

## Minutes of the 3<sup>rd</sup> Meeting of the ER P24 Task Group

14<sup>th</sup> April 2016

Held at the ENA, Dean Bradley House, 52 Horseferry Road, London, SW1P 2AF

### Attendees:

Name	Initials	Company
David Hewings	DH	NR
Pavel Januska	PJ	SSE
Stuart Stone	SS	SSE
Gavin Baxter	GBa	NPg
Graham Brewster	GBr	WPD
Ben Gomersall	BG	National Grid (NG)
Richard Parke	RP	Threepwood Consulting Ltd (TCL)

### Apologies:

Razvan Pabat-Stroe	SPEN
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## 1. Welcome, Introductions

RP welcomed everybody to the third meeting of the ER P24 Task Group.

Attendance, apologies and absences were noted.

In his role as Chair, GBa agreed the Agenda for the meeting proposed by RP to facilitate the meeting.

## 2. Outline of previous discussions

### 2.1 Overview

In advance of the meeting, RP circulated the following documents for the Task Group to discuss.

- *ENA\_EREC\_P24\_Issue 2\_(2016)\_Working Draft\_v0.2*
- *P24 TG Revision Progress\_v2\_Issued*

The Task Group considered the latest amendments to P24 and revisited previous discussions, as described below.

### 2.2 Protection philosophies

It was previously agreed that P24 should provide some guidance on protection and include indicative schemes for information. Clause 14 has been amended by RP with the guidance of SS and PJ. The Task Group were in general agreement with the amendments to Clause 14. The indicative protection schemes are taken from TS 41-15 Part 9 and the Task Group agreed that TS 41-15 Part 9 could now be archived.

**ACTION:** RP to initiate the archiving of TS 41-15 Part 9.

GBr commented that the Clause 14 is applicable to 'established connection technology' and does not apply to converter/SVC connections.

**ACTION:** RP to amend Clause 14 to clarify that the protection philosophy is applicable to established connections (1x25 kV and 2x25 kV) only.

It was noted that the indicative protection schemes did not reflect 2x25 kV arrangements.

**ACTION:** BG to share typical protection schemes for 2x25 kV arrangements.

It was noted that the term 'surge -proof' should not be used in Clause 14.4 as it is specific to a type of protection scheme. Guidance in P24 must ensure alternatives are considered.

It was noted that the term 'pilot' should be amended so that fibre optics are included and reference to ENA TS 12-4 should be added to Clause 14.4.

It was noted that Clause 14.4 may not accurately reflect 2x25 kV arrangements.

**ACTION:** BG to ensure that NG completes a review of Clause 14.4 of P24.

### **2.3 Boundary conditions**

The Task Group previously reached the consensus that the connection boundary is dependent on the technology used.

- 25 kV connection boundary used for established arrangements i.e. 1x25 kV and 2x25 kV.
- EHV connection boundary for developing technologies.

The Task Group were agreed on the above consensus. GBr pointed out that the ENFG are not fully aware of the 'developing technology' options and it would be important that P24 describes the term appropriately. GBr added that P24 should include descriptions of the 'main' developing technologies.

It was agreed that the main 'developing technologies' include the following.

1. Transformer connection with 'balancer'.
2. Static VaR Compensator connection (SVC). Also known as converter connection.
3. Scott transformer connection. BG commented that NG are of the opinion that the Scott is unlikely to become established.

The Task Group were agreed that 'developing technology' would be captured in P24 Annexes.

BG explained that NG and NR are currently developing a 'large' 2x25 kV connection for HS2. Although the connection will make use of a 120 MVA 2x25 kV transformer, a 'balancer' will also be included which means it is likely to be treated as a 'developing technology' connection.

BG commented that the term 'ownership' should not be used in P24 as it will not accurately reflect the arrangements between NR and the Network Operator.

## 2.4 Earthing

RP explained that the ENA Earthing Co-ordination Group (ECG) will consider earthing issues for P24. There has been no comments provided by the ECG at this time.

DH added that the issue of using rails to 'hold down' grid site earthing should be raised with the ECG. Grid site earthing should be satisfactory prior to completion of rail bonding.

## 2.5 Typical connections

The Task Group reviewed Clause 5 of the P24 and the following points were noted.

DH explained that NR and NG are discussing the possibility of removing neutral connections from the 2x25 kV arrangement. In this case, the earth connection for the rail is derived from the autotransformer. However, the standard approach will still be to use the neutral connection.

**ACTION:** RP to include a brief description in P24 Clause 5.1.2 of the excluded neutral connection option on 2x25 kV arrangements.

DH commented that isolation of the earth link should be clearly described in P24 and should be depicted in the drawings.

**ACTION:** RP to ensure that the earth isolation procedure is captured in Clause 16. RP to add earth isolation links to the drawings in Figures 6 & 7.

DH confirmed that the content in Clause 5.3.1.1 and Clause 5.3.1.2 is correct.

The Task Group commented that the abbreviations '1T0' and '1F0' should be referred to as '\*T0' and '\*F0' in P24 i.e. '1' refers to the circuit number and in many cases there are 2 circuits for traction supplies.

The Task Group commented on Clause 5.3.4 with the following suggested amendments:

- The term 'dead' should be replaced with 'off-load'.
- The word 'associated' should be deleted.
- Interlocking should be for 'local' switchgear only.
- Electrical interlocking supplies should be derived from a battery backed supply.
- Software interlocking 'may' be considered and should not be mandatory.

**ACTION:** RP to amend Clause 5.3.4 in accordance with above comments.

## 2.6 Regenerative braking

Previously, it was agreed that P24 should include information on regenerative braking.

