

ClassNK Wind Turbine Certification and Related Services

[Public website version]

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NIPPON KAIJI KYOKAI

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1. ClassNK Wind Turbine Certification

Type certification

Large wind turbine type certification

Conducts evaluations based on various technical standards related to wind turbines, such as design conformity assessments and type testing assessments using test units, and ultimately issues a type certificate.



Small wind turbine type certification

Evaluates the conformity of small wind turbines to the requirements in international and domestic standards (performance and safety) and issues a type certificate.



Wind farm certification

Wind farm certification

Evaluates the environmental conditions of the site where the wind farm is to be constructed, evaluates and confirms that the strength and safety of the wind turbine and support structure are secured in terms of the design based on these environmental conditions, and issues a Conformity Statement. ->This statement is utilized in the construction plan review under the Electricity Business Act.



Wind turbine support structure: Material certification

Certification assumes the wind turbine support structure is made of materials that do NOT fall under any of the following:

- Building Standards Act, Article 37: “Designated building materials”
- Materials approved by the Minister of Land, Infrastructure, Transport and Tourism
- Materials approved in terms of performance assessments pertaining to technical standards conformity for wind power generation facilities

Wind turbine certification [Large wind turbines]

Design conformity assessment

- Assesses whether the wind turbine is designed and documented according to the design assumptions, specific standards, and other technical requirements

Prototype certification

- Design evaluation specialized in verifying safety when constructing test units

Type testing

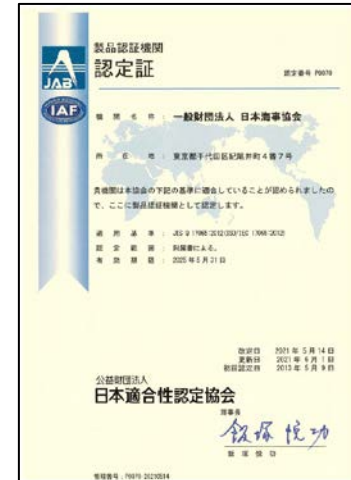
- Verifies the output performance and performs an experimental safety verification through the actual operation of the test unit

Manufacturing evaluation

- Assesses whether the wind turbine is manufactured according to the design documents verified during the design evaluation

Type certification

- A certificate is granted to wind turbines that satisfy every requirement in the design evaluation, type test, and manufacturing evaluation



Wind Turbine Certification
Body Certificate
(Japan Accreditation Board)

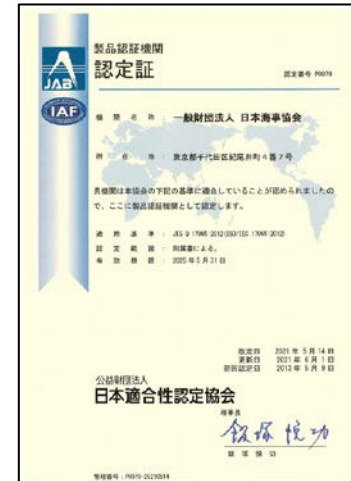
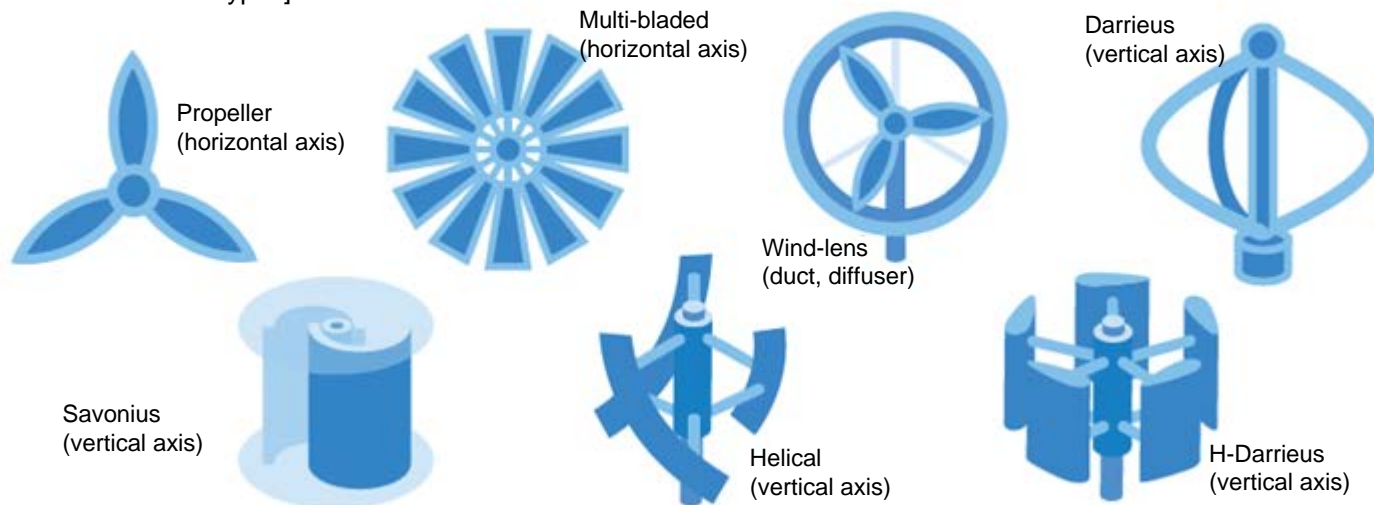
Wind turbine certification [small wind turbines]

- Verifies whether the performance and safety of the wind turbine complies with the requirements specified in the Japan Small Wind Turbines Association Standards (JSWTA0001).
- Certification procedures comply with the “Guidelines for Certification of Wind Turbines and Wind Farms”

Small wind turbine definition

- Swept area: less than 200 m²
- Output: less than 20 kW

[Small wind turbine types]



Wind Turbine Certification Body Certificate (Japan Accreditation Board)

Wind farm certification overview

Evaluates the environmental conditions of the site where the wind farm is to be constructed and verifies that the strength and safety of the wind turbine and support structure are secured in terms of the design based on the environmental conditions. (This certification is unique to Japan and is intended for use in the Construction Plan Notification review under the Electricity Business Act.)

- In principle, wind farm certification is for wind farms in Japan that have an output of 500 kilowatts or more, consist of one or more wind turbines (RNA) and their support structures (tower and foundation), and are subject to the Electricity Business Act.
- The purpose of wind farm certification is to assess whether the design for type-certified wind turbines (RNA) and their support structures (tower and foundation) are in conformity with the external conditions and the requirements under the Electricity Business Act.

<Main compliance criteria for wind farm certification>

- ◆ 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 of March 27, 1997, final revision: Ordinance of the Ministry of Economy, Trade and Industry No. 32 of March 31, 2017)
- ◆ Interpretation of Technical Standards for Wind Power Generation Facilities (Ministry of Economy, Trade and Industry, No. 20140328, Bureau of Commerce No. 1, April 1, 2014)
- ◆ Guidelines and explanation for the design of support structures of wind power generation facilities (Japan Society of Civil Engineers, 2010)

Nippon Kaiji Kyokai is accredited by the Japan Accreditation Board as an ISO/IEC 17065 (JIS Q 17065) Product Certification Body based on the Board's "Wind Power Generation System: Windfarm" accreditation criteria.



- Japan Accreditation Board website, accredited Product Certification Bodies: <https://www.jab.or.jp/system/service/product/accreditation/detail/453/>

Wind turbine support structure: Material certification overview

Certification assumes the wind turbine support structure is made of materials that do NOT fall under any of the following:

- Building Standards Act, Article 37: “Designated building materials”
- Materials approved by the Minister of Land, Infrastructure, Transport and Tourism
- Materials approved in terms of performance assessments pertaining to technical standards conformity for wind power generation facilities

<Review scope>

- Tower flanges
- Flange joint bolt and nut flat washer sets
- Anchor bolts
- Steel plates

<Review criteria>

- The review criteria used in the Ministry of Land, Infrastructure, Transport and Tourism Minister’s certification process apply mutatis mutandis (in the course of the technical review, a fatigue strength evaluation, which is important for wind power generation facilities, may be added)

<Review details>

- Technical review (statistical assessment)
 - Chemical property value stability (component ratio of present elements, especially weldability, crack sensitivity, etc.)
 - Physical property value stability (dimensions, hardness, strength, tolerance, variance, relaxation, delayed fracture resistance, etc.)
- Quality control system review
 - A quality management system equivalent to ISO 9001 is in place.
 - A subcontract management system is in place and properly operated.
 - A receiving system is in place and an inspection system at each stage within the company has been established.
 - Testing and inspection equipment are properly managed.

