



31122403-NR-Appendix 7-Required specification Criteria (VSE) Nautical Radar

Requirement specification General MIVSP LiDAR

Case number: 3112 2403

Date: 18/05/2017

Status: Final

31122403-NR-Appendix 7-Required specification Criteria (VSE) Nautical Radar

Requirement specification General MIVSP LiDAR

Colophon

Issued by:	Ministry of Infrastructure and the Environment
Date:	18-5-2017
Status:	Final



Table of contents

1	INTRODUCTION.....	4
1.1	General.....	4
1.2	Purpose of the Tender Specification Requirements.....	4
1.3	Place of TSR in the document structure	4
1.4	Document overview.....	5
1.5	Interpretation of this document	5
1.5.1	General.....	5
1.5.2	Influence of categories on requirements.....	5
1.5.3	Reading instructions	5
1.5.4	Interpretation of requirements.....	6
1.5.5	Verification method.....	6
2	REFERENCED DOCUMENTS	7
3	OBJECT DESCRIPTION.....	8
4	FUNCTIONAL, TECHNICAL, AND SYSTEM REQUIREMENTS	9
4.1	Radar/Installation locations.....	9
4.2	Infrastructure	9
4.2.1	Passive Infrastructure	9
4.2.2	Active infrastructure	10
4.2.3	Power supply	10
4.3	Radar sensor device	11
4.3.1	General.....	11
4.3.2	Nautical Radar Sensor.....	14
4.3.3	Radar sensor cables and connectors.....	16
4.3.4	Tubular pole or mast.....	17
4.3.5	Lightning protection	17
4.4	Management and maintenance.....	18
4.4.1	General.....	18

List of images

Figure 1	Place of TSR in the document structure	4
Figure 2	Object Tree Nautical Radar Sensor	8

List of tables

Table 1:	Verification methods.....	6
Table 2:	Referenced documents.....	7

1 Introduction

1.1 General

These Tender Specification Requirements (TSR) are part of the Agreement with case number 3112 2403 for the drafting of a Framework Agreement MIVSP Nautical RADAR. Hereinafter referred to as Agreement.

The work concerns the realisation of a framework agreement in preparation for the purchase of the Nautical Radars.

Details regarding the nature of the work, the scope, and the reasons and backgrounds for creating such an infrastructure are described in the General Tender Specification (GTS) of this project.

Process requirements, which mainly apply during the preparation and execution of the Work, are described in the Process Tender Specification (TSP) of this project.

1.2 Purpose of the Tender Specification Requirements

This TSR describes the *technical and system requirements* on the one hand and the *aspect requirements* which the Client sets to the infrastructure to be realised at the designated Installation Locations on the other hand.

1.3 Place of TSR in the document structure

The Tender Specification Requirements are positioned in the document structure associated with the Agreement as follows:

