

Instruction Manual for Flowrox™ LPP-T and LPP-D hose pumps in explosive conditions



These instructions must be read carefully and understood prior to the installation, use, and servicing of this product.

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READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the product.

If you require additional assistance, please contact the manufacturer or manufacturer's representative.

SAVE THESE INSTRUCTIONS!

Addresses and phone numbers are printed on the back cover.

1 EU DECLARATION OF CONFORMITY

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Valmet Flow Control Oy
Marssitie 1
53600 Lappeenranta
Finland
Tel. +358 (0)10 417 5000

Product model/type: Peristaltic Hose Pump LPP-D and LPP-T

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Machinery Directive 2006/42/EC: Annex II A

ATEX Directive 2014/34/EU: Non-electrical equipment

Follow the pump installation, operating and maintenance instructions in this manual.

On behalf of Valmet Flow Control Oy
In Lappeenranta, 13th May 2022



Riku Salojärvi
Head of Operations

2 EXEMPTION FROM LIABILITY

These ATEX instructions deal with implementation of the safety requirements specified in the EU Machinery Directive, 94/9/EC, for Valmet Flow Control Oy's hose pumps as applicable, in accordance with standards EN ISO 80079-36 and EN ISO 80079-37, harmonised under the directive. These standards are applicable to design of equipment operated by other than electrical means and to atmospheres with a pressure between 0.8 and 1.1 bar (11.60 and 15.95 psi) and a temperature between -20 and +40°C (-4 and +104°F). If the intended temperature range for the hose pump differs from -20...+40°C (-4...+104°F), this is indicated on its type plate. The purpose of the standards is to prevent and eliminate explosive conditions in advance. Explosive ignition sources include the following:

- Hot surfaces
- Flames and hot gases or liquids Self-ignition of dust
- Mechanical sparks
- Sparks from electrical equipment
- Stray current
- Cathodic protection currents
- Static electricity
- High-frequency electrical fields
- Light-frequency radiation
- Ionising radiation
- Ultrasonic frequencies
- Adiabatic compression
- Pressure waves
- Heat-generating chemical reactions.

2.1 Electrical equipment:

All electrical equipment used with the pumps and installed in explosive atmospheres must meet the ATEX requirements and, at minimum, comply with the standards for Equipment Category 2 GD (LPP-T and LPP-D pumps). The electrical equipment used also determines the explosion group and temperature class of the assembly. The electrical equipment must be installed in accordance with the EN 60079-14 standard. If power is supplied to the Exd motor by means of a frequency converter, the motor temperature must be monitored with temperature sensors, located on the stator windings and connected to an ATEX-approved thermistor relay.

Valmet Flow Control Oy is responsible for the functioning of its pumps and the related equipment in conditions that have been determined according to information provided by the customer and that comply with the above standards.

Due to continuous product development, there may be some differences between the pump products and the instructions. Also, Valmet Flow Control Oy reserves the right to change the structure of its pumps without being obliged to change previously manufactured pumps to correspond to the new structure. Customers with any questions about the pumps or their operating conditions are advised to contact Valmet Flow Control Oy's sales service.

3 DEFINITIONS

3.1 Normal operation

The equipment, protection systems, or components operate in accordance with their design parameters.

3.2 Foreseeable fault condition

Problems and equipment malfunctions occurring during normal use.

3.3 Maximum surface temperature:

The highest temperature of a piece of equipment, protection system, or component that causes ignition of an explosive atmosphere. To prevent ignition, the maximum surface temperature must be lower than the ignition temperature of the explosive atmosphere.

4 GENERAL

4.1 Safe operation of the LPP-D and LPP-T pumps

Instructions for normal operation of the pumps are provided in Valmet Flow Control Oy's hose pump manuals Installation, operation, and maintenance instructions for LPP-D hose pumps and Installation, operation, and maintenance instructions for LPP-T hose pumps. These manuals include detailed instructions for the pumps, covering, e.g., the following:

- Principle of operation
- Installation and commissioning
- Safe operation
- Maintenance (servicing and repair) and adjustment

The purpose of these ATEX instructions is to provide information about safe operation of hose pumps in explosive atmospheres. The manuals covering normal operation of the pumps complement these ATEX instructions at a general level.

