

COMMISSION REGULATION (EU) 2016/631

of 14 April 2016

establishing a network code on requirements for grid connection of generators

(Text with EEA relevance)

[...]

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 ⁽³⁾, Article 2 of Regulation (EC) No 714/2009, Article 2 of Commission Regulation (EU) 2015/1222 ⁽⁴⁾ Article 2 of Commission Regulation (EU) No 543/2013 ⁽⁵⁾ and Article 2 of Directive 2009/72/EC shall apply.

In addition, the following definitions shall apply:

[...]

(5) 'power-generating module' means either a synchronous power-generating module or, a power park module. V2G electric vehicle and associated V2G electric vehicle charging point or installation are regarded a power generating module;

[...]

(10a) charging point or installation document or 'CPID' means a document provided by the electrical charging park owner to the relevant system operator for a EV3 V2G electric vehicle charging point or installation which confirms that the charging point or installation's compliance with the technical criteria set out in this Regulation has been demonstrated and provides the necessary data and statements, including a statement of compliance;

[...]

(67) 'electricity storage module' or 'ESM' means a synchronous power-generating module or a power park module which can inject and consume active power to and from the network for electricity storage, excluding pump-storage power-generating modules. A V2G electric vehicle and associated V2G electric vehicle charging point or installation with a bidirectional functionality is regarded as an electricity storage module;

(68) 'maximum consumption capacity' means the maximum continuous active power which an electricity storage module or demand unit can consume less any demand or losses associated solely with facilitating the operation of that electricity storage module or demand unit, as specified in the connection agreement, as agreed between the relevant system operator and the power-generating facility owner or demand facility owner, or determined by other appropriate means, where an agreement is not required;

(69) 'V1G electric vehicle' means the vehicle that is powered, fully or in part, with electricity and can only withdraw electricity from the grid;

(70) 'V2G electric vehicle' means the vehicle that is powered, fully or in part, with electricity and is equipped with technology enabling the vehicle to provide electricity to the grid.

(71) 'V1G electric vehicle charging point or installation' means the infrastructure necessary to safely conduct electrical energy from the electricity supply grid to the electric vehicle with demand-only behaviour. Electrical wirings are not deemed part of an electric vehicle charging point or installation.

(72) 'V2G electric vehicle charging point or installation' means the infrastructure necessary to conduct electrical energy safely from the electricity supply grid to the electric vehicle and from the electric vehicle to the electricity supply grid with both generation and demand behaviour. Electrical wirings are not deemed part of an electric vehicle charging point or installation.

(73) 'V1G electrical charging park' means the installation that has a single connection point to the relevant network and where three or more V1G electric vehicles can be simultaneously connected.

(74) 'V2G electrical charging park' means the installation that has a single connection point to the relevant network and where one or more V2G electric vehicles can be simultaneously connected.

(75) 'Electrical charging park owner' means a natural or legal entity owning a V1G or V2G electrical charging park.

Article 3

Scope of application

1. The connection requirements set out in this Regulation shall apply to new power-generating modules, new V2G electric vehicles and associated V2G electric vehicle charging points or installations which are considered significant in accordance with Article 5, unless otherwise provided.

[...]

Article 5

Determination of significance

[...]

2. A power-generating modules, excluding V2G electric vehicles and associated V2G electric vehicle charging points or installations below 1 MW maximum capacity, within the following categories shall be considered as significant:

[...]

5. V2G electric vehicles and associated V2G electric vehicle charging points or installations, within the following categories shall be considered as significant:

(a) maximum capacity larger than or equal to 0,8 kW and less than 2,4 kW (type EV1):

(b) maximum capacity larger than or equal to 2,4 kW and less than or equal to 42 kW (type EV2):

(c) maximum capacity larger than 42 kW and less than or equal to 1 MW inclusive (type EV3).

Requirements applicable to types EV1 and EV2 V2G electric vehicles and associated V2G electric vehicle charging points or installations are set out exhaustively in Article 13a and follow compliance provisions of Article 30a only, whereas requirements applicable to type EV3 V2G electric vehicles and associated V2G electric vehicle charging points or installations are set out exhaustively in Article 14a and follow compliance provisions of Article 30b only.

[...]

Article 6

Application to power-generating modules, pump-storage power-generating modules, V2G electrical charging parks, combined heat and power facilities, and industrial sites

[...]

6. Electricity storage module and V2G electric vehicles and associated V2G electric vehicle charging points or installations shall be capable of satisfying the requirements of this Regulation irrespective of whether the electricity storage module or V2G electric vehicle charging points or installations injects and consumes active power to and from the network.

