



Royal Netherlands
Meteorological Institute
*Ministry of Infrastructure
and Water Management*

Annex 10

Verification Phase and Delivery

Pertaining to : Acquisition and 3rd line Maintenance of Present Weather Sensors

According to a : Public European Tender Procedure

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1. Introduction

This document describes the Verification Phase that is part of the Descriptive Document pertaining to 'Acquisition and Maintenance of Present Weather Sensors', reference no. TN-349307 dated January 20th 2023.

As outlined in the Descriptive Document, the Tenderer with the highest score while meeting all Mandatory requirements will be awarded the Contract (see Annex 5.1 - Draft Agreement) and enters the Verification Phase. The Verification Phase, as well as the required sensors and support, are detailed in this document. The Verification Phase has a duration of one (1) year so that the Contracting Authority can verify the performance of the PWS and BLS during all seasons (for explanation of the acronyms, see the Descriptive Document). The acceptance of the offered PWS and BLS and continuation of the Contract occurs only after a successful completion of the Verification Phase.

The Tenderer with the second highest score while meeting all Mandatory requirements enters the Waiting Room (Annex 5.2 Draft Waiting Room Agreement) and will be on stand-by during the Verification Phase. The stand-by Tenderer only enters the Verification Phase when the first Tenderer fails the Verification Phase.

In addition, this document outlines the delivery details of the sensors and the locations at which the PWSs and BLSs will be operated.

By submitting a Tender, the Tenderer fully and unreservedly agrees to the process described in this document.

2. Overview

First ranked party:

The Tenderer of the selected PWS and BLS shall make ten (10) sensors (PWS and BLS) and related products (masts, mounting tools, calibrators, etc.) available to KNMI. Two (2) sensors and related parts shall be delivered to KNMI in De Bilt within two (2) weeks after signing the Contract. The other eight (8) sensors and related parts shall be delivered to KNMI in De Bilt within four (4) weeks after signing the Contract. See section 4.6 for further details of the Delivery Schedule.

The FAT and calibration reports shall be provided together with a full set of documentation at the time of the first sensor delivery.

The Tenderer will provide support, when requested by KNMI, during the entire period of the Verification Phase. Specifically, enquiries shall be answered by the Tenderer within two (2) working days.

The enquiries (or other support requests) shall be initiated by KNMI, for example, to clarify documentation, to solve problems and to ensure that the PWS and BLS operate



correctly. The contact details of Tenderer's staff required for these enquiries shall be specified beforehand by the Tenderer.

KNMI will report any malfunctioning of a selected PWS or BLS, accompanying part or tool, directly to Tenderer. If the issue cannot be resolved by KNMI with Tenderer's support within one (1) week then a spare or repair shall be provided by Tenderer within two (2) weeks. An analysis detailing the cause of the problem and an incident report shall be provided to KNMI stating the reason for the malfunction, the repair, and substantiation whether the malfunctioning affects the required MTBF, as stated in the Program of Requirements and Desirables (Annex 3).

The selected PWS and BLS will be subjected to field and laboratory tests before, during and after the field tests. The field tests will take place in De Bilt and at eight (8) other measurement locations of KNMI throughout the Netherlands (see section 4.6 - Delivery schedule, first and second delivery). However, KNMI reserves the right to perform tests partly or entirely at other locations.

The Verification Phase starts two (2) weeks after the second delivery. The duration of the Verification Phase is one (1) year. All costs of the Verification Phase including the ten (10) PWSs and ten (10) BLSs, masts, one set of calibrators and materials and tools for installation and maintenance will be borne by KNMI.

During the Verification Phase information will be shared with the selected Tenderer in order to make sure that the sensors are configured, installed and operating correctly and that the results are interpreted correctly.

The Verification Phase will be used to verify that all Mandatory requirements are met and that the offered PWS and BLS are indeed suitable for the intended use by KNMI. The performance of the PWSs and BLSs during the Verification Phase will be analysed and the results will be examined by representatives of several user groups (observers, forecasters, technicians, validation staff, R&D) and stakeholders (weather, climate, aviation). The final decision regarding the suitability of the offered PWS and BLS will be determined by these representatives. Note that when a PWS or BLS at one (1) or more locations is non-compliant or receives a negative decision on the suitability, the offered PWS and BLS is considered non-compliant or unsuitable.

