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# Study of Production Methods of Polyethylene Fittings

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**Annotation:** Pipe and pipe fittings of organic polymeric material such as polyethylene have become widely known and used for diverse purposes such as for conveying fluids. Piping systems of polyethylene material have been found to be desirable especially in view of the ease with which such systems may be fabricated. The paper is a market study that aims to identify the problems encountered in welding polyethylene pipe - fittings assemblies. The market study is made within companies that activate in the field, gathering answers from polyethylene certified welders, technicians responsible with welding techniques, and from those who supervise and manage these activities.

**Keywords:** polyethylene pipes, fittings, electrofusion welding, market research.

Fitting-(English fitting from fit "to fit, mount, assemble") - a connecting part of the pipeline, installed for branching, turns, transitions to a different diameter, as well as, if necessary, frequent assembly and disassembly of pipes. Fittings also serve to hermetically seal the pipeline and other auxiliary purposes. Fittings connecting the ends of pipes of the same diameter are called straight fittings, fastening the ends of pipes of different diameters.

Fittings for polypropylene pipes have the same purpose as fittings for metal pipes. Welding is used to connect them to pipes. Welding is usually performed with a special device that heats the surfaces to be joined up to 260 C. Fittings can also be transitional from a welded joint to a threaded joint for connecting polypropylene pipes and metal pipes. Polimer Group Asia is a high-tech plant for the production of various polymer (plastic) products. Among the products of our company there are pressure (gas and water) pipes, and non-pressure (technical) pipes, as well as various types of fittings for connecting polyethylene pipes. Various types of plastics are used in production: low-pressure polyethylene (HDPE), high-pressure polyethylene (LDPE) and others. Manufactured plastic pipes have various purposes: for sewerage, for heating, for irrigation, for drinking water, for protecting cables when they are laid in the ground (under the road) and others.

Xperiments have been conducted using PEO as DRA for the flow of water to compare its performance vis a vis PAM in terms of concentration and pressure gradient for the same set [1].

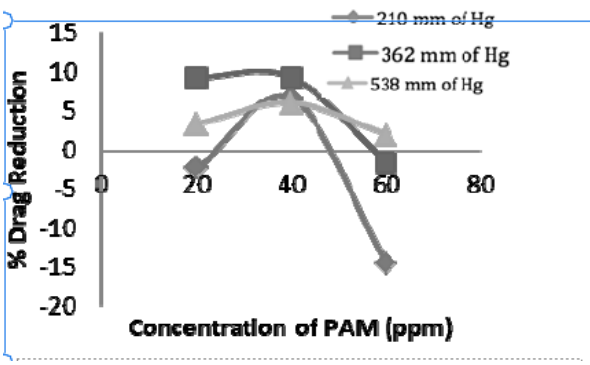


Fig. 1. %DR vs. concentration of PAM for 45o elbow.

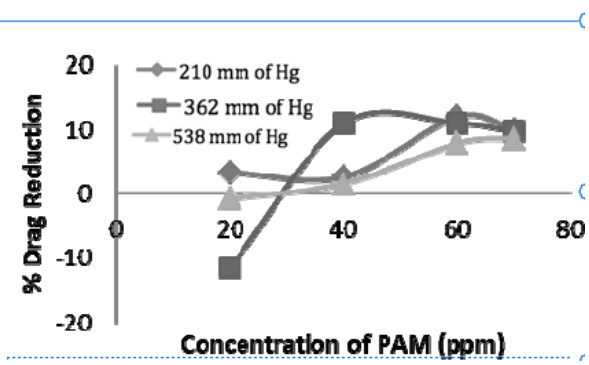


Fig. 2. %DR vs. concentration of PAM for 90o miter.

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During the construction of gas pipelines made of polyethylene, one of the types of welding permitted by regulatory documents is welding pipes using couplings with embedded electric heaters, as well as connecting saddle water pipes to the pipe in the same way. In general, such connections are quite reliable in operation, mainly due to the fact that the connections, due to the design of the connecting parts, as a rule, do not carry a significant mechanical load. The design features of such connecting parts do not allow non-destructive testing of their welded joints by physical methods. At the same time, studying the issue of the mechanical strength of such joints is of particular practical interest, since such joints during the operation of gas pipelines can be subjected to force loads, for example, during soil movements, when saddle branches operate as shut-off valves, etc.

The mechanical performance of pipe connections with couplings, according to regulatory documents, is determined by a flattening test, and saddle bends by a tear test, with fixation of the nature of the delamination and the value of the tear forces. In this case, the value of the limiting value of the pull-off force is not regulated.

Since the price of connecting parts with embedded heaters is quite high, conducting experiments related to mechanical testing of such parts is a very expensive process. Therefore, these experiments were carried out by analyzing the results of mechanical tests of samples welded during the tolerance tests of welders in the certification center of the NAKS system. Compliance with the welding conditions and mode parameters was controlled by monitoring the performance of operations by welders, as well as by the printouts of the welding cycle issued by the welding machine. The total amount of analysis of the results of mechanical tests was about 60 samples of coupling joints and 30 samples of joints of saddle connections. The tests were performed on coupling joints of pipes with a diameter of 63 and 100 mm, cSDR11 using couplings and saddle branches manufactured by OAO Sibgazapparat and Friatek [2].

Parker's CPI™/A-LOK instrumentation tubing fittings are designed for use as pressure-tight connections in process, power, and instrumentation applications. Equipped with one or two O-rings, these fittings are manufactured to high quality assurance standards and are available in a wide range of sizes, materials and configurations. CPI™/A-LOK tube fittings are available from Parker in a wide range of ISO and ANSI pipe threads. See Catalog 4260 for a complete list of available fittings. As standard, Parker CPI™/A-LOK fittings are manufactured from 316 stainless steel, heat code. Other common materials used include steel, brass, aluminium, cupro-nickel alloys, Hastelloy C, Alloy 600, titanium, 6 µm molybdenum coated material, Incoloy 625 and 825. Cylindrical fittings are made from cold-drawn bar stock, and shaped bodies from fine-grained forgings by machining. In terms of their chemical properties, the initial materials used fully meet the requirements listed in the specifications (see table 1). For nuclear power and other critical applications, CPI™/A-LOK fittings are available in heat code certified stainless steel.

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