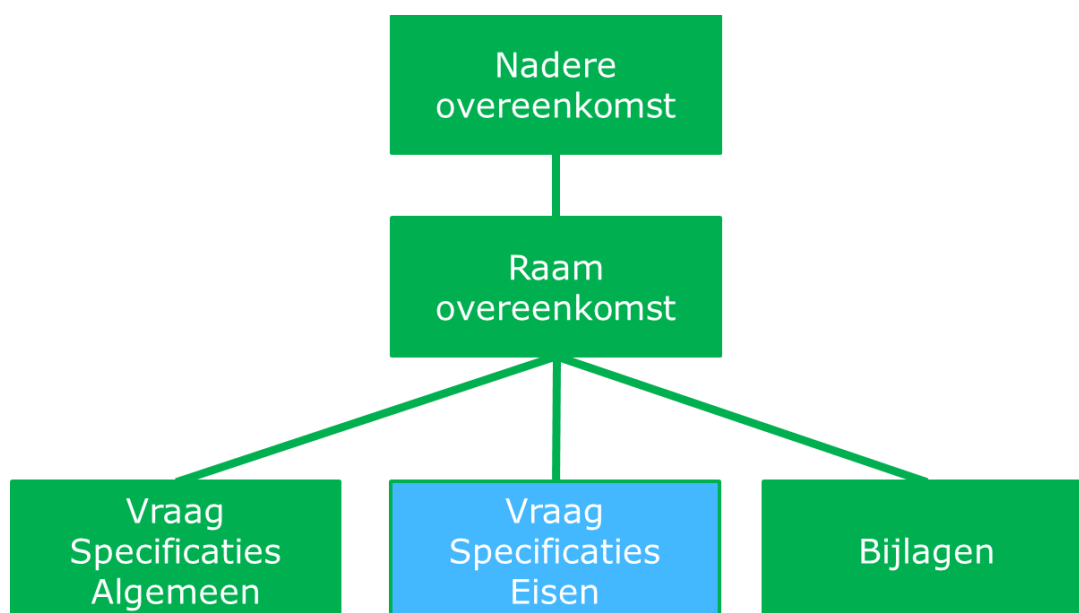


Figure 1 Place of TSR in the document structure

A description of the other documents is included in the GTS.



1.4 Document overview

This document contains the following chapters:

- Chapter 1 describes the position and place of this document in relation to other documents associated with the Agreement with case number 3112 2403. In addition, this chapter describes how this document and the requirements contained therein should be read;
- Chapter 2 specifies the references documents;
- Chapter 3 contains a so-called "object description" which uses a tree view to gradually zoom in on specific parts and/or work;
- Chapter 4 describes the functional, technical, and system requirements.

1.5 Interpretation of this document

1.5.1 *General*

The requirements included in this TSR are minimum requirements. Due to the fact that many requirements are of a more technical nature, it may not be deduced that this TSR is complete and correct in all cases. The Contractor must have thorough knowledge of the subject in order to design, realise, and deliver a high-quality installation based on these requirements. If the Contractor feels that one or more requirements in this TSR are not realistic or are in violation of laws and/or common standards, then the Contractor must inform the Client of this immediately and with substantiation.

Tender Specification Site Integration Test. The Client intends to have a Site Integration Test carried out that serves as preparation for the placement of equipment on platforms at wind farms in the North Sea for the benefit of the MIVSP (Maritime IV Service Point) project of Rijkswaterstaat Central Information Services (CIV).

1.5.2 *Influence of categories on requirements*

The General Tender Specifications (GTS) of this project contain tables that classify Installation Locations into three categories in terms of the expected difficulty of the Work. The expected differences in technology are of importance to this TSR in relation to the difficulty of the Work. Whether or not and which requirements apply in this TSR can be deduced from the text of the requirements where needed.

1.5.3 *Reading instructions*

The following reading instructions apply to this document:

- The reader is strongly advised to read about the definitions and abbreviations, which can be found in the GTS, before reading this document;
- References to the GTS will be interpreted as a reference to the GTS itself *and* to all underlying documents;



1.5.4 Interpretation of requirements

With regard to the requirements contained in this document, the following applies:

- Requirements can be recognised by a unique identifier "TSR-nn" followed by a bold heading that specified the requirement in key terms. Below that is a row that is identified by the word "Requirement:" followed by the formal requirement text;
- Below the requirement, there is space for an explanation. The explanation is not a part of the requirement; however, the requirement may not be seen as separate from the explanation. The reason for this is that the explanation offers additional information in support of the interpretation of the requirement.
- Finally, a verification method is listed under each requirement. Verification methods are further explained in §1.5.5.

1.5.5 Verification method

Contractor must perform all relevant tests to demonstrate that the delivered installation(s) meet the requirements. The different verification methods are specified below in Table 1. One or more verification methods have been included in each of the requirements in this document; each of these verification methods must be met.

Contractor must perform each of the verification methods and record them in reports in accordance with the requirements included in the TSP.

