Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-ZE-22290-01-01 according to DIN EN ISO/IEC 17065:2013

Valid from: **01.09.2025**

Date of issue: 01.09.2025

This annex is part of the Accreditation Certificate D-ZE-22290-01-00.

Holder of the Accreditation Certificate:

DNV Renewables Certification GmbH
Brooktorkai 18, 20457 Hamburg, Germany

with the locations

DNV Renewables Certification Brooktorkai 18, 20457 Hamburg, Germany
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The certification body meets the requirements of DIN EN ISO/IEC 17065:2013 to carry out the conformity assessment activities listed in this annex. The certification body meets additional legal and normative requirements, if applicable, including those in relevant sectoral schemes, provided that these are explicitly confirmed below.

The management system requirements of DIN EN ISO/IEC 17065 are written in the language relevant to the operations of certification bodies and they conform to the principles of DIN EN ISO 9001.

This annex to the certificate was issued by the Deutsche Akkreditierungsstelle GmbH (DAkkS) and is digitally sealed.
This annex to the certificate is only valid together with the written accreditation certificate and reflects the status as indicated by the date of issue. The current status of any valid and surveyed accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH (www.dakks.de).

Certification of products, processes and services in the areas of:

1. **Wind turbines and their components, small wind turbines, wind farm projects, wind power plants, incl. floating wind**
2. **Photovoltaic plants**
3. **Ocean energy converters**
4. **Service programs incl. lifetime extension and related services and technologies**
5. **Grid connection of power generating units, components and generating plants**
6. **Energy storage for wind energy, photovoltaics and other energies**
7. **Marking of offshore installations**

Flexibility of the scope of accreditation

Within the parts of accreditation scope marked with * the application of certification programs and standards with different dates of revision is permitted to the Certification Body without prior confirmation by DAkkS (Flexibility Category A). The certification body maintains a current list of all certification programs and standards within the flexible scope of accreditation.

The certification methods are indicated with the following abbreviations for locations, in which they are performed:

Hamburg = H Dresden = D Hellerup = C
London = L Shanghai = S

I. Product(s) / Product group(s) and applicable certification schemes

1. Certification of wind turbines and their components, wind farm projects, small wind turbines and related technologies

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a. Type and component certification

Document reference	Document title	locations
DNV-SE-0441 * 2021-10	Type and component certification of wind turbines	H, C, S
DNV-SE-0074 * 2021-09	Type Certification of Wind Turbines according to IEC 61400-22	H, C, S

Document reference	Document title	locations
GL Rules and Guidelines 2003 (with supplementary 2004) 2010	Guideline for the Certification of Wind Turbines	H
DECC, UK * 2014	Microgeneration Certification Scheme (MCS)	H
TAPS-2000 * 2003-04	Provisional Type Certification Scheme For Wind Turbine Generator Systems In India	H

b. Project certification

Document reference	Document title	locations
DNV-SE-0190 * 2023-03	Project certification of wind power plants	H, C, L, S
DNV-SE-0073 * 2021-09	Project Certification of Wind Farms according to IEC 61400-22	H, C, L, S
BSH 7005 * 2021-06	Standard Design: Minimum requirements concerning the constructive design of offshore structures within the Exclusive Economic Zone (EEZ)	H
GL Rules and Guidelines 2005 2012	Guideline for the Certification of Offshore Wind Turbines	H

c. Applicable for Type, component and project certification

Document reference	Document title	locations
DNV-SE-0422 * 2024-09	Certification of floating wind turbines	H, C, L
DNV-SE-0420 * 2021-10	Certification of meteorological masts	H
DNV-SE-0436 * 2022-09	Shop approval in renewable energy	H, C, S
DNV-SE-0077 * 2021-10	Certification of fire protection systems for wind turbines	H

