

ISG217/02 – METERING DISPENSATION D/494 – GREENHILL NETWORK RAIL

MEETING NAME	ISG 217
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Date of meeting	21 May 2019
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Owner/author	Mike Smith
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Purpose of paper	Decision
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Classification	Public
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Summary	EDF Energy Customers Limited has applied for a lifetime Metering Dispensation (D/494) against Code of Practice (CoP) 2 for the Metering Equipment associated with Network Rail's Greenhill Feeder Station. The measurement transformers are the incorrect accuracy class and the voltage transformers also feed non-Settlement burdens (protection relays). Overall accuracy is maintained with CoP2 limits. We invite the Imbalance Settlement Group (ISG) to approve Metering Dispensation D/494 on a lifetime basis.
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1. BSC requirements

- 1.1 Section L 'Metering' of the Balancing and Settlement Code (BSC) requires all Metering Equipment to either:
- comply with the requirements set out in the relevant Code of Practice (CoP) at the time the Metering System is first registered for Settlement; or
 - be the subject of, and comply with, a Metering Dispensation.
- 1.2 Section L allows the Registrant of a Metering System to apply for a Metering Dispensation if, for financial or practical reasons, Metering Equipment will not or does not comply with some or all the requirements of a CoP.
- 1.3 The process for applying for a Metering Dispensation is set out in BSCP32 'Metering Dispositions'.

2. Confidentiality request

- 2.1 Registrants can request confidentiality for Metering Dispensation applications (or parts of them or attachments to them). In this case, the Registrant has requested confidentiality for the electrical single line diagrams (Attachments C - F).

3. Background to Metering Dispensation D/494

- 3.1 Network Rail (NR) are currently undertaking resilience works to the existing connection at its Greenhill Feeder Station (FS), supplied from Bonnybridge 132kV Grid Supply Point (GSP). Attachments C – F detail the three stages of the works:
- Stage 1: Existing NR 25kV switchboard renamed as 'B'. New NR 25kV switchboard (Board 'A') installed (with interconnection to Board 'B'). Grid Transformer T6 connection transferred from Board 'B' to Board 'A'.
 - Stage 2: New NR 25kV switchboard (Board 'C') installed (with interconnection to Board 'B'). Grid Transformer T4 connection transferred from Board 'B' to Board 'C'.
 - Stage 3: Voltage transformer installed on NR 25kV switchboard Board 'B' (incomer circuit - GH/S2).

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- 3.2 The Meter Operator Agent (LONDCVAM) has found that, for all three feeder circuits, the existing Settlement Metering Equipment¹ is non-compliant with Code of Practice (CoP) 2².
- 3.3 The assets were procured/installed due to a misalignment between NR standards and CoP2. The issue has been escalated within NR to the Professional Head of Electrical Power who will provide an update to asset policy such that it aligns with CoP2 for future 25kV installations.

4. Metering Dispensation application (D/494)

- 4.1 EDF Energy Customers Limited has applied for a lifetime Metering Dispensation (D/494) against CoP2 for the Metering Equipment associated with the Greenhill (NR) FS (Attachment A):
- the current transformers (CTs) are non-compliant with CoP2, clause 5.1.1³, because they are to accuracy class 0.2 instead of accuracy class 0.2s;
 - the voltage transformers (VTs) are non-compliant with CoP2, clause 5.1.2⁴, because they are to accuracy class 1.0 instead of accuracy class 0.5.
 - the VTs are connected to the busbars below the Defined Metering Point (DMP)⁵, rather than on each circuit (or 'line') at the DMP; and
 - the secondary winding of each VT is not dedicated for Settlement purposes (as required by CoP2) as it also feeds protection equipment. The existing arrangement places limited burden on the VT windings due to the specification of the other devices in the circuit (i.e. the protection relays have low burden).
- 4.2 EDF Energy Customers Limited propose to utilise the existing CTs and VTs due to:
- the good accuracy levels already present;
 - the disproportionate costs associated with changing them; and
 - the disruption to the operational railway.
- 4.3 **Existing accuracy** - The overall accuracy of each feeder's Metering Sub-System⁶ will be maintained within CoP2 limits (e.g. +/-1.0% at Unity Power Factor) at the DMP without compensating the Meters for the CT/VT errors (Attachment B). Compensation can be made for CT/VT errors if required, however EDF Energy Customers Limited see no value in applying compensation values as the overall error is within limits.
- 4.4 NR expect the typical operating load on each circuit to be 30-40% (expressed as a percentage of the rated current of the CTs), when the trains are in use. Between these typical operating load percentages:
- for feeder 1, the expected⁷ Metering Sub-System error will be between +0.22 to +0.23%;
 - for feeder 2, the expected Metering Sub-System error will be between +0.09 to +0.12%; and
 - for feeder 3, the expected Metering Sub-System error will be between +0.26 to +0.27%.
- 4.5 **Cost of changing the CT/VTs** - The cost of replacing the existing CTs and VTs with CoP2 compliant CTs and VTs is estimated to be approximately £670,000. The cost breakdown is:

¹ The Balancing Mechanism Units (T_GNHDL-1, 2 and 3) for these three Transmission System (TS) connected circuits were registered for Settlement purposes on 28 May 2017.

² 'Code of Practice for the metering of circuits with a rated capacity not exceeding 100 MVA for Settlement Purposes'

³ 'Current Transformers'

⁴ 'Voltage Transformers'

⁵ The point of connection to the Transmission System.