TITLE II REQUIREMENTS

CHAPTER 1 General requirements

[...]

Article 13a

General requirements for type EV1 and EV2 V2G electric vehicles and associated V2G electric vehicle charging points or installations

1. Type EV1 and EV2 V2G electric vehicles and associated V2G electric vehicle charging points or installations shall fulfil the following requirements relating to frequency stability:

(a) With regard to frequency ranges, type EV1 and EV2 V2G electric vehicles and V2G electric vehicle charging points or installations shall be capable of remaining connected

to the network and operate within the frequency ranges and time periods specified in Table XY:

(b) With regard to the rate-of-change-of-frequency withstand capability:

(i) A type EV1 and EV2 V2G electric vehicles and associated V2G electric vehicle charging points or installations shall be capable of staying connected to the network and operate at rates-of-change-of-frequency up to the following values:

- $\pm 4,0$ Hz/s over a period of 0,25 s
- $\pm 2,0$ Hz/s over a period of 0,5 s
- $\pm 1,5$ Hz/s over a period of 1 s
- $\pm 1,25$ Hz/s over a period of 2 s

(ii) Without prejudice to Article 13a(1)(a), type EV1 and EV2 V2G electric vehicles and associated V2G electric vehicle charging point or installations 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;

(iii) If the rate-of-change-of-frequency is used for loss of mains protection, the rate-of-change-of-frequency threshold shall be set at higher values than the ones defined in point;

(c) The protection schemes shall not jeopardise frequency-ride-through performance specified in Article 13a(1)(b).

Table XY

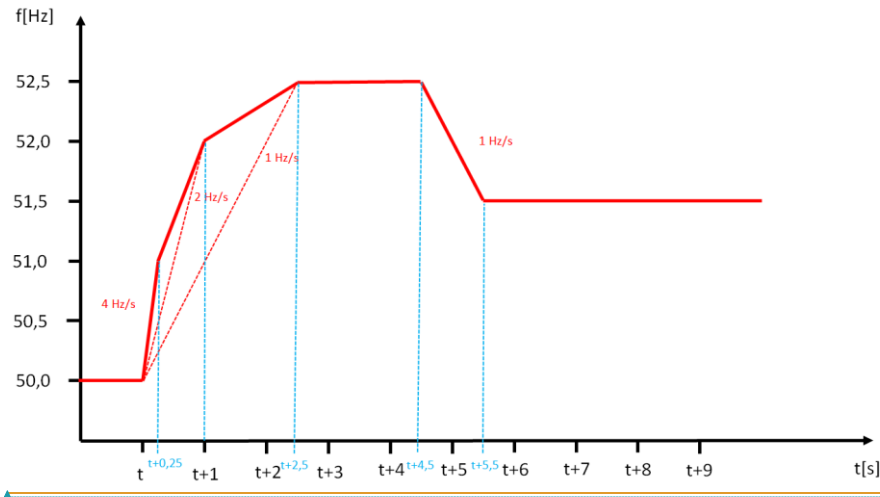
Minimum time periods for which a type EV1 and EV2 V2G electric vehicle and an associated V2G electric vehicle charging point or installation has to be capable of operating on different frequencies, deviating from a nominal value, without disconnecting from the network.

Frequency range	Time period for operation
47,5 Hz-48,5 Hz	30 minutes
48,5 Hz-49,0 Hz	30 minutes
49,0 Hz-51,0 Hz	Unlimited
51,0 Hz-51,5 Hz	30 minutes
51,5 Hz-52,5 Hz	10 seconds

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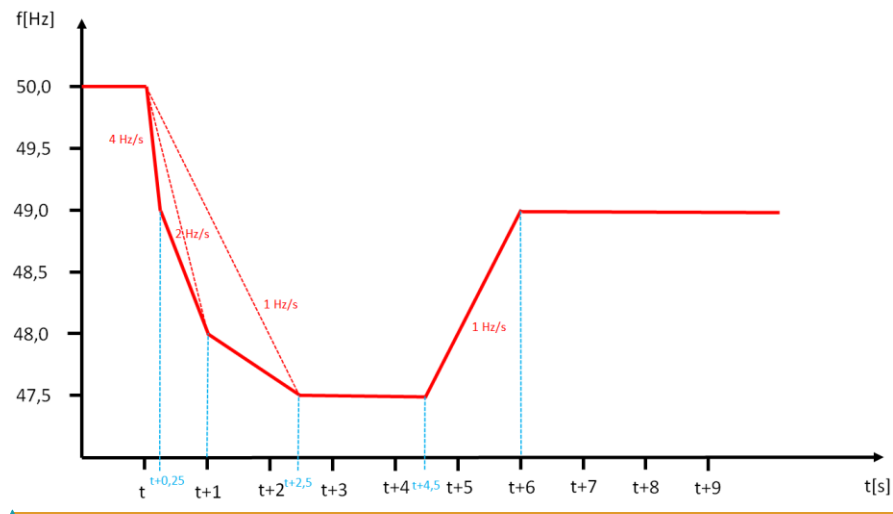
Commented [A2]: Frequency range and time period are not final. Subject to the discussion with the system operators.