Document reference	Document title	locations
GL Rules and Guidelines Rev. 2, 2009-01	GL Wind Technical Note - Certification of Fire Protection Systems for Wind Turbines - Certification Procedures	H
GL Rules and Guidelines Rev. 3, 2013-07	GL Renewables Certification - Technical Note - Certification of Fire Protection Systems for Wind Turbines	H
GL Rules and Guidelines Rev. 5, 2013-07	GL Wind Guideline 067 - Certification of Wind Turbines for Extreme Temperatures (here: Cold Climate)	H
EN 61400-22 2011-10	Wind turbines - Part 22: Conformity testing and certification	H, C
IEC 61400-22 Edition 1.0 2010-05	Wind turbines - Part 22: Conformity Testing and Certification (withdrawn standard)	H, C
IS 61400-22 2018-06	Wind turbines - Part 22: Conformity Testing and Certification	H, C
CNS 15176-22 2018	Wind Turbines - Part 22: Conformity testing and certification (translation of the IEC 61400-22:2010)	H, C, S
JIS C 1400-22 2014	Wind Turbines - Part 22: Conformity testing and certification (translation of the IEC 61400-22:2010)	H, C
KS C IEC 61400-22 2013-10	Conformity testing and certification (translation of the IEC 61400-22:2010)	H, C
Danish Energy Agency BEK 1773 2020-11	Executive Order from the Danish Ministry for Climate, Energy and Buildings No. 1773 dated 2020-11-30: “Executive order on the technical certification and servicing of wind turbines etc.“	H, C
Danish Energy Agency BEK 73 2013-01	Executive Order from the Danish Ministry for Climate, Energy and Buildings No. 73 dated 2013-01-25: “Executive order on the technical certification scheme for wind turbines“	H, C
Danish Energy Agency BEK 648 2023-05	Bekendtgørelse om teknisk certificering og servicering af vindmøller m.v. “Executive Order on technical certification and servicing of wind turbines, etc.”	H, C
Danish Energy Agency BEK 1047 2023-07	Bekendtgørelse om ændring af bekendtgørelse om teknisk certificering og servicering af vindmøller m.v. “Executive Order on change to Executive Order on technical certification and servicing of wind turbines, etc.”	H, C

Document reference	Document title	locations
DIBt 2015-03	Guideline for wind turbines	H

2. Certification of photovoltaic plants

Document reference	Document title	locations
DNV-SE-0078 * 2021-10	Project certification of photovoltaic power plants	H

3. Certification of ocean energy converters

Document reference	Document title	locations
DNV- SE-0120 * 2023-03	Certification of wave energy converters and arrays	H, L
DNV-SE-0163 * 2021-10	Certification of tidal turbines and arrays	H, L

4. Service programs

Document reference	Document title	locations
DNV-SE-0263 * 2021-10	Certification of lifetime extension of wind turbines	H
GL Rules and Guidelines 2009	Guideline for the continued operation of wind turbines	H
NPR 8400 en * 2016	Principles and technical guidance for continued operation of onshore wind turbines	H

Document reference	Document title	locations
DNV-SE-0439 * 2021-10	Certification of condition monitoring	H, S
GL Rules and Guidelines 2007 2013	Guideline for the Certification of Condition Monitoring Systems for Wind Turbines	H
DNV-SE-0448 * 2021-10	Certification of service and maintenance activities in the wind energy industry	H
GL Rules and Guidelines Rev. 6, 2009-12	GL Wind Guideline - Certification of Service Providers in the Wind Energy Industry - Scope of Assessment	H

5. Grid connection of power generating units, components and generating plants

Document reference	Document title	locations
DNV-SE-0124 * 2024-11	Certification of grid code compliance *http://www.dnv.com/GridCodeListing.pdf*	H, D
FGW TR 8 * Rev. 9, 2019-02	Zertifizierung der elektrischen Eigenschaften von Erzeugungseinheiten und -anlagen, Speicher sowie für deren Komponenten am Stromnetz	H, D
Asociacion Empresarial Eolica PVVC Versión 11 2018-09	"Procedure for verification, validation and certification of the requirements of the P.O. 12.3 and P.O. 12.2 on the response of the wind farms and photovoltaic plants in the event of voltage dips" (Spanish certification procedure) Procedimientos de verificación, validación y certificación para los requisites del P.O.12.3 y P.O.12.2 SENP sobre la respuesta de las instalaciones eólicas y fotovoltaicas ante huecos de tension	H, D

