

**Grid Code
Modification
Recommendation Form**



Title of Recommended Proposal:

Incorporation of MPID 229 RoCoF Modification Approved in Principle by CRU (2014)

MPID: 229(a)

Date:	26/01/2023
Recommended at GCRP Meeting No.:	GCRP Meeting 09/11/2022
Grid Code Version:	Version 11
Grid Code Section(s) Impacted by Recommended Proposal:	CC7.3.1.1(d) CC.7.5.1.1(d) PPM.1.5.1(d) Definition: Rate of Change of Frequency (RoCoF)

Modification Proposal Justification:

MPID 229 was approved ¹ in principle in 2014 to modify the definition of Rate of Change of Frequency (RoCoF) and amend the then clause CC7.3.1.1(d) (now CC7.3.1.1(d)(i)) and similar clauses for Interconnectors and WFPSs (now PPMs), and to give direction on when this clause does and does not apply.

The pre-requisites to implementing the modification, as set out by the CRU (at that time the CER), have now been achieved. Following an extensive project, the generation in question has now implemented the required changes to ensure compliance with 1 Hz/s over 500 ms and only 19 MW of distribution-connected generation over 80 sites remains non-compliant. With this low level of non-compliant generation EirGrid can safely operate the system at 1 Hz/s RoCoF over 500 ms.

Furthermore, the implementation of the Requirements for Generators (RfG) EU Network Code in 2019 has brought in this same RoCoF requirement for generation subject to RfG.

However, some housekeeping alterations are required to the original modification prior to its implementation, as there have been extensive numbering and formatting changes to the Grid Code since 2014. The alterations to the original modification proposal are purely housekeeping and do not change the intent of the original modification as approved in principle by the CRU.

The original Modification Proposal MPID 229 is attached to the email for information and this MPID229a

¹ <https://www.cru.ie/wp-content/uploads/2014/07/CER14081-ROCOF-Decision-Paper-FINAL-FOR-PUBLICATION.pdf>

incorporates the required alterations.

Not implementing this modification would result in non-compliance with CRU (then CER) Decision Paper on RoCoF published in 2014.

History of Progression through GCRPs, Working Group and/or Consultation:

On 4 April 2014 the CRU (previously the CER) approved, in principle, the RoCoF modification MPID 229. A link to the [CER decision](#) is present on the front cover of the EirGrid Grid Code since 2014, this is to ensure all Users are aware of the approval in principle. The history of progression of the original modification is documented in that paper.

A proposal to apply housekeeping alterations to the original modification (MPID 229) was presented to the Joint Grid Code Review Panel on 14 June 2022. Those specific alterations were presented to the EirGrid Grid Code Review Panel on 09 November 2022.

Separately please note, on 14 June 2019 the CRU approved Grid Code modification MPID 275 to integrate EU Commission Regulation EU 2016/631 establishing a network code on requirements for grid connection of generators (RfG) into the Irish Grid Code, version 8. This established the new RoCoF requirement for generators subject to RfG. The RoCoF requirement, as per MPID 229a, applies to non-RfG users.

Summary Note of any Objections to the Recommended Change from GCRP Members or Consultation Responses:

No objections were raised at the GCRP meeting that took place 09 November 2022.

Outcome of any GCRP Meeting Actions Relating to the Recommended Modification:

No actions were raised at the GCRP meeting that took place 09 November 2022.

Red-line Version of Impacted Grid Code Section(s) - show proposed changes to text:

Deleted text in ~~strike-through red font~~ and new text highlighted in blue font

Definition: Rate of Change of Frequency (RoCoF)

The rate of increase or decrease of **Frequency** as measured at the **User's Connection Point** over the time period as set out in CC.7.3.1.1(d) ~~and~~, CC.7.5.1.1 (d), CC.7.5.1.1(u) and PPM1.5.1(d).

CC.7.3.1.1 Each **Generation Unit**, shall, as a minimum, have the following capabilities:



- (a) operate continuously at normal rated output at **Transmission System Frequencies** in the range 49.5Hz to 50.5Hz;
- (b) remain synchronised to the **Transmission System** at **Transmission System Frequencies** within the range 47.5Hz to 52.0Hz for a duration of 60 minutes;
- (c) remain synchronised to the **Transmission System** at **Transmission System Frequencies** within the range 47.0Hz to 47.5Hz for a duration of 20 seconds required each time the **Frequency** is below 47.5Hz;



- (d)
 - (i) remain synchronised to the **Transmission System** ~~during rate of change of Transmission System Frequency of values up to and including 0.5 Hz per second~~ for a **Rate of Change of Frequency** up to and including 1 Hz per second as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **Rate of Change of Frequency** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause CC.7.3.1.1(h) supercedes this clause (CC.7.3.1.1(d)(i)); For the avoidance of doubt, this requirement relates to the capabilities of **Generating Units** only and does not impose the need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays;

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- (ii) remain synchronised to the **Transmission System** for a **Rate of Change of Frequency** up to and including 1 Hz per second as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **Rate of Change of Frequency** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause CC.7.3.1.1(y) supersedes this clause (CC.7.3.1.1(d)). For the avoidance of doubt, this requirement relates to the capabilities of **Generating Units** only and does not impose the need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays;

PPM1.5 Transmission System Frequency Ranges

PPM1.5.1 **Controllable PPMs** shall have the capability to:

- (a) operate continuously at normal rated output at **Transmission System Frequencies** in the range 49.5 Hz to 50.5 Hz;
- (b) remain connected to the **Transmission System** at **Transmission System Frequencies** within the range 47.5 Hz to 52.0 Hz for a duration of 60 minutes;
- (c) remain connected to the **Transmission System** at **Transmission System Frequencies** within the range 47.0 Hz to 47.5 Hz for a duration of 20 seconds required each time the **Transmission System Frequency** is below 47.5 Hz;
- (d)

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- (i) remain connected to the **Transmission System** ~~during rate of change of Transmission System Frequency of values up to and including 0.5 Hz per second~~ for a **Rate of Change of Frequency** up to and including 1 Hz per second as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **ROCOF** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause PPM1.4.1 supercedes this clause (PPM1.5.1(d)(i)); For the avoidance of doubt, this requirement relates to the capabilities of **Controllable PPMs** only, and does not impose the need for **Rate of Change of**

Frequency protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays.

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- (ii) remain connected to the **Transmission System** for a **Rate of Change of Frequency** up to and including 1 Hz per second as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **ROCOF** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause PPM1.4.2(f) supersedes this clause. For the avoidance of doubt, this requirement relates to the capabilities of **Controllable PPMs** only, and does not impose the need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays.

CC.7.5 INTERCONNECTOR

CC.7.5.1.1 Each Interconnector, shall have the following minimum capabilities, for the avoidance of doubt, additional performance capabilities are required from OC.4 System Services:

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- (a) operate continuously at **MW Output** at **Transmission System Frequencies** in the range 49.5Hz to 50.5Hz;
- (b) operate and remain connected to the **Transmission System** at **Transmission System Frequencies** within the range 47.5Hz to 52.0Hz;
- (c) remain connected to the **Transmission System** at **Transmission System Frequencies** within the range 47.0Hz to 47.5Hz for a duration of 30 seconds required each time the Frequency is below 47.5Hz;
- (d) remain connected to the **Transmission System** during rate of change of **Transmission System Frequency** of values up to and including 1 Hz per

second-as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **ROCOF** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause CC7.5.1.1(g) supercedes this clause (CC7.5.1.1(d)); For the avoidance of doubt, this requirement relates to the capabilities of **Interconnectors** only, and does not impose the need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays;

- (e) remain connected to the **Transmission System** at **MW Output** at **Transmission System Voltages** within the ranges specified in CC.8.3.2 for step changes in **Transmission System Voltage** of up to 10%;

Green-line Version of Impacted Grid Code Section(s) - show proposed final text:

Definition: Rate of Change of Frequency (RoCoF)

The rate of increase or decrease of **Frequency** as measured at the **User's Connection Point** over the time period as set out in CC.7.3.1.1(d), CC.7.5.1.1 (d), CC.7.5.1.1(u) and PPM1.5.1(d).