Figure XX.a



Field Code Changed

Figure XX.b



Field Code Changed

2. A V2G electric vehicle charging point or installation shall be equipped with a cyber-protected data exchange interface in order to modulate, without undue delay, active power output and input following an instruction being received at the input port. The relevant system operator shall have the right to specify requirements for equipment to make this facility operable remotely.

3. A type EV1 and EV2 V2G electric vehicles and associated V2G electric vehicle charging point or installation may autonomously connect to the network under the following conditions:

-(a) Frequency range $49.8 \text{ Hz} \leq f \leq 50.2 \text{ Hz}$;

(b) Minimum observation time: 5 s.

4. A type EV1 and EV2 V2G electric vehicles and associated V2G electric vehicle charging point or installation may autonomously connect to the network after tripping due to a system disturbance under the following conditions:

(a) Frequency range $49.8 \text{ Hz} \leq f \leq 50.2 \text{ Hz}$;

(b) Minimum observation time: 60 s.

5. With regard to the limited frequency sensitive mode – underfrequency (LFSM-U-EV):

(a) A type EV1 and EV2 V2G electric vehicle and associated V2G electric vehicle charging point or installation shall be capable of activating the provision of active power frequency response from the current active power input/output automatically up to the maximum capacity according to the indicative Figure YY at a frequency threshold and with the droop setting;

(b) The droop setting shall be 1%;

(c) The frequency threshold Δf_1 shall be 49,8 Hz inclusive, except for synchronous area IE where the frequency threshold shall be 49,5 Hz inclusive;

(d) A type EV1 and EV2 V2G electric vehicles and associated V2G electric vehicle charging point or installations shall stay and operate stably in this specific mode as long as the frequency is below the frequency threshold and according to its content of energy. If the frequency recovers, the V2G electric vehicle and associated V2G electric vehicle charging point or installation shall follow the same power-frequency characteristic until it is back to its prior state of active power input/output;

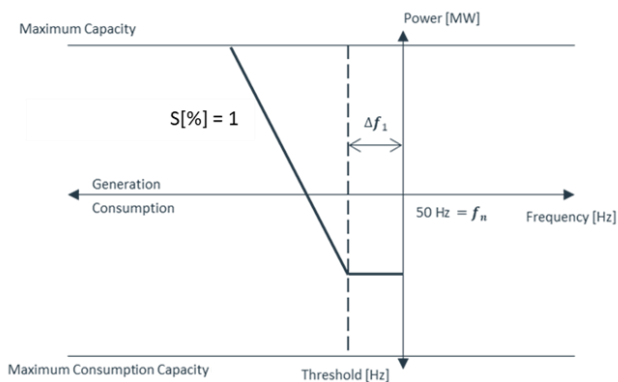
(e) The initial delay time shall not be intentionally delayed;

(f) The response time shall be less or equal to 0,5 s for an active power setpoint change of 1 pu of capacity excluding the time for switching from consumption to generation or vice versa;

(g) Switching from consumption to generation and vice versa should be as fast as technically feasible.

Figure YY

Active power frequency response capability of type EV1 and EV2 V2G electric vehicles and associated V2G electric vehicle charging points or installations in LFSM-U-EV



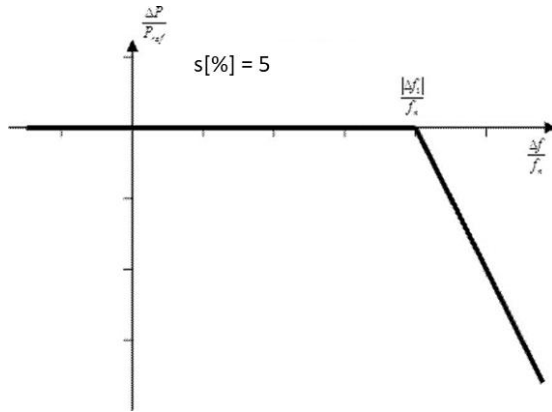
P_{ref} is the actual active power at the moment the LFSM-U threshold is reached.

