

COMMISSION REGULATION (EU) 2016/1388
of 17 August 2016
establishing a Network Code on Demand Connection
(Text with EEA relevance)

[...]

TITLE I
GENERAL PROVISIONS

Article 1

Subject matter

1. This Regulation establishes a network code which lays down the requirements for grid connection of:

- (a) transmission-connected demand facilities;
- (b) transmission-connected distribution facilities;
- (c) distribution systems, including closed distribution systems;
- (d) demand units, used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant TSOs;
- (e) [V1G electric vehicle and associated V1G electric vehicle charging point or installation, heat-pumps and power-to-gas demand units.](#)

[...]

Article 2

Definitions

For the purposes of this Regulation, the definitions in Article 2 of Directive 2012/27/EU of the European Parliament and of the Council ⁽⁴⁾, Article 2 of Regulation (EC) No 714/2009, Article 2 of Commission Regulation (EU) 2015/1222 ⁽⁵⁾, Article 2 of Commission Regulation (EU) 2016/631 ⁽⁶⁾, Article 2 of Commission Regulation (EU) No 543/2013 ⁽⁷⁾ and Article 2 of Directive 2009/72/EC shall apply.

In addition, the following definitions shall apply:

[...]

- (4) 'demand unit' means an indivisible set of installations containing equipment which can be actively controlled by a demand facility owner or by a CDSO, either individually or commonly as part of demand aggregation through a third party [or is a V1G electric vehicle and associated V1G electric vehicle charging point or installation, power-to-gas demand unit or heat-pump;](#)

[...]

(22) 'demand ~~response~~-unit document' (DRUD) means a document, issued either by the demand facility owner or the CDSO to the relevant system operator for demand units with demand response, demand units which are V1G electric vehicles and associated V1G electric vehicle charging points or installations, power-to-gas demand units or heat-pumps and connected at a voltage level above 1 000 V, which confirms the compliance of the demand unit with the technical requirements set out in this Regulation and provides the necessary data and statements, including a statement of compliance.

[...]

(*) 'power-to-gas demand unit' means a demand unit that converts electricity to gases (such as hydrogen or, with subsequent methanation, synthetic methane or other gases);

(**) 'heat pump' means a heat pump as defined in point (18) of Article 2 of Directive 2010/31/EU;

(***) 'minimum technical operating level' is the operation level of active power where the demand unit can operate without negative influence on the inherent process of its work (e.g. charging, electrolysis, ...).

Article 3

Scope of application

1. The connection requirements set out in this Regulation shall apply to:

- (a) new transmission-connected demand facilities;
- (b) new transmission-connected distribution facilities;
- (c) new distribution systems, including new closed distribution systems;
- (d) new demand units used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant TSOs;
- (e) V1G electric vehicles that do not meet the definition of electricity storage and associated V1G electric vehicle charging point or installations, heat-pumps and power-to-gas demand units, with maximum consumption capacity larger than 800W at any voltage level.

The relevant system operator shall refuse to allow the connection of a new transmission-connected demand facility, a new transmission-connected distribution facility, or a new distribution system, V1G electric vehicles and associated V1G electric vehicle charging point or installations, power-to-gas demand unit, or heat-pump, which does not comply with the requirements set out in this Regulation and which is not covered by a derogation granted by the regulatory authority, or other authority where applicable in a Member State pursuant to Article 50. The relevant system operator shall communicate such refusal, by means of a reasoned statement in writing, to the demand facility owner, DSO, or CDSO and, unless specified otherwise by the regulatory authority, to the regulatory authority.

Based on compliance monitoring in accordance with Title III, the relevant TSO shall refuse demand response services subject to Articles 27 to 30 from new demand units not fulfilling the requirements set out in this Regulation.

[...]

Article 25

Final operational notification

[...]

3. For the purposes of the data and study review, the transmission-connected demand facility owner or transmission-connected distribution system operator must submit the following to the relevant TSO:

- (a) an itemised statement of compliance; ~~and~~
- (b) an update of the applicable technical data, simulation models and studies as referred to in points (b), (d) and (e) of Article 24(3), including the use of actual measured values during testing; ~~and~~
- c) an update of the applicable technical data, simulation models and studies proving compliance of electric vehicles and associated V1G electric vehicle charging point or installations, power-to-gas demand unit and heat-pumps.

[...]

