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Testing Protocol for Gas Chromatographs

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Introduction

Gas chromatographs (GCs) with improved design and performance claims are regularly introduced to the natural gas industry. Natural gas companies that purchase these GCs often have to debug these units, eliminate problems, and evaluate field performance characteristics and specifications of the units at their own expense. Often several companies form a consortium to conduct performance verification tests on such devices, while individual companies may also perform their own tests that unnecessarily duplicate effort.

The need for a standardized testing protocol to assess the performance of GC technology that will allow test results to be recognized by regulators and accepted by the user community is recognized by the natural gas industry. Test results published in a specified format and obtained by following an industry-accepted uniform testing protocol will benefit the natural gas industry and save the industry from duplication of effort. To meet this need, this general GC performance test protocol specifies the scope and reporting requirements of GC tests for repeatability, reproducibility, and response. This document specifies requirements for tests over a range of gas compositions, tests over a range of operating conditions, and tests with variations in other external parameters that may influence GC performance.

Many existing industry standards and accepted practices for the analysis of natural gas by gas chromatography were reviewed for the development of this protocol. Applicable standards at the time this document was written are listed in the Bibliography. It is not the intent of this protocol to replace these standards, but to allow those who perform the tests to incorporate these standards into the testing process where possible.

This protocol does not specify acceptance criteria for GCs undergoing tests, nor does it permit those who perform the tests to set acceptance criteria within the test procedures or judge the usefulness of a GC for a particular application. The end-users of test reports created using this protocol should choose acceptance criteria for GCs based on their individual applications and requirements.

Testing Protocol for Gas Chromatographs

1 Scope

This standard is a general gas chromatograph (GC) performance test protocol. It specifies the scope and reporting requirements of GC tests for repeatability, reproducibility, and response linearity. The protocol specifies requirements for tests over a range of gas compositions, tests over a range of environmental conditions, and long-term performance tests.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API *Manual of Petroleum Measurement Standards* (*MPMS*), Chapter 14—*Natural Gas Fluids Measurement*, Part 1—*Collecting and Handling of Natural Gas Samples for Custody Transfer*, February 2006

GPA Standard 2198 [1], *Selection, Preparation, Validation, Care and Storage of Natural Gas and Natural Gas Liquids Reference Standard Blends*

3 Terms, Definitions, Acronyms, Abbreviations, and Symbols

3.1 Terms and Definitions

For the purposes of this document, the following definitions apply.

3.1.1
acceptance criteria
Defined upper and lower limits for accepting the value of a process variable which is being monitored.

3.1.2
ambient conditions
The conditions (pressure, temperature, humidity, etc.) of the medium surrounding an object such as the case of a meter, instrument, transducer, etc.

3.1.3
atmospheric pressure
The pressure exerted by the weight of the atmosphere. At sea level, the pressure is approximately 14.7 pounds per square inch (101 kilopascals), often referred to as 1 atmosphere, atmospheric pressure, or pressure of one atmosphere.

3.1.4
barometric pressure
Ambient pressure in an absolute pressure scale monitored or displayed by a barometer.

3.1.5
bias
Any influence on a result that produces an incorrect approximation of the true value of the variable being measured. Bias is the result of a predictable systematic error.

[1] Gas Processors Association, 6526 E. 60th Street, Tulsa, Oklahoma 74145, www.gpaglobal.org.