Installation, commissioning, operation, maintenance, and adjustment procedures must be performed by authorized personnel. The authorized personnel must follow these ATEX instructions, in addition to the instructions for normal operation, and take into account the warning labels on the pumps. In addition to the operating instructions, attention must be paid to national and regional regulations and instructions related to the operating conditions, to ensure safe operation of the hose pumps.

4.2 CE and Ex markings



on the product means that the manufacturer assures that the product meets the requirements of the relevant directives.

According to the EU Machinery Directive, pumps without a drive unit must not be CE-marked. By contrast, pumps with a drive unit are CE-marked.



on the product indicates conditions applying to explosion protection and the related special instructions.

4.3 Application of ATEX legislation

ATEX legislation is applied to equipment and explosive atmospheres:

Equipment:

- Electrical equipment and electrical installations
- Mechanical equipment, such as pumps
- Safety, adjustment, and control systems located outside explosive atmospheres

Explosive atmospheres:

- Flammable liquids and gases
- Explosive dusts (coal, wood, sugar, grain, flour, plastic, metal)

5 DELIVERY OF AN ATEX-APPROVED HOSE PUMP

Valmet Flow Control Oy delivers LPP-D and LPP-T hose pumps as follows:

1. ATEX hose pump ready for operation (ATEX-approved gear motor connected to the pump).
2. ATEX hose pump without a gear motor (Pump Head pump).

If the pump delivered to the customer corresponds to Item 1 (ATEX hose pump ready for operation), the pump fully meets the ATEX requirements and this is indicated on its type plate.

If the pump has been delivered to the customer without a gear motor and thus is a Pump Head hose pump in accordance with Item 2, the ATEX protection structure marking on its type plate applies only to the structure of the pump section delivered by Valmet Flow Control Oy. All components and equipment subsequently connected to the pump must have an ATEX protection structure corresponding to at least that of the pump section delivered by Valmet Flow Control Oy.

6 ATEX GROUPING AND CLASSIFICATION OF HOSE PUMPS

Valmet Flow Control Oy's LPP-D and LPP-T hose pumps meet the following ATEX and other Ex requirements:



II 2 GD Ex h IIB T6 Gb

Ex h IIIB T85° Db, in which

II = Equipment Group, including other equipment than that intended for use in mines and surface installations of mines (normal industrial use; flammable gases and dusts).

2 = Equipment Category. The electrical equipment has been designed such that a high level of protection is guaranteed with the operational values given by the manufacturer. For equipment in Equipment Category 2, the manufacturer must meet the following requirements for proof of compliance: EC type inspection and either ATEX-approved product quality assurance or ATEX-approved type compliance verification is required for electrical equipment. The equipment in this category is intended for places in which an explosive atmosphere is likely to occur (zones 1 and 21). The equipment must guarantee a sufficient level of protection during recurring problems or normal equipment malfunctions.

For mechanical equipment, the manufacturer must perform an internal inspection and send the technical documentation to the notified body.

G = flammable substance; gas or liquid

D = flammable substance; dust

Explosion Group: IIB

Dust Group: IIIB

Allowable temperature for equipment in Equipment Group II G (inside and outside of the pump):

T6 = Temperature Class (or maximum surface temperature; Tmax). The maximum allowable surface temperature for the pump is stated for normal operating conditions (-20°C...+40°C / -4...+104°F), either as Temperature Class T6 (max.: 85°C / 185°F) or as a maximum allowable surface temperature (Tmax) specified by the manufacturer.

This means that the ignition temperature of the gas or vapour in the customer's process must be higher than 85°C (185°F).

In ATEX operation of hose pumps manufactured by Valmet Flow Control Oy, the maximum allowable temperature of the liquid to be pumped is 70°C (158°F).