Method	Description
Analysis	The Contractor must demonstrate that they meet the requirement by performing analyses and/or benchmarks and/or simulations and/or calculations and/or by means of the analysis of test data, measurement data, performance data and/or availability data.
Certificate	A document issued by a competent authority that demonstrates that the relevant material, component, or process meets the required specifications.
Documentation	The Contractor must demonstrate that they meet the requirement by means of documentation which describes the relevant material, component, or process in detail.
Inspection	The Contractor must demonstrate that they meet the requirement by means of visually inspecting the delivered and/or installed materials, components, documents, and/or equipment.
Chain test	A simultaneous test of multiple systems connected in series and/or applications with the purpose of demonstrating that the umbrella functionality is met.
Measurement	The Contractor must demonstrate that they meet the requirement by means of measurements with the help of measuring equipment such as field strength measuring devices, Ohmmeters, network testing equipment, etc.
Test	The Contractor must demonstrate that they meet the requirement by determining that the behaviour of the (sub)system meets the requirement. Testing should take place using pre-defined procedures and under well-defined conditions, configuration and input data, possibly making use of specific test tools and/or test facilities.

Table 1: Verification methods



2 Referenced documents

This chapter contains a list of documents which are referenced by requirements in this TSR. For the manner of interpretation of referenced documents and the relative ranking, we refer you to the GTS.

Identification	Description
[IALA guideline 1111]	'Preparation of Operational and Technical Performance Requirements for VTS Systems', of May 2015. http://www.iala-aism.org/product/preparation-of-operational-and-technical-performance-for-vts-equipment/
[IALA V-128]	IALA Recommendation v-128, Operational and Technical Performance of VTS systems
[NEN1010]	NEN-1010:2007 + correction sheet C1:2008: "Safety requirements for low-voltage installations".
[NEN3140]	NEN-3140:1998 "Operation of electrical installations – Low voltage".
[EN50110]	NEN-EN-50110-1:2005 "Operation of electrical installations" and NEN-EN-50110-2:2010 "Operation of electrical installations – Part 2: National annexes".
[RWS-ELEK]	"Generic requirements of electrical installations", 01-Jul-2010, RWS-DI
[IEC62305]	NEN-EN-62305 "Protection against lightning" consisting of: <ul style="list-style-type: none">• Part 1 "General principles", publication date 01-March-2011;• Part 2 "Risk management", publication date 01-Dec-2006;• Part 3 "Physical damages to structures and life hazard", publication date 01-March-2011;• Part 4 "Electrical and electronic systems within structures", publication date 01-March-2011.
[NEN50164]	NEN-EN 50164 "Lightning Protection Components", parts 1 through 7, published in 2008 and 2009.
[NPR1014]	NPR 1014 "Dutch Guidance Protection Against Lightning" (published by NEN as addition/guidance to NEN-EN-62305), publication date 1-Nov-2009.
[NPR8110]	NPR 8110 "Dutch guidance risk management surge and transient protection", publication date 01-Jan-2003.
[RWS-NNF]	"New Network Facilities Public Works and Water Management – Connection Requirements", Version C, 26-Aug-2009
[NEN60529]	NEN-EN-IEC 60529 "Degrees of protection provided by enclosures (IP Code)", publication date 1-March-2000.

Table 2: Referenced documents

3 Object description

The object tree displayed in Figure 2 below identifies objects to which the technical and system requirements in this TSR apply. The number between the round brackets is a reference to the paragraph where the requirements associated with the object are specified.

In the Further Agreement (FAM), a continuation of this Framework Agreement, one must commit to the following functional, technical, and system requirements contained in this TSR.

