Offshore Grid Connection Requirements

Annex A_02:

Main Circuit Parameter Report

Area of Application: DC-connected Offshore Windfarms

Revision history

Rev. Number	Date	Change	Author
1.0	28.07.2025	First edition	T. Nguyen (50HzT) E. Wiebe (AMP)

1 General

This annex describes the minimum requirements of the TSO for the Main Circuit Parameter Report towards the DC-connected Offshore Windfarm (OWF). It may provide supplementary requirements to [1] and [2].

The report shall give an overview of the electrical parameters of the DC connected OWF with their Wind Turbine Generators (WTG). In addition, the connectee shall provide information about the inherent capabilities of the DC-connected OWF and WTGs to the TSO.

2 Standards

If no explicit standards are specified, the following systems of standards shall be followed in the prioritized order:

i. German standards and regulations, including the grid codes of TSO
ii. Cenelec
iii. IEC
iv. Cigré recommendations
v. IEEE standards and recommendations.

If alternative standards will be used, they shall be approved by TSO. The latest edition including amendments of each standard and regulation shall apply.

SI units and the passive sign convention shall be used in all documents, if it is not otherwise specified by the TSO.

3 References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs:

[1] VDE-AR-N 4131: 2019-03: Technische Anschlussbedingungen für HGÜ-Systeme und über HGÜ-Systeme angeschlossene Erzeugungsanlagen (TAR HGÜ).
[2] 50HzT, AMP: Offshore-Netzanschlussregeln

4 Definitions

AC	Alternating Current
DC	Direct Current
HVDC	High Voltage Direct Current
IEC	International Electrotechnical Commission

IEEE	Institute of Electrical and Electronics Engineers
OWF	Offshore Windfarm
ONAR	Offshore-Netzanschlussregel
TSO	Transmission System Operator
VDE	Verband der Elektrotechnik Elektronik Informationstechnik e. V.
WTG	Wind Turbine Generator

5 Report Requirements

The connectee shall prepare the report “Main Circuit Parameters” and hand it over to the TSO.

The report shall be provided as a preliminary document at the start of the grid code compliance process with all already available information.

The report shall be provided in a final version as soon as all data are available (e.g., coming from steady-state simulation).

The report shall state different operation configurations (e.g. closed loops), if applicable.

The report shall state for all p.u. and % values the respective base value.

6 Equipment Data

In general, all requirements from section B.2.2.2 of [1] shall be fulfilled and additional requirements shall be taken the following into account.

The report shall contain the following additional data of the transformers, if applicable:

- tapping speed of tap changer for one step and for the complete range
- saturation curve

The report shall contain all electrical data of all switching devices and switchgears, if applicable.

The report shall contain all electrical design data of an AC filter, if applicable.

The report shall contain all electrical data from the chopper, if applicable, incl.

- energy storage capability
- time to conduct
- thermal recovery curve over time
- how much energy can be consumed by the chopper.
- graph displaying the thermal recovery over time.

The report shall contain all max. thermal load and short circuit currents of all components.

The report shall contain surge arrestor data, if applicable:

7 Operating Data

The report shall contain electrical parameters at which the OWF can operate, if applicable.

The report shall contain for the OWF the AC grid frequencies with which the system can

operate. If there are time limitations for certain AC grid frequencies, they shall be given in the report.

The report shall contain for the OWF the AC grid voltages with which the system can operate. If there are time limitations for certain AC grid voltages, they shall be given in the report.

The final report shall contain for the OWF the max. active and reactive power operating points with which the system can operate with based on steady-state simulations. If there are time limitations for certain active and reactive power, they shall be given in the report.

The operation range provided in this report shall at least fulfill all requirements stated in [1] and [2].

8 Evaluation criteria

The connectee shall prove that all relevant data are provided and the electrical parameters of the main circuit are complying with [1] and [2]. The TSO will verify and confirm the evaluation of the connectee.