MA8g - Automatic Meteorological Reporting Systems Assessment Process
## Revision history

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Description</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 April 2016</td>
<td>0.1</td>
<td>First draft</td>
<td>John Darnley</td>
</tr>
<tr>
<td>29 July 2016</td>
<td>0.2</td>
<td>Change of title, addition of RVR requirements</td>
<td>John Darnley</td>
</tr>
<tr>
<td>12 August 2016</td>
<td>0.3</td>
<td>Third draft</td>
<td>John Darnley</td>
</tr>
<tr>
<td>18 August 2016</td>
<td>0.4</td>
<td>Fourth draft</td>
<td>John Darnley</td>
</tr>
<tr>
<td>24 August 2016</td>
<td>0.5</td>
<td>Fifth draft</td>
<td>Alicia Tuppack</td>
</tr>
<tr>
<td>7 October 2016</td>
<td>0.6</td>
<td>Sixth draft</td>
<td>John Darnley</td>
</tr>
<tr>
<td>20 October 2016</td>
<td>0.7</td>
<td>Seventh draft</td>
<td>John Darnley</td>
</tr>
<tr>
<td>25 October 2016</td>
<td>0.8</td>
<td>Eighth draft (Number reformatting).</td>
<td>John Darnley</td>
</tr>
<tr>
<td>3 November 2016</td>
<td>0.9</td>
<td>Ninth draft (inclusion of Sensors)</td>
<td>John Darnley</td>
</tr>
<tr>
<td>3 November 2016</td>
<td>0.10</td>
<td>Tenth draft</td>
<td>John Darnley</td>
</tr>
<tr>
<td>17 February 2017</td>
<td>0.11</td>
<td>Eleventh draft</td>
<td>John Darnley</td>
</tr>
<tr>
<td>13 December 2017</td>
<td>0.12</td>
<td>Twelfth draft</td>
<td>Robert Lawry &amp; Andrew Arnold</td>
</tr>
<tr>
<td>14 December 2017</td>
<td>0.12</td>
<td>Final draft</td>
<td>Alicia Tuppack</td>
</tr>
<tr>
<td>12 January 2018</td>
<td>0.13</td>
<td>Final draft</td>
<td>Andrew Arnold, Doug Body</td>
</tr>
<tr>
<td>29 January 2018</td>
<td>0.14</td>
<td>Final draft</td>
<td>Alicia Tuppack</td>
</tr>
<tr>
<td>24 July 2018</td>
<td>1.0</td>
<td>Draft for consultation</td>
<td>Andrew Arnold</td>
</tr>
<tr>
<td>12 October 2018</td>
<td>1.1</td>
<td>Update post consultation</td>
<td>Andrew Arnold</td>
</tr>
<tr>
<td>9 February 2019</td>
<td>2.0</td>
<td>Final</td>
<td>Alicia Tuppack</td>
</tr>
</tbody>
</table>

## Document management register

**Document** | **File reference**
---|---
MA8g – Automatic Meteorological Reporting Systems assessment procedure | 60/001248 – Publications – Aviation – Meteorological Authority Publications
Review Status

Release Signatories

<table>
<thead>
<tr>
<th>Approval</th>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director of Meteorology</td>
<td>Dr Andrew Johnson</td>
<td></td>
<td>22 March 2019</td>
</tr>
</tbody>
</table>
# Contents

