



High Temperature Radial Seals

Global Leader in Cement Process Technology Since 1985

Since 1985, Oswal kiln seal has specialized in precision-engineered systems for the cement industry, focusing on process stability, material handling, and quality control. With deep domain expertise and a process-driven approach, the company delivers reliable solutions that enhance efficiency, reduce variability, and ensure consistent plant performance aligned with global standards.

Key Benefits

■
Industry
Leadership

■
Pioneering
Innovation

■
Maximise energy
efficiency

■
Optimise
performance

■
Safety and
Reliability

High Temperature Radial Seals

Radial sealing systems operate at one of the most critical mechanical interfaces of the rotary kiln — where continuous rotation, thermal expansion, circumferential contact, and abrasive conditions must be precisely managed in real time.

Unlike axial sealing systems, radial seals are responsible for maintaining uniform contact along the entire kiln circumference, directly influencing false air ingress, draft stability, and thermal efficiency. This requires a delicate balance between contact pressure, movement compensation, and material durability.

Under operating conditions, the kiln shell undergoes significant thermal expansion, ovality variation, and dynamic deformation. A rigid sealing system will bind and fail under expansion, while an overly flexible system will lose sealing pressure and allow uncontrolled air leakage.

Oswal Kiln Seal has developed high-temperature radial sealing systems engineered for precision contact control under real operating conditions — not static assumptions.

By integrating optimized geometry, controlled pressure distribution, and adaptive expansion compensation, the system ensures continuous circumferential sealing without excessive friction or structural stress, delivering stable performance across all thermal cycles.

Key Advantages

- Controlled circumferential sealing across full kiln perimeter
- Effective reduction in false air ingress
- Stable sealing contact under thermal expansion
- Low friction with minimized wear
- Improved draft stability and thermal efficiency
- Long operational life with reduced maintenance

Engineering Concept

Radial sealing requires a system that can maintain continuous shell contact while dynamically adapting to expansion and rotation.

Oswal's design is based on:

- Precision-controlled contact force
- Adaptive response to shell expansion and ovality
- Uniform pressure distribution along sealing arc

This ensures consistent sealing performance without over-constraining the system.

The Principle of Contact Control & Expansion Compensation

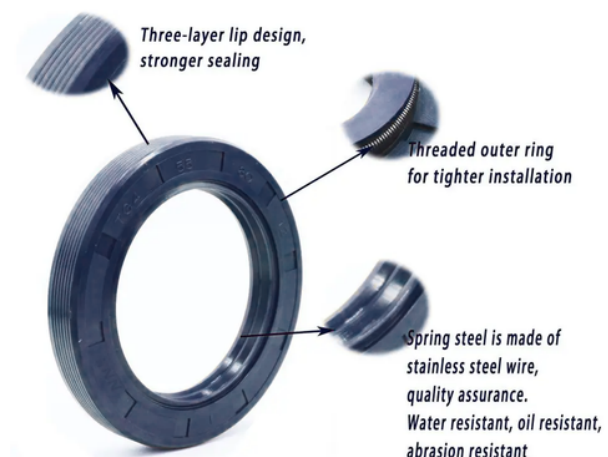
Critical sealing requirements:

- Continuous circumferential contact
- Controlled sealing pressure
- Adaptation to thermal expansion
- Resistance to abrasive wear

The system ensures:

- Stable contact during rotation
- Expansion without binding
- Sealing integrity across thermal cycles

Result: Reliable sealing performance under continuous dynamic conditions



Radial Seal System Operation

Continuous sealing maintained during:

- Kiln rotation
- Thermal expansion and contraction
- Shell ovality variations
- Process load fluctuations

Adaptive response to:

- Diameter changes during heat-up
- Pressure variations
- Mechanical distortions

Outcome:

Uniform sealing contact across the kiln circumference.

Precision Geometry & Contact Control

- Optimized contact surface geometry
- Uniform pressure distribution across sealing arc
- Precision-machined structural supports
- Controlled compression mechanisms

Thermal Expansion Compensation

- Expansion synchronized with kiln shell growth
- Maintains sealing contact without binding
- Prevents excessive pressure during heat-up
- Avoids gap formation during cool-down cycles

Material & Durability Engineering

- High-temperature resistant materials
- Wear-optimized contact surfaces
- Reinforced structural supports
- Stable friction characteristics under continuous operation

Draft & Process Impact

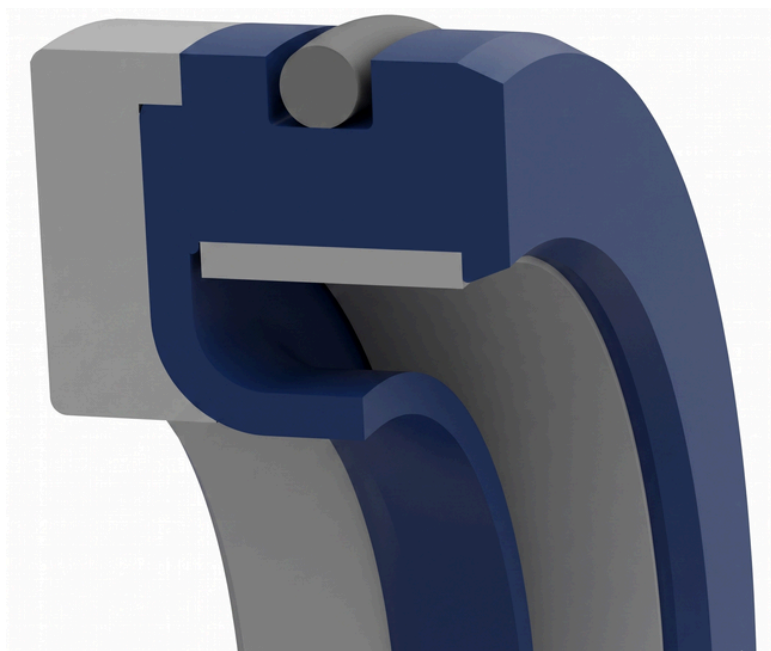
- Reduced circumferential air leakage
- Improved draft stability
- Enhanced thermal efficiency
- Reduced energy losses
- Consistent kiln operating conditions

