

International regulations and guidelines for maritime spatial planning related to safe distances to multiple offshore structures (e.g. wind farms)

Introduction

This is a summary of the most important international regulations that are decisive for the minimum distance from the border of a route to an area with multiple objects, e.g. wind turbines, which can be navigated by vessels.

This document is not applicable to areas with multiple objects in shallow waters, where traffic inside such area is not possible.

It is regarded as a **minimum distance** as it is the minimum space needed by vessels to comply with collision regulations, and is as follows:

- Starboard side of any route: 0,3 nM + 6 ship lengths + 500 meter
- Portside of any route: 6 ship lengths + 500 meter

The reasons for these minimum distances and other arguments are discussed in the document.

This document has been provided by the Shipping Advisory Board Northsea. Comments are welcome.

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Points of attention when reading this document:

- 1) One should consider that 80% of all disasters at sea are caused by human error. It is therefore realistic to keep certain margins when considering a safe distance.
- 2) When these provisions and regulations were designed, multiple structures such as wind farms did not exist yet. However, also the existing provisions and regulations provide sufficient guidance to argue a safe distance to such objects. Such a paragraph with guidelines related to multiple objects should be added to the General Provisions on Ships'Routeing in the near future.

The following Regulations and Guidelines have been established internationally:

1. General Provisions on Ships' Routeing of International Marine Organization (GPSR)
2. United Nations Convention on the Law of the Sea (UNCLOS)
3. International Regulations for Preventing Collisions at Sea, 1972, as amended: (COLREG)

The relevant Regulations and Guidelines will be discussed, and the relation with the minimum distance to areas with multiple objects explained.

GPSR 1.1

The purpose of ships' routing is to improve the safety of navigation in converging areas and in areas where the density of traffic is great or where freedom of movement of shipping is inhibited by restricted sea room, the existence of obstructions to navigation, limited depths or unfavorable meteorological conditions.

To demonstrate that the routing measure improves safety, a Formal Safety Assessment (FSA) is recommended. This FSA can provide arguments for selecting a certain route and is based on a probabilistic risk assessment.

The Captain will make his own risk assessment when passing structures along this route, and will keep a certain distance, depending on the size of the vessel, status of the main engine, weather conditions, traffic, so he/she can act according to the Colregs. This risk assessment is deterministic, as he/she wants 0 incidents. If all Captains feel that the routing measure takes the vessel too close to multiple structures, they will all shift to one side of the routing measure, causing the density of shipping to increase at one side – which is not in line with the starting point of GPSR: to improve safety of navigation.

Therefore demonstrating that a new routing measure improves safety of navigation can be done by means of FSA. However, determining the safe distance to structures along that route should be done via a deterministic approach, using the rules and regulations which a Captain should follow.

GPSR 6.4

Course alterations along a route should be as few as possible and should be avoided in the approaches to convergence areas and route junctions or where crossing traffic may be expected to be heavy.

Keeping in mind that a Captain keeps a safe distance to certain structures, again the structures should not be positioned in such a way that certain vessels will change course in order to reach this safe distance.

GPSR 6.8

Traffic separation schemes shall be designed so as to enable ships using them to fully comply at all times with the International Regulations for Preventing Collisions at Sea, 1972, as amended.

De safe distances to structures should be determined in such a way that a vessel can act according to the Colregs At ALL TIMES – also when sailing on the border of a routeing measure.

GPSR 6.10 Traffic lanes should be designed to make optimum use of available depths of water and the safe navigable areas, taking into account the maximum depth of water attainable along the length of the route. The width of lanes should take account of the traffic density, the general usage of the area and the sea-room available.

It is not easy to determine a safe width of a routeing measure. A guideline that has proofed to be accurate, based on AIS study by Maritime Institute Netherlands (MARIN):

- Number of vessels: based on AIS study, keeping in mind the future development during the lifespan of the structures
- Maximum size of vessels: same
- Number of vessels taking over:
 - < 4400 vessels per year: 2 vessels side to side
 - >4400 vessels and < 18000 vessels: 3 vessels side to side
 - >18000 vessels: 4 vessels side to side
- Room per vessel: 2 ship lengths

Example: a traffic lane which accommodates 18000 vessels per year with a maximum size of 400 meters should be at least 3200 meter wide. This matches with most of the present traffic lanes (e.g. approach Rotterdam, TSS Maas West)

Unclos Article 60

1. In the exclusive economic zone, the coastal State shall have the exclusive right to construct and to authorize and regulate the construction, operation and use of:

(a) artificial islands;

(b) installations and structures for the purposes provided for in article 56 and other economic purposes;

(c) installations and structures which may interfere with the exercise of the rights of the coastal State in the zone.

