



**Wilo Top S
Wet Rotor Circulation Pumps**

Engineering Specification

PART 1 – GENERAL

1.1 SUMMARY

- A. Furnish and install circulating pumps consistent with the hydronic system's performance and requirements. The circulating pumps shall be suitable for the specified system function and capacity.

1.2 REGULATORY

- A. Circulating pumps shall be rated to a minimum 125 PSI and 212 degrees Fahrenheit and where applicable, bear the approval symbol of the required regulatory body.
- B. Electrical assemblies (circuitry, wiring terminals and internal connections) of the circulating pumps shall be certified and registered to bear the emblem of UL, CSA or ETL as required. Electrical assembly shall meet codes and standards established by national bodies.

1.3 REFERENCES

- A. UL 778 Standard

1.4 SUBMITTALS

- A. Provide submittals, warranty information and shop drawings in accordance with the General Requirements and as specified herein. Submit detailed product drawings including wiring schematics. Indicate critical dimensions of the circulating pumps.
- B. Submit manufacturer's technical data in the form of published Installation and Operation and Maintenance Manuals to be supplied with the circulating pumps at time of installation.
- C. Circulating pumps shall be tested and verified for performance. Copies of "Certification of Performance" shall be made available to the specifying engineer if requested.
- D. Submit catalogue data on all equipment, pipe, fittings, fasteners and associated items supplied by others to complete the installation of the circulating pumps in the system installation.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Circulating pumps shipped in boxes and are to remain in factory shipping condition until immediately prior to installation.
- B. Circulating pumps are to be stored indoors in a conditioned space, protected from exposure to the elements, and from exposure to other potential contaminants.
- C. Factory applied labels are to remain in place and un-obscured. These identification tags are to display model numbers, serial numbers, and evidence of certifications/listings.

1.6 WARRANTY

- A. The Manufacturer shall warrant the circulating pumps for a period of 2 years from date of manufacture or 1.5 years from the date of installation, subject to the Terms and Conditions of said Warranty. A copy of the Manufacturer's Warranty shall be provided as part of the Submittals as outlined in Section 1.04 of this specification.

PART 2 - PRODUCTS

2.1 TERMINAL BOXES

- A. The circulating pumps shall have a high quality cast aluminum terminal box with NPT electrical connections and a secure, gasketed cover, Class 2 protection level.

2.2 ELECTRICAL CONNECTIONS

- A. Circulating pump shall have a coded terminal strip indicating common/neutral/ground within the terminal box for field connections for single phase and L1, L2, L3 plus ground for three phase.

2.3 ELECTRICAL

- A. All 24 volt wiring shall be of 18 gauge or larger, UL/CSA approved, 300 volts, 220 deg F maximum temperature.
- B. All 110 volt wiring shall be of 14 gauge or larger, UL/CSA approved, 300 volts, 220 deg F maximum temperature.
- C. The motor shall be a minimum of class H winding insulation as defined by UL 778.
- D. Voltage variances shall be less than +/- 5% from rated voltage with pump under load conditions. Amperage variance between phases on three phase systems shall be less than +/- 5%. Power to the pump is confirmed with a green light in the pump electrical terminal box. Rotation on three phase systems is reverse if red light appears in the pump electrical box (no red light is correct rotation).
- E. Stator thermal overload sensors are provided as an integral part of the pump and are potential-free, normally closed contact (maximum load 250 volt/1 amp). The thermal sensor shall be wired to the contactor via terminals P1 and P2. In the event of winding temperatures in excess of 375 deg F (190 deg C), the thermal sensor beaks contact to the relay (supplied by others) turning the power off to the pump until the overload has cooled down. If the thermal overload sensor system is not used the pump must be protected against overloading by the use of motor starter heaters. The heater set point is based on the model and speed as indicated on the nameplate of the pump. Single phase systems will incorporate circuit breakers to protect the pump against overload conditions.

2.4 CONTROL, OPERATION AND DIAGNOSTICS

- A. Circulating pumps must be capable of multi-speed operation, manually changed in the terminal box after power to the pump has been discontinued.
- B. Single phase models shall have an LED indicating power is available at the terminal strip. Additionally, three phase models shall have a warning LED indicating the circulator is running in reverse rotation and that field wiring connections should be reviewed and corrected.
- C. A winding resistance chart shall be accessible for service and diagnostics as required.
- D. The circulating pumps shall be suitable for inclusion as part of a DDC or Building Management System as required under Division 23 Controls.