6. With regard to limited frequency sensitive mode – overfrequency (LFSM-O-EV):

- (a) A type EV1 and EV2 V2G electric vehicle and associated V2G electric vehicle charging point or installation which is absorbing active power during an overfrequency event shall increase the level of active power absorbed according to the LFSM-O characteristic, if technically feasible. The type EV1 and EV2 V2G electric vehicle and associated V2G electric vehicle charging point or installation shall absorb power up to filling the maximum energy that it is able to store, then it may cease consumption.
- (b) Type EV1 and EV2 V2G electric vehicles and associated V2G electric vehicle charging points or installations shall be capable of activating the provision of active power frequency response according to Figure 1X at the frequency threshold Δf_1 equal to 50,2 Hz (inclusive), except for synchronous area IE where Δf_1 shall be 50,5 Hz (inclusive):
- (c) The droop setting shall be 5-%;
- (d) Any unintentional delay shall be as short as possible;
- (e) The type EV1 and EV2 V2G electric vehicle and associated V2G electric vehicle charging point or installation shall be capable of operating stably during LFSM-O operation. When LFSM-O is active, the LFSM-O setpoint will prevail over any other active power setpoints which would result in an increase of power above the LFSM-O setpoint;
- (f) The response time T_{resp} (Figure XX) for active power decrease in case of increasing frequency, shall be as fast as technically feasible and less or equal to 2 seconds for an active power setpoint change of 50% maximum power.

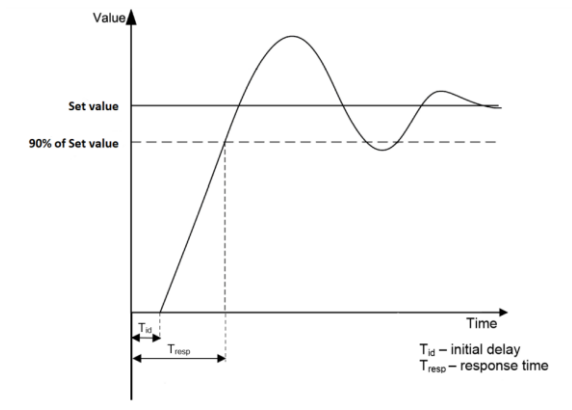
Figure 1X

Active power frequency response capability of type EV1 and EV2 V2G electric vehicles and associated V2G electric vehicle charging points or installations in LFSM-O-EV



P_{ref} is the actual active power at the moment the LFSM-O threshold is reached

Figure XX



7. A type EV1 and EV2 V2G electric vehicle and associated V2G electric vehicle charging point or installation shall be capable of maintaining constant output at its target active power value regardless of changes in frequency, except where output follows the changes specified in the context of paragraphs 2 and 4 of this Article.

8. The admissible active power reduction from maximum output with falling frequency below 49 Hz, is at a reduction rate of 2% of the maximum capacity at 50 Hz per 1 Hz frequency drop.

9. With regard to voltage stability, a type EV1 and EV2 V2G electric vehicles and associated V2G electric vehicle charging point or installation shall be capable of staying connected to the network and operate continuously within the range of 0,85 pu - 1,1 pu at the connection point. Beyond these values the under voltage ride through immunity limits as specified in paragraph 10 of this Article apply.

10. A type EV1 and EV2 V2G electric vehicle and associated V2G electric vehicle charging point or installation, when operating above the minimum stable operating level, shall be capable of staying connected to the network and continuing to operate stably after the power system has been disturbed by faults in the transmission network according to a voltage-against-time-profile in line with Figure 3 at the connection point and with the set points in Tables X.1.1 and X.1.2.

Table x.1.1

Voltage parameters for Figure 3 for fault-ride-through capability of type EV1 and EV2 V2G electric vehicle and associated V2G electric vehicle charging point or installation

Voltage parameters (pu)	
U_{ret} :	0.15
U_{clear} :	0.15
U_{rec1} :	0.15
U_{rec2} :	0.85

Table X.1.2

Time parameters for Figure 3 for fault-ride-through capability of type EV1 and EV2 V2G electric vehicle and associated V2G electric vehicle charging point or installation

Time parameters (seconds)	
t_{clear} :	0.15
t_{rec1} :	0.15
t_{rec2} :	0.15
t_{rec3} :	3.0

11. The voltage-against-time-profile expresses a lower limit of the profile of the phase-to-phase voltages on the network voltage level during a symmetrical fault, as a function of time before, during and after the fault. The pre-fault and post-fault conditions to be considered for fault-ride-through capability are set as follows XYZ.

