

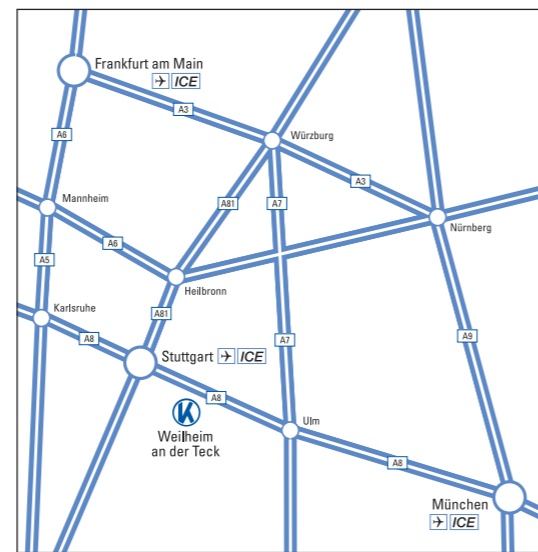


Certified quality

KÄCHELE
V I B R A S T O P



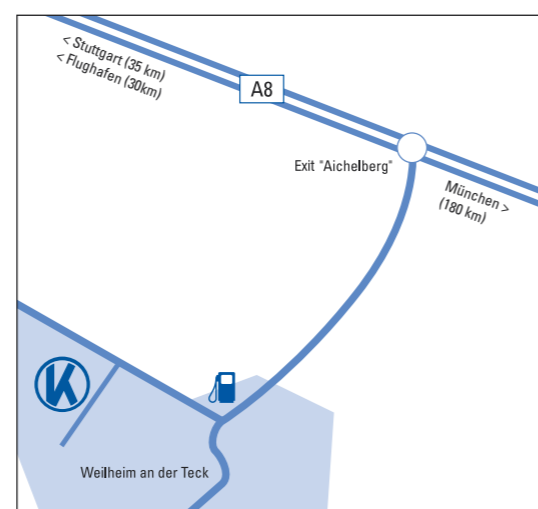
The rubber team with the high-tech spleen



Pump and Stator Technology



Wilhelm Kächele GmbH
Elastomertechnik
Jahnstraße 9
D-73235 Weilheim/Teck
Tel. +49 (0)7023/103-0
Fax +49 (0)7023/103-188
www.w-kaechele.de
vibrastop@w-kaechele.de



Exit A8 Aichelberg, then turn right up to the town entrance of Weilheim, at the petrol station turn right in the direction of Kirchheim/Teck, after approx. 500 m turn left (Kächele company sign).

KC 03_04 - www.triple-x.biz

Welcome to Kächele!

Renowned pump manufacturers worldwide have been using stators and rotors manufactured by Kächele for more than 40 years.

The suitable solution for each application: Kächele's ¹ team of engineers clears up the task in cooperation with the customers by an intense contact with them. Often a solution can already be found within the large standard program of geometries and elastomers. But Kächele's experts also stand by the customer with the experience of more than 40 years of pump technology when it comes to developing new pump ranges for pump manufacturers or to creating special solutions that are project-oriented.

Kächele has all the necessary equipments for the realization of the constructions at its disposal. A modern tool ² manufacture and a creative ³ compound development create best possible conditions for pioneer products and for innovative products that bring the decisive competitive advantages for the customer.

⁴ The production of all parts already starts at Kächele with the production of the rubber. A computer-controlled vulcanising, the support of all departments by electronic data processing completely networked and, last but not least, the highly qualified team constitute the basis for uncompromising quality.



