



CHETRA Mechanical Seals for the Pharmaceutical Industry

In the pharmaceutical industry, as well as in the related area of diagnosis, medicine and cosmetics are produced in solid, liquid and paste-like form by industrial production methods.

For this, many aggregates such as agitators, mixers, dryers, reactors and fermentors are used, for which mechanical seals must fulfill special prerequisites: Among other things, they must be free of chemical and biological contamination, they must protect the vacuum-pressurized aggregates from material foreign to the product and they must ensure that no material from the vessel under excess pressure will leak out. Factors such as the ability to clean (CIP) and sterilize (SIP) the installations without disassembly are very important.

CHETRA takes economic efficiency and observance of statutory conditions as well as the requirements of environmental protection into consideration beginning with the basic concept of a seal and the choice of suitable accessories.

The results are innovative and often custom-made solutions based on decades of experience in this area, with sound application technology advice for the optimum appropriate mechanical seal and the corresponding accessories.

The CHETRA supply program covers special custom-made products and high-grade standard seals. 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.
- » meeting CIP, SIP, GMP requirements.
- » design with no dead spots.
- » EHEDG design (in adherence with hygienic requirements).
- » special seal face geometry.
- » guided circulation flow for optimum heat dissipation.
- » optimization of material: employment of suitable materials – secondary seals and seal faces in compliance with FDA. Steel qualities 1.4435 / 1.4404 (316 L) or 1.4539 are used with surface finish Ra value: < 0.4 µm.

“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 for renowned customers in the pharmaceutical industry – original equipment manufacturers (OEM) as well as end users.

Our mechanical seals are designed acc. to the relevant DIN and ISO standards (DIN EN 12756, 28136 ff., ISO 3069 a.o.), TÜV regulations, factory standards and local regulations.

CHETRA mechanical seals are also available acc. to EHEDG stipulations (design fulfills hygienic requirements). Our claim to high quality is reliably underpinned: We have been working acc. to DIN EN ISO 9001: 2008 since 1996 and are certified by DQS/IQ NET.





Example Seals



CHETRA style 900 S

Mechanical seal especially designed for applications involving cleaning and sterilizing processes CIP/SIP in the pharmaceutical and food processing industry.

Typical applications are in the production of pastes and emulsions, e.g. in eccentric screw pumps or in mill technology. The product space of pumps and mills is designed with no dead spots and gaps by the innovative mechanical seal style 900 S. These seals can be flushed thoroughly during cleaning processes and meet the highest hygienic requirements (EHEDG).

CHETRA style 900 S is balanced and designed with additional secondary seals optimized for cleaning. A protected spring assembly prevents contamination and impairment of sealing function. All materials and surface finish (Pharma finish) are adjusted to the demanding requirements of the pharmaceutical industry.



CHETRA style 541 S

This double mechanical seal offers special advantages for sterilization in the seal. To enable this, barrier fluid spaces in the mechanical seal, e.g. the spring assembly and the metallic interior components, are designed minimizing any gaps.

Application areas are agitators and vacuum process plants for liquid and semisolid media such as pastes, ointments, injection solutions and emulsions. There is special experience, for example with applications for the production of eye preparations. In this area, service life runs up to more than 5 years without maintenance. Style 541 S is designed as a double mechanical seal, in compact design, as pre-assembled unit. There is a choice between integrated or adjusted bearing. Stationary seal design with optimized barrier fluid guidance provides good heat dissipation / circulation. For applications with extreme low-speed equipment, CHETRA Aktiv-Lub-System was developed to create a suitable lubricating film between the seal faces.

CHETRA mechanical seals style 541 S and 841 S are available for special applications, also as coaxial designs.



CHETRA style 557

The most important properties of this (4 to 6) multiple mechanical seal are connected with the operational principle of rotating filters, which deploy the filtrate (medium) in various layers.

Short design double mechanical seals are laid out in pairs for these applications. Operation is carried out with higher barrier fluid pressure. The stationary design with exclusive use of solid seal rings and stationary seats in "self-aligning" arrangement is a special advantage.

CHETRA mechanical seal style 557 is custom-made to the respective aggregate, to which CIP and SIP and GMP principles are applied also.





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 (= Clean Air Act).
- » **CHETRA sterile vessels.**
- » **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 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, world-wide 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 world-wide 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 according to parts' unit.
- » **CHETRA CAS Computer Aided Seal Selection:** A CHETRA-developed design recommendation for 1000 media acc. to temperature, pressure and speed, for material, operation, style and assessment of friction power of mechanical seals.



Solutions

Technology

New Requirements for Innovative Installation Concepts

In cooperation with a well-known European-American system manufacturer, CHETRA developed new high sterile aseptic mechanical seals.

They are used for newly designed "modular" installations, which cover the various application areas of mills, dispersers, homogenizers and agitators.

