



Tender Specification Requirements, ADM Lot

Description of the Performance

ADM Flow Measurement Instruments - Supply, Implement, Manage, Maintain

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1 Introduction

1.1 Purpose of the Tender Specification Requirements

These Tender Specification Requirements ('TSR') describe Rijkswaterstaat's ('RWS's') need to produce reliable discharge and flow velocity data using new ADM Flow Measurement Instruments at existing and new ADM Measurement Sites.

1.2 Structure of the TSR

Chapter 2 'System Definition' contains a description of the ADM Flow Measurement Instruments and the relationship that these Flow Measurement Instruments have with the civil, electrical and telecommunications infrastructure on an ADM Measurement Site. This shows the functional choices that the Contractor must make to be able to supply the requested ADM Flow Measurement Instruments.

Chapter 3 'System Requirements' contains the Performance requirements set for the ADM Flow Measurement Instruments from several perspectives.

This TSR refers to several annexes. These documents form an inseparable part of the Agreement.

1.3 Reading guide

This TSR is best read after the TSG and before the TSP.

The meaning and definition of the terms and abbreviations used in this TSR can be found in **Annex A. 'Glossary Discharge, ADM Lot'** to the Tender Specification.



2 System Definition

2.1 Introduction

This TSR covers the Supply, Implementation, Management and Maintenance of the ADM Flow Measurement Instruments. The purpose of the ADM Flow Instruments is to provide RWS with accurate discharge and flow velocity data at the ADM Measurement Sites in accordance with the specifications.

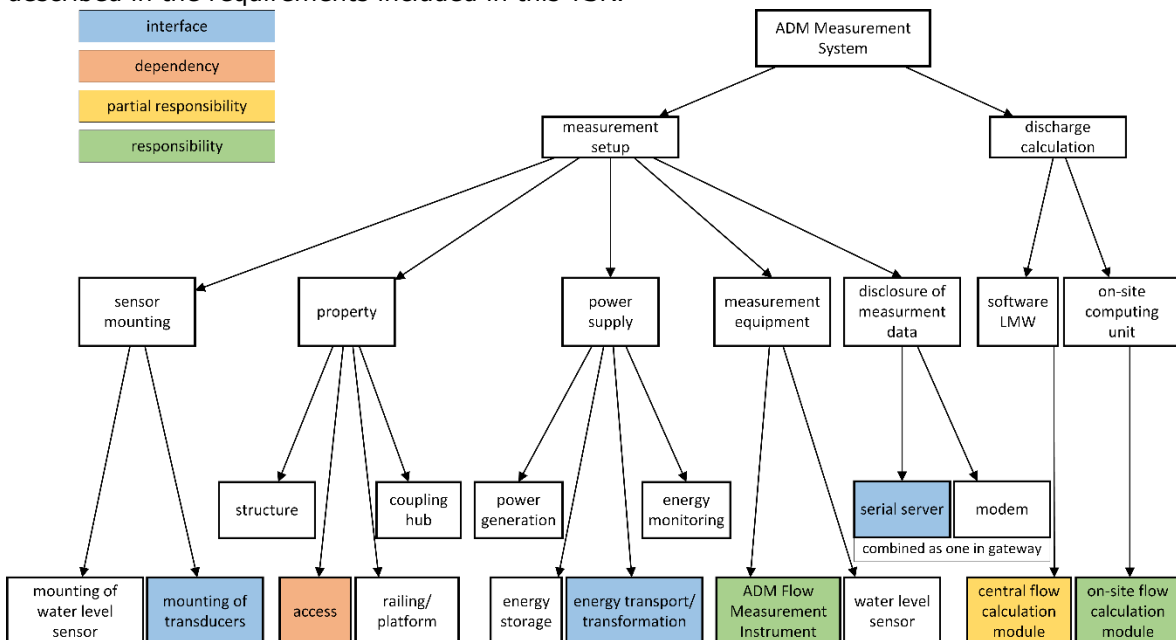
2.2 System Context

2.2.1 System Description

The ADM Flow Measurement Instrument contains the following elements at each ADM Measurement Site:

1. 4 transducers, or a multiple of that if there are several measurement planes;
2. a computing unit;
3. cables between the computing unit and the transducers;
4. transponder (at some ADM Measurement Sites).

