



CHETRA Mechanical Seals

for Water Works, Wastewater
and Sewage Treatment Plants

Day after day we produce an abundance of wastewater. It comes from industrial enterprises and private households and is contaminated with dirt, solid matter as well as chemical products. Before being reintroduced into the natural circuit, it must be thoroughly reprocessed in wastewater or sewage treatment plants. A great many pumps, agitators and aerators etc. are used in this process. They fulfill the varying tasks of separation, filtration and sewage purification.

In many stages of these processes, mechanical seals are employed. These seals must meet the high demands set, particularly with regard to corrosion resistance and suitability for solid matter.

The demands placed on mechanical seals used in the closed circuit purification of industrially produced wastewater are also very exacting. The water is, dependent upon its utilization, polluted with the most diverse types of material.

Rigorous demands must also be met concerning the drinking water supply. The relevant regulations must be observed in the interest of the consumer. Various types of pumps are employed in the processing of clean drinking water, a.o. doubly supported, multiple-stage pumps and vacuum pumps, which are frequently sealed with single-acting mechanical seals. For higher vacuum, however, mostly double-acting mechanical seals are used.



The results are innovative and often custom-made solutions for the special requirements of water works, sewage and wastewater treatment plants, based on decades of experience in this area.

Supported by sound application technology advice, CHETRA determines the optimum appropriate mechanical seal and the corresponding accessories for the application intended.

The CHETRA supply program covers high-grade standard seals and special custom-made products. Notable features and benefits:

- » robust construction with extensive safety reserves.
- » protection of sensitive components.
- » solid seal rings and stationary seats in self-aligning arrangement.
- » stationary design, if applicable.
- » special seal face geometry.
- » special measures such as grease lubrication.

“Made in Germany” and International Experience

CHETRA is an international specialist for high-quality and high-performance mechanical seals. We offer quality “Made in Germany” with mechanical seals in complex and demanding applications for renowned customers in the water and wastewater industry.

Our mechanical seals are designed acc. to the relevant DIN and ISO standards (DIN EN 12756, 28136 ff., ISO 3069 a.o.), in adherence to the drinking water regulations (such as KTW), factory standards and local guidelines.

Our claim to high quality is reliably underpinned: We have been working in conformance to DIN EN ISO 9001: 2008 since 1996 and are certified by DQS/IQ NET.



Example Seals



CHETRA style 210 N

The single-acting and balanced CHETRA mechanical seal style 210 N corresponds to the standard DIN EN 12756; it is of short design with L1k and type kU. Because of its stationary design and the protected springs, it is especially suitable for implementation in sewage treatment plants.

The stationary design of this mechanical seal ensures that the seal faces always run plane-parallel to each other. Thus the movement of the dynamic O-ring is always towards the clean side. This means it cannot cake up, and the encapsulated springs are reliably protected from clogging and choking.

To make the CHETRA mechanical seal 210 N even more resistant to solids and wear and tear, it is equipped with solid seal rings and stationary seats out of tungsten carbide and silicon carbide. This mechanical seal can be universally employed in pumps, agitators and conveying screws (dia: 24-130 mm) up to a pressure of max. 28 bar. A further advantage is its ability to remain sealed, even in vacuum, in case of backwashing.



CHETRA style 270

This is the mechanical seal style 700 with metal bellows, well proved in wastewater treatment applications, as a single-acting cartridge mechanical seal style 270, for fast installation and disassembly. The mechanical seal is designed like the basic mechanical seal style 700 (in design and related materials), especially for wastewater treatment operation: by using hard metal seal faces, a higher suitability to solids, corrosion-resistant membrane metal bellows in Inconel (T.M. Cabot), secondary seals in FKM or PTFE with filler material.

By means of the connections in the gland of style 270 the mechanical seal can be operated in a simple way with corresponding accessories (flushing).



CHETRA style 209 D

The stationary seal design with protected fixed – instead of rotating – springs has been tried and proved. Unavoidable mechanical tolerances, which lead to angular misalignment and non-plane-parallel positioning of seal ring and stationary seat are equalized by the stationary design. This type, as a completely pre-assembled, pressure-tested cartridge unit with solid, non-shrunk seal rings and stationary seats of hard metal is successfully used in applications in water/sewage treatment operations.

The variety of applications for style 209 D is further extended by a gland with long slot attachment, flushing connection and universal centering.

Further information concerning water incl. hot water applications s. leaflet "Power stations".





Experience

Innovative Supply Systems and Accessories

- » **CHETRA individual supply systems and central installations:** An innovative and complete program for the supply of mechanical seals, consisting of **barrier fluid** and **quench fluid vessels**, acc. to EU guidelines and Regulation for Pressure Vessels incl. API vessels (acc. to ASME standard) and in connection with TA-Luft (= Clear Air Act).
- » **CHETRA vessel accessories:** p/t measuring systems, level switch, manual refill pump, cooling coil, pressure gauge and pressure switch.
- » **CHETRA heat exchanger,** water-cooled or air-cooled
- » **CHETRA cyclone separator.**
- » **CHETRA pressure transmitter.**
- » **CHETRA loop systems.**
- » **CHETRA central refill systems.**
- » **CHETRA SCU units for control and measurement of flushing water.**

CHETRA International Services

- » **CHETRA Service Centers** in Europe, in the Middle East and in Asia, as well as on-call service supervisors from the parent company ensure swift implementation of CHETRA mechanical seals, whether new or second-hand.
- » **CHETRA repair and maintenance service:** Analysis of damage, advice for improvement potential, expert and quick overhauling and optimizing of CHETRA seals and competitors' seals, worldwide logistics.
- » **CHETRA maintenance contracts:** Optimized fixed costs contracts and maintenance contracts.
- » **CHETRA spare parts service:** Large volume of spare parts on stock and perfected logistics for the supply of mechanical seals spare parts. Spare parts kits available for all cartridge mechanical seals (all dynamically used parts) as well as individual spare parts acc. to parts' unit.
- » **CHETRA CAS® Computer Aided Seal Selection:** A CHETRA-developed design recommendation for 1000 media, as to the type and materials of the mechanical seal with reference to pressure, temperature and speed, incl. appropriate operation and determination of friction power.