Contents........................................................................................................................................... iii
Glossary.............................................................................................................................................. iv
1 Introduction........................................................................................................................................ 1
2 Roles and responsibilities ................................................................................................................ 2
3 Application process ........................................................................................................................... 3
4 AWS System assessment process .................................................................................................... 4
  4.1 Background................................................................................................................................... 4
  4.2 Assessment process ....................................................................................................................... 4
  4.3 Step 1: Technical Audit ................................................................................................................ 5
  4.4 Step 2: Technical Verification ....................................................................................................... 5
5 RVR System assessment and verification process ............................................................................. 6
  5.1 Background................................................................................................................................... 6
  5.2 Assessment process ....................................................................................................................... 6
  5.3 Step 1: Technical Audit ................................................................................................................ 7
  5.4 Step 2: Technical Verification ....................................................................................................... 7
6 Sensor verification process ................................................................................................................ 8
  6.1 Policy ........................................................................................................................................... 8
  6.2 Step 1: Technical Audit ................................................................................................................ 8
  6.3 Step 2: Technical Verification ....................................................................................................... 8
References............................................................................................................................................. 9
Contact details ..................................................................................................................................... 10
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment</td>
<td>means a technical evaluation</td>
</tr>
<tr>
<td>Assessment Process</td>
<td>means the series of steps completed by an applicant as defined in <em>MA8g – Automated Meteorological Reporting Systems Assessment Process</em></td>
</tr>
<tr>
<td>Australian Bureau of Meteorology (Bureau)</td>
<td>means a government body responsible for Australia's national weather, climate and water, ABN 92 637 533 532</td>
</tr>
<tr>
<td>Authorisation</td>
<td>means an authorisation granted by the Director of Meteorology to an organisation in relation to certain meteorological observations or reports that may be relied upon by an operator or a pilot in command of an aircraft in Australia, for the purpose of regulation 120 of the Civil Aviation Regulations 1988 (Cth)</td>
</tr>
<tr>
<td>Authorisation Process</td>
<td>means the guidance for the authorisation process to be completed by an organisation as detailed in <em>MA2 – Aviation Meteorological Reporting Services Authorisation Process</em></td>
</tr>
<tr>
<td>Automated</td>
<td>means to operate independently of human assistance</td>
</tr>
<tr>
<td>Automatic Weather Station (AWS)</td>
<td>means a meteorological station at which Meteorological Observations are made and transmitted automatically[^1]</td>
</tr>
<tr>
<td>Aviation Meteorological Reporting Service</td>
<td>means the provision of Meteorological Observations and/or Meteorological Reports for use by aviation using data derived from Aviation Meteorological Reporting Systems</td>
</tr>
<tr>
<td>Aviation Meteorological Reporting Systems</td>
<td>means the meteorological equipment including Sensors, Automatic Weather Stations (AWS) Systems, Runway Visual Range Systems and any associated processing units used to create meteorological data</td>
</tr>
<tr>
<td>AWS System</td>
<td>means an integrated concept of various measuring devices in combination with the data-acquisition and processing units. Such a combined system of instruments, interfaces and processing and transmission units is usually called an automated weather observing system (AWOS) or automated surface observing system (ASOS). It has become common practice to refer to such a system as an AWS[^2]</td>
</tr>
<tr>
<td>CAR 120</td>
<td>means Australian Civil Aviation Regulations 1988, regulation 120 (Cth)</td>
</tr>
</tbody>
</table>

[^1]: WMO, 1992a
[^2]: WMO-No.8, Part II, Observing Systems
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago Convention</td>
<td>means the 1944 United Nations Convention on International Civil Aviation</td>
</tr>
<tr>
<td>Confidential Information</td>
<td>means information that is marked or otherwise identified as confidential at the time of its disclosure</td>
</tr>
<tr>
<td>Deed of Agreement</td>
<td>means a Legal Document executed between the applicant seeking CAR 120 approval and the Director of Meteorology outlining the terms and conditions of the approval</td>
</tr>
<tr>
<td>Director of Meteorology (Director)</td>
<td>means the CEO and/or agency head of the Australian Bureau of Meteorology.</td>
</tr>
<tr>
<td>International Civil Aviation Organization (ICAO)</td>
<td>means a United Nations specialized agency, established by States in 1944 to manage the administration and governance of the Convention on International Civil Aviation (Chicago Convention).</td>
</tr>
<tr>
<td>Meteorological Authority Office</td>
<td>means the office responsible for representing the Bureau of Meteorology as the designated Meteorological Authority for Australia and assisting the Director of Meteorology’s role in the regulation of aviation meteorological services</td>
</tr>
<tr>
<td>Meteorological Information</td>
<td>means meteorological report, analysis, forecast and any other statement relating to existing or expected meteorological conditions in support of aviation</td>
</tr>
<tr>
<td>Meteorological Observation</td>
<td>means the evaluation of one or more meteorological parameters</td>
</tr>
<tr>
<td>Meteorological Report</td>
<td>means a statement of observed meteorological conditions related to a specific time and location in support of aviation</td>
</tr>
<tr>
<td>OMD</td>
<td>One Minute Data</td>
</tr>
<tr>
<td>Runway Visual Range (RVR)</td>
<td>means the range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line</td>
</tr>
<tr>
<td>RVR System</td>
<td>means the instrument system used to measure Runway Visual Range in low visibility conditions (&lt; 2000m)</td>
</tr>
<tr>
<td>Sensor</td>
<td>means a device which detects or measures a physical property and records, indicates, or otherwise responds to it</td>
</tr>
<tr>
<td>SME</td>
<td>Subject Matter Expert</td>
</tr>
</tbody>
</table>

