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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 11060.12-2023

**Natural gas - Determination of sulfur compound - Part 12:
Determination of hydrogen sulfide content by laser absorption
spectroscopy**

天然气 含硫化合物的测定 第12部分：用激光吸收光谱法测定硫化氢含量

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Foreword

This document is in accordance with the provisions of GB/T 1:1-2020 "Guidelines for Standardization Work Part 1: Structure and Drafting Rules for Standardization Documents" drafting: This document is part 12 of GB/T 11060 "Determination of Sulfur Compounds in Natural Gas": GB/T 11060 has issued the following part:

- Part 1: Determination of hydrogen sulfide content by iodometric method;
- Part 2: Determination of hydrogen sulfide content by the methylene blue method;
- Part 3: Determination of hydrogen sulfide content by double-light path detection method of lead acetate reaction rate;
- Part 4: Determination of total sulfur content by oxidative microcoulometry;
- Part 5: Determination of total sulfur content by hydrogenolysis-rate meter colorimetric method;
- Part 6: Measuring the content of hydrogen sulfide, mercaptan sulfur and sulfur oxide carbon by potentiometric method;
- Part 8: Determination of total sulfur content by ultraviolet fluorescence photometry;
- Part 9: Determination of mercaptan sulfur content by iodometric method;
- Part 10: Determination of sulfur compounds by gas chromatography;
- Part 11: Determination of hydrogen sulfide content by coloring length detection tube method;

--- Part 12: Determination of hydrogen sulfide content by laser absorption spectroscopy;

--- Part 13: Determination of hydrogen sulfide content by ultraviolet absorption method: This document replaces GB/T 11060.12-2014 "Determination of Sulfur Compounds in Natural Gas - Part 12: Laser Absorption Spectroscopy "Determination of hydrogen sulfide content", compared with GB/T 11060.12-2014, except for structural adjustment and editorial changes, the main technical changes are as follows:

a) Changed the measurement range of hydrogen sulfide, changed the measurement range from "1%~20% (mole fraction)" to "1x10⁻⁶~20% (mole fraction) score)" (see Chapter 1, Chapter 1 of the:2014 edition);

1 Scope

GB/T 11060.12-2023 is Part 12 of the Chinese series on determining sulfur compounds in natural gas, and measures hydrogen sulfide by laser absorption spectroscopy. H₂S is the contaminant that corrodes pipelines, poisons catalysts and kills people, and it is capped at a few milligrams per cubic metre in pipeline gas - a limit that has to be checked continuously at custody transfer points rather than by taking a sample to a laboratory, because H₂S does not survive the journey in a cylinder. A tunable diode laser locked to an absorption line measures it in the flowing stream. The standard sets the principle, the reagents and materials including the H₂S reference gas, the instruments and equipment covering the laser source, the sample pretreatment system and the analysis, processing, display and transmission units, the sample, the determination procedure and the calculation and reporting of results. It took effect on 1 September 2023.

This document specifies the test method for the determination of hydrogen sulfide content in natural gas by laser absorption spectroscopy, including the principle of the method, reagents and materials Specific requirements for materials, instruments and equipment, samples, determination procedures, data processing, method precision and uncertainty, etc: This document is applicable to the online continuous monitoring of hydrogen sulfide content in natural gas, and the measurement range is 1x10⁻⁶~20% (mol fraction):

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text: Among them, dated references For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to this document:

GB/T 13609 Natural Gas Sampling Guidelines (GB/T 13609-2017, ISO 10715:1997, MOD)

GB/T 20604 Natural Gas Vocabulary

3 Terms and Definitions

The terms and definitions defined in GB/T 20604 apply to this document:

4 Principles

The tuned laser beam emitted by the semiconductor laser passes through the measured gas and is detected by the photoelectric sensor of the receiving unit: exciting The beam energy is attenuated by the absorption of hydrogen sulfide molecules in the measured gas, and the absorbance detected by the receiving unit is related to the hydrogen sulfide content in the measured gas: According to the Lambert-Beer law: Figure 1 shows the schematic diagram of the detection principle of the hydrogen sulfide analyzer by laser absorption spectroscopy: