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Date: 28/11/2022 18:51:49

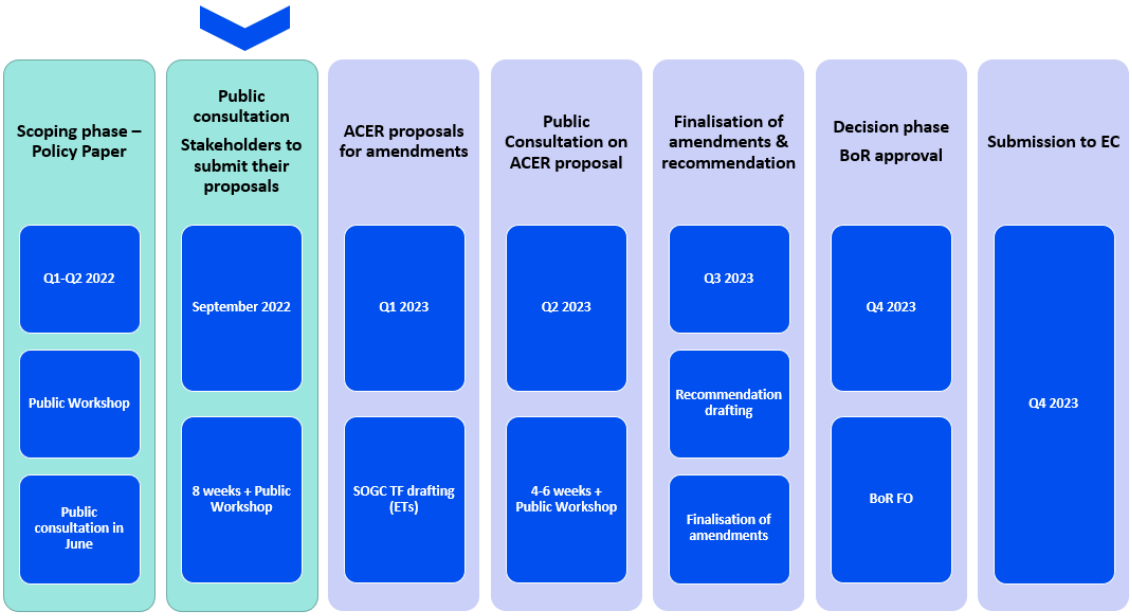
Proposals for amendments to the Requirements for Generators

Fields marked with * are mandatory.

Introduction

Important developments in the policies of decarbonisation of the European Union (EU) energy and transport sectors have taken place since the inception of the development of the first European Grid Connection Network Codes (GC NCs) in 2012.

In the framework of the Grid Connection European Stakeholder Committee (GC ESC), the European Commission proposed for ACER to initiate the process towards the amendment of the existing GC NCs in September 2022. The amendment process, as presented to the GC ESC is outlined in the Figure below:



Following the scoping phase, ACER published the Policy Paper on the revision of the network code on requirements for grid connection of generators and the network code on demand connection in September 2022. The Policy Paper aims to transparently indicate to stakeholders the key policy areas in which amendments are to be expected. Moreover, the Paper draws on the alternative policy options and provides recommendations and proposed actions for the amendment process.

Access the ACER Policy Paper on the revision of the NC RfG and NC DC

This consultation aims at gathering, from all interested stakeholders, concrete proposals for amendments to the Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a **Network Code on Requirements for Grid Connection of Generators** ('NC RfG').
For amendment proposals concerning Network Code on Demand Connection, please go to the form: **NC DC**.

Responses to this consultation should be submitted by 28 November 2022 23:59 CET.

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* Name of the stakeholder:

EUGINE

* Contact person:

Annette Jantzen

* Contact person's email address:

annette.jantzen@eugine.eu

* Country of the stakeholder's headquarters or main country of operation:

Belgium

* Type of the stakeholder:

- ○ Generator (including association)
- ○ Consumer (including association)
- ○ Transmission system operator (including association)
- ○ Distribution system operator (including association)
- ◉ Manufacturers (including association)
- ○ Academia/research institution
- ○ Regulatory authority
- ○ Other (please, elaborate)

Please, elaborate on your answer above, if necessary:

* Do you consent to the publication of the stakeholder's name?

- ◉ Yes
- ○ No

* Do you consent to the publication of provided answers?

- (●) Yes
- ( ) No (please, note that your answer, without your name and organization, may be shared with the EU institutions and national authorities, drafting team members, and other persons or entities involved in the European Grid Connection Network Codes amendment process)

Instructions

Stakeholders are invited to submit their amendment proposals to the RfG articles that they consider should be revised in a two-step process:
1. by inserting the proposed amendments in the provided Word file
2. by motivating/reasoning the proposed amendments through this online consultation form.

Both steps are mandatory for all amendment proposals.

(Where no amendment is proposed, the article text in the word file can be left unaltered and the cells in the consultation form can be left blank.)

The mandatory steps for submitting amendment proposals are detailed below. At the end of this section, you can find an example showing how to submit your proposals.

