

# HIGH PRESSURE HUMIDIFICATION SYSTEM

## **PART 1 – GENERAL**

### **a. RELATED DOCUMENTS**

1. All applicable requirements of other portions of the Contract Documents apply to the Work of this Section including, but not limited to, all Drawings, all Specifications, General Conditions, and General Requirements including submittals.
2. Division-15 Section “Basic Mechanical Requirements” applies to work of this section.

### **b. DESCRIPTION OF WORK**

1. GoFog, Inc. Commercial Series Atomizing Humidifier as indicated on drawings and schedules.
2. Types of evaporative humidification system specified in this section include the following:
  - a. High pressure water atomization type.
3. Refer to Division-16 sections for the following work; not work of this section:
  - a. Power supply wiring from power source to power connection on water pumps. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
  - b. Interlock wiring between electrically-operated equipment and field-installed control devices.
    - 1) Interlock wiring specified as factory-installed is work of this section.
4. Provide the following electrical work as work of this section, complying with requirements of Division-15 section “Electrical Work for Mechanical Systems”:
  - a. Control Wiring between field-installed humidity sensors or BAS output panel, staging valves and humidification system control panels.

### **c. QUALITY ASSURANCE**

1. Manufacturer:
  - a. For each product specified, provide components by same manufacturer throughout.

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- b. Manufacturing company shall have field service support to provide continuing support of humidification system.

### 2. Codes and Standards:

- a. UL and NEMA Compliance: Provide electrical components required as part of humidifiers, which are listed and labeled by UL and comply with NEMA Standards.
- b. Provide electrical control panels assembled and labeled in UL qualified facility.
- c. NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to installation and electrical connections of ancillary electrical components of humidifiers.
- d. International Mechanical Code and State Mechanical Code Rules.

### **d. SUBMITTALS**

1. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights, installation and start-up instructions, and furnished specialties and accessories.
2. Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating pipe routing, nozzle locations, solenoid valves, dimensions, weight loadings, required clearances, and methods of assembly of components.
3. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to pump units, solenoid valves, sensors and control panels. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
4. Maintenance Data: Submit maintenance data and parts lists for the entire system including pumps, sensors, valves, control and accessory: including "trouble-shooting" maintenance guide; product data, shop drawings, and wiring diagrams in maintenance manual; in accordance with requirements of Related Documents.

### **e. WARRANTY**

1. Products shall be supported with a warranty that ensures it will be free from defects in materials and workmanship for a period of (1) year.

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## PART 2 – PRODUCTS

### A. MATERIALS AND COMPONENTS

1. General: Except as otherwise indicated, provide packaged humidifiers and ancillary equipment with manufacturer's standard materials and components as indicated and published product information, designed and constructed by manufacturer, and as required for complete installation.
2. Acceptable Manufacturers: Subject to compliance with requirements, provide the central evaporative humidification system manufactured by one of the following:

GoFog, Inc. – 803.220.0101 (info@gofoginc.com)

### B. HIGH PRESSURE WATER ATOMIZATION TYPE HUMIDIFIER

1. General: Provide high pressure water atomization type humidifier including the following components:
  - a. Fog nozzles
  - b. Fog pump unit(s)
  - c. Water treatment equipment (using RO treated water).
  - d. Fog nozzle manifolds and main feed lines.
  - e. Droplet Filters and frames
  - f. Electrical panels and automatic control valves.

The system component sizes and capacities shall meet the specified load for humidification zones.

High pressure humidification system shall not use more than .003 kW/# of moisture generated.

2. Fog Nozzle Section:
  - a. Nozzle: 316 stainless steel construction with a 0.008" (0.2 mm) machined orifice.
  - b. Median droplet size to be between 10-40 microns with 95% of the droplets at 15 microns or less at 1,000 psig (69 bar) operating pressure.

