Revision of Wind Farm Certification Onshore Wind Power Plant Edition (NKRE-GL-WFC01)

Comparison Table for Previous and New Versions

[After revision: Edition: September 2024 ← Before revision: Edition: March 2023]

September 01, 2024
NIPPON KAIJI KYOKAI (ClassNK)

- The underlined parts of the provisions listed in the "Before revision" column shall be amended to the underlined parts of the corresponding provisions listed in the "After revision" column.
- Where a provision is marked with double lines in the "Before revision" column and there is no corresponding provision in the "After revision" column, that provision shall be deleted.
- Where a provision is marked with double lines in the “After revision” column and there is no corresponding provision listed in the "Before revision" column, that provision shall be added.

End

Cover and revision history

After revision	Before revision
Revision History I. *(Omitted)* II. *(Omitted)* III. New issue dated September 01, 2024 (Document No.: NKRE-GL-WFC01, Edition: September 2024) EFFECTIVE DATE and APPLICATION 1. These guidelines shall be enforced from September 01, 2024. 2. It should be noted that the requirements based on the following regulation shall be applied from the effective date of that regulation in accordance with Chapter 1, 1.1.1-3. of these Guidelines. 1) 20240318 Hokyoku, No. 3: "Partial Amendment of Interpretation of Technical Standards for Wind Power Generation Facilities"	Revision History I. *(Omitted)* II. *(Omitted)* *(Added)*

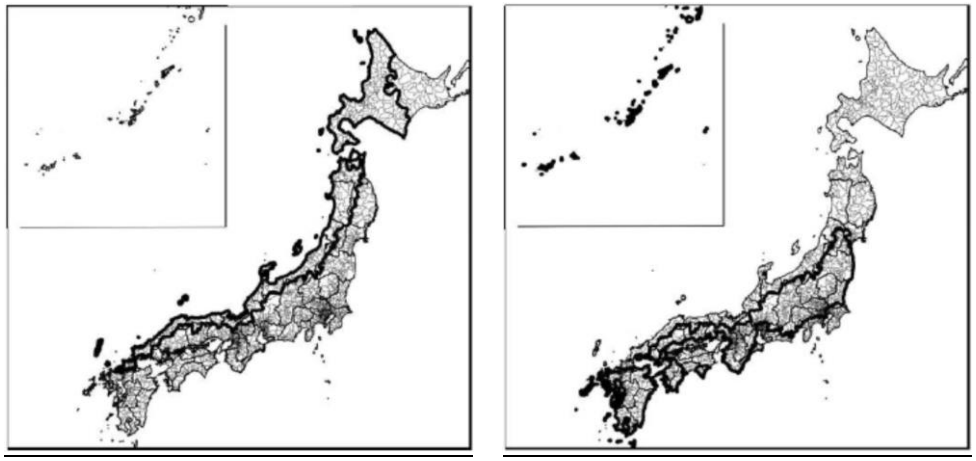
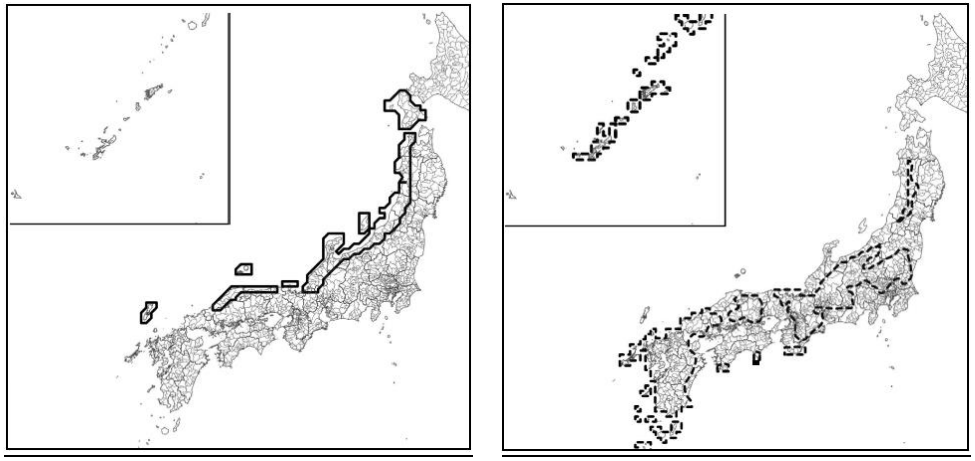
Chapter 1 General