1



2



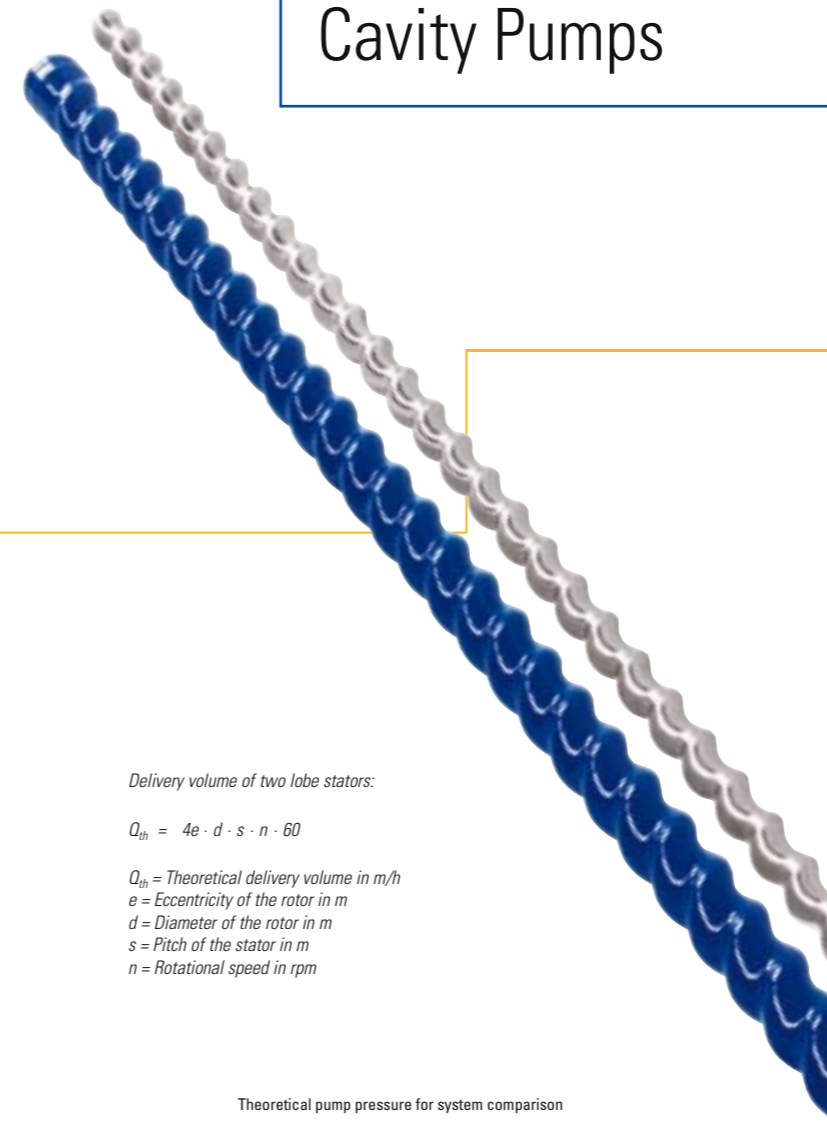
3



4

Progressing Cavity Pumps

PCP – Function and applicability



Due to the eccentric slewing motion of the rotor delivery chambers with constant volume move along the stator. While doing so the inside geometry of the stator in spiral form always has one lobe more than the rotor. The rubber coating of the stator together with the rotor form delivery chambers sealed against each other. The lining up of several delivery pitches enables very high pressures. Different delivery capacities are attainable through the variation of the geometry. The used material and the geometry have to be adjusted carefully dependent on the operating conditions such as delivery capacity and delivery pressure, temperature, viscosity and solids content, as well as chemical and mechanical characteristic features of the delivery medium.

Stator and rotor result in a hydraulic motor by the inversion of the principle of efficiency (the delivery flow produces a slewing motion of the rotor). This principle is above all used for drilling in the mineral oil technology and in the gas-handling technology.