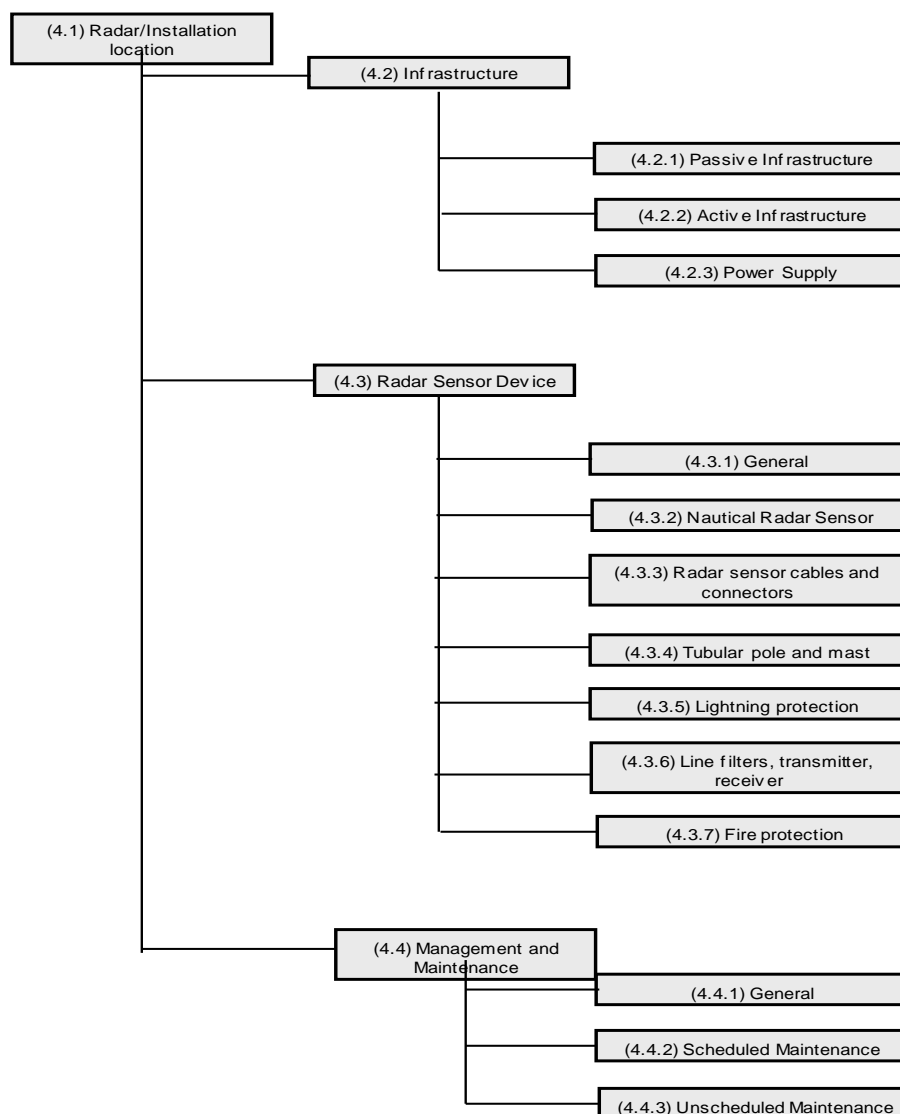


Figure 2 Object Tree Nautical Radar Sensor



4 Functional, technical, and system requirements

4.1 Radar/Installation locations

The delivery of the Radar Sensor includes the complete Radar Sensor (antenna, transceiver, connection box), the cabling, and the associated documentation for the correct installation and technical and functional testing of the radar sensor.

The installation and testing of the Radar Sensor at sea as well as in the inland waters is performed by a Site Integrator.

For the Radar Sensor installation locations at sea, we speak of:

- Offshore Substation, hereinafter referred to as OSS.
- Platform on the WindTurbineGenerator, hereinafter referred to as WTG/Transition Piece.

VSE-01	Installation locations inland waters, OSS and WTG/Transition Piece
Requirement: Accept: <input type="checkbox"/>	If necessary, the Contractor must provide support with the installation of the radar sensor at the installation location. Radar sensor installation requirements should be usable by a third party.
Explanation:	The Site Integrator is responsible for the installation on the platforms at sea.
Verification:	Inspection, documentation

VSE-02	Prevention of malfunction, nuisance, and other obstacles
Requirement: Accept: <input type="checkbox"/>	All facilities provided by the Contractor must be designed in such a way that malfunctions and nuisance at the installation location are avoided as much as possible.
Explanation:	Third parties must not experience inconvenience from the Radar Sensor when performing their work. Think of noise nuisance or related legislation, electromagnetic field associated with land or sea.
Verification:	Inspection, measurements

4.2 Infrastructure

4.2.1 Passive Infrastructure

VSE-03	OSS: location of equipment associated with Nautical Radar
Requirement: Accept: <input type="checkbox"/>	The Contractor ensures that any associated equipment of the Radar Sensor is suitable for installation in a 19" rack.
Explanation:	Directly under the mast is a technical area for any associated equipment with the option for actual Radar Sensor equipment.
Verification:	Documentation, Inspection