After revision	Before revision
1.1 General 1.1.1 to 1.1.3 *(Omitted)*	1.1 General 1.1.1 to 1.1.3 *(Omitted)*
1.2 Normative References 1.2.1 General -1. *(Omitted)* [J-01] to [J-02] *(Omitted)* [J-03] Ministerial Ordinance Prescribing Technical Standards for Wind Power Generation Facilities (Ministry of Economy, Trade and Industry, Ordinance of the Ministry of International Trade and Industry No. 53, final revision: Ordinance of the Ministry of Economy, Trade and Industry No. 31 of April 01, 2024) [J-04] to [J-06] *(Omitted)* [J-07] 20240318 Hokyoku, No. 3: "Partial Amendment of Interpretation of Technical Standards for Wind Power Generation Facilities" -2. *(Omitted)* [R-01] NKRE-SP-0003 Wind Farm Certification Procedures, Edition September 2024 [R-02] Annotations to the Ministerial Ordinance Prescribing Technical Standards for Wind Power Generation Facilities and its Interpretation *(Deleted)* [R-03] to [R-06] *(Omitted)* [R-07] JIS C 1400-24:2023: Wind energy generation systems - Part 24: Lightning protection [R-08] to [R-17] *(Omitted)*	1.2 Normative References 1.2.1 General -1. *(Omitted)* [J-01] to [J-02] *(Omitted)* [J-03] Ministerial Ordinance Prescribing Technical Standards for Wind Power Generation Facilities (Ministry of Economy, Trade and Industry, Ordinance of the Ministry of International Trade and Industry No. 53, final revision: Ordinance of the Ministry of Economy, Trade and Industry No. 32 of March 31, 2017) [J-04] to [J-06] *(Omitted)* *(Added)* -2. *(Omitted)* [R-01] NKRE-SP-0003 Wind Farm Certification Procedures, Edition October 2021 [R-02] Annotations to the Ministerial Ordinance Prescribing Technical Standards for Wind Power Generation Facilities and its Interpretation (Ministry of Economy, Trade and Industry, revised on March 20, 2023) [R-03] to [R-06] *(Omitted)* [R-07] JIS C 1400-24:2014: Wind turbines - Part 24: Lightning protection [R-08] to [R-17] *(Omitted)*
1.3 Definitions and abbreviations 1.3.1 to 1.3.3 *(Omitted)*	1.3 Definitions and abbreviations 1.3.1 to 1.3.3 *(Omitted)*
1.4 Wind farm certification 1.4.1 to 1.4.9 *(Omitted)*	1.4 Wind farm certification 1.4.1 to 1.4.9 *(Omitted)*
1.5 Documents to be submitted 1.5.1 to 1.5.6 *(Omitted)*	1.5 Documents to be submitted 1.5.1 to 1.5.6 *(Omitted)*
1.6 Correspondence to the Technical Standards for Wind Power Generation Facilities [Reference] 1.6.1 General -1. *(Omitted)*	1.6 Correspondence to the Technical Standards for Wind Power Generation Facilities [Reference] 1.6.1 General -1. *(Omitted)*