Document reference	Document title	locations
NTS-631 SEPE * Rev. 2.1, 2021-07	Norma técnica de supervision de la conformidad de los módulos de generación de electricidad según el Reglamento UE 2016-631 “Technical standard for monitoring the compliance of electricity generation modules according to EU Regulation 2016/631” (The certified type of product and the assessment activities are detailed in Table 1 below)	H, D
NTS SENP * Rev. 1.1, 2021-07	Norma técnica de supervisión de la conformidad de los módulos de generación de electricidad según el P.O. 12.2 SENP “Technical standard for monitoring the compliance of power generating modules according to P.O. 12.2 SENP” (The certified type of product and the assessment activities are detailed in Table 1 below)	H, D
Anexo de la NTS * Rev. 1.0, 2021-11	Anexo sobre los subapartados 5.6, 5.9 y 5.10 de la versión 2.1 (del 9/7/2021) de la NTS	H, D

6. energy storage for wind energy, photovoltaics and other energies

Document reference	Document title	locations
DNV-SE-0190, sec. 8.12 * 2021-09	Project certification of wind power plants	H
DNV EESS* 2023-08	Certification of grid connected electrical energy storage systems	H

7. Marking of offshore installations

Document reference	Document title	locations
Rahmenvorgaben der WSV * Version 3.0 2019-07	Generaldirektion Wasserstraßen und Schifffahrt WSV-Rahmenvorgaben Kennzeichnung Offshore-Anlagen, Version 3.0, Stand 01.07.2019 (in German)	H

I. Related Standards

1. Wind turbines and their components, small wind turbines, wind farm projects, wind power plants, incl. floating wind

Document reference	Document title
AWEA 9.1 standard * 2009	AWEA Small Wind Turbine Performance and Safety Standard
BSH 7004 2008-02	Standard - Ground Investigations for Offshore Wind Farms
BWEA 2008-02	Small Wind Turbine Performance and Safety Standard
CNS 15176-1 2018	Wind Turbines - Part 1: Design requirements (*translation of the IEC 61400-1 with local amendments*)
CNS 15176-3 2019	Wind Turbines - Part 3: Design requirements for offshore wind turbines (*translation of the IEC 61400-3*)
DIBt 2012-07	Note for the manufacturing, design and implementation of solar plants
DIN 18088-1 * 2019-01	Structures for wind turbines and platforms - Part 1: Basic principles and actions
DIN 18088-2 * 2019-01	Structures for wind turbines and platforms - Part 2: Concrete structures
DIN 18088-3 * 2019-01	Structures for wind turbines and platforms - Part 3: Steel structures
DIN 18088-4 * 2019-01	Structures for wind turbines and platforms - Part 4: Soil and foundation elements
DIN 18088-5 * 2020-10	Structures for wind turbines and platforms - Part 5: Joints between steel structures and concrete structures
DIN EN 50308 * VDE 0127-100 Berichtigung 1, 2008-11	Wind turbines - Protective measures - Requirements for design, operation and maintenance
DNV-RP-0175 * 2021-10	Icing of wind turbines
DNV-RP-0286 * 2021-10	Coupled analysis of floating wind turbines

Document reference	Document title
DNV-RP-0286 * 2021-10	Coupled analysis of floating wind turbines
DNV-RP-0360 * 2021-10	Subsea power cables in shallow water
DNV-RP-0363 * 2021-10	Extreme temperature conditions for wind turbines
DNV-RP-0416 * 2021-10	Corrosion protection for wind turbines
DNV-RP-0419 * 2021-10	Analysis of grouted connections using the finite element method
DNV-RP-0585 2021-08	Seismic design of wind power plants
DNV-RP-0618 2022-09	Rock scour protection for monopiles
DNV-ST-0054 * 2021-11	Transport and installation of wind power plants
DNV-ST-0076 * 2021-06	Design of electrical installations for wind turbines
DNV-ST-0119 * 2021-06	Floating wind turbine structures
DNV-ST-0126 * 2021-12	Support structures for wind turbines
DNV-ST-0145 * 2021-09	Offshore substations
DNV-ST-0359 * 2021-11	Subsea power cables for wind power plants
DNV-ST-0361 * 2021-11	Machinery for wind turbines
DNV-ST-0376 * 2024-04	Rotor blades for wind turbines
DNV-ST-0437 * 2024-05	Loads and site conditions for wind turbines
DNV-ST-0438 * 2021-11	Control and protection systems for wind turbines
IEC 61400-1 * Edition 4.0, 2019-02	Wind energy generation systems - Part 1: Design requirements

