

Reactor Coolant Pump: Sigma™ Seal

The Westinghouse Sigma Reactor Coolant Pump Seal provides reliable performance and costs savings to support safe and long-term plant operation.

What is the Sigma Reactor Coolant Pump Seal?

The Sigma seal was developed from 30-plus years of positive operating experience and lessons learned with original #1 seal design, state-of-the-art design methods, and a complementary full-scale testing facility to create a fit, form and functional replacement seal that meets the demands of today's PWR fleet.

The seal design integrates seamlessly into the existing plant equipment and is compatible with the Westinghouse SHIELD® Passive Thermal Shutdown Seal resulting in a comprehensive and cost-effective sealing solution that provides unprecedented reliability and service life with integrated passive safety features.



*Westinghouse Reactor Coolant Pump #1 Sigma Seal.
Applicable to Models 93, 93A, 93A-1, 93D and 100A/D*

Designed for 12 years of operation

Qualified to work seamlessly within the plant's existing operating and licensing basis, the Sigma seal design is capable of providing up to 12 years of continuous operation with reliable seal performance.



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The Sigma seal includes a hydrostatic number 1 double-delta channel seal (DDCS) that offers stable leakage between 2.5 and 3.5 GPM and integrates design features that offer*:

- 400 times reduction in DDCS wear
- 40% improvement in performance predictability
- 60% reduction in thermal sensitivity
- 50% reduction in failure modes
- 20% reduction in sensitivity to particle depositions

Benefits

- Reduces seal maintenance costs
- Decreases refueling outage dose
- Eliminates seal installation issues
- Prevents plant start-up delays attributed to low-pressure operation and seal hang-ups
- Reduces probability of a forced outage due to seal performance
- 20,000 hours of development, functional and qualification testing:
 - Full-scale dynamic endurance (4,000 hours)
 - Station Blackout
 - Fire Scenario (NFPA 805, Appendix R)
 - Safety injection restarts (cold water injection)
 - Tribological sensitivity and wear testing

Availability

The Sigma number 1 seal will be available starting in fall 2018.

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*Based on industry statistics of current and previous seal designs

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