After revision		Before revision	
Table 1 -5 Correspondence between the Technical Standards for Wind Power Generation Facilities and the requirements of these guidelines		Table 1-5 Correspondence between the Technical Standards for Wind Power Generation Facilities and the requirements of these guidelines	
Technical Standards for Wind Power Generation Facilities (Excerpts from the original text, and temporary translation)	Related items in these guidelines	(As left)	(As left)
(Scope) *(Omitted)*	*(Omitted)*	(Scope) *(Omitted)*	*(Omitted)*
(Definitions) *(Omitted)*	*(Omitted)*	(Definitions) *(Omitted)*	*(Omitted)*
(Hazard prevention measures for persons other than operators) Article 3. When installing a wind power plant, the operator shall indicate that the wind turbine is dangerous at a place that is easy to see for persons other than the operator, and shall take appropriate measures to prevent those persons from easily approaching it. 2. If a wind power generation facility is the small power generation facility, the provisions of the preceding paragraph shall be applied by replacing the phrase "wind power plant" in the paragraph with "wind power generation facilities" and the phrase "those persons from easily approaching it" with "those persons from easily approaching the wind turbine".	*(Omitted)*	(Hazard prevention measures for persons other than operators) Article 3. When installing a wind power plant, the operator shall indicate that the wind turbine is dangerous at a place that is easy to see for persons other than the operator, and shall take appropriate measures to prevent those persons from easily approaching it. 2. If a wind power generation facility is the Electric Facility for General Use, the provisions of the preceding paragraph shall be applied by replacing the phrase "wind power plant" in the paragraph with "wind power generation facilities" and the phrase "those persons from easily approaching it" with "those persons from easily approaching the wind turbine".	*(Omitted)*
(Wind turbine) *(Omitted)*	*(Omitted)*	(Wind turbine) *(Omitted)*	*(Omitted)*
(Ensuring the safety of wind turbines) Article 5. Measures shall be taken to ensure that wind turbines stop safely and automatically in the following cases. (i) When the rotational speed has increased significantly (ii) When the functioning of the control equipment for the wind turbine has significantly deteriorated 2. If a wind power generation facility is the small power generation facility, the provisions of the preceding paragraph	*(Omitted)*	(Ensuring the safety of wind turbines) Article 5. Measures shall be taken to ensure that wind turbines stop safely and automatically in the following cases. (i) When the rotational speed has increased significantly (ii) When the functioning of the control equipment for the wind turbine has significantly deteriorated 2. If a wind power generation facility is the Electric Facility for General Use, the provisions of the preceding paragraph shall be	*(Omitted)*

After revision		Before revision	
shall be applied by replacing the phrase "Measures shall be taken to ensure that wind turbines stop safely and automatically" in the paragraph with "Measures shall be taken to ensure safe conditions". 3. For wind power generation facilities on which the highest part is more than 20 meters above the ground surface, measures shall be taken to protect the wind turbine from lightning strikes. However, this shall not apply in a case where the surrounding conditions mean that there is no risk of lightning strikes damaging the wind turbine.		applied by replacing the phrase "Measures shall be taken to ensure that wind turbines stop safely and automatically" in the paragraph with "Measures shall be taken to ensure safe conditions". 3. For wind power generation facilities on which the highest part is more than 20 meters above the ground surface, measures shall be taken to protect the wind turbine from lightning strikes. However, this shall not apply in a case where the surrounding conditions mean that there is no risk of lightning strikes damaging the wind turbine.	
(Prevention of dangers of oil pressure systems and compressed air devices) *(Omitted)*	*(Omitted)*	(Prevention of dangers of oil pressure systems and compressed air devices) *(Omitted)*	*(Omitted)*
(Structure to support the wind turbine) Article 7. The structure supporting the wind turbine shall be structurally safe against its own weight, loading capacity, snow and wind pressure, and against earthquakes and other vibrations and impacts. 2. If a wind power generation facility is the small power generation facility, appropriate measures shall be taken to prevent a person other than the operator from easily climbing the structure supporting the wind turbine.	*(Omitted)*	(Structure to support the wind turbine) Article 7. The structure supporting the wind turbine shall be structurally safe against its own weight, loading capacity, snow and wind pressure, and against earthquakes and other vibrations and impacts. 2. If a wind power generation facility is the Electric Facility for General Use, appropriate measures shall be taken to prevent a person other than the operator from easily climbing the structure supporting the wind turbine.	*(Omitted)*
(Prevention of pollution, etc.) *(Omitted)*	*(Omitted)*	(Prevention of pollution, etc.) *(Omitted)*	*(Omitted)*