Document reference	Document title
IEC 61400-1 * Edition 4.0, 2019-02	Wind energy generation systems - Part 1: Design requirements
IEC 61400-2 * Edition 3.0, 2013-12	Wind turbines - Part 2: Small wind turbines
IEC 61400-24 * Edition 1.0, 2010-06	Wind Turbines - Part 24: Lightning protection
IEC 61400-25-2 * Edition 1.0, 2006-12	Wind turbines - Part 25-2: Communications for monitoring and control of wind power plants - Information models
IEC 61400-25-3 * Edition 1.0, 2006-12	Wind turbines - Part 25-3: Communications for monitoring and control of wind power plants - Information exchange models
IEC 61400-25-4 * Edition 1.0, 2008-08	Wind turbines - Part 25-4: Communications for monitoring and control of wind power plants - Mapping to communication profile
IEC 61400-25-5 * Edition 1.0, 2006-12	Wind turbines - Part 25-5: Communications for monitoring and control of wind power plants - Conformance testing
IEC 61400-25-6 * Edition 1.0, 2010-11	Wind turbines - Part 25-6: Communications for monitoring and control of wind power plants - Logical node classes and data classes for condition monitoring
IEC 61400-26-1 * Edition 1.0, 2019-05	Wind energy generation systems - Part 26-1 Availability for wind energy generation systems
IEC 61400-3 * Edition 1.0, 2009-02	Wind turbines - Part 3: Design requirements for offshore wind turbines
IEC 61400-3-1 * Edition 1.0, 2019-04	Wind energy generation systems - Part 3-1: Design requirements for fixed offshore wind turbines
IEC 61400-4 * Edition 1.0, 2012	Wind turbines - Part 4: Design requirements for wind turbine gearboxes
IEC 61400-5 * Edition 1.0, 2020-06	Wind energy generation systems - Part 5: Wind turbine rotor blades

Document reference	Document title
IEC 61400-6 * Edition 1.0, 2020-04	Wind energy generation systems - Part 6: Tower and foundation design requirements
IEC TS 61400-3-2 * Edition 1.0, 2019-04	Wind energy generation systems - Part 3-2: Design requirements for floating offshore wind turbines
JIS C 1400-1 2017-01	Wind Energy Generation systems - Part 1: Design requirements (*translation of the IEC 61400-1:2010*)
JIS C 1400-3 2014-08	Wind turbines - Part 3: Design requirements for offshore wind turbines (*translation of the IEC 61400-3:2009*)
JIS C 1400-24 2023-05	Wind Turbines – Part 24: Lightning protection
JSCE 2010	Guidelines for Design of Wind Turbine Support Structures and Foundation
KS C 8572 2015-07	Wind turbines - Part 1: Design requirements for wind turbines (*translation of the IEC 61400-1:2010*)
KS C 8573 2015-07	Wind turbines - Part 3: Design requirements for offshore wind turbines (*translation of the IEC 61400-3:2009*)
Renewable UK * 2014-01	Small Wind Turbine Standard
UL 6141 * 2016-05	Standard for Wind Turbines Permitting Entry to Personnel
UL 6142 * 2012-11	Standard for Safety for Small Wind Turbines
VGBE-S-021-01 * 2023-05 DE	VGB/BAW-Standard: Korrosionsschutz von Offshore-Bauwerken zur Nutzung der Windenergie Teil 1: Allgemeines Corrosion Protection for Offshore Wind Structures, Part 1: General
VGBE-S-021-02 * 2023-05 DE	VGB/BAW-Standard: Korrosionsschutz von Offshore-Bauwerken zur Nutzung der Windenergie Teil 2: Anforderungen an Korrosionsschutzsysteme
VGBE-S-021-03 * 2023-05 DE	VGB/BAW-Standard: Korrosionsschutz von Offshore-Bauwerken zur Nutzung der Windenergie Teil 3: Applikation von Beschichtungssystemen
VGB-S-021-04 2018-07 DE	VGB/BAW-Standard: Korrosionsschutz von Offshore-Bauwerken zur Nutzung der Windenergie Teil 4: Kathodischer Korrosionsschutz (KKS)
ISO 24656 2022-05	Cathodic protection of offshore wind structures

