BESONDERE ASPEKTE DER HEISSGASFÜHRUNG BEIM THTR-300-MWE-PROTOTYP-KERNKRAFTWERK

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The hot gas duct consists of gas channels in the bottom of the core with receivers and the hot gas channel. The hot gas duct has to satisfy a number of requirements which are partly quite opposite to another. Most of the problem can not be solved by theoretical methods.

The hot gas leaves the core with different temperatures and has to be mixed, when it reaches the entrance of the heat exchanger. On the other hand the pressure loss should be as small as possible, to get a minimum of blower performance required and a great efficiency. An equalized profile of velocity should be obtained in spite of several deflections.

The supporting structure of the hot gas channel is protected against high temperatures by a thermal insulation. The thermal insulation affects the thermal efficiency of the reactor, and it requires also small pressure losses and an equalized profile of velocity of the gas without any bypass-flow in the insulation.

The transmission of the forces resulting of the outer pressure to the bottom and to the liner, as well as a free thermal expansion have to be guaranteed. Results of experiments show that the construction of the hot gas duct fulfills all the requirements.

The pressure conditions of the hot gas channels have been tested on a 1/6 sector model of the core connected with hot gas channel and lower part of the shell of the heat exchanger.

The tests included different structural forms of the hot gas channel, on the one hand sharp-edged and rounded, on the other hand cranked and in line. The influence of the perforated plate has been tested too.

Tests showed that the gas was mixed sufficiently to meet all requirements of the manufacturers of the heat exchangers. The distribution of the velocity of the gas at the entrance of the heat exchanger could be corrected by variations of the free cross-section area in the perforated plate.

The distribution of the velocity of the cold gas has been measured at the outside of the channel to obtain knowledge whether the cooling of the supporting structure was homogeneous or not. The mass-flow of the bypass and the deformations of the bellows has been tested at various positions to get an optimum structure.