

Regulations relating to the marking and establishment of safety zones in connection with offshore renewable energy installations

Statutory authority: Laid down by the Ministry of Transport and Communications on 15 September 2016 pursuant to Act no. 21 of 4 June 2010 on Offshore Renewable Energy Production (the Offshore Energy Act) section 5-2, cf. Delegation Decision no. 701 of 20 June 2014 and Act no. 19 of 17 April 2009 relating to port and navigable waters sections 13 and 20, cf. Royal Decree no. 1607 of 17 December 2010 and Royal Decree no. 1287 of 10 October 2014.

Although all efforts have been made to produce an English version authentic to the original, this English translation is not an official version of the Regulations. In case of inconsistencies or errors, the official Norwegian version shall prevail. For the Norwegian version, please refer to:

<https://lovdata.no/dokument/SF/forskrift/2016-09-15-1066>

Section 1. (Scope)

The regulations apply in internal waters, territorial waters, the Norwegian economic zone and on the continental shelf.

The regulations apply to offshore renewable energy installations above or below the sea surface that constitute an obstacle to vessels.

Section 2. (Marking of renewable energy installations)

The owner is responsible for ensuring that renewable energy installations are marked in such a way that they are visible to vessels at all times. The marking must be carried out in accordance with Appendix 1 to these regulations. The Norwegian Coastal Administration (NCA) may, in certain cases, impose requirements on the marking other than those stated in Appendix 1.

The NCA must be notified once the marking has been carried out.

The NCA may amend Appendix 1 by regulation.

Section 3. (Duty of maintenance)

The owner is required to maintain the marking and equipment in a way that enables them to serve their intended function and safeguards their proper condition at all times. This requirement also includes rectifying faults in the equipment without undue delay.

If the conditions in the first paragraph cannot be rectified, this must be reported immediately to the national coordinator for navigational warnings at the NCA.

Section 4. (Safety zone in connection with renewable energy installations)

In order to safeguard maritime safety or the safety of a renewable energy installation, the NCA may, through regulation, establish a safety zone in connection with the installation.

Within this safety zone, restrictions may be imposed on traffic and other use of the waters, for example a ban on specific groups of vessels, anchoring, fishing or such like.

The safety zone in the Norwegian economic zone and on the continental shelf may extend up to 500 metres beyond the outer edge of the installation.

Section 5. (*Marking non-operational renewable energy installations*)

If a renewable energy installation is no longer operational, the requirements for marking pursuant to these regulations shall remain in force until the installation is removed.

Section 6. (*Entry into force*)

These regulations enter into force on 1 January 2017.

Appendix 1. Provisions on the marking of offshore renewable energy installations

1. Introduction

The provisions assume that offshore energy installations are normally shown on nautical charts and that vessels follow planned routes that ensure a safe distance for passing single installations or areas with several installations.

The provisions stipulate requirements with reference to the manual published by the Norwegian Public Roads Administration (NPRA) or recommendations or guidelines by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA). Reference is also made to standards, recommendations and guidelines by the International Maritime Organization (IMO), the International Telecommunications Union (ITU) and the International Electrotechnical Commission (IEC).

2. Availability

Light signals, and any radar transponder beacon (racon) and AIS AtoN (Aid to Navigation) shall have a minimum availability of 99.8%.

Availability shall be documented over a period of 3 years.

If a light signal, racon or AIS AtoN is out of operation, this must be reported to the national coordinator for navigational warnings at the NCA.

3. Light signals, lighting and colour

Luminous range

IALA's recommendations must be followed when calculating the light intensity in order to meet the luminous range requirement. Calculations shall be based on an atmospheric transmissivity of $T_M = 0.74$ (meteorological visibility of 10 nautical miles).

In special cases, where the transmissivity for much of the time is shown to be less than 0.74 ($T_M < 0.74$), a requirement may be imposed to use the lower transmissivity when calculating the luminous range.