Document reference	Document title
METI Rev. 5 2023-03	Interpretation of Technical Standards for Wind Power Generation Facilities
Committee on Study of Developing Offshore Wind Power Generation Facilities 2020-03	Official Explanation of Technological Standards for Offshore Wind Power Facilities (Revised) (March 2020)

2. photovoltaic plants

Document reference	Document title
UL 2703 * 2015-01	Standard for Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels

Standards listed in sec. II.1. are partly applicable.

3. ocean energy converters

Document reference	Document title
DNV-ST-0164 * 2021-11	Tidal turbines

Standards listed in sec. II.1. are partly applicable.

4. service programs incl. lifetime extension

Document reference	Document title
DNV-ST-0262 * 2021-11	Lifetime extension of wind turbines

Standards listed in sec. II.1. are partly applicable.

5. Grid connection of power generating units, generating plants

Document reference	Document title
12/X/STD (CONN)/GM/CEA 2007-02	THE GAZETTE OF INDIA Notification No. 12/X/STD (CONN)/GM/CEA Technical Standards for Connectivity to the Grid 21st February , 2007
12/X/STD (CONN)/GM/CEA 2013-10	THE GAZETTE OF INDIA Notification No. 12/X/STD (CONN)/GM/CEA Technical Standards for Connectivity to the Grid 15th October, 2013
12/X/STD (CONN)/GM/CEA/2018 2019-02	THE GAZETTE OF INDIA, Central Electricity Authority Notification No. 12/X/STD (CONN)/GM/CEA/2018 6th February, 2019
12/X/STD (CONN)/GM/CEA/2018 2023-01	Central Electricity Authority Clarification in CEA, No. 12/X/STD (CONN)/GM/2023/428 6th January, 2023
BDEW * 2012-11	BDEW application hints for “Ordinance on management premium for current from wind and solar radiation energy (ordinance that cuts the management premium - MaPrV)”
BDEW * 2008	Generating plants at medium-high-voltage, directive for connection and parallel operation of generating plants at medium-high-voltage with the supplements of January 2009, July 2010, 15th February 2011 and 1st January 2013
CEI 0-16 * 2022-03	Regola tecnica di riferimento per la connessione di Utenti attivi e passivi alle reti AT ed MT delle imprese distributrici di energia elettrica Reference technical rules for the connection of active and passive consumers to the HV and MV electrical networks of distribution Company

Document reference	Document title
CEI 0-16 V1 * 2022-11	Regola tecnica di riferimento per la connessione di Utenti attivi e passivi alle reti AT ed MT delle imprese distributrici di energia elettrica Reference technical rules for the connection of active and passive consumers to the HV and MV electrical networks of distribution Company
CEI 0-16 V2 * 2023-05	Regola tecnica di riferimento per la connessione di utenti attivi e passivi alle reti AT ed MT delle imprese distributrici di energia elettrica Reference technical rules for the connection of active and passive consumers to the HV and MV electrical networks of distribution Company
CEI 0-16 V3 * 2024-01	Regola tecnica di riferimento per la connessione di Utenti attivi e passivi alle reti AT ed MT delle imprese distributrici di energia elettrica Reference technical rules for the connection of active and passive consumers to the HV and MV electrical networks of distribution Company
CEI 0-21 2022-03	Regola tecnica di riferimento per la connessione di Utenti attivi epassivi alle reti BT delle imprese distributrici di energia elettrica Reference technical rules for the connection of active and passive users to the LV electrical Utilities
EN 50549-1 * 2019-02	Requirements for generating plants to be connected in parallel with distribution networks - Part 1: Connection to a LV distribution network above 16 A
EN 50549-2 * 2019-02	Requirements for generating plants to be connected in parallel with distribution networks - Part 2: Connection to a MV distribution network
EN 50549-10 * 2022-10	Requirements for generating plants to be connected in parallel with distribution networks - Part 10: Tests for conformity assessment of generating units

