
CHAPTER 6

VISIBILITY

6.1 General

Visibility is a measure of the opacity of the atmosphere. An automated, instrumentally-derived visibility value is a sensor value converted to an appropriate visibility value using standard algorithms and is considered to be representative of the visibility in the vicinity of the airport runway complex. A manually-derived visibility value is obtained using the "prevailing visibility" concept. In this chapter, the term "prevailing visibility" shall refer to both manual and instrument derived visibility values.

6.2 Scope

This chapter describes the standards for observing and reporting visibility.

6.3 Visibility Parameters

The visibility parameters are:

- a. **Prevailing visibility.** The visibility that is considered representative of visibility conditions at the station; the greatest distance that can be seen throughout at least half the horizon circle, not necessarily continuous.
- b. **Sector visibility.** The visibility in a specified direction that represents at least a 45 degree arc of the horizon circle.
- c. **Surface visibility.** The prevailing visibility determined from the usual point of observation.
- d. **Tower visibility.** The prevailing visibility determined from the airport traffic control tower (ATCT) at stations that also report surface visibility.

6.4 Visibility Observing Standards. Visibility may be manually determined at either the surface, the tower level, or both. If visibility observations are made from just one level, e.g., the airport traffic control tower, that level shall be considered the "usual point of observation" and that visibility shall be reported as surface visibility. If visibility observations are made from both levels, the visibility at the tower level may be reported as tower visibility.

Visibility may be automatically determined by sensors operating in accordance with the *Federal Standard Algorithms for Automated Weather Observing Systems Used for Aviation Purposes*. This visibility algorithm calculates a mean visibility which is the sensor equivalent of prevailing visibility. The visibility data during the period of observation are examined to determine if variable visibility shall be reported.

6.4.1 Observing Sites. Where the observer's view of the horizon is obstructed, the observer shall move to as many locations as necessary and practicable within the time allotted for the observation to view as much of the horizon as possible. In this respect, natural obstructions, such as trees, hills, etc., are not obstructions to the horizon. These natural obstructions define the horizon.

For automated weather observing stations, the visibility sensor shall be located, in accordance with the *Federal Standard for Siting Meteorological Sensors at Airports*.

6.4.2 Manual Observing Aids. Agencies shall establish procedures to ensure that insofar as possible, dark or nearly dark objects viewed against the horizon sky shall be used during the day, and unfocused lights of moderate intensity (about 25 candela) shall be used during the night as reference points for manually determining visibility. In addition, visibility sensors may be used to assist the observer in the evaluation.

6.4.3 Observer Adaptation to Ambient Light Conditions. Agencies shall establish procedures to ensure that observer's eyes shall be accustomed to the ambient lighting conditions before manual visibility observations are taken.

6.4.4 Visibility. Manually-derived visibility shall be evaluated as frequently as practicable. All available visibility reference points shall be used. The greatest distances that can be seen in all directions around the horizon circle shall be determined. When the visibility is greater than the distance to the farthest reference point, the greatest distance seen in each direction shall be estimated. This estimate shall be based on the appearance of the most distant visible reference points. If they are visible with sharp outlines and little blurring of color, the visibility is much greater than the distance to them. If they can barely be seen and identified, the visibility is about the same as the distance to them. After visibilities have been determined around the entire horizon circle, they shall be resolved into a single value for reporting purposes. To do this, the greatest distance that can be seen throughout at least half the horizon circle, not necessarily continuous shall be used; this is prevailing visibility. If the visibility is varying rapidly during the time of the observation, the average of all observed values around the horizon circle shall be used for reporting purposes.

6.4.5 Variable Prevailing Visibility. If the prevailing visibility rapidly increases and decreases by 1/2 statute mile or more, during the time of the observation, and the prevailing visibility is less than 3 miles, the visibility is considered to be variable.

6.4.6 Sector Visibility. When the manually-derived visibility is not uniform in all directions, the horizon circle shall be divided into arcs that have uniform visibility and represent at least one eighth of the horizon circle (45 degrees). The visibility that is evaluated in each sector is sector visibility.

6.5 Visibility Reporting Standards

6.5.1 Unit of Measure. Visibility shall be reported in statute miles.

6.5.2 Prevailing Visibility. Prevailing visibility shall be reported in all weather observations. The reportable values for visibility are listed in Table 6-1. If the actual visibility falls halfway between two reportable values, the lower value shall be reported (see paragraph 12.6.6).

6.5.3 Variable Prevailing Visibility. Variable prevailing visibility shall be reported if the prevailing visibility is less than 3 miles and rapidly increases or decreases by 1/2 statute mile or more during the time of observation. The minimum and maximum visibility values observed shall be reported in remarks section (see paragraph 12.7.1.g).

6.5.4 Tower Visibility. Tower visibility shall be reported, in accordance with agency procedures (see paragraph 12.7.1.f).

6.5.5 Surface Visibility. Surface visibility shall be the prevailing visibility from the surface at manual stations or the visibility derived from sensors at automated stations (see paragraph 12.7.1.f).

6.5.6 Visibility At Second Location. When an automated station uses a meteorological discontinuity visibility sensor, remarks shall be added to identify visibility at the second location which differ from the visibility in the body of the report (see paragraph 12.7.1.i).

6.5.7 Sector Visibility. Sector visibility shall be reported in remarks when it differs from the prevailing visibility by one or more reportable values and either the prevailing or sector visibility is less than 3 miles (see paragraph 12.7.1.h).

Table 6-1. Reportable Visibility Values

Source of Visibility Report							
Automated			Manual				
M ^{1/4}	2	9 ^a	0	5/8	1 5/8	4	12
1/4	2 1/2	10	1/16	3/4	1 3/4	5	13
1/2	3		1/8	7/8	1 7/8	6	14
3/4	4		3/16	1	2	7	15
1	5		1/4	1 1/8	2 1/4	8	20
1 1/4	6 ^a		5/16	1 1/4	2 1/2	9	25
1 1/2	7		3/8	1 3/8	2 3/4	10	30
1 3/4	8 ^a		1/2	1 1/2	3	11	35 ^b

a. These values may not be reported by some automated stations.
b. Further values in increments of 5 statute miles may be reported, i.e., 40, 45, 50, etc.

6.6 Summary of Visibility Observing and Reporting Standards

Table 6-2 summarizes the applicability of visibility standards.

Table 6-2. Summary of Visibility Observing and Reporting Standards and Procedures

Visibility	Type of Station	
	Automated	Manual
Surface	Represents 10-minutes of sensor outputs.	Visual evaluation of visibility around the horizon.
Variable	Reported when the prevailing visibility varies by 1/2 mile or more and the visibility is less than 3 miles.	
Tower	Augmented.	Reported at stations with an ATCT.
Sector	Not reported.	Reported at all stations.