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Seismic Design of Building Structures and Components with regard to the revised German Safety Standard Series KTA 2201

Fritz-Otto Henkel[1], Rüdiger Meiswinkel[2] and Franz-Hermann Schlüter[3]

[1] Wölfel Beratende Ingenieure GmbH & Co KG, Höchberg, Germany
[2] MBI Bautechnik GmbH, Enkenbach-Alsenborn, Germany
[3] SMP, Consulting engineers for Civil Engineering, Karlsruhe, Germany

The safety standard series KTA 2201 entitled "Design of nuclear power plants against seismic events" is comprised of six parts where the part KTA 2201.1 represent the basis for the following five parts (see Elsche et. al. (2013)). With respect to a necessary revision of KTA 2201.1 the revision of all the others parts of KTA 2201 had become necessary. In this paper the actual revised parts 2, 3 and 4 of the safety standard series KTA 2201 will be presented

KTA 2201.2 deals with the determination and application of subsoil properties governing the seismic design of nuclear power plants. So requirements for the subsoil investigation are specified. Furthermore analytical procedures concerning the determination of dynamic subsoil properties are presented as well as important information about possible changes of the subsoil that might occur as a result of earthquakes and basic principles for the evaluation of soil liquefaction.

KTA 2201.3 defines the demands on the seismic design of building structures of nuclear power plants which exceeds those of conventional buildings given in European standards like Eurocode 8 (2010). So with respect to the fundamentals of KTA 2201.1 the structural analysis including the determination of building response spectra occupy a central position.

Furthermore in KTA 2201.3 as well as in KTA 2201.4 the verification procedures have been adjusted to those of the new generation of European standards called Eurocodes. These procedures require the consideration of the partial safety concept given in DIN EN 1990 (2010). With regard to the partial safety concept the verifications for ultimate limit states and serviceability limit states are specified for reinforced concrete and pre-stressed concrete structures as well as for steel structures.

In addition to KTA 2201.3 the part KTA 2201.4 is provided for the design of components. Consequently the secondary seismic responses (time histories or spectra) of the building structures will be assigned to KTA 2201.3 and in KTA 2201.4 the tertiary seismic responses will be dealt with. KTA 2201.4 specifies how to envelope computed spectra including rules for

cutting unrealistic spectral peaks. Furthermore KTA 2201.4 deals with the application of time history analysis and with the response spectrum modal analysis, pointing out the modal superposition with the CQC-method Also application of nonlinear analysis is explicitly addressed in order to open the KTA-standard for new methods of analysis. By contrast to the former version of KTA 2201.4 which dealt with verification by analogy and plausibility in a rather poorly state, the chapters “verification by similarity” and “experienced based verification” are separated now and can be found generally on an equal footing with computational and experimental methods. The experimental methods for verification comprise a large part of KTA 2201.4. But here refinement only of the specifications proved to be sufficient. A substitute procedure for approximately estimating response spectra, now part of KTA 2201.3 – secondary spectra – and KTA 2201.4 – tertiary spectra – is dealt with in Henkel (2013).

References

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