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# 40 C.F.R. § 1065.543

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## Carbon balance error verification.

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- (a) This optional carbon balance error verification compares independently calculated quantities of carbon flowing into and out of an engine system. The engine system includes aftertreatment devices as applicable. Calculating carbon intake considers carbon-carrying streams flowing into the system, including intake air, fuel, and optionally DEF or other fluids. Carbon flow out of the system comes from exhaust emission calculations. Note that this verification is not valid if you calculate exhaust molar flow rate using fuel rate and chemical balance as described in § 1065.655(f)(3) because carbon flows into and out of the system are not independent. Use good engineering judgment to ensure that carbon mass in and carbon mass out data signals align.
- (b) Perform the carbon balance error verification after emission sampling is complete for a test sequence as described in § 1065.530(g)(5). Testing must include measured values as needed to determine intake air, fuel flow, and carbon-related gaseous exhaust emissions. You may optionally account for the flow of carbon-carrying fluids other than intake air and fuel into the system. Perform carbon balance error verification as follows:
- (1) Calculate carbon balance error quantities as described in § 1065.643. The three quantities for individual test intervals are carbon mass absolute error,  $\epsilon_{aC}$ , carbon mass rate absolute error,  $\epsilon_{aCrate}$ , and carbon mass relative error,  $\epsilon_{rC}$ . Determine  $\epsilon_{aC}$ ,  $\epsilon_{aCrate}$ , and  $\epsilon_{rC}$  for all test intervals. You may determine composite carbon mass relative error,  $\epsilon_{rCcomp}$ , as a fourth quantity that optionally applies for duty cycles with multiple test intervals.

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