

than 2 percent of full-scale chart deflection on the lowest range used. The analyzer span is defined as the difference between the span-response and the zero-response. The span-response is defined as the mean response including noise to a span gas during a 30-second time interval.

(Secs. 206, 301(a), Clean Air Act as amended (42 U.S.C. 7525, 7601(a)))

[42 FR 45154, Sept. 8, 1977, as amended at 44 FR 16917, Mar. 20, 1979]

§ 86.316-79 Carbon monoxide and carbon dioxide analyzer specifications.

(a) Carbon monoxide and carbon dioxide measurements are to be made with nondispersive infrared (NDIR) analyzers.

(b) The use of linearizing circuits is permitted.

(c) The minimum water rejection ratio (maximum CO₂ interference) as measured by § 86.321 shall be:

(1) For CO analyzers, 1000:1.

(2) For CO₂ analyzers, 100:1.

(d) The minimum CO₂ rejection ratio (maximum CO₂ interference) as measured by § 86.322 for CO analyzers shall be 5000:1.

(e) *Zero suppression.* Various techniques of zero suppression may be used to increase readability, but only with prior approval by the Administrator.

§ 86.317-79 Hydrocarbon analyzer specifications.

(a) Hydrocarbon measurements are to be made with a heated flame ionization detector (HFID) analyzer.

(b) *Option.* A non-heated flame ionization detector (FID) that measures hydrocarbon emissions on a dry basis is permitted for gasoline-fueled testing; *Provided,* That equivalency is demonstrated to the Administrator. With the exception of temperatures, all specifications contained in subpart D apply to the optional system.

(c) The analyzer shall be fitted with a constant temperature oven housing the detector and sample-handling components. It shall maintain temperature within 2 °C of the set point. The detector, oven, and sample-handling components within the oven shall be suitable for continuous operation at temperatures to 200 °C.

(d) Fuel and burner air shall conform to the specifications in § 86.308.

(e) The percent of oxygen interference must be less than 3 percent, as specified in § 86.331(d)(7).

(f) Premixed burner air:

(1) For Diesel engines, premixing a small amount of air with the HFID fuel prior to combustion within the HFID burner is not recommended as a means of improving oxygen interference (%O₂ I). However, this procedure may be used if the engine manufacturer demonstrates on each basic combustion system (i.e., 4 cycle DI, 2 cycle DI, 4 cycle precup, etc.) that an HFID using this procedure produces comparable results to an HFID not using this procedure. These data must be submitted to the Administrator for his approval prior to testing.

(2) For gasoline-fueled engines, premixing burner air with the HFID fuel is not allowed.

§ 86.318-79 Oxides of nitrogen analyzer specifications.

(a) Oxides of nitrogen are to be measured with a chemiluminescence analyzer.

(1) The NO_x sample must be heated per § 86.309(a) and § 86.310(a) up to the NO₂ to NO converter.

(2) For high vacuum CL analyzers with heated capillary modules, supplying a heated sample to the capillary module is sufficient.

(3) The NO₂ to NO converter efficiency shall be at least 90 percent.

(4) The quench interference must be less than 3.0 percent as measured in § 86.327.

(b) *Option.* The oxides of nitrogen may be measured with an NDIR analyzer system that meets the following specifications:

(1) The system shall include an NO₂ to NO converter, a water trap, and an NDIR analyzer in that order.

(2) The NO₂ to NO converter shall obtain a sample directly from the heated sample line.

(3) The water trap shall meet the specifications in § 86.311(e).

(4) The NO NDIR analyzer shall be calibrated per § 86.330.

(5) The minimum water rejection ratio (maximum water interference)

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for the NO NDIR analyzer shall be 5,000:1 (see § 86.321).

(6) The minimum CO₂ rejection ratio (maximum CO₂ interference) for the NO NDIR analyzer shall be 30,000:1 (see § 86.322).

§ 86.319–79 Analyzer checks and calibrations; frequency and overview.

(a) Prior to initial use and after major repairs, bench check each analyzer (see § 86.320).

(b) At least monthly during testing, check the NO_x converter efficiency, as described in § 86.332.

(c) At least once every 30 days during testing, perform the following:

(1) Leak check the pressure side of the system (see § 86.328). If the option described in § 86.328(b)(2) is used, a pressure leak check is not required.

(2) Calibrate all analyzers (see §§ 86.330 through 86.332).

(3) Check the analysis system response time (see § 86.329). If the option described in § 86.329(b) is used, a response time check is not required.

(4) Verify that the automatic data collection system (if used) meets the chart reading requirements found in § 86.343.

(5) Check the fuel flow measurement instrument to insure that the specifications in § 86.314 are met. Flow meters of the tapered tube and float design (rotometers) or the balance beam principle need be checked only every 90 days.

(d) At least once every 90 days during testing check the water rejection ratio and the CO₂ rejection ratio on all NDIR analyzers (see §§ 86.321 and 86.322).

(e) At least once every 180 days during testing check the dynamometer test stand and power output instrumentation (see § 86.333).

[42 FR 45154, Sept. 8, 1977, as amended at 58 FR 58422, Nov. 1, 1993]

§ 86.320–79 Analyzer bench check.

(a) Prior to initial use and after major repairs verify that each analyzer complies with the following specifications:

- (1) Response time (see § 86.315(a)).
- (2) Precision (see § 86.315(b)).
- (3) Noise (see § 86.315(c)).
- (4) Zero drift (see § 86.315(d)).
- (5) Span drift (see § 86.315(e)).

(6) Water rejection ratio, NDIR analyzers only (see §§ 86.316(c) and 86.318(b)(5)).

(7) CO₂ rejection ratio, NDIR analyzers only (see §§ 86.316(d) and 86.318(b)(6)).

(8) Quench check, CL analyzers only (see § 86.327).

(b) If a stainless steel NO₂ to NO converter is used, condition all new or replacement converters. The conditioning consists of either purging the converter with air for a minimum of 4 hours or until the converter efficiency is greater than 90 percent. The converter must be at operational temperature while purging. Do not use this procedure prior to checking converter efficiency on in-use converters.

§ 86.321–79 NDIR water rejection ratio check.

(a) Zero and span the analyzer on the lowest range that will be used.

(b) Introduce a saturated mixture of water and zero gas at room temperature directly to the analyzer.

(c) Determine and record the analyzer operating pressure (*GP*) in absolute units in pascals. Gauges G3 and G4 may be used if the values are converted to the correct units.

(d) Determine and record the temperature of the zero-gas mixture.

(e) Record the analyzers' response (*AR*) in ppm to the saturated zero-gas mixture.

(f) For the temperature recorded in step (d), determine the saturation vapor pressure (*P_{WB}*) from § 86.344(d).

(g) Calculate the water concentration (*Z*) in the mixture from:

$$Z = (P_{WB}/GP)(10^6)$$

(h) Calculate the water rejection ratio (*WRR*) from:

$$WRR = (Z/AR)$$

§ 86.322–79 NDIR CO₂ rejection ratio check.

(a) Zero and span the analyzer on the lowest range that will be used.

(b) Introduce a CO₂ calibration gas of at least 10 percent CO₂ or greater to the analyzer.

(c) Record the CO₂ calibration gas concentration in *ppm*.

(d) Record the analyzers' response (*AR*) in *ppm* to the CO₂ calibration gas.