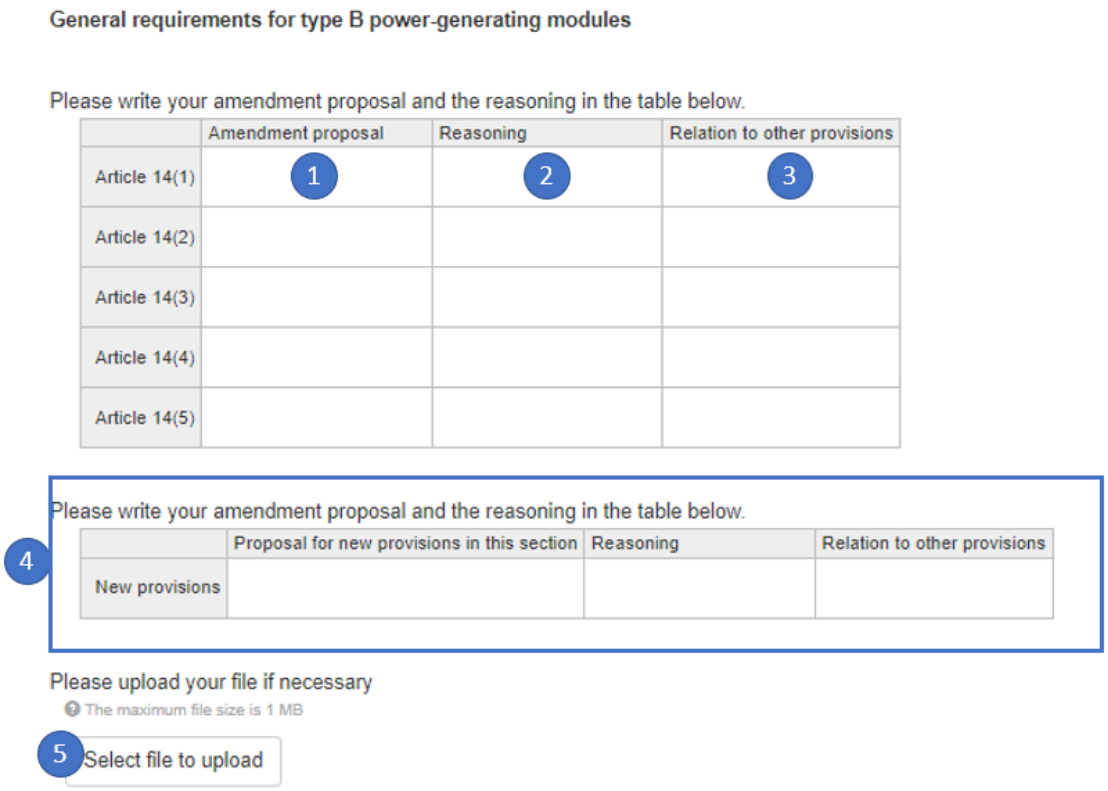
Step 1

Please include all your amendment proposals in the **Word file provided below using the Track Changes mode**. Once you edit the file and rename it with your stakeholder's name ("NC_RfG_stakeholder_name"), please upload it in the last section of this form (FILE UPLOAD)

Download the Word file (NC RfG)

Step 2

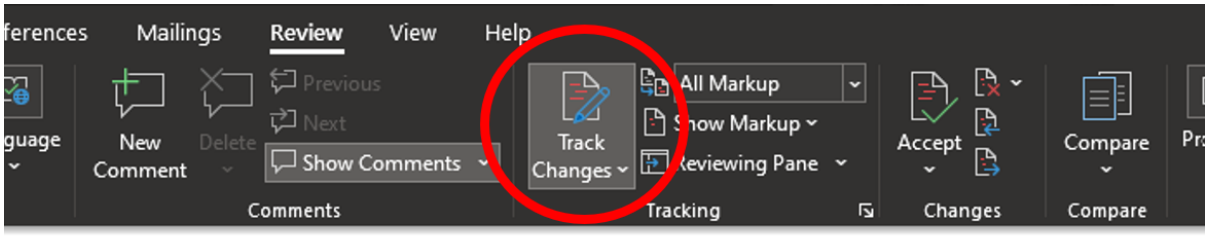
In addition, please use this form to motivate/reason your proposals, following the instructions:



1. Propose an amended wording of the relevant provision, as you provided in the Word file.
2. Provide the motivation/reasoning behind your proposal.
3. Indicate (if any) which other provisions of the NC RfG are impacted and may need to be amended following your proposal.
4. Provide (if any) your proposals for adding new provisions to the relevant section of the Regulation, as you provided in the Word file.
5. Upload figures or tables if necessary; text inputs should be provided directly in the consultation form.

Example

Stakeholder XYZ would like to propose an amendment to Article 27 of NC RfG. In their view, the meaning of the word "respectively" in this article is not clear. Following a two-step process, the stakeholder downloads the Word file from the **Instruction** section, turns on the Track Changes mode and edits the text (first step).



Article 27

System restoration requirements applicable to AC-connected offshore power park modules

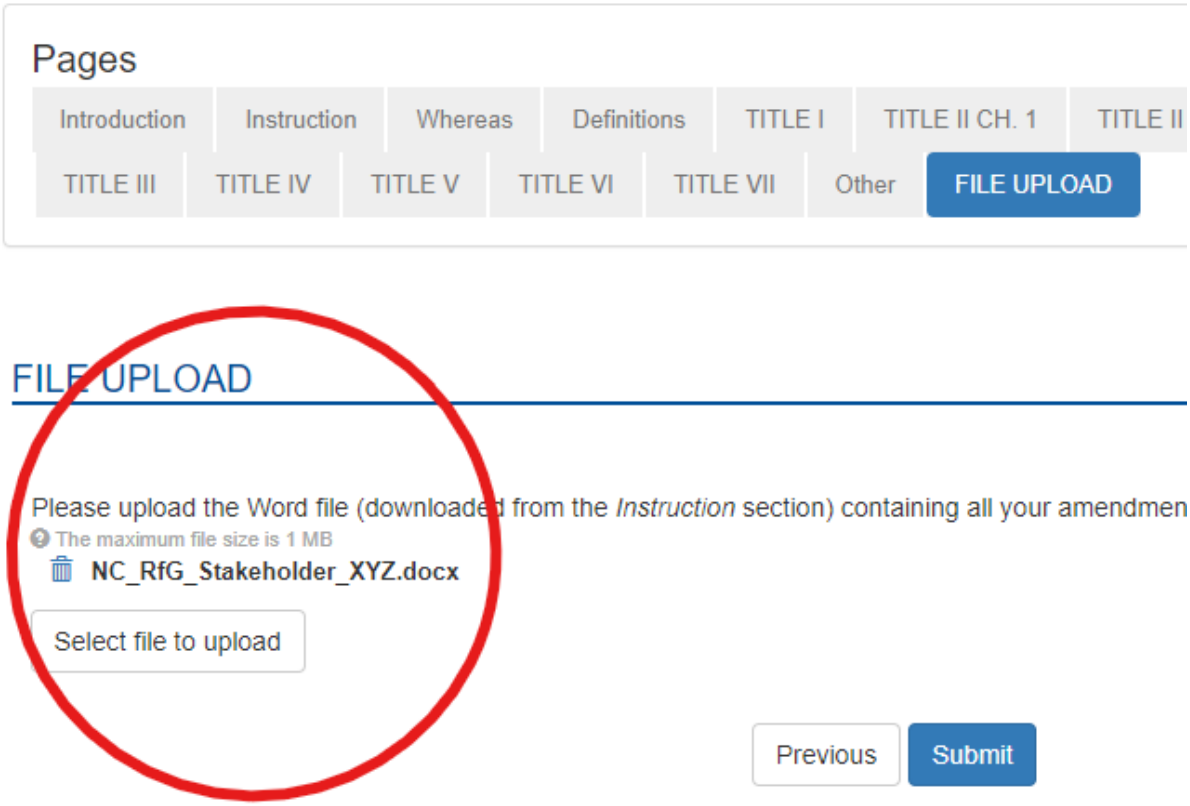
The system restoration requirements laid down ~~respectively~~ in Article 14(4) and Article 15(5) shall apply to AC-connected offshore power park modules types B and C, respectively.

