

Solar Radiation

Field of Application Meteorological sensors used to measure solar radiation must meet the following performance specifications, unless an equivalent, alternative sensor is authorized in writing by the Director. It is not the intent of the Department to exclude sensors with operating principles and/or equivalent performance specifications different than those provided. Written authorization from the regulator must be received prior to the purchase, installation and/or use of any sensor based on an alternative principle of operation or differing performance specifications from those herein.

Solar radiation measured along with air quality parameters helps to understand the dynamics of air pollution. Solar radiation is a driving force behind atmospheric motion, and is also related to photochemical activity in reactions such as ozone formation.

Principles of Operation Continuous ambient air monitoring methods accepted by the Department for measuring solar radiation include the following.

Pyranometers: Pyranometers measure the solar radiation received from a hemispherical section of the atmosphere. Most pyranometers use either a thermopile or a silicon photovoltaic cell as a sensor. With the thermopile sensor, solar radiation is converted to heat, and the sensor generates a voltage output signal proportional to the solar radiation. For a photovoltaic cell, the sensor response is directly proportional to solar radiation.

Performance Specifications Specifications listed here are minimum performance specifications. Some applications may warrant use of equipment with better specifications.

Criteria	Performance Specification
Required Operating Range (Full Scale):	0 - 1 300 W m ⁻²
Spectral Range:	400 - 1 100 nm
Precision:	5% of reading
Linearity:	2.5% of full scale

W m⁻² is energy flux measured in watts per metre squared
nm refers to wavelength of incident radiation, in units of nanometres

Operational Requirements Installation and operation of solar radiation sensors must meet all requirements specified in the Air Monitoring Directive (AMD).

All sensors must be operated according to manufacturer’s specifications.

ISBN: 978-1-4601-1820-7 (print)
ISBN: 978-1-4601-1821-4 (pdf)

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Calibration Requirements	Refer to the manufacturer's requirements for calibration and the calibration section of the AMD.
Reporting Requirements	Refer to the reporting section of the AMD.
Additional Information	A sensor measuring total hemispheric radiation should have a 360° view of the horizon without significant obstacles. Sensors also require frequent cleaning to remove any material deposited on the surface that may intercept the radiation.