Allowable temperature for equipment in Equipment Group II D (outside of the pump):

For equipment in this group, the manufacturer must specify the actual maximum surface temperature of the pump. The maximum allowable surface temperature (Tmax) for Valmet Flow Control Oy's pumps is 85°C (185°F) when operated in conditions with a risk of dust explosion (-20°C...+40°C / -4°F...+104°F). The customer using the flow pump is obliged to ensure that no flammable layer or cloud of dust accumulates on top of the pump. The maximum surface temperature of the pump must always be 75°C (167°F) lower than the glowing temperature of the dust in the customer's process, and a maximum of 2/3 of the ignition temperature of the dust/air mixture in question.

7 ZONE CLASSIFICATION BY THE CUSTOMER

The customer performs zone classification and assessment of the probability of an explosion hazard for the hose pump's planned location, and this information is used to determine the suitability of Valmet Flow Control Oy's pump for the customer's ATEX conditions.

LPP-T and LPP-D hose pumps (Equipment Category 2 GD) are suitable for use with gases and liquids in Zone 1 and 2, and dusts in Zone 21 and 22 conditions.

Instructions for zone classification are provided in the standards EN 60079-10 and EN 61241-10 as well as in SFS Handbook 59.

7.1 Zones for gases and liquids

Zone 1: A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour, or mist is likely to occur in normal operation occasionally. A potentially explosive concentration is present in Zone 1 for 10–1,000 h/a.

Zone 2: A place, in which, an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour, or mist is not likely to occur in normal operation and where, if it does occur, it will persist for a short while only. A potentially explosive concentration is present in Zone 2 for <10 h/a.

7.2 Zones for dusts

Zone 21: A place, in which, an explosive atmosphere (in the form of a cloud of combustible dust) in air is likely to occur in normal operation occasionally.

Zone 22: A place, in which, an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation and where, if it does occur, it will persist for a short while only.

PUMP TYPE PLATES

Below is an example of a type plate attached to a hose pump: a hose pump ready for operation (a gear motor has been connected to the pump).

- Pump type: e.g. LPP-T65 GM10-2-0-I-TD
- Pump manufacturing year: e.g. 2009
- Pump serial number: e.g. 08–4045-10
- Pump flow rate: e.g. 14 m³/h (not specified for Pump Head pumps)
- Maximum operating pressure: e.g. 10 bar (145.0377 psi)

Below is an example of an ATEX plate for a piece of equipment in Group II, Equipment Category 2, intended for explosive gas atmospheres, with a surface temperature class of 85°C / 185°F (T6), and for explosive dust atmospheres, with a maximum equipment surface temperature of 85°C (185°F).

8 HOSE PUMP OPERATOR'S RESPONSIBILITY

Instructions for installation, maintenance, and inspection of the equipment are provided in the normal operation manuals. Installation, operation, and maintenance instructions for LPP-D hose pumps and Installation, operation, and maintenance instructions for LPP-T hose pumps as well as these ATEX instructions.

Special safety precautions must be taken when the pumps are used in explosive ATEX conditions. The hose pump operator is responsible for following the maintenance instructions in the manuals and performing regular inspections, to ensure that the pump temperatures remain below the maximum temperatures specified. The pump operator may perform the required regular measurements by means of temperature and vibration gauges as well as visual and aural observation.

The customer's zone classification and assessment of the probability of an explosion hazard are used to determine the operating area for the hose pumps, as well as the operating range, which must not be exceeded. If the operating range is exceeded, the pump temperatures could exceed the allowable limit.

Operation of the hose pumps causes internal friction heat, which is influenced by, e.g., the rotating friction between the pressing wheel and the rotor, the viscosity and specific heat of the liquid being pumped, and the LPP lubricant inside the pump housing. It is the customer's responsibility to ensure that the amount of LPP lubricant specified in the instructions is present inside the pump during operation and that the flow rate of the liquid being pumped is sufficient to eliminate internal friction heat. The liquid flow rate decreases as the pump hose is subjected to wear, causing backflow, which may impede the dissipation of friction heat. The customer must perform appropriate monitoring to ensure that the surface temperatures do not exceed the allowable limits.