4. The coastal State may, where necessary, establish reasonable safety zones around such artificial islands, installations and structures in which it may take appropriate measures to ensure the safety both of navigation and of the artificial islands, installations and structures.

5. The breadth of the safety zones shall be determined by the coastal State, taking into account applicable international standards. Such zones shall be designed to ensure that they are reasonably related to the nature and function of the artificial islands, installations or structures, and shall not exceed a distance of 500 meters around them, measured from each point of their outer edge, except as authorized by generally accepted international standards or as recommended by the competent international organization. Due notice shall be given of the extent of safety zones.

6. All ships must respect these safety zones and shall comply with generally accepted international standards regarding navigation in the vicinity of artificial islands, installations, structures and safety zones.

7. Artificial islands, installations and structures and the safety zones around them may not be established where interference may be caused to the use of recognized sea lanes essential to international navigation

Paragraph 6: The 500 meter zone is for protection of the structure and is not meant as a safe distance for safe maneuvering according the Colregs.

Paragraph 7: Interference means e.g. limited ability to comply with the Colregs, The required room is not mentioned in the Colregs, however with the help of guidelines for shipbuilding regarding maximum room for full round turns there are arguments for a minimum distance.

COLREG 2a) and b)

Nothing in these Rules shall exonerate any vessel, or the owner, master or crew thereof, from the consequences of any neglect to comply with these Rules or the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case

In construing and complying with these Rules due regard shall be had to all dangers of navigation and collision and to any special circumstances, including the limitations of the vessels involved, which may make a departure from the Rules necessary to avoid immediate danger.

The Captain is held responsible for having mitigating measures in place for unforeseen conditions such as a Not Under Command situation. So sailing very close to islands or multiple structures is not according ordinary practice of seamen.

A study regarding Not Under Command situations shows that 90% of the vessels drift for one hour (AIS tracks in combination with Dutch Coast guard reports) – resulting in a drifting distance of 1,7 nautical Mile. This distance is a result of local conditions, and per area this distance should be evaluated.

COLREG 7c)

Assumptions shall not be made on the basis of scanty information, especially scanty radar information.

Because targets of vessels within an area with multiple structures tend to swap to the structures, a CPA is hard to get. Only when the vessel departs this areas, the CPA can be determined. The time needed to identify and plot the vessel has been determined to be 6 minutes. If a service vessel exits the wind farm with a speed of e.g. 10 knots, crossing the course line of a passing vessel, the minimum distance needed to get a reliable CPA is 1,0 nautical Mile.

AIS information is available, but a CPA based on AIS information should not be used to determine the risk for collision as the speed input is based on GPS and not on water track.

Next to the effect of swapping targets, wind farms cause radar interference. The safe distance to avoid interference has been determined by deep sea pilots to be 0,8 nautical miles.

COLREG 15

When two power driven vessels are crossing so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way and shall, if the circumstances of the case admit, avoid crossing ahead of the other vessel.

COLREG 8

Action taken to avoid collision with another vessel shall be such as to result in passing at a safe distance. The effectiveness of the action shall be carefully checked until the other vessel is finally past and clear

If the stand on vessel does not act according the Colregs, the give way vessel's last resort is a full round turn over starboard.

The required room is:

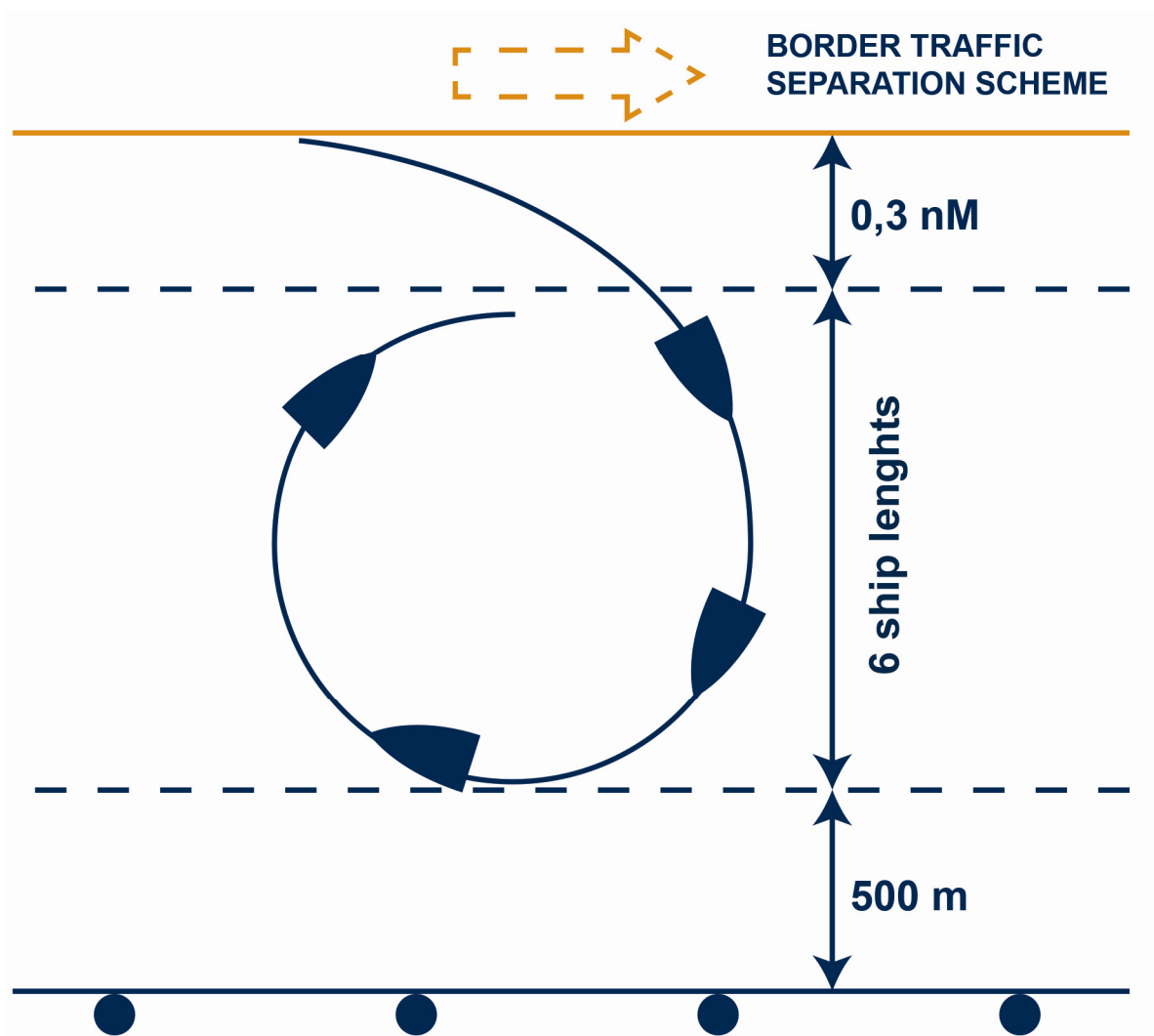
- 1) Start of the round turn. A round turn is not started right away. Normally one first deviates course, while observing the other vessel. This requires time. In the meantime one deviates from the original track. The distance is minimum 0,3 nM

2) The round turn itself is determined as follows:

- Para. 5.3.1: Turning ability: The advance should not exceed 4.5 ship lengths (L) and the tactical diameter should not exceed 5 ship lengths in the turning circle manoeuvre.
- Para. 1.2.3.5: Turning ability: Turning ability is the measure of the ability to turn the ship using hard-over rudder.' (zie resp. Resolutie MSC.137 (76) en MSC/Circ.1053).

The before mentioned requirement is under controlled conditions during sea trials. It is reasonable to take an extra ships length to compensate for the fact that the Officer On Duty is not fully prepare for this maneuver. Therefore the diameter of the round turn has been determined to be 6 ship's lengths.