CC.7.3.1.1 Each **Generation Unit**, shall, as a minimum, have the following capabilities:



- (a) operate continuously at normal rated output at **Transmission System Frequencies** in the range 49.5Hz to 50.5Hz;
- (b) remain synchronised to the **Transmission System** at **Transmission System Frequencies** within the range 47.5Hz to 52.0Hz for a duration of 60 minutes;
- (c) remain synchronised to the **Transmission System** at **Transmission System Frequencies** within the range 47.0Hz to 47.5Hz for a duration of 20 seconds required each time the **Frequency** is below 47.5Hz;



(d)

- i. remain synchronised to the **Transmission System** for a **Rate of Change of Frequency** up to and including 1 Hz per second as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **Rate of Change of Frequency** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause CC.7.3.1.1(h) supercedes this clause (CC.7.3.1.1(d)(i)); For the avoidance of doubt, this requirement relates to the capabilities of **Generating Units** only and does not impose the need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays;



- ii. remain synchronised to the **Transmission System** for a **Rate of Change of Frequency** up to and including 1 Hz per second as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **Rate of Change of Frequency** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause CC.7.3.1.1(y) supercedes this clause (CC.7.3.1.1(d)). For the avoidance of doubt, this requirement relates to the capabilities of **Generating Units** only and does not impose the need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays;

PPM1.5 Transmission System Frequency Ranges

PPM1.5.1 Controllable PPMs shall have the capability to:

- (a) operate continuously at normal rated output at **Transmission System Frequencies** in the range 49.5 Hz to 50.5 Hz;
- (b) remain connected to the **Transmission System** at **Transmission System Frequencies** within the range 47.5 Hz to 52.0 Hz for a duration of 60 minutes;
- (c) remain connected to the **Transmission System** at **Transmission System Frequencies**

within the range 47.0 Hz to 47.5 Hz for a duration of 20 seconds required each time the **Transmission System Frequency** is below 47.5 Hz;

(d)



- (i) remain connected to the **Transmission System** for a **Rate of Change of Frequency** up to and including 1 Hz per second as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **ROCOF** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause PPM1.4.1 supercedes this clause (PPM1.5.1(d)(i)); For the avoidance of doubt, this requirement relates to the capabilities of **Controllable PPMs** only, and does not impose the need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays.



- (ii) remain connected to the **Transmission System** for a **Rate of Change of Frequency** up to and including 1 Hz per second as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **ROCOF** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause PPM1.4.2(f) supersedes this clause. For the avoidance of doubt, this requirement relates to the capabilities of **Controllable PPMs** only, and does not impose the need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays.

CC.7.5 Interconnector

CC.7.5.1.1 Each Interconnector, shall have the following minimum capabilities, for the avoidance of doubt, additional performance capabilities are required from OC.4 System Services:



- (a) operate continuously at **MW Output at Transmission System Frequencies** in the range 49.5Hz to 50.5Hz;
- (b) operate and remain connected to the **Transmission System at Transmission System Frequencies** within the range 47.5Hz to 52.0Hz;
- (c) remain connected to the **Transmission System at Transmission System Frequencies** within the range 47.0Hz to 47.5Hz for a duration of 30 seconds required each time the Frequency is below 47.5Hz;
- (d) remain connected to the **Transmission System** during rate of change of **Transmission System Frequency** of values up to and including 1 Hz per second—as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **ROCOF** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause CC7.5.1.1(g) supercedes this clause (CC7.5.1.1(d)); For the avoidance of doubt, this requirement relates to the capabilities of **Interconnectors** only, and does not impose the need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays;
- (e) remain connected to the **Transmission System at MW Output at Transmission System Voltages** within the ranges specified in CC.8.3.2 for step changes in **Transmission System Voltage** of up to 10%;

Green-line Version of Impacted Grid Code Section(s) - show proposed final text:

Definition: Rate of Change of Frequency (RoCoF)

The rate of increase or decrease of **Frequency** as measured at the **User's Connection Point** over the time period as set out in CC.7.3.1.1(d), CC.7.5.1.1 (d), CC.7.5.1.1(u) and PPM1.5.1(d).

