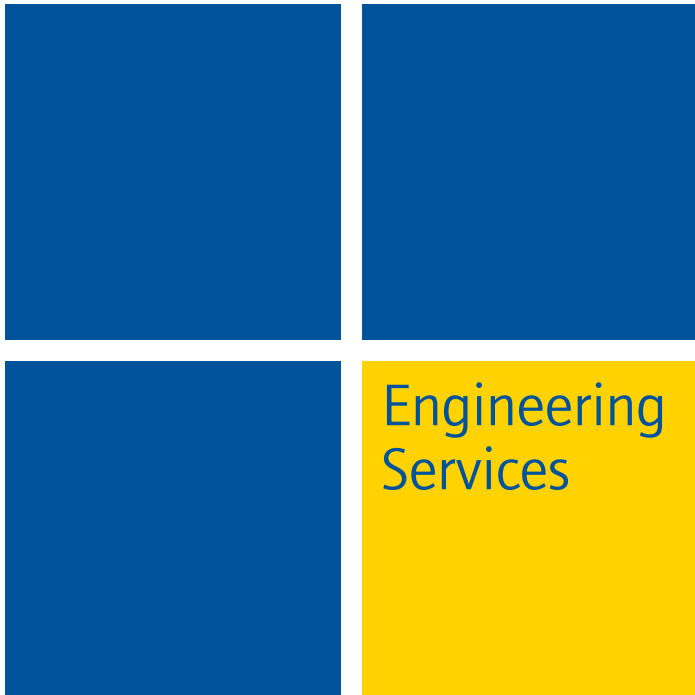


# Permanent Cavity Seal Ring (PCSR)



Engineering  
Services

## Background

Conventional cavity seal rings must be installed and removed during each outage. They are difficult to handle and allow significant leakage past the seals. Westinghouse has designed the Permanent Cavity Seal Ring (PCSR), a permanently installed, stainless steel structure with flexures to compensate for thermal growth and seismic movement.

## Benefits

The Westinghouse-designed PCSR offers the following advantages:

- Eliminates installation and removal of cavity seal ring during each outage, reducing critical path time and radiation exposure.
- Eliminates or minimizes the potential for cavity seal ring leakage and associated problems (such as corrosion of equipment from boric acid).
- Minimizes chances of a catastrophic failure that could result in rapid loss of cavity pool water during refueling.
- Eliminates need to store cavity seal ring when not in use, freeing valuable storage space in containment.
- Provides a convenient integral walking and working surface during refueling.
- Is completely seal-welded, eliminating future outage attention to prepare, inflate, monitor, deflate, or otherwise maintain an alternative.



## Description

The top plate and inner and outer support rings of the PCSR provide structural support for the weight and pressure loads. The PCSR incorporates two stainless steel L-shaped flexure seals that absorb radial and vertical expansion in the vessel.

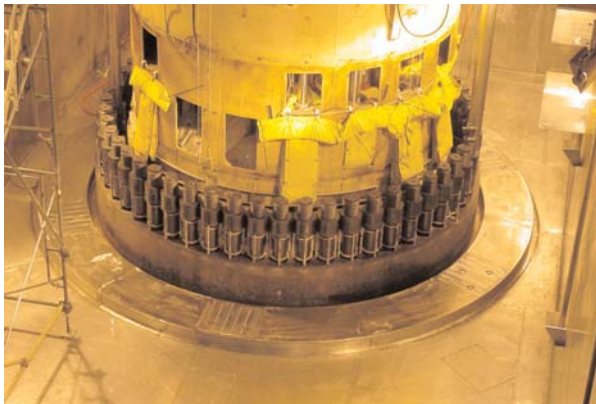
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The inner and outer seals are shop-welded to the PCSR top plate, minimizing the amount of field welding. The assembly is typically supplied in three 120-degree segments that are field-welded together during installation to form a single unit that spans the entire annulus between the reactor vessel and cavity floor.

The PCSR includes hatches with captured bolts, each fitted with a lifting handle. Prior to plant operation, the hatches are removed. The openings in the top plate provide the required air flow area for plant operation.

Before refueling, the hatches are installed. Each hatch incorporates two captured O-rings with a leak test port between the O-rings, allowing pneumatic testing of the seals prior to flood-up.

Optional neutron shielding is available as an integral part of the permanent cavity seal ring for those plants presently using temporary neutron shielding, such as water bags.



## Experience

Westinghouse has provided PCSRs to the following nuclear plants as a backfit installation:

- Wolf Creek
- Seabrook
- Calvert Cliffs 1&2
- St. Lucie 1
- Shearon Harris
- Haddam Neck
- Waterford 3

Also, PCSRs have been provided as original equipment to:

- South Texas 1&2
- Vogtle 1&2
- Comanche Peak 1&2
- Doel 4
- Tihange 3
- Sizewell B

## Deliverables

The Westinghouse-designed PCSR can be delivered and installed 12 months after receipt of order.

Westinghouse provides the following:

- Qualified procedures
- Qualified personnel
- Hardware
- Design information package (layout drawings, general assembly drawings, design report, etc.)

Westinghouse Electric Company  
Box 355  
Pittsburgh, PA 15230

[www.westinghousenuclear.com](http://www.westinghousenuclear.com)

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