

These General Terms and Conditions define the basic rules for the proper use of turbomachinery (hereinafter referred to as the machine) from Piller Blowers & Compressors GmbH (hereinafter referred to as the Manufacturer). Specifications regarding correct use contained in the product-specific operating instructions apply in addition to the conditions indicated here.

Other conditions for the use of machines are specified in the order-specific operating instructions. In case of contradictory information, the information in the operating instructions always applies.

The individual general conditions are as follows:

- All maintenance instructions must be observed.
- All safety devices (separating and non-separating) must be installed correctly.
- All functional safety signals (SIL) must be integrated into the operator-side safety chain in accordance with the specifications in the operating instructions. This applies to so-called interlinked machines in particular.
- Settings made by the Manufacturer may only be changed with the Manufacturer's consent. Approval must be given in writing.
- **Emergency operation** must be individually agreed upon with the Manufacturer and approved in writing by the Manufacturer. Such emergency operation always means a limitation to the warranty, which must be determined during approval.
- Only the lubricants specified by the Manufacturer or equivalent lubricants may be used. Contamination is prohibited.
- If the machines are permanently installed, the foundation must be laid professionally in accordance with DIN 4024, Part 2 and the machine must be secured in accordance with the Manufacturer's recommendations and the specifications on the dimension sheet.
- Reactive forces due to the connection of pipelines must be limited to the values specified on the dimension sheet.
- No liability is accepted for faults caused by improper commissioning by the person carrying out commissioning/the operator.
- It is prohibited to exceed the maximum permissible temperatures and speeds specified in the operating instructions under any circumstances.
- It is not permissible to allow foreign bodies to enter the impeller. A foreign body is any body that does not correspond to the correct use or the medium specified for the correct use.
- The machine may only convey the specified medium. Damage caused by unspecified components of the medium will invalidate the warranty.
- The machines may only be operated when running smoothly. Alarm and switch-off values in the operating instructions define the permissible bearing vibrations.
- If vibration monitoring is installed, the alarm and switch-off functions must be implemented using the limit values specified in the operating instructions. Operation beyond the alarm limit is only briefly permissible in order to analyze (troubleshooting phase) the cause of vibrations. Sudden deteriorations in vibration levels may signal a failure in the machine or a machine part and may put operational reliability at risk. The causes must be determined immediately and corrective action taken.
- The correct use of each machine is to supply the specified medium with an enthalpy defined via operating points. The energy is converted in the direction of action of the motor (or turbine), drive phase and medium.
- In applications where there may be a suction or pressure-side flow through a machine or multi-stage machine arrangement on the system side, the intended direction of action is reversed. This is not permissible and will invalidate the warranty!
- Reversing the direction of action leads to impermissibly high speeds and will cause rotating components to burst. This represents a danger to life and limb!
- If there is a risk of the intended direction of action being reversed, this must be reliably prevented by the customer by means of tightly closing non-return valves or other equivalent

(complete revision, therefore no YY reference)

measures. If it is not possible to reliably prevent backflow on the system side, the machine may **not** be put into operation.

Non-compliance will void the warranty.

- Operation of machines supplied without vibration monitoring is only permissible if the vibration levels do not exceed the limits specified in the operating instructions. If the information is missing, the limit values below must be observed:
 - 7.1 mm/s in a rigid installation in accordance with ISO 14694 BV-3;
 - 4.5 mm/s in a rigid installation in accordance with ISO 14694 BV-4
- Modifications to impellers in connection with operational balancing carried out by the customer must be coordinated with the Manufacturer. Unauthorized measures will void the warranty.
- System-related spinning of the inlet-side flow into the machine is not permissible.
- Continuous operation of the machine is only permissible in accordance with a defined operating mode as per the "correct use" and the operating points specified in the operating instructions. Operation with
 - the inlet guide vane closed
 - the safety devices (flaps and sliders) closed
 is explicitly prohibited.
- For continuous-flow machines in inlet guide vane mode, only blade positions 0 to 60° are permissible (0° = fully open; 90° = fully closed). In addition, the impermissible inlet guide vane range is blocked by a physical stop. Removing this stop will immediately invalidate the warranty. Any resulting damage is the sole responsibility of the operator.
- In start-up and shut-down processes, the minimum flow rate may not fall below 40 percent of the optimal flow rate or the optimal volume flow at a given speed.
- The maximum number of start-up and shut-down processes is limited due to the individual short-term strengths of the materials used. The limits to be observed for the respective machine are defined in the machine-specific operating instructions. These limits may not be exceeded!
- Caking, corrosion or visible wear on impellers is not permissible. The Manufacturer must be consulted right away to coordinate measures to prevent this from happening.
- If the customer supplies the motor and/or the frequency converter, the Manufacturer will not provide a warranty for design and function or for the operational reliability of the coupling in the event of electrical faults (as per VDI 3840).
- The machines may only be started up when at a standstill.
- In particular if machines are operated in parallel, operation must be blocked to the left of the peak in the characteristic curve.
- Speed changes for multi-stage machines may only be specified with a synchronous setpoint value. Sequential operation and the switching on or off of individual machines in interlinked operation are not permissible.

Special consideration of machine types VapoFan, VapoFlex and VapoMaxX in connection with the compression of condensable media (steam, vapors etc.)

- The mass fraction of the liquid phase of the vapor must be limited to a maximum of 1 percent at the inlet to the machine through the customer's installation of suitable separation measures.
- The maximum permissible droplet size at the machine inlet is 1 mm.
- Avoid the gushing of liquid into the machine under all circumstances.
- Fan housings and suction- and pressure-side pipelines must be drained using suitable methods.
- Pipeline routing must be designed in such a way that condensate cannot accumulate.
- Long pipeline sections with large height differences upstream and downstream of the fan must be avoided.
- Barrier fluids for the shaft seal must be clean and properly connected.
- Re-cooling of the steam through uncontrolled condensate injection is permissible up to 5 [K] above the saturation temperature on the pressure side.
- Controlled re-cooling through condensate injection is permissible up to 2 [K] above the saturation temperature on the pressure side. Suitable control types are described in the order-specific P&ID.
- The condensate used for re-cooling must meet the order-specific requirements on the pH value and corrosive components.
- The condensate used for re-cooling must be free of dispersed and dissolved solids.
- The pressure in the condensate line must correspond with the Manufacturer's specifications.
- The temperatures defined by the Manufacturer for the condensate used for re-cooling must be observed.