8.1 Precautions, maintenance, and monitoring

Special attention must be paid to the following procedures:

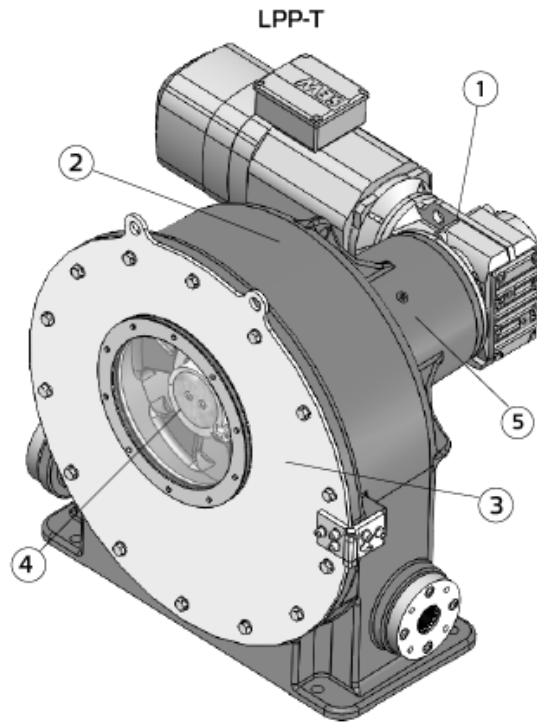
- Preventive maintenance measures (replacing the hose, checking the condition of the gaskets, and lubricating the bearings and gear clutch):
 - The condition of the pump bearings and the sufficiency of their lubrication must be checked at least every three months (more often if the conditions so require). Greasing instructions as well as grease types and amounts are provided in the manuals Installation, operation, and maintenance

instructions for LPP-D hose pumps and Installation, operation, and maintenance instructions for LPP-T hose pumps.

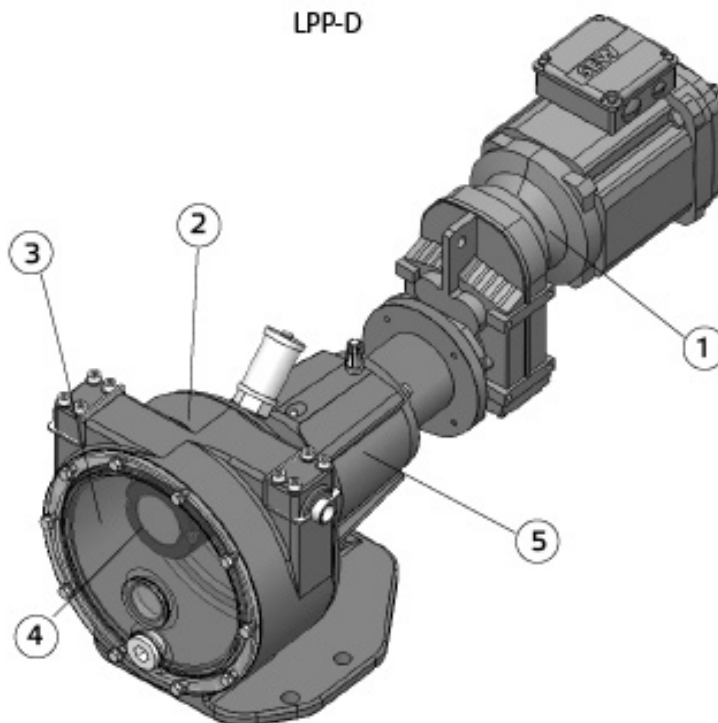
The gear clutch surfaces of the hose pumps must be well-greased to eliminate the risk of explosion. It is the operator's responsibility to check the grease status of the gear clutch every six months. The suitable grease type for the clutch is SKF LGHP2 or equivalent.