2.5 MATERIALS AND CONSTRUCTION

- A. Circulating pumps shall be constructed with either bronze or Cast-Iron bodies. Cast Iron body circulating pumps shall have a factory applied Cathaphoresic coating.
- B. Shafts shall be constructed of high quality stainless steel. Motor bearings shall be metal impregnated carbon. Impellers will be constructed of a high strength, glass filled polypropylene engineered composite.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prior to commencing work the contractor will have read and understood both the Installation, and Operation and Maintenance Manuals (IOM) supplied and enclosed with the attendant circulating pumps. These are to be supplied in English, French and Spanish.
- B. The effectiveness of the system is dependant on the system being designed and installed correctly. Proper consideration of factors such as BTU loads, outdoor design temperature, indoor design temperature, room set-point temperature(s), differential fluid temperatures, head loss, flow rates and transfer capacities of the heat emitters is critical.
- C. Prior to final connection of the circulators as part of the hydronic system, the system piping shall be flushed of all contaminants and foreign objects.

3.2 INSTALLATION

- A. The circulating pumps must be installed by a qualified installer/service technician.
- B. The circulating pumps shall be installed in accordance with the relevant requirements of the Local Authority Having Jurisdiction, as required to meet the performance requirements and function specified for the system.
- C. The circulating pumps must be installed and operated strictly in accordance with the terms set out in both the Installation and Operation and Maintenance Manuals supplied and enclosed with the attendant circulating pumps.
- D. The pump shall be installed with the motor shaft in a horizontal plane with no exceptions. The electrical terminal box shall be installed at the 3:00, 9:00 or 12:00 position, referenced from the nameplate end of the motor.
- E. The pump must be installed in a way that it is not stressed by the pipework. A minimum of three pipe diameters is recommended on the inlet of the pump. Pressure gauges are recommended, installed in the ¼" NPT suction and discharge pressure gauge tapings provided with the pump.
- F. Where antifreeze protection is required, the maximum concentration of heating system glycol is 50% by volume. High concentrations of glycol at lower system design temperatures may require increasing the design operating point. Use of leak sealant products or automotive antifreeze is not permitted.
- G. Fluid temperature limitations are 248 deg F (120 deg C) to 14 deg F (-10 deg C) for closed systems and 140 deg F (60 deg C) to 14 deg F (-10 deg C) for open systems. Maximum ambient temperature surrounding the pump shall be between 32 deg F (0 deg C) to 104 deg F (40 deg C).
- H. Inlet pressure shall not exceed 145 psi (10 Bar). Minimum inlet pressure shall be enough

3.3 FIELD QUALITY CONTROL

- A. Upon receipt and prior to commissioning the circulating pumps should be inspected for any sign of visible damage.
- B. Prior to commissioning the circulating pumps, the system connections should be complete and leak free. The system should be filled and purged as per instructions in the IOM manuals. The system fluid should be tested and have a pH level of between 8 and 9.5 and be suitable for hydronic system use.
- C. Following fill and purge, the system should undergo a pressure test, followed by a run-through of the sequence of operations listed in the IOM manuals.

Typical Schedule:

Mark	Qty.	Duty	Inlet design temp	Outlet design temp	Manufacturer	Model	Electrical Service required	Pump function	Remarks
P-1	1	Primary loop pump	180°F	160°F	WILO	TOP S 1.5 X 35	230/1/60, 20 Amp required	Primary circulation	Two speed
P-2	1	Secondary loop terminal units	180°F	160°F	WILO	STAR S 21	115/1/60, 15 Amp required	Zone control to panel radiators	Module with 3 hi temp zones and a pressure bypass
P-3-5	3	Radiant loop manifold supply	130°F	110°F	WILO	STAR S 16	115/1/60, 15 Amp required	Zone control to radiant panels	Radiant zone control panel, each to have 5 zones low temp, 20 MBH output
P-6	1	Snow Melt manifold supply	160°F	110°F	WILO	TOP S 1.25 x 25	115/1/60, 15 Amp required	Zone control to snowmelt panels	Snow melt system with ECL 302 snowmelt control and snow sensor. 140 MBH Output capacity

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