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AGREEMENT

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Risk-Based Inspection and Maintenance Procedures for European Industry (RIMAP)

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Foreword

The production of this CWA (CEN Workshop Agreement) specifying the essential elements of risk based assessment of industrial assets according to the RIMAP approach was formally accepted at the Workshop's kick-off meeting on 2005-06-30.

The document has been developed through the collaboration of a number of contributing partners in the Workshop, some of them mentioned in the chapter "Acknowledgments". Further information on who have supported the document's contents may be obtained from the CEN Management Centre.

CWA approval was obtained in principle at the Workshop's meeting on 2007-07-05, followed by an electronic approval process which finished on 2007-09-25.

This CWA consists of the following main parts, under the general title "Risk-Based Inspection and Maintenance Procedures for European Industry":

Part 1: RIMAP Framework (presented in Chapter 4 of the document)

Part 2: RIMAP Procedure (presented in Chapter 5 of the document)

This document is a "CEN Workshop Agreement" document. CEN defines the Workshop Agreement as:

> CEN Workshop Agreements (CWAs) are consensus-based specifications, drawn up in an open Workshop environment. The CEN Workshop is an open process that aims at bridging the gap between industrial consortia that produce de facto standards with limited participation of interested parties, and the formal European standardization process, which produces standards through consensus under the authority of the CEN member bodies.

A CWA is supposed to be developed in such a way that it should be sufficiently flexible in being applicable both to the technologies currently in use and to technologies to be developed in the future. A CWA should also contribute to ensure that new technologies can be introduced in plants in a safe and cost-efficient manner.

This document has been drawn up in following CEN Technical Committees:

- CEN/TC 12 Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries
- CEN/TC 23/SC 3 Operational requirements DIN
- CEN/TC 54 Unfired pressure vessels BSI
- CEN/TC 110 Heat exchangers BSI
- CEN/TC 114 Safety of machinery DIN
- CEN/TC 121/SC 5 Non destructive examination AFNOR
- CEN/TC 138 Non-destructive testing AFNOR
- CEN/TC 186 Industrial thermo-processing – Safety DIN
- CEN/TC 197/SC 1 Safety DIN
- CEN/TC 267 Industrial piping
- CEN/TC 269 Shell and water-tube boilers DIN
- CEN/TC 274/SC 1 General safety requirements DIN
- ECISS/TC 29/SC 1 Tubes for pressure purposes UNI
- ECISS/TC 29/SC 10 Non-destructive testing UNI

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Comments or suggestions from the users of the CEN Workshop Agreement are welcome and should be addressed to the CEN Management Centre.

Introduction

This particular CWA provides the essential elements of risk based assessment of industrial assets according to the RIMAP approach which has been developed and demonstrated in and by the European R&D project RIMAP (GIRD-CT-2001-03008 and the corresponding RIMAP Network: "Risk-Based Inspection and Maintenance Procedures for European Industry"). One of the main goals of the project, as well as of this CWA, has been to contribute to the harmonization of the EU national regulatory requirements related to the inspection and maintenance programs in the industrial plants and make them more cost-efficient while, at the same time, safety, health, and environmental performance is maintained or improved.

The document is intended for the managers and engineers establishing the RBIM (Risk-based Inspection and Maintenance) policies in the companies in power, process, steel and other relevant industries. It is supposed to be used in conjunction with the relevant internationally accepted practices, national regulations and/or company policies. The document is supposed to provide a common reference for formulating the above policies and developing the corresponding inspection and maintenance programs within different industrial sectors, such as oil refineries, chemical and petrochemical plants, steel production and power plants. Each part of this Agreement can be used as a stand-alone document.

The positive impact and transfer of industry practices resulting from the use of this document and from the approach promoted by/in it are expected to be of benefit for the European industry and strengthening of its competitiveness through better inspection and maintenance practices.

Acknowledgements

This document has been developed through the collaboration of following main contributors (companies/persons).

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1 Scope

The objective of this CEN Workshop Agreement document is to present a set of transparent and accurate framework for applying / implementing risk-based inspection and maintenance (RBIM) and risk-based life management (RBLM)[1] in industrial organizations

The document formulates the procedure for risk based approach, thereby supporting optimization of operations and maintenance (O&M) as well as asset management.

The purpose of RBIM is to ensure that clearly defined and accepted levels of risk related to:

- safety,
- health,
- environment and
- business/production/operation

are achieved using resource-efficient methods of inspection and maintenance. The methodology for RBIM described here is based on that developed in the European project RIMAP (Risk-based Inspection and Maintenance Procedures for European Industry) [11]. Within the RIMAP project, the RBIM methodology has been developed and validated for chemical, petrochemical, power and steel industries in Application Workbooks [20], [21], but the methodology as such is intended to be industry independent. The methodology addresses the following aspects:

- Inspection and maintenance
- All types of equipment, e.g. pressure containing, rotating, electrical, instruments and safety devices
- Technical and managerial aspects of maintenance and inspection planning
- Asset management related to inspection, maintenance and life assessment for plants, systems and components
- Production and operation.

Although RBIM encompasses RBI & RCM, this document focuses primarily onto RBI. The RCM is included only up to the extent to demonstrate the applicability in the overall context of RBIM.

[1] Hence forth, the term RBIM will be used in this doument in place of similar terminologies like RBLM, RBMI, etc.

2 Normative References

The following referenced documents are indispensable for the for the application of this document. For dated references, only cited applies. For undated references, the latest edition of the referenced document (including amendments) applies

[1] "Best practice for Risk Based Inspection as a part of Plant Integrity Management" by J.B. Wintle, B.W. Kenzie, G.J. Amphlett and others, ISBN 0717620905, Health and Safety Executive (HSE Books), (CRR 363/2001); www.hsebooks.com/Books/

[2] EN 473 – "Non destructive testing - Qualification and certification of NDT personnel - General principles", European Committee for Standaradization (CEN)

[3] CEN/TR 14748 Non-destructive testing – Methodology for qualification of non-destructive tests, European Committee for Standaradization (CEN),

[4] IEC 812 – "Analysis techniques for system reliability – Procedure for failure mode and effects analysis (FMEA)", International Electrotechnical Commission (IEC),

[5] EN ISO 14224 –" Petroleum, petrochemical and natural gas industries - Collection and exchange of reliability and maintenance data for equipment (ISO 14224:2006)", European Committee for Standaradization (CEN),

[6] NACE TM0248 – "Evaluation of pipeline and pressure vessel steels for resistance to hydrogen induced cracking", NACE Int. (USA)

[7] SAE JA 1011 – "Evaluation Criteria for Guide to the Reliability Centered Maintenance (RCM) Processes" (1998) – SAE International G-11 Supportability Committee; www.sae.org/technical/standards/JA1011 199908

[8] SAE JA 1012A – "Guide to the Reliability - Centered Maintenance (RCM) Standard" (2002), SAE International G-11 Supportability Committee; www.sae.org/technical/standards/JA1012 200201

[9] EN ISO/IEC 17020 (ISO/IEC 17020) – "General criteria for the operation of various types of bodies performing inspection", European Committee for Standaradization (CEN)

[10] EN ISO/IEC 17025 (ISO/IEC 17025) – "General requirements for the competence of testing and calibration laboratories", European Committee for Standaradization (CEN)

NOTE: Other cited references in the text of this document are presented as reference documents in the Bibliography.