# Process sequence

## OF A WASTE WATER CLEANING PLANT

### The process

**We provide you NEMO® progressing cavity pumps and TORNADO® rotary lobe pumps in diverse designs and materials, designed according to the location of use in the waste water plant. Low viscosity and also abrasive sludge is reliably conveyed using our pumps with flanged connections. Designs of the NEMO® hopper pumps are available with screw conveyors or also with our aBP Module® to prevent bridging for media with a high dry material content, such as de-watered sludge.**

#### The robust NEMO® progressing cavity pump:

NEMO® progressing cavity pumps are used in all sectors of the environment to convey almost all types of media continuously, smoothly, with low pulsation and dosing in proportion to speed. (refer to p. 8/9)

Further features:

- High suction capacity - up to 9 mWC
- Direction of rotation and flow can be reversed
- Can be installed in any position
- Quiet, low-noise running
- Temperatures from - 20°C to + 200 °C

#### The compact TORNADO® rotary lobe pump:

Due to their compact construction, TORNADO® rotary lobe pumps are predestined for confined installation situations. In robustness, they are no inferior to the progressing cavity pumps and are also very suitable for media with larger solid substances. As TORNADO® Mobile or on a hand trolley, they are used locally flexible and have proven their reliability in the event of a catastrophe. (refer to p. 10)

#### Grinder for process reliability

The cutting plate grinder M-Ovas® and NETZSCH twin shaft grinder protect lines and pumps and, alongside the wide range of accessories, also contribute to the process reliability of the overall plant. (refer to p. 11)

#### NETZSCH Accessories

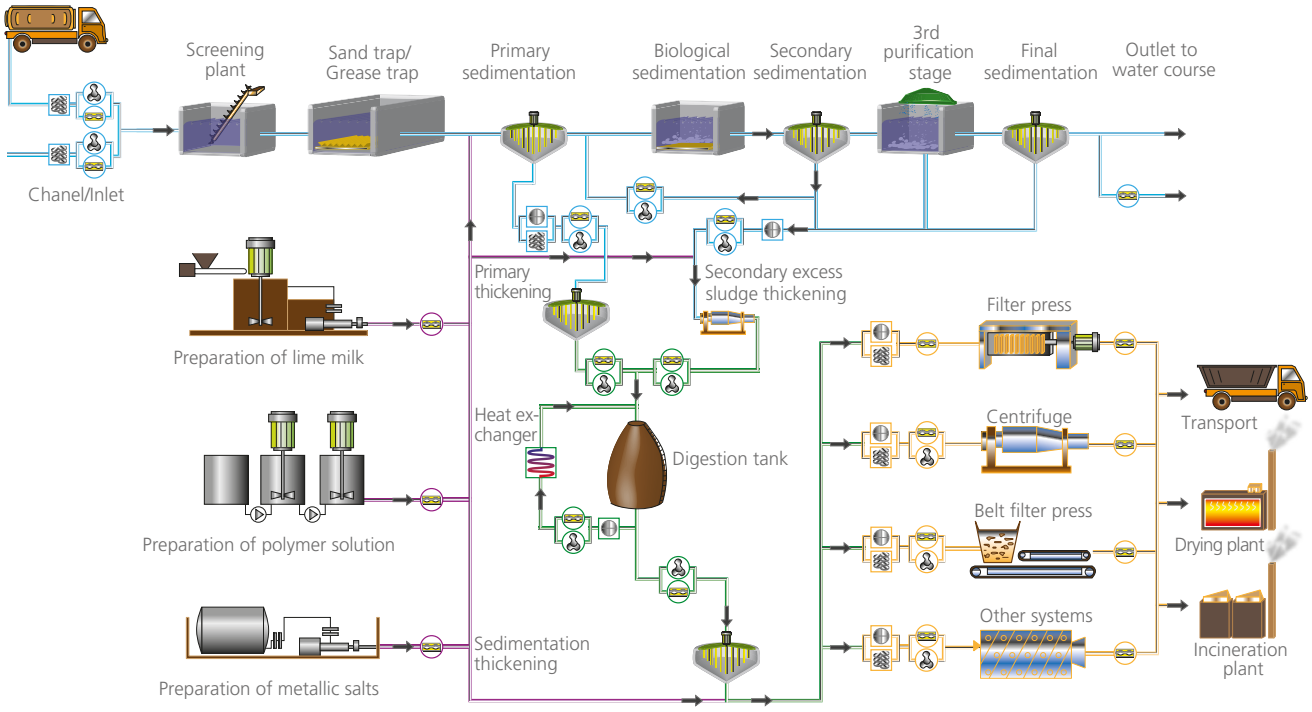
- Protection devices
- Flushing/pressurised flushing devices
- Control units
- Transport devices
- Tools

