Mechanical Seals — Identification, EN 12756, Selection

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How to identify, specify and replace a pump mechanical seal without the OEM drawing: the EN 12756 (DIN 24960) dimension system and its L1k working lengths, face material pairs from carbon/SiC to SiC/SiC and tungsten carbide, elastomer selection by medium and temperature, balanced against unbalanced and single against double arrangements, the API 682 flush-plan shorthand worth knowing ashore and afloat, failure-mode reading from the old seal, and the measurements that make a seal RFQ quotable in one pass.

The short version

Most industrial pump seals are dimensionally standardised: EN 12756 (the old DIN 24960) defines shaft diameters, seat formats and the L1k working length for short (K) and long (N... historically; current practice quotes the standard length series) patterns — which is why a 25 mm EN 12756 seal from one maker drops into another maker's pump. Identification is measurement, not archaeology.

A seal is specified by five things: shaft size, working length/format per EN 12756 (or the maker's drawing where proprietary — cartridge seals especially), face pair, elastomers, and metal parts — written like "25 mm, EN 12756 short, Car/SiC, EPDM, 1.4571". Our catalogue carries the common sizes as stock articles, e.g. 20 mm Car/SiC/EPDM, 25 mm Car/SiC/FKM, 35 mm Car/SiC/EPDM.

Face pairs carry the duty: carbon vs silicon carbide is the clean-liquid default; SiC vs SiC for abrasive or crystallising media; tungsten carbide where shock and dry-run abuse happen. Harder is not better everywhere — hard/hard pairs demand better lubrication from the pumped film.

Elastomers die first: EPDM for hot water and steam-adjacent duty (never mineral oil), FKM/Viton for oils, fuels and broad chemistry (not hot water/steam, not amines), NBR for cool oil duty, FFKM (see the FFKM chart) when chemistry defeats the rest. Matching the O-ring set to the medium is half of seal life.

OEM cartridge seals cross-reference by pump, not by guesswork: Grundfos shaft-seal codes decode per our HQQE/HQQV/AQQE guide; John Crane, EagleBurgmann, Roten and AES patterns interchange where dimensions and materials match — stated per line, never silently.

1. Reading the old seal — identification that survives a seized pump

Measure / observe | How | What it fixes |

Shaft or sleeve diameter | Vernier on the shaft where the seal ran (d1) | The headline size — EN 12756 runs the standard steps (10–100 mm) |

Working length under compression | Old seal's set length, or housing depth vs seat position | Short vs long pattern; wrong length = no face load or coil-bind |

Seat (stationary) type and O.D. | G-type seat profiles: plain cup, O-ring mounted, clamped | The stationary half must fit the housing bore and its O-ring groove |

Rotary construction | Single spring, multi-spring, elastomer bellows, metal bellows, wave spring | Bellows types forgive deposits on the shaft; multi-spring suits higher speeds |

Face materials | Carbon is matte black and light; SiC dark grey, ceramic white, TC heavy metallic | The duty story the last engineer chose — upgrade knowingly, never downgrade blindly |

Elastomers | Colour/feel is unreliable — go by medium and temperature instead | EPDM/FKM/NBR/FFKM selection per section 3 |

Drive and hardware | Set screws, drive pins, clamp ring; metal parts magnetic or not | 316-class (1.4401/1.4571) is the marine default; magnetic hardware in seawater duty is a finding |

Send exactly that list — seven lines and two photos (face side, spring side) — and any competent supplier returns a quotable match. The pump nameplate (maker, type, impeller size) upgrades the answer from dimensional match to OEM-correct article, including the kit variants with sleeve and seat where the pump uses them.

2. Face material pairs

Pair (rotary/stationary) | Habitat | Strengths | Limits |

Carbon / SiC (or carbon / ceramic in light duty) | Clean water, seawater, oils, condensate — the general-service default | Forgiving, low friction, tolerates marginal lubrication | Carbon wears in abrasives; ceramic cracks under thermal shock |

SiC / SiC | Abrasive, crystallising, high-temperature duty — e.g. SiC/SiC transfer-pump kits, tank-cleaning booster pumps | Hardness, chemical breadth, heat | Needs a liquid film — dry running kills it fast; brittle to mechanical shock |

Tungsten carbide / SiC or TC/TC | Slurries, shock loads, sloppy operation | Toughness, dry-run abuse tolerance (relative) | Weight, galvanic care in some media, price |

Carbon / TC | Legacy general duty at higher pressure | Proven at load | Superseded by Car/SiC in most new work |

3. Elastomers — where seals are really won and lost

Elastomer | Service window | Right for | Never for |

EPDM | " 40…+120 °C class (peroxide-cured higher) | Hot fresh water, glycols, many chemicals, steam-adjacent |

Mineral oils, fuels, greases — it swells and dies |

FKM (Viton class) | " 15…+200 °C class | Oils, fuels, broad chemistry, air | Hot water/steam, amines, some esters — hydrolysis cracks it |

NBR | " 30…+100 °C class | Cool oil and fuel duty, economy general service | Heat, ozone/weathering, aggressive chemistry |

FFKM (Kalrez/Chemraz class) | to +230…320 °C by grade | Aggressive solvents, acids, hot chemistry — see the FFKM compatibility chart | Budgets that the duty does not justify |

The failure chemistry is usually visible: swollen, gummy O-rings = wrong elastomer for the medium; hard, cracked rings = heat or the FKM-in-steam trap; nibbled rings = explosive decompression or installation damage. Replace the elastomer set to the medium, not to what happened to be in the box last time — and on drinking-water and food duty, specify the approval (WRAS/KTW/FDA class) on the line.