Article 28

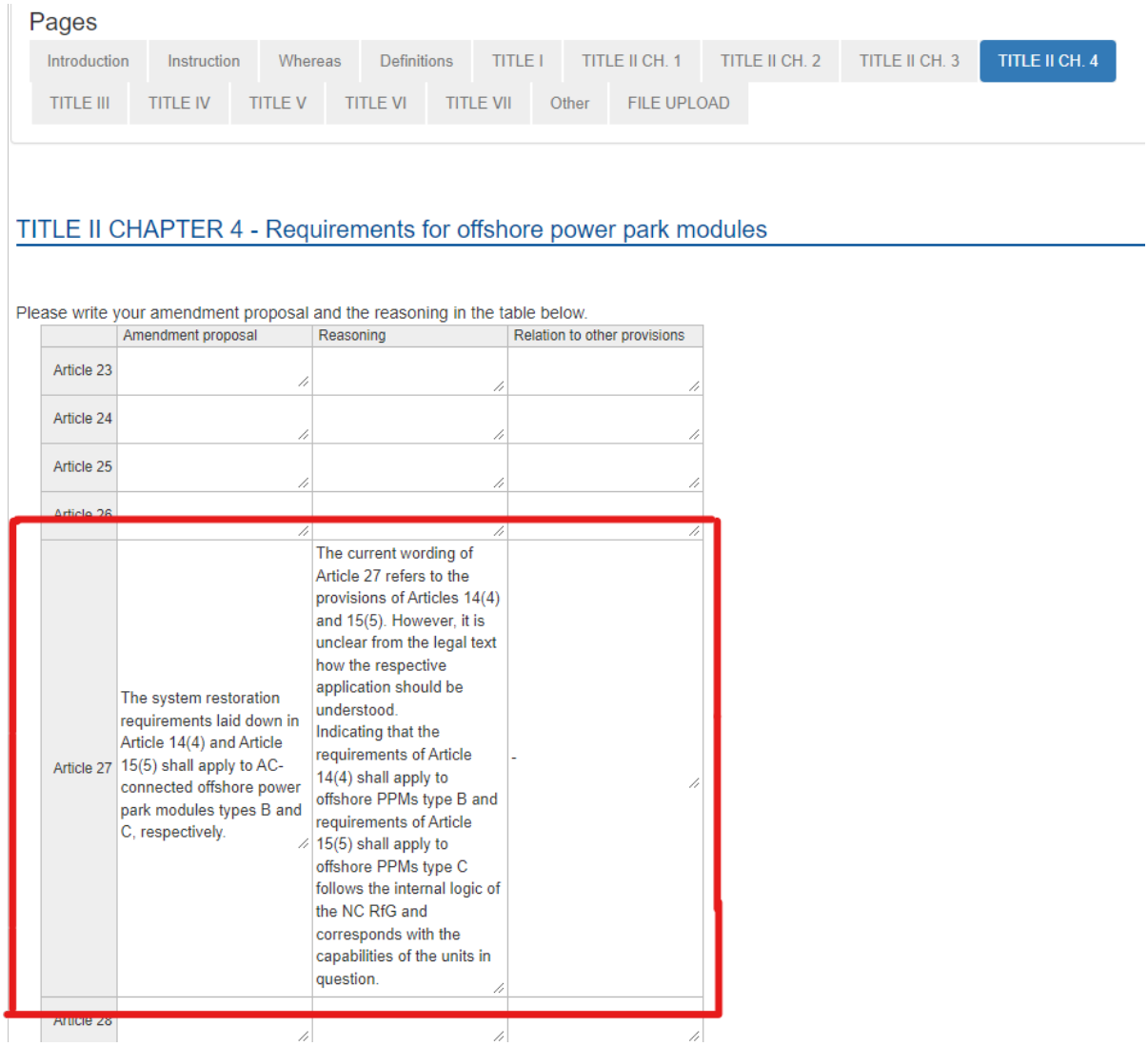
General system management requirements applicable to AC-connected offshore power park modules

The general system management requirements laid down in Article 14(5), Article 15(6) and Article 16(4) shall apply to AC-connected offshore power park modules.

After saving the edited file on their device under the name "*NC_RfG_Stakeholder_XYZ*", the stakeholder uploads it in the **FILE UPLOAD** section.



The stakeholder proceeds to motivate/reason their proposal. As they would like to propose an amendment to Article 27 of NC RfG, they enter **TITLE II CHAPTER 4** Section and insert the proposed amended wording and the reasoning (second step). As the proposed amendment of Article 27 does not affect other provisions, they leave the last column blank.



As the survey is long,
1. you have the possibility to edit your answer after submission. When clicking on "submit", you will be given a contribution ID, which you can then use to access your contribution here. This allows you to proceed in steps.
2. we kindly suggest that you download the entire survey as .pdf (link on the right), prepare your answers and then upload them at once in the EU Survey Tool, to avoid a session timeout on submission.

The maximum length of each cell is 5000 characters. This is the maximum technical limit set by the EUsurvey tool, which cannot be increased.

Whereas Section

Please write your amendment proposal and the reasoning in the table below.

Numbers in the first column correspond with the recitals of the NC RfG Whereas section

	Amendment proposal	Reasoning	Relation to other provisions
(1)			
(2)			
(3)			
(4)			
(5)			
(6)			
(7)			
(8)			

(9)	The significance of power-generating modules should be based on their size and their effect on the overall system. Synchronous machines should be classed on the machine size and include all the components of a generating facility that normally run indivisibly, such as separate alternators driven by the separate gas and steam turbines of a single combined-cycle gas turbine installation. For a facility including several such combined-cycle gas turbine synchronous power generating units installations, each should be assessed on its the individual unit size, and not on the whole capacity of the facility; this implies that each individual synchronous power generating unit (SPGU) shall be considered a synchronous power generating module (SPGM). Non-synchronously connected power-generating units, where they are collected together to form an economic unit and where they have a single connection point should be assessed on their aggregated capacity.	HARMONIZED SPGM DEFINITION: More clarity is needed on the type-classification of synchronous power generating modules (SPGM). There are today many inconsistencies across EU member states on how the determination of significance is applied (installed capacity vs individual unit rating). This issue was first raised by EUGINE in a letter to the EU Commission, dated 22nd June 2016 It would be helpful for SPGM manufacturers if the legislation clearly defines how the type-classification should be considered.	Article 2.9
(10)			
(11)			

(12)			
(13)			
(14)			
(15)			
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(31)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new recitals	Reasoning	Relation to other provisions
New recitals			

Definitions (Article 2)

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 2(1)			
Article 2(2)			
Article 2(3)			
Article 2(4)			
Article 2(5)			
Article 2(6)			
Article 2(7)			
Article 2(8)	DELETE	The "main generating plant" definition should be removed. PGU, PGM and PG-facility concepts already exist. Other definitions should be removed to avoid confusion.	

Article 2(9)	‘synchronous power-generating module’ or ‘SPGM’ means an indivisible set of components which can generate electrical energy such that the frequency of the generated voltage, the generator speed and the frequency of network voltage are in a constant ratio and thus in synchronism; each synchronous power generating unit (SPGU) will be considered a synchronous power generating module (SPGM); SPGU and SPGM shall be used interchangeably.	HARMONIZED SPGM DEFINITION: More clarity is needed on the type-classification of synchronous power generating modules (SPGM). There are today many inconsistencies across EU member states on how the determination of significance is applied (installed capacity vs individual unit rating). This issue was first raised by EUGINE in a letter to the EU Commission, dated 22nd June 2016 It would be helpful for SPGM manufacturers if the legislation clearly defines how the type-classification should be considered.	Recital (9)

Article 2(10)	‘power-generating module document’ or ‘PGMD’ means a document provided by the power-generating module owner to the relevant system operator for a type B or C power-generating module which confirms that the power-generating module'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;	The power generating facility owner is actually the power generating module owner.	
Article 2(11)			
Article 2(12)			
Article 2(13)			
Article 2(14)			

Article 2(15)	connection point’ means the interface at which the power-generating module, demand facility, distribution system or HVDC system is connected to a transmission system, offshore network, distribution system, including closed distribution systems, or HVDC system, as identified in the connection agreement, the connection point defines difference between power generating unit, power generating module and power generating facility;	The connection point is the criterion according to which PGU, PGM, or PG-facility are defined.	
Article 2(16)			
Article 2(17)			
Article 2(18)			
Article 2(19)			
Article 2(20)			
Article 2(21)			
Article 2(22)			
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Article 2(61)			
Article 2(62)			
Article 2(63)			
Article 2(64)			
Article 2(65)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new definitions	Reasoning	Relation to other provisions
New definitions	(10.1) 'power-generating module statement' or 'PGMS' defined according to the Expert Group on Harmonization of Certification and product Family grouping; (66) 'Power generating unit' or 'PGU' means a unit generating electricity, which is either synchronously or non-synchronously connected to the network or connected through power electronics; (67) 'Synchronous Power generating unit' or 'SPGU' shall be used interchangeably with SPGM; (68) 'PGU Family' means a group of power generating units (SPGU or PPM) with the same technology and similar behaviour and design including controllers with equivalent software but with different nominal power and/or different voltage; (69) 'PGU Family Certificate' means a document issued by an authorised certifier for a PGU Family based on the analysis of a representative PGU. The Family	10.1> PGMD is only for Type B and C, a general defintion for all type (A, B, C and D) PGM is missing. (66) - (69) FAMILY DEFINITION: PGU manufacturers produce similar products with variations on power size and voltage, while keeping all other characteristics the same. It is impractical for those manufacturers to obtain individual equipment certificates for each unit – in many cases this may require testing a large quantity of units (hundreds of tests). Therefore, an approach to allow testing a representative unit of a product "family" and apply the results to other members within the family is required. Certification and family concepts are on PGU and not PGM level PGU Family definition is missing in existing NC RfG and is essential for acceptance of PGU certification among EU countries. The existing "fixed power range family definition" does not encourage manufactures to improve their product quality and	10.1 > Article 2(10)

	certificate defines the scope of its validity at a national or other level at which a specific value is selected from the range allowed at a European level. For the purpose of replacing specific parts of the compliance process, the Family certificate may include simulation models that have been verified against actual test results.	product scaling accuracy. Manufacturers can design PGUs and scale them in large power ranges with high product quality and accuracy. In practice, manufactures may reduce PGU types to fit the “fixed power range family definition” in certain market. At the end, the customers lose SPGU selection flexibility.	

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TITLE I - General provisions

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 1			
	Article 3.3 [NEW] 3. Regarding PGU families, the following conditions need to be met to consider that a group of PGUs belong to a specific family: (a) Regarding SPGUs (i) SPGUs are considered in the same family if they share the following characteristics: • Prime mover technology (gas engine, gas turbine, hydro turbine, etc) • Control system of the prime mover (governor) brand and model with equivalent control software* • Alternator type - Synchronous generator • Automatic Voltage Regulator (AVR) brand and model with equivalent control software* • Simulation model structure** (validated) when required (where FRT requirements need to be considered) *Different versions of the control software may be accepted if there are no changes to relevant functions for grid parallel operation that may affect compliance with		

	the requirements; this needs to be described and justified within the manufacturers declaration and it will be on the certifiers judgment to accept or reject. **Structure of the model cannot be modified, while the parameters of the model can be changed. The brand (manufacturer) or rotor construction (salient pole or round rotor) associated to the synchronous generator is not relevant for this definition because the active and reactive power response of the unit solely depend on the unit's prime mover controller and AVR. The applicability range can be defined as follows: 1. Based on the tests done on one representative unit of the family and through the manufacturer's declaration and the acceptance of the certifier. When FRT capability needs to be considered, the unit needs to have undergone a simulation model validation process that includes testing and validating the model against multiple controller settings of the same machine (used to investigate the influence of key settings on PGU performance). Alternatively, it can be defined with			