2. Wind Farm Certification [Onshore Wind Power Plant]

Wind Farm Certification modules [for onshore wind farms]

[M1] Site conditions assessment (wind conditions)

[M2] Wind turbine (RNA) design evaluation

(including site conditions assessment, design basis evaluation, and integrated load analysis)

[M3] Support structure design evaluation (tower)

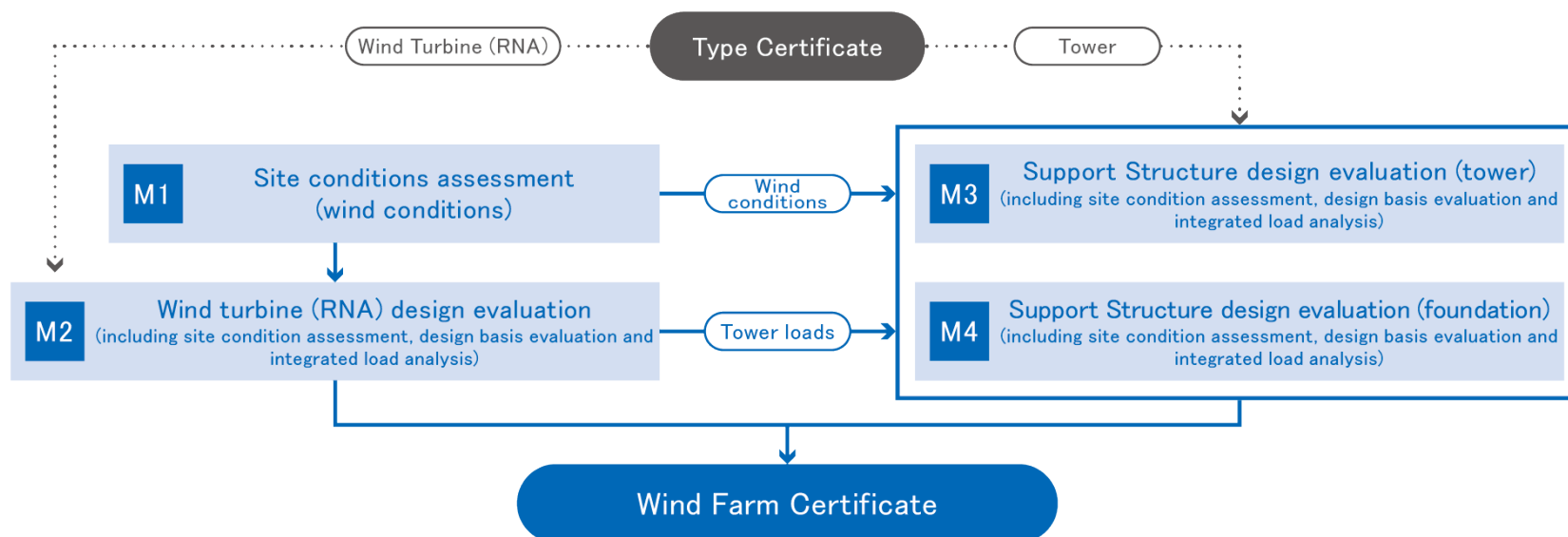
(including site conditions assessment, design basis evaluation, and integrated load analysis)

[M4] Support structure design evaluation (foundation)

(including site conditions assessment, design basis evaluation, and integrated load analysis)

- In the case of onshore wind farms, the applicant may, based on their own judgment, specify whether they will implement all modules or only some modules, according to the existence of items falling under the category of special equipment and the applicant's wishes.
- For the definition of special equipment, see “Implementation Procedures Regarding the Review of Installation and Modification Construction Plans for Wind Farms.”

https://www.meti.go.jp/policy/safety_security/industrial_safety/oshirase/2021/05/20210525-1.html



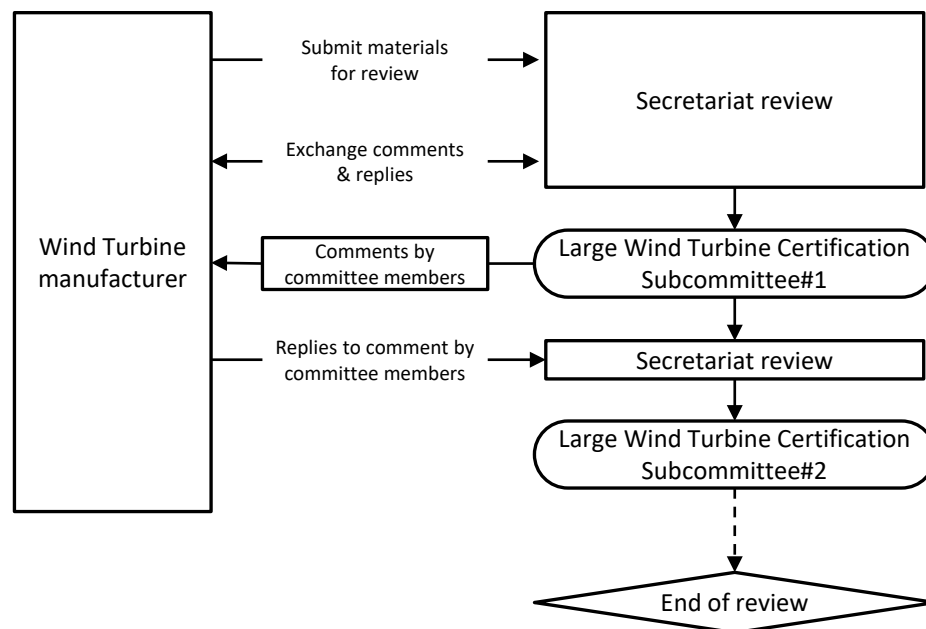
Review process: [M1] Site conditions assessment (wind conditions) + [M2] Wind turbine (RNA) design evaluation

[1] Review materials submitted by the operator or the wind turbine manufacturer are first reviewed by the secretariat, the members of which are ClassNK staff (hereinafter, the Secretariat).

[2] Once the contents of step [1] are in place, the Secretariat conducts a review in the form of an explanation to the experts who serve as members of the Large Wind Turbine Certification Subcommittee.

[3] Review steps [1] and [2] are repeated until compliance with the technical standards, etc. is verified. (The dashed arrow in the figure indicates that the review by the Large Wind Turbine Certification Subcommittee will be repeated as necessary.)

[4] Once all items have been verified to comply with the technical standards, etc., the review is complete.

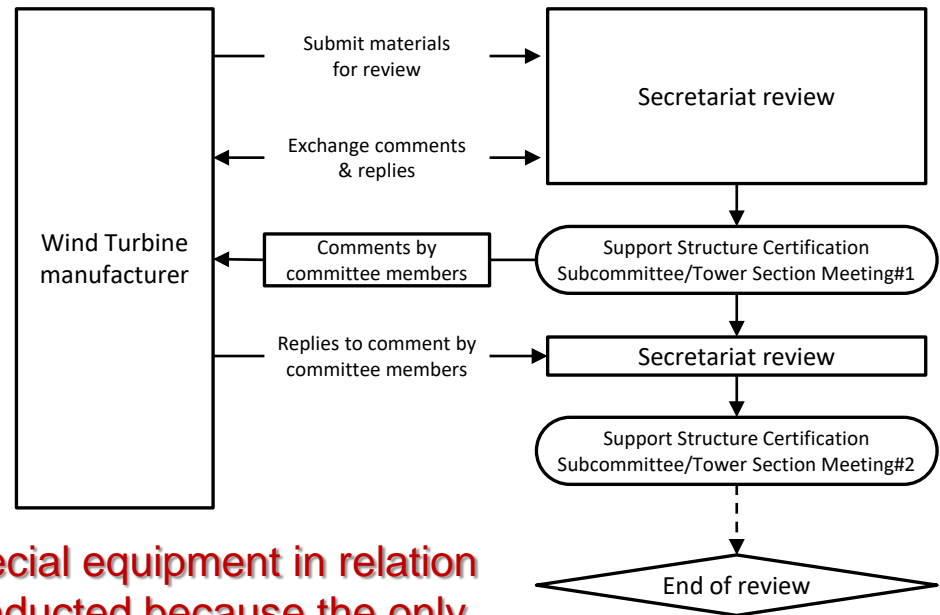


Review process: [M3] Support structure design evaluation (tower)

- [1] Review materials submitted by the operator or the wind turbine manufacturer are first reviewed by the Secretariat.
- [2] Once the contents of step [1] are in place, the Secretariat conducts a review in the form of an explanation to the experts who serve as members of the Support Structure Certification Subcommittee/Tower Section Meeting.

[3] Review steps [1] and [2] are repeated until compliance with the technical standards, etc. is verified. (The dashed arrow in the figure indicates that the review by the Support Structure Certification Subcommittee/Tower Section Meeting will be repeated as necessary.)

[4] Once all items have been verified to comply with the technical standards, etc., the review is complete.



