**Test Procedures**

for the

**Procurement of Meteorological Observation Systems**

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# INTRODUCTION

Many NMHS already have template documents to cover all aspects of the procurement of all or part of an Observation Network.

In the absence of these, this document is provided as an example Test Procedures which may be adapted.

Text in red italics should be replaced by information relevant for this Procurement.

The aim of the example documents is to provide guidance. Most NMHS have their own documents/templates/formats should be used for this purpose. These example documents allow a NMHS to check their own documentation against these examples to ensure their Procurement considers the relevant aspects.

These documents have not been checked or approved by WMO legal. They are provided as examples only and should not be used without specific endorsement by the NMHS’s own legal departments.

# Test procedures

The Contractor shall prove by tests the correct operation and well-functioning of the System according to the specifications given in Appendix II, Requirement Specifications, of the Agreement.

## Definitions

* **System** **Components**System Components are related groups of functionalities that are combined into one device. The following System Components are distinguished:
* **Instruments**
Various meteorological instruments, connected to a datalogger.
* **AWS**
The combination of the instruments and the datalogger and auxiliary equipment installed in a cabinet; the AWS is installed in a (unmanned) observation site and forwards the observation at regular interval to the meteorological information and processing system (MIPS) at the Purchaser’s HQ.
* **MIPS**
The meteorological information and processing system (MIPS), usually installed at the Purchaser’s HQ. The MIPS controls the data acquisition process, the observation network configuration, the processing of the data, storage, the report generation and automatically forwards the reports to the GTS via a message switch (MMS).
* **Display system**A display system that connects to the MIPS. It is used for presenting the meteorological observations in the MIPS, for presenting system management and status data, for system configuration, etc.

# Test Requirements

The following tests have to be performed before the system as a whole can be approved for operational services.

1. **Factory Acceptance Test (FAT)**
All instruments, AWS stations and MIPS shall go through a Factory Acceptance Test (FAT) at the Contractors facilities. The components and the system as a whole shall be tested in the same configuration that shall be installed in the field on the observation sites. If ‘real’ data input is not available, it shall be provided by a simulation system. Factory Acceptance (FA) shall follow FAT if the all requirements as defined in the Requirement Specifications document are met.
2. **Provisional Site Acceptance Test (PSAT)**
After delivery and installation of the AWS stations and the MIPS, the PSAT shall be performed for the AWS including instruments, and for the MIPS (including display systems) separately. Provisional Site Acceptance (PSA) shall follow PSAT if the requirements as defined in the Requirement Specifications document are met.
3. **Final Site Acceptance Test (FSAT)**After the AWS’ with instruments and the MIPS passed their PSA, a reliability test shall be performed. This test shall in general take more time (1 week to 3 months in total), in which the system as a whole shall work uninterruptedly without critical failures, to demonstrate its reliability. Final Site Acceptance (FSA) shall follow FSAT if the requirements as defined in the Requirement Specifications document are met.
4. **Final Project Acceptance Test (FPAT)** The integration of all instruments, AWS’ and MIPS finally results in the meteorological observation network. The final project acceptance test includes all deliverables from the project, the instruments, AWS’, the MIPS and display, but also training, all documentation, spare parts, etc. Final Project Acceptance (FPA) shall follow FPAT if the requirement specifications as defined in the Requirement Specifications document are met.

# Systems to be tested

All system components mentioned in Section 1.1 shall be subjected to a FAT. FAT-reports per system component shall be submitted to the Purchaser for approval (see the Acceptance Protocols, Appendix 9 of the Agreement, documents for a model of the FAT-report). The same procedure shall be followed for the PSAT and FSAT.