Chapter 2. Site conditions assessment

After revision	Before revision
2.1 General 2.1.1 *(Omitted)*	2.1 General 2.1.1 *(Omitted)*
2.2 Wind conditions during power production 2.2.1 to 2.2.10 *(Omitted)*	2.2 Wind conditions during power production 2.2.1 to 2.2.10 *(Omitted)*
2.3 Wind conditions during parked by storm 2.3.1 to 2.3.2 *(Omitted)*	2.3 Wind conditions during parked by storm 2.3.1 to 2.3.2 *(Omitted)*
2.4 Geotechnical and earthquake conditions 2.4.1 General -1. *(Omitted)* (1) *(Omitted)* (2) Interpretation of Technical Standards for Wind Power Generation Facilities[J-04], [J-07] (3) *(Omitted)* -2. to -3. *(Omitted)*	2.4 Geotechnical and earthquake conditions 2.4.1 General -1. *(Omitted)* (1) *(Omitted)* (2) Interpretation of Technical Standards for Wind Power Generation Facilities[J-04]*(Added)* (3) *(Omitted)* -2. to -3. *(Omitted)*
2.5 Lightning environment conditions 2.5.1 General -1. *(Omitted)* -2. The frequency of lightning strikes in each area is classified into the three categories shown in Figure 2-1, which are the areas enclosed by (a) lines, the areas enclosed by (b) lines and other areas. 	2.5 Lightning environment conditions 2.5.1 General -1. *(Omitted)* -2. The frequency of lightning strikes in each area is classified into the three categories shown in Figure 2-1, which are the areas surrounded by solid lines, the areas surrounded by dashed lines and other areas. 

After revision	Before revision
(a) (b) Figure 2-1 Frequency of lightning strikes by region	*(Added)* *(Added)* Figure 2-1 Frequency of lightning strikes by region
2.6 Other environmental conditions 2.6.1 *(Omitted)*	2.6 Other environmental conditions 2.6.1 *(Omitted)*

Chapter 3. Design basis evaluation

After revision	Before revision
3.1 General 3.1.1 *(Omitted)*	3.1 General 3.1.1 *(Omitted)*
3.2 Design basis requirements 3.2.1 to 3.2.2 *(Omitted)* 3.2.3 Support structure design basis -1. The document which shows the design basis for the support structure (tower) shall describe how the following matters were decided. For the design basis for the support structure (Tower), it should be noted that there must be compliance with Articles 10, 11 and 12 of the Interpretation of Technical Standards for Wind Power Generation Facilities[J-04], [J-07]. (1) to (7) *(Omitted)* -2. Regarding the design basis for the support structure (foundation), in principle, it is acceptable to follow the regulations in the Guidelines for Design of Wind Turbine Support Structures and Foundation[J-05]. For the design basis for the support structure (foundation), it should be noted that there must be compliance with Articles 10, 11 and 12 of the Interpretation of Technical Standards for Wind Power Generation Facilities[J-04], [J-07].	3.2 Design basis requirements 3.2.1 to 3.2.2 *(Omitted)* 3.2.3 Support structure design basis -1. The document which shows the design basis for the support structure (tower) shall describe how the following matters were decided. For the design basis for the support structure (Tower), it should be noted that there must be compliance with Articles 10, 11 and 12 of the Interpretation of Technical Standards for Wind Power Generation Facilities[J-04]*(Added)*. (1) to (7) *(Omitted)* -2. Regarding the design basis for the support structure (foundation), in principle, it is acceptable to follow the regulations in the Guidelines for Design of Wind Turbine Support Structures and Foundation[J-05]. For the design basis for the support structure (foundation), it should be noted that there must be compliance with Articles 10, 11 and 12 of the Interpretation of Technical Standards for Wind Power Generation Facilities[J-04]*(Added)*.

