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## CHAPTER 11

### PRESSURE

#### 11.1 General

Atmospheric pressure is the force exerted by the atmosphere at a given point. In this chapter, the term "barometric pressure" refers to the actual pressure sensor value. The sensor value may be an altimeter setting, station pressure, or simply a direct pressure value without applied corrections depending on the type of sensor.

#### 11.2 Scope

This chapter prescribes the standards for observing and reporting atmospheric pressure data.

#### 11.3 Pressure Parameters

- a. **Station pressure.** The atmospheric pressure at the designated station elevation.
- b. **Altimeter setting.** The pressure value to which an aircraft altimeter scale is set so that it will indicate the altitude above mean sea level of an aircraft on the ground at the location for which the value was determined.
- c. **Sea-level pressure.** A pressure value obtained by the theoretical reduction of barometric pressure to sea level. Where the Earth's surface is above sea level, it is assumed that the atmosphere extends to sea level below the station and that the properties of that hypothetical atmosphere are related to conditions observed at the station.

#### 11.4 Pressure Observing Standards

**11.4.1 Barometer Comparisons.** Each agency shall establish an agency standard barometer traceable to the standard of the National Institute of Standards and Technology. Each agency shall also establish a system of routine barometer comparisons to determine corrections required to keep the station's pressure sensors within the required accuracy (see Appendix C).

**11.4.2 Atmospheric Pressure.** The various pressure parameters shall be determined from the barometric pressure after appropriate corrections are applied. The method used shall depend on the type of sensor and the available computational aids. These aids may be systems that result in a direct readout of the desired parameter, pressure reduction calculators, or tables. Designated stations may use constants to convert measured pressure to the desired pressure parameter.

**11.4.3 Station Pressure.** Station pressure shall be determined by adjusting the corrected barometric pressure to compensate for the difference between the height of the barometer and the designated station elevation.

**11.4.4 Sea-Level Pressure.** At designated stations, sea-level pressure shall be computed by adjusting the station pressure to compensate for the difference between the station elevation and sea-level. This adjustment shall be based on the station elevation and the 12-hour mean temperature at the station. The 12-hour mean temperature shall be the average of the present ambient temperature and the ambient temperature 12 hours ago.

Stations within  $\pm 50$  feet of sea-level may be authorized by their agency to use a constant value to adjust station pressure to sea-level pressure. Otherwise, stations shall use reduction ratios provided by their responsible agency to calculate sea-level pressure.

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**11.4.5 Altimeter Setting.** The altimeter setting shall be determined either directly from an altimeter setting indicator or computed from the station pressure by applying a correction for the difference between the station elevation and field elevation in the standard atmosphere. Where this difference is 30 feet or less, agencies may authorize the use of a constant correction.

**11.4.6 Pressure Change (Rising/Falling).** At designated stations, the pressure calculated for each report shall be examined to determine if a pressure change is occurring. If the pressure is rising or falling at a rate of at least 0.06 inch per hour and the pressure change totals 0.02 inch or more at the time of the observation, a pressure change remark shall be reported (see paragraph 12.7.1.u).

**11.4.7 Pressure Tendency.** Designated stations shall include pressure tendency data in each 3- and 6-hourly report. The pressure tendency includes two parts: the characteristic (an indication of how the pressure has been changing over the past three hours) and the amount of the pressure change in the past three hours. The characteristic shall be based on the observed or recorded (barogram trace) changes in pressure over the past three hours. The amount of pressure change is the absolute value of the change in station pressure or altimeter setting in the past three hours converted to tenths of hectopascals.

## **11.5 Pressure Reporting Standards**

**11.5.1 Rounding Pressure Values.** When computations of pressure values require that a number be rounded to comply with standards on reportable values, the number shall be rounded down to the next reportable value. For example, an altimeter reading of 29.248 inches becomes 29.24 and a station pressure reading of 29.249 inches becomes 29.245.

**11.5.2 Units of Measure.** Table 11-1 lists the units of measure for pressure parameters.

**Table 11-1. Units of Measure of Pressure Parameters**

<b>Parameter</b>	<b>Units of Measure</b>
Altimeter Setting	Inches of Mercury
Sea-Level Pressure	Hectopascals
Station Pressure	Inches of Mercury

**11.5.3 Altimeter Setting.** Altimeter setting shall be reported in all reports (see paragraph 12.6.11).

**11.5.4 Sea-Level Pressure.** At designated stations, sea-level pressure shall be included in the remarks section of all METARs (see paragraph 12.7.1.v).

**11.5.5 Remarks.** At designated stations, the pressure change remarks (PRESRR or PRESFR) shall be reported if occurring at the time of observation (see paragraph 12.7.1.u). The pressure tendency group shall only be included in 3- and 6-hourly reports (see paragraph 12.7.2.h).

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## 11.6 Summary of Pressure Observing and Reporting Standards

Table 11-2 summarizes the pressure observing and reporting standards.

**Table 11-2. Summary of Pressure Observing and Reporting Standards**

<b>Parameter</b>	<b>Reporting Standard</b>
Altimeter Setting	Reported in inches of mercury at all stations.
Sea-level pressure	Reported in hectopascals at designated stations.
<u>Remarks:</u> Rising Rapidly Falling Rapidly	Reported at designated stations.
Pressure Tendency	Reported at designated stations.