Solutions

Technology

Effective Optimization of Centrifugal Pumps in Large Sewage Treatment Plants

Insufficient service life for sealing of digested sludge with 3.5 % drier (TS) and sand contingents triggered retrofitting to the CHETRA mechanical seal with metal bellows, style 700. This single mechanical seal has corrosion-resistant membrane metal bellows made out of Inconel (T.M. Cabot) with a "self-cleaning" effect. The omission of springs (due to the bellows) causes this mechanical seal to be inured, to a large extent, to deposits and contaminations.

Further measures to improve economy: Occasional flushing only – every 2–4 weeks for 1–2 minutes – instead of the previous continuous flushing with high fresh water requisite.

Some mechanical seals do away entirely with the need for flushing by using a grease lubricant on the respective stuffing-box. Occasional feeding done via grease pistol. The average service life of a mechanical seal style 700 in these applications is 10 years.

Problems with Leakage Solved to Utmost Satisfaction

In a steel factory - in the coking plant - problems arose with the sealing of the "tar water" pumps, due, on the one hand, to the high degree of contamination (leakages) in the plant tract and, on the other hand, to the limited service life of the seal. Tar water is corrosive and tainted with solid matter. An additional obstacle for the seal was the design of the pump being used: doubly supported, without fixed bearing. Thus, axial movements of ± 4 mm had to be absorbed.

The CHETRA single mechanical seal style 201, in stationary design and in pre-assembled cartridge design, was devised in such way as to meet these demands with regard to construction as well as to the materials utilized. Solid (non-shrunk) seal rings and stationary seats in tungsten carbide and PTFE secondary seals were used. Springs and other components from CrNiMo steel. Operation was also improved by corresponding guided circulation flow.

The result was a "leakage-free" operation – with service lives of > 3 years.

"Good Housekeeping" in Water Supply Works of a Big City

Water supply pumps with packings were to be retrofitted with mechanical seals, with the goal of a "leakage-free pump" and the optimization of the flushing water requisite. The CHETRA double mechanical seal style 809 is designed for pressureless tandem operation as well as for operation with higher barrier fluid pressure (double pressure balance). At the same time, the cross-sections of the mechanical seal are dimensioned so that a retrofit from pumps, so far equipped with packings, is possible without changing the inner diameter of the stuffing-box. This intention was put into effect. Style 809 in the material combination of carbon / silicon carbide was employed. The flushing water is controlled by CHETRA SC-D units (flow rate control) to the economically optimum and technically justifiable minimum value.

Water Works, Wastewater and Sewage Treatment Plants

The mechanical seals listed here comprise some of the **standard seals (DIN EN 12756)** as well as **standard cartridge seals**, several **„customized“ cartridge mechanical seals** in adaptation to the resp. application and the aggregate. Further mechanical seal designs, cartridge as well as “non-cartridge”, are available.

Mechanical seal, style / Series:	Typical applications:	Technical Data (physical parameters):	
Single mechanical seals “non-cartridge”			
208 N / 210 N	For universal applications: mech. seal acc. to DIN EN 12756 (24960) for pumps, agitators, conveying screws.	210 N pmax: 28 bar t: -80° C – +220° C vmax: 25 m/s	208 N 50 bar -80° C – +220° C 35 m/s
299	The fully split single-acting mech. seal for applications with high disassembly-/installation requirements and for remote locations.	p: vacuum 0.5 abs. up to 25 bar tmax: +120° C vmax: 10 m/s	
700	Mech. seal with metal bellows for applications in wastewater treatment plants. - digested sludge with drier / sand contingents - corrosive media	pmax: 25 bar t: -80° C up to +315° C vmax: 25 m/s	
Single and double mechanical seals cartridge			
201 S	Industrial processing water, e.g. tar water – corrosive, high solid matter.	pmax: 50 (70) bar t: -80° C up to +220° C vmax: 35 m/s	
209 D / S	Stationary cartridge single mech. seal for universal applications, specially for retrofits of packings – in water supply and urban drainage.	pmax: 25 bar tmax: 200° C vmax: 25 m/s	
270	Single metal bellows cartridge seal for wastewater treatment plant applications.	pmax: 25 bar t: -80° C up to 315° C vmax: 25 m/s	
809	Cartridge double mech. seal; stationary design with double pressure relief (pressureless tandem operation or higher barrier fluid pressure) for water supply. Also suitable for retrofits from packings to mechanical seals.	p: vacuum up to 30 bar tmax: +260° C vmax: 25 m/s	

All mechanical seals are available in compliance with **ATEX**. Dimensions: Dia: 20 mm to 600 mm, sizes in inches possible.

Safety instructions for application areas and technical data:

The statements in this leaflet are based on the current state-of-the-art technology, including extensive testing and practical experience. Please note: The physical parameters (technical data) given here will interact with each other and cannot be fully utilized all at the same time. The listed temperature ranges are, among others, dependent on the type of secondary seal used, the accessories for the seal and the other technical parameters. Due to the variety of uses and the individual technical arrangements only general pointers, which may not be applicable in every case, can be given for a successful application. No responsibilities can be accepted for statements made in this leaflet and therefore it is recommended to always undertake tests prior to application.