Trends in Pipe Coating Selection Process

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ABSTRACT

There are many different kinds of pipeline coatings. This paper will focus on the typical coatings used by ExxonMobil for Upstream projects. As stated earlier there is guidance for selection of the most appropriate coating provided within ExxonMobil GPs.

Fusion-bonded epoxy (FBE) is the most commonly used anti-corrosion coating used for upstream oil and gas projects, either as a stand-alone system or as a primer for multi-layer systems. However, there are numerous other types of coatings or additions to coating that can be used. Additional pipeline coating systems commonly used by ExxonMobil include liquid applied coatings, fusion bonded epoxy (FBE), dual layer FBE, three layer polyethylene (3LPE), three layer polypropylene (3LPP), thermal insulation, concrete weight coatings and rock shields.

INTRODUCTION

Corrosion control is important to help ensure the long term integrity of a pipeline. Coatings and cathodic protection work in unison to help provide the needed corrosion protection. Coatings normally provide corrosion protection for the pipeline by providing a barrier to the corrosive external environment, soil or water. If a coating was applied with no defects or holidays and remained in that state for its design life, no additional corrosion protection would be needed. This concept also presupposes that the corrosives present in the surrounding soil or water never penetrate the coating. Experience shows that coatings do degrade and are rarely (if ever) installed defect free. Thus, the combination of coatings and cathodic protection should normally be applied to provide the needed corrosion protection.

ExxonMobil Development Company uses a series of documents termed Global Practices (GPs) to help select, specify and procure pipe coatings. Generally, the GPs are the basis for the Project Specification. The GPs are normally developed by ExxonMobil Development Company but reviewed and approved by numerous Subject Matter Experts (SME’s) from within the company. This paper will discuss several of the GPs as an attempt to explain the pipe coating selection process. There are GPs for main line pipe, field joint, insulation, and concrete weight coatings.

TYPES OF PIPE COATINGS

Coatings and cathodic protection should normally be applied to provide the needed corrosion protection. There are many different kinds of pipeline coatings. This paper will focus on the typical coatings used by ExxonMobil for Upstream projects. As stated earlier there is guidance for selection of the most appropriate coating provided within ExxonMobil GPs.

Fusion-bonded epoxy (FBE) is the most commonly used anti-corrosion coating used for upstream oil and gas projects, either as a stand-alone system or as a primer for multi-layer systems. However, there are numerous other types of coatings or additions to coating that can be used. Additional pipeline coating systems commonly used by ExxonMobil include liquid applied coatings, fusion bonded epoxy (FBE), dual layer FBE, three layer polyethylene (3LPE), three layer polypropylene (3LPP), thermal insulation, concrete weight coatings and rock shields.

Pipeline Coating Selection Process

Pipe coating selection is typically addressed by utilizing one of the GPs. In general, the GPs utilize industry standard approaches. However, many lessons learned have been included to help ensure the selection, application and performance of the pipe coatings and field joints are adequate to provide excellent long term corrosion protection.

The specific GP that assists with pipe coating selection is titled, "Pipeline Corrosion Protection." This GP covers the selection of external coatings for onshore and offshore carbon steel pipelines. However, an additional GP is utilized to help define requirements for the corresponding field joint material. Thus, "Pipeline Corrosion Protection" provides a road map to assist a project to choose the appropriate pipeline coating and field joint. Table 1 shows an excerpt from the "Pipeline Corrosion Protection" GP. The approach used is that the project can select the proper system by considering the location of the pipeline (onshore, shallow water or deep water), operating temperature and need for concrete weight coating. The possible coatings to select include FBE (single or dual layer), 3 LPE or 3LPP. For a specific service, Table 1 presents the appropriate referenced GP for the specific of the coating requirements and the field joint. For example, if a pipeline is operating in deepwater at 85°C without weight coating, the appropriate GP for pipeline coating and field joint application are GP 29-02-05 and GP 72-06-10, respectively. An additional requirement is the FBE should have a minimum thickness of