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A Working Party Report on

Guidelines on Materials Requirements for Carbon and Low Alloy Steels For H_2S-Containing Environments in Oil and Gas Production

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Preface

The presence of H_2S 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 H_2S 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 H_2S 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 H_2S-containing environments.

This guideline document is specifically concerned with the material requirements for carbon and low alloy steels for H_2S-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 H_2S, 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 H_2S-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.

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Second Edition Note

After the first publication of EFC16 in 1995, two joint industry sponsered projects were established to investigate safe hardness limits for welds in carbon and low alloy steels in H_2S-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 editoral.

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