Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (Text with EEA relevance)

PART IV

LOAD-FREQUENCY CONTROL AND RESERVES

TITLE 2

FREQUENCY QUALITY

Article 127

Frequency quality defining and target parameters

- The frequency quality defining parameters shall be:

 a the nominal frequency F1...;
 b the standard frequency range F1...;
 c the maximum instantaneous frequency deviation F1...;
 d the maximum steady-state frequency deviation F1...;
 e the time to restore frequency F1...;
 f the time to recover frequency F2...;
 g the frequency restoration range F3...;
 h the frequency recovery range F4...; and
 i the alert state trigger time F5....
- The nominal frequency shall be 50 Hz F6....
- The default values of the frequency quality defining parameters listed in paragraph 1 are set out in Table 1 of Annex III.
- 4 The frequency quality target parameter shall be the maximum number of minutes outside the standard frequency range per year per synchronous area and its default value per synchronous area are set out in Table 2 of Annex III.
- The values of the frequency quality defining parameters in Table 1 of Annex III and of the frequency quality target parameter in Table 2 of Annex III shall apply unless all TSOs of [F7the GB synchronous area] propose different values pursuant to paragraphs F8... 7 and 8.

^{F9} 6																

- 7 All TSOs of the GB [F10] synchronous area] shall have the right to propose in the synchronous area operational agreement values different from those set out in Tables 1 and 2 of Annex III regarding:
 - a time to restore frequency;
 - b the alert state trigger time; and
 - c the maximum number of minutes outside the standard frequency range.

- The proposal for modification of the values pursuant to paragraph ^{F11}... 7 shall be based on an assessment of the recorded values of the system frequency for a period of at least 1 year and the synchronous area development and it shall meet the following conditions:
 - a the proposed modification of the frequency quality defining parameters in Table 1 of Annex III or the frequency quality target parameter in Table 2 of Annex III takes into account:
 - (i) the system's size, based on the consumption and generation of the synchronous area and the inertia of the synchronous area;
 - (ii) the reference incident;
 - (iii) grid structure and/or network topology;
 - (iv) load and generation behaviour;
 - (v) the number and response of power generating modules with limited frequency sensitive mode over frequency and limited frequency sensitive mode under frequency as defined in Article 13(2) and Article 15(2)(c) of Regulation (EU) 2016/631;
 - (vi) the number and response of demand units operating with activated demand response system frequency control or demand response very fast active power control as defined in Articles 29 and 30 of Regulation (EU) 2016/1388; and
 - (vii) the technical capabilities of power generating modules and demand units;
 - all TSOs of the synchronous area shall conduct a public consultation concerning the impact on stakeholders of the proposed modification of the frequency quality defining parameters in Table 1 of Annex III or the frequency quality target parameter in Table 2 of Annex III.
- 9 All TSOs shall endeavour to comply with the values for the frequency quality defining parameters or for the frequency quality target parameter. All TSOs shall verify the fulfilment of the frequency quality target parameter at least annually.

Textual Amendments

- Words in art. 127(1)(a)-(e) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 82(2)(a) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F2 Words in Art. 127(1)(f) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 82(2)(b) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- Words in Art. 127(1)(g) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 82(2)(c) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- Words in Art. 127(1)(h) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 82(2)(d) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- Words in Art. 127(1)(i) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I.

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- 2019/533), reg. 1(2), **Sch. 1 para. 82(2)(e)** (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- **F6** Words in Art. 127(2) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), **Sch. 1 para. 82(3)** (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F7 Words in Art. 127(5) substituted (E.W.S.) (31.12.2020) by The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 82(4)(a) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F8 Word in Art. 127(5) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 82(4)(b) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F9 Art. 127(6) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 82(5) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F10 Words in Art. 127(7) substituted (E.W.S.) (31.12.2020) by The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 82(6) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F11 Words in Art. 127(8) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 82(7) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)

Article 128

FRCE target parameters

^{F12} 1																	
^{F12} 2																	
F123																	

- Where an LFC block consists of more than one LFC area, all TSOs of the LFC block shall specify in the LFC block operational agreement the values of the FRCE target parameters for each LFC area.
- For the GB [F13 synchronous area] the Level 1 FRCE range shall be equal to or larger than 200 mHz and the Level 2 FRCE range shall be equal to or larger than 500 mHz.
- 6 All TSOs of the GB [F14synchronous area] shall endeavour to comply with the following FRCE target parameters of a synchronous area:
 - a the maximum number of time intervals outside the Level 1 FRCE range shall be less than or equal to the value in the Table of Annex IV as a percentage of the time intervals per year;
 - b the maximum number of time intervals outside the Level 2 FRCE range shall be less than or equal to the value in the Table of Annex IV as a percentage of the time intervals per year.