Part of the Contract involves the complete renewal of ADM Measurement Sites. To this end, it is important to understand the components that are in Scope for the Contract and the interfaces with the components provided by the Client or by LMW's M&S (Management & Servicing) Contractor. The object tree below illustrates the structure of the complete Measurement System, including the ADM Flow Measurement Instrument at the ADM Measurement Site. For each component, it is specified whether the Contractor bears responsibility (full or partial) for this purpose and whether there are interfaces or dependencies. The exact content of the responsibilities, interfaces and dependencies is described in the requirements included in this TSR.



2.3 Functions of the ADM Flow Measurement Instrument

An ADM Flow Measurement Instrument has the following two main functions:

1. Measuring the flow velocity;
2. Calculating the Discharge from the measured flow velocity and the external data of the water level and bed profile.



3 System Requirements

3.1 Introduction

This chapter describes the functional specifications set for the ADM Flow Measurement Instruments based on the defined requirements.

The requirements for each component are set out in **Chapter 3.2**.

The requirements for each RAMSSHEEP aspect are set out in **Chapter 3.3**. More information on the RAMSSHEEP aspects can be found at <https://www.rijkswaterstaat.nl/zakelijk/zakendoen-met-rijkswaterstaat/werkwijzen/werkwijze-in-gww/sturen-op-prestaties-met-rams>

The requirements resulting from the interface analysis are set out for each interface in **Chapter 3.4**.

The corresponding information for each requirement is provided in accordance with the table below. The identification of the requirements in this chapter is preceded by the prefix 'ADM'.

Each TSR requirement has the following structure.

ADM.xxx	<Requirement title>		
Requirement:	<Requirement text>		
Explanation of requirement:			
Parent requirement(s):	<Requirement ID of parent requirement(s)> <i>Parent requirements specify the origin and thus the background of the requirement.</i>	Child requirement(s):	<Requirement ID of child requirement(s)> <i>Child requirements are derived from the requirement.</i>
V&V method:	<Conditions for the verification(s) and/or validation(s) of this requirement. Verification and/or validation is aimed at meeting/functioning in accordance with the requirement>		

Each requirement specifies the Verification and Validation that must be performed to ensure that the ADM Flow Measurement Instruments meet the relevant requirement. The table below shows how the Verification and Validation must be done for each V&V method.

V&V method	Verification and Validation
Contractor's Analysis	Written substantiation by the Contractor, by means of a technical dossier, that a product or product type meets a requirement. This could be based on evidence or statements from suppliers, calculations and simulations or logical reasoning. The Contractor warrants substantive accuracy; RWS generally tests for plausibility.
RWS's Analysis	Written substantiation by the Client, by means of a technical dossier, that a product or product type meets a requirement. This could be based on evidence or statements from suppliers, calculations and simulations or logical reasoning.
Contractor's Calibration Report	Contractor's report for each ADM Measurement Site describing the conditions under which measurement results are provided by the ADM Flow Measurement Instrument based on evidence from the Client's reference measurements and



	the calculated flow velocity and/or the calculated Discharge based on the measurement results produced by the ADM Flow Measurement Instrument. It contains a description of the formula used and the calibration coefficient values for the flow velocity and/or discharge calculation. The Contractor delivers this calibration report after each calibration.
Contractor's Work Plan	A Work Plan in accordance with Directive 92/57/EEC that describes the construction project, the parties involved, and the designated coordinators. It includes a hazard inventory and risk assessment together with the corresponding preventive measures. The Work Plan also defines arrangements on cooperation, work procedures, emergency provisions, and access control to safeguard Health & Safety at the construction site. Additionally, it sets out how the plan is updated and specifies which information must be included in the Health & Safety file.
Asset Delivery Report	A set of documents that the Contractor must submit within six weeks after realisation, enabling the registration of the completed ADM Flow Measurement Instrument in the RWS asset management system Ultimo.



3.2 Requirements from the function analysis

3.2.1 General

ADM.001	ADM;General		
Requirement:	Each ADM Flow Measurement Instrument must be supplied, implemented, managed and maintained at the ADM Measurement Sites designated by RWS in such a way that all requirements in the Tender Specification are met.		
Explanation of requirement:			
Parent requirement(s):		Child requirement(s):	
V&V method:	RWS's Analysis		