12. When the network voltage resumes, after the fault has been cleared, to a value within the voltage range of 0.85 pu – 1.1 pu, the type EV1 and EV2 V2G electric vehicle and associated V2G electric vehicle charging point or installation shall recover its active

Commented [A3]: System operators to provide these values similar to the generic values for type B PGMs derived from typical cases.

power output level to its pre-fault value. The recovery time shall not exceed a maximum of 1s.

[...]

Article 14a

Requirements for type EV3 electric vehicles and associated V2G electric vehicle charging points or installations and V2G electrical charging parks

1. Type EV3 electric vehicles and associated V2G electric vehicle charging points or installations shall fulfil the requirements set out in Article 13a, except for Article 13a(9) and 13a(10).

2. A type EV3 electric vehicles and associated V2G electric vehicle charging point or installation shall fulfil the following requirements relating to voltage stability:

a) With regard to voltage stability, a type EV3 electric vehicles and associated V2G electric vehicle charging points or installation shall be capable of staying connected to the network and operate continuously within the range of 0,9 pu - 1,1 pu at the connection point should that be above 400V and below 110 kV. Beyond these values the under and over voltage ride through immunity limits as specified in Article 14(3)(a) and (c) apply:

b) With regard to voltage ranges of 110 kV and above:

(i) without prejudice to paragraph (1)(c) of this Article, Article 14(3)(a), Article 14(3)(c) and Article 16(3)(a) if applicable, a type EV3 electric vehicles and associated V2G electric vehicle charging point or installation shall be capable of staying connected to the network and operating within the ranges of the network voltage at the connection point, expressed by the voltage at the connection point related to the reference 1 pu voltage, and for the time periods specified in Tables XX.1 and XX.2 or, for rated voltages not included in the tables and above voltage level 110 kV as specified by the relevant system operator in coordination with the relevant TSO;

(ii) the relevant TSO may specify shorter periods of time during which type EV3 electric vehicles and associated V2G electric vehicle charging points or installations shall be capable of remaining connected to the network in the event of simultaneous overvoltage and underfrequency or simultaneous undervoltage and overfrequency;

(iii) notwithstanding the provisions of paragraph (i), the relevant TSO in Spain may require type EV3 electric vehicles and associated V2G electric vehicle charging points or installations to be capable of remaining connected to the network in the voltage range between 1,05 pu and 1,0875 pu for an unlimited period;

(iv) for the 400 kV grid voltage level (or alternatively commonly referred to as 380 kV level), the reference 1 pu value is 400 kV; for other grid voltage levels, the reference 1 pu voltage may differ for each system operator in the same synchronous area;

(v) notwithstanding the provisions of paragraph (i), the relevant TSOs in the Baltic synchronous area may require type EV3 electric vehicles and associated V2G electric vehicle charging points or installations to remain connected to the 400 kV network in the voltage range limits and for the time periods that apply in the Continental Europe synchronous area;

(vi) the relevant system operator, in coordination with the relevant TSO, and the electrical charging park owner may agree on wider voltage ranges or longer minimum time periods for operation to ensure the best use of the technical capabilities of type EV3 electric vehicles and associated V2G electric vehicle charging points or installations, if it is required to preserve or to restore system security.

The electrical charging park owner shall not unreasonably withhold consent to apply wider voltage ranges or longer minimum times for operation, taking account of their economic and technical feasibility;

3. Type EV3 electric vehicles and associated V2G electric vehicle charging points or installations shall fulfil the following requirements in relation to robustness:

(a)with regard to fault-ride-through capability:

(i)each TSO shall specify a voltage-against-time-profile in line with Figure 3 at the connection point for fault conditions, which describes the conditions in which a type EV3 electric vehicle and associated V2G electric vehicle charging point or installation, when operating above the minimum stable operating level, is capable of staying connected to the network and continuing to operate stably after the power system has been disturbed by secured faults on the transmission system;

(ii)the voltage-against-time-profile shall express a lower limit of the actual course of the phase-to-phase voltages on the network voltage level at the connection point during a symmetrical fault, as a function of time before, during and after the fault;

