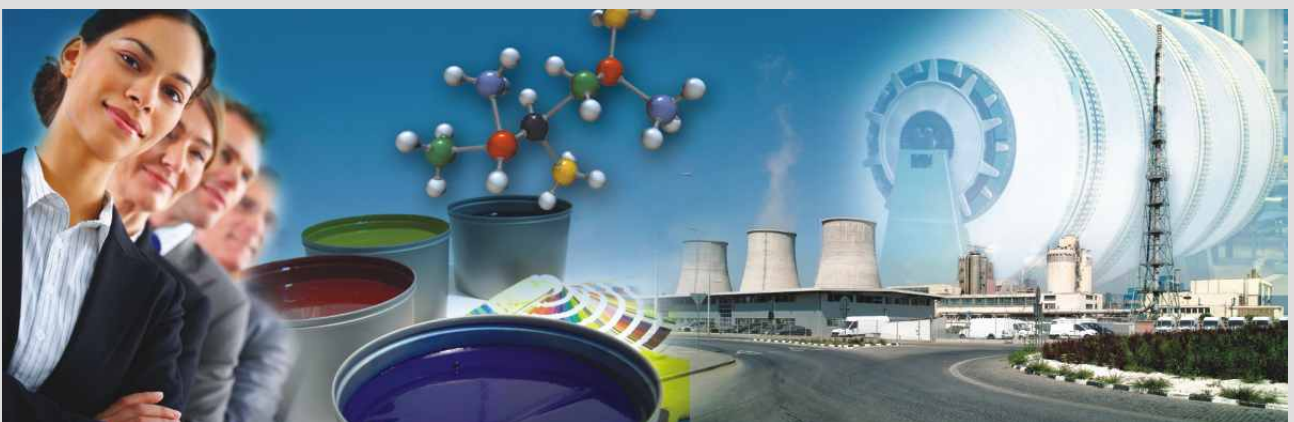


NETZSCH

Chemical, Pulp & Paper

Product Overview, Technology and Application Areas



The heart of your process. ■

Business Field Chemical, Pulp & Paper Products and Components



Competence and innovative Solutions for Reliability and Operating Safety

Within the business unit PUMPS the business field Chemical, Pulp & Paper offers, throughout the world, individual solutions for various process requirements in the chemical industry, pulp and paper production, explosives manufacturing, ceramic industry, paint fabrication as well as petrochemical and many other primary industries.

Business Field Chemical, Pulp & Paper

- Building Material
- Biomass Fuel
- Ceramics and Glass
- Chemical and Biochemical
- Liquid Explosives
- Paper and Chemical Pulp
- Printing Inks and Varnish
- Tanneries/Leather
- Textile
- Wood Processing
- And many others



How fortunate to be able to choose ■

In a dynamic, economic environment where safety, reliability and effectiveness become more and more important, the selection of the right pump is vital. The continuous development of our NEMO® Progressing Cavity Pumps and TORNADO® Rotary Lobe Pumps ensures the optimal solution for your individual application.

Always the right product. ■

So far we delivered 500.000 pumps, 150.000 of which are to the chemical industry. For each individual case of application, the technically most suitable pump is chosen. Your advantages are pump types and series, which are optimally matched to your specific application, reliable and market driven.

We are where you are. ■

Competent and reliable advice, on-site; guarantees optimal service, fast response and delivery times. With more than 1300 employees at five development and production sites as well as 20 sales offices, a cooperation partner and another 200 NETZSCH representatives we are close to you wherever you are.

NEMO® Progressing Cavity Pumps

- Standard pump
- Hopper pumps
- Immersible pumps
- High pressure pumps (injection pumps)
- Custom built pumps

TORNADO® Rotary Lobe Pumps

- Standard pumps
- Custom built pumps

NETZSCH Engineering

- Testing and quality control
- Inspection and certification
- Special documentation

NETZSCH Accessories

- Protection devices
- Pressure relief valves
- Controls
- Trailers
- Tools

General

Substances endangering health and the environment, highly viscous fluids containing dry solids or shear sensitive fluids ask for pumps capable of

conveying most difficult media in hermetically closed systems without compromising safety. For more than five decades NETZSCH has provided

such pumps to the chemical industry - as a competent partner, aware of its specific requirements and demanding applications.