- Monitoring of the temperature of the hose pump frame bearings is important for detection of impending bearing damage at a sufficiently early stage. Bearing damage often increases the pump's surface temperature to above normal values and thus makes it necessary to replace the bearings:
- Frame bearings: The temperature of the pump frame bearings can be measured and monitored by means of a temperature strip, a portable temperature gauge, vibration measurement equipment, and aural observation.
- Pressing wheel bearings: The condition of the pump pressing wheel bearings can be monitored by means of infrared thermometers, vibration measurement equipment, and aural observation.

The surface temperatures of the frame and pressing wheel bearings and the other items to be observed must be measured at the following points:



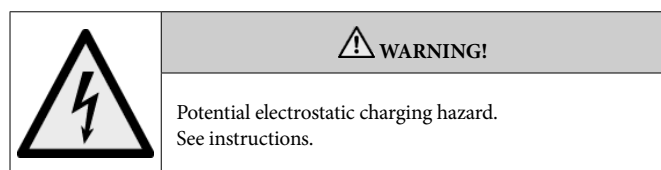
| Item | Description | Item | Description |
|------|-------------|------|---|
| 1 | Gear motor | 4 | Locking cover (pressing wheel bearings) |
| 2 | Frame | 5 | Frame bearings |
| 3 | Front cover | | |



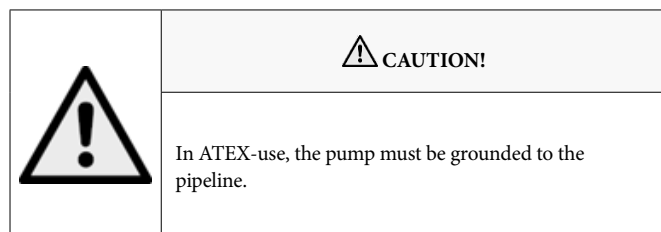
| Item | Description | Item | Description |
|------|-------------|------|----------------|
| 1 | Gear motor | 4 | Shaft journal |
| 2 | Frame | 5 | Frame bearings |
| 3 | Front cover | | |

Springs used in explosive atmospheres must be made of stainless steel.

- Static electricity and earthing:
 - LPP-T hose pumps have a polycarbonate plate window to facilitate adjustment of the hose and monitoring of hose condition. To prevent static discharge, the window must not be cleaned with a dry cloth. The pump has a warning label that reminds the operator of the dangers of static electricity.



- To prevent a discharge of static electricity, the earthing (equipotential bonding) between the hose pump and the related parts (frame, valves, and pipes) must be checked before use of the pump. The pump has a warning label that reminds the operator of the importance of earthing.



- Hose leak detectors:
 - Hose leak detectors must be wired to the Exi circuit by means of suitable Ex-approved ancillary equipment, which is to be installed outside the Ex space.
- Temperature of the pumped medium (heat is conducted into the pump structures):
 - The pump and the motor must be kept clean in order to prevent excessive heat production. At normal operating temperatures, the temperature of a running hose pump is approximately equal to that of the medium being pumped. When the unit is used in compliance with the ATEX standard, the maximum temperature of the medium is 70 °C (158°F).

- Hose lubricant:
 - The operator must ensure that the amount of LPP Silicon lubricant inside the hose pump is always correct, to prevent excessive wear and heating of the hose. Instructions related to hose replacement and lubricants are provided in the manuals Installation, operation, and maintenance instructions for LPP-D hose pumps and Installation, operation, and maintenance instructions for LPP-T hose pumps.

WARNING:



The glycerine hose lubricant used in Valmet Flow Control Oy's LPP-D and LPP-T pumps may react with oxidising substances, resulting in a risk of fire or explosion.

Oxidising chemicals include the following:

- Ammonium nitrate
- Ammonium persulphate (diammonium peroxide sulphate)
- Chromium trioxide
- Sodium chlorate
- Organic peroxides
- Nitric acid
- Hydrogen peroxide solution

Customers with any questions about the operating conditions are advised to contact Valmet Flow Control Oy's sales service.