A negative decision on the compliancy or suitability of the offered PWS or BLS can occur at any point during the Verification Phase. If this occurs, the Tenderer is informed immediately. The Tenderer has one (1) week to resolve the problem. Note that only changes to the configuration or installation of the PWS and BLS are allowed at this stage because we are verifying the offered solution.

A negative decision on the suitability occurs when, despite the Mandatory requirements:

- the quality of the measurements of the offered PWS and BLS is substantially lower compared to the current PWS and BLS (there are 50% or more observations indicated as suspect or faulty) and/or;



- the offered PWS and BLS require substantially more 1st and 2nd line maintenance compared to the current PWS and BLS (there are 50% more corrective events) and/or;
- two (2) or more of either PWSs or BLSs fail during the Verification Phase and a solution cannot be provided within one (1) week.

Note that the first two items are evaluated by comparison to the current PWS since the quality of the measurements and the required 1st and 2nd line maintenance depends on the actual conditions that will occur during the Verification Phase. Here, the total number of suspect or faulty observations or corrective maintenance events for all PWS and BLS during the Verification Phase period will be considered.

Second ranked party:

The PWS and BLS of the Tenderer with the second highest score will be stand-by during the Verification Phase. Two (2) units of this sensor (PWS and BLS) and related products (masts, mounting tools, calibrators, etc.) shall be made available to KNMI within two (2) weeks after signing the Contract. The costs for the two sensors (PWS and BLS) and related products will be borne by KNMI. The sensors will be installed at the test field in De Bilt to facilitate, if needed, an efficient transition to this PWS and BLS. The PWS and BLS of the second ranked Tenderer only enters the Verification Phase when the first PWS or BLS of the first ranked Tenderer fails the Verification Phase. In that case, the one (1) year Verification Phase with the second Tenderer starts anew at week 4 of the schedule given in section 4.6.

3. Verification Phase

The Verification Phase lasts one (1) year and will be executed from approximately week 6 after signing of Contract to week 58 (see section 4.6). The verification will take place at the test field in De Bilt and at eight (8) other KNMI locations (see section 4.6 - Delivery Schedule). KNMI's test field in De Bilt is equipped with a transmissometer, a precipitation gauge and air temperature and relative humidity sensors that serve as a reference for visibility (MOR, up to 1500 m), precipitation intensity and air temperature and relative humidity, respectively. No reference is available for visibility values above 1500 m and for precipitation type. When there is no reference, the selected PWS and BLS will be compared with the current PWS and BLS, taking into account experiences with the current PWS and BLS after more than 10 years of operational use, and experiences by comparisons with human observers. Furthermore, the measurements of auxiliary sensors, webcam images and the evaluation of the meteorological situation by forecasters and data validation experts will be considered during the Verification Phase. Details of the test field in De Bilt, the analysis and experiences of KNMI are given in the references (see section 6). During the Verification Phase, if PWSs or BLSs are demonstrably non-compliant with the Program of Requirements and Desirables and derogations cannot be resolved by supplier, then KNMI will dissolve the Agreement for this reason and the stand-by supplier (second ranked party) will take supplier's place.



In case of a negative outcome of the Verification Phase, the agreement is cancelled. The sensors and related materials and tools are returned to the Tenderer and the purchase costs shall be reimbursed (see Annex 5.1 - Draft Agreement).

3.1. Stage 1: Laboratory tests and field installation

The selected PWS and BLS will be inspected upon receipt and verified in the laboratory using the calibrators and tools provided by the Tenderer. This process includes the three phases of Delivery acceptance (see section 4.2). Other means of verification will be investigated during this stage and may for example include methods to simulate contamination of the lenses, such as generating precipitation with a plant sprayer. Tests will be performed in order to verify that the requirements are met. KNMI will decide whether all or just a subset of the requirements will be verified. All requirements remain obligatory even if not tested directly by KNMI during the Verification Phase. The Verification Protocol (provided by Tenderer along with their offer) must be successfully completed by KNMI before installing the PWS and BLS at the test field of KNMI in De Bilt. The procedures for 1st and 2nd line maintenance that are carried out by KNMI will be evaluated and implemented. Maintenance includes the exchange of replaceable modules of the PWS and BLS by KNMI staff.

