

## Variable Length Repair Sleeve for PE Pipe

**Description:** A Variable Length Repair Sleeve (VLRS) is an electrofusion fitting designed to repair damaged PE pipes.

**Status:** VLRS is being manufactured by NUPI- Americas / GECO Systems.

### BENEFITS

Current available repair patches or saddles for polyethylene (PE) plastic pipes with diameters greater or equal to two inches have a repair zone of approximately two to two-and-one-half inches in length.

In many situations, gouges on PE pipes are greater than two inches in length. There is no patch or fitting available to make the repair. In these cases the repair is made by replacing a section of pipe by isolating the pipeline in question and closing valve(s) or by squeezing-off the pipe at points on both sides of the damaged section. If service to a customer cannot be interrupted, a bypass is established around the damaged section. These operations are expensive and time consuming and generally require large and/or multiple excavations.

Obviously, there is a great value in developing tools and tools that would allow the repair of damaged PE pipes without the need for pipe replacement and/or interruption of service.

The PE repair sleeve being developed by NUPI-GECO and NYSEARCH will allow gas operators to rehabilitate damaged PE pipe while maintaining service to the customer. The design of the new sleeve will allow for repairs of PE pipe damages of variable lengths.

It is expected that the cost of the repair using these new Variable Length Repair Sleeves (VLRS) will be considerably less than that of pipe section replacement. In addition, the sleeve may be used for the strengthening of old squeeze-off points that show evidence of fatigue.

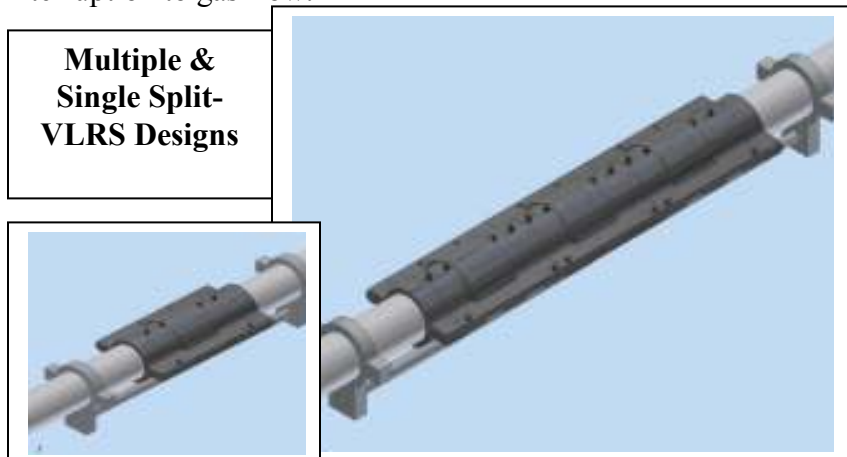
In summary, VLRS repair fittings will reduce repair cost and time of damaged PE pipe over conventional method, while using smaller excavations with no interruption to gas flow.



### BACKGROUND

PE pipe is the preferred material for the gas industry. At times, installed 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 thickness, the pipe must be replaced or repaired. If a cost-effective procedure and repair system for PE pipe

**Multiple & Single Split-VLRS Designs**



damages (without a leak) were available, this would provide both a cost savings and improved safety.

### **TECHNICAL APPROACH**

NYSEARCH is funding the project through GECO System SPA of Italy – a subsidiary of NUPI Americas. The objective is to develop an VLRS for PE systems that is installed using electrofusion. GECO will be exploring two design concepts: 1) a split-sleeve application for 4” pipe with the ability to electrofuse multiple sleeves together for long length damages, and, 2) a ribbon-wrap design to accommodate long length damages and multiple PE sizes. The ribbon-type sleeve is designed to fully encapsulate the carrier pipe and will require the ends to be retained with clamps/anchors during the installation process.

Split Sleeve: In order for the repair sleeve to vary in length, the system is comprised of multiple pieces. There are two unique end pieces and separate middle sections. Several middle sections can be utilized to accommodate the varying length feature. Electrofusion is used to fuse the new component pieces together and to fuse the fitting to the carrier pipe. The maximum length of a pipe gouge for a single repair sleeve is approximately 12”.

Ribbon-wrap: The current design uses a PE 100 material. The ribbon is

approximately ¾” wide and will have embedded copper wires and electrodes. The ribbon will be available in a variety of lengths.

The two repair systems will be constructed of PE 100 materials and will have a bar-code setup for use with any universal electrofusion machines. They can be applied to repair both medium density and high density PE pipe. The repair systems will be rated for systems operating up to 124 psig and will undergo extensive laboratory testing in order to meet all applicable ASTM standards. It should be noted that the repair systems are not recommended for situations where gas is blowing due to a damage that has ruptured the pipe.

### **PROJECT STATUS**

In the early stages of the project, sponsors decided to first develop a Butt Fusion Repair Patch (BFRP) in a separate NYSEARCH project. The current project schedule for 2008 for the VLRS fitting includes development of the split sleeve mold, lab testing in accordance with ASTM and testing by NYSEARCH member companies to further validate the integrity of the repair fitting.

NYSEARCH and GECO are planning to commercialize the VLRS fitting in the near future.

### **HIGHLIGHTS**

- Repair HD and MD pipes, up to 124 psig
- Initial repair sleeves for 2” and 4” PE pipes
- Repair damaged PE pipe under live gas conditions irrespective of length of damaged section.
- Avoid excessive repair costs of additional excavations, bypass or system shutdown.
- Rehabilitate old squeeze-off points

### **FOR ADDITIONAL INFORMATION**

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