7011.0535 PERFORMANCE TEST PROCEDURES.

Subpart 1. **In general.** Performance tests shall be conducted according to the requirements of this part and parts 7017.2001 to 7017.2060.

Subp. 2. **Method 1.** The sampling site, as selected by Method 1, shall be the same for each pollutant during a performance test.

Subp. 3. **Method 5.** For Method 5, the sampling time for each run shall be at least 60 minutes and the minimum sampling volume shall be 0.85 dscm (30 dscf) except that smaller sampling times or volumes, when necessitated by process variables or other factors, may be approved by the agency. The probe and filter holder heating systems in the sampling train shall be set to provide a gas temperature between 120 degrees Celsius and 160 degrees Celsius (250 degrees Fahrenheit and 320 degrees Fahrenheit).

Subp. 4. **Methods 6 and 7.** For Methods 6 and 7, the sampling point in the duct shall be at the center of the cross section or at a point no closer to the walls than 1 m (3.28 feet). For Method 6 the sample shall be extracted at a rate proportional to the gas velocity at the sampling point.

Subp. 5. **Method 6.** For Method 6, the minimum sampling time shall be 20 minutes and the minimum sampling volume 0.02 dscm (0.71 dscf) for each sample. The arithmetic mean of two samples shall constitute one run. Samples shall be taken at approximately 30-minute intervals.

Subp. 6. **Method 7.** For Method 7, each run shall consist of at least four grab samples taken at approximately 15-minute intervals. The arithmetic mean of the samples shall constitute the run value.

Subp. 7. **Nanograms.** For each performance test, the emissions expressed in nanograms/joule (lb/million Btu) shall be determined by the following procedure:

$$E = CF \left(\frac{20.90}{20.9 - \%O_2} \right)$$

where:

A. E = pollutant emission, g/million cal nanograms/joule (lb/million Btu);

B. C = pollutant concentration g/dscm (lb/dscf), determined by Method 5, 6, or 7;

C. $\%O_2$ = oxygen content by volume (expressed as percent), dry basis. Percent oxygen shall be determined by using the integrated sampling procedures of Method 3 and by analyzing the sample with a continuous monitoring system, or with the Orsat analyzer. The sample shall be obtained as follows:

(1) For determination of sulfur dioxide and nitrogen oxides emissions, the oxygen sample shall be obtained at approximately the same point in the duct as used to obtain the samples for Methods 6 and 7 determinations, respectively.

(2) For determination of particulate emissions, the oxygen sample shall be obtained simultaneously by traversing the duct at the same sampling location used for each run of Method 5 in accordance with Method 1, except that 12 sample points shall be used in all cases;

D. The owner or operator may use either subitem (1) or (2) to determine the value of F. F = factor representing a ratio of the volume of dry flue gases generated to the calorific value of the fuel combusted.

(1) Values of F are given as follows:

(a) for anthracitic coal according to A.S.T.M. D388-66, F = 2.723 x 10^{-7} dscm/J (10140 dscf/10^6 Btu);

(b) for subbituminous and bituminous coal according to A.S.T.M. D388-66, F = 2.637 x 10^{-7} dscm/J (9820 dscf/10^6 Btu);

(c) for liquid fossil fuels including crude, residual, and distillate oils, F = 2.476 x 10^{-7} dscm/J (9220 dscf/10^6 Btu); and

(d) for gaseous fossil fuels including natural gas, propane, and butane, F = 2.347 x 10^{-7} dscm/J (8740 dscf/10^6 Btu).

(2) An owner or operator may use the following equation to determine an F factor (dscf/10^6 Btu):

$$F = \frac{10^6[3.64(\%H) + 1.53(\%C) + 0.57(\%S) + 0.14(\%N) - 0.46(\%O)]}{GVH}$$

where:

(a) H, C, S, N, and O are content by weight of hydrogen, carbon, sulfur, nitrogen, and oxygen (expressed as percent), respectively, as determined by ultimate analysis of the fuel fired, dry basis, using A.S.T.M. methods D3168-74 or D3176 (solid fuels) or D240-64(73) (liquid fuels) or computed from results using A.S.T.M. method D1137-53(70), D1945-64(73) or D1946-67(72) (gaseous fuels) as applicable; and

(b) GHV is the gross heating value (Btu/lb dry basis);

E. When combinations of fuels are fired, the F factors determined by item C or D shall be prorated in accordance with the following formula:

$$F = \frac{xF_1 + yF_2 + zF_3}{100}$$

where:

x = the percentage of total heat input derived from gaseous fossil fuel;

y = the percentage of total heat input derived from liquid fossil fuel;

z = the percentage of total heat input derived from solid fossil fuel;

F_1 = the value of F for gaseous fossil fuels according to item D or E;

F_2 = the value of F for liquid fossil fuels according to item D or E; and

F_3 = the value of F for solid fossil fuels according to item D or E;

F. When combinations of fossil fuels are fired, the actual heat input, expressed in cal/hr (Btu/hr), shall be determined during each testing period. The rate of fuels burned during each testing period shall be determined by suitable methods and shall be confirmed by a material balance over the indirect heating system.

Subp. 8. **Alternate method.** When the emission factor cannot be calculated by means of the method outlined in subpart 7, the emission factors for all pollutants for all new and existing indirect heating equipment expressed in nanograms/joule (lb/million Btu) shall be determined by the following procedure:

$$E = \frac{E_t}{Z}$$

where:

E = pollutant emissions, in nanograms/joule (lb/million Btu);

E_t = pollutant emission rate, in nanograms/hr (lb/hr), determined by Method 5; and

z = actual heat input, in joules/hr, (million Btu/hr).

Subp. 9. **Operation of indirect heating equipment.** The indirect heating equipment shall be operated during the performance test at 90 percent or more of the rated heat input, or at 100 percent of peak operating load if an owner or operator intends to achieve compliance by derating.

Statutory Authority: *MS s 116.07*

History: *18 SR 614; 18 SR 1412; 22 SR 1237*

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