VSE-04	WTG: location of equipment associated with Nautical Radar
Requirement: Accept: <input type="checkbox"/>	The Contractor must ensure that no or little equipment associated with the radar sensor must be placed in a 19" rack.
Explanation:	The Site Integrator is responsible for a sea weatherproof cabinet at the WTG for the possible installation of associated radar equipment.
Verification:	Documentation, Inspection

VSE-05	Inland waterways: location of equipment associated with Nautical Radar
Requirement: Accept: <input type="checkbox"/>	The Contractor ensures that any associated equipment of the Radar Sensor is suitable for installation in a 19" rack.
Explanation:	The Site Integrator is responsible for a weatherproof cabinet for the possible installation of associated radar equipment.
Verification:	Documentation, Inspection

VSE-06	Labels on cabling
Requirement: Accept: <input type="checkbox"/>	All cabling mounted and 19" racks and/or cabinets installed by the Contractor must be equipped with clearly legible and unambiguously identifiable labels in accordance with the documentation and/or drawings to be provided by the Contractor.
Explanation:	
Verification:	Inspection

4.2.2 Active infrastructure

VSE-07	Active infrastructure interface
Requirement: Accept: <input type="checkbox"/>	The equipment connected to the network is based on Ethernet connection, IP-based, for connections with end users/customers.
Explanation:	Collected data is transferred via an IP carrier service.
Verification:	Documentation, inspection, test

4.2.3 Power supply

VSE-08	Radar sensor voltage power specification
Requirement: Accept: <input type="checkbox"/>	The Radar Sensor must be suitable for 220V and 380V.
Explanation:	Available power supply is not yet known at the time of setting up the WTG/Transition Piece.
Verification:	Documentation, inspection

VSE-09	Radar sensor power consumption
Requirement: Accept: <input type="checkbox"/>	Required power must be at least suitable for a power supply of 220V and 16A.



Explanation:	The maximum peak power requirement for all components of the radar sensor combined must be no more than 3500 Watt. At the time of writing, it is not yet known what the maximum power output is.
Verification:	Documentation, Inspection

VSE-10	Radar sensor connection device
Requirement: Accept: <input type="checkbox"/>	All internal equipment (19"rack) provided must be powered based on 220-240 Volt schuko plugs with grounding.
Explanation:	The power supply voltage delivered to the components of the radar sensors must function exclusively with standard 220-240 Volt grounded schuko plugs.
Verification:	Inspection, test, measurements

VSE-11	Radar sensor grounding power specification
Requirement: Accept: <input type="checkbox"/>	All equipment provided must be able to be grounded for all components
Explanation:	All components of the radar sensor must be equipped with a grounding device
Verification:	Documentation, Inspection, test, measurements

VSE-12	Voltage
Requirement: Accept: <input type="checkbox"/>	The system must continue to function properly with voltage variations of $\pm 10\%$ and/or frequency variations of $\pm 3\%$.
Explanation:	
Verification:	Documentation

4.3 Radar sensor device

4.3.1 General

VSE-13	Radar Sensor installation
Requirement: Accept: <input type="checkbox"/>	The Contractor must provide installation and replacement instructions for installation on the OSS or WTG based on the antenna plan.
Explanation:	The Site Integrator has technically skilled personnel who can perform the installation and connection of the system components. Site Integrator provides antenna plan for setting up the installation instructions.
Verification:	Documentation, inspection

VSE-14	Radar sensor device - features
Requirement: Accept: <input type="checkbox"/>	Providing an interface document, mechanical and electrical interface.



