

## Risk-based inspection framework

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English Version

## Risk-based inspection framework

Cadre d'inspection basée sur les risques

Risikobasierte Inspektion (RBIF)

This European Standard was approved by CEN on 22 October 2017.

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## European foreword

This document (EN 16991:2018) has been prepared by Technical Committee CEN/TC 319 “Maintenance”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2018 and conflicting national standards shall be withdrawn at the latest by October 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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## Introduction

Since the late 1990s, inspection and maintenance approaches in industry have been globally moving from prescriptive, time-based towards risk-based ones. This trend has clearly been established by the wish to increase the on-stream production time, to reduce unscheduled downtime due to corrective maintenance, to avoid shutdown due to equipment failure and/or to reduce undesirable impacts on process safety.

This European Standard provides the essential elements of risk-based assessment of industrial assets according to the approach developed and demonstrated in the European pre-standardization document CWA 15740:2008 [1]. The CWA 15740 document was updated in 2011, and from 2014 its further development continued within this document and the corresponding EU Project RIMAP (Risk-Based Inspection and Maintenance Procedures for European Industry) [2] [3].

The document is intended for managers and engineers establishing the RBIM (Risk-based Inspection and Maintenance) policies in the process, power, steel and other relevant industries. This document is intended to be used in conjunction with the relevant internationally accepted practices, national regulations and RBI company policies. The document aims to provide a common reference for formulating the RBI policies and developing the corresponding inspection and maintenance programs.

The background of the RBIM methodology is provided by the EU project RIMAP (Risk-based Inspection and Maintenance Procedures for European Industry) [4]. In this project, the industry independent methodology has been validated for chemical, petrochemical, power and steel industries and summarized in the respective RIMAP Application Workbooks [4].

The main goal of this European Standard and the former RIMAP project is to support the establishment and application of risk-based inspection and maintenance programs in industrial plants in a documented and efficient way, while at the same time maintaining or improving safety, health and environment performance.

The RBIF addresses primarily static pressure equipment (e.g. tanks, piping), but is also applicable to dynamic/rotating equipment (e.g. pumps, turbines, valves) and pressure relief devices, and it can be extended to other types of equipment, if appropriate. It addresses primarily the equipment and/or systems in the in-service phase of the operation, but can also be applied in the design-phase for analysis and/or determination of maintenance/inspection strategies or life extension phases. Application of this RBIF in industry will take into account also the general developments in the industry and maintenance practices (e.g. The Industry 4.0).



## 1 Scope

This European Standard specifies the Risk-Based Inspection Framework (RBIF) and gives guidelines for Risk-Based Inspection and Maintenance (RBIM) in hydrocarbon and chemical process industries, power generation and other industries where RBI is applicable.

Although RBIF encompasses both inspection and maintenance, this document focuses primarily on Risk-Based Inspection (RBI) and its applicability within the context of RBIM. The RBIF thereby supports optimization of operations and maintenance as well as asset integrity management.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

#### **risk**

combination of the probability of occurrence of harm and the severity of that harm

Note 1 to entry: The probability of occurrence includes the exposure to a hazardous situation, the occurrence of a hazardous event, and the possibility to limit the harm.

Note 2 to entry: Other definitions, e.g. the one from ISO 31000 are recognized, but not used practically in the document.

[SOURCE: ISO/IEC Guide 51:2014, 3.9]

### 3.2

#### **risk management**

coordinated activities to direct and control an organization with regard to risk

Note 1 to entry: Systematic application of management policies, procedures, and practices to the tasks of analysing, evaluating and controlling risk.

[SOURCE: ISO Guide 73:2009, 2.1, ISO 31000:2009, 2.2]

### 3.3

#### **equipment**

individual item that is part of a system, equipment is comprised of an assemblage of components Examples include pressure vessels, pressure relief devices, piping, boilers and heaters.

[SOURCE: API RP 581:2016, 3.1.23]

### 3.4

#### **inspection**

examination for conformity by measuring, observing or testing the relevant characteristics of an item

[SOURCE: EN 13306:2010, 8.1]