

Application Note

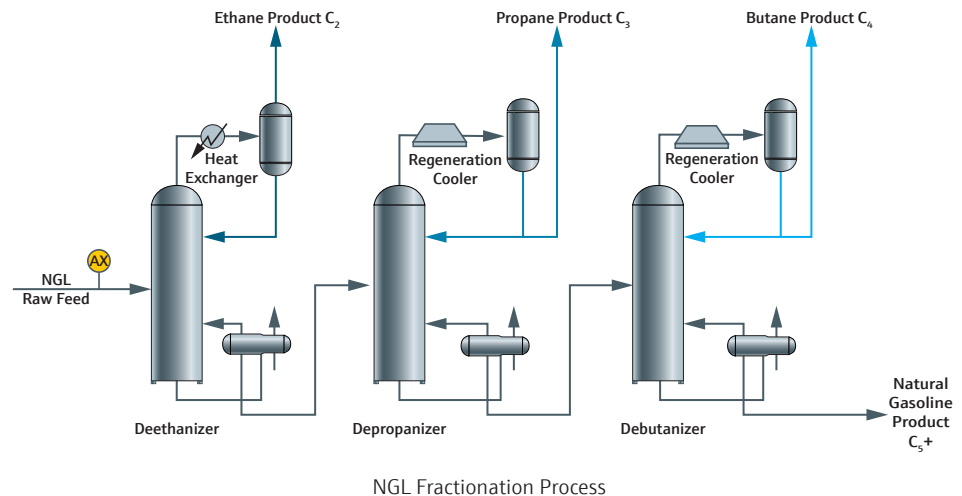
Carbon dioxide measurement in Y-grade NGL fractionation feed

Industry:
Natural Gas Processing
Application Note 35003

Key Points

- Fast response to CO₂ concentration changes
- Laser-based measurement is highly selective and accurate for CO₂ in Y-grade
- Non-contact laser measurement avoids fouling and corrosion for reliable long-term operation
- Low maintenance and OPEX costs – no frequent change out of sensor in direct contact with process stream

Fractionation and recovery of NGLs Natural gas from some geological formations contains natural gas liquids (NGLs); ethane, propane, butane and a mix of C₅+ liquid condensates. Once methane in the raw natural gas is separated in a Demethanizer the remaining NGLs can be recovered using a cryogenic turbo expander yielding a mixed Y-grade stream. The Y-grade mixture can be fed to a fractionation unit to separate and recover individual NGL products.



Measurement of CO₂ to meet specifications Y-grade and NGL product streams have a moisture specification set by customers or pipelines based on the intended use and downstream processing. Contaminants including H₂O, CO₂, and H₂S are measured in Y-grade and NGL fractionation products to ensure specifications are met and documented as required in tariff and sales agreements between suppliers, carriers and end users. Specifications and contracts typically state that Y-grade and NGL fractionation products shall not contain less than 500 ppm of CO₂.

SpectraSensors' solution SpectraSensors tunable diode laser absorption spectroscopy (TDLAS) analyzers have proven effective for monitoring CO₂ in Y-grade feed to NGL fractionation units. TDLAS analyzers have an exceptionally fast response to changes in CO₂ concentration, an important performance characteristic for measuring H₂O in Y-grade feed entering a fractionation unit, or at custody transfer points. Laser and detector components are isolated and protected from process gas and contaminants avoiding fouling and corrosion and ensuring stable long-term operation and measurements in the field.

Application Data

Target Component (Analyte)	CO ₂ in Y-grade NGL Fractionation Feed
Typical Measurement Range	0-500 ppm*
Typical Repeatability	±10 ppm**
Measurement Response Time	1 to ~60 seconds
Principle of Measurement	Tunable Diode Laser Absorption Spectroscopy
Validation	Certified blend of CO ₂ in Nitrogen

* Consult factory for alternate ranges.

** Repeatability is based on a single stream composition with minimal variation and which falls within the table below. If the stream composition varies, the factory should be consulted for specification.

Typical Background Stream Composition

Component	Minimum (Mol%)	Typical (Mol%)	Maximum (Mol%)
Methane (C ₁)	0	1	1.5
Ethane (C ₂)	35	45	55
Propane (C ₃)	30	36	45
Butane (C ₄)	0	12	20
C ₅ +	0	5	6
Water (H ₂ O)	0	100 ppb	250 ppm
Hydrogen Sulfide (H ₂ S)	0	40 ppm	500 ppm

The background stream composition must be specified for proper calibration and measurement performance. Specify the typical composition, along with the minimum and maximum expected values for each component, especially CO₂, and the measured component. Other stream compositions may be allowable with approval from SpectraSensors.