Chapter 4. Integrated load analysis evaluation

After revision	Before revision
4.1 General 4.1.1 *(Omitted)*	4.1 General 4.1.1 *(Omitted)*
4.2 Requirements for load analysis for RNA and tower evaluation 4.2.1 to 4.2.2 *(Omitted)*	4.2 Requirements for load analysis for RNA and tower evaluation 4.2.1 to 4.2.2 *(Omitted)*
4.3 Requirements for load analysis for support structure evaluation 4.3.1 General -1. *(Omitted)* (1) *(Omitted)* (2) Interpretation of Technical Standards for Wind Power Generation Facilities[J-04], [J-07] (3) *(Omitted)* 4.3.2 Support structure load analysis -1. to -4. *(Omitted)* -5. The handling of wind and wind turbine control loads combined with the seismic loads obtained from the results of seismic response analysis must follow the Appended Table 3 of the Interpretation of Technical Standards for Wind Power Generation Facilities[J-04], [J-07]. Although the handling of the wind and wind turbine control loads shall be as described above, the specific method for combining the seismic load and the wind and wind turbine control loads may be carried out in accordance with Paragraph 5.5.4 of the Guidelines for Design of Wind Turbine Support Structures and Foundation[J-05]. When coupled analysis simultaneously considering both the seismic and the wind and wind turbine control loads is performed, this shall be approved as appropriate by ClassNK. -6. *(Omitted)*	4.3 Requirements for load analysis for support structure evaluation 4.3.1 General -1. *(Omitted)* (1) *(Omitted)* (2) Interpretation of Technical Standards for Wind Power Generation Facilities[J-04]*(Added)* (3) *(Omitted)* 4.3.2 Support structure load analysis -1. to -4. *(Omitted)* -5. The handling of wind and wind turbine control loads combined with the seismic loads obtained from the results of seismic response analysis must follow the Appended Table 3 of the Interpretation of Technical Standards for Wind Power Generation Facilities[J-04]*(Added)*. Although the handling of the wind and wind turbine control loads shall be as described above, the specific method for combining the seismic load and the wind and wind turbine control loads may be carried out in accordance with Paragraph 5.5.4 of the Guidelines for Design of Wind Turbine Support Structures and Foundation[J-05]. When coupled analysis simultaneously considering both the seismic and the wind and wind turbine control loads is performed, this shall be approved as appropriate by ClassNK. -6. *(Omitted)*