TITLE XXX

CONNECTION OF V1G ELECTRIC VEHICLES AND ASSOCIATED V1G ELECTRIC VEHICLE CHARGING POINT OR INSTALLATION, POWER-TO-GAS DEMAND UNITS AND HEAT-PUMPS

CHAPTER 1

General requirements

Article XX

Specific provisions for V1G electric vehicles and associated V1G electric vehicle charging point or installation, power-to-gas demand units and heat-pumps

1. With regards to frequency and voltage ranges, a V1G electric vehicles and associated V1G electric vehicle charging point or installations, power-to-gas demand units and heat-pumps shall comply with the following requirements:

- (a) be capable of operating across the frequency ranges specified in Article 12(1) and the extended range specified in Article 12(2);
- (b) be capable of operating across the voltage ranges specified in Article 13 if connected at a voltage level at or above 110 kV;

(c) be capable of operating across the normal operational voltage range of the system at the connection point, specified by the relevant system operator, if connected at a voltage level below 110 kV.

2. With regard to the rate of change of frequency withstand capability,

(a) a V1G electric vehicle and associated V1G electric vehicle charging point or installation, power-to-gas demand units and heat-pumps shall be capable of staying connected to the network and operate at rates-of-change-of-frequency up to the following values:

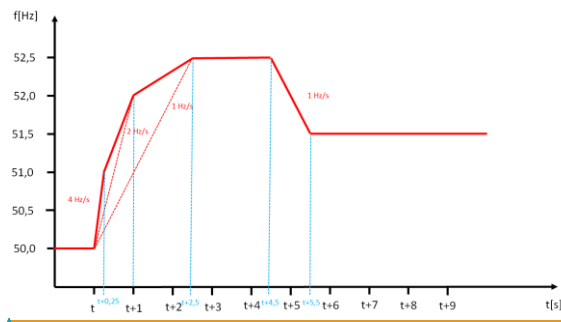
- (i) ± 4.0 Hz/s over a period of 0,25 s
- (ii) ± 2.0 Hz/s over a period of 0,5 s
- (iii) $\pm 1,5$ Hz/s over a period of 1 s
- (iv) $\pm 1,25$ Hz/s over a period of 2 s

(b) Without prejudice to point 2 (a) from this Article, V1G electric vehicle and associated V1G electric vehicle charging point or installation, power-to-gas demand unit and heat-pump shall be capable of staying connected to the network and operate at the sequence of rates of change of frequencies which are defined considering the overfrequency against time profiles given in figure XX.a and the underfrequency against time profiles given in figure XX.b.

(c) With regard to the rate of change of frequency withstand capability defined in points (a) and (b) of this article, a V1G electric vehicle and associated V1G electric vehicle charging point or installation, power-to-gas demand unit and heat-pump shall be capable of staying connected to the network, unless disconnection was triggered by the low frequency demand disconnection of the demand facility.

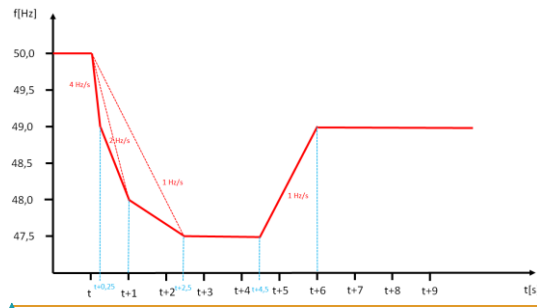
Commented [A1]: Subject to separate ACER workshop in May

Figure XX.a



Field Code Changed

Figure XX.b



(d) The V1G electric vehicle and associated V1G electric vehicle charging point or installation, power-to-gas demand unit and heat-pump shall be capable of remaining connected to the network and continuing to operate stably when the system frequency remains within the frequency range specified in Table 2. The demand unit protection schemes shall not jeopardise frequency-ride-through performance specified in point 2.b from this Article;

3. With regard to LFSM-UC on V1G electric vehicle and associated V1G electric vehicle charging point or installation and power-to-gas demand units:

(a) The V1G electric vehicle and associated V1G electric vehicle charging point or installation and the power-to-gas demand unit shall be capable of reducing the consumption from the current active power input automatically down to the minimum technical operational level according to the indicative Figure XX at a frequency threshold and with a droop setting specified by the relevant TSO;

(b) The droop shall be 1%.

(c) The frequency threshold shall be 49,8 Hz (inclusive), except for synchronous area IE where the frequency threshold shall be 49,5 Hz (inclusive).

(d) The V1G electric vehicle and associated V1G electric vehicle charging point or installation and the power-to-gas demand unit shall stay in this specific mode as long as the frequency is below the frequency threshold. If the frequency recovers the electrical charging demand unit shall follow the same power-frequency characteristic until it is back to its prior state of active power input.