APPENDIX A: General safety warnings

Lifting

1. Always use a lifting plan created by a qualified person to lift this equipment. Lifting guidance is provided in this IMO (Installation, Maintenance and Operation manual) to assist in lifting plan development. Think about the center of gravity (CG) of the equipment being lifted. Make sure the CG is always under the central lifting point.
2. Use only correct and approved lifting devices. Ensure that lifting devices and straps are securely attached to the equipment prior to lifting.
3. Check, that lifting devices are not damaged and in good condition with a valid check stamp prior to use.
4. Workers must be trained for lifting and handling pumps.
5. Never lift an assembly by the instrumentation (drive unit). Failure to follow the lifting guidance provided may result in damage and personal injury from falling objects.

Work activities on the pump

1. Wear your personal safety equipment. Personal safety equipment includes but is not limited to protective shoes, protective clothing, safety glasses, helmet, hearing protection and working gloves.
2. Always follow the local safety instructions in addition to the Valmet instructions. If Valmet instructions conflict with local safety instructions, stop work and contact Valmet for more information.
3. Before beginning service on the equipment, make sure that the drive unit is disconnected from any kind of power source (hydraulic, and/or electric), and no stored energy is applied on the drive unit.
4. Make sure that there is a LOTOTO (Lock Out / Tag Out / Try Out) procedure in place for the system in which the pump is installed and strictly follow it.
5. Always make sure that the pipeline is depressurized and in ambient temperature condition before maintenance work is started.
6. Keep hands and other body parts out of the flow port when the pump is being serviced and the drive unit is connected to the pump. There is a high risk of serious injury to hands and/or fingers due to malfunction if the pump suddenly starts to operate.

General disclaimers

Receive, handle and unpacking

1. Respect the safety warnings above!
2. Pumps are critical components for pipelines to control high pressure fluids and must therefore be handled with care.
3. Store pumps and equipment in a dry and protected area until the equipment is installed.
4. Do not exceed the maximum storage temperatures given in the IMO (installation, maintenance, and operating instructions).
5. Keep the original packaging on the pumps as long as possible to avoid environmental contamination by dust, water, dirt, etc.
6. FOR YOUR SAFETY IT IS IMPORTANT THE FOLLOWING PRECAUTIONS BE TAKEN PRIOR TO REMOVAL OF THE PUMP FROM THE PIPELINE OR BEFORE ANY DISASSEMBLY:
 - Be sure you know what fluid is in the pipeline. If there is any doubt, confirm with the proper supervisor.
 - Wear any personal protective equipment (PPE) required for working with the fluid involved in addition to any other PPE normally required.
 - Depressurize the pipeline, bring to ambient temperature, and drain the pipeline fluid.
 - Cycle the pump to relieve any residual pressure in the body cavity.
 - After removal but before disassembly, cycle the pump again until no evidence of trapped pressure remains.

Operating

1. The type plate (nameplate, or engraved markings) on the pump gives the information of max. process conditions to the pump.
2. Temperatures and pressures must never exceed values marked on the pump. Exceeding these values may cause uncontrolled release of pressure and process fluid. Damage or personal injury may result.
3. Valmet pumps typically are designed to be used in atmospheric conditions. Do not use pumps under external pressurized conditions unless specifically designed and explicitly marked for this service.
4. Avoid Pressure shocks or water hammer. Systems with high pressure pumps should be equipped with a bypass to reduce the differential pressure before opening the pump to avoid pressure shock.
5. Avoid thermal shock. High temperature, Low temperature pumps should be operated in a way that limits the rate of increase or decrease in temperature. The pump should be thermally stabilized before being pressurized.
6. Materials of the pump are carefully selected for the process conditions. Changes to the process media can have a major impact on function and safety of the pump. Always confirm the materials are suitable for the service prior to installation.
7. As the use of the pump is application specific, a number of factors should be taken into account when selecting a pump for a given application. Therefore, some situations in which the pumps are used are outside the scope of this manual.
8. It is the end user's responsibility to confirm compatibility of the pump materials with the intended service, however if you have questions concerning the use, application, or compatibility of the pump for the intended service, contact Valmet for more information.
9. Never use a pump with enriched or pure oxygen if the pump is not explicitly designed and cleaned for oxygen. Selected materials and design have a major impact on the safety to operate the pump with oxygen.
10. Pumps intended for use in or with explosive atmospheres must be equipped with a grounding device and marked according ATEX (or equivalent international standards).

