

Corrosion and mechanical performance of three-layer polyethylene and dual layer FBE coating systems for gas transmission pipelines

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Coatings and cathodic protection (CP) together form a system designed to protect pipelines from corrosion. In National Iranian Gas Company (NIGC) the majority of new steel underground high pressure gas transmission pipelines are coated with three-layer polyethylene (3LPE) coating system. It is comprised of 150 microns of fusion-bonded epoxy (FBE), 150 microns of a grafted adhesive, and a PE applied at a coating thickness of 3.0-3.5 mm. However, loss of coating adhesion has been frequently reported a few years after application of this coating system. It is well-known that this coating system has cathodic shielding concern. Dual layer FBE (DLFBE) coating system is another coating system that is allowed to apply in accordance with the Iranian Gas Standard (IGS) specifications. The thickness of the individual layers is 400±50 microns. Some field reports describe periodic blistering. This coating system doesn't have very high electrical resistivity and because of its low thickness, the CP current could pass directly through the FBE barrier to the underlying steel. DLFBE coatings are more prone to mechanical damage during transportation and handling on site, and during backfilling and service and so require the padding and bedding materials to have a particle size of less than 10 mm. This paper describes the performance of 3LPE and DLFBE coating systems and discusses the differences in the two types of coating systems and how CP works with these coatings.