In recent years, there has been a significant increase in the number of energy generation plants utilizing renewable energy sources. In addition to photovoltaics (PV) and wind power, biomass or biogas-fired combined heat and power plants (CHP) or hydroelectric power plants are also counted under renewables. Industry experts assume that the share of renewable energies in the overall energy balance will continue to increase in the coming years.

This increasing growth presents the energy industry with new challenges. In order to guarantee the stability and security of the energy supply, corresponding grid access regulations have been defined in many European countries. These stipulate a minimum of electrical properties and must be observed by future energy producers.

As your independent and competent partner, VDE Renewables validates the grid conformity of your power generation unit or your generation plant according to the respective grid access regulations (grid codes).

In Germany, different grid access regulations exist for the grid voltage level. These can be found in the following table:

<table>
<thead>
<tr>
<th>Voltage level</th>
<th>Grid Code</th>
<th>Testing and certification standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low voltage</td>
<td>VDE AR-N 4105</td>
<td>VDE 0124-100</td>
</tr>
<tr>
<td>Medium voltage</td>
<td>VDE AR-N 4110</td>
<td></td>
</tr>
<tr>
<td>High voltage</td>
<td>VDE AR-N 4120</td>
<td>FGW TR3, TR4, TR8</td>
</tr>
<tr>
<td>Maximum voltage</td>
<td>VDE AR-N 4130</td>
<td></td>
</tr>
</tbody>
</table>
Connection to low voltage grids
The manufacturers of energy generation units (EGU) as well as operators of energy generating plants (EGP) must guarantee compliance with the grid code requirements for connection to the low voltage grid (e.g. PV inverter, wind turbine, CHP and battery storage system). This is generally done by laboratory testing of the corresponding test standard (type testing). VDE Renewables and its partner laboratories offer relevant testing and certification services in order to be able to test your EGU at a short notice and in a qualified manner. This also applies to a large number of foreign low voltage grid codes, for example:

- **Austria**: ÖVE/ÖNORM E 8001-4-712 & TOR D4
- **France**: DIN VDE 0126-1-1:2013 & ENEDIS-NOI-RES-13E
- **Italy**: CEI 0-21
- **United Kingdom**: ER G98 and G99 (previous version: ER G83/2 & ER G59/3)
- **European Grid Code**: EN 50549 (Poland, Cyprus, Czech Republic, Denmark, Greece, Ireland, Netherlands, Portugal, Sweden, Slovakia)
- **Australia/New Zealand**: AS/NZS 4777.2

Connection to the medium, high and maximum voltage grids
In Germany, the verification of network conformity to the medium, high and maximum voltage levels is generally carried out in 2 steps:

1. The operator of an energy generation plant (EGP) must enter the grid code of the relevant voltage level. This is done within the framework of the power plant certificate.

2. After construction and commissioning of the EGP, the required declaration of conformity is issued; this serves as proof that the EGP was constructed in accordance with the specifications of the power plant certificate.

The prerequisite for the connection of an EGU in an EGP at the medium, high and maximum voltage levels is a unit certificate. In the case of EGU whose individual measurement within the framework of the unit certificate becomes uneconomical (e.g. due to excessive performance), the plant certificate can be obtained via a “unique procedure”.

Component certification
In addition, independent component certificates (e.g. EGP controllers) are provided for important components that are used in an EGP at the medium, high and maximum voltage levels. Please also contact us if you have any questions regarding the approval of your EGU or EGP abroad. We will be happy to assist you.

The extensive experience and impartiality of our experts ensure a professional assessment of EGU and EGP, in which the relevant grid codes and safety standards must be taken into account. With strong expertise in all essential areas, VDE Renewables is able to support government agencies, grid operators and energy suppliers in the definition and implementation of grid codes and other technical framework conditions in the field of grid operations.

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