A sensor interface will be developed by KNMI for the selected PWS and BLS (both for the current KNMI SIAM interface and the future Campbell Scientific CR1000X) to verify the communication with the sensors and to facilitate implementation of the sensors in the meteorological network of KNMI. The sensor data will be polled and archived together with technical status information at a 12 second resolution. Raw data from all sensors will be archived during the field verification as well. Next, the selected PWS and BLS will be installed at the test field of KNMI in De Bilt using the mounting tools and documentation provided by the Tenderer. Each PWS and BLS will be operated for one week at the test field in De Bilt. If the PWS or BLS operates correctly for the duration of one week and has passed all previous tests, the PWS or BLS has passed the SAT and is ready for deployment at other sites. During the Verification Phase, the successful completion of stage 1 also leads to acceptance of the sensors and payment.

3.2. Stage 2: Field evaluation

The selected PWS and BLS are verified in the field, during which the sensors will be inspected and maintained by KNMI on a regular basis. The calibration will also be checked on a regular basis. Two (2) units of the selected PWS and BLS will be installed at the test field of KNMI in De Bilt. The other eight (8) sensors will be installed at other locations, either parallel to the currently deployed PWSs or stand alone. Note that the selected PWSs and BLSs may also be temporarily installed at the test field in De Bilt to verify the reproducibility of the PWS and BLS results. KNMI may also repeat or extend the laboratory tests of stage 1.

The performance, maintainability, and overall quality of the PWS and BLS will be analysed during the field evaluation in accordance with the requirements and wishes set



out in the Program of Requirements and Desirables. The quality of the PWS will be examined statistically for the overall performance and for specific conditions by comparison with reference instruments and with the current PWS, but allowing for the latter's shortcomings. Also, the agreement between the results obtained with the two (2) collocated units of the selected PWS and BLS will be evaluated. The effect of window contamination and the suitability of the maintenance interval will also be investigated by maintaining one (1) sensor as good as possible while letting the other deteriorate until the PWS or BLS starts reporting warnings or errors or the results of the PWS or BLS become obviously affected. Special attention will be given to the sensitivity and impact of spider silk and flying insects on the PWS measurements.

3.3. Stage 3: Evaluation continued and completion

The evaluation of the selected PWS of stage 2 is continued.

When certain meteorological conditions have not occurred during the evaluation or when specific aspects need special attention according to KNMI, an evaluation of the selected PWS and BLS at other locations may take place, including locations outside the Netherlands.

At the end of the field evaluation, each PWS and BLS will be inspected and verified in the laboratory using the calibrators and tools provided by the Tenderer. Additionally, second line maintenance is applied and the Verification Protocol must be successfully completed.

An overall analysis of the Verification Phase is prepared and examined by KNMI representatives of several user groups (observers, forecasters, technicians, validation staff, R&D) and stakeholders (weather, climate, aviation). The result of this examination is the decision whether the offered PWS and BLS meet all Mandatory requirements and are considered suitable for the intended use by KNMI.

At the end of the Verification Phase and in case of a successful completion of the Verification Phase, the Waiting Room Agreement (Annex 5.2) with the second party will officially expire. Upcoming orders will then exclusively be placed with the selected primary supplier for the duration of the Contract.

4. Delivery of Sensors

The offered PWS and BLS are accepted when the Verification Phase is completed successfully. Thereafter, KNMI/Contracting Authority will order the PWS and BLS sensors and related products (masts, mounting tools, calibrators, etc.) in batches. Specifically, the sensors will be delivered in partial amounts determined by KNMI with three (3) weeks' notice. These deliveries will be spread over a period of two years as indicated in section 4.6.



4.1. Delivery location

All the sensors shall be delivered to the KNMI in De Bilt. From there, KNMI will transport and install the sensors at the measurement locations.

Royal Netherlands Meteorological Institute (KNMI)
T.a.v. Kalibratielab (calibration laboratory)
Utrechtseweg 297
3731 GA De Bilt
Netherlands

4.2. Delivery acceptance

Each shipment of sensors that is delivered will be checked and tested at the calibration laboratory and the test field of KNMI in De Bilt. The acceptance of a delivery is divided into three phases.

Phase 1:

The shipment will be checked at the KNMI for completeness and damage to the instruments, parts or tools.

Each instrument must be delivered with a passed FAT protocol and a calibration certificate.

Phase 2:

The verification and calibration protocols (provided by supplier along with their offer) will be performed in accordance with the procedures specified by the supplier.

This process includes checking that the settings and firmware version of the sensors are correct.