#### Further information

NEMO®
progressing cavity pump
Brochure NPS · 305

TORNADO® rotary lobe pump
Brochure NPS · 081

Grinder
Brochure NPS · 040




NEMO® progressing cavity pump

TORNADO® rotary lobe pumps

NETZSCH Cutting Plate Macerator M-Ovas®

NETZSCH Twin Shaft Macerators

External view: NEMO® progressing cavity pump in a sewage plant with hopper and aBP-Module®

Internal view of the progressing cavity pump: Attachment with aBP-Module® to prevent bridging

TORNADO® rotary lobe pump conveys digested sludge in the sewage plant

# Typical application
## IN THE WASTE WATER SECTOR

### Flotation sludge

Flotation sludge and sludge foam represent floatation fractions of sludge that collect on the surface in the secondary settlement tanks. This effect is not desired and results in the floatation sludge, appearing as an air-medium mixture, needing to be pumped away. Ideal for this is the NEMO® progressing cavity pump, which reliably and continuously conveys, even with a high ratio of gas in the medium. For restricted spaces, the TORNADO® rotary lobe pump can also be used here.

### Concentrated sludge

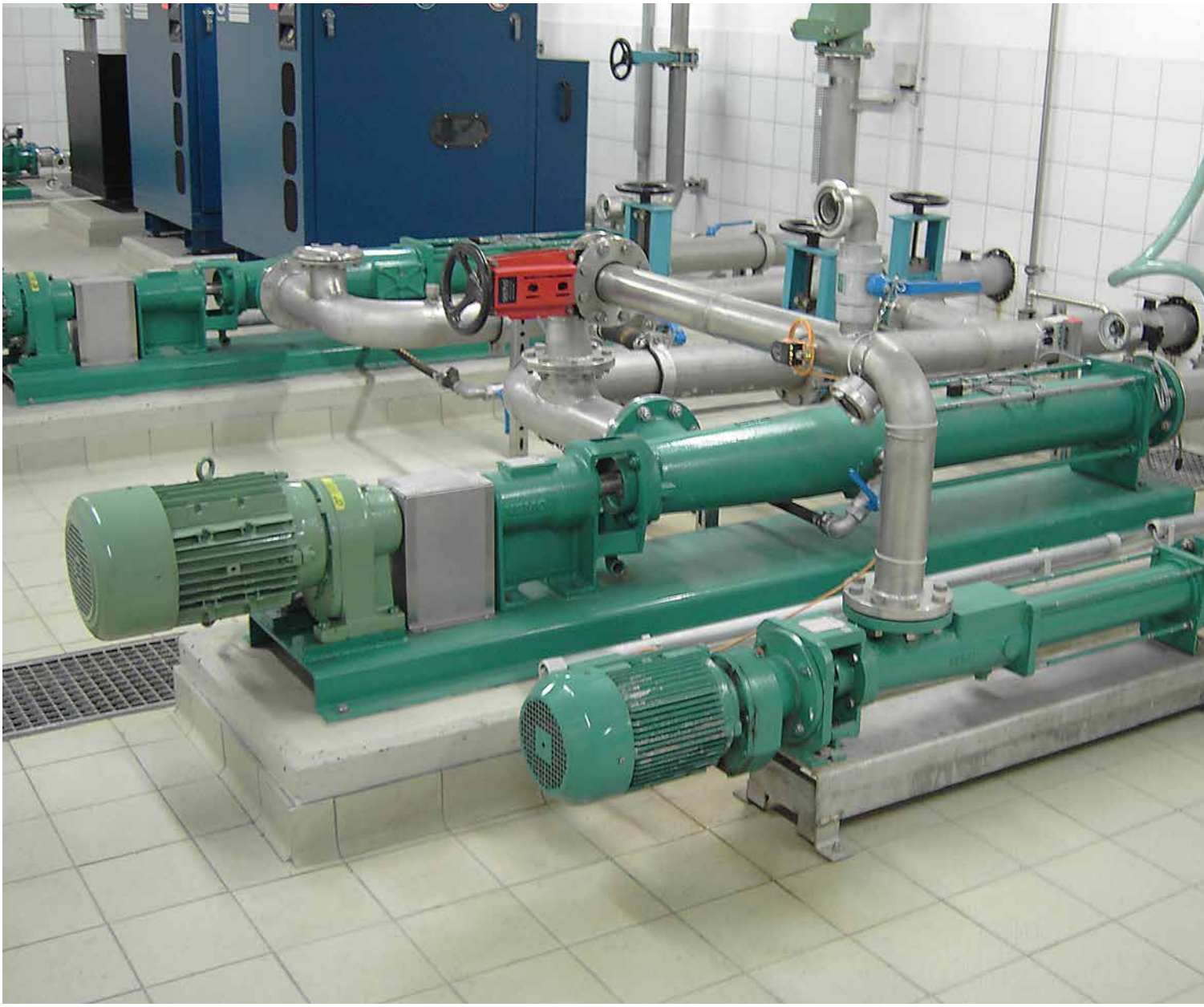
In an initial step, the water ratio and, thus, the overall volume of the sludge is reduced by means of gravity or mechanical thickening. Thereby, the objective is to attain a dry matter content of 4 % to 11 % in the medium. Thickened sludge is a flowable to viscous media that can also be pumped over long distances. High counter-pressures are overcome by using multiple stage NEMO® progressing cavity pumps. The space-saving TORNADO® roatary lobe pump is also frequently used on this sludge.