Chapter 5. Wind turbine (RNA) design evaluation

After revision	Before revision
5.1 General 5.1.1 *(Omitted)*	5.1 General 5.1.1 *(Omitted)*
5.2 Wind turbine (RNA) design evaluation 5.2.1 to 5.2.2 *(Omitted)*	5.2 Wind turbine (RNA) design evaluation 5.2.1 to 5.2.2 *(Omitted)*
5.3 Nacelle cover strength evaluation 5.3.1 to 5.3.4 *(Omitted)*	5.3 Nacelle cover strength evaluation 5.3.1 to 5.3.4 *(Omitted)*
5.4 Evaluation in the event of the electrical power network loss 5.4.1 to 5.4.2 *(Omitted)*	5.4 Evaluation in the event of the electrical power network loss 5.4.1 to 5.4.2 *(Omitted)*
5.5 Evaluation to secure a safe state on the wind turbine 5.5.1 *(Omitted)* 5.5.2 Safe and automatic shutdown of wind turbines -1. Even in the following cases, there shall be a function to stop safely and automatically, and also the safe state after stopping shall be maintained. It should be noted that for these items, it is necessary to conform to Article 7 of the Interpretation of Technical Standards for Wind Power Generation Facilities[J-04], [J-07]. (1) to (2) *(Omitted)* -2. *(Omitted)* 5.5.3 Protection against lightning strikes -1. to -2. *(Omitted)* -3. *(Omitted)* (1) Regions enclosed by (a) lines in Figure 2-1 (a) to (c) *(Omitted)* (d) A lightning detection system, etc., that can be used to stop the wind turbine immediately in the event of lightning striking the wind turbine must be provided. (2) Regions enclosed by (b) lines in Figure 2-1 (a) *(Omitted)* (b) The requirements set forth in (1) (b), (1) (c) and (1) (d) shall be satisfied. (3) Areas other than those enclosed by (a) lines or (b) lines in Figure 2-1 (a) *(Omitted)* (b) The requirements set forth in (1) (b), (1) (c) and (1) (d) shall be satisfied.	5.5 Evaluation to secure a safe state on the wind turbine 5.5.1 *(Omitted)* 5.5.2 Safe and automatic shutdown of wind turbines -1. Even in the following cases, there shall be a function to stop safely and automatically, and also the safe state after stopping shall be maintained. It should be noted that for these items, it is necessary to conform to Article 7 of the Interpretation of Technical Standards for Wind Power Generation Facilities[J-04]*(Added)*. (1) to (2) *(Omitted)* -2. *(Omitted)* 5.5.3 Protection against lightning strikes -1. to -2. *(Omitted)* -3. *(Omitted)* (1) Regions enclosed by solid lines in Figure 2-1 (a) to (c) *(Omitted)* (d) An emergency stop device, etc., that can be used to stop the wind turbine immediately in the event of lightning striking the wind turbine must be provided. (2) Regions enclosed by dashed lines in Figure 2-1 (a) *(Omitted)* (b) The requirements set forth in (1) (b) and (1) (c) shall be satisfied. (3) Areas other than those enclosed by solid lines or dashed lines in Figure 2-1 (a) *(Omitted)* (b) The requirements set forth in (1) (b) and (1) (c) shall be satisfied.

After revision	Before revision
(4) The lightning detection system shall conform to lightning current detection system for wind turbine shown in JIS C 1400-24:2023[R-07]. However, it should be noted that the area enclosed by (a) lines in Figure 2-1 is called the winter lightning area, and the area other than the area enclosed by (a) lines in Figure 2-1 is called the summer lightning area in JIS C 1400-24:2023[R-07].	*(Added)*
-4. *(Omitted)*	-4. *(Omitted)*
(1) The lightning protection through which the current generated by a lightning strike can flow safely into the ground without damaging the structures that support the wind turbine must conform to JIS C 1400-24:2023[R-07].	(1) The lightning protection through which the current generated by a lightning strike can flow safely into the ground without damaging the structures that support the wind turbine must conform to JIS C 1400-14:2023[R-07].
(2) *(Omitted)*	(2) *(Omitted)*
-5. *(Omitted)*	-5. *(Omitted)*

Chapter 6. Support structure design evaluation

After revision	Before revision
6.1 General 6.1.1 General -1. *(Omitted)* -2. *(Omitted)* (1) *(Omitted)* (2) Interpretation of Technical Standards for Wind Power Generation Facilities[J-04], [J-07] (3) to (4) *(Omitted)* -3. to -5. *(Omitted)*	6.1 General 6.1.1 General -1. *(Omitted)* -2. *(Omitted)* (1) *(Omitted)* (2) Interpretation of Technical Standards for Wind Power Generation Facilities[J-04]*(Added)* (3) to (4) *(Omitted)* -3. to -5. *(Omitted)*
6.2 Support structure (Tower) 6.2.1 *(Omitted)*	6.2 Support structure (Tower) 6.2.1 *(Omitted)*
6.3 Support structure (Foundation) 6.3.1 to 6.3.3 *(Omitted)*	6.3 Support structure (Foundation) 6.3.1 to 6.3.3 *(Omitted)*

Annex A. Measurement data evaluation methods [normative]