(iii)the lower limit referred to in point (ii) shall be specified by the relevant TSO using the parameters set out in Figure 3, and within the ranges set out in Tables 3.1.1, 3.1.2, 3.2.1 and 3.2.2;

(iv)each TSO shall specify and make publicly available the pre-fault and post-fault conditions for the fault-ride-through capability in terms of:

—the calculation of the pre-fault minimum short circuit capacity at the connection point,

—pre-fault active and reactive power operating point of the type EV3 electric vehicles and associated V2G electric vehicle charging points or installations at the connection point and voltage at the connection point, and

—calculation of the post-fault minimum short circuit capacity at the connection point;

(v)at the request of an electrical charging park owner, the relevant system operator shall provide the pre-fault and post-fault conditions to be considered for fault-ride-through capability as an outcome of the calculations at the connection point as specified in point (iv) regarding:

—pre-fault minimum short circuit capacity at each connection point expressed in MVA,

—pre-fault operating point of the type EV3 electric vehicles and associated V2G electric vehicle charging points or installations expressed as active power output and reactive power output at the connection point and voltage at the connection point and

—post-fault minimum short circuit capacity at each connection point expressed in MVA.

Alternatively, the relevant system operator may provide generic values derived from typical cases:

Table 3.2.1

Voltage parameters for Figure 3 for fault-ride-through capability of type EV3 electric vehicles and associated V2G electric vehicle charging points or installations

Voltage parameters (pu)			
U_{pre} :	0.05-0.15		
U_{clear} :	$U_{pre}-0.15$		
U_{rec1} :	U_{clear}		
U_{rec2} :	Minimum voltage specified in paragraph (2)		

Table 3.2.2

Time parameters for Figure 3 for fault-ride-through capability of type EV3 electric vehicles and associated V2G electric vehicle charging points or installations

Time parameters (seconds)	
t_{clear} :	0.14-0.15 (or 0.14-0.25 if justified by the system protection and secure operation needs)
t_{rec1} :	t_{clear}
t_{rec2} :	t_{rec1}

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(vi) the type EV3 electric vehicle and associated V2G electric vehicle charging point or installation shall be capable of remaining connected to the network and continuing to operate stably when the actual course of the phase-to-phase voltages on the network voltage level at the connection point during a symmetrical fault, given the pre-fault and post-fault conditions in points (iv) and (v) of paragraph 3(a), remain above the lower limit specified in point (ii) of paragraph 3(a), unless the protection scheme for internal electrical faults requires the disconnection of the type EV3 electric vehicle and associated V2G electric vehicle charging point or installation from the network. The protection schemes and settings for internal electrical faults must not jeopardise fault-ride-through capabilities of a type EV3 electric vehicle and associated V2G electric vehicle charging point or installation, in line with the requirements set out in this Regulation;

(vii) without prejudice to point (vi) of paragraph 3(a), undervoltage protection (either fault-ride-through capability or minimum voltage specified at the connection point voltage) shall be set by the electrical charging park owner according to the widest possible technical capability of the type EV3 electric vehicles and associated V2G electric vehicle charging points or installations, unless the relevant system operator requires narrower settings in accordance with point (b) of paragraph 5. The settings shall be justified by the electrical charging park owner in accordance with this principle;

(b) fault-ride-through capabilities in case of asymmetrical faults shall be specified by each TSO.

4. Type EV3 electric vehicles and associated V2G electric vehicle charging points or installations shall fulfil the following requirements relating to system restoration:

(a) the relevant TSO shall specify the conditions under which a type EV3 electric vehicles and associated V2G electric vehicle charging points or installations is capable of reconnecting to the network after an incidental disconnection caused by a network disturbance; and

(b) installation of automatic reconnection systems shall be subject both to prior authorisation by the relevant system operator and to the reconnection conditions specified by the relevant TSO.

5. Type EV3 electric vehicles and associated V2G electric vehicle charging points or installations shall fulfil the following general system management requirements:

(a) with regard to control schemes and settings:

(i) the schemes and settings of the different control devices of the type EV3 electric vehicles and associated V2G electric vehicle charging points or installations that are necessary for transmission system stability and for taking emergency action shall be coordinated and agreed between the relevant TSO, the relevant system operator and the electrical charging park owner;

(ii) any changes to the schemes and settings, mentioned in point (i), of the different control devices of the type EV3 electric vehicles and associated V2G electric vehicle

charging points or installations shall be coordinated and agreed between the relevant TSO, the relevant system operator and the electrical charging park owner, in particular if they apply in the circumstances referred to in point (i) of paragraph 5(a):