3.2.2 Measurement Sites for the ADM Flow Measurement Instruments

ADM.010	ADM;RWS_Specifications		
Requirement:	<p>ADM Flow Measurement Instruments must be implemented for discharge and flow velocity measurements at the following seven ADM Measurement Sites:</p> <ul style="list-style-type: none"> • Bunde (1x measurement plane) • Driel (2x measurement planes) • Genemuiden (1x measurement plane) • Hagestein (2x measurement planes) • Megen (1x measurement plane) • Sint Pieter Noord (2x measurement planes) • Venlo (2x measurement planes). <p>ADM Flow Measurement Instruments must be implemented for flow velocity measurements at the following ADM Measurement Site:</p> <ul style="list-style-type: none"> • Wieldrecht (1x measurement plane). 		
Explanation of requirement:	The ADM Measurement Sites are described in more detail in Annex C. 'Environmental conditions for each Measurement Site' to the Tender Specification. Ten additional Measurement Sites for ADM Flow Measurement Instruments may be added during the term of the Agreement.		
Parent requirement(s):		Child requirement(s):	ADM.020 ADM.040 ADM.041 ADM.042 ADM.043 ADM.044 ADM.200 ADM.210 ADM.220 ADM.230
V&V method:	Contractor's Analysis		



3.2.3 Specifications for the ADM Flow Measurement Instruments

ADM.020	ADM;RWS_Specifications	
Requirement:	<p>The ADM Flow Measurement Instrument must be suitable for the ADM Measurement Sites and comply with the following specifications:</p> <ul style="list-style-type: none"> • A Measurement Plane must consist of one Measurement Path aligned with the flow direction and one Measurement Path oriented against the flow direction; • It must be possible to supply the ADM Flow Measurement Instrument with both a transducer frequency of 200 kHz and a frequency \leq 100 kHz (also see Annex C. 'Environmental conditions for each Measurement Site' to the Tender Specification); • The Flow Measurement Instrument (ADM) must be installable both with and without a transponder, as specified per location in Annex C "Environmental Conditions per Measurement Site"; • The connection between the computing unit, the transducers, and—when a transponder is used—the street cabinet on the opposite riverbank must consist of cables. • The cables between the computing unit and the transducers must consist of two parts, interrupted by a coupling in what is known as the coupling hub. RWS calls the cable that runs from the computing unit to the coupling hub the 'ground signal cable' and the cable that runs from the coupling hub to the transducer the 'transducer cable'. More information on the locations of the coupling hubs can be found in Annex C. 'Environmental conditions for each Measurement Site' to the Tender Specification; • It must be possible to supply the ADM Flow Measurement Instrument with variable cable lengths to suit the ADM Measurement Sites (also see Annex C. 'Environmental conditions for each Measurement Site' to the Tender Specification); • New ground signal cables must be sheathed/armoured and have a minimum technical service life of 40 years; • New and existing ground signal cables must be connected to transducer cables with watertight couplings; • Various error codes must be visible at the ADM Measurement Site to enable a thorough fault analysis at the ADM Measurement Site. 	
Explanation of requirement:	<p>The coupling hub houses the coupling between the ground signal cables and the thinner, more flexible transducer cable. This coupling hub protects against mechanical stress, soil and dirt, but is not watertight. A detachable coupling is desirable, but not mandatory, and must be resistant to the aforementioned environmental conditions at all times.</p>	
Parent requirement(s):	ADM.010	Child requirement(s): ADM.045
V&V method:	Contractor's Analysis	



3.2.4 Implementation of the ADM Flow Measurement Instruments

ADM.040	ADM;Alignment		
Requirement:	Before Calibration, the Contractor must check the aligned ADM Flow Measurement Instrument at each ADM Measurement Site for correct alignment. If the alignment is incorrect, the instrument must be definitively and properly aligned in cooperation with LMW's M&S Contractor. The Contractor must bring its own hardware and software to perform this alignment.		
Explanation of requirement:	LMW's M&S Contractor attaches the ADM Flow Measurement Instrument to the civil infrastructure at the ADM Measurement Site(s) based on the Contractor's Installation Instruction and initially aligns it.		
Parent requirement(s):	ADM.010	Child requirement(s):	ADM.100
V&V method:	Contractor's Analysis		

ADM.041	ADM;Calibration;Initial		
Requirement:	The ADM Flow Measurement Instrument must be calibrated once during the implementation phase of an ADM Measurement Site such that the discharge and flow velocity measurements can be done with the required accuracy at the ADM Measurement Sites designated by RWS and the generally stated requirements in requirement ADM.100 of this TSR are met under any circumstance. It must be verified that the accuracy of the measurement data of the ADM Flow Measurement Instrument after alignment and calibration meets the requirements in the Tender Specification.		
Explanation of requirement:	For each ADM Measurement Site where discharge and/or flow velocity data is required, the alignment and calibration must be based on the information provided by RWS in Annex C. 'Environmental conditions for each Measurement Site' to the Tender Specification.		
Parent requirement(s):	ADM.010	Child requirement(s):	ADM.100
V&V method:	Contractor's Calibration Report		