Solutions for Applications in all Industries

- Automotive
- Base chemicals
- Biochemical industry
- Building material industry
- Coal mining
- Electroplating
- Glass and ceramic industry
- Leather industry
- Mineral processing

- Mining
- Nuclear industry
- Plastics production
- Power generation
- Printing inks Industry
- Production of chemical pulp
- Refineries
- Rubber industry
- Smelting works

- Tanneries
- Textile industry
- Tyre production
- Varnish industry
- Wood processing
- And many others

Example Installations

Coating Colour in the Paper Industry

The dosing of coating colour in the paper industry represents a typical application for the use of NEMO® progressing cavity pumps. High standards are demanded with low pulsation pumping and high dosing accuracy. This can be achieved by 2/3 lobe conveying elements and the use of two parallel operated, synchronized NEMO® progressing cavity pumps.

Latex Dispersions as a Base Chemical

Due to their features, NEMO® progressing cavity pumps or TORNADO® rotary lobe pumps are suitable for pumping latex dispersion as a base chemical for paint production. Coagulating binders in the pumped fluid quite often affect the function of the shaft seal. Therefore, shaft seals are selected with regard to the individual fluid.

Conveyance of Liquid Explosives

Liquid explosives are pumped by NEMO® progressing cavity pumps. The special design of the drive train prevents sparking inside the pump. Another safety aspect is the special make of the stator tube. Furthermore, in explosives production great care is taken with regard to dry running and overpressure protection. NETZSCH dry running and pressure protection units provides this security. This equipment increases the operational reliability of the pump and your process, reducing down time. Critical conditions within the pump are avoided.

Applications in the Petrochemical Industry

In the petrochemical industry aromatic hydrocarbons contained in the pumped fluids cause problems quite often because such substances generate swelling of stators and joint seals. The use of suitable elastomers or stators made from solid materials in NEMO® progressing cavity pumps prevents swelling and guarantees the operational reliability of your plant.



General

Variety and complexity of applications in the chemical industry ask for individual handling of each application. For this very reason, the selection of the right materials is a prerequisite for the reliable function and operational safety of pumps.

Stator Materials

The materials used for NETZSCH original stators include elastomers such as

- NEMOLAST® S31 (CSM)
- NEMOLAST® S45 (EPDM)
- NEMOLAST® S65 (NBR)
- NEMOLAST® S91 (FKM)
- NEMOLAST® S61T (HNBR)
- NEMOLAST® S91T (TFE)
- Polyurethane (PUR)
- Silicone Rubber (SI)

These materials, available in dark and light compounds, are mostly used for NEMO® progressing cavity pumps in the chemical industry. Due to the NETZSCH elastomer technology a continuous improvement of our elastomer compounds is ensured. Our contribution to quality assurance is to check each and every stator and to trace all components back to the different constituents of the compound.

The production of stators made from solid materials like PTFE, PVC, Polypropylene, Grey Cast Iron and Brass completes our current product programme. These materials are used in cases where elastomer stators are not suitable. Typical applications are fluids to be pumped at high temperatures and/or containing aromatic hydrocarbons.

Rotor Materials and Coatings

Many fluids in the chemical industry contain abrasive components which have to be taken into consideration when selecting pump materials. In many cases the use of wear resistant, chrome-plated NETZSCH original rotors in connection with the appropriate pump design prevents early wear when, for example, pumping starch suspension or lime milk. For the conveyance of highly abrasive and/or high-chloride components NETZSCH original rotors coated with chromium carbide are available. Such coating is mostly used for pumping caolin or titanium dioxide suspensions and highly corrosive gypsum slurries with a high dry solids content from flue gas desulphurisation. Thus, the service life of the rotors is enormously increased.

Moreover, mineral slurries like ceramic slip, which are extremely abrasive, present a special challenge for the wearing life of rotors. For such applications, the NEMO CERATEC® rotors made from solid ceramics have proven their excellence. The NEMO CERATEC® ceramic rotors have a surface hardness of more than HV 2.500 which makes them wear resistant to an extreme degree. In addition, this material is also very resistant to chemical corrosion across the whole pH range.

