

KIT Stahl- und Leichtbau Karlsruher Institut für Technologie (KIT)	Kurzfassung: Vergleichsberechnungen zu stehenden zylindrischen Tanks	Seite 2 von 3	
		Datum: 27.10.2017	Version: 1

Comparative calculations on cylindrical tanks

Within the scope of the research project “comparative calculations on cylindrical tanks”, commissioned by the Deutsche Institut für Bautechnik (German Institute for Structural Engineering) the standard DIN EN 1993-4-2 was examined against the background of a technical introduction and the uncertain safety level that exists for a design in the new standard environment consisting of DIN EN 1991, DIN EN 1993 and DIN EN 1993-4-2. Weak points were identified, discussed and proposals for an improvement of the standard were elaborated.

Starting point of the investigations is that, in the course of the conversion to the Eurocodes, the tank construction standard DIN 4110 that had been used for a long time in the Germany was replaced by other standards.

These are DIN EN 1993-1-6 as basic standard for shell structures as well as DIN EN 1993-4-2 as design standard for tanks. In addition, there is EN 14015 as application standard for tanks (not mandated) and EN 14620 (low temperature). Furthermore, in the load standard DIN EN 1991-4 for tanks, loads and partial safety factors were defined deviating from previous specifications.

The investigations are based on three geometries of a small, mean and large dimension agreed upon with the supporting group, and cover the usual tank geometries designed according to EN 1993-4-2. In addition to the dimensions, different representative load scenarios are compared. Five static calculations each according to DIN and EC provide the basis for a comparison of the safety level. The differences discovered through the direct comparison of the static calculations have been then theoretically processed and justified. At the same time, a general increase of the safety level was detected. This is based on other safety factors and more comprehensive design methods.

Furthermore designs which are not covered by the DIN EN 1993-3-2 compared to DIN 4119 where identified. Investigations on the connections to the application standards EN 14015 or rather EN 14620 complete the presentations. The results of the investigations are processed in a commented version of DIN EN 1993-4-2, in an extensive final report, 10 verifiable statics as well as an explanatory background document on the static calculations.