Operational Advantages

- Continuous sealing under dynamic rotation
- Reduced friction-induced wear
- Extended component lifespan
- Lower maintenance requirements
- Improved process reliability

Typical Applications

- Cement rotary kilns
- High-temperature clinker production systems
- Lime and mineral processing kilns



Problem vs Solution

The Challenge

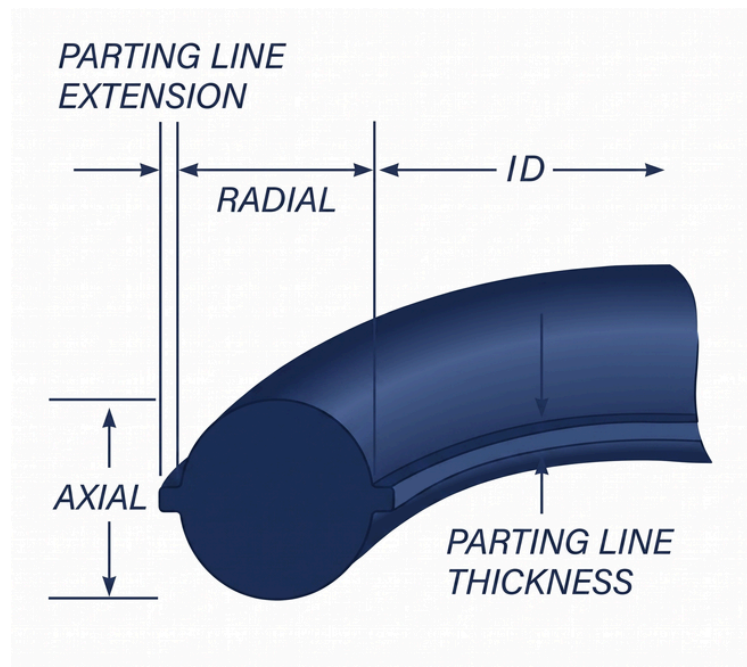
- Loss of sealing due to thermal expansion
- Excessive friction or binding
- Circumferential air leakage
- Rapid wear under dynamic contact

Oswal Radial Seal Solution

- Precision contact control
- Adaptive expansion compensation
- Uniform pressure distribution

Proven Industry Impact

- Reduced false air ingress
- Improved thermal efficiency
- Stabilized draft conditions
- Increased equipment life
- Reduced operational cost



Engineering Outcome

Controlled circumferential sealing. Adaptive expansion compensation. Stable contact without excessive friction.

High-Temperature Radial Seals by Oswal Kiln Seal deliver precision sealing performance under continuous thermal and mechanical load — ensuring reliable operation, improved energy efficiency, and long-term durability.

Oswal's high-temperature radial sealing system introduces a highly robust mechanical architecture designed with:

- Continuous Radial Conformity Under Thermal Expansion
- Thermally Reinforced Structure to Withstand Extreme Radiated Heat
- Optimized Perimeter Tension Distribution

SUSTAINABILITY IMPACT

Reducing Energy Loss at the Source

- The Oswal High-Temperature Radial Seals guarantee precision thermal containment at the source, preventing costly resource and BTU waste.

Result:

- Zero thermal energy rejection through precise, high-elasticity radial sealing.
- Enhanced fuel-to-clinker/melt efficiency by securing uniform internal process temperatures.

Thermal Efficiency & Power Optimization

Equipped with advanced multi-layered alloy and composite elements, the radial seal is designed to deliver high-precision sealing performance under extreme thermal expansion with a highly optimized friction profile.

- Low-Friction Thermal Barrier
- Smart Thermal Expansion Tolerance

Aligned with Global Sustainability Goals

Oswal sealing systems support global, industry-wide initiatives focused on sustainable resource management, carbon emission reduction, and automated operational excellence in extreme environments.

Emission Control & Environmental Performance

Maintaining a completely sealed process environment is critical for industrial workplace safety and stringent emission targets. The Radial Seal's multi-ply, dust-tight construction ensures that fine particulates, hazardous gases, and volatile emissions are fully contained during active rotation or static cycles.

- Zero Gas and Dust Leakage
- Fugitive Emission Elimination
- Safe Hazardous Material Containment

Process Stability & Resource Efficiency

Unbiased, resilient mechanical sealing cycles directly translate into optimized plant resource management and extended equipment lifecycles.

- Consistent Internal Pressure Profile
- Reduced Temperature Fluctuations
- Minimized Component Replacement Wastage



Zero thermal wastage. Absolute particulate containment. Optimized mechanical consumption. Oswal Radial Seal Systems enable cleaner, more efficient, and resource-responsible plant operations.



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