G5/4-1 Review Group

A Joint GCRP/DCRP Working Group

Date: Wednesday 10 May2016
Time: 10:00 to 15:30
Location: Holiday Inn Leamington Spa Warwick- Olympus Avenue, LEAMINGTON SPA CV34 6RJ

Attendees:

Attendee	Affiliation
Graham Stein	National Grid
Forooz Ghassemi	National Grid
Ben Gomersall	National Grid
Simon Scarbro	Western Power
Andrew Oliver	TNEI
Abram Perdana	RES
Frank Griffith	ABB
Steve Mould	UKPN
Roshan Bhattarai	Northern Power Grid
Ahmed Shafiu	Siemens
Patrick Osakue	National Grid
Sarath Wijesinghe	RWE
Davor Vujatovic	Vanda
Xiaoyau Zhou	National Grid
Steve Robertson	Electricity North West
Wayne Tuctill	Mitsubishi Electric
Victoria Montac	Gambica

Agenda

1. Introductions and Apologies **GS**

2. Review and accept minutes from last meeting **BG**

3. General text decisions from working group: **FG**
    a. Definitions
    b. Aggregation exponent for the 5^{th} harmonic
    c. …(Additions welcome)
    d. Any other comments on general text

[General text is expected to be accepted in this working group except for any comments raised in the WG or received within 2 weeks afterwards.]

4. Stage 1 decisions from working group: **FG**
    a. WG to decide on PL and voltage ranges
    b. Fault level to be used in Stage 1
    c. Converter rating for Stage 1
    d. …(Additions welcome)
    e. Any other comments on stage 1

[Stage 1 is expected to be accepted except for any comments raised in the WG or received within 2 weeks afterwards.]

5. Discussion and way forward with stage 2 & 3 **WG**

6. Review working group plan **BG**

7. Date ,Time and Location of Next Meeting **BG**

8. AOB

Minutes

Introductions and Apologies GS

Introduction

Review and accept minutes from last meeting BG

Two amendments added to minutes were received since the last working group. These changes were accepted and **the updated minutes were accepted by the working group**

General text decisions from working group: FG

Definitions

Some definitions were raised by SS. **FG to include these in the draft.**

It was raised that PoC may be different from PCC. G55 offers conectee option to apply limit at PoC not PCC. **WG decided to remove reference to PoC from the draft.**

Aggregation exponent for the 5th harmonic

Recap discussion from last meeting

The question put to the working group was: Do we want to use 1 as G5/4 or 1.4 as IEC?

It was noted that this choice will have an impact on setting limits thus have a financial impact.

FG presented results show diversity of phase angle of 5th from different sources.

It was noted that for a customer connections with several of the same type of load there is no diversity thus it will add 'linearly'. Therefore the aggregation only works with aggregation of injection and background.

Note in IEC was shown recommending that if a linear situation is expected use 1.

WG decide to use the aggregation exponents specified in the IEC [1.4].

WG to decide on PL and voltage ranges

FG presented some results showing 5th harmonic at different voltage levels over the same time period. Showing transfer gains are "all over the place" thus having HV with less PL then MV doesn't hold.

It was also suggested that generally background does go up as you go down voltage levels.

Do we want individual voltage levels? or use IEC voltage bands.

WG decided to have values for each voltage level.

DNO's and OFTO to provide the voltage levels they use and FG to combine and rationalise where possible.

Any other comments on General Text

The working group were invited to provide additional comments on the general text**. The working group agreed that any comments received would be address otherwise the general text would be accepted in the next working group meeting.**

Stage 1 decisions from working group: FG

Fault level to be used in Stage 1

Review section 4.3.1

Linear scale of fault level can be used.

Discuss reference impedance from IEC.

This was accepted by the working group

Section 5.3

Should the condition to meet fault level fall on the DNO or the user?

It was suggested that the purpose of stage 1 is to require no input from DNOs and if more margin is needed to keep this philosophy that should be added.

Current document says if you comply with 61000-3-12 you can connect. However a 75A connection can be compliant with 3-12 but not with current standard. This needs to be addressed in the draft.

It was proposed to change the condition to meet fault level to fall on the DNO not the user.

