\( \text{Section 98.424} \)

(1) For each CO\(_2\) stream that delivers CO\(_2\) to containers, for which mass is measured, you shall calculate CO\(_2\) supply in containers using Equation PP–1 of this section.

\[
\text{CO}_2 = \sum_{p=1}^{i} Q \tag{Eq. PP–4}
\]

where:
- \( \text{CO}_2,u \) = Annual mass of CO\(_2\) supplied in containers delivered by CO\(_2\) stream u.
- \( C_{\text{CO}_2,p,u} \) = Quarterly CO\(_2\) concentration measurement of CO\(_2\) stream u that delivers CO\(_2\) to containers in quarter p (wt. \%CO\(_2\)).
- \( Q_{p,u} \) = Quarterly mass of contents supplied in all containers delivered by CO\(_2\) stream u in quarter p (metric tons).
- \( p = \) Quarter of the year.
- \( u = \) CO\(_2\) stream that delivers to containers.

(2) For each CO\(_2\) stream that delivers to containers, for which volume is measured, you shall calculate CO\(_2\) supply in containers using Equation PP–2 of this section.

(3) To aggregate data, sum the mass of CO\(_2\) supplied in containers delivered by all CO\(_2\) streams in accordance with Equation PP–3a of this section.

\[ Q = \text{Annual mass in all CO}_2\text{ containers imported or exported during the reporting year (metric tons).} \]

§98.424 Monitoring and QA/QC requirements.

(a) Determination of quantity. (1) Reporters following the procedures in §98.423(a)(3)(i) shall determine quantity using a flow meter or meters located in accordance with this paragraph.

(i) If the CO\(_2\) stream is segregated such that only a portion is captured for commercial application or for injection, you must locate the flow meter according to the following:

(A) For reporters following the procedures in §98.423(a)(3)(i), you must locate the flow meter(s) after the point of segregation.

(B) For reporters following the procedures in paragraph (a)(3)(ii) of §98.423, you must locate the main flow meter(s) on the captured CO\(_2\) stream(s) prior to the point of segregation and the subsequent flow meter(s) on the CO\(_2\) stream(s) for on-site use after the point of segregation.

You may only follow the procedures in paragraph (a)(3)(ii) of §98.423 if the CO\(_2\) stream(s) for on-site use is/are the only diversion(s) from the main, captured CO\(_2\) stream(s) after the main flow meter(s).
(ii) Reporters that have a mass flow meter or volumetric flow meter installed to measure the flow of a CO\textsubscript{2} stream that meets the requirements of paragraph (a)(1)(i) of this section shall base calculations in §98.423 of this subpart on the installed mass flow or volumetric flow meters.

(iii) Reporters that do not have a mass flow meter or volumetric flow meter installed to measure the flow of the CO\textsubscript{2} stream that meets the requirements of paragraph (a)(1)(i) of this section shall base calculations in §98.423 of this subpart on the flow of gas transferred off site using a mass flow meter or a volumetric flow meter located at the point of off-site transfer.

(2) Reporters following the procedures in paragraph (b) of §98.423 shall determine quantity in accordance with this paragraph.

(i) Reporters that supply CO\textsubscript{2} in containers using weigh bills, scales, or load cells shall measure the mass of contents of each CO\textsubscript{2} container to which the CO\textsubscript{2} stream is delivered, sum the mass of contents supplied in all containers to which the CO\textsubscript{2} stream is delivered during each quarter, sample the CO\textsubscript{2} stream delivering CO\textsubscript{2} to containers on a quarterly basis to determine the composition of the CO\textsubscript{2} stream, and apply Equation PP–1.

(ii) Reporters that supply CO\textsubscript{2} in containers using loaded container volumes shall measure the volume of contents of each CO\textsubscript{2} container to which the CO\textsubscript{2} stream is delivered, sum the volume of contents supplied in all containers to which the CO\textsubscript{2} stream is delivered during each quarter, sample the CO\textsubscript{2} stream on a quarterly basis to determine the composition of the CO\textsubscript{2} stream, determine the density quarterly, and apply Equation PP–2.

(3) Importers or exporters that import or export CO\textsubscript{2} in containers shall measure the mass in each CO\textsubscript{2} container using weigh bills, scales, or load cells and sum the mass in all containers imported or exported during the reporting year.