Integration tests (FAT, PSAT, FSAT, FPAT) shall include:

1. **Instruments**
For all instruments tests shall be conducted to demonstrate that they comply with the requirement specifications.
2. **Complete AWS with Instruments**The complete AWS (cabinet, datalogger, power supplies, lightning protection, heating, housekeeping measurements, etc.) with instruments connected, shall be tested as complete systems to demonstrate compliance with the requirement specifications.
3. **MIPS**The MIPS functionality shall be tested per requirement specification. Test data may be used to demonstrate the generation of reports.
4. **Combining AWS’ and the MIPS**Complete AWS stations with instruments shall be connected to the MIPS. Data communication shall be tested, as well as the complete chain from instrument measurements to report generation. The connection to and sending of reports to the message switch shall be tested.

# Testing

To test and verify the conformance of the system the Contractor shall present a Test Plan, Test Description, and Test Reports which are all subject to Purchaser review and approval.

1. The Contractor shall conduct all tests in accordance with the approved Test Plan and Test Descriptions. The Contractor shall perform test briefings and debriefings as required, and prepare quick-look summaries of the test results.

2. At least three weeks prior to any testing requiring Purchaser’s attendance, the Contractor shall notify the Purchaser.

3. If re-verification is required as a result of any verification defect or deficiency, the Contractor shall perform these re-verifications without additional costs.

## Factory inspection

Purchaser and Contractor agree that inspection of factories of Contractor (or Subcontractor) by the Purchaser shall be carried out in accordance with the Contractor’s inspection procedures. The Contractor (or Subcontractor) will then make a set-up in the factory to demonstrate if necessary by means of a simulation of the activities representative for the Purchaser, that the hardware and software comply with the agreed specifications and that the composite elements of the hardware have been properly manufactured. An official report will be drawn up of a successful factory inspection, to be signed on behalf of both parties. The inspection and the signing of the official report shall not prejudice the eventual acceptance of the system.

All costs of inspections and tests in the factory or factories of the Contractor or Subcontractors, including the costs of all personnel or material assistance required, will be for Contractor’s account. The accommodation and travelling expenses of the Purchaser will be for the Purchaser’s account.

## Factory acceptance tests

The Contractor shall provide the Factory Test Procedure in accordance with the Test Plan, Test Procedures and Test Reports for Purchaser review and approval.

1. Procedures for final inspection and testing shall ensure that inspections and tests that should have been conducted at earlier stages have been performed. Successful completion of these tests shall be acknowledged by a certificate of conformity.

2. In presence of the Purchaser, if he requires so, the Contractor shall collect and analyse all system test data to verify that all test objectives are met and to ensure that deficiencies are noted and solved.

3. Both a designated Contractor representative and a Purchaser representative shall sign the recorded verification test data sheets.

## On-site acceptance tests

The Contractor shall provide an On-Site Acceptance Test Plan as part of the Test Plan, Test Procedures and Test Reports for Purchaser’s review and approval. The Contractor shall conduct the verification tests in accordance with the approved On-Site Acceptance Test Plan.

1. In presence of the Purchaser the Contractor shall collect and analyse all system test data to verify that all test objectives are met and to ensure that deficiencies are noted and solved.

2. Both a designated Contractor representative and an authority representative shall sign the recorded verification test data sheets.

# Test Plan

This description delineates the overall plan for the system tests. The Contractor shall prepare a Test Plan with content as follows:

**1. Purpose.**
This section shall state the purpose of the Test Plan and shall identify the phase to which it applies. The purpose shall be stated in terms of establishing detailed requirements, criteria, general methods, responsibilities, and overall planning to confirm, in accordance with the specifications, that the system or designated portions of it, fulfils the requirements of the specification. Reasons for excluding any portions of the system from this Test Plan shall be stated.

**2. General Requirements.**
Discuss pertinent background information and functions performed, and include a brief overall description of the system, overall responsibility for the execution of the Test Program and overall schedules.

**3. Description of the Test Item.**Indicate the number of test items involved and the features which positively identify the items.

**4. Participating Organisations.**
List each of the participating organisations and their basic responsibilities and tasks. Include a breakdown of the test force functional organisation and a time-phased listing of test force personnel requirements by organisations and job title.

**5. Milestones and Schedules.**
The plan should include an overall flow diagram of the entire Test and deployment program as outlined. This flow shall be sequentially arranged to include all significant Test milestones and any additional information which clarifies the description of the Test program. The schedule includes identification of the milestone, start and finish dates and the associated location.