Explanation:	For the support structure and the cabling.
Verification:	Documentation

VSE-15	Radar sensor horizontal dimensions
Requirement: Accept: <input type="checkbox"/>	The antenna of the radar must have a maximum horizontal diameter of 21 ft (641 cm) for the benefit of the sea (OSS and WTG)
Explanation:	Preferably the smallest possible sensor
Verification:	Documentation

VSE-16	Minimum and maximum height of the radar sensor
Requirement: Accept: <input type="checkbox"/>	The sensor for the system for the horizontal plane must remain within 2 m and 3 m on the WTG/Transition Piece.
Explanation:	Safe passage and easy maintenance for third parties.
Verification:	Documentation

VSE-17	Maximum weight radar sensor
Requirement: Accept: <input type="checkbox"/>	The sensor for the horizontal plane may have a maximum weight of 500 kg for the benefit of the sea.
Explanation:	The sensor for collecting horizontal information may not weigh more than 500 kg. Preferably the lightest possible sensor.
Verification:	Documentation

VSE-18	Shockproof transport
Requirement: Accept: <input type="checkbox"/>	The sensor must be resistant to shock and impact during transport, max 1.7G.
Explanation:	This includes the transport from factory to the SIT location (Mock-up) and the transport on- and offshore
Verification:	Documentation

VSE-19	Prevention of water accumulation
Requirement: Accept: <input type="checkbox"/>	All externally placed materials and equipment (including radar sensor installation point and cable routing) must be mounted in a way that prevents water accumulation.
Explanation:	The purpose of this is to avoid corrosion and contamination as much as possible.
Verification:	Inspection

VSE-20	Wind force
Requirement:	The radar sensor device must be designed and placed in such a way that it can resist wind force 12 (32 m/s), including the gusts occurring therewith, without suffering



Accept: <input type="checkbox"/>	damage. In accordance with the IALA guidelines 1111.
Explanation:	Think of turbulent wind currents behind the WTG (Transition Piece) during standstill and operational mode. Consider the torsional rigidity of the radar arm on the WTG.
Verification:	Documentation

VSE-21	Hardware
Requirement: Accept: <input type="checkbox"/>	All (computer) hardware that is to be provided within the scope of this contract must be of the most recent generation. It must be demonstrated that all hardware are in conformity with the market or from the latest release/generation.
Explanation:	
Verification:	Documentation, Inspection

VSE-22	External climate control
Requirement: Accept: <input type="checkbox"/>	The equipment placed outdoors must continue to function properly at temperatures between -25°C to +50°C and a relative humidity of 10% to 90%.
Explanation:	
Verification:	Documentation

VSE-23	Internal climate control
Requirement: Accept: <input type="checkbox"/>	The equipment placed indoors must continue to function properly at temperatures between +5°C to +50°C and a relative humidity of 10% to 90%.
Explanation:	
Verification:	Documentation

VSE-24	Commercial Off The Shelf
Requirement: Accept: <input type="checkbox"/>	If possible, the required hardware and software, including system software, middleware, and the general application software, must be of the "Commercial Off The Shelf" (COTS) type. If there are areas where this requirement cannot be met, this must be unambiguously indicated in the offer.
Explanation:	
Verification:	Documentation

VSE-25	Delivery within 6 month
Requirement: Accept: <input type="checkbox"/>	The radar sensor or parts must be delivered within 6 months.
Explanation:	Short lead times and deadlines of the external parties of RWS



Verification:	Documentation
---------------	---------------

VSE-26	Maintenance-free (assembly) materials
Requirement: Accept: <input type="checkbox"/>	The (assembly) materials applied by the Contractor must be as maintenance-free as possible. The Contractor will provide a list for all applied non-maintenance-free (assembly) materials which indicated when what maintenance and/or inspections are necessary.
Explanation:	
Verification:	Inspection

VSE-27	Power failure
Requirement: Accept: <input type="checkbox"/>	The installation must be self-starting when power returns after power failure.
Explanation:	
Verification:	Documentation, chain test

VSE-28	Malfunctions
Requirement: Accept: <input type="checkbox"/>	The equipment must be resistant to power failure, voltage drop(s), and lightning.
Explanation:	
Verification:	Documentation

VSE-29	Safety
Requirement: Accept: <input type="checkbox"/>	The equipment must be protected against overvoltage between the phases R, S and T, and between neutral and earth.
Explanation:	
Verification:	Documentation