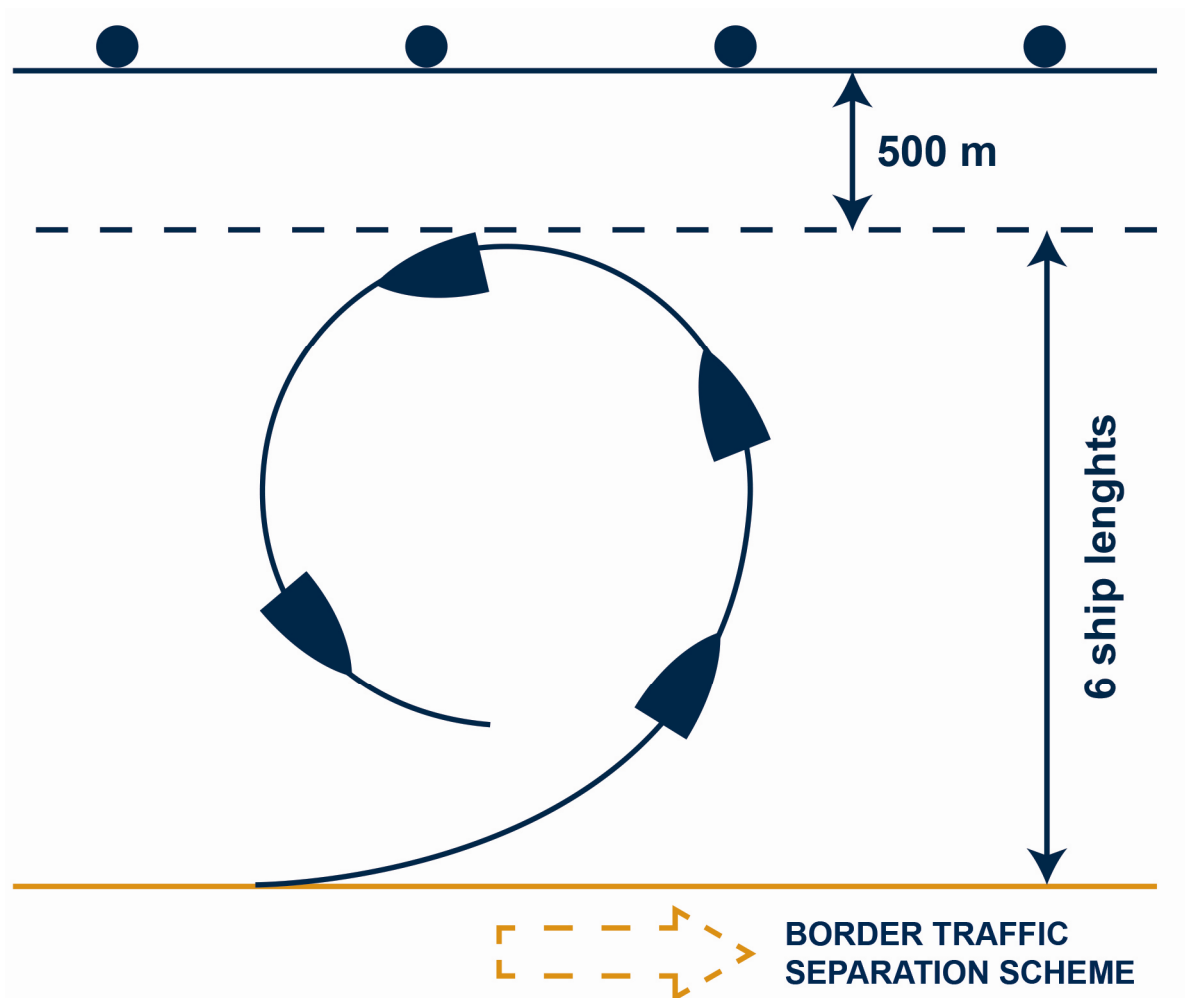
3) The round turn should not bring the vessel closer than the 500 meter distance safety zone.



A round turn will also be made over port side, in case e.g. the starboard aft quarter is blocked due to an overtaking vessel. However, than the vessel will not first deviate to port, but start a round turn right away:

Points of attention:

- 1) It happens quite often that after making a round turn a Not Under Command situation occurs, due to mechanical problems (e.g. low low level alarm on oil levels etc.)
- 2) On many vessels the Officer On Duty will hesitate to use hard rudder at once. Especially on passenger ships and container vessels one will be very cautious before starting such a turn as it can result in a lot of damage to passengers, crew and cargo.
- 3) Round turns are also made in case of a Man Over Board situation.



