

EPERC

European Pressure Equipment Research Council



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EN 13445 – EN 13480

Gaps and Needs to progress in International Competitiveness

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Content

- ❑ Introduction
- ❑ Competitiveness
- ❑ Other similar Codes
- ❑ Questions with use
- ❑ Suggestions to progress
- ❑ Conclusions

- EN 13445 Part 1 to 5: Unfired Pressure Equipment
 - Conformity presumption with European PE Directive

- Competitiveness
 - In Europe
 - Outside Europe

- Other aspects
 - User friendly
 - Scope
 - State of the art
 - Connection with operation conditions and life

Competitiveness

- ❑ "Safe" and "economical" pressure equipment
- ❑ Selection of material and thickness for pressure resistance and shape stability
- ❑ Risk analysis in connection with planned operating conditions
- ❑ Analysis of margins in front of degradation mechanisms
- ❑ Fabrication, welding and control
- ❑ Instruction notice
- ❑ Final visit, including Pressure Test



Other similar Codes

- ❑ ASME Section VIII – Division 1, 2 and 3
- ❑ National Codes in some CE members

Questions with use ...

- Format/ content:
 - No design specification
 - No content of Risk Analysis
 - No content of Instruction Notice
 - "reasonably predictable" / "exceptional" definition and clarification of rules to fulfil
 - How to more consider Operation at Design level ?
- Scope to be enlarged:
 - High temperature
 - High Pressure
 - New materials
- External / Internal hazards
 - Consider all of them independently: rules, methods, data and criteria
 - Combination rules with other operating conditions

□ Design rules

– Cyclic loading

- Clause 18 needs review and supplement (including background)
- Ratchetting and plastic shakedown for high allowable stress f and $3f$ criteria
- Environmental effects for many types of fluids

– Non-linear Analysis

- Usable Appendix B with details for application, data, criteria to apply the rules
- Inconsistency with WNA-CORDEL Project for plastic collapse, plastic instability, fatigue and plastic shakedown
- Nozzles, under piping loads

– Bolted flanges

- Review and supplement, if necessary

– Buckling

- Review and supplement, if necessary

– Design Fracture analysis

- Meaning of Design by "Fracture Mechanics", used in PED ?
- Rules for basic fracture mechanics approaches, priority to ferritic steels, but not only

Questions with use ...

- Other failure modes and degradation mechanisms
 - Local failure, without cracks
 - Corrosion-Erosion
 - Corrosions
 - Thermal ageing ($TS \geq 320^{\circ}\text{C}...$)

- Materials
 - How to stay with so different material properties between Codes or Standards for the same chemical composition !!!!
 - Material strength
 - Cyclic stress-strain curves
 - Fatigue curves
 - What's the validation process used for Materials EN Standards developments

Suggestion to progress...

- ❑ 1. Large review of needs from Industry Users and potential future Users....., in Europe and outside Europe (including China)
- ❑ 2. Review of on-going R&D to support EN 13445 improvements
- ❑ 3. Detailed comparison last Edition of EN 13445 and ASME Section VIII, Div. 2
- ❑ 4. Prepare some appendices to cover "High Pressure components"
- ❑ 5. Re-start supplementary Tasks in TC 54, more industry representatives, more R&D representatives (EPERC...), associated to volunteers to write or re-write
- ❑ 6. Develop by TC54 + large review by external experts, a 3 to 5 years "Road Map for EN 13445 Improvements"

- ❑ More User Friendly:
 - Clarify Responsibility of actors
 - Clarify Content of documents by dedicated Appendices with Forms
- ❑ Enlarged the scope by considering new needs, like "High Pressure Vessels"
- ❑ Review needs of Industry and Views of Research organizations
- ❑ Compare EN 13445 and ASME VIII Div. 2
- ❑ Define a **3 to 5 years Road Map to "Improve EN 13445"** (TC54)

- ❑ **A similar program can be proposed for EN 13480 and different ASME B31 Codes, in particular non metallic piping (HDPE...)**