### Flocculating agent

Flocculating agent is fed to the sludge before draining. It promotes formation of larger solid flakes in the sludge and, in this manner, contributes to improved de-watering. Normally, flocculating agent is dosed as a polymer solution or dispersion. Its viscosity and the requirement to be able to accurately dose the quantity, place requirements on pumps that the NEMO® progressing cavity pump can conform to.

### De-watered sludge

During de-watering of the sludge, by adding flocculating agents in centrifuges, decanters, belt or chamber filter presses, an additional reduction in the volume of between 65% and 80% can be attained. A crumbly, compacted product ensues that cannot flow. Due to the characteristics of the medium, forced feeding into the pump is required. Furthermore, bridging in the inlet area of the pump must be prevented. Fundamentally, NEMO® progressing cavity pumps with rectangular inlet hopper and feed and conveying screw are used for these applications. A feature of this pump is the horizontally positioned, patented conveying screw that ensures an optimum degree of filling of the delivery chamber. For sludge that tends towards bridging, the feed hopper of the NEMO® progressing cavity pump has an additional aBP-Module® or integrated bridge breaker.



NEMO® progressing cavity pumps convey digested sludge

# Typical application
## IN THE WASTE WATER SECTOR

### Liquid sludge

During the initial steps of cleaning waste water, liquid sludge occurs in large quantities as "waste". This is sludge with a dry matter content of approx. 1% to 4 %. Depending on the origin, the ratio of the content of organic and inorganic substances can differ greatly. Pumps that can convey large quantities at low pressures, as well as feature a long service life, are normally required to convey low viscosity sludge. Both the NEMO® progressing cavity pumps as well as the TORNADO® rotary lobe pumps are used here. Particularly when using the L and P-geometry, NEMO® progressing cavity pumps feature a high power density. Another advantage is presented by long service live, to the long seal line and reduced sliding velocity of the rotor.

### Lime milk

Lime milk is an inorganic suspension of lime hydrate and water. Alternatively, lime milk can also be directly produced by quenching caustic lime with a surplus of water. Lime milk is used as an aid to filtration during the de-watering of sludge using filter presses. The structure and constitution of the calcium carbonate is dependent on the origin of the production process. It is a very abrasive medium. In order to attain high service life, NEMO® progressing cavity pumps are used equipped with rotors and stators of high-quality material. Here, the non-wear NEMO CERATEC® ceramic rotor, in combination with an extremely abrasion-resistant elastomer stator is ideal.

### Marine waste water

Compact, light, robust and simple to use – these requirements are particularly applicable for pumps in ships. The pumps must also be versatile for universal use to keep down the cost of servicing and spare parts. The TORNADO® rotary lobe pump takes into account all of these demands. Therefore, it is used as a bilge pump as well as a waste water pump: The core is the oil-free synchronised gear with belt drive. It reduces the weight of the pump by a minimum of 30 percent compared to a normal gear drive and the robust sub-assembly uses significantly less individual parts. The overall mechanism is extremely reliable, the number of spare parts is conceivably low. Because the system is not lubricated, extravagant lubricant changes are not necessary and leakage detrimental to the environment is excluded. After removing the drive cover, the entire synchronised gear including the belt can be accessed. Workload is kept to a minimum and downtimes are shorter. If maintenance or repair tasks are required in the pump room, these can be carried out quickly and easily by direct access from flange to flange.