***If there are no items corresponding to special equipment in relation to the tower, steps [2] and [3] are NOT conducted because the only step is the review by the Secretariat.**

Review process: [M4] Support structure design evaluation (foundation)

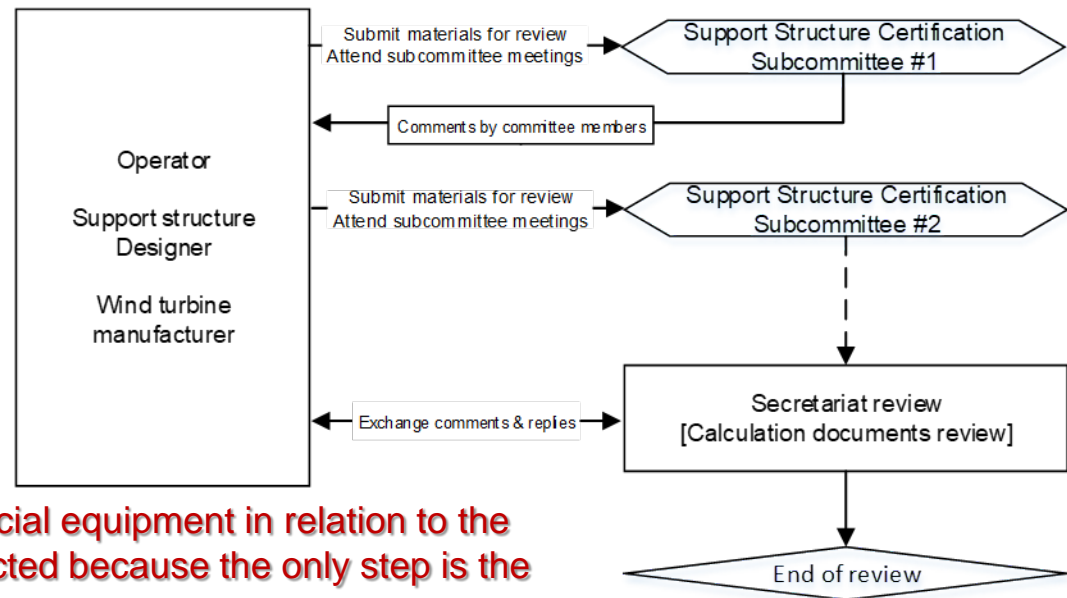
[1] Based on the review materials submitted by the operator, support structure design firm, and wind turbine manufacturer, the Support Structure Certification Subcommittee first conducts a review with a focus on those items that fall under special equipment.

*The Support Structure Certification Subcommittee utilizes a format in which the operator, support structure design firm, and wind turbine manufacturer directly explain the design to the experts in each field that serve as committee members.

[2] During following subcommittee meetings, the subcommittee responds to matters indicated during step [1]. This process is repeated until compliance with the technical standards has been verified, at which point the review by the subcommittee is complete.

(The dashed arrow in the figure indicates that the review by the Support Structure Certification Subcommittee will be repeated as necessary.)

[3] After the subcommittee completes its review of special equipment, the Secretariat reviews all support structure design and calculation statements, and the review is complete when this step is finished.



*If there are no items corresponding to special equipment in relation to the foundation, steps [1] and [2] are not conducted because the only step is the review by the Secretariat.

Wind Farm Certificate and Certification Assessment Report Issuance System [for onshore wind farms]

[M1] Site conditions assessment (wind conditions)

Site Conditions Conformity Statement

Certification assessment report (site wind conditions)

[M2] Wind turbine (RNA) design evaluation

RNA Design Conformity Statement

Certification assessment report (wind turbine design evaluation)

[M3] Support structure design evaluation (tower)

Support Structure Design Conformity Statement*1

Certification assessment report (support structure design evaluation, tower)

Checklist*2

[M4] Support structure design evaluation (foundation)

Support Structure Design Conformity Statement*1

Certification assessment report (support structure design evaluation, foundation)

Checklist*2



Example of a Conformity Statement



Example of a Certification Assessment Report

- *1 and *2: When a review application is submitted for both [M3] and [M4], the same Conformity Statement covers both [M3] and [M4].
- A separate Wind Farm Certificate will be issued when a power utility operator submits an application for [M1] to [M4] together.

Guidelines: Wind Farm Certification - Onshore wind farm edition

- ClassNK has compiled the requirements as formulated based on a number of examples of past wind farm certification reviews for onshore wind farms, and issued this compilation as a new set of guidelines.
 - ✓ **Since the start of certification services in 2016, ClassNK has issued Wind Farm Certificates for 124 onshore wind farms (as of the end of June 2021).**
- These guidelines also correspond to the latest version of the “Implementation Procedures Regarding the Review of Installation and Modification Construction Plans for Wind Farms” issued by the Ministry of Economy, Trade and Industry, and also address the latest requirements associated with the rapid increase in the size of wind turbines in recent years.
- In addition to certification review requirements, the guideline’s annexes cover a comprehensive range of content, including details on implementation and verification methods for air flow analysis and wind pressure coefficients for the nacelle cover, which are based on the results of independent examinations by ClassNK.



Guidelines: Wind Farm Certification - Onshore wind farm edition Table of contents

Chapter 1. General	Annex A. Measurement data evaluation methods [normative]
Chapter 2. Site conditions assessment	Annex B. Airflow analysis and verification of its validity [normative]
Chapter 3. Design basis evaluation	Annex C. Evaluation method for wind conditions [informative/normative]
Chapter 4. Integrated load analysis evaluation	Annex D. Equivalent wind pressure coefficient for the nacelle cover [informative]
Chapter 5. Wind turbine (RNA) design evaluation	Annex E. Measurement testing for fluctuating pressure characteristics acting on a nacelle surface [informative]
Chapter 6. Support structure design evaluation	Annex F. Design methodologies for tower structures [normative]

3. Wind Farm Certification [Offshore Wind Power Plant]

Wind Farm Certification module [Offshore Wind Power Plant]

(1) Site conditions assessment

- Assess environmental conditions at the construction site (environmental conditions include general weather conditions, such as wind conditions, temperature conditions, and humidity conditions, as well as marine conditions (for offshore wind farms), altitude conditions, landforms, topography, earthquakes, lightning, and changes in operating methods related to grid interconnections)

(2) Design basis evaluation

- Evaluates whether appropriate design criteria (design policies, etc.) considering the site conditions have been set based on the design criteria applied at the time of type certification for the purpose of safe design and project execution

(3) Integrated load analysis evaluation

- Evaluates whether the loads and load effects for the site-specific environmental conditions on the integrated wind turbine structure, including the wind turbine, support structure, and supporting soils, have been calculated in conformity with the design basis.

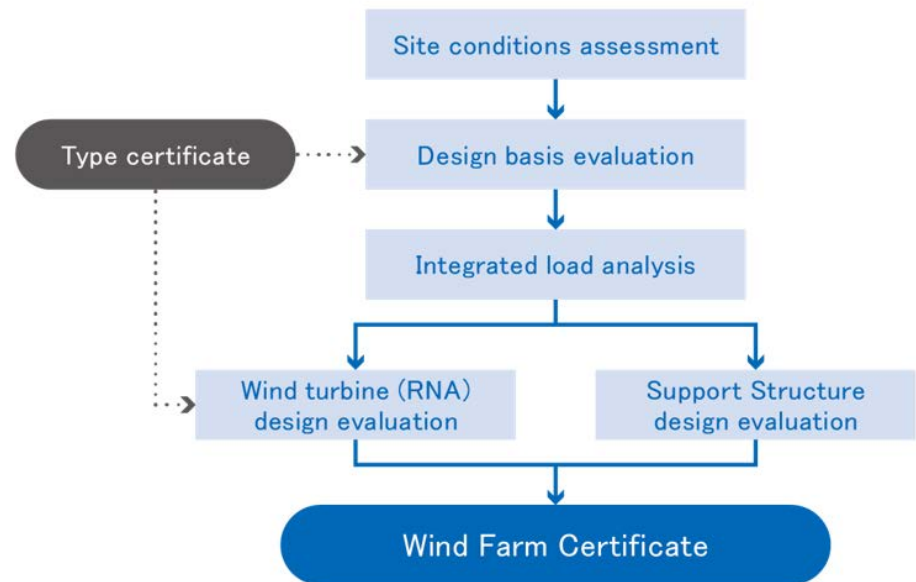
(4) Wind turbine (RNA) design evaluation

- Evaluates whether the type-certified wind turbine (RNA) has structural integrity against the environmental conditions of the construction site

*RNA: Rotor Nacelle Assembly

(5) Support structure design evaluation

- Evaluates the structural integrity of the support structure against the environmental conditions of the construction site



*In the case of offshore wind farms, only the power utility operator can apply for review. (Applications for review cannot be made separately for each module)

(1) Site conditions assessment [1]

- Evaluates whether the following value settings for environmental and external conditions at the construction site as provided by the operator are valid.

Classification	Item (example)	Setting methods, etc. (examples)
Wind conditions	<p>[1] Wind conditions during wind turbine operations (wind turbine position and hub height)</p> <ul style="list-style-type: none"> - 10-minute average wind speed, turbulence intensity, power index, air density, etc. <p>[2] Wind conditions during wind turbine storm standby (wind turbine position and hub height)</p> <p>[50-year recurrence periods]</p> <ul style="list-style-type: none"> - 10-minute average wind speed, turbulence intensity, 3-second average wind speed, power index, air density, etc. 	<p>[1] Wind conditions during wind turbine operations</p> <p>Calculate values at each wind turbine position and hub height based on observation data at the site and simulations</p> <p>[2] Wind conditions during wind turbine storm standby</p> <p>Calculate values at each wind turbine position and hub height based on the reference wind speed under the Building Standards Act and simulations</p>
Marine conditions	<p>[1] Marine conditions during normal states (during wind turbine operations) (wind turbine position)</p> <ul style="list-style-type: none"> - Significant wave height, significant wave period, tide level, currents, etc. <p>[2] Marine conditions during storm waves (wind turbine position)</p> <p>[50-year recurrence interval]</p> <ul style="list-style-type: none"> - Significant wave height, significant wave period, tide level, currents, etc. 	<p>[1] Marine conditions during normal periods</p> <p>Calculate values at each wind turbine position based on observation data at the site and simulations</p> <p>[2] Marine conditions during storm waves</p> <p>In addition to existing wave observation and wave prediction data, calculate the values at each wind turbine position with reference to design values for nearby port and coastal protection facilities</p>

(1) Site conditions assessment [2]

- Evaluates whether the following value settings for environmental and external conditions at the construction site as provided by the operator are valid.