⁶ Registered under the Metering System (MSID 8356).

⁷ Calculated at 30% and 40% rated current based on a straight line gradient between the known error points at 20% and 50% rated current.

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- design & procurement of VTs - £60k (lead time - 12 weeks minimum)
- implementation & commissioning - £50k
- design & procurement of CTs - £60k (lead time - 12 weeks minimum)
- implementation & commissioning - £100k
- prolongation of subcontractor up to end of July - £400k

4.6 **Disruption to the operational railway** - The impact of removing the supply to replace the VTs and CTs would be the cancellation of electric trains between Edinburgh, Glasgow and Stirling resulting in significant disruption to the Scottish economy and reputational damage for the rail industry.

5. MDRG comments

5.1 We circulated the Metering Dispensation application to the Metering Dispensation Review Group (MDRG) for comments.

5.2 Three out of five MDRG members responded:

- One MDRG member supports the lifetime application as the accuracy limits are maintained for CoP2 according to their submitted evidence;
- One MDRG member would support the application as a time limited Metering Dispensation with VT errors being calculated and suitable compensation programmed into the Meters. This MDRG member would support a lifetime Metering Dispensation if NR demonstrates that future outages on these circuits would not be of sufficient duration to change the CTs & VTs;
- One MDRG member has not yet confirmed their view on the Metering Dispensation application and has asked for clarification on:
 - the suggested impact of removing the supply to replace the VTs and CTs, as there is the ability to isolate different VT/CTs while maintaining supplies;
 - whether there are other installations installed/operational, on order or being installed that will have the same non-compliance, which we will see as future Metering Dispensations?; and
 - the statement that accuracy will be maintained within CoP2 overall limits without compensation for CT/VT errors. The MDRG member questioned if this is true at all loads, including the lowest loads? What is the difference between 0.2 and 0.2S – if nothing then why is 0.2S specified? What is the evidence for this statement?

5.3 ELEXON forwarded some of the questions raised by last two MDRG members' to the applicant. In response the applicant provided the following responses:

- Greenhill FS does have 3 circuits and the works currently ongoing are required to maximise resilience at the site for the aforementioned reasons due to earlier design issues. Replacement of the CT and VT would require the switchgear to be de-gassed and disassembled which would require an outage of circa 1 month per circuit, with associated risk to the railway during this period as Greenhill FS cannot be alternately fed from another feeder station as it is the most northerly in the UK. This is the reason that the site has 3 circuits compared to the traditional 2. Network Rail are understandably nervous to undertake such an outage unless there is no other option due to the potential impact on the electric train service and resulting reputational damage; and

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- the Network Project team have raised this with the relevant senior engineers in Network Rail HQ and await their response. It is noted and accepted that any such dispensation for future sites is unlikely to be granted.

5.4 ELEXON also explained the differences between the error limits for a class 0.2 and 0.2s CT (summarised in the table below) to one of the MDRG members. ELEXON confirmed it believed that all the CT test certificates show errors within class 0.2s error limits at/from 5% rated current up. At the rated burden of 15VA, all the CT's actual errors (on either ratio) are within a class 0.2s CT's error limits at 5% rated current (i.e. are better than $\pm 0.35\%$). At 3.75VA burden they are well within CT error limits:

Class	Ratio Error ($\pm \%$)				
	at % of rated current				
	1	5	20	100	120
0.2	-	0.75	0.35	0.2	0.2
0.2s	0.75	0.35	0.2	0.2	0.2

5.5 As a result of the responses from the applicant one MDRG member re-confirmed they would support a lifetime Metering Dispensation and suggested it would be good practice to compensate for the VT errors. They suggested that CT errors are harder to compensate for as the CT burden varies with the circuit load so unless the circuit load is already known to be around 20% of the rated capacity then they agree that the CT error figure should be used to prove compliance with overall accuracy only and not programmed into the Meter.

5.6 ELEXON is awaiting a response from the other MDRG member.

6. NETSO comments

6.1 We circulated the Metering Dispensation application to the National Electricity Transmission System Operator (NETSO) for comments. The NETSO confirmed it has no comments and supports the application.

7. ELEXON's view

7.1 ELEXON supports this lifetime Metering Dispensation application as accuracy will be maintained within CoP2 limits at the DMP.

7.2 The cost of replacing the CT/VTs at future outages will be approximately £270k which is difficult to justify if the Meters can be compensated for the existing measurement transformer errors. Therefore, if approved, ELEXON recommends that a condition be attached to the approved Metering Dispensation that the Meters are compensated for, as a minimum, voltage transformer errors to bring the overall errors as close as possible to zero.

8. Recommendations

8.1 We invite you to:

- APPROVE** Metering Dispensation D/494, for Greenhill Network Rail, on a lifetime basis, subject to the Meters being compensated for, as a minimum, voltage transformer errors.

Attachments

Attachment A – Metering Dispensation (D/494) application form

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Attachment B – Greenhill Feeder Station overall accuracy

Attachment C (CONFIDENTIAL) – Greenhill Feeder Station overall single line diagram (SLD)

Attachment D (CONFIDENTIAL) – Greenhill Feeder Station SLD Stage 1

Attachment E (CONFIDENTIAL) – Greenhill Feeder Station SLD Stage 2

Attachment F (CONFIDENTIAL) – Greenhill Feeder Station SLD Stage 3

For more information, please contact:

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