Design of Reactor Containment Systems for Nuclear Power Plant (DS482)

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The document (NS-G 1.10) was published in 2004

The current revision (DS 482) was initiated to:

- Comply with the long term structure of safety standards approved in 2008

- Provide design recommendations and guidance to fulfil the latest safety requirements in SSR-2/1, Rev.1(2016) with regard to:
  - Extension of the plant design envelope (design extensions conditions w/wo core melting)
  - Prevention and minimization of radiological releases in accident conditions
  - Avoiding early radioactive releases or radioactive releases large enough to require long term protective measures and actions
  - Implementation of defence in depth strategy
  - Cooling and stabilization of the corium
  - Control of the combustible gases
  - Containment venting
Overview of the Document

• The scope of NS-G 1.10 remains essentially unchanged
  
  - Section 2: Containment safety functions and design approach
  - Section 3: Design Basis of Containment Structures, Systems and Components
  - Section 4: Design of Containment structure and Associated systems
  - Section 5: Tests and Inspections
  - Appendix 1: NPPs designed with earlier standards (new)
  
However specific guidance and recommendations were added in section 3 and 4 for design of SSCs necessary in DECs, safety classification, implementation of DiD, identification of conditions which could lead to a failure of the containment in the event of an accident with core melting, control of combustible gases, rare and extreme hazards, etc.
The objectives of 2015 Vienna Declaration and the recommended action 35/6 of the 6th CNS Review meeting have been considered in this revision.
Status of the Document

- Draft DPP approved at 36th NUSSC and NSCG meetings (2013/11)
- Draft DPP approved at 35th CSS meeting (2014/04)
- The first draft was approved by the Committees (41th NUSSC/Step 7/June 2016)
- Member States consultation October 2016-January 2017
- Table of resolution of MS comments posted on the website in April 2017
- Submission to the Committees after resolution of MS comments in April 2017
- 2nd review of draft DS482 by Review Committees (43th NUSSC/Step 11c/June 2017)
Member States Comments: Summary

• Comments from Finland, France, Germany, Hungary, India, Japan, Republica of Dominica, Sweden, Tajikistan, United Kingdom, United States of America and from ENISS (Observer)

  – The comments were mainly to improve clarity/phrasing of the recommendations and for a consistent use of terminology.

  – There were no unresolved comments.
• Comments from NUSSC Members: Czech Republic, Finland, France, Germany, Japan, Korea, Pakistan, United Kingdom, United States of America, and from ENISS (Observer).

  – The comments and the proposals made by the reviewers were mainly to improve clarity of the recommendations

  – All comments were addressed and some proposed resolutions were discussed with the relevant Member to check whether the proposed resolutions appropriately addressed their comments.

  – After the follow-up, there are no unresolved comments
NUSSC Member Comments: Summary

• Follow up:
  
  – Korean practice included (item 5.24). Tendon monitoring programme is implemented instead of a structural integrity test.

  – Japan: 4.138 (new):”Where means are necessary to limit and remove hydrogen in the event of DBA, the means necessary to limit hydrogen concentration in the event of accident with core melting should be designed to be independent from those needed in DBAs”.

  – France: (new):”For clarity and consistency with the list of examples of conditions to be PE given in item 3.74, reference to the same foot note 3 is added in item 4.48

4.48 Acceptance criteria for leak-tightness and integrity given by Table 2 should be met in the event of accident conditions with significant core degradation, and conditions for a basemat melt through* should be practically eliminated for both of the design options retained for the core molten retention (In Vessel Retention or Ex Vessel Retention).

Foot note: These conditions should be analysed during the identification of situations to practically eliminate. Nevertheless, their consequences could generally be mitigated with implementation of reasonable technical means.
Requested Action

Technical approval by NUSSC to submission to Commission of Safety Standards for endorsement
Thank you!

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Member States Comments:

• All comments made to improve clarity/phrasing accepted
• Recommendations for the control of energy released inside BWR containment have been improved taking into account BWR specifics (small dry well, suppression pool)
• MS practices to conduct Integrated leak rate tests and structural integrity tests added
• Guidance to control hydrogen concentration improved