---

3 Annex 3 (ICAO, 2018) Definitions
4 Annex 3 (ICAO, 2018) Definitions
5 Oxford Dictionaries
| World Meteorological Organization (WMO) | WMO is the specialised agency of the United Nations for meteorology (weather and climate), operational hydrology and related geophysical sciences. |
1. **Introduction**

1.1 This document outlines the Assessment Process for Automated Aviation Meteorological Reporting Systems such as Automatic Weather Station (AWS) Systems, Runway Visual Range (RVR) Systems and other meteorological Sensors which have not previously:

   a. been assessed and deemed suitable by the Bureau for use in aviation reporting; and
   b. are intended to be utilised to provide an Automated Aviation Meteorological Reporting Service under CAR 120.

1.2 There are three main categories of instrumentation for Assessment:

   a. AWS Systems;
   b. RVR System; and
   c. Sensors.

1.3 Instrument Assessment does not provide Authorisation to operate an Automated Aviation Meteorological Reporting Service under CAR 120.

1.4 Organisations applying for Authorisation from the Director under CAR 120 to provide an Automated Aviation Meteorological Reporting Service should initially refer to the Meteorological Authority Office document *MA2 – Aviation Meteorological Reporting Services Authorisation Process*. An application form to provide services under CAR 120 is provided in *MA3 – Application for Authorisation Form*. All documents related to the provision of an Automated Aviation Meteorological Reporting Service are available at [http://www.bom.gov.au/met-authority/information-centre.shtml](http://www.bom.gov.au/met-authority/information-centre.shtml).

1.5 Organisations wishing to provide reports from Automatic Weather Station (AWS) Systems at Land-based locations, including Heliports, should refer to Meteorological Authority Office policy document *MA8c – Land-based Automatic Weather Station (AWS) Systems Policy*.

1.6 Organisations wishing to provide reports from Automatic Weather Station (AWS) Systems at Offshore locations, including Helidecks, should refer to Meteorological Authority Office policy document *MA8e – Offshore Automatic Weather Station (AWS) Systems Policy and Instrument Siting Requirements*.

1.7 Organisations wishing to provide reports of RVR should refer to Meteorological Authority Office policy document *MA8f - Runway Visual Range (RVR) System Policy and Instrument Siting Requirements*.

1.8 Further information on the Assessment Process is available by contacting the Meteorological Authority Office at [metauthority@bom.gov.au](mailto:metauthority@bom.gov.au).
2. Roles and responsibilities

2.1 Under the Convention for International Civil Aviation 1947 (the Chicago Convention) the Bureau of Meteorology (the Bureau) is the designated Meteorological Authority for Australia and is required to ensure that meteorological services are provided in accordance with international aviation standards. The Meteorological Authority Office represents the Bureau as the designated Meteorological Authority for Australia.