This cooperation resulted in the development of two completely new mechanical seal types: 877 X and 900 S-Aseptic, which provide an easy exchange and fulfill the special requirements of the pharmaceutical industry combined with the "modular" concept.

Minimal Wear by using CHETRA Aktiv-Lub-System.

Vacuum dryers are used for granulation in the production of tablets and powder, which rotate rather slowly (approx. 5-30 rpm). Furthermore, their agitator shaft changes the direction of rotation in short intervals. These installations are mostly run with demineralized water as a barrier medium for the double mechanical seal used.

Conventional liquid-lubricated mechanical seals "squeak" in these conditions. This means a considerable amount of noise and is an indication of heightened wear of the seal faces and a reduced service life resulting from it.

CHETRA Aktiv-Lub-System, specifically designed for this application, prevents lack of lubrication by supplying the optimal amount of liquid via adequate feeding zones and channels. A relevant prolongation of service life of the mechanical seal is guaranteed by the adequate lubrication of the seal faces when using the innovative Aktiv-Lub-System.

Custom-made Solutions for Current Installations

In the course of a production line adjustment, an international pharmaceutical company group planned to use a Rosemund Guedu vacuum filter dryer for the production of a new medicine which extracts excess iron from the body. A special adjustment of the mechanical seal was necessary for this procedure.

CHETRA designed a gas-lubricated double mechanical seal (style 577 G) with stroke bellows to take up the axial movement: with total CIP and SIP quality, using FDA-approved materials and "iron-free" steel parts in specialty alloy.

In addition, the mechanical seal was adjusted to the existing arrangements so that the change-over to the new seal was effected without problems.

Pharmaceutical Industry

As a specialist for custom-made solutions, CHETRA offers **customer-specific solutions** as well as a series of proven, high-grade **standard mechanical seals** for the pharmaceutical industry.

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"		
900 S	Single-acting mech. seal for sterile applications in centrifugal pumps and eccentric screw pumps	p _{max} : 28 bar t _{max} : 200° C v _{max} : 15 m/s
900 S-aseptic	(EHEDG); in special design for mills.	
Single and double mechanical seals cartridge		
201 S	Mechanical seal for agitators, single-acting with fluid quench, in sterile design; in biotechnology/fermenter; mech. seal with and without integrated bearing.	p: vacuum up to 20 bar t _{max} : 200° C v _{max} : 25 m/s
509	Standardized mech. seal for agitators/mixers in dia 70-120 mm; esp. suitable for retro-fittings from packings to mech. seals; compensation of axial and radial end-play/shaft runout (± 3 mm).	p: vacuum up to 30 bar t: -25° C up to +205° C v _{max} : 25 m/s
521	Double-acting sterile design, adapted to the aggregate, for agitators, dryers, mixers – with integrated bearing; operation with higher barrier pressure. Special design for low-speed equipment and poor lubricating barrier fluid media (DM 202.11805.3).	p: vacuum up to 12 bar t _{max} : 200° C v _{max} : 15 m/s Low-speed equipm.: 5 – 30 min ⁻¹
541 S (841 S)	Stationary coaxial double mech. seal (CIP-/SIP) with specifically designed barrier fluid system – for combined installations: mills / homogenizers, for vacuum process installations, vacuum ventilation installations for the production of pastes, ointments, injection solutions, emulsions etc.	p: vacuum up to 35 bar t _{max} : 200° C v _{max} : 30 m/s
541 S/L	Double-acting mech. seal for agitators in aseptic processes (designed for CIP-/SIP); surface finish Ra = 0.4 µm. Mech. seal with integrated bearing; seal verified acc. to EHEDG (Cert. no. 89/240804).	p: vacuum up to 20 bar t _{max} : 220° C v _{max} : 15 m/s
577	Double-acting and multiple (4-6) mech. seal (CIP-SIP-GMP) for rotating filters: with stroke bellows for filter dryers and suction filters; mech. seal with integrated bearing(s): for applications e.g. aniline, powder/tablets-preproducts, granulates etc.	p: vacuum up to 20 bar t _{max} : 250° C v _{max} : 15 m/s Stroke length: acc. to application
577 G	- in gas-lubricated design -	
597	Standard double mech. seal, fitting dimensions acc. to DIN 28136/28138 for enamelled vessels / autoclaves; Operation: mech. seal with or without integrated bearing; pressureless quench.	p: vacuum up to 10 bar t _{max} : 220° C v _{max} : 20 m/s
600 L 600 LL	Single cartridge mech. seal for enamelled vessels; connections according to DIN 28138 with integrated bearing.	p: vacuum up to 10 bar t _{max} : 220° C v _{max} : 20 m/s
877 X-aseptic	Double-acting cartridge mech. seal for aseptic modular installations: dispergers, homogenizers, agitators, mills.	p: vacuum up to 20 bar t _{max} : 220° C v _{max} : 20 m/s

All mechanical seals are available in compliance with **ATEX**. Dimensions: Dia: 15 mm to 450 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.

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