Document reference	Document title
DNV-ST-0125 * 2024-11	Grid code compliance
ena Engineering Recommendation G99, Issue 1, Amendment * 10 2024-03	Requirements for the connection of generation equipment in parallel with public distribution networks on or after 27 April 2019
ENTSO-E 2020-11	General guidance on compliance verification - compliance testing and use of equipment certificates
EU 2016/631	COMMISSION REGULATION (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators
FGW TG 4 * Rev. 10, 2022-04	Demands on modelling and validation of simulation models of the electrical characteristics of generating units and -plants, storage systems as well as their components
German Federal Ministry of Justice 2012-11	Ordinance on management premium for current from wind and solar radiation energy (ordinance that cuts the management premium - MaPrV)
IEC 61400-27-1 * 2020-07	Wind energy generation systems - Part 27-1: Electrical simulation models - Generic models
IEC 61400-27-2 * 2020-07	Wind energy generation systems - Part 27-2: Electrical simulation models - Model validation
IEC TS 62786 * 2017-04	Distributed energy resources connection with the grid
IEC TS 62910 * 2015-10	Utility-interconnected photovoltaic inverters - Test procedure for low voltage ride-through measurements

Document reference	Document title
Orden TED/749/2020 * 2020-08	Orden TED/749/2020, de 16 de julio, por la que se establecen los requisitos técnicos para la conexión a la red necesarios para la implementación de los códigos de red de conexión. BOLETÍN OFICIAL DEL ESTADO, Núm. 208, Sec. I. Pág. 62406 "Ordinance TED/749/2020, 16th of July, establishing the necessary technical requirements for grid connections for the implementation of the network connection codes. Official State Journal No. 208, Sec. I. Page 62406*
P.O. 12.3: Ministerio de Industria, Turismo y Comercio 2006	Requirements regarding wind power facility response to grid voltage dips
P.O.12.2 2018-05	“Generation and demand facilities: Minimum requirements for design, equipment, operation, commissioning and safety” (Spanish grid code of the grid operator) Instalaciones de generación y de demanda: Requisitos minimos de diseño, equipamiento, funcionamiento, puesta en servicio y seguridad
PSE 2018-12	Wymogi ogólnego stosowania wynikające z Rozporządzenia Komisji (UE) 2016/631 z dnia 14 kwietnia 2016 r. ustanawiającego kodeks sieci dotyczący wymogów w zakresie przyłączenia jednostek wytwórczych do sieci (NC RfG)”/ ”Generally applicable requirements resulting from Commission Regulation (EU) 2016/631 of 14 April 2016 laying down the network code concerning the requirements for connection of generating units to the grid (NC RfG)”

Document reference	Document title
PTPiREE * 2024-10	Warunki i procedury wykorzystania certyfikatów w procesie przyłączenia modułów wytwarzania energii do sieci elektroenergetycznych Conditions and procedures for using certificates in the process of connecting power generation modules to power networks, Rev. 1.3
Resolución PO 12.2 * 2018-02	Resolución de 1 de febrero de 2018, de la Secretaría de Estado de Energía, por la que se aprueba el procedimiento de operación 12.2 «Instalaciones conectadas a la red de transporte y equipo generador: requisitos mínimos de diseño, equipamiento, funcionamiento, puesta en servicio y seguridad» de los sistemas eléctricos no peninsulares. BOLETÍN OFICIAL DEL ESTADO, Núm. 42,Sec. III. Pág. 18835 Resolution of 1th February 2018, from the Secretary of State for Energy, approving the operating procedure 12.2 "Installations connected to the transmission grid and generating equipment; minimum requirements for design, equipment, Operation, commissioning and security" of electrical Systems from the Islands. Official State Journal No. 42, Sec, III. page 18835"
Terna Allegato A.18, Rev. 02 2021-02	Guida Tecnica, Verifica della conformità degli impianti di produzione alle prescrizioni tecniche del Gestore (Technical Guide, Verification of compliance of production plants with the Operator’s technical requirements)
VDE V 0124-100 * 2020-06	Niederspannung - Prüfanforderungen an Erzeugungseinheiten vorgesehen zum Anschluss und Parallelbetrieb am Niederspannungsnetz

