

Rev. 0

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Task Group 07

Fitness for Service and Risk Based Inspection

1st meeting minutes

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1 Date, Agenda and List of Participants to the TG7 1st meeting

- Date: June 03, 2021 10:00-13:00
- Agenda:
 1. Participant welcome and background
 2. General Presentation of TG7
 3. WP presentation and Participant remarks
 4. Planned Project Task contents
 5. Participants potential contribution
 6. Roadmap drafting
 7. Next meeting
 8. Meeting Closing
 9. Annex 1: EN 16991 April 2018: "Risk-based inspection framework (RBIF)"
- List of Participants

TG7 - 1st meeting participants				
Name	Company	E-mail	Status	Country
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Guy Baylac	Consultant	guy.baylac114@gmail.com	EPERC-BOD	France
Claude Faidy **	Consultant	claudio.faidy@gmail.com	EPERC-BOD	France
* : visio-conference organiser		** : TG7 Chairman		10 participants: I(5), F(3), NL(2)

2 General Presentation of TG7

Major objective: Review, Supplement and Validation of FFS and RBI Rules

- Contribution to PED Risk Analysis and Instruction notice requirements (Guides)
- Ageing Management and Surveillance/Inspection of PE in operation
- Degradation rate and Maximum allowable degradation
- Repair-Replacement criteria proposal
- Collection of material properties needs to perform all the analyses
- Comparison of all available International Code & Standards
- Gaps / Needs identification and associated **R&D program proposals**
- Best practices report (draft/final)
- definition, performance and syntheses of practical benchmarks
- proposal of **final best practice document** with all the validation limits of rules
- large knowledge transfer
- TG management using a detailed Road Map

3 WP presentation and Participant remarks

- 4 major degradations:
 - o cracks
 - o thinning and pitting
 - o excessive overload deformation or buckling
 - o loss of material properties
- 3 major steps:
 - o understanding of root causes and mechanisms
 - fatigue, corrosions, creep, high temperature hydrogen attacks
 - more specific one by industry types
 - o degradation rates
 - o maximum acceptable degradation: leak or break
- WP1 Generalities – Existing Codes & Standards
 - o **Task 1.1:** review of existing international Codes & Standards for:
 - **FFS** : ASME BPVC Section XI, RSEM/RCC-MRx, R5-R6, API-ASME, FITNET, BS 7910, JSME, KEPIC, VERLIFE...
 - **RBI** : ASME BPVC Sec XI Code Cases/Division 2 RIM, API 581, RIMAP, ENIQ, TWI, JSME, EN16991 ...

One participant remark: add EN 16991 April 2018: "Risk-based Inspection Framework (RBIF)"

- o **Task 1.2:** identification of Gaps and Needs
- o **Task 1.3:** draft "Best Practice Report"
- WP2: R&D Program
 - o **Task 2.1:** Crack analyses
 - Fracture mechanic parameters (K, J, C*): handbook or analysis method
 - Multiple defects interaction and interaction with free surface
 - Crack growth rate: fatigue, creep, corrosion
 - Critical crack size
 - Material properties base metal/ Heat Affected Zone / Weld
 - Residual stresses consequence
 - Leak Before Break procedure
 - o **Task 2.2:** Thinning – Pitting analyses
 - Rate and maximum allowable
 - o **Task 2.3:** Loss of material properties analyses
 - Thermal Ageing / Strain Ageing / Others...
 - o **Task 2.4:** Excessive deformation and buckling
 - Connected to overloads or compression loads

- Use of Design Codified Rules
- WP3: Surveillance program and In-service Inspection (ISI)
 - Techniques for surveillance of key parameters
 - ISI optimization: techniques, frequency, and performance
 - Risk Based Inspection
- WP4: Benchmarks on Practical cases
 - Benchmarks definition / Benchmarks performance / Benchmarks synthesis
- WP5: Project Synthesis and Conclusions
 - List of Document produced in the TG7 Project
 - Synthesis for each Work Package
 - Final Best Practice Reports
 - Code Case Proposal
 - Knowledge Transfer
- WP6: TG7 Management through a Road Map, / EC support
 - **Task 6.1:** TG7 Management
 - List of TG7 members and Chairman
 - List of actions
 - Detailed program of each task in a Road Map
 - Periodic update of the List of actions and Roadmap
 - **Task 6.2** TG7 Reports:
 - reviewed by TG7 Project members
 - and selected International Key Actors of the domain
 - All the documents of each Work Package will be released to:
all the TG7 contributors and EPERC members
 - **Task 6.3** Large Knowledge transfer
 - Workshop, Training, Conferences
 - **Task 6.4** Financial supports
 - **EC key documents** to require EC support directly by Participants
 - "How to Link Standardization with EU research projects"
www.cencenelec.eu/research
 - "Horizon 2020" December 2019
<https://ec.europa.eu/programmes/horizon2020/en/background-material>
 - "Strategic Plan" December 2019
https://ec.europa.eu/info/files/strategic-planning-process-and-strategic-plan_en
 - "Different CEN cooperation working products": ES, TS, TR, Gu, CWA
<https://www.cen.eu/work/products/cwa/pages/default.aspx>
ES: European Standard TS: Technical Specification TR: Technical Report Gu: Guide CWA: CEN Workshop Agreement
 - **EPERC Support**
 - No potential direct support from EPERC
 - Only organization/management support, information and document released
 - EPERC website management: www.eperc-aisbl.eu

4 Planned Project Task contents

4.1 Generalities

- Overview and "updated comparison" of existing international rules and standards
- Gaps and Needs
- New and future operating conditions, as high pressure, high and low temperature, new internal and external environment (including hydrogen...) including external hazards (seismic, flooding, wind...)
- Origins and mechanisms of the operating plant degradations
- Degradation rate and maximum available degradation

