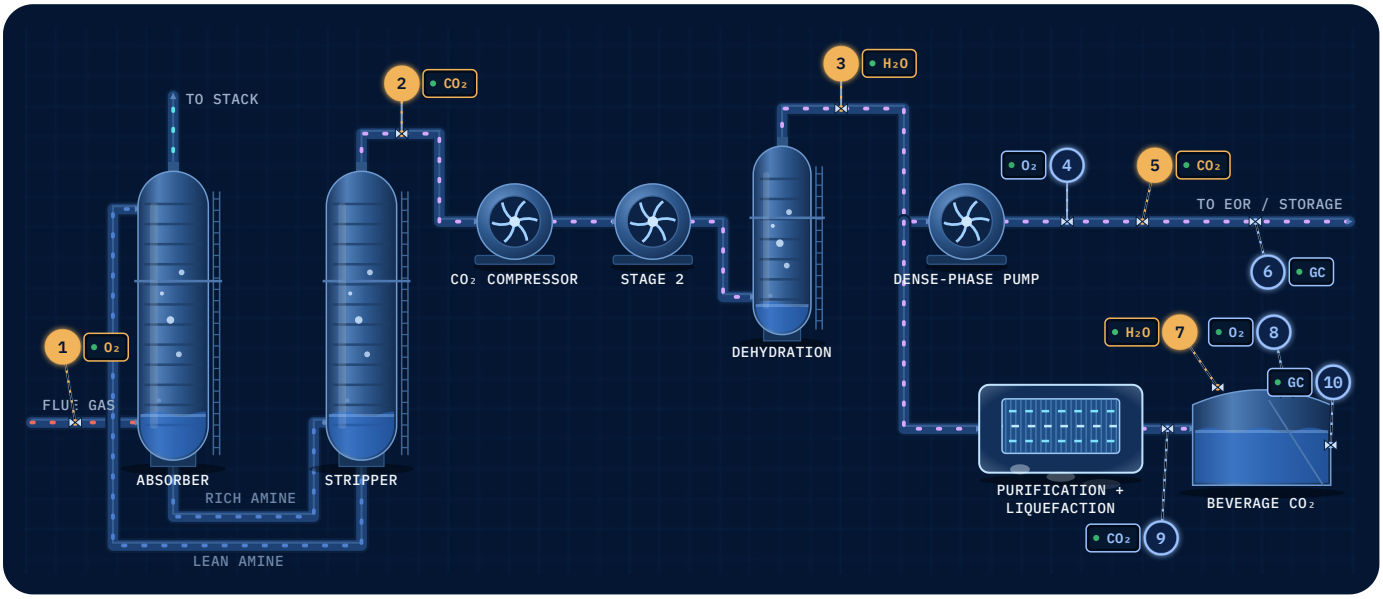
CO_2 capture: where to measure O_2, moisture and CO_2 purity

Follow CO_2 from the flue gas through the amine unit, compression and drying to a pipeline or to beverage-grade storage. Each numbered point shows what is measured, the typical limit and the analyzer that fits.



● YORK instrument ○ Integrated system (supplied through YORK)

How the process works

Capture plants take CO_2 from flue gas or process off-gas, then compress and dry it for a pipeline or purify it for sale. The specification at the end decides which impurities need measuring along the way.

1. **Absorption.** An amine solvent absorbs CO_2 from the flue gas in the absorber; the cleaned gas goes to the stack.
2. **Stripping.** The rich amine is heated in the stripper, which releases nearly pure, water-saturated CO_2. The lean amine returns to the absorber.
3. **Compression.** CO_2 is compressed in stages; water condenses out between the stages.
4. **Dehydration.** A glycol contactor or molecular sieve dries the CO_2 so it cannot form carbonic acid or hydrates.
5. **Pipeline.** Dense-phase CO_2 goes by pipeline to enhanced oil recovery (EOR) or storage, against limits on water, oxygen and other impurities.
6. **Beverage grade.** Part of the CO_2 can be purified and liquefied to meet the ISBT beverage-grade guidelines.

Interactive version with animation:
https://www.yorkinstrument.ae/guides/co2-capture-measurement-points/

Measurement points

#	POINT	MEASURES	TYPICAL VALUE / LIMIT	RECOMMENDED SOLUTION
1	Absorber inlet (flue gas)	Oxygen	Percent level in combustion flue gas	POA3500; Integrated system: in-situ zirconia O_2 probe for the hot, wet gas
2	Stripper overhead	CO_2 purity (%)	High-purity, water-saturated CO_2 on its way to the ≥ 95 % product specification	PGA520, PGA620
3	Dehydration outlet	Water content	500 ppmv design limit for EOR pipelines (≈ −27 °C frost point at 1 atm)	DPT830, DPT810, DM9700
4	CO_2 pipeline to EOR / storage	Trace oxygen	0.001 vol % (10 ppmv) design value	Integrated system: trace O_2 analyzer qualified for CO_2 service
5	CO_2 pipeline to EOR / storage	CO_2 purity	≥ 95 % CO_2 (design value)	PGA520
6	CO_2 pipeline to EOR / storage	CO, H_2S, N_2 and other impurities	Design values: CO 35 ppmv, H_2S 0.01 vol %, N_2 1 %	Integrated system: process gas chromatograph with sulfur-selective detection
7	Beverage-grade CO_2 storage	Moisture	≤ 20 ppm v/v under the ISBT guidelines (≈ −55 °C frost point at 1 atm)	DPT810, DM9800
8	Beverage-grade CO_2 storage	Trace oxygen	≤ 30 ppm v/v under the ISBT guidelines	Integrated system: trace O_2 analyzer qualified for CO_2 service
9	Beverage-grade CO_2 product	CO_2 purity	≥ 99.9 % under the ISBT guidelines	Integrated system: high-resolution CO_2 purity analysis (GC or high-precision NDIR)
10	Beverage-grade CO_2 product	CO, total sulfur, hydrocarbons, benzene	ISBT limits include CO ≤ 10 ppm v/v and total sulfur ≤ 0.1 ppm v/v	Integrated system: gas chromatograph with sulfur-selective detection, or FTIR

Typical values from published standards, regulations and technical literature. Your contract, licensor or plant specification always governs. Integrated systems are supplied by YORK through its partner integration factory.

Key references

1. QGESS: CO_2 Impurity Design Parameters (NETL-PUB-22529) — US DOE National Energy Technology Laboratory
2. Gasifipedia: Acid Gas Removal — US DOE National Energy Technology Laboratory