(4) All flow meters, scales, and load cells used to measure quantities that are reported in §98.423 of this subpart shall be operated and calibrated according to the following procedure:

(i) You shall use an appropriate standard method published by a consensus-based standards organization if such a method exists. Consensus-based standards organizations include, but are not limited to, the following: ASTM International, the American National Standards Institute (ANSI), the American Gas Association (AGA), the American Society of Mechanical Engineers (ASME), the American Petroleum Institute (API), and the North American Energy Standards Board (NAESB).

(ii) Where no appropriate standard method developed by a consensus-based standards organization exists, you shall follow industry standard practices.

(iii) You must ensure that any flow meter calibrations performed are NIST traceable.

(5) Reporters using Equation PP–2 of this subpart and measuring CO\textsubscript{2} concentration as weight % CO\textsubscript{2} shall determine the density of the CO\textsubscript{2} stream on a quarterly basis in order to calculate the mass of the CO\textsubscript{2} stream according to one of the following procedures:

(ii) You may follow an industry standard method.

(b) Determination of concentration.

(1) Reporters using Equation PP-1 or PP-2 of this subpart shall sample the CO₂ stream on a quarterly basis to determine the composition of the CO₂ stream.

(2) Methods to measure the composition of the CO₂ stream must conform to applicable chemical analytical standards. Acceptable methods include, but are not limited to, the U.S. Food and Drug Administration food-grade specifications for CO₂ (see 21 CFR 184.1240) and ASTM standard E1747–95 (Reapproved 2005) Standard Guide for Purity of Carbon Dioxide Used in Supercritical Fluid Applications (ASTM International, 100 Barr Harbor Drive, P.O. Box CB700, West Conshohocken, Pennsylvania 19428–B295, (800) 262–1373, http://www.astm.org).

(c) You shall convert the density of the CO₂ stream(s) and all measured volumes of carbon dioxide to the following standard industry temperature and pressure conditions: Standard cubic meters at a temperature of 60 degrees Fahrenheit and at an absolute pressure of 1 atmosphere. If you apply the density value for CO₂ at standard conditions, you must use 0.001868 metric tons per standard cubic meter.


§ 98.425 Procedures for estimating missing data.

(a) Whenever the quality assurance procedures in §98.424(a)(1) of this subpart cannot be followed to measure quarterly mass flow or volumetric flow of CO₂, the most appropriate of the following missing data procedures shall be followed:

(1) A quarterly CO₂ mass flow or volumetric flow value that is missing may be substituted with a quarterly value measured during another quarter of the current reporting year.

(2) A quarterly CO₂ mass flow or volumetric flow value that is missing may be substituted with a quarterly value measured during the same quarter from the past reporting year.

(3) If a mass or volumetric flow meter is installed to measure the CO₂ stream, you may substitute data from a mass or volumetric flow meter measuring the CO₂ stream transferred for any period during which the installed meter is inoperable.

(4) The mass or volumetric flow used for purposes of product tracking and billing according to the reporter’s established procedures may be substituted for any period during which measurement equipment is inoperable.

(b) Whenever the quality assurance procedures in §98.424(b) of this subpart cannot be followed to determine concentration of the CO₂ stream, the most appropriate of the following missing data procedures shall be followed:

(1) A quarterly concentration value that is missing may be substituted with a quarterly value measured during another quarter of the current reporting year.

(2) A quarterly concentration value that is missing may be substituted with a quarterly value measured during the same quarter from the previous reporting year.

(3) The concentration used for purposes of product tracking and billing according to the reporter’s established procedures may be substituted for any quarterly value.

(c) Missing data on density of the CO₂ stream shall be substituted with quarterly or annual average values from the previous calendar year.

(d) Whenever the quality assurance procedures in §98.424(a)(2) of this subpart cannot be followed to measure quarterly quantity of CO₂ in containers, the most appropriate of the following missing data procedures shall be followed:

(1) A quarterly quantity of CO₂ in containers that is missing may be substituted with a quarterly quantity measured during another representative quarter of the current reporting year.

(2) A quarterly quantity of CO₂ in containers that is missing may be substituted with a quarterly quantity measured during the same quarter from the past reporting year.

(3) The quarterly quantity of CO₂ in containers recorded for purposes of product tracking and billing according to the reporter’s established procedures