Document reference	Document title
VDE-AR-N 4100 * 2019-04	Technische Regeln für den Anschluss von Kundenanlagen an das Niederspannungsnetz und deren Betrieb (TAR Niederspannung) Technical rules for the connection and operation of customer installations to the low voltage network (TAR low voltage)
VDE-AR-N 4105 * 2018-11	Erzeugungsanlagen im Niederspannungsnetz - Technische Mindestanforderungen für Anschluss und Parallelbetrieb von Erzeugungsanlagen am Niederspannungsnetz; Generators connected to the low-voltage distribution network - Technical requirements for the connection to and parallel operation with low-voltage distribution networks
VDE-AR-N 4110 * 2023-09	Technische Regeln für den Anschluss von Kundenanlagen an das Mittelspannungsnetz und deren Betrieb (TAR Mittelspannung); Technical requirements for the connection and operation of customer installations to the medium voltage network (TAR medium voltage)
VDE-AR-N 4120 * 2018-11	Technische Regeln für den Anschluss von Kundenanlagen an das Hochspannungsnetz und deren Betrieb (TAR Hochspannung); Technical requirements for the connection and operation of customer installations to the high voltage network (TAR high voltage)
VDE-AR-N 4130 * 2018-11	Technische Regeln für den Anschluss von Kundenanlagen an das Höchstspannungsnetz und deren Betrieb (TAR Höchstspannung); Technical requirements for the connection and operation of customer installations to the extra high voltage network (TAR extra high voltage)
VDE-AR-N 4131 2019-03	Technische Regeln für den Anschluss von HGÜ-Systemen und über HGÜ-Systeme angeschlossene Erzeugungsanlagen (TAR HGÜ); Technical requirements for grid connection of high voltage direct current systems and direct current-connected power park modules (TAR HVDC)

6. Energy storage

Document reference	Document title
IEC 62619 * 2017-02	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications
IEC 62933-1, ED1 2018-02	Electrical energy storage (EES) systems - Part 1: Vocabulary
IEC 62933-2-1, ED1 2017-12	Electrical Energy Storage (EES) systems - Part 2-1: Unit parameters and testing methods - General specification
IEC 62933-3-1, ED1 2018-08	Electrical energy storage (EES) systems Part 3-1: Planning and performance assessment of electrical energy storage systems General specification
IEC TS 62933-4-1, ED1 2017-07	Electrical energy storage (EES) systems Part 4-1: Guidance on environmental issues General specification
IEC TS 62933-5-1, ED1 2017-07	Electrical energy storage (EES) systems Part 5-1: Safety considerations for grid-integrated EES systems General specification
IEC TS 62933-5-2, ED1 2020-04	Electrical energy storage (EES) systems - Part 5-2: Safety requirements for grid-integrated EES systems - Electrochemical-based systems
UL 1973 * 2013-07	Batteries for Use in Light Electric Rail (LER) Applications and Stationary Applications

Document reference	Document title
UL 9540 * 2016-11	Energy Storage Systems and Equipment
UL 9540A * 2018-06	Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems
VDE-AR-E 2510-50 2017-05	Stationary battery energy storage systems with lithium batteries - Safety requirements

Standards listed in sec. II.5. are partly applicable.

