TTO Piston Seals

DESCRIPTION

U-Cup Lip Seals for Pistons

The U-Cup series lip seals are asymmetric and symmetric dynamic sealing solutions designed to guarantee absolute fluid retention in hydraulic and pneumatic cylinders. The flexible pre-loaded lip geometry exploits internal system pressure to proportionally increase the radial contact force against the piston bore. The range includes O-ring energized profiles for low-pressure environments and pure polyurethane or rubber configurations engineered to resist mechanical wear, high friction, and extrusion.

PROFILES AND GEOMETRIC VARIANTS

PROFILE	GEOMETRIC DESCRIPTION AND TYPICAL APPLICATION
TTU Type	Universal symmetric profile with identical extruded lips, optimized for both rod and piston configurations in medium-duty hydraulic systems.
TTE Type	Asymmetric variant featuring a shorter and stouter outer lip, specifically engineered to maximize static stability on the piston head.
TTO Type	Inverted asymmetric profile designed for highly compact hardware housings with excellent residual oil film preservation.
TTU/O Type	Geometric evolution pre-loaded with an inner elastomeric O-ring energizer in the lip cavity, ideal for ensuring flawless leakage control at zero pressure.
GUM Type	Classic configuration manufactured entirely from NBR elastomer without reinforcing inserts, ideal for industrial pneumatics and low-friction automation.

MATERIALS AND OPERATING LIMITS

MATERIAL / COMPOUND	VELOCITY	TEMPERATURE	MAX PRESSURE
Hydrolytic Polyurethane Tecnopolymer	Up to 1.0 m/s	−35 / +110 °C	40 MPa 400 bar
NBR Nitrile Rubber 80 ShA GUM Type	Up to 0.5 m/s	−30 / +100 °C	16 MPa 160 bar
FKM Fluoroelastomer / Viton	Up to 0.5 m/s	−20 / +200 °C	25 MPa 250 bar

COMPATIBLE FLUIDS AND COMPLIANCE

Traditional mineral oils, synthetic hydraulic fluids, ester-based lubricants, and water-glycol emulsions. Profiles are manufactured in absolute compliance with standard housing dimensions specified by **DIN ISO 5597** and **ISO 6547** international regulations for piston sealing cavities.

CORE CHARACTERISTICS AND HYDRODYNAMIC EFFECT

- **Calibrated Geometric Profile:** the dynamic sealing edge is razor-cut with high precision to minimize idling friction.
- **Self-Energizing Mechanism:** increased system pressure boosts radial interface contact, neutralizing micro-leakages.
- **Flexible Elastomeric Shell:** fully rubberized design eliminates bare metal contact, preventing damage to inner housings.

MARKET CROSS-REFERENCES

MANUFACTURER	STANDARD PROFILE (TTU / TTE)	ENERGIZED PROFILE (TTU/O)
Net Seals	TTE / TTU Series	TTU/O Series with O-Ring

MANUFACTURER	STANDARD PROFILE (TTU / TTE)	ENERGIZED PROFILE (TTU/O)
Freudenberg (Simrit)	T20 / NI300 Profile	O-Ring Loaded U-Cup Profile
Parker Prädifa	Profile B3 / E5	PolyPak Type SP Profile
Dichtomatik	NIP / KN Profile	KNDA Profile
Kastas Sealing Tech.	K22 / K32 Profile	K33 Profile