Selection Assistance for Metering Pumps

General

A large number of optimally adapted metering pumps has been developed for the divers applications in process engineering. The diagram overleaf is meant to be a guide for being able to select a perfect and cost-effective metering pump and for avoiding planning errors. Using the diagram, preliminary decisions are taken in view of the metering chemical characteristics. These decisions have to be considered when finally selecting the pump (e.g. using spring-loaded valves or wear-resistant Aramid reinforced packings).
The table presents in a very clear manner all available metering pumps for a given metering capacity as well as the corresponding documentation number. The documentation provides you with all necessary technical details.

Special planning aids

Before taking the final decision concerning the selection oft the metering pump, the following questions should be answered:

1. Chemical

Which chemical is to be metered and which properties does it have?
a) Viscosity
The higher the viscosity, the lower the stroke frequency and the larger the pipe cross-section should be.
With viscosities higher than 400 mPas we recommend to use spring-loaded suction and discharge valves.
b) Abrasiveness
Suspensions (e.g. diatomaceous earth) or metering chemicals tending to crystallization (phosphate solution) may lead to early leakage at the packing in the case of piston pumps. Therefore Aramid-Kevlar reinforced packings should be used unless strong acids or bases are to be metered.
c) Aggressiveness
The materials of those parts getting into contact with the chemical should first be determined according to well proven experience and common resistance lists. Then the corresponding pump should be selected.

2. Metering capacity

The pump has to be designed such that the maximum required capacity will already be reached if the pump setting is from 80 to 90 % , in order to have sufficient adjustment reserve.
Below 20 % the performance of diaphragm metering pumps is not satisfactory.

3. Backpressure

The backpressure directly at the pump is an important value. If the pipe line from the pump to the injection point is very long (e.g. more than 10 m) pressure pulsations can reach considerable values interfering with the pressure at the injection point. Non-observance may cause damage of the hydraulic system or affect the metering performance. In this case pulsation dampers should be used.

4. Suction pressure

The suction pressure should not excede 200 mbar during operation of the pump. With diaphragm pumps the suction pressure has to be kept as constant as possible (± 50 mbar) because an unsteady suction pressure affects the metering capacity. A level oscillating around 4m would be extremely unfavorable especially with a density of 1,900 kg/m^3. Suction pressure fluctuations of up to 760 mbar would cause metering errors of more than 10 %, in extreme cases even up to 25 %. With piston and piston/diaphragm pumps an unsteady suction height has only a small influence. Make sure that suction lines are as short as possible or with lengths of more than 8 m that a suction air tank is mounted shortly before the suction valve.

5. Pressure dependence

Because of the elastic cloth-reinforced diaphragm, diaphragm metering pumps are relatively dependent on the backpressure. A constant artificial backpressure can be provided by setting the backpressure valve to a value which is approx. 1 bar higher than that of the injection point.

6. Nominal diameter of the line

When sizing the line for systems without pulsation dampers, the 3-fold value of the nominal metering capacity has to be considered for calculating the nominal width at a flow rate of 1m/s on the pressure side and 0.5m/s on the suction side.

7. Metering pump controls

Check if the metering pump works with a manually set value or if it is controlled using a remote signal which changes either the stroke frequency or stroke length.
If the input frequency is to be changed the metering output follows proportionally in the case of diaphragm, piston and piston/diaphragm metering pumps.
If the stroke frequency is to be changed the metering output follows with

piston metering pumps	proportionally
piston/diaphragm metering pumps	proportionally
diaphragm metering pumps	not proportion.

according to the performance diagrams of the corresponding technical documentation. The nonlinearity of diaphragm pumps is only compensated by the controller with automatic control systems (e.g. pH-control).

8. Metering in dependence of water meter pulses

An ideal possibility for metering chemicals proportionally to the water flow is to actuate the solenoid metering pumps using contact water meters. Once the stroke is set it remains constant so that nonlinearity of the diaphragm does not become effective.