ADM.042	ADM;Calibration;Adjustment		
Requirement:	The Contractor must perform a new calibration of the ADM Flow Measurement Instrument if the Client detects a discrepancy.		
Explanation of requirement:	<p>RWS carries out reference measurements on a regular basis. If there is a discrepancy between the Discharge from the ADM Flow Measurement Instrument and the Discharge from the reference measurement, RWS may instruct the Contractor to adjust the calibration. This check occurs no more than once a year.</p> <p>The reference measurements performed by RWS are vessel-mounted measurements. These must comply with ISO 18365, ISO 15769, and ISO 24578, as well as more stringent requirements. The accuracy of these measurements is 5% or better.</p> <p>If the difference between the ADM measurement and the reference measurement exceeds the sum of their respective accuracies, this constitutes a deviation that must be corrected.</p>		
Parent requirement(s):	ADM.010	Child requirement(s):	ADM.100
V&V method:	Contractor's Calibration Report		



ADM.043	ADM;Flow_Rate_Calculation_method		
Requirement:	The ADM Flow Measurement Instrument must calculate the Discharge on-site in the computing unit supplied by the Contractor using a method of its choice, in accordance with ISO 6416. A cross-sectionally averaged flow velocity must also be calculated in accordance with ISO6416.		
Explanation of requirement:	The cross-sectionally averaged flow velocity refers to the longitudinal flow velocity averaged over the flow area.		
Parent requirement(s):	ADM.010	Child requirement(s):	
V&V method:	Contractor's Calibration Report		

ADM.044	ADM;Content_Flow_Rate_message		
Requirement:	<p>The ADM Flow Measurement Instrument must provide flow velocity data for each measurement plane in the longitudinal and transverse direction and provide the Discharge at the ADM Measurement Site to the Gateway, in accordance with the following elements in the message:</p> <ul style="list-style-type: none"> • Resolution of Discharge; • Frequency of the message; • Discharge value; • Partial discharge for each measurement plane (if available); • Water level; • Current velocities for each measurement plane in the longitudinal and transverse direction; • Cross-sectionally averaged flow velocity; • Error codes where a distinction can at least be made between malfunctions/errors in each of the above parameters. 		
Explanation of requirement:			
Parent requirement(s):	ADM.010	Child requirement(s):	ADM.122
V&V method:	Contractor's Calibration Report		

ADM.045	ADM;Quality_Ground_signal_cable		
Requirement:	If the existing ground signal cables of the current ADM Flow Measurement Instrument are reused, the Contractor must provide a measurement and report of the existing ground signal cables at each ADM Measurement Site. The Contractor must demonstrate through an impact analysis that the existing ground signal cables are of such a quality that all the requirements set out in the Tender Specification are met.		
Explanation of requirement:	The current type of ground signal cable is CAI 1990 NKF COAX 6. RWS is prepared to assume the risk itself if the ground signal cable needs to be replaced before the end of the contract term. The Contractor's impact analysis is important to be able to make an informed decision in this regard.		
Parent requirement(s):	ADM.020	Child requirement(s):	
V&V method:	Contractor's Analysis		



3.3 Requirements from the aspect analysis

3.3.1 Reliability

ADM.100	ADM;Accuracy;Current_velocity		
Requirement:	The 10-minute mean value of the flow velocity of each ADM Flow Measurement Instrument must have a minimum accuracy of 10 cm/s and a minimum accuracy of 10 degrees for the current direction at the ADM Measurement Sites.		
Explanation of requirement:	The accuracy of the bed profile provided by RWS is 10 cm at each ADM Measurement Site. This value is given as 1 standard deviation.		
Parent requirement(s):		Child requirement(s):	
V&V method:	RWS's Analysis		

ADM.101	ADM;Accuracy;Flow_Rate		
Requirement:	The 10-minute mean value of the Discharge of each ADM Flow Measurement Instrument must have a minimum accuracy of 10% with a minimum of 1 m ³ /s at the ADM Measurement Sites.		
Explanation of requirement:	The accuracies of the given water level and bed profile are 2.5 cm and 10 cm, respectively, at each ADM Measurement Site. These values are given as 1 standard deviation.		
Parent requirement(s):		Child requirement(s):	
V&V method:	RWS's Analysis		

3.3.2 Availability

No specified requirement(s).