2.2 Under Civil Aviation Regulations 1988, Regulation 120 (CAR 120), the Director of Meteorology (the Director) may authorise aviation meteorological observations, forecasts or reports.

Civil Aviation Regulation 1988, Regulation 120 (CAR 120) states:

120 Weather reports not to be used if not made with authority

(1) The operator or pilot in command of an aircraft must not use weather reports of actual or forecasted meteorological conditions in the planning, conduct and control of a flight if the meteorological observations, forecasts or reports were not made with the authority of:

(a) the Director of Meteorology; or
(b) a person approved for the purpose by CASA.

Penalty: 5 penalty units.

(2) An offence against subregulation (1) is an offence of strict liability.

Note For strict liability, see section 6.1 of the Criminal Code.

2.3 The Meteorological Authority Office assists the Director in assessing applications for Authorisation of Automated Aviation Meteorological Reporting Services under CAR 120.

2.4 The Meteorological Authority Office acts for the Director in processing applications for Authorisation of Automated Aviation Meteorological Reporting Services and conducts independent compliance audits of aviation meteorological service providers. The Meteorological Authority Office then provides a recommendation to the Director for decision.

2.5 The Meteorological Authority Office will not disclose Confidential Information without the prior written authorisation of the other party. Exceptions to this obligation will include the disclose of Confidential Information to:

- the Subject Matter Expert/s responsible to conducting the Assessment Process;
- internal management Personnel, solely to enable effective management of the Assessment Process or auditing of the Meteorological Authority Office;
- external auditors of the Meteorological Authority Office; or
- to appropriate authorities as authorised or required by law to be disclosed.

---

3. Application process

3.1 Automated Aviation Meteorological Reporting Systems used to supply an Automated Aviation Meteorological Reporting Service must be deemed suitable for use for aviation reporting in Australia by an appropriate Bureau Subject Matter Expert (SME). This Assessment Process provides the Meteorological Authority Office with advice on the suitability of the equipment prior to the acceptance of an application for Authorisation under CAR 120.

3.2 Where an application for Authorisation under CAR 120 includes Automated Aviation Meteorological Reporting Systems that have not previously been deemed suitable for use in Australia by the Bureau, the organisation must follow the Assessment Process outlined in this document.

3.3 Organisations requiring an Assessment of their Automated Aviation Meteorological Reporting Systems for suitability via the Assessment Process described in this document will be charged a fee for the service. A cost estimate and approximate timeframe for the work can be provided on request.

3.4 A list of equipment which has already been assessed and deemed suitable for use in aviation reporting is available in MA8i – Meteorological Authority Office Suitable Instruments.
4. **AWS System assessment process**

4.1 **Background**

4.1.1 AWS Systems are used to measure and report meteorological parameters in real time for a variety of purposes.

**Note:** Meteorological Sensors attached to an AWS System to collect data on meteorological parameters must also be deemed suitable for use in aviation reporting by a Bureau SME (See Part 6).

**Note:** Siting requirements related to the AWS System are provided in MA8a – Instrument Siting Requirements.

4.1.2 The main meteorological parameters measured and reported for aviation purposes include, but are not limited to:

- Wind speed, direction and gusts;
- Air temperature and dew point temperature;
- Relative Humidity;
- Barometric air pressure;
- Horizontal visibility;
- Cloud height and coverage;
- Present weather; and
- Rainfall.

4.1.3 The World Meteorological Organization (WMO) defines the algorithms utilised in the reporting of meteorological parameters for aviation. These algorithms can be found in WMO-No.8 Guide to Meteorological Instruments and Methods of Observation.

4.1.4 Bureau specifications for data formats for the transmission and storage of Meteorological Information and data will be provided on request.

4.2 **Assessment process**

4.2.1 A two–step process managed by the Bureau Observing Systems & Operations In–situ Measurement Group is used to assess an AWS System not previously deemed suitable for use for aviation reporting by the Bureau in Australia. The two steps comprise a Technical Audit and a Technical Verification.