4. Arrangements and flush plans — the shorthand worth knowing

Single internal seal is the default; balanced construction (hydraulically relieved faces) takes higher pressures and runs cooler at the same duty — the step to specify above roughly 10–15 bar seal-chamber pressure or on sensitive media. Double seals (back-to-back with barrier fluid, or tandem with buffer) contain hazardous, crystallising or gassing media and buy dry-run security at the cost of a support system. The API 682 plan numbers name the plumbing around the seal, and the handful worth recognising on requisitions: Plan 11 (discharge recirculation through an orifice to the faces — the industrial default), Plan 13 (recirculation back to suction, vertical pumps), Plan 21 (cooled recirculation), Plan 23 (closed loop with cooler — hot water/boiler feed), Plan 32 (clean external flush into the chamber — slurries), Plan 52/53A-C (unpressurised/pressurised dual-seal support), Plan 62 (external quench — steam on hot hydrocarbon, water on crystallisers), Plan 65/66 (leakage detection). A seal RFQ that names the plan tells the supplier the duty's whole story in two characters.

5. Quotable lines and honest substitution

The complete RFQ line: pump (maker, type, serial if OEM-correct is wanted), shaft size and standard/length (EN 12756 short/long, or "cartridge — see photos"), faces / elastomers / metallurgy, medium, temperature, pressure, speed, and quantity with a spare set — because the pump that ate one seal will be opened again. Substitution rules we quote by: dimensional equivalents across John Crane, EagleBurgmann, Roten, Vulcan and AES classes are legitimate where every one of the five specification elements matches and the arrangement/plan is respected — stated as "dimensional equivalent to type X" on the line; OEM cartridges (Grundfos HQQE-class, 22 mm / 28 mm, HQQV 12 mm, or DESMI ROTAN kits) stay OEM-pattern unless the owner signs off a conversion. Related rotating-equipment references: the radial shaft seal guide for lip seals that neighbour the gland, and the ISO 4406 guide for the oil cleanliness that decides bearing and seal life together.

How buying works at cballast. We quote OEM and dimensional-equivalent seals side by side with the basis stated per line, kits with sleeves and seats where the pump uses them, and spare sets priced into the first quote. Accounts are vetted at onboarding; first order prepaid; established accounts on credit terms with repeat discounts; public bodies and utilities invoiced against purchase order from the first order. RFQs to sales@cballast.com.

Frequently asked questions

How do I identify a mechanical seal without a part number?Measure the shaft diameter, establish the working length and whether the pattern is EN 12756 short or long, note the seat type, faces and elastomers, and photograph both sides. Those data quote a dimensional match; the pump nameplate upgrades it to the OEM-correct article.
What is EN 12756 / DIN 24960?The European dimension standard for mechanical seals — shaft sizes, seat formats and working lengths. Its point is interchangeability: a compliant 25 mm short-pattern seal from any maker fits the same cavity. DIN 24960 is the historic name still printed on drawings; the content lives on as EN 12756.
Carbon/SiC or SiC/SiC faces — which do I need?Carbon against silicon carbide for clean liquids — forgiving and the general default. SiC against SiC when the medium is abrasive, crystallising or hot. Hard/hard pairs need a decent liquid film; if the pump runs dry in normal operation, fix that or specify accordingly, because no face pair survives chronic dry running.
Which O-ring material for my pump seal?By medium and temperature: EPDM for hot water and glycols (never oil), FKM for oils and fuels (never hot water/steam), NBR for cool oil economy duty, FFKM when aggressive chemistry rules the rest out. The elastomer set usually decides seal life before the faces do.
What is the difference between balanced and unbalanced seals?Balanced seals geometrically relieve part of the hydraulic closing force, so the faces run cooler and survive higher pressures; unbalanced seals are simpler and fine at low pressure. Above roughly 10–15 bar in the seal chamber, or on heat-sensitive media, specify balanced.
What does API Plan 11 (or 52, 53) mean?API 682 plan numbers describe the piping around the seal: Plan 11 recirculates discharge flow across the faces (the common default), Plan 23 runs a cooled closed loop, Plan 32 injects a clean external flush, Plans 52/53 support dual seals with unpressurised/pressurised barrier systems, Plan 62 quenches the atmospheric side. Naming the plan on an RFQ communicates the whole seal environment.
Can I replace an OEM cartridge seal with a generic one?Sometimes — where dimensions, materials and arrangement genuinely match, a dimensional equivalent is legitimate and we state it as such on the quote. But cartridge geometries are often proprietary, and warranty or classed service may require OEM pattern. The honest answer is per-case, in writing, never a silent swap.
Who supplies mechanical seals and seal kits?cballast.com quotes EN 12756 stock seals, OEM cartridges (Grundfos, DESMI ROTAN and peers) and dimensional equivalents with the basis stated per line — plus the elastomer sets and sleeves that belong with them. Write to sales@cballast.com with the seven identification lines above.

References and related guides

Standards and sources referenced: EN 12756 / DIN 24960 (dimensions), API 682 (seal systems and plans), seal manufacturers' engineering handbooks (John Crane, EagleBurgmann classes), elastomer compatibility data per compound makers.

Grundfos shaft seal codes — HQQE, HQQV, AQQE

Chemraz vs Kalrez — FFKM compatibility

Radial shaft seal size guide

O-ring size finder

ISO 4406 cleanliness codes & particle counters

Alfa Laval purifier & separator spares

Questions on a seal identification or a substitution judgement: write to sales@cballast.com. We answer whether or not you buy from us.

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