Engineering Technical Note

Single-Path Ultrasonic Meters for Low Pressure Natural Gas Distribution Duties

A guide for use in distribution measurement systems

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American Gas Association

Engineering Technical Note

Prepared by the AGA Operations Section
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Single-Path Ultrasonic Meters for Low Pressure Natural Gas Distribution Duties

A guide for use in distribution measurement systems

This technical note contains reference information for measuring natural gas using single-path ultrasonic flow meters, including principles of operation, technical issues, evaluation of measurement performance, error analysis, testing and calibration, references.

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TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

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1 Introduction

The Distribution Measurement and Regulation Committee of the American Gas Association submits the following reference information for measuring natural gas using single-path ultrasonic flow meters. The examples and figures shown in the technical note illustrate one variation of the technology and are not intended to place any constraints on current or future development of the technology.

The information in this technical note pertains only to ultrasonic flow meters that derive the gas stream velocity by measuring the transit time of pulses of high frequency sound. Gas volume and flow rate are calculated using the equations identified in the Principle of Operations section of this note.

These meters have a number of important attributes for accurately measuring low and intermediate volumetric flow rates of natural gas. Ultrasonic meters are designed to have a high turndown ratio, incur low pressure loss and not obstruct the flow of gas even when inoperable. The measurement accuracy and uncertainty of these meters is intended to be comparable with other types of gas flow meters.

Only single-path meters are addressed in this note. Meters of the type addressed in this note may rely on empirical characterization to compensate for deviations from theoretical flow conditions caused by the need for compact meter design to meet present meter installation requirements.

1.1 Task Group Scope

- Develop an AGA Engineering Technical Note to address the current state of single-path, custody transfer ultrasonic gas meter technology which may be suitable for distribution system gas measurement.
- Share and disseminate operating experiences with ultrasonic gas meters.
- Develop an understanding of ultrasonic gas metering technology as it relates to custody transfer applications in natural gas distribution systems.
- Identify potential technical issues or limitations and related research needs.
- Review current industry guidance and practices with the anticipation that a national standard for the construction, operation, installation and servicing of ultrasonic meters for natural gas custody transfer applications may be developed at some later date.

1.2 Engineering Technical Note Scope

- This Technical Note is limited to single-path ultrasonic meters in sizes and pressure ratings suitable for the measurement of natural gas in distribution systems.