Classification	Item (example)	Setting methods, etc. (examples)
Soil and geology	[1] Submarine topography of the sea area	[1] Conduct a submarine topography survey
	[2] Soil composition, structure, and properties at the wind turbine position (physical properties, mechanical properties, etc.)	[2] Set the required values for the design at each wind turbine position based on the results of geophysical exploration, ground boring and sampling, field tests, and laboratory tests
Earthquake	Seismic waves at the wind turbine position [1] Spectrally matched waves [2] Observed waves [3] Site waves	Set [1] and [2] as rarely occurring earthquake ground motions and extremely rarely occurring earthquake ground motions specified in “Interpretation of Technical Standards for Wind Power Generation Facilities”
		Set [3] as Port and Harbor Level 1 earthquake ground motions specified in the Technical Standards for Port and Harbor Facilities in Japan (consideration should also be given to Port and Harbor Level 2 earthquake ground motions as necessary)
Other environmental conditions	Tsunamis, snow cover, sea ice and ice accumulation, marine growth, temperature and humidity, sea water density, lightning	Set site-specific values based on relevant laws and regulations, local ordinances, and observation data at the site, etc.

(2) Design basis evaluation

- Assesses whether the design criteria considering the site conditions (design policies, etc.), as indicated below, have been appropriately set based on the design criteria applied at the time of type certification for the purpose of safe design and project execution.

Design Criteria Part A Site conditions (Example)	Design Criteria Part B Wind turbines and towers (Example)	Design Criteria Part C Foundation (Example)
Prepared by: Operator	Prepared by: Wind turbine manufacturer	Prepared by: Foundation designer
1) Wind turbine installation location 2) Wind conditions 3) Wave conditions 4) Other marine conditions 5) Soil and geological conditions 6) Seismic conditions 7) Other environmental conditions 8) Constraints, etc. *Includes items that overlaps with the site conditions assessment	1) Applicable criteria and standards 2) Site conditions 3) Wind turbine and tower specifications 4) Design policy (required performance, reference items, materials used, etc.) 5) Design parameters related to the load calculations, and the validity of the applied load analysis method 6) Load case table 7) Partial safety factor 8) Overview of the load analysis model 9) Simulation details 10) Extreme and fatigue design loads and response analysis 11) Materials and welds 12) Coatings and corrosion prevention systems	1) Applicable criteria and standards 2) Site conditions 3) Support structure specifications (including additional installations) 4) Design policy (required performance, reference items, materials used, etc.) 5) Design parameters related to the load calculations, and the validity of the applied load analysis method 6) Load case table 7) Partial safety factor 8) Overview of the load analysis model 9) Simulation details 10) Extreme and fatigue design loads and response analysis 11) Materials and welds 12) Coatings and corrosion prevention systems

(3) Integrated load analysis evaluation

- Assesses whether the loads and load effects for the site-specific environmental conditions on the integrated wind turbine structure, including the wind turbine, support structure, and supporting soils, have been calculated in conformity with the design basis.

<Main assessment items>

1. Combinations of external and design conditions

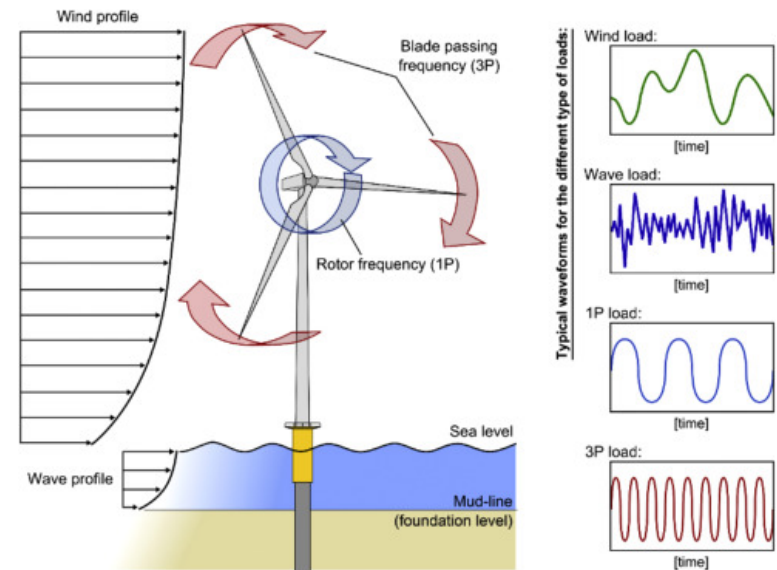
- Wind turbine in operation (wind conditions + normal marine conditions during wind turbine operation)
- Wind turbine during storm standby (wind conditions during wind turbine storm standby + marine conditions during storm waves)
- During an earthquake (during wind turbine operations/wind turbine emergency shutdown/wind turbine standby)

2. Design load cases defined with reference to site conditions, as well as to wind turbine operational and safety systems

3. Partial safety factor

4. Calculation methods (simulation procedures, number of simulations, and combinations of wind and wave loads, etc.)

5. Analytical model employed as the integrated load analysis and validation outcome for its results



Analysis Concept for a Wind Turbine During Operations
(analysis is conducted in consideration of the effects of wind turbine operations, wind, waves, flow, and soil at the same time)

Source: Wind Energy Engineering, A Handbook for Onshore and Offshore Wind Turbines, P. 276

(4) Wind turbine (RNA) design evaluation

- Assesses whether the type-certified wind turbine (RNA) has structural integrity against the environmental conditions of the construction site

<Main assessment items>

- Closely examines the following items to verify whether the wind turbine is structurally safe against the site-specific load based on the site conditions obtained from the integrated load analysis
 - [1] Comparison of the design load set at the time of type certification (certified design load), and the site-specific load obtained from the integrated load analysis
 - [2] Detailed calculation/analysis results for each component when the site-specific load exceeds the design load set at the time of type certification (certified design load)
 - [3] Specifications and the validation results for any parts and systems that are NOT fully covered by type certification and that have been newly modified or reinforced for the site
- The protection design for the part of the power cable that passes from the seafloor surface into the wind turbine foundation is also subject to wind turbine (RNA) design evaluation

(5) Support structure design evaluation

- Assesses whether the support structure has structural integrity against the environmental conditions of the construction site

<Main assessment items>

- Closely examines the following items to verify whether the support structure is structurally safe against the site-specific load based on the site conditions obtained from the integrated load analysis
 - [1] Detailed design calculation statement for the support structure associated with the integrated load analysis results
 - [2] Detailed structural design drawings and calculation statements for the support structure
 - [3] Design drawings and calculation statements for additional installations related to support structures, such as scour protection works and landing facilities

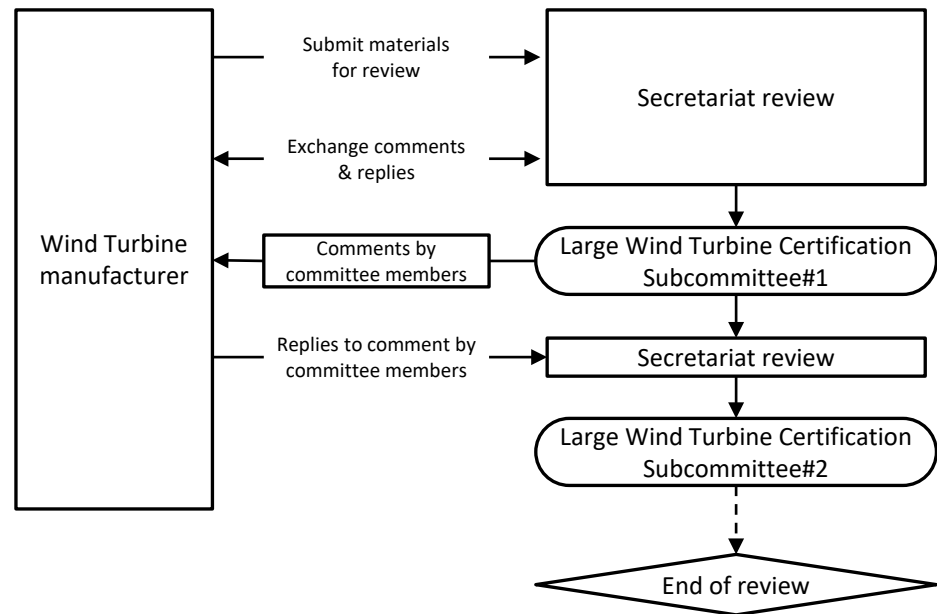
**Review process: (1) Site conditions assessment [RNA-related matters only]
(2) Design basis evaluation [RNA-related matters only]
(3) Integrated load analysis evaluation [RNA-related matters only]
(4) Wind turbine (RNA) design evaluation**

[1] Review materials submitted by the operator or the wind turbine manufacturer are first reviewed by the secretariat (hereinafter, the Secretariat), the members of which are ClassNK staff.