4.2.2 This Assessment Process does not provide Authorisation to operate an Automated Aviation Meteorological Reporting Service under CAR 120.

4.2.3 The Bureau Observing Systems & Operations In–situ Measurement Group will provide a report to the Meteorological Authority Office on the results of the Technical Audit and the Technical Verification with a determination of the suitability of the AWS System for the purposes of aviation reporting.

4.2.4 The Meteorological Authority Office will contact the applicant regarding the determination of the suitability of the AWS System for Automated Aviation Meteorological Reporting Services in Australia.
4.3 Step 1: Technical Audit

4.3.1 The Technical Audit is performed by the Bureau SMEs using technical documentation on the AWS System provided by the applicant. This information will include, but not be limited to, the following items for every meteorological parameter reported:

- Measurement sampling period;
- Measurement resolution, accuracy, repeatability;
- Sensor time constant;
- Sensor transfer function;
- Measurement transfer function;
- Data calculations (algorithms); and
- Algorithm references.

4.3.2 Feedback is provided to the applicant from the Technical Audit to clarify any missing information and/or apparent anomalies. Once any anomalies have been clarified, and the Bureau is satisfied the AWS System meets the requirements on paper, the assessment can proceed to Step 2.

4.4 Step 2: Technical Verification

4.4.1 The Technical Verification is performed by the Bureau SMEs. This involves a demonstration by the applicant of the measurements and algorithms used in their AWS System to generate the reported meteorological parameters, including compliance to output data message format(s). The verification process involved may vary and will be determined by the Bureau SME. This process may include, but is not limited to:

- Ingestion of test data sets used to simulate meteorological conditions or events;
- Sensor simulators;
- Environmental test chambers;
- References from other international meteorological services where the systems are in use; or
- Any combination of the above.

4.4.2 Where an AWS System has not previously been used in Australia but is being used by other international meteorological services, the company applying for Authorisation may submit supplementary evidence of the veracity of the AWS System from other users to support their application.

4.4.3 Upon completion of the Technical Verification, the Meteorological Authority Office will contact the applicant regarding the determination of the suitability of the AWS System for aviation reporting in Australia.
5. **RVR System assessment and verification process**

5.1 **Background**

5.1.1 Runway Visual Range (RVR) is defined as:

“The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.”

5.1.2 The main purpose of RVR is to provide pilots, air traffic services (ATS) units and other aeronautical users with information on runway visibility conditions during periods of low visibility.

5.1.3 Instrumented systems are used to assess atmospheric factors and provide a measurement of Runway Visual Range (RVR) for use by pilots in low visibility conditions. Particulate types that can obscure horizontal visibility and result in low visibility conditions fall into four main areas as described in ICAO Doc 92385:

- Lithometeors (Haze, dust, sand, smoke and volcanic ash)
- Hydrometeors (Mist and fog)
- Liquid precipitation (Rain and drizzle)
- Solid precipitation (Snow, snow grains, ice crystals, ice pellets, hail, small hail/snow pellets).

5.1.4 The ICAO provide guidance on RVR Systems in *ICAO Doc 9328 - Manual of Runway Visual Range Observing and Reporting Practices*.

5.2 **Assessment process**

5.2.1 A two–step process managed by the Bureau Observing Systems & Operations In–situ Measurement Group is used to assess an RVR System not previously deemed suitable for use for aviation reporting by the Bureau in Australia. The two steps comprise a Technical Audit and a Technical Verification.

5.2.2 This Assessment Process does not provide Authorisation to operate an Automated Aviation Meteorological Reporting Service under CAR 120.

---

7 ICAO, Annex 3 – Meteorological Service for International Air Navigation
8 ICAO, Doc 9328 – Manual of Runway Visual Range Observing and Reporting Practices
5.2.3 The Bureau Observing Systems & Operations In–situ Measurement Group will provide a report to the Meteorological Authority Office on the results of the Technical Audit with a determination of the suitability of the RVR System for installation and further verification.

