7011.1430 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. **Sampling time.** For Method 5, the sampling time for each run shall be at least 60 minutes and the sampling rate shall be at least 0.015 dscm (0.53 dscf/min), except that shorter sampling times may be approved by the agency when process variable or other factors preclude sampling for at least 60 minutes.

Subp. 3. **Extraction rate.** For Method 10, the sample shall be extracted at a rate proportional to the gas velocity at a sampling point near the centroid of the duct. The sampling time shall not be less than 60 minutes.

Subp. 4. **Introducing gases into sampling train.** For Method 11, when refinery fuel gas lines are operating at pressures substantially above atmospheric, the gases sampled must be introduced into the sampling train at approximately atmospheric pressure. This may be accomplished with a flow control valve. If the line pressure is high enough to operate the sampling train without a vacuum pump, the pump may be eliminated from the sampling train. The sample shall be drawn from a point near the centroid of the fuel gas line. The minimum sampling time shall be ten minutes and the minimum sampling volume 0.01 dscm (0.35 dscf) for each sample. The arithmetic average of two samples shall constitute one run. Samples shall be taken at approximately one-hour intervals. For most fuel gases, sample times exceeding 20 minutes may result in depletion of the collecting solution, although fuel gases containing low concentrations of hydrogen sulfide may necessitate sampling for longer periods of time.

Subp. 5. **Sampling to determine SO_2 concentration.** The sampling site for determining SO_2 concentration by Method 6 shall be the same as for determining volumetric flow rate by Method 2. The sampling point in the duct for determining SO_2 concentration by Method 6 shall be at the centroid of the cross section if the cross sectional area is less than 5 m^2 (54 ft^2) or at a point no closer to the walls than 1 meter (39 inches) if the cross sectional area is 5 m^2 or more and the centroid is more than one meter from the wall. The sample shall be extracted at a rate proportional to the gas velocity at the sampling point. The minimum sampling time shall be ten minutes and the minimum sampling volume 0.01 dscm (0.35 dscf) for each sample. The arithmetic average of two samples shall constitute one run. Samples shall be taken at approximately one-hour intervals.

Subp. 6. **Coke burn-off rate.** Coke burn-off rate shall be determined by the following formula:

$$R_c = 0.2982\ Q_{re}\ (\%CO_2 + \%CO) + 2.088\ Q_{ra} - 0.0994\ Q_{re}\ (\%CO/2 + \%CO_2 + \%O_2) \text{ (metric units)}$$

$$R_c = 0.0186\ Q_{re}\ (\%CO_2 + \%CO) + 0.1303\ Q_{ra} - 0.0062\ Q_{re}\ (\%CO/2 + CO_2 + O_2) \text{ (English units)}$$

R_c = coke burn-off rate, kg/hr (English units lb/hr);

0.2982 = metric units material balance factor divided by 100, kg-min/hr-m^3;

0.0186 = English units material balance factor divided by 100, lb-min/hr-ft^3;

Q_{re} = fluid catalytic cracking unit catalyst regenerator exhaust gas flow rate before entering the emission control system, as determined by Method 2, dscm/min (English units: dscf/min);

$\%CO_2$ = percent carbon dioxide by volume, dry basis, as determined by Method 3;

%CO = percent carbon monoxide by volume, dry basis, as determined by Method 3;

$\%O_2$ = percent oxygen by volume, dry basis, as determined by Method 3;

2.088 = metric units material balance factor divided by 100, kg-min/hr-m^3;

0.1303 = English units material balance factor divided by 100, lb-min/hr-ft^3;

Q_{ra} = air rate to fluid catalytic cracking unit catalyst regenerator, as determined from fluid catalytic cracking unit control room instrumentation, dscm/min (English units: dscf/min);

0.0994 = metric units material balance factor divided by 100, kg-min/hr-m^3;

0.0062 = English units material balance factor divided by 100, lb-min/hr-ft^3.

Subp. 7. **Particulate emissions.** Particulate emissions shall be determined by the following equation:

$R_e = (60x10^{-6}) Q_{rv}C_x$ (metric units); or

$R_e = (8.57x10^{-3}) Q_{rv}C_s$ (English units)

where:

R_e = particulate emission rate, kg/hr (English units: lb-hr);

$60x10^{-6}$ = metric units conversion factor, min-kg/hr-gr;

$8.57x10^{-3}$ = English units conversion factor, min-lb/hr.gr;

Q_{rv} = volumetric flow rate of gases discharged into the atmosphere from the fluid catalytic cracking unit catalyst regenerator following the emission control system, as determined by Method 2, dscm/min (English units: dscf/min);

C_s = particulate emission concentration discharged in the atmosphere, as determined by Method 5, mg/dscm (English units: gr/dscf).

Subp. 8. **Coke burn-off.** For each run, emissions expressed in kg/1000 kg (lb/1000 lb) of coke burn-off in the catalyst regenerator shall be determined by the following equation:

$$R_s = 1000 \frac{R_e}{R_c} \quad \text{(Metric or English Units)}$$

where:

R_s = particulate emission rate, kg/1000 kg (lb/1000 lb) of coke burn-off in the fluid catalytic cracking unit catalyst regenerator;

1000 = conversion factor, kg to 1000 kg (lb to 1000 lb);

R_e = particulate emission rate, kg/hr (lb/hr);

R_c = coke burn-off rate, kg/hr (lb/hr).

Subp. 9. **Particulate matter; rate of emissions permitted.** In those instances in which auxiliary liquid or solid fossil fuels are burned in an incinerator-waste heat boiler, the rate of particulate matter emissions permitted must be determined. Auxiliary fuel heat input, expressed in millions of cal/hr (English units: millions of Btu/hr) shall be calculated for each run by fuel flow rate measurement and analysis of the liquid or solid auxiliary fossil fuels. For each run, the rate of particulate emissions permitted shall be calculated from the following equation:

New Affected Facilities	Existing Affected Facilities	
$R_a = 1.0 + \frac{0.18\ H}{R_c}$	$R_a = 10.0 + \frac{0.72\ H}{R_c}$	(Metric Units)
or		
$R_a = 1.0 + \frac{0.10\ H}{R_c}$	$R_a = 10.0 + \frac{0.4\ H}{R_c}$	(English Units)

where:

R_a = allowable particulate emission rate, kg/1000 kg (English units: lb/1000 lb) of coke burn-off in the fluid catalytic cracking unit catalyst regenerator;

1.0 = emission standard for new affected facilities, 1.0 kg/1000 kg (English units: 1.0 lb/1000 lb) of coke burn-off in the fluid catalytic cracking unit catalyst regenerator;

10.0 = emission standard for existing affected facilities;

0.18 = metric units maximum allowable incremental rate of particulate emissions for new affected facilities gm/million cal;

0.10 = English units maximum allowable incremental rate of particulate emissions for new affected facilities, lb/million Btu;

0.72 = metric units maximum allowable incremental rate of particulate emissions for existing affected facilities gm/million cal;

0.4 = English units maximum allowable incremental rate of particulate emissions for existing affected facilities, lb/million Btu;

H = heat input from solid or liquid fossil fuel, million cal/hr (English units: million Btu/hr);

R_c = coke burn-off rate, kg/hr (English units: lb/hr).

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