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# SHIELDING DESIGN OF ITER PRESSURE SUPRRESSION LINE

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Since the size of NBI tank is very large, the volume of the tank can be effectively utilized for relieving the unexpected in-vessel pressurization during LOCA in the vacuum vessel of ITER. The pressurized steam is guided further to an in-vessel pressure relief line connected to the NBI tank. Rupture discs are installed in the line to make the vacuum boundary during normal operations. Since neutrons stream through the line, the pressure relief line must be designed so that the dose rate due to the activation of the rupture disc is lower than the allowable level 10 μSv/h for the maintenance work.

Several designs of the pressure relief lines were studied for the streaming effect with a simple design code DUCT-III. The amounts of the rupture disc activation were compared among the design options to decide the best size of the cross section, the number of bends and the length of each leg, and the duct size larger than 1.2 m _ 1.2 m in cross section, more than one bends and the first leg longer than 300 cm were found reasonable to suppress the streaming effect below the criteria.

In addition to the streaming neutrons, permeating components from the first to the second or third leg through the duct shield may enhance the activation of the rupture disc. In order to decrease this component, thick iron shield surrounding the line is required. It is clear that the thicker shield is more effective to resist the intruding component from the outside, however, the thick shield may increase the streaming neutrons, and raise adverse design conditions against earthquake in addition to the problems concerning radioactive material disposal after the decommission. The neutron permeation through the shield was studied by Monte Carlo calculations with MCNP code, and the result mentions that 15 cm thick iron shield must be enough to suppress the permeating component from the outside. In addition, it does that about 30 % the volume of the shield can be reduced if the optimized iron shield structure having localized thickness along intense permeation path is employed to shield the pressure suppression line.