Materials for Pump Housings and Rotating Parts

For many applications in the chemical industry standard materials like CrNiMo 17-12-2 stainless steel and cast iron are suitable. These

applications include the conveyance of polymer solutions, various acids and alkaline solutions, crude oil, galvanic sludge, cement slurries and

many others. However, for aggressive fluids there is a great variety of metallic materials available, e.g.:

Duplex Steel (1.4462)

for the conveyance of various chlorinated fluids like leachates, oil/sea water mixtures, sludges generated by flue gas desulphurisation

Hastelloy® B and C (2.4610 und 2.4617)

for the conveyance of highly oxidizing fluids like aqueous solutions of bromine, chlorine, chlorites and hydrochlorites, ethanoic acid and formic acids

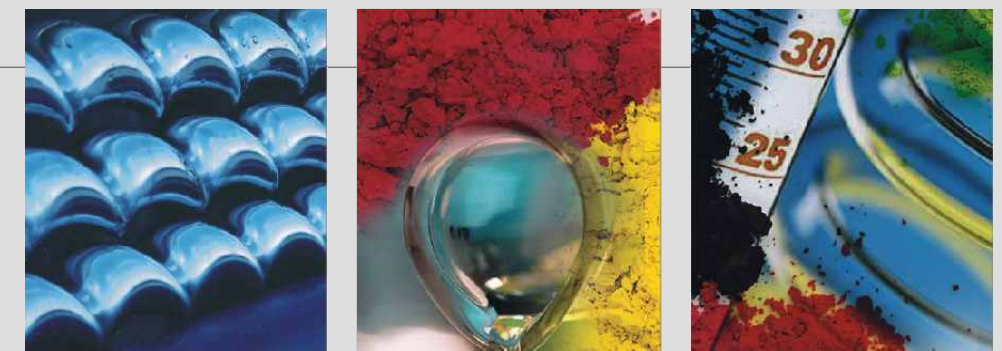
Uranus® B6 (1.4539)

for the conveyance of fluids containing sulphur, phosphor and/or hydrochloric acids as well as other aggressive fluids

Titanium (3.7035)

for the conveyance of concentrated ferric chloride solutions

On request, we also offer NEMO® progressing cavity pumps in other materials such as Monel or 254 SMO as well as pump housing linings from hard rubber (Genakor) and Halar.



Shaft Seals

Apart from the selection of the right materials, the correct design of the shaft seal is vital for smooth operation. Shaft seals prevent the fluid from leaking through the pump housing into the atmosphere. We use various seal types, all of them specifically selected for the fluid and the safety requirements of the user.

Supply Systems

For smooth and safe operation of shaft seals additional equipment is often required to circulate clean buffer fluid through the seal. Depending on the type of shaft seal and the properties of the pumped product, various dead-end or circulation systems according to API 610/682 are used:

- for avoiding deposits of solids from the fluid between the seal faces
- to compensate for leakage of the buffer fluid
- for preventing any leakage reaching the atmosphere
- for lubricating the atmospheric side seal in a double acting mechanical seal arrangement

Further Types of Seals

For special applications many other varieties of seals are available:

- Lip seals with or without flushing
- Gland packing with or without flushing or buffer fluid
- Pumps with magnetic couplings (no seals) for highest safety requirements when pumping dangerous fluids, which are harmful to health and the environment e.g. the conveyance of isocyanate.

Single acting Mechanical Seals

Bidirectional single acting mechanical seals are used for fluids or suspensions which are not toxic, harmful to the environment or the process. Such mechanical seals are used for fluids which do not tend to cure or stick. Various types are available:

Construction Design

- Balanced or unbalanced
- With single or multiple springs for fluids of low viscosity and/or fluids with low dry solids content
- With elastomer bellows for high solids and fibre content and for abrasive fluids
- Encapsulated mechanical bellows seal for highly viscous fluids with high solids content
- With flush or non pressurised quench to avoid dry running in vacuum operation or vertical installation of the pump and for adhesive and crystalline fluids
- With knife edge for additional protection for fluids prone to coagulation

Double acting Mechanical Seals

Double acting mechanical seals are mostly used for a smooth and leak free operation when pumping dangerous matter. Other reasons for using double acting mechanical seals are high demands on the service life of the seal faces or if the fluid should have no contact with the atmosphere. Regardless of the fluid; whether solids free, low or high in solids content, low or high in viscosity, abrasive, sticky, prone to crystallisation or otherwise problematic; different designs of seals can be used.