[2] Once the contents of step [1] are in place, the Secretariat conducts a review in the form of an explanation to the experts who serve as members of the Large Wind Turbine Certification Subcommittee.

[3] Review steps [1] and [2] are repeated until compliance with the technical standards, etc. is verified. (The dashed arrow in the figure indicates that the review by the Large Wind Turbine Certification Subcommittee will be repeated as necessary.)

[4] Once all items have been verified to comply with the technical standards, etc., the review is complete.



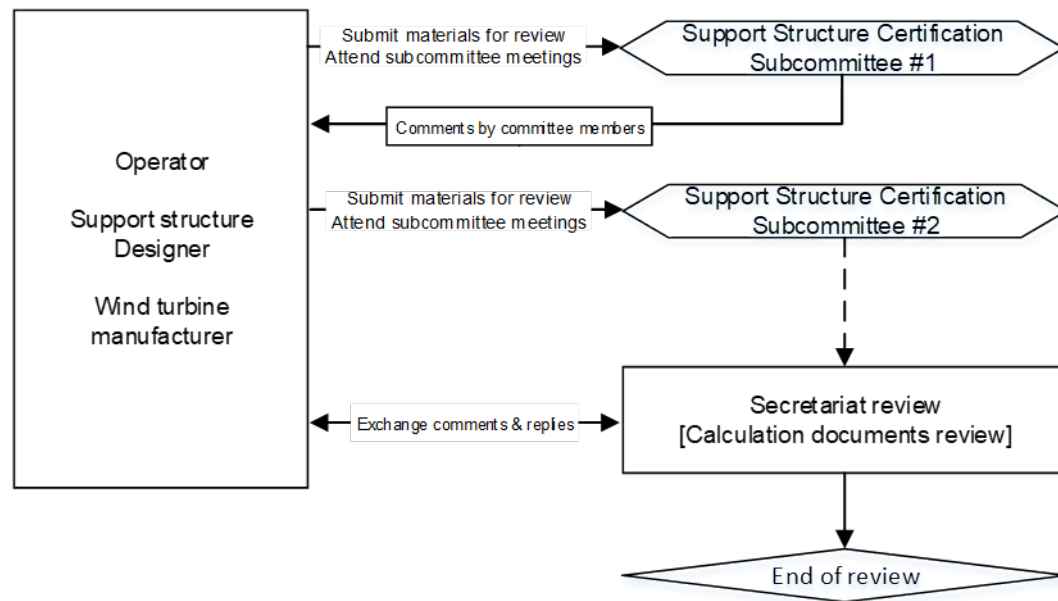
- Review process:**
- (1) Site conditions assessment [excluding RNA-related matters]
 - (2) Design basis evaluation [excluding RNA-related matters]
 - (3) Integrated load analysis evaluation [excluding matters only related to RNA]
 - (5) Support structure design evaluation

[1] Based on the review materials submitted by the operator, support structure design firm, and wind turbine manufacturer, the Support Structure Certification Subcommittee first conducts a review with a focus on those items that fall under special equipment.

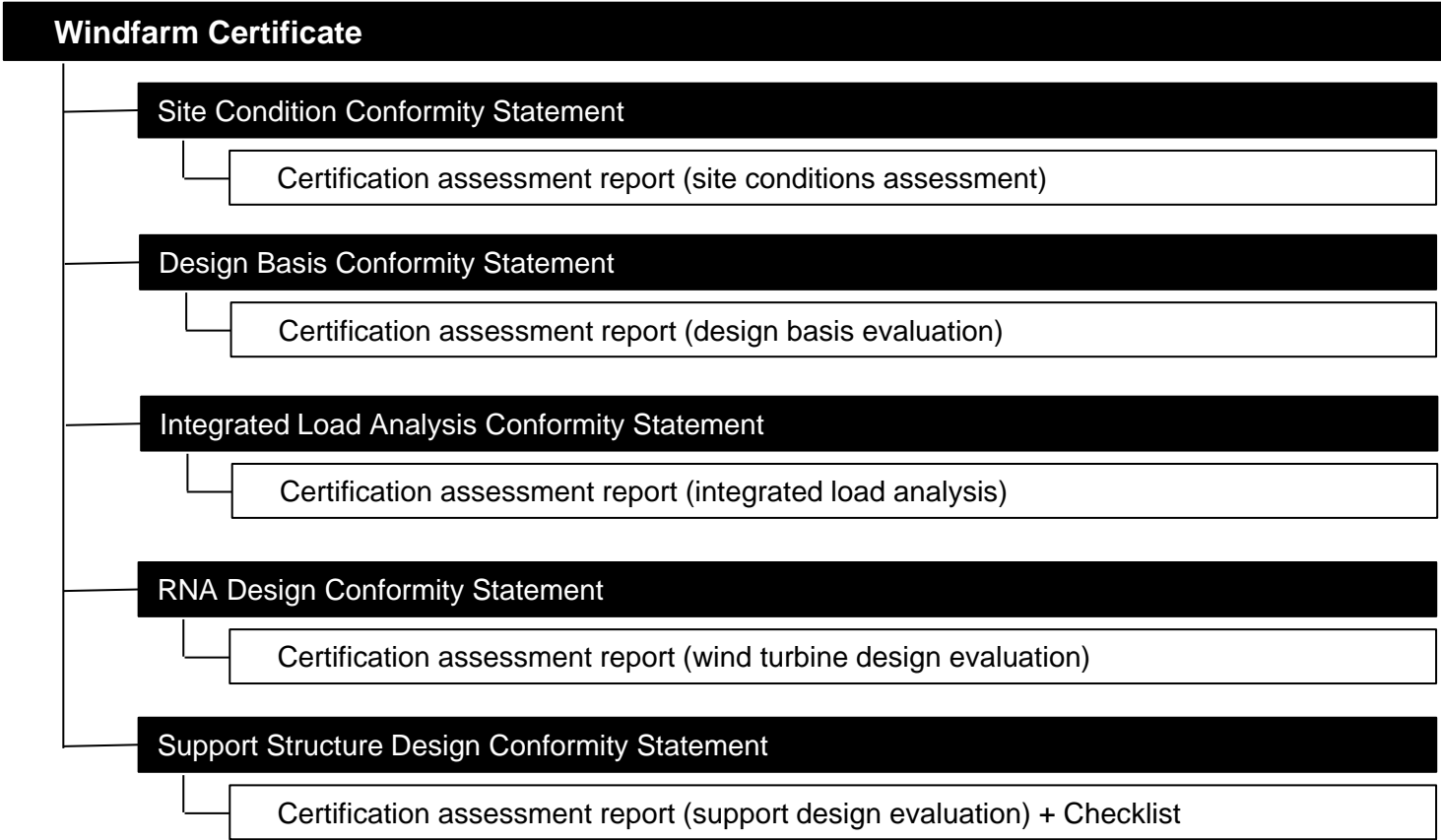
**The Support Structure Certification Subcommittee utilizes a format in which the operator, support structure design firm, and wind turbine manufacturer directly explain the design to the experts in each field that serve as committee members.*

[2] During following subcommittee meetings, the subcommittee responds to matters indicated during step [1]. This process is repeated until compliance with the technical standards has been verified, at which point the review by the subcommittee is complete. (The dashed arrow in the figure indicates that the Support Structure Certification Subcommittee will be repeated as necessary)

[3] After the subcommittee completes its review of special equipment, the Secretariat reviews all support structure design and calculation statements, and the review is complete when this step is finished.



Windfarm Certificate and Certification Assessment Report Issuance System [for offshore wind farms]



Example of a Conformity Statement

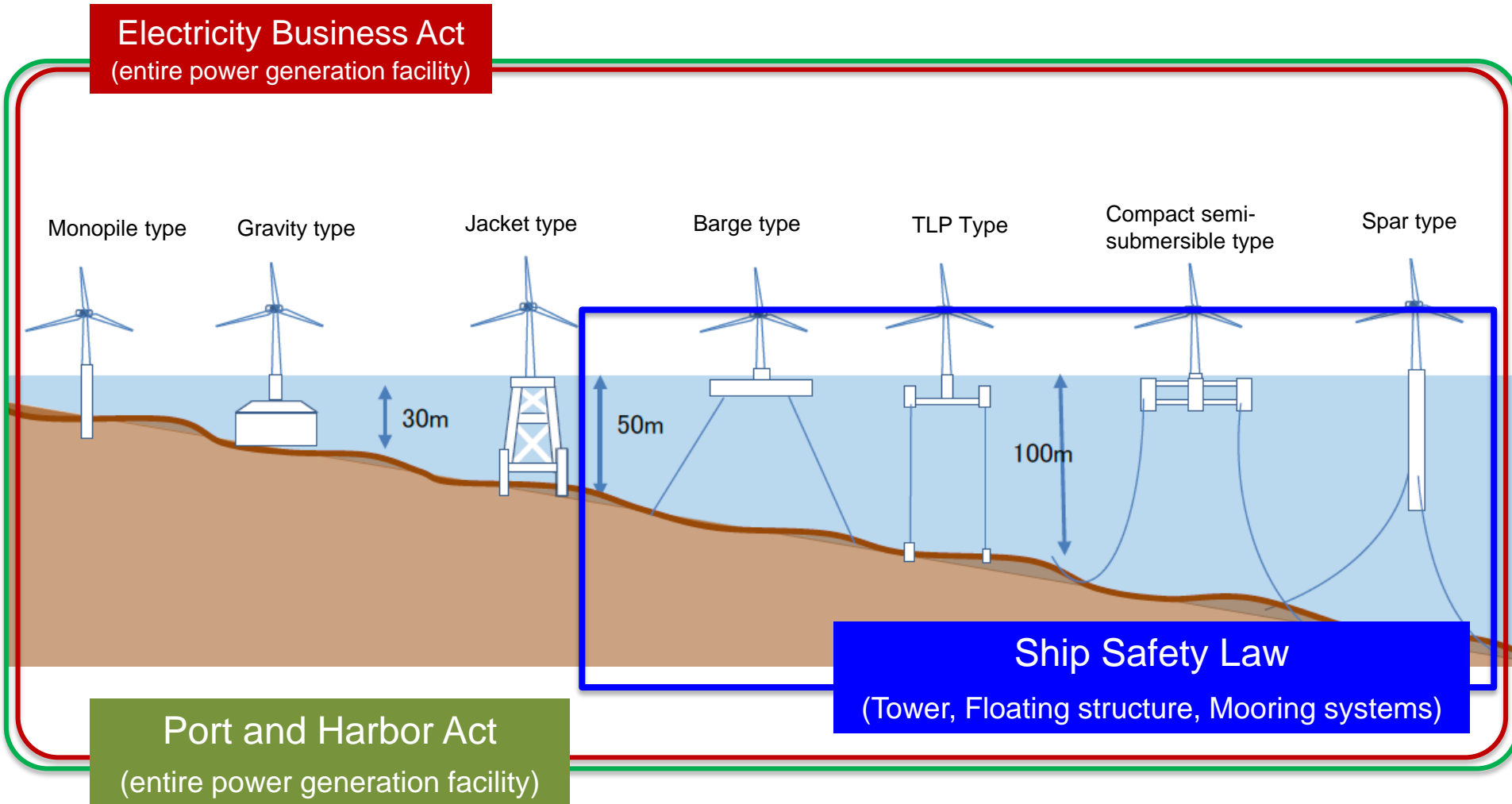


Example of a Certification Assessment Report

4. Compliance with laws and regulations for offshore wind turbines

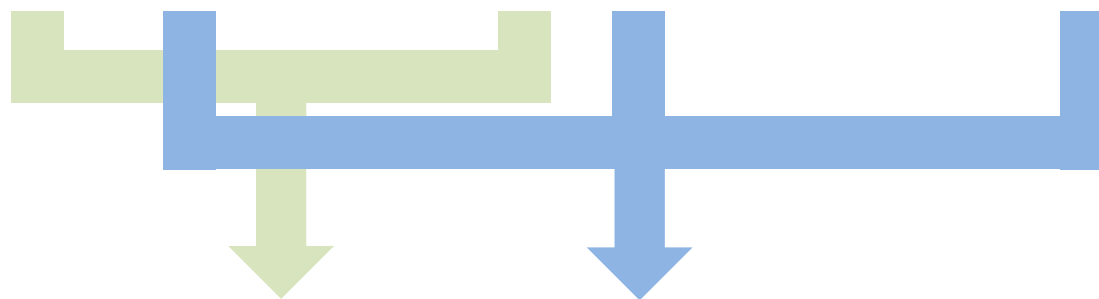
4. Compliance with laws and regulations for offshore wind turbines **ClassNK**

In the case of offshore wind turbines, measures are taken in consideration of the fact that the structure of wind turbines and support structures are subject to the Electricity Business Act, as well as the Port and Harbor Act and the Ship Safety Act.



4. Compliance with laws and regulations for offshore wind turbines **ClassNK**

	Electricity Business Act	Port and Harbor Act	Ship Safety Law
Onshore wind farm	Applied	N/A	N/A
Offshore wind farm (fixed-bottom type)	Applied	Applied	N/A
Offshore wind farm (floating type)	Applied	Applied	Applied
Approval format	Construction Plan Notification (uses the results of Wind Farm Certification)	Conformity verification by CDIT, a confirmation agency registered with the Minister of Land, Infrastructure, Transport and Tourism	Classification Survey by ClassNK, a classification society registered with the Minister of Land, Infrastructure, Transport and Tourism



CDIT and ClassNK have established a system to jointly review the support structure of offshore wind farms and their additional installations because some review items are the same under the applicable laws and regulations for fixed-bottom and floating wind farms, respectively.

<Joint press release>

Launch of joint review for Wind Farm Certification under the Electricity Business Act and conformity verification under the Port and Harbor Act for offshore wind farm support structures

CDIT (Coastal Development Institute of Technology): https://www.cdit.or.jp/o_news/20210331.html

ClassNK: https://www.classnk.or.jp/hp/ja/hp_news.aspx?id=5962&type=press_release&layout=5

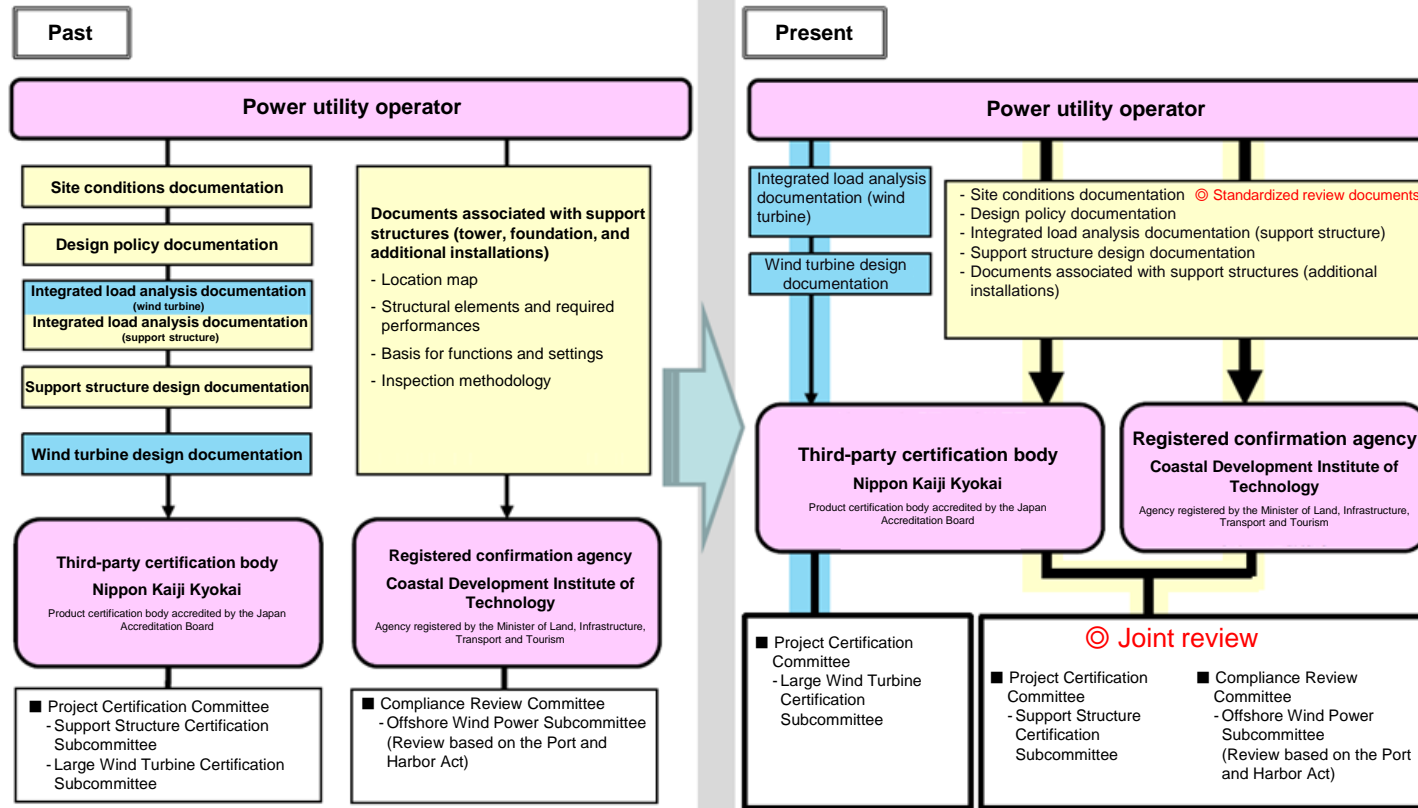
Port and Harbor Act compliance

■ The NK Support Structure Certification Subcommittee and CDIT Offshore Wind Power Subcommittee hold joint sessions

Note: In case of a dispute over translation, Japanese text shall prevail

Unified review system overview

- Standardizing the review documents for offshore wind farm support structures and submitting the same documents to both organizations reduces the burden on power utility operators.
- Unifying the process through a joint review shortens the review duration.