5.2.4 The Meteorological Authority Office will contact the applicant regarding the determination of the suitability of the RVR System for installation.

5.3 **Step 1: Technical Audit**

5.3.1 The Technical Audit is performed by the Bureau SMEs using the instrument’s technical documentation provided by the applicant for comparison against WMO and Bureau specifications.

5.3.2 The Technical Audit is performed by the Bureau SMEs using technical documentation on the RVR System provided by the applicant. This information will include, but not be limited to, the following items for every meteorological parameter reported:

- Measurement sampling period;
- Measurement resolution, accuracy, repeatability;
- Sensor time constant;
- Sensor transfer function;
- Measurement transfer function;
- Data calculations (algorithms); and
- Algorithm references.

5.3.3 Feedback is provided to the applicant from the Technical Audit to clarify any missing information and/or apparent anomalies. Once any anomalies have been clarified, and the Bureau is satisfied the RVR System meets the requirements on paper, the assessment can proceed to Step 2.

5.4 **Step 2: Technical Verification**

5.4.1 After a satisfactory Technical Audit, further in-situ verification of the equipment is required as per the RVR Policy, *MA8f – Runway Visual Range (RVR) Policy and Instrument Siting Requirements*.

5.4.2 The provision of the in-situ verification report for RVR System itself does not provide Authorisation to operate the system under CAR 120.

5.4.3 Upon completion of the Technical Verification, the Meteorological Authority Office will contact the applicant regarding the determination of the suitability of the RVR System for aviation reporting in Australia.
6 Sensor verification process

6.1 Policy

6.1.1 Sensors utilised for the collection of meteorological data for use by aviation reporting are required to meet standards set by WMO, ICAO and the Bureau.

6.1.2 Sensors that have not previously been deemed suitable for aviation reporting by the Bureau in Australia are required to be assessed via a two-step process managed by the Bureau of Meteorology. The two steps comprise a Technical Audit and a Technical Verification.

6.1.3 This Assessment Process does not provide Authorisation to operate an Automated Aviation Meteorological Reporting Service under CAR 120.

6.2 Step 1: Technical Audit

6.2.1 The Technical Audit is performed by the Bureau SMEs using the Sensor's technical documentation and supporting evidence provided by the applicant for comparison against WMO and Bureau specifications.

6.2.2 Provision of calibration certificates and details on the transfer function of each Sensor and/or measurement channel from the manufacturer are required to assist the Bureau to perform an Assessment of each Sensor.

6.2.3 Feedback is provided to the applicant from the Technical Audit to clarify any missing information and/or apparent anomalies. Once any anomalies have been clarified, and the Bureau is satisfied the Sensor meets the requirements on paper, the Assessment can proceed to Step 2.

6.3 Step 2: Technical Verification

6.3.1 After a satisfactory Technical Audit, further in-situ assessment is required.

6.3.2 The Bureau will conduct spot checks on one or more Sensors or channels to verify the data provided in the calibration certificates and transfer function documentation.

6.3.3 Upon completion of the Technical Verification, the Meteorological Authority Office will contact the applicant regarding the determination of the suitability of the Sensor for aviation reporting in Australia.
References

Civil Aviation Regulations 1988, regulation 120 (CAR 120).
MA2 – Authorisation Process, Meteorological Authority Office, Bureau of Meteorology.
MA3 – Application Form, Meteorological Authority Office, Bureau of Meteorology.
MA4 – Aviation Meteorological Reporting Services Authorisation, Meteorological Authority Office, Bureau of Meteorology.
MA8c – Land-based Automatic Weather Station (AWS) Policy, Meteorological Authority Office, Bureau of Meteorology.
MA8f – Runway Visual Range (RVR) System Policy and Instrument siting requirements, Meteorological Authority Office, Bureau of Meteorology.
Contact details

Meteorological Authority Office
Bureau of Meteorology
GPO Box 1289
Melbourne VIC 3001

T  03 9669 4000
E  metauthority@bom.gov.au