CC.7.3.1.1 Each **Generation Unit**, shall, as a minimum, have the following capabilities:



- (e) operate continuously at normal rated output at **Transmission System Frequencies** in the range 49.5Hz to 50.5Hz;
- (f) remain synchronised to the **Transmission System** at **Transmission System Frequencies** within the range 47.5Hz to 52.0Hz for a duration of 60 minutes;
- (g) remain synchronised to the **Transmission System** at **Transmission System Frequencies** within the range 47.0Hz to 47.5Hz for a duration of 20 seconds required each time the **Frequency** is below 47.5Hz;



- (h)
 - i. remain synchronised to the **Transmission System** for a **Rate of Change of Frequency** up to and including 1 Hz per second as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **Rate of Change of Frequency** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause CC.7.3.1.1(h) supersedes this clause (CC.7.3.1.1(d)(i)); For the avoidance of doubt, this requirement relates to the capabilities of **Generating Units** only and does not impose the need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays;



- ii. remain synchronised to the **Transmission System** for a **Rate of Change of Frequency** up to and including 1 Hz per second as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **Rate of Change of Frequency** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause CC.7.3.1.1(y) supersedes this clause (CC.7.3.1.1(d)). For the avoidance of doubt, this requirement relates to the capabilities of **Generating Units** only and does not impose the need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays;

PPM1.5 Transmission System Frequency Ranges

PPM1.5.1 Controllable PPMs shall have the capability to:

- (e) operate continuously at normal rated output at **Transmission System Frequencies** in the range 49.5 Hz to 50.5 Hz;
- (f) remain connected to the **Transmission System** at **Transmission System Frequencies** within the range 47.5 Hz to 52.0 Hz for a duration of 60 minutes;
- (g) remain connected to the **Transmission System** at **Transmission System Frequencies** within the range 47.0 Hz to 47.5 Hz for a duration of 20 seconds required each time the **Transmission System Frequency** is below 47.5 Hz;
- (h)



- (iii) remain connected to the **Transmission System** for a **Rate of Change of Frequency** up to and including 1 Hz per second as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **ROCOF** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause PPM1.4.1 supercedes this clause (PPM1.5.1(d)(i)); For the avoidance of doubt, this requirement relates to the capabilities of **Controllable PPMs** only, and does not impose the need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays.



- (iv) remain connected to the **Transmission System** for a **Rate of Change of Frequency** up to and including 1 Hz per second as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **ROCOF** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause PPM1.4.2(f) supersedes this clause. For the avoidance of doubt, this requirement relates to the capabilities of **Controllable PPMs** only, and does not impose the need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays.

CC.7.5 Interconnector

CC.7.5.1.1 Each Interconnector, shall have the following minimum capabilities, for the avoidance of doubt, additional performance capabilities are required from OC.4 System Services:



- (f) operate continuously at **MW Output** at **Transmission System Frequencies** in the range 49.5Hz to 50.5Hz;
- (g) operate and remain connected to the **Transmission System** at **Transmission System Frequencies** within the range 47.5Hz to 52.0Hz;
- (h) remain connected to the **Transmission System** at **Transmission System Frequencies** within the range 47.0Hz to 47.5Hz for a duration of 30 seconds required each time the Frequency is below 47.5Hz;
- (i) remain connected to the **Transmission System** during rate of change of **Transmission System Frequency** of values up to and including 1 Hz per second-as measured over a rolling 500 milliseconds period. **Voltage** dips may cause localised **ROCOF** values in excess of 1 Hz per second for short periods, and in these cases, the **Fault-Ride Through** clause CC7.5.1.1(g) supersedes this clause (CC7.5.1.1(d)); For the avoidance of doubt, this requirement relates to the capabilities of **Interconnectors** only, and does not impose the

need for **Rate of Change of Frequency** protection nor does it impose a specific setting for anti-islanding or loss-of-mains protection relays;

- (j) remain connected to the **Transmission System** at **MW Output** at **Transmission System Voltages** within the ranges specified in CC.8.3.2 for step changes in **Transmission System Voltage** of up to 10%;