All TSOs shall verify, at least annually, that the FRCE target parameters are fulfilled.

Textual Amendments

- F12 Art. 128(1)-(3) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 83(2) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F13 Words in Art. 128(5) substituted (E.W.S.) (31.12.2020) by The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 83(3) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F14 Words in Art. 128(6) substituted (E.W.S.) (31.12.2020) by The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 83(4) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)

Article 129

Criteria application process

The criteria application process shall comprise:

- (a) the collection of frequency quality evaluation data; and
- (b) the calculation of frequency quality evaluation criteria.

Article 130

Frequency quality evaluation data

- 1 The frequency quality evaluation data shall be:
 - a for the synchronous area:
 - (i) the instantaneous frequency data; and
 - (ii) the instantaneous frequency deviation data;
 - for each LFC block of the synchronous area, the instantaneous FRCE data.
- 2 The measurement accuracy of the instantaneous frequency data and of the instantaneous FRCE data, where measured in Hz, shall be 1 mHz or better.

Article 131

Frequency quality evaluation criteria

- 1 The frequency quality evaluation criteria shall comprise:
 - a for the synchronous area during operation in normal state or alert state as determined by Article 18(1) and (2), on a monthly basis, for the instantaneous frequency data:
 - (i) the mean value;

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- (ii) the standard deviation;
- (iii) the 1-,5-,10-, 90-,95- and 99-percentile;
- (iv) the total time in which the absolute value of the instantaneous frequency deviation was larger than the standard frequency deviation, distinguishing between negative and positive instantaneous frequency deviations;
- (v) the total time in which the absolute value of the instantaneous frequency deviation was larger than the maximum instantaneous frequency deviation, distinguishing between negative and positive instantaneous frequency deviations;
- (vi) the number of events in which the absolute value of the instantaneous frequency deviation of the synchronous area exceeded 200 % of the standard frequency deviation and the instantaneous frequency deviation was not returned to F15... the frequency restoration range for the GB [F16synchronous area], within the time to restore frequency. The data shall distinguish between negative and positive frequency deviations;
- (vii) for the GB [F17] synchronous area] the number of events for which the absolute value of the instantaneous frequency deviation was outside of the frequency recovery range and was not returned to the frequency recovery range within the time to recover frequency, distinguishing between negative and positive frequency deviations;

^{F18}b

- c for the LFC blocks of the GB ^{F19}... synchronous area, during operation in normal state or alert state in accordance with Article 18(1) and (2), on a monthly basis and for a dataset containing the average values of the FRCE of the LFC block over time intervals with a length of one minute: the number of events for which the absolute value of the FRCE exceeded the maximum steady-state frequency deviation and the FRCE was not returned to 10 % of the maximum steady-state frequency deviation within the time to restore frequency, distinguishing between negative and positive FRCE.
- All TSOs of [F20] the GB synchronous area] shall specify in the synchronous area operational agreement a common methodology to assess the risk and the evolution of the risk of exhaustion of FCR in the synchronous area. That methodology shall be performed at least annually and shall be based at least on historical instantaneous system frequency data for not less than 1 year. All TSOs of [F20] the GB synchronous area] shall provide the required input data for this assessment.

Textual Amendments

- F15 Words in Art. 131(1)(a)(vi) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 84(2)(a)(i) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F16 Words in Art. 131(1)(a)(vi) substituted (E.W.S.) (31.12.2020) by The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 84(2)(a)(ii) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F17 Words in Art. 131(1)(a)(vii) substituted (E.W.S.) (31.12.2020) by The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I.

- 2019/533), reg. 1(2), **Sch. 1 para. 84(2)(b)** (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F18 Art. 131(1)(b) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 84(2)(c) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F19 Words in Art. 131(1)(c) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 84(2)(d) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F20 Words in Art. 131(2) substituted (E.W.S.) (31.12.2020) by The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 84(3) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)

Article 132

Data collection and delivery process

- 1 The data collection and delivery process shall comprise the following:
 - a measurements of the system frequency;
 - b calculation of the frequency quality evaluation data; and
 - c delivery of the frequency quality evaluation data for the criteria application process.
- 2 The data collection and delivery process shall be implemented by the synchronous area monitor appointed in accordance with Article 133.

Article 133

Synchronous area monitor

- All TSOs of [F21] the GB synchronous area] shall appoint one TSO of that synchronous area in the synchronous area operational agreement as synchronous area monitor.
- 2 The synchronous area monitor shall implement the data collection and delivery process of the synchronous area referred to in Article 132.
- 3 The synchronous area monitor shall implement the criteria application process referred to in Article 129.
- 4 The synchronous area monitor shall collect the frequency quality evaluation data of its synchronous area and perform the criteria application process, including the calculation of the frequency quality evaluation criteria, once every 3 months and within 3 months after the end of the analysed period.