Switching on and off

Light signals and lighting must ordinarily be switched on and off when the ambient light level is 50-100 lux and 150–200 lux respectively.

Yellow surface colour

The chromatic values (colour coordinates) for yellow surface colour shall lie within the corner points specified for ordinary yellow in IALA's *Recommendation E-108 – Surface Colours used as Visual Signals on Marine Aids to Navigation*.¹

Yellow retroreflective materials

Retroreflective materials shall meet the luminance factor and chromatic value (colour coordinates) requirements as indicated for yellow reflective sign sheeting in classes 2 and 3 in the NPRA's manual *R310 Road Traffic Safety Equipment Technical requirements*.

Yellow light

The chromatic values (colour coordinates) for yellow light shall lie within the corner points specified for yellow light in optimal regions in IALA's *Recommendation E-200-1 on Marine Signal Lights Part 1 – Colours*.

4. Standard marking of wind power installations

Wind power installations that need to be marked include wind turbines, meteorological masts, transformer stations and such like that are necessary for energy production or the transportation of energy, etc.

4.1 Surface colour, retroreflection and identification

4.1.1 Surface colour

The surface colour of fixed and floating wind power installations shall be yellow from the Highest Astronomical Tide (HAT) or the waterline respectively up to a height of 15 metres.

Use of the yellow surface colour may be adapted where concrete caissons, trusses and such like form part of a fixed installation's foundation, or where other factors make it necessary or expedient to do so.

¹ The standard colours RAL 1023 traffic yellow and NCS S 1080-Y Yellow meet the requirements for yellow surface colour.

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4.1.2 *Retroreflection*

Yellow retroreflective sign sheeting shall be fitted to parts of the yellow surface on wind power installations, and arranged in a suitable pattern. This material must be visible from all directions horizontally when illuminated by searchlights in the dark.

4.1.3 *Identification boards/panels*

Wind power installations shall have identification boards or panels with identification in the form of letters and numbers in the same typeface as that used on road traffic signs in Norway (*Trafikkalfabetet*).

Identification must be visible from all directions horizontally at distances up to 1.5 nautical miles.

Letters and numbers shall be a minimum height of 0.7 metres, and the distance from the outermost letter or number to the edge of the identification board or panel shall be at least 0.3 metres.

Identification boards and panels shall light up in the dark.

Illuminated identification boards/panels

The letters and numbers on illuminated identification boards and panels shall be black in colour, on a background of yellow retroreflective sign sheeting.

The board or panel shall ideally have a luminance level of 10 cd/m².

Identification boards/panels with backlighting

The letters and numbers on identification boards and panels with backlighting shall be black in colour, on a transparent yellow background.

The board or panel shall ideally have a luminance level of 10 cd/m².

Identification boards/panels with luminous pixels

Where the letters and numbers on identification boards and panels are made up of pixels, these pixels shall be luminous, on a black background.

The board or panel shall ideally have a luminance level of 10 cd/m².

4.2 Light signals

Light signals shall ideally be placed at a height of between 6 and 15 metres above the HAT for a fixed wind power installation or above the waterline for a floating wind power installation.

4.2.1 *Light signals*

Offshore energy installations shall be equipped with the following light signals:

- Colour: Yellow
- Character: Oc Y 2s
- Cycle period: 2 seconds (1.75 seconds of light – 0.25 seconds of dark, i.e. an operating cycle of 87.5%)
- Luminous range: 5 nautical miles
- Coverage: 360° horizontally

4.2.2 *Wind farms*

When establishing a number of wind power installations which collectively constitute a wind farm, the NCA can grant approval such that light signals are only required on wind power installations that form the perimeter of the wind farm. After a concrete assessment, some wind power installations on the wind farm's perimeter may be exempted from the requirement for light signals. Wind power installations that form the corners of the wind farm must always be marked with light signals. The light signal requirement may also be imposed for individual installations within the wind farm.