(b)with regard to electrical protection schemes and settings:

(i)the relevant system operator shall specify the schemes and settings necessary to protect the network, taking into account the characteristics of the type EV3 electric vehicles and associated V2G electric vehicle charging points or installations. The protection schemes needed for the type EV3 electric vehicles and associated V2G electric vehicle charging points or installations and the network as well as the settings relevant to the type EV3 electric vehicles and associated V2G electric vehicle charging points or installations shall be coordinated and agreed between the relevant system operator and the electrical charging park owner. The protection schemes and settings for internal electrical faults must not jeopardise the technical capabilities of a type EV3 electric vehicles and associated V2G electric vehicle charging points or installations, in line with the requirements set out in this Regulation;

(ii)electrical protection of the type EV3 electric vehicles and associated V2G electric vehicle charging points or installations shall take precedence over operational controls, taking into account the security of the system and the health and safety of staff and of the public, as well as mitigating any damage to the EV3 electric vehicles and associated V2G electric vehicle charging points or installations;

(iii) protection schemes may cover the following aspects:

- external and internal short circuit,
- asymmetric load (negative phase sequence),
- over-/underexcitation,
- over-/undervoltage at the connection point,
- over-/undervoltage at the alternator terminals,
- inter-area oscillations,
- inrush current,
- asynchronous operation,
- line protection,
- transformer protection,
- back-up against protection and switchgear malfunction,
- overfluxing (U/f),
- rate of change of frequency, and
- neutral voltage displacement,

(iv)changes to the protection schemes needed for the type EV3 electric vehicles and associated V2G electric vehicle charging points or installations and the network and to the settings relevant to the type EV3 electric vehicles and associated V2G

electric vehicle charging points or installations shall be agreed between the system operator and the electrical charging park owner, and agreement shall be reached before any changes are made;

(c) the electrical charging park owner shall organise its protection and control devices in accordance with the following priority ranking (from highest to lowest):

- (i) network and EV3 electric vehicles and associated V2G electric vehicle charging points or installations protection;
- (ii) synthetic inertia, if applicable;
- (iii) frequency control (active power adjustment);
- (iv) power restriction; and
- (v) power gradient constraint;

(d) with regard to information exchange:

(i) V2G electrical charging parks shall be capable of exchanging information with the relevant system operator or the relevant TSO in real time, as specified by the relevant system operator or the relevant TSO. The content of real-time data shall be consistent with the data exchange requirements laid down in Title 2 of Regulation (EU) 2017/1485;

(ii) V2G electrical charging parks shall be capable of exchanging real time data for metering with the relevant system operator or the relevant TSO;

(iii) if required by the relevant system operator the V2G electrical charging park shall be able capable to provide fault recording for the following parameters:

- voltage,
- active power,
- reactive power, and
- frequency;

(iv) the settings of the fault recording equipment, including triggering criteria and the sampling rates shall be agreed between the electrical charging park owner and the relevant system operator in coordination with the relevant TSO;

(v) the facilities for quality of supply and dynamic system behaviour monitoring shall include arrangements for the electrical charging park owner, and the relevant system operator and the relevant TSO to access the information. The communications protocols for recorded data shall be agreed between the electrical charging park owner, the relevant system operator and the relevant TSO.

6. Type EV3 electric vehicles and associated V2G electric vehicle charging points or installations shall fulfil the following additional requirements in relation to voltage stability:

(a) with regard to reactive power capability, the relevant system operator shall have the right to specify the capability of a type EV3 electric vehicles and associated V2G electric vehicle charging points or installations to supply and absorb reactive power;

(b) the relevant system operator in coordination with the relevant TSO shall have the right to specify that a type EV3 electric vehicles and associated V2G electric vehicle charging points or installations be capable of providing fast fault current at the connection point in case of symmetrical (3-phase) faults, regarding the following:

(i) the type EV3 electric vehicles and associated V2G electric vehicle charging points or installations shall be capable of activating the supply of fast fault current either by:

- ensuring the supply of the fast fault current at the connection point, or
- measuring voltage deviations at the terminals of the individual type EV3 electric vehicle and associated V2G electric vehicle charging point or installation and providing a fast fault current at their terminals;

(ii) the relevant system operator in coordination with the relevant TSO shall specify:

- how and when a voltage deviation is to be determined as well as the end of the voltage deviation,
- the characteristics of the fast fault current, including the time domain for measuring the voltage deviation and fast fault current, for which current and voltage may be measured differently from the method specified in Article 2,
- the timing and accuracy of the fast fault current, which may include several stages during a fault and after its clearance;

(c) with regard to the supply of fast fault current in case of asymmetrical (1-phase or 2-phase) faults, the relevant system operator in coordination with the relevant TSO shall have the right to specify a requirement for asymmetrical current injection.

