Guidance for corrosion management in oil and gas production and processing

Second edition

HSE

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GUIDANCE FOR CORROSION MANAGEMENT IN OIL AND GAS PRODUCTION AND PROCESSING

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A registered charity, the EI serves society with independence, professionalism and a wealth of expertise in all energy matters.

This publication has been produced as a result of work carried out within the Technical Team of the EI, funded by the EI's Technical Partners. The EI's Technical Work Programme provides industry with cost-effective, value-adding knowledge on key current and future issues affecting those operating in the energy sector, both in the UK and internationally.

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FOREWORD

Corrosion is first and foremost a safety risk which has to be understood and managed. Once the safety risks associated with corrosion are managed control of the associated economic risks will generally follow.

Corrosion has the potential to cost between 2 and 4 % of a company's turnover. The NACE International report on the costs of corrosion suggests that approximately 25 % of this cost could be saved by application of effective corrosion management, which presents an opportunity to make significant savings and hence improve profitability for Operators.

Definitions of corrosion:

NACE/ASTM G193: '*Corrosion is the deterioration of a material, usually a metal, that results from a chemical or electrochemical reaction with its environment.'*

ISO 8044: '*Physicochemical interaction between a metal and its environment that results in changes in the properties of the metal, and which may lead to significant impairment of the function of the metal, the environment or the technical system, of which these form part.'*

NASA: '*Corrosion can be defined as the degradation of a material due to a reaction with its environment. Degradation implies deterioration of physical properties of the material. This can be a weakening of the material due to a loss of cross-sectional area, it can be the shattering of a metal due to hydrogen embrittlement, or it can be the cracking of a polymer due to sunlight exposure. Materials can be metals, polymers (plastics, rubbers, etc.), ceramics (concrete, brick, etc.) or composites-mechanical mixtures of two or more materials with different properties.'*

After the success of previous editions, this second edition of the Energy Institute (EI)'s *Guidance on corrosion management in oil and gas production and processing* has been updated to:

(a) align with the Health and Safety Executive (HSE)'s revised guidance on *Managing for Health and Safety*[1] HSG65 2013;
(b) update the corrosion mechanisms;
(c) incorporate the lessons learned from the HSE's *Ageing and Life Extension Programme* KP4[2];
(d) highlight the applicability of this document to onshore oil and gas processing plant;
(e) consider Human Factors.

This guidance document was revised in conjunction with specialists from UK Offshore Operators and Materials and Corrosion Engineering Consultants competent in corrosion control in the offshore oil and gas industry.

Input to this revision was gained through working group meetings and individual contributions. The information gathered has been collated and reviewed to identify commonalities in the approaches taken to corrosion management across the industry.

The guidance is laid out such that the initial sections 1, 2 and 3 provide the overview of corrosion management, whilst the details are contained in a series of Appendices. This approach is designed to assist the reader to dip in and out of the document to obtain the information they need. For example, Annex A provides details in the Structured Framework for Corrosion Management.