The marking of wind power installations in accordance with this paragraph must be coordinated with the Civil Aviation Authority of Norway's requirements for the marking of wind farms, see section 10 of Regulation no. 980 of 15 July 2014 relating to the reporting, registration and marking of aviation obstacles.

Light signals in an area with a number of wind power installations (wind farm) shall be synchronised.

5. Standard marking of wave and tidal energy installations

The requirement for marking encompasses, but is not limited to, wave and tidal energy installations that are:

- placed on or anchored to the seabed and in all or part of the water column above, or
- anchored to the seabed or moored in some other way and lying on the surface.

5.1 Surface colour, retroreflective materials, identification and light signals

Where wave and tidal energy installations are above the water surface, the marking requirements applicable to wind power installations similarly apply, cf. section 4 above.

Where wave and tidal energy installations are below the water surface, or where marking pursuant to section 4 is not practical, the NCA shall approve the marking and consider the need for marking by means of AtoN as stated in section 7.

5.2 Radar reflector

Wave and tidal energy installations that are partially above the water surface shall be marked with radar reflectors in order to increase the chance of radar detection.

A radar reflector shall have a minimum radar cross section (RCS) of 7.5 m² in the X-band and 0.5 m² in the S-band.

6. Additional marking of wind power installations and wave and tidal energy installations

Offshore energy installations that constitute a particular navigational hazard, or are especially valuable, important or similar, should be equipped with a racon or AIS AtoN to further safeguard detection and recognition by seafarers, i.e. where marking in accordance with sections 4 and 5 above is not considered sufficient.

6.1 Radar transponder beacons (racons)

Racons shall respond to marine radars operating in the 3 cm and 10 cm frequency bands. In the 10 cm band, this requirement does not apply to NT (New Technology) radars.

Racons shall respond with a signal in the form of an appropriate letter in Morse code, and beginning with a 'dash'. In Morse code, a 'dash' has a duration of three 'dots', and the duration without transmission between 'dashes' and 'dots' is one 'dot'.

6.2 AIS Aid to Navigation (AtoN)

An AIS AtoN may be either physical or virtual:²

- A physical AIS AtoN is an AIS message 21 'Aids-to-navigation report (AtoN)', which represents an aid that physically exists.
- A virtual AIS AtoN is an AIS message 21 'Aids-to-navigation report (AtoN)', which represents an aid that does not physically exist.

Access to and reporting in the network

An AIS AtoN shall use 'random access TDMA' (RATDMA) for control of access to the network (cf. AIS VHF Data Link (VDL)).

Reporting to the network should be in Mode B with transmission of the same message first on channel 1 and then on channel 2 or vice versa, in rapid succession, nominally 4 seconds.

² Cf. International Maritime Organization MSC.1/Circ. 1473 Policy on Use of AIS Aids to Navigation

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AIS AtoN report

An AIS AtoN report shall be in the form of an 'Aids-to-navigation report (AtoN)' with type indication:

- fixed structure offshore, such as oil platforms, wind farms;
- other type indications such as 'Special mark'.

Installations shall be indicated using appropriate identification.

Maritime Mobile Service Identity

Establishing an AIS AtoN requires a Maritime Mobile Service Identity (MMSI), which is assigned by Telenor Maritim Radio.

6.3 Indirect light (floodlighting)

A wind power installation may be illuminated in order to make it more visible for work in the dark or for other purposes.

Indirect light³ (floodlighting) on wind power installations shall not represent a nuisance to seafarers. In order to avoid attracting fish to the installation, illumination of the sea must be avoided or limited to the greatest degree possible.

7. Use of AtoN

As described in the NCA's guidelines for the design, technical requirements and placing of AtoN, such aids can be used for:

- the permanent marking of wind farms, or wave and tidal energy farms, or single installations; or
- temporary marking during offshore construction work.

This particularly applies to lateral markings, cardinal markings, isolated danger markings, special markings and sector lights.

³ Defined for these purposes as lighting in which the observer does not see the light source directly.

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