After revision	Before revision
A.1 to A.4 *(Omitted)*	A.1 to A.4 *(Omitted)*
A.5 Measurements and evaluation report of measurement results -1. *(Omitted)* -2. *(Omitted)* (1) *(Omitted)* (2) Wind direction and wind speed data: a. *(Omitted)* b. The Weibull shape and scale factors for each direction, and the appearance frequency distribution and energy density distribution (with a wind direction sector width of 30° or less) for each direction described in tabular form for each measurement mast. A wind direction distribution map (plot) is also required. c. to d. *(Omitted)* (3) *(Omitted)* (4) Turbulence intensity: a. The ambient turbulence intensity for each direction (with a wind direction sector width of 30° or less) described in tabular form for each measurement mast. b. (Omitted) (5) to (7) *(Omitted)*	A.5 Measurements and evaluation report of measurement results -1. *(Omitted)* -2. *(Omitted)* (1) *(Omitted)* (2) Wind direction and wind speed data: a. *(Omitted)* b. The Weibull shape and scale factors for each direction, and the appearance frequency distribution and energy density distribution (with a wind direction sector width of 30° or less) for each direction specified in tabular form for each measurement mast. A wind direction distribution map (plot) is also required. c. to d. *(Omitted)* (3) *(Omitted)* (4) Turbulence intensity: a. The ambient turbulence intensity for each direction (with a wind direction sector width of 30° or less) specified in tabular form for each measurement mast. b. (Omitted) (5) to (7) *(Omitted)*
A.6 to A.7 *(Omitted)*	A.6 to A.7 *(Omitted)*

Annex B Airflow analysis and verification of its validity [normative]

After revision	Before revision
B.1 to B.3 *(Omitted)*	B.1 to B.3 *(Omitted)*

Annex C Evaluation method for wind conditions [informative /partially normative]

After revision	Before revision
C.1 to C.3 *(Omitted)*	C.1 to C.3 *(Omitted)*
C.4 Reports on wind conditions C.4.1 Report on wind conditions during power production -1. *(Omitted)* (1) Average wind speed (including the following content): a. The Weibull shape and scale factors for each direction, and the wind direction appearance frequency distribution (with a wind direction sector width of 30° or less and the first sector centered on true north) described in tabular form for each wind turbine position (hub height). b. *(Omitted)* (2) to (4) *(Omitted)* C.4.2 to C.4.3 *(Omitted)*	C.4 Reports on wind conditions C.4.1 Report on wind conditions during power production -1. *(Omitted)* (1) Average wind speed (including the following content): a. The Weibull shape and scale factors for each direction, and the wind direction appearance frequency distribution (with a wind direction sector width of 30° or less and the first sector centered on true north) specified in tabular form for each wind turbine position (hub height). b. *(Omitted)* (2) to (4) *(Omitted)* C.4.2 to C.4.3 *(Omitted)*
C.5 *(Omitted)*	C.5 *(Omitted)*

Annex D Equivalent wind pressure coefficient for the nacelle cover [informative]

After revision	Before revision
D.1 General -1. *(Omitted)* -2. *(Omitted)*	D.1 General -1. *(Omitted)* -2. *(Omitted)*

Table D.1 Main conditions for wind tunnel tests

(Omitted)	*(Omitted)*
Model (Scale 1/50)	・Nacelle: 280 x 80 x 80 (mm) ・Tower: 60 φ (mm) *A photograph of the model is shown in Figure D-1.
(Omitted)	*(Omitted)*

Table D.1 Main conditions for wind tunnel tests

(Omitted)	*(Omitted)*
Model (Scale 1/50)	・Nacelle: 250 x 80 x 80 (mm) ・Tower: 60 φ (mm) *A photograph of the model is shown in Figure D-1.
(Omitted)	*(Omitted)*

D.2 to D.4 *(Omitted)*	D.2 to D.4 *(Omitted)*

Annex E Measurement testing for fluctuating pressure characteristics acting on a nacelle surface [informative]

After revision	Before revision
E.1 to E.4 *(Omitted)*	E.1 to E.4 *(Omitted)*

Annex F Design methodologies for tower structures [normative]

After revision	Before revision
F.1 to F.9 *(Omitted)*	F.1 to F.9 *(Omitted)*

Annex G Design methodologies for foundations [normative]

After revision	Before revision
G.1 to G.6 *(Omitted)*	G.1 to G.6 *(Omitted)*