

Primary function — seal between a rotating shaft and a stationary housing to retain lubricant and exclude contaminants (single-lip or double-lip designs; optional dust lip).

Common materials (sealing lip): NBR (nitrile) for general oil/grease service, FKM/Viton for higher temperature and aggressive fluids, HNBR for higher temperature/chemical resistance, PTFE or PTFE-composites for low friction / special media. Case can be metal with rubber outside diameter (rubber-covered OD) or full metal.

Temperature ranges (typical by material): NBR ~ -40 ° C to $+100$ ° C (short excursions higher); FKM ~ -25 ° C to $+150$ ° C (depends on compound).

Dynamic limits (typical): circumferential/shaft surface speed and pressure depend on design & material: many industrial radial lip seals are rated up to $\sim 10 - 12$ m/s for NBR and $\sim 35 - 38$ m/s for FKM in manufacturer guidance; typical low differential pressure capability (non-pressurised to ~ 0.5 bar for many designs). Use the seal data sheet for exact service limits.

Shaft counterface & hardness: recommended shaft hardness $\geq \sim 45$ HRC for long life (or hardened/chrome plated surface). Shaft surface finish recommended $R_a \approx 0.2 - 0.8$ μm (ISO/DIN recommendations vary with seal type — some ranges use $R_a 0.2 - 0.5$ μm for the sealing area). Housing bore tolerance typically H8; shaft tolerance commonly h11 for many industrial designs.

Typical spring / energiser: garter spring at the lip root is common for single/double lip seals; some designs use no spring (PTFE/metal combinations).

Standards & families: many industrial radial seals follow DIN 3760 / ISO 6194 and OEM catalogue families. Use the catalogue designation (e. g., 20×40×7 HMSA10) when searching or ordering.