

Appendix E to Part 43 -- Altimeter System Test and Inspection

Each person performing the altimeter system tests and inspections required by §91.411 shall comply with the following:

(a) Static pressure system:

- (1) Ensure freedom from entrapped moisture and restrictions.
- (2) Determine that leakage is within the tolerances established in §23.1325 or §25.1325, whichever is applicable.
- (3) Determine that the static port heater, if installed, is operative.
- (4) Ensure that no alterations or deformations of the airframe surface have been made that would affect the relationship between air pressure in the static pressure system and true ambient static air pressure for any flight condition.

(b) Altimeter:

- (1) Test by an appropriately rated repair facility in accordance with the following subparagraphs. Unless otherwise specified, each test for performance may be conducted with the instrument subjected to vibration. When tests are conducted with the temperature substantially different from ambient temperature of approximately 25 degrees C., allowance shall be made for the variation from the specified condition.
 - (i) *Scale error.* With the barometric pressure scale at 29.92 inches of mercury, the altimeter shall be subjected successively to pressures corresponding to the altitude specified in Table I up to the maximum normally expected operating altitude of the airplane in which the altimeter is to be installed. The reduction in pressure shall be made at a rate not in excess of 20,000 feet per minute to within approximately 2,000 feet of the test point. The test point shall be approached at a rate compatible with the test equipment. The altimeter shall be kept at the pressure corresponding to each test point for at least 1 minute, but not more than 10 minutes, before a reading is taken. The error at all test points must not exceed the tolerances specified in Table I.
 - (ii) *Hysteresis.* The hysteresis test shall begin not more than 15 minutes after the altimeter's initial exposure to the pressure corresponding to the upper limit of the scale error test prescribed in subparagraph (i); and while the altimeter is at this pressure, the hysteresis test shall commence. Pressure shall be increased at a rate simulating a descent in altitude at the rate of 5,000 to 20,000 feet per minute until within 3,000 feet of the first test point (50 percent of maximum altitude). The test point shall then be approached at a rate of approximately 3,000 feet per minute. The altimeter shall be kept at this pressure for at least 5 minutes, but not more than 15 minutes, before the test reading is taken. After the reading has been taken, the

pressure shall be increased further, in the same manner as before, until the pressure corresponding to the second test point (40 percent of maximum altitude) is reached. The altimeter shall be kept at this pressure for at least 1 minute, but not more than 10 minutes, before the test reading is taken. After the reading has been taken, the pressure shall be increased further, in the same manner as before, until atmospheric pressure is reached. The reading of the altimeter at either of the two test points shall not differ by more than the tolerance specified in Table II from the reading of the altimeter for the corresponding altitude recorded during the scale error test prescribed in paragraph (b)(i).

- (iii) *After effect.* Not more than 5 minutes after the completion of the hysteresis test prescribed in paragraph (b)(ii), the reading of the altimeter (corrected for any change in atmospheric pressure) shall not differ from the original atmospheric pressure reading by more than the tolerance specified in Table II.
- (iv) *Friction.* The altimeter shall be subjected to a steady rate of decrease of pressure approximating 750 feet per minute. At each altitude listed in Table III, the change in reading of the pointers after vibration shall not exceed the corresponding tolerance listed in Table III.
- (v) *Case leak.* The leakage of the altimeter case, when the pressure within it corresponds to an altitude of 18,000 feet, shall not change the altimeter reading by more than the tolerance shown in Table II during an interval of 1 minute.
- (vi) *Barometric scale error.* At constant atmospheric pressure, the barometric pressure scale shall be set at each of the pressures (falling within its range of adjustment) that are listed in Table IV, and shall cause the pointer to indicate the equivalent altitude difference shown in Table IV with a tolerance of 25 feet.

(2) Altimeters which are the air data computer type with associated computing systems, or which incorporate air data correction internally, may be tested in a manner and to specifications developed by the manufacturer which are acceptable to the Administrator.

- (c) Automatic Pressure Altitude Reporting Equipment and ATC Transponder System Integration Test. The test must be conducted by an appropriately rated person under the conditions specified in paragraph (a). Measure the automatic pressure altitude at the output of the installed ATC transponder when interrogated on Mode C at a sufficient number of test points to ensure that the altitude reporting equipment, altimeters, and ATC transponders perform their intended functions as installed in the aircraft. The difference between the automatic reporting output and the altitude displayed at the altimeter shall not exceed 125 feet.
- (d) Records: Comply with the provisions of §43.9 of this chapter as to content, form, and disposition of the records. The person performing the altimeter tests shall record on the altimeter the date

and maximum altitude to which the altimeter has been tested and the persons approving the airplane for return to service shall enter that data in the airplane log or other permanent record.

Table I

Altitude	(inches of	Equivalent Pressure (+/- feet) Mercury)	Tolerance
--1,000.....		31.018	20
0.....		29.921	20
500.....		29.385	20
1,000.....		28.856	20
1,500.....		28.335	25
2,000.....		27.821	30
3,000.....		26.817	30
4,000.....		25.842	35
6,000.....		23.978	40
8,000.....		22.225	60
10,000.....		20.577	80
12,000.....		19.029	90
14,000.....		17.577	100
16,000.....		16.216	110
18,000.....		14.942	120
20,000.....		13.750	130
22,000.....		12.636	140
25,000.....		11.104	155
30,000.....		8.885	180
35,000.....		7.041	205
40,000.....		5.538	230
45,000.....		4.355	255
50,000.....		3.425	280

Table II--Test Tolerances

Test	Tolerance (feet)
Case Leak Test.....	(+/-) 100
Hysteresis Test:	
First Test Point (50 percent of maximum altitude).....	75
Second Test Point (40 percent of maximum altitude).....	75
After Effect Test.....	30

Table III--Friction

Altitude (feet)	Tolerance (feet)
1,000.....	(+/-) 70
2,000.....	70
3,000.....	70
5,000.....	70
10,000.....	80
15,000.....	90
20,000.....	100
25,000.....	120
30,000.....	140
35,000.....	160
40,000.....	180
50,000.....	250

Table IV--Pressure-Altitude Difference

Pressure (inches of Hg)	Altitude difference (feet)
28.10.....	-1,727
28.50.....	-1,340
29.00.....	-863
29.50.....	-392
29.92.....	0
30.50.....	+531
30.90.....	+893
30.99.....	+974

(Secs. 313, 314, and 601 through 610 of the Federal Aviation Act of 1958 (49 U.S.C. 1354, 1355, and 1421 through 1430) and sec. 6(c), Dept. of Transportation Act (49 U.S.C. 1655(c)))
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