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A Working Party Report on

Guidelines on Materials Requirements for Carbon and Low Alloy Steels For $\text{H}_2\text{S}$-Containing Environments in Oil and Gas Production

MANEY

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Contents

Series Introduction vi

Preface vii

Second Edition Note viii

1. Definitions, Abbreviations & Symbols 1
2. Standards Referred to in this Document 7
3. Introduction 9
4. Scope 11
5. Objective 13
6. Types of Cracking in Wet H,S-containing Environments 15
   6.1. General
   6.2 Sulphide Stress Cracking (SSC)
   6.3 Stepwise Cracking (SWC)
   6.4 Stress Oriented Hydrogen Induced Cracking (SOHIC) and Soft Zone Cracking (SZC)

7. Environmental Factors Affecting Cracking in H2S-Containing Environments 19
   7.1. General
   7.2 Environmental Conditions Influencing SSC
        7.2.1 Sulphide stress corrosion cracking domains
        7.2.2 Influence of temperature

8. Guidelines to Avoid Cracking 23
   8.1 General
   8.2 Guidelines to Avoid SSC
        8.2.1 Materials requirements
        8.2.2 Cold deformation requirements
        8.2.3 Free machining steels
        8.2.4 Qualification tests
   8.3 Guidelines to Avoid SWC
        8.3.1 General
        8.3.2 Seamless pipes, castings and forgings
        8.3.3 Rolled steel
   8.4. Guidelines to Avoid SOHIC and SZC
ANNEX A

Procedures and Guidance for Sulphide Stress Cracking Testing

A.1. Scope
A.2. Applicable Test Methods
A.3. Test Solutions
A.4. Test Temperature
A.5. Reagents
A.6. Acidic Gases
A.7. Specimen Geometry
A.8. Test Vessels and Solution Volume

Appendix 1

Preparation and Use of Smooth Uniaxial Tensile Test Specimens
(SSC Test Method A)
1.1. Method
1.2. Test Time
1.3. Applied Stress
1.4. Specimens
1.5. Failure Appraisal

Appendix 2

Preparation and Use of Four Point Bend Test and C-Ring Test Specimens (SSC Test Methods B and C)
2.1. General
2.2. Method
2.3. Applied Deflection
2.4. Reporting

Appendix 3

Preparation and Use of Pre-Cracked Double Cantilever Beam Test Specimens (SSC Test Method D)
3.1. General
3.2. Method
3.3. Fatigue Pre-Cracking
3.4. Specimen Loading
3.5. Stress Intensity Factor
3.6. Test Duration
Contents

Appendix 4

Preparation and Use of Smooth Slow Strain Rate Tensile Test Specimens (SSC Test method E) 39
  4.1 General
  4.2 Method
  4.3 Test Apparatus
  4.4 Specimens
  4.5 Extension Rate
  4.6 Failure Appraisal

ANNEX B

Procedures and Guidance on Test Methods for Stepwise Cracking 41
  B.1. Scope
  B.2 Test Method
  B.3 Test Solution
  B.4 Test Temperature
  B.5 Number of Test Specimens
  B.6 Position of Test Specimens
  B.7 Evaluation
  B.8 Acceptance Criteria

ANNEX C

Guidelines for Determination of pH 45

ANNEX D

Hardness Testing of Components and Weld Zones for Service in H₂S-Containing Environments 49
  D.1 Scope
  D.2 Significance of Welds
  D.3 Hardness Testing Techniques
  D.4 Location of Hardness Impressions

References 55
Preface

The presence of H₂S in oil and gas production poses its own specific threat to the integrity of the production system. Many materials suffer from cracking of various forms when exposed to H₂S which may result in the catastrophic failure of equipment with the attendant risk of releasing the contents into the environment. Besides the general risks associated with release of hydrocarbons in terms of pollution and fire, the release of H₂S exposes persons in the vicinity to the risks of poisoning and death.

For these reasons the materials engineer is mindful of the need to select materials of proven resistance to cracking in H₂S-containing environments.

This guideline document is specifically concerned with the material requirements for carbon and low alloy steels for H₂S-containing oil and gas field service. It aims to be comprehensive in considering all possible types of cracking which may result from exposure of such steels to H₂S, the conditions under which they may occur and appropriate materials requirements to prevent such cracks. In addition, the document recommends test methods for evaluating materials performance and particularly focuses on a fitness-for-purpose approach whereby the test conditions are selected to reflect the realistic service conditions.

Thus, this guideline document is believed to be a practical, industry-oriented guide to the subject. It incorporates much of the recent developments in knowledge on the way in which the detailed environmental conditions affects risk of cracking. It also recognises conditions in which some relaxation of strict requirements may be made which can result in considerable cost saving without any increase in risk. Furthermore, it is believed to be the first document which tackles, in one volume, all the H₂S-related cracking problems of all items of equipment used in the oilfield — from the well to the export pipelines.

It is hoped that this guideline document will prove to be a key reference document for materials engineers and product suppliers working in the oil and gas industry.

Svein Eliassen
Chairman (1993-1998)
Carbon and Low Alloy Steels
Working Group of the Working Party
European Federation of Corrosion

Llane Smith
Chairman (1993-1998)
Working Party on Corrosion in Oil and Gas Production
European Federation of Corrosion
Second Edition Note

After the first publication of EFC16 in 1995, two joint industry sponsored projects were established to investigate safe hardness limits for welds in carbon and low alloy steels in H₂S-containing environments.¹ ² This edition incorporates the results of those projects, following the guidance of ISO 15156, in section 8.2.1, Table 8.1. Other changes to the text are mostly editorial.

Liane Smith
Chairman (1998-2001)
Carbon and Low Alloy Steels
Working Group of the Working Party
European Federation of Corrosion

Phil Jackman
Chairman (1998-2001)
Working Party on Corrosion in Oil and Gas Production
European Federation of Corrosion