

Quick Closing/Opening System for Drywell Covers in Nuclear Plants



After the securing pins of the quick closing/opening system are released, the drywell cover can immediately be lifted off with a crane

The containment of boiling-water reactors of the General Electric type contains a pressure-tight part of the structure—the drywell—which encloses the reactor pressure vessel and the connected circuits. On the occurrence of leakage in the primary system, the drywell almost completely prevents radioactive substances from escaping into the containment. In the event of a maximum credible accident, it serves also to intercept the steam emitting from a broken steam or recirculation line, and to divert it to the suppression pool as a mean of relieving the pressure.

Since for refueling and maintenance work the reactor pressure vessel must be accessible from above, the drywell is fitted with a gas-tight cover. For technical and economic reasons, the cover must be opened and closed in the shortest time possible. Today, the Sulzer quick closing/opening system, which has proven itself in the Leibstadt Nuclear Power Station, therefore provides a viable retrofitting alternative to reactor operators in place of the conventional bolted drywell cover flange connection.



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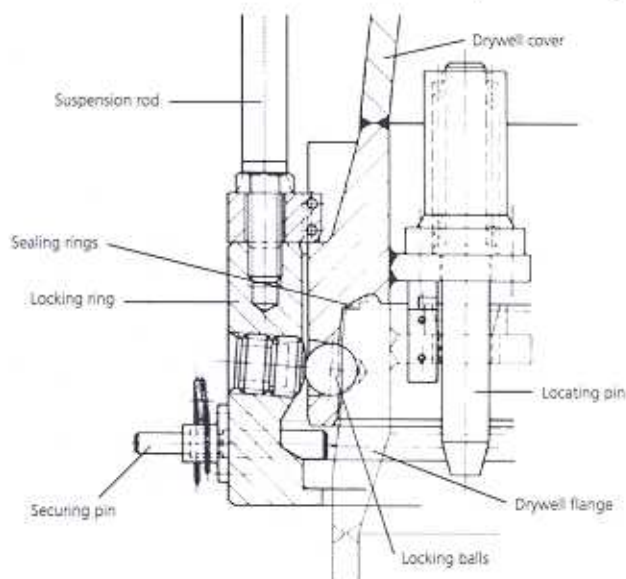
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The innovative design

The drywell cover quick closing/opening system of the Leibstadt Nuclear Power Plant as an example

For the Leibstadt Nuclear Power Plant, Sulzer has developed and patented a quick closing/opening system. With this system the drywell cover can be lifted off with a crane immediately after releasing only four securing pins. While the reactor is in operation, the cover is covered with water for the purpose of shielding against nuclear radiation. For this reason the cover, the quick closing/opening

cover closure. To release the connection, the locking ring is lifted upward, permitting the balls to slide into a recess in the ring, thereby unlocking the drywell quick closing/opening system. The locking ring is connected with the movable cover suspension device via linkage rods, and at the bottom it is furnished with an inward-facing projection on which the cover rests during lifting. After the four securing pins are removed and the crane hook is attached by remote control, the drywell cover can be lifted off without any further measures having to be



Sectional drawing of the quick closing/opening system.

system and the actuating device have been manufactured of stainless steel.

The function of the drywell quick closing/opening system

Radial bores arranged around the circumference of the flange of the drywell cover (diameter about 9.2 m) contain stainless steel balls which, when the quick closing/opening system is in the closed condition, are held in hemispherical bores in the drywell flange. The radial clearance is adjusted by means of adjusting screws to produce a positive connection between the drywell cover and the drywell flange. Two inside sealing rings afford verifiable sealing of the



The drywell is sealed gas-tight with this cover with the quick closing/opening system.

taken. In addition to the enormous shortening of the time required for the opening and closing of the drywell from about 1 day to a maximum of 20 minutes, the time that service personnel are exposed to radiation, which is subject to increasing regulation, is reduced substantially.

Further application possibilities are found wherever vessels with covers have to be opened and closed in a minimum of time. Sulzer Thermtec stands at your disposal for clarifications on specific applications.



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