4.3.2 **Nautical Radar Sensor**

VSE-30	Features
---------------	-----------------



Requirement Accept: <input type="checkbox"/>	Capability	Target Type	Typically representing	Vessel Traffic Service area Availability	
	Advanced	2	Zone coverage 500m platform/OSS safety zone 2 nautische mijl around windfarm 50m rondom WTG	VTS 99,9%	Non-VTS 90-95%
	Standard	2,3	In-shore fishing vessels, sailing boats, speedboats and the like		
	Basic	3	Aids to navigation with radar reflector		
Explanation:	The radar sensor must meet the requirements set in IALA Guideline 1111 'Preparation of Operational and Technical Performance Requirements for VTS Systems', of May 2015.				
Verification:	Documentation				

VSE-31	Radar resolution	
Requirement Accept: <input type="checkbox"/>	Tangential resolution The system must be able to distinguish one or multiple echoes at a certain distance	
	Distance (km)	Tangential resolution (m)
	1	≤ 25
	4	≤ 50
	12	≤ 150
	20	≤ 250
Explanation:	Measured on the screen of the operator	
Verification:	Documentation, test.	

VSE-32	Radar sensor resolution
Requirement Accept: <input type="checkbox"/>	Radial resolution The distance in range between the echoes at which the echoes are still being properly distinguished. The radial resolution must be ≤ 50m within the entire radar coverage area.
Explanation:	Measured on the screen of the operator
Verification:	Documentation, test.

VSE-33	Radar sensor type
Requirement: Accept: <input type="checkbox"/>	At least a Solid State Radar
Explanation:	No Microwave Radar for radars at sea due to high power, clutter, compliance, and maintainability.



Verification:	Documentation
---------------	---------------

VSE-34	Response times – collected data
Requirement: Accept: <input type="checkbox"/>	The radar sensor must be able to provide data to the data centre (AM), the interface for the end users for the data processing (Radar Data Processing), within one second.
Explanation:	The radar sensor must be delivered with demonstrable data delivery within the set time.
Verification:	Documentation, test

VSE-35	Interoperability
Requirement: Accept: <input type="checkbox"/>	The collected data must be able to be accessed and distributed based on at least ASTERIX protocol with at least CAT240 as subcategory, latest version published 2 months before the contract date of the FAM.
Explanation: Accept: <input type="checkbox"/>	An open standard is required, so that a radar sensor can be purchased from any suppliers (interchangeable), without being dependent on the “proprietary protocol”, unless it concerns a replacement of an already existing system. A convertor proprietary to Asterix is
Verification:	Documentation, test

4.3.3 Radar sensor cables and connectors

VSE-36	Radar sensor cable installation
Requirement: Accept: <input type="checkbox"/>	Radar sensor cables must be installed according to the instructions of the manufacturer. In any case, kinks in the cable (both during installation and after completion) must be avoided, as this negatively influences the signal quality (high frequency properties) of such cables. Determining the locations where the radar sensor cables will be mounted and run through roofs and/or walls should be done in consultation with the Installation Location Manager.
Explanation:	The Contractor is required to deliver the power supply cabling and other sensor cabling customized and assembled for an easy installation by the Site Integrator. If the cabling is assembled on site, this must be specified and documented.
Verification:	Inspection

VSE-37	Radar sensor connectors
Requirement: Accept: <input type="checkbox"/>	Radar sensor cables must be installed according to the instructions of the manufacturer. Connectors that are exposed to the outside must be protected against weather influences.
Explanation:	
Verification:	Inspection



4.3.4 Tubular pole or mast

VSE-38	Radar sensor location
Requirement: Accept: <input type="checkbox"/>	Contractor provides the specifications of the radar sensor (dimensions, angle, structure stiffness, weight, etc.) to the Site Integrator (SI) for a correct attachment to the mast.
Explanation:	SI is responsible for delivering the mast and the construction on the platform. The detail engineering on the platform falls under the responsibility of the Site Integrator.
Verification:	Documentation

VSE-39	Platform Antenna Plan
Requirement: Accept: <input type="checkbox"/>	The Contractor reports their findings and recommendation for the antenna plan to Site Integrator
Explanation:	The Antenna Plan for the inland waterways, the OSS, and WTG/Transition Piece is a responsibility of the SIT.
Verification:	Documentation