3.3.3 Maintainability

ADM.120	ADM;Maintainability;Preventive		
Requirement:	An ADM Flow Measurement Instrument must be able to undergo periodic preventive maintenance at <u>every</u> ADM Measurement Site by LMW's M&S Contractor based on the Contractor's Maintenance Manual.		
Explanation of req.:			
Parent requirement(s):		Child requirement(s):	
V&V method:	Contractor's Analysis		

ADM.121	ADM;Maintainability;Corrective		
Requirement:	An ADM Flow Measurement Instrument must be constructed in a modular way, so that corrective maintenance is possible at <u>every</u> ADM Measurement Site by LMW's M&S Contractor, including the replacement of standard components, based on the Contractor's Maintenance Manual, or with remote support from the Contractor.		
Explanation of req.:			
Parent requirement(s):		Child requirement(s):	
V&V method:	Contractor's Analysis		



ADM.122	ADM;Maintainability;Error_codes		
Requirement:	Every ADM Flow Measurement Instrument must be able, for the purpose of corrective maintenance, to send several types of error codes in the data message for different faults.		
Explanation of req.:			
Parent requirement(s):	ADM.044	Child requirement(s):	
V&V method:	Contractor's Analysis		

3.3.4 Safety (Occupational health and safety)

ADM.130	ADM;Safety		
Requirement:	An ADM Flow Measurement Instrument must operate safely at each ADM Measurement Site for people and the environment in accordance with the applicable occupational health and safety legislation.		
Explanation of req.:			
Parent requirement(s):		Child requirement(s):	
V&V method:	Contractor's Analysis		

3.3.5 Security (Environmental safety and security)

ADM.140	ADM;Security.Software_malware-free_delivery		
Requirement:	Every software component of an ADM Flow Measurement Instrument must be delivered tested and free of malware.		
Explanation of req.:			
Parent requirement(s):		Child requirement(s):	
V&V method:	Contractor's Analysis		

3.3.6 Health

ADM.150	ADM;Health.Safeguards		
Requirement:	An ADM Flow Measurement Instrument must not endanger the health of people or put the environment at risk.		
Explanation of req.:			
Parent requirement(s):		Child requirement(s):	
V&V method:	Contractor's Analysis		



3.3.7 Economics

ADM.160	ADM;Economy.Service_life		
Requirement:	The Mean Time Between Failures ('MTBF') of each ADM Flow Measurement Instrument must be at least five years with an average technical service life of ten years excluding wear and tear and consumable components or parts.		
Explanation of req.:	This service life may be guaranteed on the basis of replacement components.		
Parent requirement(s):		Child requirement(s):	
V&V method:	Contractor's Analysis		

3.3.8 Ecology

ADM.170	ADM;Sustainability		
Requirement:	Every ADM Flow Measurement Instrument must meet the underlying requirements for sustainability.		
Explanation of req.:			
Parent requirement(s):		Child requirement(s):	ADM.171 ADM.172 ADM.173 ADM.174
V&V method:	Through specific underlying requirements.		

ADM.171	ADM;Sustainability.Components.Repairs		
Requirement:	ADM Flow Measurement Instrument components must be replaced with new materials and/or components only if the current materials and/or components cannot be repaired or are at the end of their service life, provided that the required availability specified in ADM.110 is maintained. Exercising this requirement may not result in undue disadvantages for the Client and/or the Contractor.		
Explanation of requirement:	This requirement applies to every ADM Measurement Site. If and insofar as the Contractor anticipates that using repairable components will or might result in non-compliance with other requirements, these other requirements will prevail.		
Parent requirement(s):	ADM.170	Child requirement(s):	
V&V method:	RWS's Analysis (the Contractor must show the extent to which all used components are repairable. For used components that are not repairable, the Contractor must demonstrate that this is not possible, or would result in undue disadvantages for RWS, the Client, others, the environment, etc.).		



ADM.172		ADM;Sustainability.Components.Reuse	
Requirement:	If ADM Flow Measurement Instrument components are replaced, the materials and/or components to be replaced must be reused as long as the required availability specified in ADM.110 is maintained. Exercising this requirement may not result in undue disadvantages for the Client and/or the Contractor.		
Explanation of requirement:	This requirement applies to every ADM Measurement Site. If and insofar as the Contractor anticipates that reusing components will or might result in non-compliance with other requirements, these other requirements will prevail.		
Parent requirement(s):	ADM.170	Child requirement(s):	
V&V method:	RWS's Analysis (the Contractor must show the extent to which all used components are reuseable. For used components that are not reusable, the Contractor must demonstrate that this is not possible, or would result in undue disadvantages for RWS, the Client, others, the environment, etc.).		

