

(9) A 20-hour run consisting of alternate periods in the lower gear ratio of 2 hours at rated maximum continuous power with maximum continuous speed, and 2 hours at maximum best economy cruising power and speed or at maximum recommended cruising power.

(10) A 5-hour run in the lower gear ratio at maximum best economy cruising power and speed or at maximum recommended cruising power and speed.

Where simulated altitude test equipment is not available when operating in the higher gear ratio, the runs may be made at the observed horsepower obtained with the critical altitude manifold pressure or specified percentages thereof, and the fuel-air mixtures may be adjusted to be rich enough to suppress detonation.

(d) *Helicopter engines.* To be eligible for use on a helicopter each engine must either comply with paragraphs (a) through (j) of § 29.923 of this chapter, or must undergo the following series of runs:

(1) A 35-hour run consisting of alternate periods of 30 minutes each at rated takeoff power with takeoff speed, and at rated maximum continuous power with maximum continuous speed.

(2) A 25-hour run consisting of alternate periods of 2½ hours each at rated maximum continuous power with maximum continuous speed, and at 70 percent rated maximum continuous power with maximum continuous speed.

(3) A 25-hour run consisting of alternate periods of 2½ hours each at rated maximum continuous power with maximum continuous speed, and at 70 percent rated maximum continuous power with 80 to 90 percent maximum continuous speed.

(4) A 25-hour run consisting of alternate periods of 2½ hours each at 30 percent rated maximum continuous power with takeoff speed, and at 30 percent rated maximum continuous power with 80 to 90 percent maximum continuous speed.

(5) A 25-hour run consisting of alternate periods of 2½ hours each at 80 percent rated maximum continuous power with takeoff speed, and at either rated maximum continuous power with 110

percent maximum continuous speed or at rated takeoff power with 103 percent takeoff speed, whichever results in the greater speed.

(6) A 15-hour run at 105 percent rated maximum continuous power with 105 percent maximum continuous speed or at full throttle and corresponding speed at standard sea level carburetor entrance pressure, if 105 percent of the rated maximum continuous power is not exceeded.

(e) *Turbosupercharged engines.* For engines incorporating a turbosupercharger the following apply except that altitude testing may be simulated provided the applicant shows that the engine and supercharger are being subjected to mechanical loads and operating temperatures no less severe than if run at actual altitude conditions:

(1) For engines used in airplanes the applicant must conduct the runs specified in paragraph (b) of this section, except—

(i) The entire run specified in paragraph (b)(1) of this section must be made at sea level altitude pressure;

(ii) The portions of the runs specified in paragraphs (b)(2) through (7) of this section at rated maximum continuous power must be made at critical altitude pressure, and the portions of the runs at other power must be made at 8,000 feet altitude pressure; and

(iii) The turbosupercharger used during the 150-hour endurance test must be run on the bench for an additional 50 hours at the limiting turbine wheel inlet gas temperature and rotational speed for rated maximum continuous power operation unless the limiting temperature and speed are maintained during 50 hours of the rated maximum continuous power operation.

(2) For engines used in helicopters the applicant must conduct the runs specified in paragraph (d) of this section, except—

(i) The entire run specified in paragraph (d)(1) of this section must be made at critical altitude pressure;

(ii) The portions of the runs specified in paragraphs (d)(2) and (3) of this section at rated maximum continuous power must be made at critical altitude pressure and the portions of the