Textual Amendments

F21 Words in Art. 133(1) substituted (E.W.S.) (31.12.2020) by The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 85 (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)

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Article 134

LFC block monitor

- 1 All TSOs of a LFC block shall appoint one TSO of that LFC block in the LFC block operational agreement as LFC block monitor.
- 2 The LFC block monitor shall collect the frequency quality evaluation data for the LFC block in accordance with the criteria application process referred to in Article 129.
- 3 Each TSO of a LFC area shall provide the LFC block monitor with the LFC area measurements necessary for collecting frequency quality evaluation data for the LFC block.
- The LFC block monitor shall deliver the frequency quality evaluation data of the LFC block and its LFC areas once every 3 months and within 2 months after the end of the analysed period.

Article 135

Information on load and generation behaviour

In accordance with Article 40, each connecting TSO shall have the right to request the information necessary from SGUs to monitor the load and generation behaviour related to imbalances. That information may include:

- (a) the time-stamped active power setpoint for real-time and future operation; and
- (b) the time-stamped total active power output.

F22Article 136

Ramping period within the synchronous area

Textual Amendments

F22 Art. 136 omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 86 (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)

Article 137

Ramping restrictions for active power output

F23 1																
^{F24} 2																

3 All connecting TSOs of an HVDC interconnector shall have the right to determine in the LFC block operational agreement common restrictions for the active power output of

that HVDC interconnector to limit its influence on the fulfilment of the FRCE target parameter of the connected LFC blocks by agreeing on ramping periods and/or maximum ramping rates for this HVDC interconnector. Those common restrictions shall not apply for imbalance netting, frequency coupling as well as cross-border activation of FRR and RR over HVDC interconnectors. All TSOs of [F25the GB synchronous area] shall coordinate these measures within the synchronous area.

- All TSOs of an LFC block shall have the right to determine in the LFC block operational agreement the following measures to support the fulfilment of the FRCE target parameter of the LFC block and to alleviate deterministic frequency deviations, taking into account the technological restrictions of power generating modules and demand units:
 - a obligations on ramping periods and/or maximum ramping rates for power generating modules and/or demand units;
 - b obligations on individual ramping starting times for power generating modules and/or demand units within the LFC block; and
 - c coordination of the ramping between power generating modules, demand units and active power consumption within the LFC block.

Textual Amendments

- F23 Art. 137(1) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 87(1)(a) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F24 Art. 137(2) omitted (E.W.S.) (31.12.2020) by virtue of The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 87(1)(a) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F25 Words in Art. 137(3) substituted (E.W.S.) (31.12.2020) by The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 87(1)(b) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)

Article 138

Mitigation

Where the values calculated for the period of one calendar year concerning the frequency quality target parameters or the FRCE target parameters are outside the targets set for [F26 the GB synchronous area] or for the LFC block, all TSOs of [F27 the GB synchronous area] or of the relevant LFC block shall:

- (a) analyse whether the frequency quality target parameters or the FRCE target parameters will remain outside the targets set for [F26the GB synchronous area] or for the LFC block and in case of a justified risk that this may happen, analyse the causes and develop recommendations; and
- (b) develop mitigation measures to ensure that the targets for [F26the GB synchronous area] or for the LFC block can be met in the future.

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Textual Amendments

- **F26** Words in Art. 138 substituted (E.W.S.) (31.12.2020) by The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), **Sch. 1 para. 88(3)** (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)
- F27 Words in Art. 138 substituted (E.W.S.) (31.12.2020) by The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 2019/533), reg. 1(2), Sch. 1 para. 88(2) (as amended by S.I. 2020/1016, regs. 1(2), 6(2)); 2020 c. 1, Sch. 5 para. 1(1)

Changes to legislation:

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Changes and effects yet to be applied to the whole legislation item and associated provisions

- Art. 2(3A) inserted by S.I. 2019/533 Sch. 1 para. 3(5) (This amendment not applied to legislation.gov.uk. Sch. 1 para. 3(5) omitted (15.9.2020) by virtue of S.I. 2020/1016, regs. 1(2), 6(3)(a))
- Art. 3.2(168) omitted by S.I. 2024/706 reg. 44(a)(iii)
- Art. 55(d) words inserted by S.I. 2019/533 Sch. 1 para. 44(2)(b) (This amendment not applied to legislation.gov.uk. Sch. 1 para. 44(2)(b) substituted (15.9.2020) by S.I. 2020/1016, regs. 1(2), 6(3)(j))