7. Type EV3 electric vehicles and associated V2G electric vehicle charging points or installations shall fulfil the following additional requirements in relation to robustness:

(a) the relevant TSO shall specify the post-fault active power recovery that the type EV3 electric vehicle and associated V2G electric vehicle charging point or installation is capable of providing and shall specify:

- (i) when the post-fault active power recovery begins, based on a voltage criterion;
- (ii) a maximum allowed time for active power recovery; and
- (iii) a magnitude and accuracy for active power recovery;

(b) the specifications shall be in accordance with the following principles:

- (i) interdependency between fast fault current requirements according to points (b) and (c) of paragraph 2 and active power recovery;
- (ii) dependence between active power recovery times and duration of voltage deviations;
- (iii) a specified limit of the maximum allowed time for active power recovery;
- (iv) adequacy between the level of voltage recovery and the minimum magnitude for active power recovery; and
- (v) adequate damping of active power oscillations.

8. The relevant TSO shall have the right to request grid forming capability at its connection point from type EV3 electric vehicles and associated V2G electric vehicle charging points or installations as listed in Article Y. After a transitional period of maximum 3 years after entering into force, a type EV3 electric vehicles and associated V2G electric vehicle charging points or installations shall be capable of providing grid forming capability requirements at its connection point listed in Article Y. Member states shall have the right to shorten this transitional period based on system needs and urgency.

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[...]

TITLE III OPERATIONAL NOTIFICATION PROCEDURE FOR CONNECTION

CHAPTER 1 *Connection of new power-generating modules*

[...]

Article 30a

Procedure for type EV2 associated V2G electric vehicle charging point or installation

1. The operational notification procedure for connection of each new type EV2 associated V2G electric vehicle charging point or installation shall consist of submitting an installation document. The electrical charging park owner shall ensure that the required information is filled in on an installation document obtained from the relevant system operator and is submitted to the system operator. Separate installation documents shall be provided for each type EV2 associated V2G electric vehicle charging point or installation within the electrical charging park.

The relevant system operator shall ensure that the required information can be submitted by third parties on behalf of the electrical charging park owner.

2. The relevant system operator shall specify the content of the installation document, which shall have at least the following information:

- (a) the location at which the connection is made;
- (b) the date of the connection;
- (c) the maximum capacity of the installation in kW;
- (d) reference to equipment certificates issued by an authorised certifier used for equipment that is in the site installation;
- (e) as regards equipment used, for which an equipment certificate has not been received, information shall be provided as directed by the relevant system operator; and
- (f) the contact details of the electrical charging park owner and the installer, and their signatures.

Article 30b

Procedure for type EV3 associated V2G electric vehicle charging point or installation

1. For the purpose of operational notification for connection of each new type EV3 V2G electric vehicle charging points or installations, a V2G electric vehicle charging point or installation document ('CPID') shall be provided by the electrical charging park owner to the relevant system operator and shall include a statement of compliance.

2. The format of the CPID and the information to be given therein shall be specified by the relevant system operator and use established European technical standards. The relevant system operator shall have the right to request that the electrical charging park owner includes the following in the CPID:

(a) evidence of an agreement on the protection and control settings relevant to the connection point between the relevant system operator and the electrical charging park owner;

(b) itemised statement of compliance;

(c) detailed technical data of the V2G electric vehicle charging point or installation with relevance to the grid connection as specified by the relevant system operator;

(d) equipment certificates issued by an authorised certifier in respect of type EV3 associated V2G electric vehicle charging point or installation, where these are relied upon as part of the evidence of compliance;

(e) compliance test reports demonstrating steady-state and dynamic performance as required by Chapters 2, 3 and 4 of Title IV, including use of actual measured values during testing, to the level of detail required by the relevant system operator; and

(f) studies demonstrating steady-state and dynamic performance as required by Chapters 5, 6 or 7 of Title IV, to the level of detail required by the relevant system operator.

3. The relevant system operator, on acceptance of a complete and adequate CPID, shall issue a final operational notification to the electrical charging park owner.

4. Member States may provide that the CPID shall be issued by an authorised certifier.

[...]

Commented [A5]: The relevant references both for tests and simulations are still to be drafted; these should follow the same structure as for type B PGMs