

Microdispensing in Perfection!

preeflow® eco-PEN

by ViscoTec

www.preeflow.com

Dosing of abrasive Fluids

Basic qualification of progressive cavity pump:

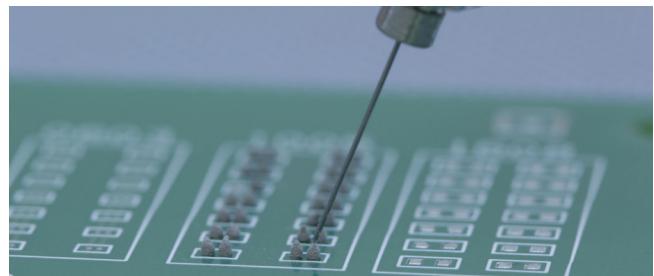
- no metal combination for rubbing components
- continuous flow rate avoids sedimentation of fillers
- no backstreaming
- no undercuts -> equal distribution of fillers
- relatively low pressure and no pressure pulsation -> no concentration of fillers
- low shear rate while dosing
- volumetric dosing -> no change in pressure -> prevention of cavitation

Best practice:

- concrete and plaster pumps are progressive cavity pumps
- progressive cavity pumps are engaged for chemically aggressive and abrasive suspensions
- for the oil production (with a high content of stone) progressive cavity pumps are used



Picture: abrasive pastes



Picture: application silver conductive paste

Abrasive wear:

Definition: Two objects with different hardness get in touch (rotor: stainless steel; stator: elastomer)

Effects on abrasive wear:

- concentration of fillers (the higher the filler rate, the higher the wear)
- pressure (the higher the pressure, the higher the wear)
- lubrication characteristics of the fluid (the lower the lubrication, the higher the wear)
- morphology of fillers: grain size, grain hardness, grain shape
- rotational speed, flow rate (wear increases with rising speed exponentially)
- shear rate of the fluid
- temperature

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Qualification of the ViscoTec dosing pump:

Measures against abrasive wear in ViscoTec pump and dispenser:



Picture: preeflow eco-PEN450

Constructive measures rotor-stator: ①

- rotor-stator geometry enables gentle and carefully sliding movement approach
- coated rotor with high surface hardness
- dimensional overlap of rotor and stator avoids leakage

Constructive measures flexible shaft and pump interior: ②

- flexible shaft: covered with elastomer (no metal combination), hard drive shaft
- interior pump housing: friction-optimised, chemically inert surface coating

Constructive measures sealing package: ③

- sealing package consisting of abrasive-resistant material with integrated lubrication

Further constructive measures:

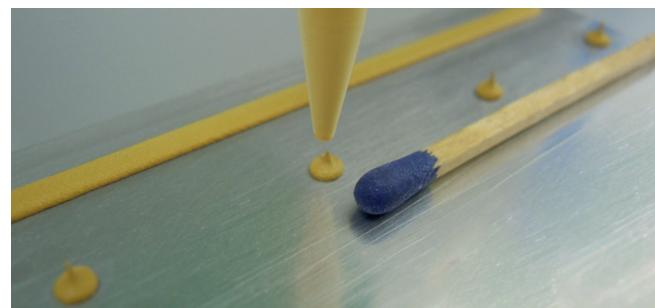
- no narrow gaps with high flow speed -> prevention of cavitation
- no sharp redirection of the flow -> prevention of cavitation

Project-specific measures:

- selection of various compound formulations according to the application (chemical, mechanical)
- correct definition of nozzle and outlet (in order to avoid high counter pressures)
- technical configuration of periphery (appropriate dosing pressure, stable material supply)
- dedicated pump configuration (low rotational speed in order to reduce wear)



Picture: application soldering paste – pipe



Picture: dosing thermal paste

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Comparison of pumps regarding abrasiveness:

greatest benefit	greatest disadvantages	area of wear	positive wear aspects	negative wear aspects	applica- bility
• high viscosities possible • high accuracy • different flow rates without changes in hardware	• higher purchase costs • low pressure applicable • dry running characteristics	• sealing package • drive shaft • contact surface • rotor/stator	• very low shear • low pulsation, no sedimentation of fillers • equal distribution of particles by continuous flow rate	• relatively low shear • just one contact surface at piston	• sliding movement • high pressure, double-stage suction and pressure level • pressure pulsation by piston stroke enhances sedimentation
• high dosing performance • higher viscosities applicable • high pressures possible	• high pulsation • piston filling influences cycle times • high purchase and maintenance costs	• sealing at piston • inlet and outlet valve with sealing • interior pump housing	• low purchase cost • little surface for wear • low shear, good dry running characteristics	• chemical compatibility membrane material • pulsation enhances sedimentation and filler concentration	• pulsation
• low purchase, service and maintenance costs • few components • high viscosities possible	• high pulsation • low pressure applicable • discontinuous, temperature-dependent dosing	• Inlet valve with sealing • outlet valve with sealing • membrane material (chemical)	• low accuracy, low cycle times • only low viscosities applicable • high pulsation	• contact surface • hose/hose	• cavitation • high shear rate of the product • high pressure, pulsation, sedimentation
• easy cleaning and handling • gentle movement of the fluid • small volumes dosable	• reversible flow direction • high pressures possible • high temperatures possible	• leakage stream • only low viscosities applicable	• contact surface • gear/housing • contact surface • gear/gear	• limited scope of application • high purchase costs	• high shear rate of the product • high material stress • high pressure
				• contact surface • screw/housing • contact surface • screw	