Northeast GAS ASSOCIATION NYSEARCH

Technology Brief

# PE Pipe Repair Methods – Multiple Sizes of Butt Fusion Repair Sleeves (BFRS) and Variable Length Repair Sleeves (VLRS)

**Description:** **A permanent repair technique for damaged, non-leaking PE pipe.**

**Status:** **PE pipe sizes of 4 inch and 6 inch are commercially available today. The 2 inch, 8 inch and 12 inch sizes are slated for commercial release in 2018. The 1 ¼ inch size in under development.**

## BENEFITS

Permanent and safe PE pipe repair methods can avoid cut-outs and potential customer interruptions. The development of butt fusion repair sleeves (BFRS) and variable length repair sleeves (VLRS) for Medium Density and High Density PE piping, operating within gas distribution pressures of 125 psig, provide repair options for damaged, non-leaking PE pipelines. Repairs are performed in-service without stopping or by-pass of normal operating gas pipelines.

## BACKGROUND

With NUPI, NYSEARCH completed an extensive development and testing program for the 4" and 6" diameter BFRS and VLRS PE pipe fittings. That program and the commercial release of those tools led to member interest in expanding the BFRS and VLRS sleeve offerings for the 2", 8" and 12" sizes.

There are clear economic and safety advantages inherent in the ability to repair in-service PE pipe without the need to squeeze-off, build a by-pass, or additional excavation to access the pipe. The designed repair approach of the BFRS and VLRS is to provide a full circumference enclosure around continuous gouges and scratches.

## TECHNICAL APPROACH

The project objective is to develop butt fusion repair sleeves (BFRS) and variable length repair sleeves (VLRS) for distribution gas PE piping (up to 125 psig). The repair technique using these fittings are only for non-leaking damaged pipe with gouges and scratches between 10-50% of the wall thickness.

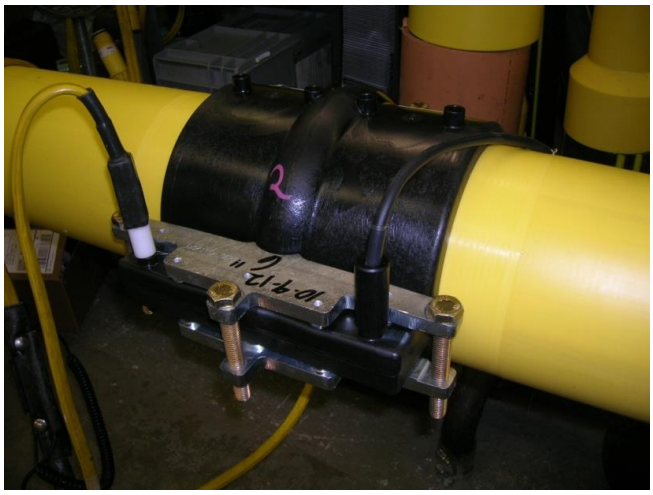

**Figure 1: BFRS being installed and encircling an existing butt fusion. ElectroFusion process is similar to industry standard practices.**

The basis for the BFRS and VLRS is responding to the federal regulation CFR49 Part 192.311 stating - each imperfection or damage that would impair the serviceability of plastic pipe must be repaired with a suitable electrofusion sleeve or the damaged pipe must be replaced.

The BFRS is designed to fully encircle a damaged or suspect butt fusion, extending along the PE

pipe for electrofusion (EF) coverage and pressure retention capability. Figure 1 illustrates the BFRS installation with a standard EF process.

The VLRS is designed to interlock end-to-end and fully encircle a gouge or scratch damaged section on the PE pipe. VLRS components may be added to accommodate any length repair required.

The design and test basis for the BFRS and VLRS are compliant with industry standards, including:

- ASTM D2513, Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings;
- ASTM F1055, Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing;
- ASTM D638, Standard Test Method for Tensile Properties of Plastic.

During the project development process, participating NYSEARCH members verified application by testing the BFRS and VLRS in laboratories and by completing field installations.

## PROGRAM STATUS

NYSEARCH has addressed the gas industry members needs for BFRS and VLRS applications. The sizes that were developed reflect the needs for operational use. Figure 2 illustrates use of the 12" BFRS to permanently repair a damaged, non-leaking HDPE gas pipe.

NYSEARCH contracted with NUPI in Italy for the design and development of the BFRS and VLRS application. Manufacturing is also performed in Italy with distribution through NUPI Americas (with a product line name of 'Elofit') at two locations domestically; Texas and South Carolina.

**Figure 2: Field installation of a 12" BFRS on a HDPE low-pressure gas pipeline.**

**Highlights**

**Applying permanent PE pipe repairs with BFRS and VLRS provides:**

- **Operational repair options to improve safety**
- **Cost effective PE pipe system maintenance and integrity**
- **Reduction of potential customer gas interruptions**

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