	any of the following: 2. Based on the tests done on the smallest and biggest representative units of the family***. 3. Based on a range dependent on the tested unit's nominal active power; this can be defined as in Germany (1/root 10 to root 10), but never smaller than the range defined by Spain (±25% of the nominal active power). *** Smaller or bigger units than those tested may be included within the family range based on the justification provided within the manufacturer's declaration and it will be on the certifiers judgment to accept or reject. (ii) Effects on main component changes When at least one of the units' main components (prime mover, prime mover control, alternator type, AVR) has changed, it now differs from the overall family that had been originally tested in such a way that it is not possible to classify the generating unit as a family member. It is expected that if this change occurs, some of the tests already performed on the reference generating unit associated to the			

shared components shall not be repeated.
For example, a generating unit can install an automatic voltage regulator which is different from the one installed on the tested generating unit and share the rest of the components. Only the tests associated to this new component will be carried out.
The change of a component shall trigger a subset of tests depending on the impact it has on the static and dynamic behaviour of the generating unit. The following table shows the possible tests that shall be repeated depending on the main components that differ from the reference type tested generating unit.
Table XX SPGU Component Change Testing Needed

The change of main components can also be considered applicable for existing units where a component is replaced (for example due to aging).

(b) Regarding PPM – Wind power generating unit (Wind PGU)
(i) Power-generating units are considered in the same family (product platform) if they share the

	following characteristics: • Equivalent design and control engineering* critical to the electrical characteristics • Equivalent until controller software** • Same model structure*** (validated) when required *Refer to Table XXX ** Different versions of the control software may be accepted if there are no changes to relevant functions for grid parallel operation that may affect compliance with the requirements; this needs to be described and justified within the manufacturers declaration and it will be on the certifiers judgment to accept or reject. ***Structure of the model cannot be modified, while the parameters of the model can be changed. The applicability range can be defined as follows: 1. Based on the tests done on one representative unit of the family and through the manufacturer's declaration and the acceptance of the certifier. When FRT capability needs to be considered, the unit needs to have undergone a simulation model validation process that includes testing and validating the model			

Article 3	against multiple controller settings of the same machine (used to investigate the influence of key settings on PGU performance). Or alternatively: 2. Based on the tests done on the smallest and biggest representative units of the family****. 3. Based on a range dependent on the tested unit's nominal active power; this can be defined as in Germany (1/2 to 2), but never smaller than the range defined by Spain (±25% of the nominal active power). The manufacturer shall technically justify to the certification body that the PGUs electrical characteristics measured during the respective type tests are identical or can be transferred as described above. The justification shall include all technical PGU electrical characteristic and differences, which may influence the respective electrical performance. The certification body checks the justification. Alternatively, the certification body can perform an independent assessment of transferability. The manufacturer presents the certification body, on request, the technical data (e.g.,	FAMILY DEFINITION: PGU manufacturers produce similar products with variations on power size and voltage, while keeping all other characteristics the same. It is impractical for those manufacturers to obtain individual equipment certificates for each unit – in many cases this may require testing a large quantity of units (hundreds of tests). Therefore, an approach to allow testing a representative unit of a product "family" and apply the results to other members within the family is required. Certification and family concepts are on PGU and not PGM level PGU Family definition is missing in existing NC RfG and is essential for acceptance of PGU certification among EU countries. The existing "fixed power range family definition" does not encourage manufactures to improve their product quality and product scaling accuracy. Manufacturers can design PGUs	New definitions in article 2 (66), (67), (68), (69)

	electrical parameter datasheets) or PGU description necessary to perform the test or carry out the assessment. **** Smaller or bigger units than those tested may be included within the family range based on the justification provided within the manufacturer's declaration and it will be on the certifiers judgment to accept or reject. (ii) Effects on main component changes A wind power-generating unit variant is defined when at least one of its main components (e.g., blades, gearbox) has changed from the power-generating unit that has been originally tested; transferability of the test results associated to the shared components shall be accepted, provided that a documented risk assessment that identifies which tests are valid and which tests need to be repeated is made. The variant is not part of the family. The risk assessment can be different depending on the Wind PGU type. The wind industry distinguishes between the following: • Type 1: Asynchronous generators directly connected to	and scale them in large power ranges with high product quality and accuracy. In practice, manufactures may reduce PGU types to fit the "fixed power range family definition" in certain market. At the end, the customers lose SPGU selection flexibility.		

	the grid • Type 2: Variable rotor resistance asynchronous generator • Type 3: Doubly fed asynchronous generator • Type 4: Connected to the gird through a full-scale power converter For example, a power-generating unit variant can have a new gearbox implemented or be equipped with different blades (e. g., increased blade length) which is different from the one implemented / equipped on the tested reference power-generating unit and share the rest of the components. This can be considered a variant of the type tested reference power-generating unit. Each Wind PGU can be represented in a modular structure, where the different subsystems as well as the main components and control systems for the different subsystems are defined. The change of a component may trigger a subset of tests depending on the risk assessment performed and the impact it has on the steady-state and dynamic behaviour of the power-generating unit. Table 5 shows which wind power-			

generating unit subsystems have an influence on the measured performance as well as the possible tests that shall be repeated depending on the main components that differ from the reference type tested generating unit.
Table XXX: Subsystems influencing the electrical characteristics of the Wind PGU

Depending on the Wind PGU type some of the following main components will be part of the different subsystems for the different Wind PGU types:
Table XXXX: Wind PGU subsystems and main components

(c) Converter based PPM units are considered in the same family if they share the following characteristics:

- Equivalent control electronics and construction topology design (bridge, location of filters) and control engineering critical to the electrical characteristic
- Same number of phases
- Equivalent unit controller software*