Maintenance

1. Respect the safety warnings above!
2. Plan service and maintenance actions, that spare parts, lifting devices and service personnel is available.
3. Maintain the pump within the recommended minimum maintenance intervals or within the recommended maximum operating cycles.
4. Always make sure that the pump and the pipeline is depressurized before starting any kind of maintenance work at a pump.
5. Always check the position of the pump before starting maintenance work. Follow the Lock out /tag out (LOTO) rules at the site before starting any maintenance activity.
6. Sealing materials (soft sealing parts) should be changed when the pump is maintained. Always use original equipment manufacturers (OEM) spare parts to ensure proper performance of the repaired pump.
7. All pressure containing parts must be inspected visually for damage or corrosion. Damaged parts must be replaced.
8. Pump pressure bearing parts and all internals must be inspected for corrosion or erosion which may result in reduced wall thickness on pressure bearing parts. Damaged pressure bearing parts must be replaced with original equipment manufacturers (OEM) replacement parts or repaired to factory specifications by an authorized Valmet service partner in order to maintain the warranty.
9. Do not use sharp tools, grinding machines, or files to work on functional surfaces such as sealing, seating or bearing surfaces as this can damage these surfaces.
10. Check the condition of sealing surfaces on the seats. Replace parts if there are significant wear, scratches, or damage.
11. Check the wear of bearings and bearing contact surfaces on the shaft and replace damaged parts if necessary.
12. Do not weld on pressure bearing parts without an ASME and PED qualified procedure and personnel.
13. Pressure bearing parts of pumps in high temperature applications must be carefully examined for the effects of material creep and fatigue.
14. Make sure that the pump is positioned in the correct flow direction into the pipeline.
15. If the pumps are marked to be suitable for explosive atmospheres, the correct function of the discharging device must be tested before returning to service.

16. Always work in a clean environment. Avoid getting particles inside the pump due to machining, grinding, or welding nearby.
17. Never store a maintained pump without flow port protection.
18. When pressure testing pumps, never exceed the maximum operating pressure of the system on the pump identification plate.
19. Drive unit mounting and unmounting:
 - Before installing the drive unit on to the pump, be sure the drive unit is properly indicating the pump position. Failure to assemble these to indicate correct pump position may result in damage or personal injury.
 - When installing or removing an adapter set, best practice is to remove the entire drive assembly, including couplings which may fall off the pump during lifting or when position changes.
 - Adapter sets have been designed to support the weight of the Valmet drive unit and recommended accessories. Use of the adapter sets to support additional equipment or additional weight such as people, ladders, etc. may result in equipment damage or personal injury.
20. The pump should be installed between flanges using appropriate gaskets and fasteners that are compatible with the application, and in compliance with applicable piping codes and standards. Center the gaskets carefully when fitting the pump between the flanges. Do not attempt to correct pipeline misalignment by means of the flange bolting.
21. Repairs on pump for special service like Oxygen, Chlorine, and Peroxide, have special requirements.
 - Parts must be cleaned appropriate to the service and protected from contamination prior to assembly.
 - Assembly areas and tools must be clean and dry to prevent contamination of the parts during assembly.
 - Test equipment must be clean and dry to prevent contamination during testing. This includes the test equipment internals that may allow particles or other contamination into the test fluid during the test.
 - Lubrication shall be used only if specifically required in the instructions. Where lubrication is required, the lubricant must be approved for the service by the end user.

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