**6. Test Support Requirements.**
Include the technical and logistic support required to perform the Test and identify special facilities, support equipment and personnel required to support the Test. Considerations should be given to such items as electronics, computer programs, facilities, ranges, simulation, and material. Provide a schedule of critical support requirements showing time, duration, for furnishing the support items. Provide calibration information, which will define and describe all systems requiring calibration. All responsibilities during Test shall be addressed in this section.

**7. Security Requirements.**Provide the security classification of equipment, test, test-results, documents and other material related to the test program.

**8. Specific Test Objectives.**
Include or reference the list of those objectives, which are necessary to fulfil the applicable requirements contained within the system specification and any applicable functional specifications.

**9. Test Methods and Descriptions.**
Outline in general terms the test execution to fulfil each of the objectives identified in the specifications, in order to provide guidance for the preparation of more detailed test descriptions.

**10. Data Collection, Reduction and Analysis**.
Provide an analysis plan which, taking into account the test objectives, indicates the type of data required and its processing. Specify the form in which the reduced data is to be presented. Outline analysis methods, criteria, and the presentation of final results. Relate results to specified objectives described in the specifications. Include requirements for data processing equipment (including approximate computer time required) and any special computer programs required for data collection/analysis. Identify Contractor’s (and sub- contractor’s) responsibilities for their respective tasks.

**11. Instrumentation.**
Indicate the instrumentation required to collect the data indicated in item 10. above and the organisation responsible for acquiring it. A block diagram layout of the system showing instrumentation’s points should be included.

**12. Personnel Subsystem Test and Evaluation.**
Discuss plans for training operator personnel for active participation in the test program.

**13.** **Control and Reporting Procedures**.
Specify requirements and procedures for controlling the Test Plan and for documenting the test procedures and results. Include the following subsections: control of Test Plan, documentation of test procedures and documentation of system results summary.

**14. Defect classification**In the event a test case within a Test should fail, a report on the defects shall be prepared. To maximise test case results and to minimise problems attributable to defects, all reports on defects will be classified as follows:

* Category A: major defect;
* Category B: average defect;
* Category C: minor defect;
* Category D: test error;
* Category E: dispute concerning an incident.

All categories are described below:

**Category A: major defect**Category A defects are defects which adversely affect the system components’ or system’s active operation to such an extent that, unavoidable, a major part of the system can no longer be used.

**Category B: average defect**Category B defects are localised problems, which do not make the system components’ or system’s active operation impossible (non-serious errors, which do not seriously affect the system). Category B defects shall be no reason to discontinue the test.

**Category C: minor defect**Category C defects are related to appearance and do not have serious adverse effects on the system components or system, and its active operation could continue without eliminating the defects (such as unclear error messages, errors in reports and screen formats). Category C defects shall be no reason to discontinue the test.

**Category D: test error**Category D defects are due to errors in the test method and/or test data, errors occurring while carrying out the test case, or errors in expected results. In the event of a conflict between Contractor and Purchaser, parties shall discuss about the validity of the test case, and if the error shall be reclassified into Category E. Category D defects shall be no reason to discontinue the test.

**Category E: dispute concerning an incident**Category E defects are defects for which Contractor and Purchaser fail to reach an agreement on classification. If the parties fail to reach an agreement within 5 (five) working days, the issue will be submitted to an independent person to be appointed, after due consulting, by the parties involved. The decision by the appointed person will be final and binding for both parties.

It is emphasised that any Category B, C, D or E defects occurring during a test shall not result in the discontinuation of that test. In the event of a Category A defect, both parties will have the right to decide independently whether or not to stop the test. In this case, a new date will be set, agreed to by both parties, on which the test shall be repeated. With the exception of Category A errors, during re-testing only those test cases that have not yet been successfully completed will be exercised.

At the end of each testing day, there will be a meeting in which Contractor and Purchaser will record the findings of that day. This report shall be approved by both parties.