(e) If the minimum technical operating level is larger than 20% of Pref the electric charging demand unit or the power-to-gas demand unit should disconnect when reaching its minimum technical operating level;

(f) If disconnection was performed according to point (e) of this article, on return of frequency above the frequency threshold, a random time delay of up to 5 minutes shall be initiated before normal operation resumes;

(g) Requirements for frequency measurement:

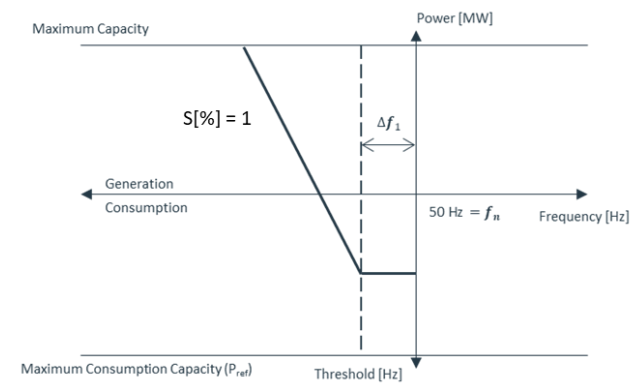
(i) Maximum measuring time window: 100 ms

(ii) Accuracy: ± 30 mHz

(h) Stable operation of the V1G electric vehicle and associated V1G electric vehicle charging point or installation and the power-to-gas demand unit during LFSM-UC operation shall be ensured;

(i) The response time for LFSM-UC shall be less or equal to 0,5 seconds. The relevant system operator has the right to request the demonstration of technical evidence of the response time.

Figure XX



5. With regard to LFSM-UC on heat-pumps:

(a) The control system of the LFSM-UC shall have no influence on the target temperature, above a frequency threshold specified in Article XX.3.c.

(b) The built in hysteresis of the heat-pump between its controllers on and off temperature range settings shall be designed to be utilised by the LFSM-UC.

(c) The heat-pumps on and off temperature range settings shall not be exceeded by the LFSM-UC when responding to frequency deviations from 50Hz.

(d) The LFSM-UC shall provide a response to deviations in system frequency across a frequency range by corresponding changes to the target temperature in proportion of its maximum temperature range. The change in target temperature shall be at the minimum when the system frequency reaches the frequency threshold specified in Article XX.3.c. The change in target temperature shall be at the widest when the system frequency reaches 49 Hz.

(e) The temperature controller of the device shall measure and update the actual system frequency measurement at least every 0,2 seconds.

(f) For system frequency below the frequency threshold around the nominal value of 50 Hz, the target temperature shall be lowered for a heating system and raised for a cooling system.

(g) On return of above the frequency threshold, a random time delay of up to 5 minutes shall be initiated before normal operation resumes.

(h) With regard to the LFSM-UC's sensitivity and accuracy of the frequency measurement and the consequent movement of the temperature target, the system shall be able to detect a change in system frequency of 0,01 Hz, in order to give overall linear

proportional system response. The system shall be capable of a rapid detection and response to changes in system frequency. An offset in the steady state measurement of frequency shall be acceptable up to 0,05 Hz.

CHAPTER 2

Operational notification procedure

Article XX+1

General provisions

1. The operational notification procedure for demand units shall be distinguished between:

- (a) demand units within a demand facility or a closed distribution system connected at a voltage level of or below 1000 V;
- (b) demand units within a demand facility or a closed distribution system connected at a voltage level above 1000 V.

2. The relevant system operator shall specify and make publicly available further details concerning the operational notification procedure.

Article XX+2

Procedures for V1G electric vehicle and associated V1G electric vehicle charging point or installation, power-to-gas demand unit and heat-pump within a demand facility or a closed distribution system connected at a voltage level of or below 1000 V

1. V1G electric vehicles and associated V1G electric vehicle charging point or installations, power-to-gas demand units and heat-pumps shall possess equipment certificates, proving compliance with this regulation.

Article XX+3

Procedures for V1G electric vehicle and associated V1G electric vehicle charging point or installation, power-to-gas demand unit and heat-pump within a demand facility or a closed distribution system connected at a voltage level above 1 000V

1. The operational notification procedure for a demand unit within a demand facility or a closed distribution system connected at a voltage level above 1000 V shall comprise a DUD. The relevant system operator, in coordination with the relevant TSO, shall specify the content required for the DUD. The content of the DUD shall require a statement of compliance which contains the information in Articles 36 to 47 for demand facilities and closed distribution systems, but the compliance requirements in Articles 36 to 47 for

demand facilities and closed distribution systems can be simplified to a single operational notification stage as well as be reduced. The demand facility owner or CDSO shall provide the information required and submit it to the relevant system operator. For any subsequent demand units, separate DUDs shall be provided.

2. Based on the DUD, the relevant system operator shall issue a FON to the demand facility owner or CDSO.