	• Simulation model structure** (validated) when required (where FRT requirements need to be considered) * Different versions of the control software may be accepted if there are no changes to relevant functions for grid parallel operation that may affect compliance with the requirements; this needs to be described and justified within the manufacturers declaration and it will be on the certifiers judgment to accept or reject. **Structure of the model cannot be modified, while the parameters of the model can be changed. The power electronics, filters and transducers sized on different voltage and/or current sizes The applicability range can be defined as follows: 1. Based on the tests done on one representative unit of the family and through the manufacturer's declaration and the acceptance of the certifier. When FRT capability needs to be considered, the unit needs to have undergone a simulation model validation process that includes testing and validating the model against multiple controller settings of the same machine (used to			

	investigate the influence of key settings on PGU performance). Alternatively, it can be defined with any of the following: 2. Based on the tests done on the smallest and biggest representative units of the family***. 3. Based on a range dependent on the tested unit's nominal active power; this can be defined as in Germany (Pgen/√10 < Pgentestate < Pgen* 2), but never smaller than the range defined by Spain (±25% of the nominal active power). *** Smaller or bigger units than those tested may be included within the family range based on the justification provided within the manufacturer's declaration and it will be on the certifiers judgment to accept or reject. For Modular generators, consisting of a basic element that is repeated N times in larger sizes, at least one complete test session is foreseen on the smaller size generator and the confirmation of the correct settings on the other models of the assembly by carrying out a partial test session on the higher power model regarding the reactive power capability and the active			

	power response in case of an over-frequency. The voltage quality requirements are fulfilled if the overall generator contribution (evaluated as the arithmetic sum of the individual generators of the lower size) is within the prescribed limits. If this is not the case, a test must be carried out on the maximum generator size		
Article 4	(b) the power-generating facility owner has concluded a final and binding contract for the purchase of the main generating module after the entry into force of the Regulation. The power-generating facility owner must notify the relevant system operator and relevant TSO of conclusion of the contract after the entry into force of the Regulation. The notification submitted by the power-generating facility owner to the relevant system operator and to the relevant TSO shall at least indicate the contract title, its date of signature and date of entry into force and the specifications of the main generating module to be constructed, assembled or purchased.	The power generating facility owner can only design its new project based on existing national implementation. Since NcRfG is a general frame among ENTSO-E members, it is not possible to predict exact national level implementation, and announce compliance to future guidelines. Based on experience with NcRfG, the duration of national implementation diverse among EU countries. Second paragraph: replace "main plant" defintion.	Article 2 (8)
	2. Power-generating modules		

within the following categories shall be considered as significant:
(a) maximum capacity from 0,8 kW to 100 kW (type A);

(b) maximum capacity at or above a threshold proposed by each relevant TSO in accordance with the procedure laid out in paragraph 3 (type B). This threshold shall not be above the limits for type B power-generating modules contained in Table 1;
(c) maximum capacity at or above a threshold specified by each relevant TSO in accordance with paragraph 3 (type C). This threshold shall not be above the limits for type C power-generating modules contained in Table 1; or
(d) A power-generating module is of type D if its maximum capacity is at or above a threshold specified in accordance with paragraph 3. This threshold shall not be above the limit for type D power-generating modules contained in Table 1.
Table 1
Limits for thresholds for type B, C and D power-generating modules
Synchronous areas Limit for maximum capacity threshold from which a power-generating module

Article 5	is of type B Limit for maximum capacity threshold from which a power-generating module is of type C Limit for maximum capacity threshold from which a power-generating module is of type D Continental Europe 0,1 MW 50 MW 75 MW Great Britain 0,1 MW 50 MW 75 MW Nordic 0,1 MW 10 MW 30 MW Ireland and Northern Ireland 0,1 MW 5 MW 10 MW Baltic 0,1 MW 10 MW 15 MW 3. Proposals for maximum capacity thresholds for types B, C and D power-generating modules shall be subject to approval by the relevant regulatory authority or, where applicable, the Member State. In forming proposals the relevant TSO shall coordinate with adjacent TSOs and DSOs and shall conduct a public consultation in accordance with Article 10. A proposal by the relevant TSO to change the thresholds shall not be made sooner than three years after the previous proposal. 4. Power-generating facility	HARMONIZED CLASSIFICATION OF TYPES EUGINE agrees with the policy analysis and recommendations on the determination of significance of PGMs Harmonizing the Type A /B value all over the EU may facilitate the acceptance of Type A unit certificates all over the EU. Small units connected at high voltage have little impact on system stability. Type D requirements can have a significant impact on the total price of a unit Harmonize the threshold for power regarding Types (same in all the EU) In paragraph 40 of the policy paper, it is stated that a complete removal of the voltage criteria for all types of PGMs does not seem to be a viable solution. From a synchronous generator manufacturer perspective, it would nevertheless appear as a good solution to remove the voltage criteria completely, so making the assessment of type purely based on (unit/module) MW capacity size. If that were implemented, all technical requirements would depend on the MW capacity.	

	owners shall assist this process and provide data as requested by the relevant TSO. 5. If, as a result of modification of the thresholds, a power-generating module qualifies under a different type, the procedure laid down in Article 4(3) concerning existing power-generating modules shall apply before compliance with the requirements for the new type is required. 6. The power-generating modules shall comply with the requirements on the basis of their maximum capacity according to the categories set out in paragraph 2. 7. PGMs at higher category shall comply with all similar requirements from smaller categories, except for those specifically excluded, (e.g. Type D units shall comply with all requirements from previous articles except for those stated under article 16 (1).		
Article 6			

Article 7	Article 7.3 (g) [NEW] (g) give permission to prototypes with new technologies to be connected to the grid with prototype declarations, and give reasonable time for power generating module owners to submit the PGMD later.	The grid codes may be newly published or updated at certain time intervals. At the same time, manufactures may release new product design or update software frequently. In these scenarios, the concept of “prototype declaration” is essential. There are already concept of “prototype” in several countries. Period of “prototype declaration” is not equivalent to “transaction period” for a newly published gridcode. A harmonized agreement among all EU countries about “prototype declaration” is expected.	
Article 8			
Article 9			
Article 10			
Article 11			
Article 12			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

Please upload figures or tables if necessary

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TITLE II CHAPTER 1 - General Requirements

