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A Guideline: Corrosion Protection of Floating Production and Storage Vessels

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Abstract

It is a challenge to provide a 10 year or longer service life for the corrosion protection of FPSO's. While traditional trading vessels will dock regularly (every 5th year), the FPSO will be in continuous operation during its service life. Today the basic corrosion protection requirements used on FPSO's are often based on established guidelines used for the trading vessels. Consequently, there is a need to develop a guideline for the corrosion protection for fixed floating vessels with a 10 years or longer service life. The paper provides a schematic presentation of the guideline /1/. The technology basis for the guideline is the state-of-the-art knowledge on corrosion protection of fixed offshore platforms and experiences from the marine industry. For cathodic protection, the design shall be based on a combination with coatings.

Keywords

FPSO, Corrosion protection, coatings, cathodic protection

Introduction

The main objective of the guideline /1/ is to achieve a long service life (10 years or longer) for the corrosion protection systems with minimal maintenance during service. Coatings are the main corrosion protection of the low alloy steel of the hull on an FPSO (floating production and storage units). For submerged areas of the external hull and in ballast tanks and other tanks containing seawater, cathodic protection (CP) is used as a supplementary protection. A combination of CP with coatings is specified as necessary for achieving a cost effective protection for a service life of 10 years or longer.

The longevity of the applied coating system depends on tasks related to surface preparation and coating application. The requirements for adequate surface preparation, a stringent limit to the salt content on the surface, and the use of only pre-qualified coating systems are critical factors for achieving a service life of 10 years or longer.

Coatings for global service: Qualification requirements

The environmental conditions for a floating offshore structure range from tropical to arctic. This will imply temperature conditions from below freezing to tropical conditions at temperatures around 30°C. The humidity conditions may be expected to be close to 100% for all offshore areas for most temperatures. A high impact from sunlight (e.g. UV-light) can be expected at the tropical locations. To ensure that a coating product will have the ability to provide a 10 year or longer global service life, the selected coating product shall be qualified.

For a coating qualification program, the relevant exposure conditions must be included. Consequently for the external hull surface above the waterline, the coating must have a high resistance to UV, while a submerged coating must be compatible with cathodic protection. To ensure that a coating product will have the ability to provide a 10 year or longer service life, such a qualification shall be done based on one of the two:

- 1) Documentation of the given coating product from previous experience
- 2) Performing a pre-qualification testing program

In the case that qualification is to be based on a pre-qualification testing program, the following standards are recommended:

- ISO 20340(2003) "Paints and varnishes- Performance requirements for protective paint systems for offshore and related structures" /2/
- Tanker Structure Co-operative Forum. "Guidelines for ballast tank coating systems and surface preparation" /3/ Appendix 3 -Testing and classification of ballast tank coatings)

ISO 20340 provides qualification guidelines for coating systems in an offshore environment, including submerged service. This qualification guideline include tests with ageing (which includes a cyclic exposure to UV, condensation, salt spray and low temperature exposure) over 4 200 hours. In addition, the qualification includes cathodic disbonding testing and immersion testing, where relevant. The Tanker Structure Cooperative Forum provides a testing scheme for ballast tank coatings which are established in the marine industry, and also accepted as a qualification by NORSOK M-501 /4/ for coating systems used for submerged service.