Depending on the verification and calibration procedure, the lead time of a sensor in the calibration laboratory will be one (1) day. This procedure involves placing and removing the sensor in the laboratory and performing the verification and calibration protocols.

Once a sensor is approved (considered complete and functioning), a calibration certificate will be created for the sensor, which will be used internally for proof of well-functioning of the sensor.

Phase 3:

In the third phase, the sensor will be placed outside at the KNMI test field in De Bilt for one (1) week. During this period, it will be checked that the sensor operates correctly.

In the case of a deviation in any of the above phases mentioned under 4.2, the sensor will be returned with an indication of the corresponding problem. When the PWS or BLS has passed all three phases successfully, it passed the SAT and is ready for deployment. A Certificate of Acceptance (Annex 11) will be completed and sent to the Tenderer for each sensor (PWS or BLS) that has successfully passed the SAT. A sensor is accepted



with reservations in case of minor defects. These minor defects need to be remedied before a specified date that has been agreed upon.

4.3. Payment

Payment for a delivery will be made when each sensor of the delivered batch has successfully passed the three phases of acceptance given in section 4.2 - Delivery acceptance. When one (1) or more sensors in a batch are returned with a problem, new sensors or a new invoice will be requested for the remaining sensors that have been accepted.

4.4. Delivery on hold

KNMI remains the right to put the ordering process on hold if there is reasonable justification for doing so. The deliveries will be stopped when problems have been detected during the deployment of the sensors in the field or when more than five (5) sensors are returned after delivery (see section 4.2). Delivery will resume when both the supplier and the KNMI agree that the underlying problem has been resolved.

4.5. Installation

The installation of the sensors at the measurement locations is carried out by KNMI employees. Based on experience, we anticipate that installation at a location should take no more than one day per sensor.

The timeline of one installation is as follows:

- Remove current PWS and BLS.
- Adapt infrastructure to facilitate new sensor.
- Install the new PWS and BLS.
- Data communication testing of sensor.
- Sensor is ready.

A KNMI team is available four (4) days per week for installation of PWSs and BLSs. The 5th day is intended for handling the administration of the previous week and preparing for installations of the coming week.

The installation is scheduled one (1) week after completing the three (3) acceptance phases (see section 4.2) to allow time for any delay in the calibration laboratory.

4.6. Delivery schedule

The delivery schedule below is given in weeks starting after signing the Contract (T=week 0). The number of PWSs and BLSs in each delivery is indicated. Note that these numbers are indications and the actual numbers may change after consultation. The sensors shall be delivered with the associated parts.



Date	Delivery details	Number of PWSs	Number of BLSs
T	Contracts signed		
T+2 weeks	1st delivery 1 st supplier, delivery of one (1) set of calibrators and two (2) sensors for test field De Bilt <i>2nd supplier (2nd ranked party awarded with waiting room Agreement) deliver one (1) set of calibrators and two (2) sensors for test field De Bilt</i>	2x	2x
T+4 weeks	2nd delivery 1 st supplier, delivery of sensors for verification locations: - Eil (AWS) - Hoogeveen (AWS) - Marknesse (AWS) - Westdorpe (AWS) - Vlissingen (AWS) - Muiden (Fog station aviation) - Rotterdam The Hague Airport (Aviation) - To be decided (Platform)	8x	8x
T+6 weeks	Start of Verification Phase		
T+58 weeks	Conclusion of Verification Phase with acceptance of PWS and BLS		
T+62 weeks	3rd delivery 1 st supplier, delivery of second set of calibrators and sensors for AWS locations: - Stavoren (AWS) - Berkhout (AWS) - Cabauw (AWS) - Twenthe (AWS) - Terschelling-Hoorn (AWS) - Herwijnen (AWS) - Wilhelminadorp (AWS) - 3 spare PWS + BLS	10x	10x
approx. T+115 weeks	4th delivery 1 st supplier, delivery of sensors for military airbases locations: - Gilze Rijen (Military Aviation) - Eindhoven (Military Aviation) - Vlieland (Military Aviation) - Deelen (Military Aviation) - Woensdrecht (Military Aviation) - Volkel (Military Aviation) - Leeuwarden (Military Aviation) - De Kooy (Military Aviation) - 3 spare PWS + BLS	18x	18x