7. Marking of offshore installations

Document reference	Document title
Rahmenvorgaben der WSV * Version 3.0 2019-07	Generaldirektion Wasserstraßen und Schifffahrt WSV-Rahmenvorgaben Kennzeichnung Offshore-Anlagen, Version 3.0, Stand 01.07.2019 (in German)

Table 1: Details on type of product and the assessment activities for the certification according to the Spanish NTS standards (*Appendix to Chapter 5 Grid Connection*)

Type of product	Certification scheme and basis for the assessment activities	Certification requirements
Power generating units and additional components (e.g. STATCOM or power plant controller), generating plants and energy storage systems for wind energy, photovoltaics and other energies (e.g. any synchronous power generating modules).	Norma técnica de supervision de la conformidad de los módulos de generación de electricidad según el Reglamento UE 2016/631, as listed above (NTS-631).	Certification requirements raised within chapter 5 (as detailed below) and following the procedures defined in chapter 4 of the stated certification scheme regarding the grid connection of the defined product types.
	Norma técnica de supervisión de la conformidad de los módulos de generación de electricidad según el P.O. 12.2 SENP, as listed above (NTS SENP).	
	As defined in table 1 of NTS-631 as well as table 1 of NTS SENP, the basis for the certification could be corresponding tests, manufacturer declarations, simulations or appropriate equipment and / or component certificates. This includes performing complementary simulations if required.	Limited Frequency Sensitive Mode-Overfrequency (LFSM-O)
		Limited Frequency Sensitive Mode-Underfrequency (LFSM-U)
		Frequency Sensitive Mode (FSM)
		Power-frequency control capability
		Capability to limit the production up and down ramps
		Active power control capability and range
		Synthetic Inertia
		Synthetic Inertia maximum capacity and below maximum capacity
		Reactive power control in PPM
		Power oscillations damping for SPGM
		Power oscillations damping for PPM
		Robustness requirements: Active power recovery after a fault, fault ride through capability, transient overvoltage and fast fault current injection
		Black start
		Island operation
		Fast re-synchronization

Abbreviations used:

AWEA	American Wind Energy Association
BAW	Bundesanstalt für Wasserbau
BDEW	Bundesverband der Energie- und Wasserwirtschaft e.V.
BSH	Bundesamt für Seeschifffahrt und Hydrographie (Bundesrepublik
Deutschland) BWEA	British Wind Energy Association
CEI	Comitato Elettrotecnico Italiano
CNS	The National Standards of the Republic of China
DECC	Department of Energy and Climate Change, United Kingdom
DIN	Deutsches Institut für Standardisierung
DIBt	Deutsches Institut für Bautechnik
DNV	Det Norske Veritas
EN	European standard
ena	Energy networks association, UK
ENTSO-E	European Network of Transmission System Operators for
Electricity EESS	Electrical energy storage systems
FGW	Fördergesellschaft Windenergie und andere Erneuerbare Energien
GL	Germanischer Lloyd
IEC	International Electrotechnical Commission
IS	Indian Standards
ISO	International Organization for Standardization
JIS	Japanese Industrial Standards Committee
JSCE	Japan Society of Civil Engineers
KS	Korean Industrial Standards
METI	Ministry of Economy, Trade and Industry
MV	Medium Voltage
NTS	Norma técnica de supervision
LR	Lloyd's Register
LV	Low Voltage
OSS	Offshore Service Specification
P.O.	Procedimiento de operación Ministerio de Industria, Turismo y Comercio (Procedure of operation)
PTPiREE	Polish Conditions and procedures for grid connection of power generation modules to the transmissions systems
PSE	Polskie Sieci Elektroenergetyczne (polish electric nets)
PVVC	Procedure for Verification, Validation and Certification
RP	Recommended Practice
SE	Service Specification
ST	Standard

Abbreviations used:

TAPS	Type Approval - Provisional Scheme, Ministry of Non-conventional Energy Sources (New Delhi, India)
Terna	Italian grid operator for electricity transmission
TN	Technical Note
TS	Technical Specifications
UL	Underwriters Laboratories
VGBE	Vereinigung der Betreiber von Kraftwerksanlagen und
Energiewirtschaft VDE	Verband der Elektrotechnik Elektronik Informationstechnik e.V.
WSV	Wasserstraßen- und Schifffahrtsverwaltung des Bundes (Federal office of waterways and shipping)