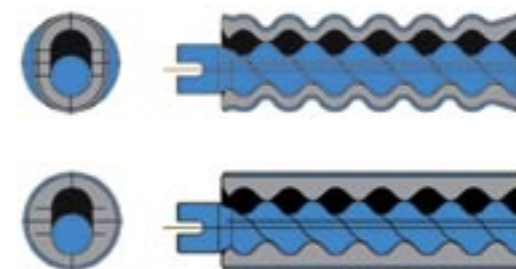
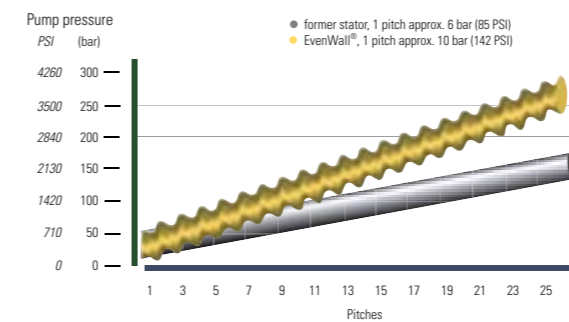
The EvenWall® technology developed by Kächele increases the efficiency of progressing cavity pumps considerably. Higher pressures (10 bar per stage compared with 6 bar with conventional design) with the same size or a smaller size with the same pressure achieve a better utilization of the materials and result in the superiority of the EvenWall® principle in technological and economical regard. Moreover, the uniform wall thickness of the rubber reduces the heat build-up and enables a high accuracy of measurements over a wide temperature range. Typical examples of use are pressures up to 250 bar in the mineral oil production or delivery volumes of only a few millilitres per rotation in the staging technology up to 500 m³/hour in the sewage technology. Stator lengths up to six metres are usual. The stators are carried out in excellent standard qualities or in special materials for the highest chemical and thermal resistance according to the application. This goes for example for food, aggressive chemicals or high process temperatures.

Delivery volume of two lobe stators:

$$Q_m = 4e \cdot d \cdot s \cdot n \cdot 60$$

Q_m = Theoretical delivery volume in m³/h
 e = Eccentricity of the rotor in m
 d = Diameter of the rotor in m
 s = Pitch of the stator in m
 n = Rotational speed in rpm

Theoretical pump pressure for system comparison



Above: EvenWall® Design, below: Cylindrical Design

Oil Industry

Power Sections for Downhole Drilling Motors
(Mud Motors)
Stators and rotors for the mineral oil transportation
(Artificial Lift)

Multi lobe power section for drilling motor

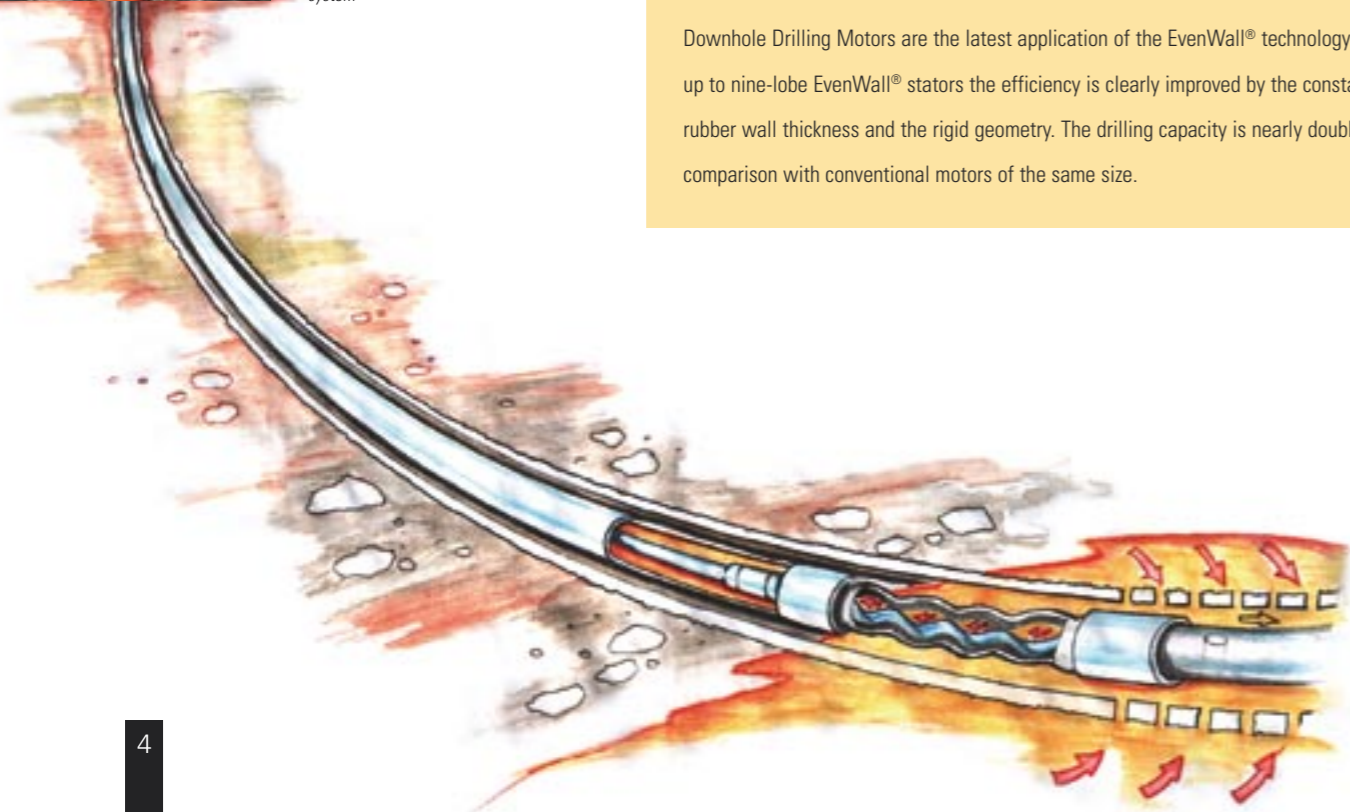
In the last years progressing cavity pumps for the mineral oil transportation developed into a superior alternative with regard to conventional "horse head pumps". Here minimum space, advantages in costs when the pumps are purchased and when they are at work are required, as well as high operational reliability.