Also the NEMO® progressive cavity pump works reliably below deck: as a bilge pump it is used successfully.

### Further information

NEMO CERATEC®
Brochure NPS · 347

TORNADO® rotary lobe pumps in digested sludge recirculation

# NEMO® Progressing Cavity Pumps
## IN WASTEWATER TREATMENT

### Large capacity and pressure range
- Capacities up to 400 $m^3/h$
- Pressures up to 48 bar

## NEMO® BY

### in block design with directly flanged drive

Compact design with directly flanged drive. It is distinguished by its low investment, operating and maintenance costs. Four rotor/stator geometries for optimum performance with every kind of application.

### The FSIP® design

The FSIP® design enables a particularly service-friendly maintenance without dis-assembling of the pump from the pipeline. By easier access to all rotating parts through cartridge joint and mechanical seals the maintenance is reduced. The downtimes and the associated costs are reduced. In addition, it reduces the required installation space, since the stator is removed laterally. The FSIP® design is offered in modification sets. So you can upgrade also existing pumps with lower costs.

## NEMO® SY

### with bearing housing and drive shaft

The design with bearing housing and drive shaft means it can be used with all types of drive. Four rotor/stator geometries for optimum performance for the respective application.
Also available in FSIP® Design

## NEMO® C.Pro®

### Mini dosing pump in plastic design

High dosing accuracy (deviation of < 1%).
Compact design with directly flanged drive.

**Further information**

NEMO® C.Pro®
Brochure NPS · 313

## NEMO® BO/BS

### in block design with directly flanged drive or NEMO® SO/SS with bearing housing and drive shaft

Housing with rectangular/square feed hopper and coupling rod with conveying screw with compression chamber for improved product feeding into the conveying elements.

## NEMO® BF option with aBP-Module®

### in block design with directly flanged drive or with bearing housing and free shaft end

Housing with enlarged, rectangular feed hopper and with removable, cone-shaped compression chamber, coupling rod with patented, horizontally positioned conveying screw for optimum product feeding into the conveying elements.
Optional with aBP-Module® to prevent bridging.

**Further information**

aBP-Module®
Brochure NPS · 070

Technical notes: the hopper dimensions can be adjusted to suit the specific application.

# BEST CHOICE

## for every application

### TORNADO® rotary lobe pumps – powerful, robust, compact

**TORNADO® self-priming, valveless positive displacement pumps for high-performance and optimally tailored to individual requirements. They are used for continuous and smooth conveyance of almost all media, as well as for dosing in proportion to speed.**

### Large capacity and pressure range

- Capacities up to 1,000 $m^3/h$
- Pressures up to 8 bar

### Broad range of applications

The pumps are primarily used with media that have the following features:

- With and without solids
- Low to high viscosity
- Thixotropic and dilatant
- Shear sensitive
- Abrasive
- Non-lubricating and lubricating

### TORNADO® Mobile

The NETZSCH TORNADO® Mobile is ideal for applications where pumps have to be used quickly and flexibly outside buildings and plants or away from any infrastructure. This unit comprises a mobile TORNADO® rotary lobe pump with diesel drive and conveys large quantities of sewage and sludge, independent of the local circumstances. Smaller mobile units are available, too.

### Further information

TORNADO®
Brochure NPS · 081

## Grinding systems

**Powerful NETZSCH grinder systems are used to protect your plant and pump units contained therein. They ensure that impurities are separated or ground suitable for pumping. Thus, the risk of blocking and/or clogging in the pump systems is reliably prevented.**

### The NETZSCH M-Ovas® cutting plate grinder

During the treatment of waste water, the impurities in the medium are directed through the specially shaped housing and gathered and cut by the rotating blades. This unit can be used for sludge with a throughput rate of up to max. 70 $m^3$/h and a dry matter content of up to 12 % and is characterised by its ease of maintenance.

### NETZSCH twin shaft macerator

The NETZSCH twin shaft grinders are used for applications with particularly coarse and solid substrates. The twin shaft macerators impress with their robust design, simple operation and high performance. They offer the optimum solution, even in the most extreme conditions. Depending on the application, five different NETZSCH twin shaft macerators can be used in various designs. The various, very slow speeds of the shafts provide the option of self cleaning. The flow rates are up to to 300 $m^3$/h with a solid content of 10 %.

NETZSCH M-Ovas® cutting plate grinder

NETZSCH twin shaft macerator

### Further information

Grinder
Brochure NPS · 040