DH commented that regenerative braking should be defined as a 'risk' of export and NR does not expect Network Operators to take exported power as part of the connection. GBr explained that this should be explained clearly in P24.

GBr asked DH to explain the potential interference of distance protection schemes caused by regenerative braking. DH explained that this issue is fully understood and is known not to be a problem for distance protection.

**ACTION:** DH to provide explanation of regenerative braking for P24. The explanation should include the perceived 'issues' and technical reasons as to why they should be discounted.

## **2. Equipment specification**

The Task Group reviewed the 'high-level' equipment specifications which will be included in P24. The intention remains not to provide detailed requirements but to highlight key characteristics for the main equipment.

### Transformers

DH explained that on-load tap-changers are not essential. Tap-changer monitoring is good practice only. Overload requirements for transformers should be agreed as part of the connection design and should not be stipulated in P24.

### Cables

DH explained that voltage ratings of cable should reflect the ratings described in BS EN 50163 i.e.  $U_n = 25 \text{ kV}$ ,  $U_{\max 1} = 27.5 \text{ kV}$ ,  $U_{\max 2} = 29 \text{ kV}$ .

Cables should be specified as LSZH.

1x25 kV arrangements should use concentric cable (phase and neutral).

2x25 kV arrangements should use single core cables,

Single point bonding and sheath voltage limiters (SVLs) should be used (ENA EREC C55 should be referenced for bonding requirements).

GBr pointed out that WPD do not employ single point bonding and hence P24 should to clearly justify the bonding requirements.

## **3. Review actions from previous meeting**

The Task Group reviewed the Actions from the previous meeting (*P24 TG Meeting 23 09 15 Minutes and Actions\_v1\_Issued*). All actions were agreed as complete with the exception of a number of items which now ongoing (see Appendix A).

### Item A

RP explained that the justification for P24 remaining a DCODE Annex 1 document had been prepared and will be forwarded to the DCRP secretary. RP explained that the justification is based around the definition of an Annex 1 Qualifying Standard in the DCODE Standard Procedure 1. The Task Group were in general agreement to submit the justification to the DCRP.

## **4. Background information and developing technology**

### **4.1 South Wales Traction Plans**

DH provided a presentation overview of the traction plans for South Wales. The presentation included diagrams of connection arrangements, voltage profile graphs for the return conductor, load profiles for the traction supplies and diagrams of the traction overhead equipment.

DH explained the accepted voltage limits for traction supplies (29 kV 2 minute allowance, 19.5 kV - 27.5 kV continuous, 17.5 kV 2 minute allowance).

DH explained that harmonics in the kHz range should be described in P24. These 'sub-transient resonant' harmonics can have an impact for networks.

**ACTION:** DH to share diagrams and relevant information from presentation.

**ACTION:** DH to provide description of sub-transient harmonic resonance for P24.

#### **4.1 Static VaR Compensation (SVC)**

GBa presented an overview of SVC technology and a high-level design of an SVC connection currently being developed for an NR supply at Doncaster. The presentation provided a useful overview diagram of SVC equipment and the risks associated with the technology.

DH explained that the protection of SVC connections needs careful consideration. The technology is dynamic and 'fault' currents can be masked by the fast switching functionality of the SVC. DH suggested that the 'in-built' protection of the SVC should be the first main protection which can inter-trips to the HV. Second-main protection would be provided by conventional overcurrent and earth fault protection on the HV. The Task Group were in general agreement with this principal.

**ACTION:** GBa to share diagrams from SVC presentation with RP.

### **5. AOB**

The date of the next Task Group meeting was agreed as 07/07/16 to take place at Northern Powergrid offices in Castleford.

**ACTION:** GBa to organise meeting room facilities for the Task Group on 07/07/16 and share the location details.

# Appendix 1

## Summary of Actions from Current Meeting

Item	Action	Responsibility	Due by
1	RP to initiate the archiving of TS 41-15 Part 9.	RP	2017
2	RP to amend Clause 14 to clarify the protection arrangements which are applicable.	RP	07/07/16
3	BG to share typical protection schemes for 2x25 kV.	BG	07/07/16
4	RP to include a brief description in P24 Clause 5.1.2 of the excluded neutral connection on 2x25 kV arrangements.	RP	07/07/16
5	RP to ensure that the earth isolation procedures is captured in Clause 16. RP to add earth isolation link to the drawings in Figure 6 & 7.	RP	07/07/16
6	RP to amend Clause 5.3.4 in accordance with above comments.	RP	07/07/16
7	DH to provide explanation of regenerative braking for P24. The explanation should include the perceived 'issues' and technical reasons as to why they are should be discounted for traction connection design.	DH	07/07/16
8	DH to share diagrams and relevant information from presentation.	DH	07/07/16
9	DH to provide description of sub-transient harmonic resonance for P24.	DH	07/07/16
10	GBa to share diagrams from SVC presentation with RP.	GBa	07/07/16
11	GBa to organise meeting room facilities for the Task Group on 07/07/16 and share the location details.	GBa	07/07/16

## Ongoing Actions

Item	Action	Responsibility	Due by
A	RP to prepare a short brief explaining P24 validity as a DCODE document. The brief will include reference to the DCRP Constitution and Rules.	RP	In progress
B	RP to ask ENA Power Quality Group for guidance in relation to the NPS limits at 132 kV. ENA ER P29 is planned for revision in 2017 alongside ETR 116	N/A	Ongoing
C	RP to include typical examples of 25 kV and 66 kV cables. Cable specification should take account of switchgear design.	RP	07/07/16