## Minimum scope for checking equipment certificates

FGW
Company issuing equipment certificate:
Designation of equipment certificate (code number)
Responsible person from the issuing company:
Company checking the equipment certificate:
Responsible employee from checking company:


Place, date, stamp of checking company:

## 1. General specifications

a. Clear designation of the equipment / version(s) of the equipment
b. Technical specifications of the equipment (e.g. rated voltage, rated power)
c. Software version (or software versions, if different versions are to be used)
d. Clear indication of deviations/special issues (it applicable, conditions at which tull contormity can be achieved at PGS level)
e. Information regarding the transfer of the characteristics to versions not measured
f. Procedure under FGW TG8 Rev. 9 or more recent adhered to
g. Validity period

2. Validated model
a. Designation (for multiple models: clear allocation to the equipment versions)
b. MD5 checksum (for multiple models: clear allocation to the individual models)
c. Simulation environment (e.g. software, version, where relevant 32 or 64 bit version)
d. Simulation settings (e.g. RMS or EMT, solver, step size, other settings), also possible as a reference to the model description
e. Description for the integration of the equipment model into a PGS model
f. Parameter setting of the model (also possible as a reference to the manufacturer's model description) with at least details of
i. parameter setting of each equipment version
ii. possible FRT modes and how these are to be set
iii. k-factor with adjustment range and step size
iv. parameter setting of quasi steady-state behaviour (e.g. setpoint value specifications, protection settings)


Designation (for multiple models. clear allocation to the equipment versions)

3. Active power provision
a. $\mathrm{P}_{600}$ value
c. Adjustable/ minimum active power step size
d. Technical minimum power
e. Setting tolerance
f. Measured maximum and minimum active power gradient
g. P-gradient after reconnection
h. Transfer of the characteristics to versions not measured

## 4. Reactive power provision

a. PQ power diagram (max. reactive power capability in over- and under-excited operation) for min.
$\pm 10 \% U_{n} / V D E-A R-N 4110: \pm 15 \% U_{n}$ (clear definition of the algebraic sign of the reactive power)
b. Reactive power jump time
c. Setting tolerance
d. Reactive power-prioritised operation possible?
e. Transfer of the characteristics to versions not measured


## 5. System perturbations

a. Flicker: Flicker coefficients c as a function of the grid impedance angle $\Psi_{\mathrm{k}}$
b. Switching operations:
i. Voltage change factor $k_{U}\left(\Psi_{\mathrm{k}}\right)$
ii. Flicker form factor $k_{\mathrm{f}}\left(\psi_{\mathrm{k}}\right)$
iii. Maximum number of switching operations in 120 min: $\mathrm{N}_{120}$
c. Harmonic currents: harmonic, interharmonic and supra-harmonic currents
d. (VDE-AR-N 4110) Converters with thyristors: Rated power of the power converter, pulse count and least favourable control angle
e. (VDE-AR-N 4110) Indication of positive and negative phase sequence system of the feed-in current and information regarding the exceedance of limit values in terms of asymmetries.

6. Dynamic grid support
a. Self-protection values of the equipment in comparison to the FRT curve
b. Description of FRT modes (adjustment range and step size of the $k$-factor, ability to set parameters for FRT thresholds, feed-in from $P$ and $Q$ impossible during the fault?)
c. Details of the parameters according to Table 15 of VDE-AR-N-4110.
d. Short-circuit current contribution of the equipment for symmetrical and asymmetric faults according to

Table 16 of VDE-AR-N4110
e. Transfer of the characteristics to versions not measured

7. Parameter list with all relevant parameters available. For each parameter the following must be stated:
a. Standard value
b. Adjustment range
c. Step size

## 8. Protection

a. Identification of all protection devices (provide information regarding external protection devices)
b. Existence of a test terminal yes/no
c. For all protection levels:
i. Adjustment range for trigger values and times
ii. Step width for trigger values and times
d. Technical measurement evidence of the overall switch-off time for the complete functional chain
e. Type test of the integrated protection devices
f. Identification of compliance with the accuracies
g. The reset ratio of the voltage protection devices is complied with
h. Evidence that protection and control functions are executed separately
i. Auxiliary power supply sufficient, if required taking into account own consumption
j. Identification of the behaviour in case of failure of the auxiliary power supply
9. Digital attachments to the unit certificate
a. Technical information to the unit certificate


The equipment certificate can be used without restirction in the system certification process. The examining certification body confirms that the submitted equipment certificate including the model is fully suitable for use in the system certification process according to VDE-AR-N 4110, 4120 or 4130 . All necessary information and assesments are included.


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The undersigned declares that all information was provided to the best knowledge and belief.

