Northeast GAS ASSOCIATION
NYSEARCH

Technology Brief

Variable Length Fusion Repair Sleeve (VLRS) for PE Pipe

Description: **Variable Length Repair Sleeve (VLRS) is an electrofusion fitting to repair long gouges or scratches in polyethylene (PE) pipe.**
Status: **4" VLRS testing is complete; 6" VLRS under development.**

BENEFITS

NYSEARCH has been working with NUPI-GECO Systems to design, develop and manufacture a variable length repair fitting for polyethylene (PE) pipe gouges and scratches. The split-type repair system, also known as VLRS (Variable Length Repair Sleeve), provides an electrofusion repair around the entire circumference of a damaged PE pipe section. The VLRS fitting provides gas companies with a permanent repair solution that can be readily applied without the need to interrupt gas service to customers. The VLRS concept provides operators with the flexibility to make repairs to any length pipe damage, as long the pipe wall has not been compromised and no gas is venting.

Typically, when a PE pipe is damaged and results in a gouge or scratch that is 10% of the pipe wall or greater, the pipe section needs to be physically removed and replaced with new PE pipe. This is a costly and time consuming process that requires additional excavations, specialized squeeze-off equipment and, at times, disruption of gas service to customers. VLRS fittings (Figure 1) will eliminate the need for this additional repair work, thereby reducing the time and cost of making the repair. In addition, the VLRS repair method minimizes the impact of static charge and improves worker safety over the conventional method requiring pipe squeeze-off and gas flow interruption.

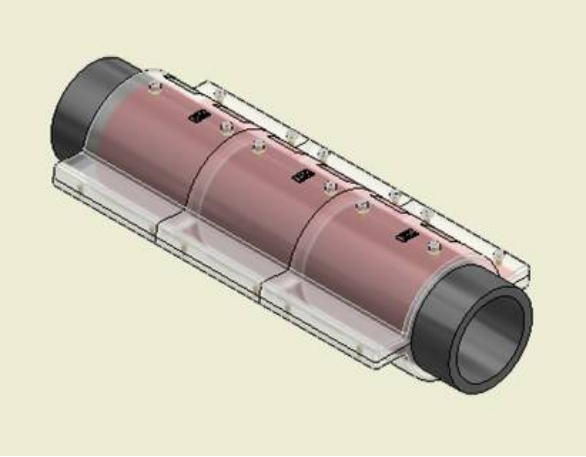

Figure 1: Triple Fitting Design

BACKGROUND

PE pipe is a preferred material for the gas industry and, at times, buried PE pipe can be subjected to third party damage. Existing regulations state that if a pipe is damaged to the point where a gouge is more than ten percent of the pipe wall, the pipe must be replaced or repaired. Existing repair patches or saddles for PE pipe have a limited repair zone of approximately 2.5" in length. If the damaged pipe section is longer than this, the pipe section is typically removed and replaced.

Pipe damage removal and replacement is completed by isolating the pipe in question, closing valve(s) or by squeezing-off the pipe at points on both sides and away from the damaged section. If service to a customer falls within the repair section, it is either temporarily disconnected or a pipe bypass is established to maintain gas flow. These operations are expensive and time consuming and generally require large and/or multiple excavations.

TECHNICAL APPROACH

The objective of the program has been to

develop a variable length system designed to repair long length pipeline damages for 4" diameter PE pipe with operating pressures up to 124 psi. The VLRS application is made from PE100 material and is designed to fully encapsulate the pipe section to be repaired, thereby making a full encirclement permanent repair.

The VLRS system utilizes a triple fitting design that allows for damages of any length to be repaired. The system includes two-end fittings that are joined together by an extension or tab. The double fitting application can repair damages up to 12-inches in length. For longer pipe gouges or scratches, an inner repair fitting(s) is inserted between the two-end fittings and the entire system is electrofused together to complete the repair (Figure 2). The number of inner sleeves to be added depends on the length of the damage that needs repair.

Figure 2: VLRS Electrofusion Process

The VLRS system installation involves scraping the pipe in accordance with standard electrofusion practices and installing one fitting at a time using the special metal clamps to bring the fitting flange-ends together. The other VLRS fittings are installed in the same manner assuring that the fittings are flush and accurately placed together. After the fittings are positioned, all of the clamps are tightened and the entire system is electrofused; one fitting after the other. Each fitting is fused using a three-step process: 1) top-half of circumference, 2) bottom-half of circumference and 3) both flange ends. After proper cooling the clamps are removed which completes the pipe repair. The VLRS fittings use universal barcode and standard electrofusion equipment.

PROGRAM STATUS

GECO is finishing tests to meet ASTM and ISO requirements (Figure 3). VLRS will be

Figure 3: Completed Repair in Lab

commercially available in 4" sizes, followed by the 6" VLRS system. The commercial fittings are being distributed by NUPI Americas in the US and Mulcare in the Northeast.

Highlights

- Repair deep gouges and scratches
- Repair any length damage
- Provides a 360° permanent repair
- Rated for 124 psi
- Reduce repair costs
- Not for blowing gas situations
- Electrofuse with standard equipment

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