Date	Delivery details	Number of PWSs	Number of BLSs
approx. T+120 weeks	5th delivery 1 st supplier, delivery of sensors for civil aviation locations: - Nieuwkoop (Fog station aviation) - Nieuw Vennep (Fog station aviation) - Assendelft (Fog station aviation) - Voorschoten (Fog station aviation) - Maastricht Aachen Airport (Aviation) - Groningen Airport Eelde (Aviation) - Lelystad Airport (Aviation) - Rotterdam The Hague Airport (Aviation) - 3 spare PWS + 2 spare BLS	15x	13x
approx. T+126 weeks	6th delivery 1 st supplier, delivery of sensors for Schiphol locations: - Amsterdam Airport Schiphol (Aviation)	19x	13x
approx. T+133 weeks	7th delivery 1 st supplier, delivery of sensors for North Sea and BES locations: - Bonaire (Aviation) - HKZA (Platform) - BSA (Platform) - A12 (Platform) - AWG (Platform) - Hoorn (Platform) - 2x Goeree (Platform) - BG-OHVS2 (Platform) - 2x Europlat (Platform) - K14 (Platform) - F3 (Platform) - P11 (Platform) - D15 (Platform) - J06 (Platform) - L9 (Platform) - HKN (Platform) - HKW (Platform) - Noord van de Wadden (Platform) - IJmuiden Ver 1 (Platform) - IJmuiden Ver 2 (Platform) - IJmuiden Ver 3 (Platform)	23x	23x
Total number of sensors		95x	87x



5. PWS & BLS Locations

KNMI has various locations in the measurement network where a PWS and BLS is installed. Not every PWS location has a BLS. The table below shows the locations equipped with a PWS and a BLS. The required or available mast is indicated by the PWS height, the height at which the visibility is to be measured. Note that spare PWSs and BLSs are not included in this list.

Station number	Location type	Location	PWS height	Position	PWS	BLS
377	AWS	Ell	1.885m	Measurement field	1	1
279	AWS	Hoogeveen	1.885m	Measurement field	1	1
273	AWS	Marknesse	1.885m	Measurement field	1	1
319	AWS	Westdorpe	1.885m	Measurement field	1	1
261	AWS	De Bilt	1.885m	Measurement field	1	1
310	AWS	Vlissingen	1.885m	Measurement field	1	1
267	AWS	Stavoren	1.885m	Measurement field	1	1
249	AWS	Berkhout	1.885m	Measurement field	1	1
260	AWS	De Bilt	1.885m	Measurement field	1	1
348	AWS	Cabauw	1.885m	Measurement field	1	1
290	AWS	Twenthe	1.885m	Measurement field	1	1
251	AWS	Terschelling-Hoorn	1.885m	Measurement field	1	1
323	AWS	Wilhelminadorp	1.885m	Measurement field	1	1
356	AWS	Herwijnen	1.885m	Measurement field	1	1
350	Airbase	Gilze Rijen	2.5m	Touchdown 10	1	1
350	Airbase	Gilze Rijen	2.5m	Touchdown 28	1	1
370	Airbase	Eindhoven	2.5m	Touchdown 21	1	1
370	Airbase	Eindhoven	2.5m	Touchdown 03	1	1
242	Airbase	Vlieland	2.5m	Measurement field	1	1
275	Airbase	Deelen	2.5m	Touchdown 02	1	1
275	Airbase	Deelen	2.5m	Touchdown 20	1	1
340	Airbase	Woensdrecht	2.5m	Touchdown 07	1	1
340	Airbase	Woensdrecht	2.5m	Touchdown 25	1	1
375	Airbase	Volkel	2.5m	Touchdown 06	1	1
375	Airbase	Volkel	2.5m	Touchdown 24	1	1
270	Airbase	Leeuwarden	2.5m	Touchdown 06	1	1
270	Airbase	Leeuwarden	2.5m	Touchdown 24	1	1
235	Airbase	De Kooy	2.5m	Touchdown 03	1	1
235	Airbase	De Kooy	2.5m	Touchdown 21	1	1
514	Fog station	Muiden	2.5m	Measurement field	1	1
515	Fog station	Nieuwkoop	2.5m	Measurement field	1	1
513	Fog station	Nieuw Vennep	2.5m	Measurement field	1	1
516	Fog station	Assendelft	2.5m	Measurement field	1	1
215	Fog station	Voorschoten	2.5m	Measurement field	1	1
280	Airport	Groningen Airport Eelde	2.5m	Touchdown 05	1	1
280	Airport	Groningen Airport Eelde	2.5m	Touchdown 23	1	1



