Conditions and Instructions for Pumps

BIERI-Pumps are used in hydraulics. The specific pump conditions are depending on the individual product and are described in the relevant data sheet in detail.

1. REASONS FOR USING A BIERI PISTON PUMP

Piston pumps can be designed for higher pressures than other types of pumps.
Piston pumps generate only minute amounts of wear particles that can contaminate the fluid.
Piston pumps have a better efficiency than for example gear pumps, particularly at higher pressure.
BIERI piston pumps are valve controlled: each cylinder has a suction and an outlet valve.

- They deliver from S to P in both rotation directions, but they are not reversible.
- The hydraulic fluid cannot flow back to the tank through the pump at standstill.

Bieri pumps are self-venting and self-priming.

2. PRESSURE

Each pump is designed for a given peak pressure at which it may be operated without risk to the environment and persons. We warrant this value because it has been proved in tests.
High operation pressure and larger piston diameters will increase the load on the bearings, leading to a shorter operating life of the pump.

3.ROTATION SPEED

Exceeding the maximum permitted rotation speed can have the following consequences:

- The pump ist unable to reach the expected delivery.
- The outlet valves are destroyed by high outlet flow speed. The pump is then unable to build up pressure.
- The life duration of the bearings is reduced.

4. HYDRAULIC FLUID

In all BIERI pumps, the hydraulic fluid is also lubricating the pump‘s bearings.
That ist why they are generally to be operated with mineral oils according to DIN 51524 part 1, 2 and 3. On request, solutions for other fluids can be investigated, taking into account:

- The fluid‘s lubricating properties and viscosity.
- The compatibility of sealing materials and chemical resistance of part surfaces.
- The Influence on the function of the pump.

5. ENVIRONMENT

BIERI pumps are designed for indoor industrial applications or for integration in machines or vehicles.
They should not be exposed to the weather or to marine environment.

6. OPERATING TEMPERATURE

The ambient temperature as well as the fluid‘s temperature have a direct influence on the materials used in the pump, e.g. on their mechanical strength.

- The permissible temperature is often limited by the sealing materials.
- At high temperatures, springs can slacken excessively.
- At very high temperatures, the life duration of rolling bearings dwindles.
- At low temperatures, certain steel grades are prone to brittle failures.

7. AMBIENT TEMPERATURE

Depending on the application, ambient temperatures can have a strong influence on the operating temperature.
It may be neccessary to cool or heat the hydraulic fluid in order to keep the operating temperature and the viscosity of the fluid within acceptable limits.

8. FLUID TEMPERATURE

The temperature of the fluid influences its viscosity and lubicating ability (see no. 9).
Very high temperatures can destroy the additives in the fluid, generate solid particles or even lead to the oil molecules cracking, leading to the loss of all lubricating properties.

9. VISCOSITY AND LUBRICATING PROPERTIES OF THE FLUID

BIERI pumps must be operated in the defined viscosity ranges.
Low viscosity fluids have a reduced lubrication ability (formation of the lubricant film). This has a substantial influence on the bearings‘ functionality and life duration. Low lubrication ability can also lead to rapid wear on the outlet valves and finally to the pump‘s failure.
High visosity fluids can impair or prevent aspiration. High viscosity may require a reservoir placed above the pump or the use of a filling pump. Should this lead to a higher suction pressure, a reinforced shaft seal must be fitted to the pump. Please contact BIERI for advice in these matters.

10. DEGREE OF CONTAMINATION OF THE FLUID

The correct function and service life of a hydraulic pump correlates closely with the degree of contamination of the fluid. The fluid cleanliness classes specified in the data sheet represent a minimum requirement for ensuring function. Not complying to them can lead to failure of the pump in a short time.

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11. NOISE LEVEL

For minimum noise levels, the design and layout of the hydraulic system are decisive.

- The Pump speed should be as low as possible: it influences noise exponentially.
- Reduce system pressure and delivery rate.
- Avoid the transmission of structure-borne vibration to other machine parts (e.g. tank)
- Structure-born vibration can be avoided with solid design and rigid construction.
- We recommend the use of damping elements for the motor and bell housing.
- For the transmission of the drive torque, use an elastic coupling.
- If possible, use hose lines instead of tubing.
- Use elastic clamps and bulkhead bushings to fasten tubing.
- Submerge the pump in the hydraulic fluid.
- Choose a motor with a dampened or a plastic fan hood.

12. LIFE DURATION

The service life of a hydraulic pump depends on many factors and can only be determined theoretically to a limited extent. The following factors have a significant influence on the service life:

- Fluid cleanliness
- Lubrication properties of the fluid
- Mounting layout of the pump
- Operating pressure
- Delivery rate
- Pump drive speed
- Operation cycle
- Ambient conditions

In applications where pump life duration is decisive, we recommend to contact BIERI for advice.

13. TIGHTENING TORQUES

When tightening the connection fittings, the recommended tightening torque in the assembly instructions or the data sheet must be adhered to.
General: if no torque tolerance range is specified, then tooling type II class A or B according to DIN EN ISO 6789 must be used.

14.FIRST OPERATION

Before start-up, the entire hydraulics system including the lines must be carefully cleaned and flushed out.
The pumps are fundamentally self-priming and can be started up directly without pre-venting or pre-filling.
Before starting the pump or the system, the pressure relief valve for the system pressure has to be set to zero.
Increase the system pressure only after the pump and system have been completely vented.
To check the venting of the pump, a transparent hose can be connected to the pressure port to lead the flow directly (without pressure relief valve) to the tank.
When a continuous oil flow with no bubbles or foam is streaming from the pump, it is fully vented.
Particulary in the case of pumps with small flow rates, this can take a little longer. Switching the motor on and off repeatedly and/or prefilling the pump (filling oil through the suction port) also speeds up the venting procedure.
If proper venting cannot be achieved, these are the possible causes:

- Leak in the suction line connection
- Leaking shaft seal
- Oil level below minimum

If the pump‘s delivery is too low, these are the possible causes:

- The suction line cross-section is too small (flow speed shall not exceed 1 m/s).
- The suction strainer is clogged or too small.