ADM.173		ADM;Sustainability.Components.Circularity	
Requirement:	As far as possible, ADM Flow Measurement Instrument components must consist of materials and/or components that are recyclable at the end of their service life.		
Explanation of requirement:	This requirement applies to every ADM Measurement Site. If and insofar as the Contractor anticipates that using recycled and/or recyclable components will or might result in non-compliance with other requirements, these other requirements will prevail.		
Parent requirement(s):	ADM.170	Child requirement(s):	
V&V method:	RWS's Analysis (the Contractor must show the extent to which all used components are recycled and/or recyclable. For used components that are neither recycled nor recyclable, the Contractor must demonstrate that this is not possible, or would result in undue disadvantages for RWS, the Client, others, the environment, etc.).		

ADM.174		ADM;Sustainability.Components.Demountability	
Requirement:	As far as possible, <u>every</u> component of <u>every</u> ADM Flow Measurement Instrument must consist of easily demountable and separable materials and/or components.		
Explanation of requirement:	This requirement applies to every ADM Measurement Site. If and insofar as the Contractor anticipates that using demountable components will or might result in non-compliance with other requirements, these other requirements will prevail.		
Parent requirement(s):	ADM.170	Child requirement(s):	
V&V method:	RWS's Analysis (the Contractor must show the extent to which all used components are easy to demount and separate. For used components that are not easy to separate or demount, the Contractor must demonstrate that this is not possible, or would result in undue disadvantages for RWS, the Client, others, the environment, etc.).		

3.3.9 Politics

No specified requirement(s).



3.4 Requirements from the Interface Analysis

3.4.1 IT facilities

ADM.200	ADM;IT_facilities		
Requirement:	Each ADM Flow Measurement Instrument must be implemented and connected to the existing IT facilities at the ADM Measurement Sites in such a way that all requirements in the Tender Specification are met.		
Explanation of requirement:	Specifications interface with IT facilities in accordance with the LMW-Next conditions: <ul style="list-style-type: none">• At least one of the following digital serial outputs:<ul style="list-style-type: none">○ RS232 full duplex, no hardware flow control;○ RS422 two-wire or four-wire;○ RS485 two-wire or four-wire;• Baud rate is between 300 and 115,200 Baud;• Only one instrument is connected per bus (serial port).		
Parent requirement(s):	ADM.010	Child requirement(s):	
V&V method:	Contractor's Analysis		

3.4.2 Power supplies

ADM.210	ADM;Power_supplies		
Requirement:	Each ADM Flow Measurement Instrument must be implemented and connected to the existing power supplies at the ADM Measurement Sites in such a way that all requirements in the Tender Specification are met.		
Explanation of requirement:	Specifications interface with power supplies: <ul style="list-style-type: none">• ADM voltage: 230Vac or <50Vdc;• ADM power: not relevant;• After each power interruption, the ADM Flow Measurement Instrument must automatically restart when the power supply is restored, without loss of settings.		
Parent requirement(s):	ADM.010	Child requirement(s):	
V&V method:	Contractor's Analysis		

3.4.3 LMW-Next Protocols



ADM.220		ADM;Protocols_LMW-Next	
Requirement:	Each ADM Flow Measurement Instrument must be implemented and connected to the protocols of the LMW-Next system at the ADM Measurement Sites in such a way that all requirements in the Tender Specification are met.		
Explanation of requirement:	Specifications interface with LMW-Next via the Gateway: <ul style="list-style-type: none"> • Only the following (polling) communication protocols are permitted in the interface with LMW-Next: <ul style="list-style-type: none"> ○ ProfiBUS; ○ Modbus ASCII/RTU; ○ ADAM ASCII; • In case the ADM Flow measurement instrument sends the data message on its own initiative, then free flow (no protocol) applies. 		
Parent requirement(s):	ADM.010	Child requirement(s):	
V&V method:	Contractor's Analysis		

3.4.4 Water level message

ADM.230		ADM;Water_level_message	
Requirement:	It must be possible to connect a water level gauge with a digital signal to each ADM Flow Measurement Instrument at the ADM Measurement Sites. If necessary, the Contractor must provide and use its own digital-to-analogue converter for this purpose as part of the system described in section 2.2.1.		
Explanation of requirement:	Specifications interface with Gateway: <ul style="list-style-type: none"> • Frequency of delivery of water level message is 1x per minute; • The water level message is delivered via a digital serial link; • The water level message is constructed according to the RMI protocol; • The RMI message consists of one value of 6 characters. The general form of the message is <LF><RMI message><CR>, with; <ul style="list-style-type: none"> ○ <LF> = line feed karakter ○ <CR> = carriage return karakter ○ <RMI-bericht> = STDDDD, with: <ul style="list-style-type: none"> ▪ S = status (' ' or 'A', in which A is for error value) ▪ T = sign (+ or -) ▪ DDDD = measurement value or code for service and management purposes 		
Parent requirement(s):	ADM.010	Child requirement(s):	
V&V method:	Contractor's Analysis		



3.4.5 Flow Message

ADM.240	ADM;Flow_message		
Requirement:	The ADM Flow Measurement Instrument must transmit the RMI ADM message at a frequency of once per minute.		
Explanation of requirement:	The RMI ADM Flow Message is defined in Annex D "RMI ADM Flow Message Specification" .		
Parent requirement(s):	ADM.010	Child requirement(s):	
V&V method:	Contractor's Analysis		

3.5 Requirements for Laboratory and Field Testing

3.5.1 Laboratory Test

ADM.300	ADM; Laboratory Test		
Requirement:	Contractor must deliver a laboratory version of the Flow Measurement Instrument to RWS, including configuration settings for: <ul style="list-style-type: none">• one Measurement Plane for the Measurement Site Sint Pieter at 42 m NAP, and• two Measurement Planes at 41 m NAP and 42 m NAP at the same Measurement Site.		
Explanation of requirement:	Delivery must be made to the CIB laboratory of RWS-CIV. Annex E "Technical Information ADM Measurement Site Sint Pieter" includes a detailed cross-section and water level data (2020–2025).		
Parent requirement(s):	ADM.010	Child requirement(s):	
V&V method:	RWS analysis		

3.5.2 Field Test Realisation

ADM.301	ADM; Realisation		
Requirement:	Contractor must install the Flow Measurement Instrument at the Measurement Site Sint Pieter, alongside the current ADM, reusing parts of the existing cabling.		
Explanation of requirement:	The Measurement Site Sint Pieter will be used as a field test location with the goal of final acceptance of the procured instrument. Annex E "Technical Information ADM Measurement Site Sint Pieter" provides technical information for this Measurement Site.		
Parent requirement(s):	ADM.010	Child requirement(s):	
V&V method:	Contractor's work plan		



ADM.310		ADM; Measurement Plane (Field Test)	
Requirement:	The Flow Measurement Instrument must replace one of the two Measurement Planes. The other Measurement Plane must remain operational. The Measurement Plane of the new instrument must be installed at 42 m + NAP.		
Explanation of requirement:	The Measurement Plane to be replaced is Measurement Cross 1. In Annex C. 'Environmental conditions for each Measurement Site' "Environmental Conditions per Measurement Site", this is the downstream (northern) cross-section, marked as cross-section A.		
Parent requirement(s):	ADM.301	Child requirement(s):	
V&V method:	Contractor's work plan		

ADM.311		ADM; Health & Safety (Arbo)	
Requirement:	Contractor must work in accordance with the Dutch Working Conditions Act (Arbowet) and the Working Conditions Decree (Arbobesluit).		
Explanation of requirement:			
Parent requirement(s):	ADM.301	Child requirement(s):	
V&V method:	Contractor's work plan		

ADM.312		ADM; H&S Diving Plan	
Requirement:	Contractor must prepare a work plan including a Health & Safety (H&S) diving plan compliant with the relevant European Directive. The work plan must give extensive attention to Health & Safety because some activities qualify as hazardous work under Article 2.28 of the Dutch Working Conditions Decree. The plan must include at least: <ul style="list-style-type: none"> • A description of the project, • An overview of all involved companies, • Names of the coordinators for the design and execution phases, • A hazard inventory and risk assessment (RI&E), • Updates during execution. 		
Explanation of requirement:	Work may only commence after RWS has approved the work plan. Using an RWS-recognised diving company is recommended to ensure timely approval.		
Parent requirement(s):	ADM.301	Child requirement(s):	
V&V method:	Contractor's work plan		