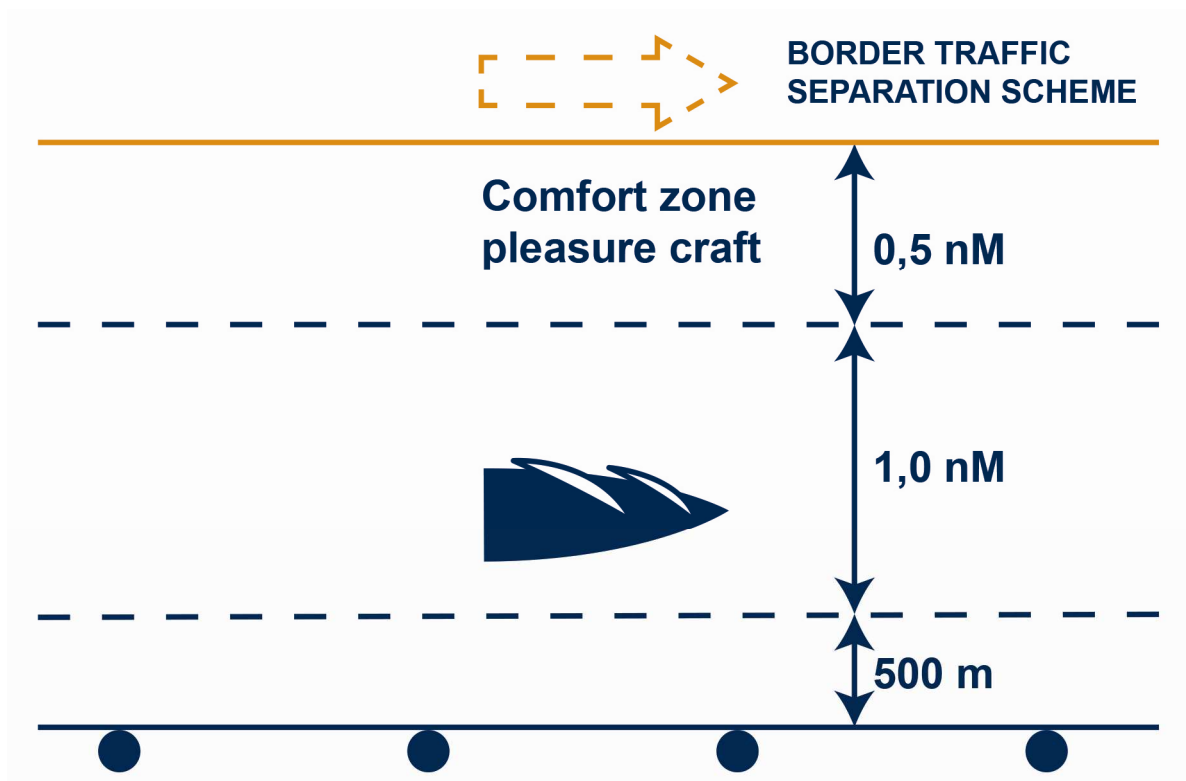
COLREG 10 h), I0, j)

A vessel not using a Traffic Separation Scheme shall avoid it by as wide a margin as is practicable.

A vessel engaged in fishing shall not impede the passage of any vessel following a traffic lane.

A vessel of less than 20 meters in length or a sailing vessel shall not impede the safe passage of a power-driven vessel following a traffic lane.

Fishing vessels and pleasure craft normally use the area next to the traffic lane. However, the picture below shows that there is little room left for e.g. sailing vessels that need to beat up against the wind.



Anchor areas.

There are no regulations that relate to anchorages.

Safe anchorages should provide sufficient room to:

- a) Maneuvers when the anchor is dragging
- b) Manoeuvre to approach the anchorage

The space to allow a vessel to start her engines and manoeuvre when an anchor is dragging has been found to be 1,7 nautical Mile to the safety zone of a multiple structures. This is the result of a safety study for an off shore platform.

The same distance has been found to be sufficient to approach that anchorage for all vessels making use of that particular area. Of course this study is related to a specific area – for other anchor areas one might to do a separate study. At least it provides an indication of the required distances.