General requirements for type A power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 13(1)	(c) With regard to the voltage operation range for alternators, a power-generating module shall be capable of staying connected to the network and operate in a range specified by the relevant TSO unless disconnection was triggered by an operation point of combined frequency and voltage outside the area defined by the outer envelope in FIGURE X. The relevant system operator, in coordination with the relevant TSO, shall specify the operation area while not exceeding the outer envelope of FIGURE X [Figure attached]	OPERATIONAL VOLTAGE REQUIREMENTS These vary significantly from each member state and are way beyond the applicable IEC standards for which the product is manufactured Harmonization of the requirements is very important for the manufacturers to maintain standard and proven product. Voltage withstand requirement has direct impact on the insulation class, winding, frame size of the equipment and indirect impact on the dynamics The existing values violate the IEC 60034- 1: 2022 which defines the limits under which rotating machines (alternators) are designed!	Article 16.2 (a) (i); Article 16.2 (a) (vi) [NEW]; Article 16.2 (d) [NEW]
	(h) Power-generating modules shall be capable of activating this provision with a power decrease response time as specified by the relevant system operator, in coordination with the relevant TSO, but always limited by the capabilities inherent to the PGM technology;		

Article 13(2)	(i) The increasing and decreasing active power ramp rate shall consider the technical constraints of power generating module technologies as defined in Table X. (i) The increasing and decreasing active power ramp rate shall consider the technical constraints of power generating module technologies as defined in Table X X. Table X: Maximum active power ramp rates for various technologies Technology Maximum Decreasing Active Power Ramp Rate Maximum Increasing Active Power Ramp Rate Synchronous power generating units excluding gas reciprocating engine-driven synchronous generating units. 5.625% of maximum power per second (45% Pmax per 8 s) 0.067% of maximum power per second (20% Pmax per 5 min) Gas reciprocating engine-driven synchronous generating units. 0.33% of maximum power per second (20% Pmax per 1 min) for units larger than 2MW, and 1.11% of maximum power per second		Article 15.2 (c) (vi) [NEW]

	(66% Pmax per 1 min) for units not exceeding 2MW 0.067% of maximum power per second (20% Pmax per 5 min) Power park modules, excluding wind generators 25% of maximum power per second (50% Pmax per 2 s) 5% of maximum power per second (50% Pmax per 10 s) Wind generators 25% of maximum power per second (50% Pmax per 2 s) 4% of maximum power per second (20% Pmax per 5 s) if the current active power is above 50% of maximum power. At operating points below 50% of maximum power a slower reaction may apply, because the wind generator response is limited by the kinetic energy of rotating masses. Nonetheless, the response time shall be as fast as technically feasible and justified to the relevant network operator If the active power change is greater than the given limits, the response time for the part of the active power change exceeding the given limit shall be as fast as possible. The power-generating facility owner shall justify the	LFSM-O/-U Active Power Response Time In the IGD on “Limited Frequency Sensitive Mode” from 31st January 2018, ENTSO-E states: “The recommended response times for active power decrease in case of increasing frequency are: Synchronous power generating modules: ≤ 8 s for an active power change of 45% maximum power” Such a requirement results in an active power rate of change that is extremely high and may not be fulfilled by internal combustion gas engines due to technical limitations Some countries have made specific provisions in their grid codes, whereas others have directly implemented the recommendation of the IGD Derogation processes can be followed but are cumbersome and poorly defined in many countries ENTSO-E accepted the comment in a modified way and informed that “technological constraint shall be duly taken into account” in the response to comments document from 31st January 2018 A formal position paper on this topic was published by EUGINE (10th January 2019)	

	response time, providing technical evidence to the relevant TSO;		
Article 13(3)			
Article 13(4)			
Article 13(5)			
Article 13(6)			
Article 13(7)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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General requirements for type B power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 14(1)			
Article 14(2)			
Article 14(3)	(b) fault-ride-through capabilities in case of asymmetrical faults shall be specified by each TSO but will not exceed the limits imposed under (v) for symmetrical faults.	HARMONIZE FRT ASYMMETRICAL LIMITS NC RfG has FRT outline profile for type B, C,D requirement, at the same time, article 14, paragraph 3(b) has following statement: “fault-ride-through capabilities in case of asymmetrical faults shall be specified by each TSO” Nevertheless, there is no common definition about PGU/PGM operation conditions, such as “full /partial load, over / under-excitation”. Lack of boundary condition leads to difficulty in acceptance of FRT test results among EU countries. Both symmetrical and asymmetrical faults shall follow the same profile. Boundary conditions should be reasonable, a simple “worst on top of worst case” definition can be difficult to fulfil.	Article 16.3 c)
Article 14(4)			

Article 14(5)	(iii) protection schemes may cover the following aspects: — external and internal short circuit, — asymmetric load (negative phase sequence), — stator overload, — over-/undervoltage at the connection point, — over-/undervoltage at the alternator terminals, — inrush current, — power-generating module line protection, — unit transformer protection, — back-up against protection and switchgear malfunction, — inverse power, — rate of change of frequency, and — neutral voltage displacement.	Modification of the protection list for Type B and C Many protections schemes mentioned in the NC RfG as “may” could be requested as “must” by member state representatives; some of these functions would imply a considerable increase in the cost of Type B units. The recommendation is to reduce the scope of the required protections for Type B and increase the list within Type C and D as needed with an additional article on electrical protection schemes and settings.	Article 15.4 (d) [NEW]

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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General requirements for type C power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 15(1)			

Article 15(2)	(vi) Power-generating modules shall be capable of activating this provision with a power increase response time as specified by the relevant system operator, in coordination with the relevant TSO, but always limited by the capabilities inherent to the PGM technology. The increasing and decreasing active power ramp rate shall consider the technical constraints of power generating module technologies as defined in Table X, Article 13(2)(h). If the technology is capable of achieving a faster response than defined in Table X this shall be permitted in agreement with the relevant system operator; however, the relevant system operator shall not define such a requirement that exceeds the maximum value given in Table X	LFSM-O/-U Active Power Response Time In the IGD on “Limited Frequency Sensitive Mode” from 31st January 2018, ENTSO-E states: “The recommended response times for active power decrease in case of increasing frequency are: Synchronous power generating modules: ≤ 8 s for an active power change of 45% maximum power” Such a requirement results in an active power rate of change that is extremely high and may not be fulfilled by internal combustion gas engines due to technical limitations Some countries have made specific provisions in their grid codes, whereas others have directly implemented the recommendation of the IGD Derogation processes can be followed but are cumbersome and poorly defined in many countries ENTSO-E accepted the comment in a modified way and informed that “technological constraint shall be duly taken into account” in the response to comments document from 31st January 2018 A formal position paper on this topic was published by EUGINE (10th January 2019)	Article 13.2 (h) [NEW]; Article 13.2 (i) [NEW]

Article 15(3)			
Article 15(4)	(d) The following additional protection schemes may cover the following aspects: — rotor overload, — over-/underexcitation, — inter-area oscillations, — asynchronous operation (pole slip), — protection against inadmissible shaft torsions (for example, subsynchronous resonance), — overfluxing (U/f),	Modification of the protection list for Type B and C Many protections schemes mentioned in the NC RfG as “may” could be requested as “must” by member state representatives; some of these functions would imply a considerable increase in the cost of Type B units. The recommendation is to reduce the scope of the required protections for Type B and increase the list within Type C and D as needed with an additional article on electrical protection schemes and settings.	Article 14.5 (b) (iii)
Article 15(5)			
Article 15(6)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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General requirements for type D power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 16(1)			
Article 16(2)	Article 16.2 (a) (i) (i) without prejudice to point (c) of Article 13(1), point(a) of Article 14(3) and point (a) of paragraph 3 below, a power-generating module 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 6.1 and 6.2, subject to the condition that alternator based PGM terminal voltage does not exceed the technical capability; Article 16.2 (a) (vi) [NEW] (vi) The requirements specified in point (a) (v) are defined at the point of connection for the PGM. In the case of terminals of alternator based PGMs, the required range may be wider than the limits defined in the standard for which the alternators are manufactured, which coincide to the ones presented in Figure X.		Article 13.1 c) [NEW]

	Compliance of the connection requirements by using mitigating methods by a transformer with On-load tap changer are allowed, in such cases the co-ordination of the protection should be made such that the protection at the connection point fulfils the Grid code requirements and the protections at the alternator terminals complies to the design standard. Article 16.2 (d) [NEW] (d) Voltage ranges defined in point (a) (v) and Frequency ranges specified in Article 13 (1) (b) and (c) are applicable at the connection point. For alternator based PGMs, voltage ranges shall be considered together with frequency ranges and shall respect the area defined in Figure X found under point (1) (c) of article 13.	OPERATIONAL VOLTAGE REQUIREMENTS These vary significantly from each member state and are way beyond the applicable IEC standards for which the product is manufactured Harmonization of the requirements is very important for the manufacturers to maintain standard and proven product. Voltage withstand requirement has direct impact on the insulation class, winding, frame size of the equipment and indirect impact on the dynamics The existing values violate the IEC 60034- 1: 2022 which defines the limits under which rotating machines (alternators) are designed!	

Article 16(3)	(c) fault-ride-through capabilities in case of asymmetrical faults shall be specified by each TSO but will not exceed the limits imposed under (a) for symmetrical faults.	HARMONIZE FRT ASYMMETRICAL LIMITS NC RfG has FRT outline profile for type B, C,D requirement, at the same time, article 14, paragraph 3(b) has following statement: “fault-ride-through capabilities in case of asymmetrical faults shall be specified by each TSO” Nevertheless, there is no common definition about PGU/PGM operation conditions, such as “full /partial load, over / under-excitation”. Lack of boundary condition leads to difficulty in acceptance of FRT test results among EU countries. Both symmetrical and asymmetrical faults shall follow the same profile. Boundary conditions should be reasonable, a simple “worst on top of worst case” definition can be difficult to fulfil.	Article 14.3 (b)
Article 16(4)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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TITLE II CHAPTER 2 - Requirements for synchronous power-generating modules

Requirements for type B synchronous power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 17(1)			
Article 17(2)			
Article 17(3)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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Requirements for type C synchronous power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 18(1)			
Article 18(2)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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Requirements for type D synchronous power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 19(1)			
Article 19(2)	(v) a PSS function to attenuate power oscillations, if the synchronous power-generating module size is above a value of maximum capacity specified by the relevant TSO. PSS requirement should also be specified considering the inherent dampening of active power oscillation of the PGM (vi The PSS acceptance criteria shall be specified by the TSO which should align with industry standard practices. The use of a PSS shall not degrade the inherent dampening of the active power oscillations of the PGM. If evaluation of additional dampening provided by PSS is not possible with industry standard practices, the TSO and PGM owner can agree on alternative procedures.	Damping inherent capability should be taken into account when looking at the impact of the PSS.	
Article 19(3)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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TITLE II CHAPTER 3 - Requirements for power park modules

Requirements for type B power park modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 20(1)			
Article 20(2)			
Article 20(3)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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Requirements for type C power park modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 21(1)			
Article 21(2)			
Article 21(3)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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Requirements for type D power park modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 22			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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TITLE II CHAPTER 4 - Requirements for offshore power park modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 23			
Article 24			
Article 25			
Article 26			
Article 27			
Article 28			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

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TITLE III - Operational notification procedure for connection

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 29			
Article 30			
Article 31			
Article 32			
Article 33			
Article 34			
Article 35			
Article 36			
Article 37			
Article 38			
Article 39			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

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TITLE IV - Compliance

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 40			
Article 41			
Article 42	Article 42.5 [NEW] 5. In principle, the connection requirements shall apply at the connection point in a local site. In practice, manufactures often conduct compliance test of PGU /components in testbenches. The gap between connection requirement of PGM/PPM and compliance tests with PGU can be closed by PGU family definition and, simulation analysis. For simplicity, PGU compliance test can be considered as sufficient to PGM/PPM connection requirements.	The PGU and PGM concepts are often confused. The simulation model is validated from PGU tests, and applied for PGM analysis with given site conditions.	
Article 43			
Article 44			
Article 45			
Article 46			
Article 47			
Article 48			
Article 49			
Article 50			
Article 51			

Article 52			
Article 53			
Article 54			
Article 55			
Article 56			
Article 57			
Article 58			
Article 59			

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	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

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TITLE V - Derogations

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 60			
Article 61			
Article 62			
Article 63			
Article 64			
Article 65			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

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TITLE VI - Transitional arrangements for emerging technologies

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 66			
Article 67			
Article 68			
Article 69			
Article 70			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

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TITLE VII - Final provisions

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 71			
Article 72			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

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Other additional provisions

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions	Reasoning	Relation to other provisions
Other new provisions			

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