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Appendix 1 Documentation

Energy storage facility category B

Technical regulation 3.3.1 for electrical energy storage facilities

EFFECTIVE FROM 18 December 2019

Please note: This is a translation. In case of inconsistencies, the Danish version applies.

# Appendix 1 Documentation

Appendix 1 specifies the documentation requirements for the five facility categories, see section 1.1.4 in the regulation:

A. Energy storage facilities up to 125 kW

B. Energy storage facilities from and including 125 kW up to 3 MW

C. Energy storage facilities from and including 3 MW up to 25 MW

D. Energy storage facilities from and including 25 MW or connected at voltages above 100 kV

SX. Category A or B energy storage facilities

T. Temporarily connected energy storage facilities

Documentation, see specifications in section 9 of the regulation, must be sent electronically to the electricity supply undertaking.

The technical documentation must include configuration parameters and configuration data applicable to the energy storage facility at the time of commissioning.

All appendix subsections must be filled in for the facility in question.

If information changes after the time of commissioning, updated documentation must be submitted as required in section 2.2.

Templates for Appendix 1 for the various facility categories are available on Energinet's website [www.energinet.dk](http://www.energinet.dk). It is thus possible to print only the appendix to be filled in.

Documentation – category B

* 1. Documentation for category B energy storage facilities (Part 1)

Please fill in the documentation form with data for the facility, valid before commissioning, and submit it to the electricity supply undertaking.

* + 1. Identification

|  |  |
| --- | --- |
| Facility  | Description of the facility |
| Facility owner name and address |  |
| Facility owner telephone no. |  |
| Facility owner e-mail |  |
| Inverter – manufacture |  |
| Inverter – model |  |
| Inverter – rated power |  |
| Storage medium – manufacture |  |
| Storage medium – model no. |  |
| Storage medium – usable energy storage capacity [kWh] |  |

* + 1. Normal operation

|  |  |
| --- | --- |
| Can the energy storage facility be started and operate continuously within the normal operation range, restricted only by grid protection settings, c.f. requirements in section Figure 6?  | Yes [ ] No [ ]  |
| If Yes, reference to documentation: |  |

* + 1. Tolerance of frequency deviations

|  |  |
| --- | --- |
| Will the energy storage facility remain connected to the public electricity supply grid during frequency deviations as specified in section 4? If Yes, reference to documentation:  | Yes [ ] No [ ]  |
| Will the facility remain connected in the event of frequency changes of 2.0 Hz/s in the POC? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + 1. Tolerance of voltage deviations (FRT)

|  |  |
| --- | --- |
| Will the energy storage facility remain connected to the public electricity supply grid during voltage dips as specified in section 4.4? If Yes, reference to documentation:  | Yes [ ] No [ ]  |
| Will the energy storage facility remain connected to the public electricity supply grid during voltage increases as specified in section 4.4? If Yes, reference to documentation: | Yes [ ] No [ ]  |
| After a voltage dip, the energy storage facility is able to return to normal operation no later than 5 s after operating conditions have returned to the normal operating range. | Yes [ ] No [ ]  |

* + 1. Additional reactive current

|  |  |
| --- | --- |
| Does the energy storage facility deliver additional reactive current as specified in section 4.4.4? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + 1. Start-up and automatic reclosing of an energy storage facility

|  |  |
| --- | --- |
| Do connection and synchronisation occur as specified in section 4.3.1?If Yes, reference to documentation:  | Yes [ ] No [ ]  |
| Is it possible to circumvent automatic synchronisation?If No, reference to documentation:  | Yes [ ] No [ ]  |

* + 1. Active power control
			1. Frequency Response – Overfrequency

|  |  |
| --- | --- |
| Is the energy storage facility equipped with a frequency response function for overfrequency as specified in section 6.2.2.1? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + - 1. Absolute power constraint function

|  |  |
| --- | --- |
| Is the energy storage facility equipped with an absolute power constraint function as specified in section 6.2.4.1.1? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + - 1. Ramp rate limit

|  |  |
| --- | --- |
| Is the energy storage facility equipped with a ramp rate constraint as specified in section 6.2.4.2.1? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + 1. Reactive power control
			1. Work area

|  |  |
| --- | --- |
| Can the energy storage facility supply reactive power at Pn and varying operating voltages, as specified in section 6.3? Where to find documentation that this requirement has been met?  | Yes [ ] No [ ]  |
| Can the energy storage facility supply reactive power at varying active power as specified in section 6.3.5.2? Where to find documentation that this requirement has been met?  | Yes [ ] No [ ]  |

* + - 1. Power factor control

|  |  |
| --- | --- |
| Is the energy storage facility equipped with a power factor control function as specified in section?If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + - 1. Q control

|  |  |
| --- | --- |
| Is the energy storage facility equipped with a Q control function as specified in section?If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + - 1. Automatic power factor control

|  |  |
| --- | --- |
| Is the automatic power factor control function activated?(Not to be activated without agreement with the electricity supply undertaking.)If Yes, with which set points? Point 1 – P/Pn Point 1 – Power factor (inductive)Point 2 – P/Pn Point 2 – Power factor (inductive)Point 3 – P/Pn Point 3 – Power factor (inductive) | Yes [ ] No [ ] \_\_\_\_\_\_\_\_ %\_\_\_\_\_\_ cosφ\_\_\_\_\_\_\_\_ %\_\_\_\_\_\_ cosφ\_\_\_\_\_\_\_\_ %\_\_\_\_\_\_ cosφ |