The demands on the elastomer are very high when crude oil is transported. High pressures, high temperatures, the chemical load of the rubber produced by the concentration of the fluorocarbon hydride of the oil mud and the content of stones and sand represent a challenge for each pump. Here the EvenWall® technology offers vast advantages, too. The effects of the increase in volume due to the temperature and of the swelling due to the absorption of aromatic compounds are very reduced by the smaller and uniform wall thickness of the rubber. Therefore the function of stator and rotor remains constant over a large operating range. The improved service life offers high operational safety and huge cost savings as non-productive times and set-up times are very expensive, mainly in the mineral oil industry. The application of EvenWall® stators allows a shorter structural shape; this is the same with the very expensive rotor. By the use of EvenWall® hollow rotors supplementary costs can be saved because of the material saving and the ingenious production process.

Downhole Drilling Motors are the latest application of the EvenWall® technology. With up to nine-lobe EvenWall® stators the efficiency is clearly improved by the constant rubber wall thickness and the rigid geometry. The drilling capacity is nearly doubled in comparison with conventional motors of the same size.



Crude oil production with PC pumping system



Industrial Pumps

Viscose and abrasive media
Chemicals
Food
Water and sewage

The important things with industrial pumps are low operating expenses, a low starting torque and an optimal adjustment of the products. The overlapping between rotor and stator often amounts only to few tenths of a millimetre and is decisive for function and lifetime.

The chemical industry

The handling of chemical media requires highly resistant elastomers. Abrasive substances, acids, alkalis, filtration residues, sludges and other chemical substances place stators under extreme levels of strain. To support selection of the most suitable elastomers, Kächele provides a list of resistance characteristics which customers should have available before

the project-planning phase gets under way. Often only minimal differences in mixture components make that all-important difference when it comes to guaranteeing a long service life.

Sewage plants

This is another application which sees the operation of Kächele stators around the clock, 365 days a year. Quality is vital in this tough operating environment.

The food industry

The law lays down stringent specifications in this sensitive field. Dairies, cheese production plants, industrial bakeries and the confectionery industry all have to transport products of a highly pasty consistency. This type of application is being increasingly solved by the use of the progressing cavity pumps. Here, too, Kächele offers rubber compounds for stators suitable for use in contact with food.

Agriculture

Pumps featuring Kächele stators are used with a high degree of success in the handling of fertilizer, dung, fodder, mash and milk. They are also enjoying increasingly widespread use in the handling of products in fruit processing applications.

