



Insert Gas Main Flexible Liners



Technology/Practice Overview

Description

Cast iron and unprotected steel piping in underground gas distribution systems have the highest leakage factors of all distribution piping materials. In contrast, plastic pipe has the lowest leakage factor. Where replacement with plastic pipe is not feasible or permitted (e.g., bridge crossings), partners report using flexible plastic insert liners.

Thin-walled plastic liners take advantage of the support offered by the parent piping material and provide the low leakage factors of plastic piping. Plastic liners can be pulled through long lengths of buried piping and bonded at joints to minimize leakage.

Operating Requirements

Plastic liners have pressure and temperature limits based on wall thickness.

Applicability

This practice is applicable to cast iron and unprotected steel distribution pipelines.

Methane Emissions

Methane emissions reductions come from lower leakage rates associated with plastic liners as compared to the typical leakage through joints in cast iron pipe and external corrosion in unprotected steel piping. Gas Technology Institute (GTI) leakage factors for plastic replacing cast iron or unprotected steel

- Compressors/Engines
- Dehydrators
- Directed Inspection & Maintenance
- Pipelines
- Pneumatics/Controls
- Tanks
- Valves
- Wells
- Other

Applicable Sector(s)

- Production
- Processing
- Transmission
- Distribution

Economic and Environmental Benefits

Methane Savings

Estimated annual methane emission reductions *225 Mcf per one mile of cast iron main and one mile of unprotected steel service lines*

Economic Evaluation

Estimated Gas Price	Annual Methane Savings	Value of Annual Gas Savings*	Estimated Implementation Cost	Incremental Operating Cost	Payback (months)
\$7.00/Mcf	225 Mcf	\$1,700	\$10,000	-\$10,000	Immediate
\$5.00/Mcf	225 Mcf	\$1,200	\$10,000	-\$10,000	Immediate
\$3.00/Mcf	225 Mcf	\$700	\$10,000	-\$10,000	Immediate

* Whole gas savings are calculated using a conversion factor of 94% methane in pipeline quality natural gas.

Additional Benefits

- Operations and maintenance cost savings
- Less impact on infrastructure, therefore lower costs and permitting requirements
- Long-term solution to leakage problem

Other Related Documents:

Use Inert Gases & Pigs to Perform Pipeline Purges, PRO No. 403

Composite Wrap for Non-Leaking Pipeline Defects, Lessons Learned

Insert Gas Main Flexible Liners (Cont'd)

in mains and service lines can be used to estimate methane savings.

Economic Analysis

Basis for Costs and Emissions Savings

Reported methane emissions reductions of 225 Mcf per year were associated with retrofitting one mile of cast iron main and one mile of unprotected steel service lines.

The costs of installing flexible liners are estimated to be \$10,000. The incremental operating cost savings are expected to offset the installation costs. The costs of inserting plastic liners are considerably lower than the costs of excavation and installation of protected steel or plastic pipe. Because companies are required to repair leaks, installing flexible liners offers an immediate payback when compared to the costs of excavation and installation of protected steel or plastic pipe.

Discussion

This technology pays back immediately due to the lower installation cost. Additional benefits include a smaller impact on infrastructure and reduced methane emissions. Flexible liners typically yield long-term solutions to leakage problems if properly installed.

Methane Content of Natural Gas

The average methane content of natural gas varies by natural gas industry sector. The Natural Gas STAR Program assumes the following methane content of natural gas when estimating methane savings for Partner Reported Opportunities.

Production	79 %
Processing	87 %
Transmission and Distribution	94 %