<SPS - Post-meeting note: In general, a customer with an LV PCC will not know the fault level at the PCC without asking the DNO. Self-assessment could degenerate into no assessment given sketchy awareness of EREC G5/4.>

<SPS – Post meeting note: The statement in IEC 61000-3-12 'Equipment complying with the harmonic current emission limits corresponding to R_{sce} = 33 is suitable for connection at any point of the supply system.' ignores i) the fact that we have the ESQC Regulations and a duty to prevent interference so far as is reasonably practicable and ii) that the reference impedance in IEC TR 60725 implies a 3-phase fault level of 565.332kVA and a single phase fault level of 112.148kVA. Rsce of 33 for these two values equates to equipment with a rating of no more than 24.7A and 14.8A respectively.>

Section 5.2

The working group were asked to accept the section allowing connection of loads less than 16 A complying with 61000-3-2. **This was accepted by the working group.**

There was insufficient time to go through all of SS's submitted comments therefore FG and SS agreed to meet to discuss outstanding issues and update the draft accordingly.

Frank Griffith suggested updating table 13 to remove ac regulator. **Agreed by WG**

Suggested to add a KVA value for direct connected to table 13. **Action: Frank Griffith to provide.**

Compatibility level

Section 4.1

The working group discussed the current text in this section. A summary of the discussion point are below:

Sub-section (b)

Concern raised that current text would use all headroom. Suggested using IEC 61000-3-6 method (section 4.2.1); Network Owner sets new PL.

Concerns were raised about this suggestion that it could delay assessment of the connection if the node is on somebody else's network. Suggestion to include reference to time scales in G97.

<SPS: It is unclear whether the text will be amended as suggested; namely: If the background level of voltage harmonic distortion is above the Planning Level but below the Compatibility Level, then the NOC may, based on consideration of the network structure and circumstances, specify network-specific Planning Levels. The harmonic headroom is determined with respect to the network-specific Planning Level. Where remote nodes associated with other NOCs are affected then agreement on the network-specific Planning Levels between the affected parties is required.~~is determined with respect to Compatibility Level. The Electricity Authority shall be informed~~.>

Sub section (c)

Why 120%? This is a temporary measure so as to not delay the connection.

Suggested remove 120% and allow flexibility in defining new level but put stricter onus on Network Owners to bring levels back within PL. Concerns were raised that the allowable level of flexibility must be defined this this method has no precedent in IEC.

Are CLs a hard limit or can they be breached on a site specific case? No conclusion was reached

Suggested this section refers to conditions that are only the case when standard fails. Therefore should not be included in G5/5. FG said this is a problem that National Grid has experienced. Therefore we need something the in standard.

Problem: NO could reduce the background to CL then the connectee still has not headroom so can't connect.

Suggested by and agreed by working group**: if node is identified to be over CL it must be mitigated by NO (bring back down to CL). For the connection assume background is at CL and design to that (i.e. create their own headroom)**

Action: FG to re-write section 4.2 to include comments above.

Any other comments on stage 1

The working group were invited to provide additional comments on the Stage 1**. The working group agreed that any comments received would be address otherwise the Stage 1 would be accepted in the next working group meeting.**

Discussion and way forward with stage 2 & 3 WG

Original plan complete a final draft by Aug 2016. This was decided to be optimistic and revised time scales may be required.

It was proposed to form 2 sub working groups to help write stage 2&3.

During the working group the following people volunteered:

Stage 2:

- Simon Scarbro
- Frank Griffith
- Ahamed Shafiu

<SPS: Post-meeting note – Andrew Oliver of TNEI agreed to be involved after the meeting closed.>

Stage 3

- Davor Vujatovic
- Forooz Ghassemi
- Roshan Bhattarai
- Ben Gomersall

Any other volunteers welcome.

Date, Time and Location of Next Meeting BG

Work Group to meet in July wc 18/ 25. It is aimed to have an update from the 2 sub-work groups.

Aim for mid-August to have first draft of stage 2 & 3.

BG to send out poll for dates and location of next meeting.

AOB

Apportionment of stage 3

Any in favour of first come first server?

Majority in favour of apportionment

Make sure that the method is test in real example.

Send in your thoughts on apportionment.

61000-3-6 is being reviewed

The output of the G5 working group may feed into their working group.