4.3.5 Lightning protection

VSE-40	Lightning protection device
Requirement: Accept: <input type="checkbox"/>	<p>The placement of antenna device(s) in connection with the work may not result in an increased risk of lightning strikes at the site of the SIT.</p> <p>If placement of antenna device(s) in connection with the work results in an increased risk of lightning strikes, the Contractor must take appropriate measures that result in a similar or lower risk of lightning strikes, in accordance with the subdivision in the LPS (Lightning Protection System) :</p> <ol style="list-style-type: none">1. External lightning protection system2. Potential equalisation plant3. Grounding system4. Surge protection system
Explanation:	Measures, which must be taken in consultation with the client, may include the modification and/or expansion of an existing lightning protection system, by realising an additional or entirely new lightning protection system. The applicable guidelines and standards apply to this, including [IEC62305], [NRP8110], [NEN62561], and [NPR1014].
Verification:	Inspection, measurement

VSE-41	Protecting equipment against lightning
Requirement	All equipment must be protected, in accordance with [IEC], against the consequences of a direct lightning strike in the antenna device and against induction



Accept: <input type="checkbox"/> :	voltages due to lightning strikes near the test location.
Explanation:	
Verification:	Inspection

VSE-42	Grounding
Requirement	All metal components of the antenna device, with the exception of the antennas themselves, must be properly grounded if they are not part of the lightning protection.
Accept: <input type="checkbox"/> :	
Explanation:	
Verification:	Inspection, measurement

VSE-43	Emergency switch
Requirement:	Radar sensor must be equipped with an emergency stop.
Accept: <input type="checkbox"/>	
Explanation:	For work on the radar, there must be an emergency stop on site to shut down.
Verification:	Inspection, test

4.4 Management and maintenance

4.4.1 General

VSE-44	Management and maintenance documentation
Requirement:	The Contractor provides the necessary documents for a correct and functional operation, installation, and preventive and corrective maintenance.
Accept: <input type="checkbox"/>	
Explanation:	
Verification:	Documentation

VSE-45	Low-maintenance on site
Requirement:	All components of the Radar Sensor must be demonstrably suitable for installation at sea with an expected operational lifespan of at least 10 years.
Accept: <input type="checkbox"/>	
Explanation:	All components and materials used must be resistant to the conditions on a platform or WTG/Transition Piece at sea. This is dependent on the final placement and for a period of at least 10 years without loss of function.
Verification:	Documentation

VSE-46	Proven technology
Requirement:	The Radar Sensor must be entirely proven technology.
Accept: <input type="checkbox"/>	



Explanation:	The supplier must demonstrate that of the offered Radar Sensor, at least one is being used by other clients of the supplier. This system must match the offered system in terms of both operation and components.
Verification:	Documentation, inspection

VSE-47	Remote management
Requirement: Accept: <input type="checkbox"/> :	The Radar Sensor must be remotely accessible for management and maintenance.
Explanation:	The Contractor must provide a system that is remotely accessible for the most common maintenance/management tasks, such as sector blanking, bypass speed, transmission power, or software updates. The system must be accessible via an IP network, and preferably via a web browser.
Verification:	Documentation

VSE-48	Remote monitoring
Requirement: Accept: <input type="checkbox"/>	The Radar Sensor must be able to be remotely monitored and automatically report disturbances.
Explanation:	The supplier must provide a system that can be monitored via an IP network and that provides a notification in case of pre-set disturbances. The Contractor can also make use of this system for the RWS Control Centre and receives at least one user account.
Verification:	Documentation, Inspection

VSE-49	Low-maintenance interval
Requirement: Accept: <input type="checkbox"/>	All components of the radar sensor must have a long lifespan with a low-maintenance interval of at least 9 months.
Explanation:	The components are placed on an offshore platform or Transition Piece platform that is visited for standard maintenance no more than twice per year. Therefore, system components that require minimal maintenance are preferable.
Verification:	Certificate, Documents

VSE-50	Ability to shut down sensors with emergency shut down button
Requirement: Accept: <input type="checkbox"/>	The contractor must equip the system with an interface to connect a mechanical emergency button to shut down the system from a safe distance.
Explanation:	The contractor must deliver an interface connection to shut down the sensors with a mechanical button (close loop contact). This for maintenance staff and in case of emergency.
Verification:	Documentation, Test