Station number	Location type	Location	PWS height	Position	PWS	BLS
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 06	1	1
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 06B	1	
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 22	1	1
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 24	1	1
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 09	1	1
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 27	1	1
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 27B	1	
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 18Re	1	1
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 18Rms	1	
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 18Rmn	1	
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 18Rw	1	1
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 36L	1	1
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 18Cb	1	
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 18C	1	1
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 36Ca	1	1
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 36Cd	1	1
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 18L	1	1
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 36R	1	1
240	Airport	Amsterdam Airport Schiphol	2.5m	Touchdown 36Rb	1	
269	Airport	Lelystad Airport	2.5m	Touchdown 05	1	1
269	Airport	Lelystad Airport	2.5m	Touchdown 23	1	1
344	Airport	Rotterdam The Hague Airport	2.5m	Touchdown 24	1	1
344	Airport	Rotterdam The Hague Airport	2.5m	Touchdown 06	1	1
380	Airport	Maastricht Aachen Airport	2.5m	Touchdown 03	1	1
380	Airport	Maastricht Aachen Airport	2.5m	Touchdown 21	1	1
380	Airport	Maastricht Aachen Airport	2.5m	Touchdown 21m	1	
78990	Airport	Bonaire	2.5m	Touchdown 10	1	1
78990	Airport	Bonaire	2.5m	Touchdown 28	1	1
216	Platform	HKZA	1.885m		1	1
217	Platform	BSA	1.885m	Helideck	1	1
205	Platform	A12	1.885m	Helideck (N)	1	1
208	Platform	AWG	1.885m	Compr Plfm (NW)	1	1
212	Platform	Hoorn	1.885m	Helideck (NO)	1	1
320	Platform	Goeree	1.885m	Lowerdeck (NW)	1	1
320	Platform	Goeree	1.885m	Lowerdeck (NW)	1	1
214	Platform	BG-OHVS2	1.885m	Helideck	1	1
321	Platform	Europlat	2.5m	Helideck	1	1
321	Platform	Europlat	2.5m	Helideck	1	1
204	Platform	K14	2.5m	Helideck (W)	1	1
239	Platform	F3	2.5m	Helideck	1	1
203	Platform	P11	2.5m	Helideck (O)	1	1
201	Platform	D15	2.5m	Helideck	1	1
211	Platform	J06	2.5m	Helideck (NW)	1	1
207	Platform	L9	2.5m	Helideck (W)	1	1



Station number	Location type	Location	PWS height	Position	PWS	BLS
	Platform	HKN	1.885m		1	1
	Platform	HKW	1.885m		1	1
	Platform	Noord van de Wadden	1.885m		1	1
	Platform	IJmuiden Ver 1	2.5m		1	1
	Platform	IJmuiden Ver 2	2.5m		1	1
	Platform	IJmuiden Ver 3	2.5m		1	1
Total number of sensors at locations					86	79

6. References

The references given below are attached to the Tender documents (Annex 13 Reference of Annex 10) and available through TenderNed. These references give details on the methods used to evaluate the measurements of PWSs and BLSs that will be used during the Verification Phase.

Wauben: Automation of visual observations at KNMI; (i) Comparison of present weather, AMS, 2002

Wauben: Comparison of visibility measurements with routine visual observations in the Netherlands, ICEAWS3, 2003

Wauben: A Test of the Precipitation Amount and Intensity Measurements with the Ott Pluvio, Paper 3(16), TECO, 2005

Bloemink: KNMI Visibility Standard for Calibration of Scatterometers, Paper P3(26), TECO 2006

De Haij: Automated discrimination of precipitation type using the FD12P present weather sensor: evaluation and opportunities, KNMI Technical Report No. 297, 2007

De Haij and Wauben: Investigations into the Enhancement of Automated Precipitation Type Observations at KNMI, Paper 3(2), TECO, 2010

Wauben: Filtering of insect reduced MOR measurements by a forward scatter sensor, TECO-2012)

Wauben et al.: Field evaluation of sensors for precipitation type discrimination, Paper 3(11), TECO, 2016

Knoop et al.: Field evaluation of sensors for precipitation type discrimination: an update, KNMI, 2017