Types of Seals

- Bi-directional back-to-back arrangement with pressurised buffer fluid for conveying fluids with a high dry solids content to guarantee long service life because only clean fluid reaches the seal faces, for reliable sealing if operating under vacuum
- Bi-directional tandem arrangement with atmospheric pressure quench system for higher safety when pumping solids free, non-adhesive or dangerous fluids, if contact between the fluid and the atmosphere must be avoided



For further information simply order brochure NMP • 343/02

General

For your variety of applications there is no standard solution, therefore we construct pumps individually designed for your purposes. In addition to the different materials and types of shaft seals, further pump versions and options are available; including:

- NEMO® immersible pumps with a submerged depth of up to 11 m are used for emptying barrels, containers, tanks, etc. They are also used where space is limited and when cavitation may be a danger or where low NPSH is available
- NEMO® progressing cavity pumps with hopper inlets for highly viscous and/or dewatered fluids and the possibility to match the hopper inlet to the equipment dimensions
- NEMO® high pressure progressing cavity pumps up to 72 bar differential pressure
- NEMO® progressing cavity pumps with heating or cooling jackets
- Pump flanges according to normal standards such as DIN, ANSI, JIS
- Pump designs according to API 676

Application Example

On drilling ships there are collection tanks holding a mixture of crude oil with sand, sea water and xylene. The tanks have to be emptied from above and the mixture has to be pumped at a pressure of about 20 bar for further treatment. For this application NEMO® immersible BT range pumps made from duplex steel (1.4462) with Viton® (FPM) stators and an NPSH(r) value of 0.1 m is suitable. Due to the high content of volatile hydrocarbon and the danger of cavitation, a pump with a low NPSH requirement should be used.



Performance test of the equipment under operational conditions prior to shipment

Drives

For NEMO® progressing cavity pumps and TORNADO® rotary lobe pumps, all types of electrical drives can be used:

- Helical gear drives
- Electric motors
- Mechanically adjustable variable speed drives
- Drives in combination with frequency inverters for speed control
- Drives suitable for use in explosive areas

For special applications we offer pumps with hydraulic or pneumatic drives. Mobile units are equipped with internal combustion engines.

General

After many years of being certified according to DIN EN ISO 9001 we are able to meet your requirements regarding quality assurance, reliability and service. Our extensive quality

Testing and Quality Control

- Function and performance tests
- Measurement of NPSH values
- Pressure and sealing tests
- Sound level measurements
- Vibration tests
- Radiation tests
- Colour penetration tests
- MPI (Magnetic Particle Inspection)
- PMI (Positive Material Identification)

management guarantees the conformity of our products with all common national and international standards. Our state-of-the-art testing facilities allow us to test under full operational

Inspection and Certificates

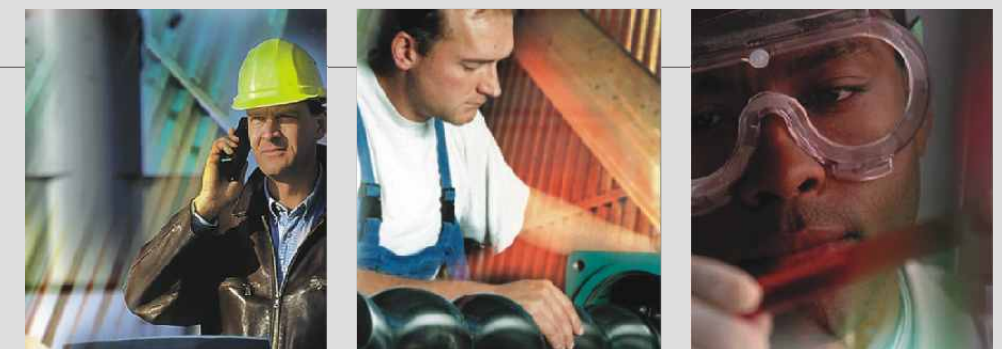
- Material test according to DIN EN 50049 - 2.1, 2.2, 3.1B or other standards
- Certificate of conformity according to directive 94/9/EG (ATEX100a)
- Certificate of conformity according to CE directive
- Certificate of auditing offices (Lloyds Register of Shipping, Germanischer Lloyd, CSA, CCC, DNV, TÜV, GOST-R, etc.)

conditions. The tests are documented and test procedures and certificates submitted.

Special Documentation

- Quality plans
- Production schedule
- Dimensional and sectional drawings
- Construction plans
- Welding procedure and qualification documentation
- Painting and coating documentation
- Operating and maintenance manuals

Upon request, we shall submit all pertinent documentation and certificates of independent auditing offices.



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