Manual of Petroleum Measurement Standards
Chapter 21—Flow Measurement Using Electronic Metering Systems

Section 1—Electronic Gas Measurement

FIRST EDITION, SEPTEMBER 1993

AGA American Gas Association

American Petroleum Institute

Helping You Get The Job Done Right.SM

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FOREWORD

This publication was developed by representatives from the American Petroleum Institute (API), the American Gas Association (A.G.A.), and the Gas Processors Association (GPA) member companies with input from the equipment manufacturers and others. This document represents the first API publication in this field.

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Suggested revisions are invited and should be submitted to Measurement Coordination, Industry Services Department, American Petroleum Institute, 1220 L Street, Northwest, Washington, D.C. 20005.

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SECTION 1—ELECTRONIC GAS MEASUREMENT

1.1 Introduction and Scope

The procedures and techniques shown in this document are recommended for use with new measurement applications. Gas measurement using existing equipment and techniques not in compliance with this standard may have a higher uncertainty than that based on the recommendations contained in this document.

This standard describes the **minimum** specifications for electronic gas measurement systems used in the measurement and recording of flow parameters of gaseous phase hydrocarbon and other related fluids for production and transmission custody transfer applications utilizing industry-recognized primary measurement devices. For the purpose of this standard, electronic correctors of the type used on linear meters were not considered to constitute an electronic gas measurement system.

1.2 Description of an Electronic Gas Measurement System

1.2.1 ELEMENTS OF A GAS MEASUREMENT SYSTEM

1.2.1.1 Introduction

For the purpose of this standard, the measurement system consists of primary, secondary, and tertiary devices. The *primary device* defines the basic type of meter used for gas measurement, including, but not limited to, an orifice, turbine, rotary, or diaphragm meter.

The *secondary device* provides such data, including, but not limited to, static pressure, temperature, differential pressure, relative density, and other variables that are appropriate for inputs into the tertiary device discussed in this standard.

Each primary device requires a specific or properly configured tertiary device appropriate to the type of meter used. The *tertiary device* is an electronic computer, programmed to correctly calculate flow within specified limits, that receives information from the primary and/or secondary devices. The tertiary and secondary devices, as well as the primary device, may be contained in one or more enclosures, or packaged separately.

1.2.1.2 Transducers/Transmitters

In electronic measurement systems, the secondary device is an electromechanical transducer that responds to an input of pressure, temperature, differential pressure, frequency, relative density (specific gravity), or other variables. Transducers respond to changes in the measured parameters with a corresponding change in electrical values. These devices are referred to as transmitters when they have been specifically designed to enhance the transmission of information from one location to another by the addition of an electronic circuit that converts the transducer output to a standard signal. The signal may be, but is not limited to, analog, digital, or frequency form.

1.2.1.3 Signal Processing

The electronic signals from the secondary devices transmit information to the tertiary device (electronic flow computer). The tertiary device receives the information, combines it with programmed instructions, and calculates the quantity of gas flowing through the primary device.

1.2.1.4 System's Accuracy

While digital computation can provide a high degree of accuracy, it is important to realize that each primary, secondary, or tertiary device is subject to separate measurement inaccuracies. The electronic flow computer has no effect on the accuracy of either the primary or secondary device, except where characterization may be performed. Each must be considered independently when viewing the overall accuracy of the system.

1.2.1.5 Data Processing

The data that the electronic gas measurement system processes must be in accordance with the other appropriate sections of this standard.

1.2.2 DEFINITIONS

1.2.2.1 Introduction

The purpose of these definitions is to clarify the terminology used in the discussion of this standard only. The definitions are not intended to be an all-inclusive directory of terms used within the measurement industry, nor are they intended to conflict with any standards currently in use.

1.2.2.2 Words and Terms

Accounting period is a group of contract days, for example, week, month, and so forth.

Analog to digital (A/D) converter is a signal processor that converts an electrical analog signal to a corresponding digital number.