Compliance with the Ship Safety Law

Note: In case of a dispute over translation, Japanese text shall prevail

Ship Safety Law

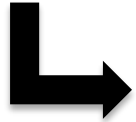
Article 2 Ships shall be outfitted pursuant to the provisions of ordinances of the Ministry of Land, Infrastructure, Transport and Tourism (ordinances of the Ministry of Land, Infrastructure, Transport and Tourism and ordinances of the Ministry of Agriculture, Forestry and Fisheries only with regard to fishing vessels) with regard to the following matters:

- (i) Hull
- (ii) to (xiii) (omitted)

[Reference] Public Notice Establishing Vessels with Special Structures or Equipment under Article 1, Paragraph 4 of the Ordinance for Enforcement of the Ship Safety Act

Ships with special structures or equipment as established in the Public Notice under Article 1, Paragraph 4 of the Ordinance for Enforcement of the Ship Safety Act are as follows:

- (i) to (iii) (omitted)
- (iv) **Floating offshore wind power facilities**



Technical Standards for Floating Offshore Wind Power Facilities

Kokkaian No. 194 dated April 23, 2012

Partially Amended Kokkaian No. 286 dated March 3, 2020

Ministry of Land, Infrastructure, Transport and Tourism website: Promoting the use of floating offshore wind power facilities

- Establishing technical standards for ensuring safety -

https://www.mlit.go.jp/maritime/maritime_fr6_000006.html

Technical standards establishing the requirements for structures and facilities based on the Ship Safety Act

<Reference> Electricity Business Act

<Technical Standards for Wind Power Generation Facilities>

(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.

<Interpretation of Technical Standards for Wind Power Generation Facilities>

(Ministerial Ordinance Article 7) Article 16

(2) The structure supporting the wind turbine (limited to those structures subject to the provisions of Article 2, Paragraph 1 of the Ship Safety Act) shall conform to the provisions of the same paragraph.

Compliance with the Ship Safety Act

Relationship between ClassNK Certification and the technical standards that must be satisfied by floating offshore wind power facilities

Electricity Business Act: Technical Standards for Wind Power Generation Facilities

Issues certification used in the Construction Plan Notification technical standards review

- Subject: Wind turbine and support structures (tower, floating structure, mooring lines)



Wind farm certification

*Joint meeting of the Support Structure Certification Subcommittee and CDIT

Ship Safety Law: Technical Standards for Floating Offshore Wind Power Facilities

Classification Survey based on the Ship Safety Law

- Subject: Support structures (Tower, Floating structures Mooring systems)



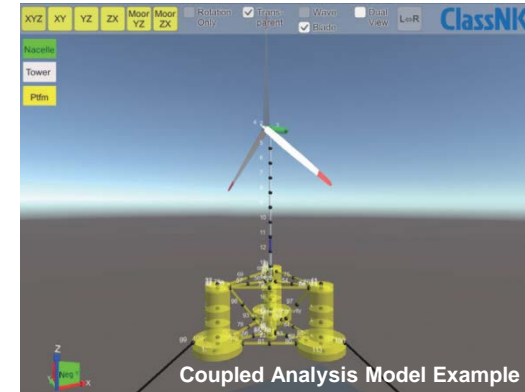
Classification Survey

- ◆ ClassNK is a “Classification Society authorized by the Minister of Land, Infrastructure, Transport and Tourism” as prescribed in Article 8 of the Ship Safety Law.
- ◆ Floating offshore wind power facilities that have been surveyed by ClassNK, a “Classification Society authorized by the Minister of Land, Infrastructure, Transport and Tourism,” and that have registered as classification are regarded as having undergone inspection and to have passed such by the maritime authorities.

Classification inspection



- Review designs for floating structures, towers, and mooring lines based on the Guidelines for Floating Offshore Wind Power Facilities.
- Review site condition (wind conditions, marine conditions, etc.) settings, wind turbine and floating structure coupled analyses, and support structure design evaluations at the same time as wind farm certification.
- Confirm that the steel plate and fittings to be used are approved by NK.



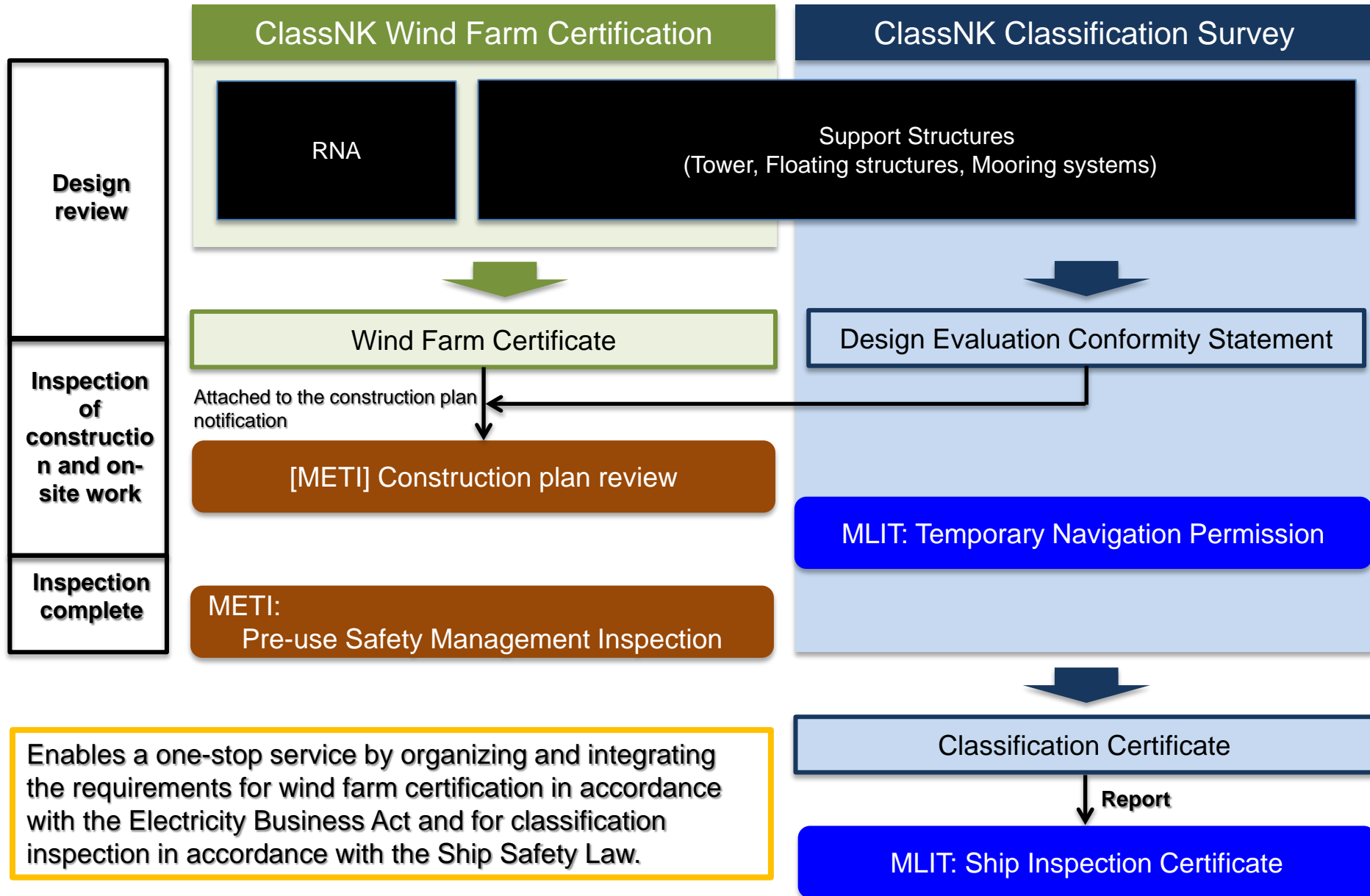
- Conduct a witness survey for the following items:
 - Witness survey during floating structure and tower manufacturing
 - Shipment survey for chains, anchors, etc. used in mooring lines
 - Attendance at manufacturing plant tests (water pressure tests, etc.) and installation work tests (holding capacity tests, etc.)



- After installation at the site is complete, ClassNK will attend verification tests of wind turbine control systems and floating structure ballast systems, etc.



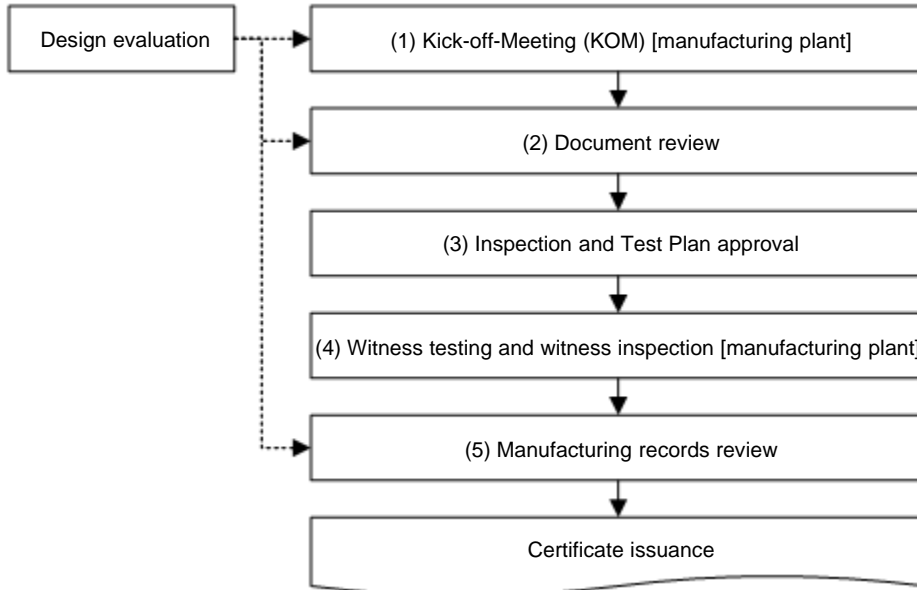
4. Compliance with laws and regulations for offshore wind turbines **ClassNK**



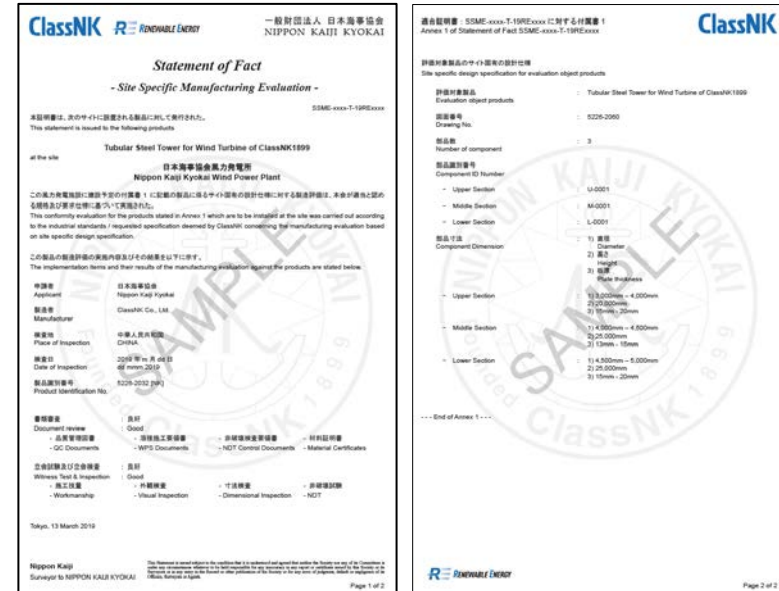
5. Other related services

Wind turbine support structure: Manufacturing evaluation

- This service covers wind farms that are subject to the Electricity Business Act and that have an output of 500 kilowatts or more, where one or more wind turbines are installed. The scope of this service includes manufacturing evaluation for the wind turbine support structures (tower and foundation) as required for acceptance of the Construction Plan Notification for such wind farms.
- This service assumes that the wind turbine support structures to be evaluated have been appropriately designed based on the local site conditions of the planned construction location, and have either obtained a Wind Farm Certificate from ClassNK regarding the details or have satisfactorily undergone design evaluation by a third party.



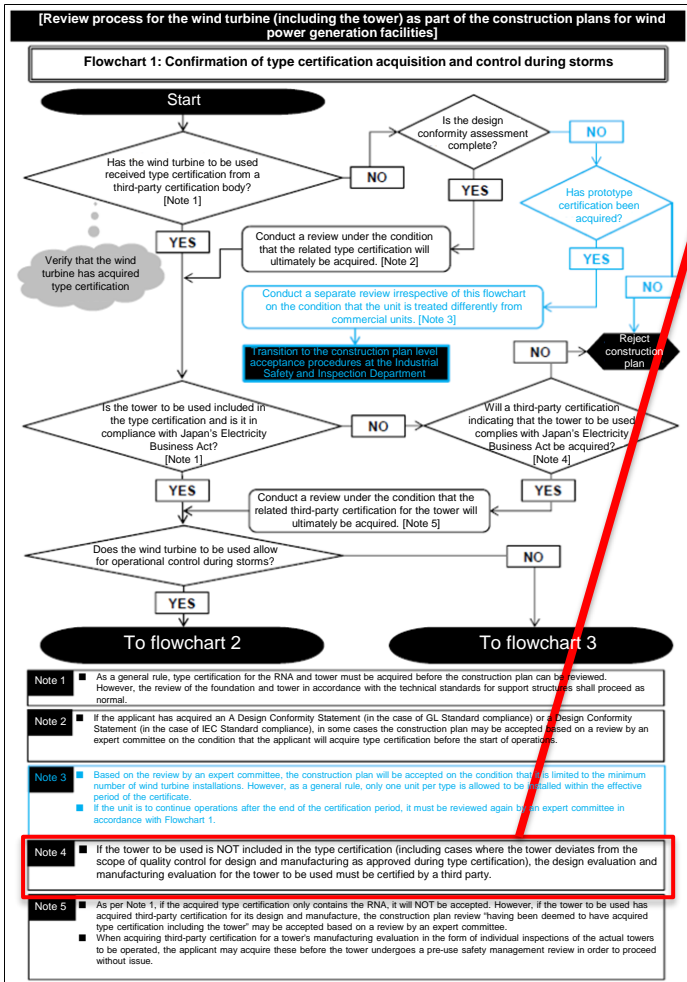
Evaluation Module and Flowchart



Certificate Example

This service corresponds to the manufacturing evaluation required in the flowchart [Note 4] specified in Construction Plan Review for Wind Turbines at Wind Power Generation Facilities Installed on Land (Ministry of Economy, Trade and Industry on April 4, 2019).

Wind turbine support structure: Manufacturing evaluation [for onshore wind farms]



Note 4 ■ If the tower to be used is NOT included in the type certification (including cases where the tower deviates from the scope of quality control for design and manufacturing as approved during type certification), the design evaluation and manufacturing evaluation for the tower to be used must be certified by a third party.

In the case of onshore wind turbines, the wind turbine tower must be included in the type certification.

<Tower design>

- When the tower is included in type certification:
 - Evaluate through wind farm certification (verify that the design approved during type certification is appropriate for the site conditions).
- When the tower is NOT included in type certification:
 - Evaluate through wind farm certification (verify that the tower design for the site is appropriate for the site conditions).

<Tower manufacturing evaluation>

- When the tower is included in type certification:
 - No specific requirements. However, this is limited to the case where the tower is manufactured by a manufacturer authorized during type certification.
- When the tower is NOT included in type certification:
 - Conduct a "Wind turbine support structure manufacturing evaluation" before the pre-use self-inspection.

Source: Construction Plan Review for Wind Turbines at Wind Power Generation Facilities Installed on Land (April 4, 2019 Ministry of Economy, Trade and Industry)
https://www.meti.go.jp/policy/safety_security/industrial_safety/oshirase/2019/4/310404-1.html

Note: In case of a dispute over translation, Japanese text shall prevail

Wind turbine support structure: Manufacturing evaluation [for onshore wind farms]

Manufacturing evaluation by type certification

Evaluates whether units are manufactured according to the design documents verified during design evaluation in terms of the following items:

1. Quality system evaluation
2. Manufacturing inspection (representative unit check)

- This certification covers the manufacturing plant, and the actual manufacturing of the towers to be delivered is NOT inspected.

Wind turbine support structure: Manufacturing evaluation

Evaluates whether units are manufactured according to the design documents verified during design evaluation in terms of the following items:

1. Quality system evaluation
2. Manufacturing inspection

- Evaluated items are the same as those under manufacturing evaluation by type certification.
- Evaluates individual manufacturing processes based on the results of the design evaluation for the site.
- Conducts witness inspections during the manufacturing processes for the towers to be delivered to the site.

As part of the wind turbine support structure manufacturing evaluation, a witness inspection is carried out during the manufacture of the towers to be actually constructed at the site, thereby acting as verification by a third party and creating a record trail that includes inspection reports.

Wind turbine support structure: Manufacturing evaluation [for offshore wind farms]

- In the case of offshore fixed-bottom wind farms, the wind turbine tower is also designed for each site and the foundation is generally made of steel. Under the Electricity Business Act, operators are responsible for quality control related to power plant construction. (At present, there are no additional requirements like those for onshore wind farms.)
- If an application is submitted for an offshore fixed-bottom wind farm, ClassNK conducts a manufacturing evaluation of the wind turbine tower and foundation (monopile/jacket).
- The “Wind turbine support structure manufacturing evaluation” for offshore fixed-bottom wind farms conducted by ClassNK is limited to a third-party assessment based on a private-sector contract. As a third party, ClassNK basically conducts its evaluation from the viewpoint of whether units are manufactured according to the order specifications.

<Application reasons assumed with offshore fixed-bottom wind farms>

- [1] When a developer / operator requires explanations to the lender from the viewpoint of project financing, or requires the EPC or contractor manufacturing the tower/foundation to undergo a third-party evaluation from the perspective of avoiding risks related to licensing.
 - [2] When the lender requires the developer / operator to undergo a third-party evaluation related to tower/foundation manufacturing from the perspective of project financing.
 - [3] When the EPC intends to acquire a third-party evaluation related to tower/foundation manufacturing from the perspectives of providing explanations to developer / operator and of avoiding various risks.
 - [4] When the tower/foundation manufacturer intends to acquire a third-party evaluation from the perspective of providing explanations to the ordering party and of avoiding various risks.
- In the case of offshore floating wind farms, an inspection equivalent to “Wind turbine support structure manufacturing evaluation” as part of classification inspection is carried out on the support structures (Tower, Floating structures, Mooring systems).

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