document which considered the scenario where connection was requested at a point in a network where existing background levels, including THD, were above G5/4-1 planning levels but below compatibility levels.

Action: All members to comment by email to E Partal.

7 Next Steps

It was agreed that the subgroups should continue to work as discussed above. The group was due to report to the GCRP and DCRP in September 2011 which implied a meeting of the group in July 2011.

8 AOB

8.a Title of G5/4-1

C Forbes queried the suitability of the title "Engineering Recommendation" for G5/4-1. When used outside the industry, this could give a misleading impression that the document was for guidance, rather than one to be complied with.

Members generally agreed with this view and asked for this to be brought to ENA's attention. It was understood that the question had already been raised within

DCRP/GCRP and was probably relevant to other DCode and GCode governed documents..

Action: D Crawley to inform D Whensley, Head of Engineering at ENA.

8.b New work on Stage 3 Assessments

L Mackay asked if recent work done by TNEI on Stage 3 assessment should be included in a new version of G5/4-1. This was agreed.

8.c New Connections - addition of network and effect on harmonics

Action: G Stein to put on agenda for next meeting.

9 Date of next meeting

Agreed as Tuesday 12 July 2011 in Warwick (exact venue to be announced later).

Action: All members to note.