4.2 Crack consequences

- Fracture mechanic parameters: K handbook, J and C* estimation scheme
- Negligible creep criteria
- Multi-defect interaction and interaction with free surface
- Crack growth rate fatigue, creep, corrosions...
- Maximum allowable crack under monotonic and cyclic loads, including creep effects
- Material Properties:
 - o stress-strain curves, cyclic stress-strain curves
 - o crack growth rate: fatigue, corrosion, creep and interaction
 - o Environmental Effects: water, steam, hydrogen, others...
 - o Toughness properties (brittle, ductile, ...) and cyclic effects, strain ageing and thermal ageing
 - o Base metal, Heat Affected Zone (HAZ) and welds
- Residual stresses analysis methods, values and consequences
- Leak before Break procedure
- Typical Examples and Pre-analyze tools, as defect propagation by master curves...

4.3 Thinning and Pitting

4.3.1 Thinning

- List of mechanisms and environment leading to potential thinning
- Potential thinning areas: as flow accelerated mechanism or other mechanism
- Thinning rate and acceptable criteria
- Interaction of different thinning areas

4.3.2 Pitting

- List of mechanisms and environment leading to potential pitting
- Potential pitting areas
- Pitting rate and acceptable criteria

4.4 Loss of Material properties

- Thermal ageing
- Strain Ageing
- Others

4.5 Excessive deformation and buckling

- Associated to small overload and some compressive loads
- Use of Design code criteria

4.6 Surveillance program and in service inspection (ISI)

- Techniques: for surveillance of key parameters
- ISI optimization: technique, frequency and performance
- Risk Based Inspection: how to move from FFS to RBI, and consequences

4.7 Deliverables

- Road map for project management
- Existing International Codes & Standards comparison – Gaps and Needs
 - o **FFS** : ASME BPVC Section XI, RSEM/RCC-MRx, R5-R6, API-ASME, FITNET, BS 7910, JSME, KEPIC, VERLIFE...
 - o **RBI** : ASME BPVC Sec XI Code Cases/Division 2 RIM, API 581, RIMAP, ENIQ, TWI, JSME, EN16991 ...
- Complementary R&D program
- Recommended practices report:
 - o rules proposals associated to validation
 - o regularly updated along the Project
- Benchmarks and Practical case examples
- Knowledge transfer: EPERC Workshops, Conferences, EPERC training....
- Code Case proposal toward CEN-TC, different other European Groups and Industry using Pressure Equipment

5 Participants potential contribution

- Will be discussed at the next TG7 meeting
- A questionnaire will be largely launched for "potential contribution to TG 7" to an extremely large list of potential contributors and experts in different TG7 topics on a separated sheet

6 Roadmap drafting

- First draft after next meeting and questionnaire results

7 Next meeting

- **Web-conference on September 1st**

8 Meeting Closing

If you are not familiar with EPERC activities you can check the EPERC website and Newsletters

www.eperc-aisbl.eu

Annex 1 to TG7 1st meeting minutes

EN 13306 January 2018: **Maintenance - Maintenance Terminology**

EN 16991 April 2018: **Risk-based inspection framework (RBIF)**

1. New CEN Standard - EN 16991:2018 on "Risk-based inspection framework"

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 industry, power generation industry and other industries where RBI is applicable.

Sommaire

1. Scope
2. Normative References
3. Terms and definitions
4. Abbreviated Terms
5. The RBI framework
6. The RBIF process
7. Initial analysis and planning
8. Data collection and validation
9. Multilevel risk analysis (ranging from screening to detailed)
10. Decision making / Action plan
11. Execution and reporting
12. Performance review/Evergreening phase
13. Annex A (informative) Assessments

2. CEN/TC 319

CEN/TC 319 - Maintenance, developed and published in May 2018, a [European Standard](#) setting out the Risk-Based Inspection Framework (RBIF) and giving guidelines for Risk-Based Inspection and Maintenance (RBIM) in hydrocarbon and chemical process industries, power generation and other industries where RBI is applicable.

This European Standard [EN 16991:2018](#) on Risk-based inspection framework provides effective guidance for the optimization of operations and maintenance as well as asset integrity management. It helps improve risk management and, thus, the safety of the plants and their operation, environment and business management.

The document is a useful tool for managers and engineers establishing the risk-based inspection and maintenance policies in the process, power, steel and other relevant industries.

The Technical Secretariat of [CEN/TC 319 – Maintenance](#) is held by [UNI](#) – Ente Nazionale Italiano di Unificazione.

For more information contact: [Alina IATAN](#)

3. CEN/TC 319 Subcommittees and Working Groups

Working group	Title
CEN/TC 319/WG 10	Maintenance within physical asset management
CEN/TC 319/WG 11	Condition assessment methodologies
CEN/TC 319/WG 12	Risk based inspection framework (RBIF)
CEN/TC 319/WG 13	Maintenance process
CEN/TC 319/WG 14	Maintenance engineering
CEN/TC 319/WG 15	Safety and maintenance
CEN/TC 319/WG 4	Terminology
CEN/TC 319/WG 6	Maintenance performance and indicators
CEN/TC 319/WG 7	Maintenance of buildings
CEN/TC 319/WG 8	Maintenance functions and maintenance management
CEN/TC 319/WG 9	Qualification of personnel

https://standards.cen.eu/dyn/www/f?p=204:29:0:::FSP_ORG_ID,FSP_LANG_ID:6300,25&cs=11A36D18FDEBC4C3943F208DED3027C90#1