* + 1. Power quality

|  |  |
| --- | --- |
| Are stated emission values calculated values?  | Yes [ ] No [ ]  |
| Are stated emission values measured values?  | Yes [ ] No [ ]  |
| Is a report enclosed, documenting that calculations or measurements comply with emission requirements? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + - 1. Rapid voltage changes

|  |  |
| --- | --- |
| Does the energy storage facility comply with the threshold for rapid voltage changes specified in section 5.1.1.3? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + - 1. DC content

|  |  |
| --- | --- |
| Does DC content at normal operation exceed 0.5% of rated current? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + - 1. Voltage unbalance

|  |  |
| --- | --- |
| Is the facility three-phase balanced? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + - 1. Flicker

|  |  |
| --- | --- |
| Is the flicker contribution for the entire energy storage facility below the threshold specified in section 5.1.1.4? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + - 1. Harmonics

|  |  |
| --- | --- |
| Are all harmonics for the entire energy storage facility below the thresholds specified in section 5.1.1.5? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + - 1. Interharmonics

|  |  |
| --- | --- |
| Are all interharmonics for the entire energy storage facility below the thresholds specified in section 5.1.1.6? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + - 1. Disturbances in the 2-9 kHz range

|  |  |
| --- | --- |
| Is the emission of disturbances with frequencies in the 2-9 kHz range lower than 0.2% of In as required in section 5.1.1.7? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + 1. Protection

|  |  |
| --- | --- |
| Is the facility protected with the functions required in section 7.2.2? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + - 1. Island operation detection

|  |  |
| --- | --- |
| Is the facility protected with the functions required in section 7.2.2? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + 1. Information exchange requirements

|  |  |
| --- | --- |
| Can the facility exchange information as required in section 8.2? If Yes, reference to documentation:  | Yes [ ] No [ ]  |

* + 1. Signature

|  |  |
| --- | --- |
| Date |  |
| Installation contractor |  |
| Person responsible for commissioning |  |
| Signature (person responsible for commissioning) |  |
| Facility owner |  |
| Signature (facility owner) |  |

* 1. Documentation for category B energy storage facilities (part 2)

Please fill in the documentation form with data for the energy storage facility, valid after commissioning, and submit it to the electricity supply undertaking.

* + 1. Identification

|  |  |
| --- | --- |
| Facility  | Description of the facility |
| Facility owner name and address |  |
| Facility owner telephone no. |  |
| Facility owner e-mail |  |
| Inverter – manufacture |  |
| Inverter – model |  |
| Inverter – rated power |  |
| Storage medium – manufacture |  |
| Storage medium – model no. |  |
| Storage medium – usable energy storage capacity [kWh] |  |

* + 1. Active power control
			1. Active power control at overfrequency

|  |  |
| --- | --- |
| Is the frequency response function for overfrequency activated? If Yes, with which settings? Frequency threshold (f2): Droop: Time for island operation detection (minimum response time):  | Yes [ ] No [ ] \_\_\_\_\_\_\_\_ Hz\_\_\_\_\_\_\_\_ %\_\_\_\_\_\_\_\_ ms |

* + - 1. Absolute power constraint function

|  |  |
| --- | --- |
| Is the absolute power constraint function activated? If Yes, with which value?  | Yes [ ] No [ ] Online control [ ] \_\_\_\_\_\_\_\_ kW |

* + - 1. Ramp rate limit

|  |  |
| --- | --- |
| Is the energy storage facility's ramp rate constraint activated? If Yes, with which value?  | Yes [ ] No [ ] Online control [ ] \_\_\_\_\_% Pn/min |

* + 1. Reactive power control
			1. Q control

|  |  |
| --- | --- |
| Is the Q control function activated? If Yes, with which set point? (Value differing from 0 kVAr must be agreed with the electricity supply undertaking.)  | Yes [ ] No [ ] Online control [ ] \_\_\_\_\_\_\_\_ kVAr |

* + - 1. Power factor control

|  |  |
| --- | --- |
| Is the power factor control function activated? If Yes, with which set point? (Value differing from cosφ 1.0 must be agreed with the electricity supply undertaking.)  | Yes [ ] No [ ] Online control [ ] \_\_\_\_\_\_\_\_ cosφInductive [ ] Capacitive [ ]  |

* + 1. Protection
			1. Relay settings

Please state current values at the time of commissioning in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Protective function** | **Symbol** | **Setting** | **Trip time** |
| Overvoltage (step 2) | U>> |  | V |  | ms |
| Overvoltage (step 1) | U> |  | V |  | s |
| Undervoltage (step 1) | U< |  | V |  | s |
| Overfrequency | f> |  | Hz |  | ms |
| Underfrequency | f< |  | Hz |  | ms |
| Change of frequency\* | df/dt |  | Hz/s |  | ms |

\* Used for island operational detection in the distribution grid

* + 1. Signature

|  |  |
| --- | --- |
| Date |  |
| Installation contractor |  |
| Person responsible for commissioning |  |
| Signature (person responsible for commissioning) |  |
| Facility owner |  |
| Signature (facility owner) |  |