ADM.313		ADM; Permits	
Requirement:	Contractor must arrange all permits required for installation and placement.		
Explanation of requirement:	Information regarding permits can be obtained from RWS if desired.		
Parent requirement(s):	ADM.301	Child requirement(s):	
V&V method:	Contractor's work plan		



ADM.314		ADM; Test Period	
Requirement:	Contractor must deliver Measurement Plane 1 at Measurement Site Sint Pieter in working condition within 16 weeks after the start of the activities. Within this period, there must be one uninterrupted period of four consecutive weeks during which data is delivered to LMW-Next without errors or interruptions caused by the sensor.		
Explanation of requirement:	Meeting the four-week requirement marks the end of the field test. Software-related response times by RWS are included in the permitted timeframe. ADM.100 and ADM.101 will be assessed using one Measurement Plane instead of two.		
Parent requirement(s):	ADM.301 ADM.100	Child requirement(s):	
V&V method:	RWS Analysis		

ADM.315		ADM; Transition Period	
Requirement:	The period between disconnecting Measurement Plane 1 of the current ADM and activating the Flow Measurement Instrument must not exceed five days. Cables of the current ADM may only be disconnected after RWS grants on-site approval.		
Explanation of requirement:	Final connection to LMW-Next will be prepared and executed jointly by Contractor and RWS.		
Parent requirement(s):	ADM.301	Child requirement(s):	
V&V method:	Contractor's work plan		

ADM.316		ADM; Reconfiguration	
Requirement:	The existing ADM must be modified so it can be reinstated and returned to working condition if required. Disconnected cables must be sealed to at least IP68 and labelled.		
Explanation of requirement:	If the field test is unsuccessful, Contractor must restore the current ADM after the test period, without the need for diving work. Dismantling the Flow Measurement Instrument may only take place after the high-water season (Annex L "Service Level Agreements for Measurement Sites").		
Parent requirement(s):	ADM.301	Child requirement(s):	
V&V method:	Contractor's work plan		



ADM.317		ADM; ADM Components	
Requirement:	The components of the Flow Measurement Instrument to be installed alongside the existing ADM are: <ul style="list-style-type: none">• the transducers,• the transducer cable from transducers to the junction pit,• the computing unit in the acquisition station.		
Explanation of requirement:			
Parent requirement(s):	ADM.301	Child requirement(s):	
V&V method:	Contractor's work plan		

ADM.318		ADM; Ground Signal Cables	
Requirement:	The ground signal cables between the junction pit and the acquisition station or responder cabinet must be reused.		
Explanation of requirement:	RWS will identify the correct cable ends.		
Parent requirement(s):	ADM.301	Child requirement(s):	
V&V method:	Contractor's work plan		

ADM.319		ADM; Transducer Construction	
Requirement:	Transducers must be mounted on a robust measurement structure that withstands the environmental conditions specified in Annex C. 'Environmental conditions for each Measurement Site' , with a minimum lifespan of five years.		
Explanation of requirement:	The current type of structure meets the requirement.		
Parent requirement(s):	ADM.301	Child requirement(s):	
V&V method:	Contractor's work plan		

ADM.320		ADM; Cable Protection	
Requirement:	Cables must be protected against environmental conditions (Annex C. 'Environmental conditions for each Measurement Site') for a minimum of five years.		
Explanation of requirement:			
Parent requirement(s):	ADM.301	Child requirement(s):	
V&V method:	Contractor's work plan		



ADM.321		ADM; Asset Delivery Report	
Requirement:	Contractor must submit an asset delivery report containing: <ul style="list-style-type: none"> • new cable routing and transducer locations, • updated mechanical engineering drawings, • drawings of structures, sensor locations, and cabling, • all documents in source format and PDF, • registration numbers of the sensors, • overview and detail photos of the completed installation. 		
Explanation of requirement:			
Parent requirement(s):	ADM.301	Child requirement(s):	
V&V method:	Asset delivery report		

ADM.322		ADM; High Water Maas	
Requirement:	Field activities must be suspended in the event of a High Water Maas scenario (Annex L "Service Level Agreements for Measurement Sites"). The planning included in Annex E "Technical Information ADM Measurement Site Sint Pieter" must therefore be adhered to.		
Explanation of requirement:	During a High Water Maas scenario, no work may be carried out in the acquisition station or at the measurement installations at Measurement Site Sint Pieter.		
Parent requirement(s):	ADM.301	Child requirement(s):	
V&V method:	Contractor's work plan		