Mining industry

Special EvenWall® high pressure pumps are employed to drain mines or to pump water of reservoirs back into the geological formation. The delivery volume is 20 m³ per hour with 150 bar (300 rpm), for example.

EvenWall® stators and cylindrical stators



Rotors



Applications of pumps



Rotary pistons, membrane tubes and other moulded rubber parts are also part of Kächele's delivery program.

Plaster machines and floor pavement pumps

Stators and rotors



Plaster coating

The EvenWall® technology introduced by Kächele established itself as a standard during the last years in Europe.

Robust design, a high availability and competitive prices are today decisive for success. For economical manufacture of hollow rotors in large quantities the EvenWall® technology offers decisive advantages with its enormous material savings and the more insignificant manufacturing requirements in contrast to the solid rotors.

Kächele offers the complete delivery program for all standard plaster machines of the leading manufacturers in Europe and the articles are delivered in many different designs.

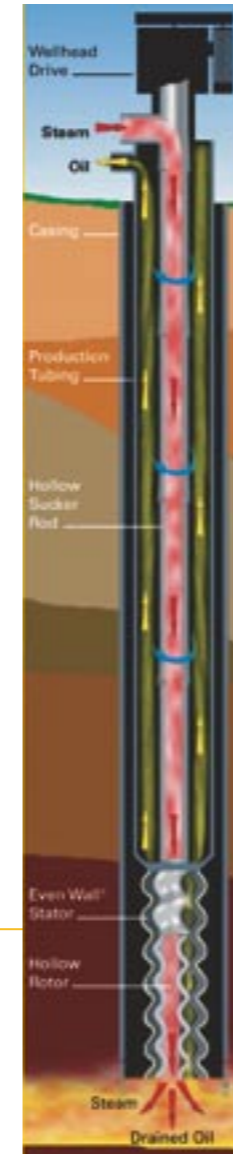
Cylindrical stator or EvenWall® stator, hollow rotor or solid rotor, all stators and rotors produced by Kächele are convincing through their optimal adjustment. EvenWall® plaster sets are maintenance-free.



Plaster machine with EvenWall®-technology

Innovations

Steam Injection®
New Ribbed Technology®
Multi-layered hollow rotors



Crude oil production with Steam Injection®

Steam Injection®

As many oil wells are considered exhausted in the meantime, the production of the remaining oil with conventional technology has only been possible with a lot of economic and technical effort up to now. The conditioning of the oil reservoir with hot steam, which increases the flowability of the remaining oil, is a common method. This has only been possible with several well holes or with high set-up costs so far. By the use of a hollow drive shaft, a hollow rotor and an EvenWall® stator with an elastomer with high temperature stability Kächele can offer a worldwide patented and unique method that requires only one well hole.

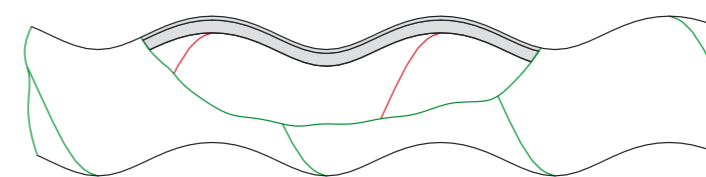
New Ribbed Technology®

The varying extension of the elastomer in the stator in the event of changes to the operating temperature has an important influence on the interference between stator and rotor. The temperature range, in which the function is guaranteed, is considerably extended by a patented design of the interior surfaces, the "New Ribbed Technology" of the stator. Further advantages are lower wear and tear by less pressing of the rubber and a reduced starting torque even with hardly lubricating substances.

Multi-layered hollow rotors

So far rotors have been produced either hard-chrome plated or completely of high-quality material to increase the capacity of resistance to wear. The further development of EvenWall® hollow rotors to a multi-layered design now permits the selective and cost-saving separation of the functions. A strong carrier tube of low price provides the required stability of the form and a high-quality outer layer gives the necessary capacity of resistance to wear. The EvenWall® technology already permits to set up the source material multi-layered. This guarantees uniform layer strength and a high accuracy of dimension in contrast to the coating processes.

Highly resistant to wear multi-layered EvenWall® Rotor



EvenWall® New Ribbed Technology