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- c. The nozzle manifold to be constructed of ½”OD 316 stainless steel tubing with 0.035” wall thickness.
  - d. Nozzle saddles to be TIG welded to the manifold.
  - e. All connections between tubing to be 316 stainless steel double-ferrule compression fittings.
  - f. Nozzle section in AHU must be non-corrosive and include a stainless steel drain pan that slopes to the drain.
3. High pressure water pump units: Complete fog pump units shall include the following:
- a. Oil lubricated ceramic plunger pumps with stainless steel heads: Water lubricated axial piston pumps are not to be used due to noise and vibration.
  - b. Direct drive connection to the motor. Belt driven not to be used.
  - c. Frame: Components to be mounted on a powder coated carbon steel frame.
  - d. ABB VFD with pressure transducer to maintain pump pressure.
  - e. Each pump system shall be rack mounted and fully assembled at the factory. The factory mounted equipment includes pumps, VFDs, filters, and associated control panels. Rack to be fully tested at the factory prior to shipment.
  - f. Pressure regulating valves: Stainless steel construction with stainless steel valve and valve seat.
  - g. Electric motors shall be TEFC, premium efficiency model. Refer to Specification Section 16150.
  - h. Pump unit shall be capable of operating minimum zone without overheating of pump.
  - i. Low water pressure cut-off: To protect pump in the event of low inlet pressure, manual reset with signal to BMS.
  - j. Low pressure discharge switch. To shut down the system if the pressure is not able to maintain 1,000 psi. Manual reset with signal to BMS.

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- k. Pump bypass to RO storage tank or finned tube heat exchanger for pump cooling during part load.
- l. Low pressure gauge: liquid filled, for 0 to 100 psig.
- m. High pressure gauge: liquid filled, for 0 to 2,000 psi.
- n. Fitting and hoses: low-pressure side fittings shall be stainless steel construction. High-pressure side fittings shall be of 304 stainless steel. Low-pressure inlet hoses and high-pressure discharge hoses shall be provided as part of humidification system.
- o. All wetted parts including piping shall be non-corrosive (stainless steel). Provide all necessary dielectric isolation.

### 4. Water Treatment:

Reverse osmosis (RO) water treatment system will be provided as part of humidification system. The RO treated water shall be piped to the fog pump units for this central humidification system as part of this humidification work. Building water to be tempered to 77F at the inlet of the water treatment system.

- a. The system supplier shall conduct complete water analysis on the RO treated water and make recommendation for water treatment additionally required prior to commencing work.
- b. Water treatment system shall protect against:
  - 1) Excessive plugging of nozzles, not more than 10% per year.
  - 2) Any water condition that could cause excessive wear or damage to the fog nozzles.
  - 3) Any dangerous bacteria growth or any condition that could result in dangerous bacteria growth, and
  - 4) Any possibility of “dusting” of the air with mineral salts.

### 5. Droplet Filters and Frames: Filters shall be UL Class I rated, polymer based with biocide agent. Filters shall be rated for use up to 700 fpm. Filters shall be installed in a stainless steel frame.

### 6. Zone control valves:

- a. High pressure motorized ball valves shall be provided on the water supply line to each humidification zone to stage the humidification

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process at the fog nozzles. The valves shall be rated for a minimum 1,500 psi operating pressure with stainless steel wetted parts.

- b. Valve control panel to accept 4-20mA or 0-10VDC demand signal from BMS.
- c. Valve control panel to send a 24VDC pump enable during a demand for humidity.
- d. Flush cycle to occur once every 24 hours for 30 seconds on each valve to keep fresh water in the system.

### **PART 3 – EXECUTION**

#### **A. INSPECTION**

1. Examine areas and conditions under which humidifiers are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

#### **B. INSTALLATION OF HUMIDIFICATION SYSTEM**

1. General: Installation shall be performed or supervised by the humidification system manufacturer's factory trained representative.  
The system shall be installed in accordance with system manufacturer's written instructions, and with recognized industry practices, to ensure that humidification system comply with requirements and serve intended purposes.
2. Access: Provide access space around humidification system components for service as indicated, but in no case less than that recommended by manufacturer.
3. Support: Provide supports from substrate for humidification system components in accordance with manufacturer's installation instructions.
4. Electrical Wiring: Install electrical devices furnished by manufacturer, but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to the electrical wiring installer.
  - a. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Specification Section 15015, Electrical Work for Mechanical Systems. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

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5. Connect the RO treated make-up water providing suitable back flow prevention devices as required by Plumbing Code having jurisdiction.  
Connect the necessary drain piping.
6. Grounding: Provide electrical equipment ground for electrical-operated humidification system components.

### **C. FIELD QUALITY CONTROL**

1. Upon completion of installation and prior to initial operation, test and demonstrate that air humidification equipment is leak-tight.
2. Repair or replace air humidification equipment as required to eliminate leaks, and retest as specified to demonstrate compliance.

### **D. START-UP, ADJUSTING AND CLEANING**

1. Start-Up: Start-up humidifiers in accordance with manufacturer's instructions under supervision of manufacturer's representative.
2. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.