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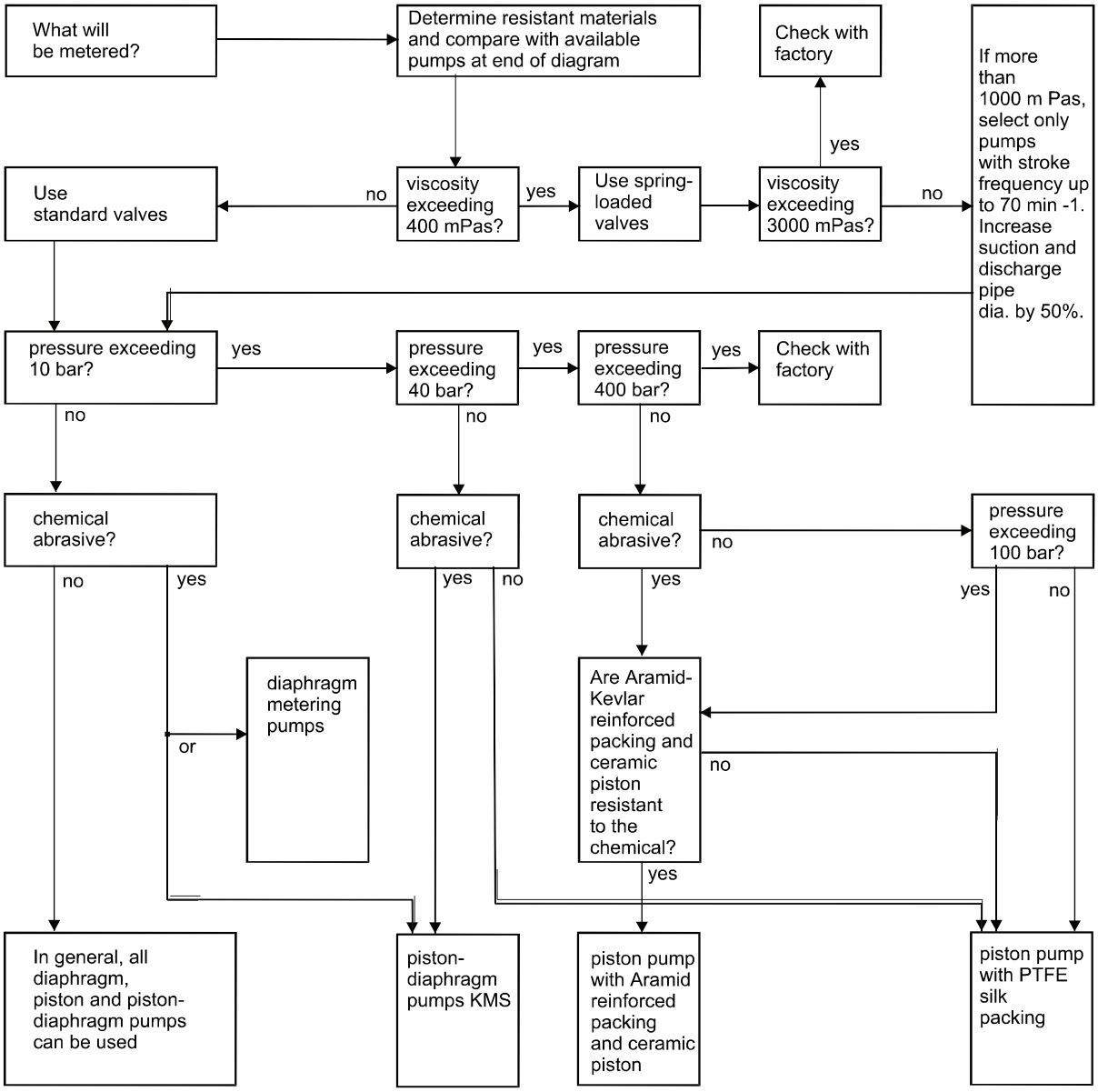

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