**PART 1 - GENERAL**

* 1. Work Included:
     1. NORTEC GS Series Gas-Fired Humidifier[s] as indicated on drawing[s] and as indicated on schedule[s].
     2. Complete and operable humidification system [which meets applicable building codes].
     3. Equipment start-up and project inspection by qualified factory trained representative.
  2. Quality Assurance:
     1. CSA Certified.
     2. ISO 9001-2008.
     3. ANSI/NFPA 70 - National Electrical Code.
     4. ARI 640, "Standard for Commercial and Industrial Humidifiers”.
     5. Products shall be supported with a warranty that ensures the product will be free from defects in materials and workmanship for a period of three years after installation or 39 months from manufacturer’s ship date, whichever is earlier.
  3. Related Sections:
     1. 23 01 00 Mechanical General
     2. 23[ ] Piping Installation
     3. 23[ ] Control System
  4. Submittals:
     1. Submit product data under provisions of Section 23 01 00. Include product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes. Include rated capacities, operating weights, furnished specialties, and accessories.
     2. Submit manufacturer's installation instructions.
     3. Submit operation and maintenance data.
     4. Submit coordination drawings. Detail fabrication and installation of humidifiers. Include piping details, plans, elevations, sections, details of components, and dispersion tubes. Detail humidifiers and adjacent equipment. Show support locations, type of support, weight on each support, and required clearances.
     5. Submit wiring diagrams including power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
     6. Submit minimum water quality requirements and water pressure requirements.
  5. Schedules:
     1. Refer to information contained in schedule[s] attached to this specification.
     2. Humidifiers to be of type, capacity, and arrangement as listed in schedule[s].
     3. Include accessories listed in schedule[s] and those accessories required for type of unit.

**GAS FIRED STEAM HUMIDIFIER – GS CS**

**PART 2 - PRODUCTS**

* 1. The NORTEC GS CS packaged gas-fired steam generating system produces clean, sterile, and efficient atmospheric pressure steam through combustion of natural gas or propane.
  2. Unit [s] to be complete with:
     1. Enclosed cabinet, powder painted steel construction and air gap between cabinet and insulated humidifier tank ensures safe surface temperature.
     2. All internal components compatible with De-Ionized (DI), Reverse Osmosis (RO), potable and softened water.
     3. All tank surfaces shall be insulated with minimum 0.5" (12 mm) thick insulation and enclosed within unit cabinetry to ensure safe surface temperature, high overall efficiency, and fast unit response time. Units with exposed insulation shall not be acceptable.
     4. Standard internal drain water cooler to ensure drain water tempering to 140° F (60° C).
     5. Blow-down p-trap, factory installed, enclosed in cabinet, prevents steam leakage to drain. Field installation not acceptable.
     6. Humidifier to prevent "back-siphoning" using an internal air gap for supply water, to meet local plumbing codes.
     7. Drain line to include a vacuum breaker to prevent siphon drainage of the tank.
     8. Stainless Steel combustion chamber(s)/heat exchanger(s) shall be tubular in design.
     9. Stainless Steel combustion chamber(s)/heat exchanger(s) shall be heat treated to protect against possible stress corrosion cracking. Combustion chamber(s)/heat exchanger(s) that are not heat treated 316 stainless steel are not acceptable.
     10. Each burner, capable of true modulation at a 5:1 ratio will provide steam production of 30 to 150 lbs/hr (14 to 68 kg/hr), 20 to 100 lbs/hr (9 to 45 kg/hr) or 10 to 50 lbs/hr (4.6 to 23 kg/hr). Time proportioning modulation is not acceptable.
     11. Maximum net overall efficiency of 90%.
     12. Unit must be rated as a condensing, high-efficiency gas appliance with a secondary heat exchanger and condensate removal.
     13. Gas system with gas valve(s), explosion proof, premix combustion air blower(s), microprocessor controlled ignition, flame sensing and fault indicator light(s), 100% premix flat burner(s), spark igniters(s) and heat transfer efficiency maintained over all operating ranges.
     14. A secondary combustion air safety, in addition to blower speed monitoring, utilizing a mechanical pressure differential switch, to ensure combustion air is entering the pre-mix blower properly.
     15. Removable cover at front of unit facilitates easy cleaning (when applicable) with complete access to tank and heat exchanger surfaces. When removed, access must extend to the bottom of the tank with no lip.
     16. Automatic water level control within a separate float chamber, isolated from the boiling action, to prevent false water level indication.
     17. Dual magnetic electronic float system, located outside of the boiling water to ensure accurate water level control and reduced maintenance. Cool fill water is to be supplied into the assembly to keep the device cool. Systems using conductivity probes or floats located within boiling reservoir water are not acceptable.
     18. Humidifier shall have a dual fill valve to feed water to the fill assembly, to reduce scaling and mineral build up on the magnetic floats.
     19. Float chamber to include LED indication of five possible water level indications.
     20. Pre-cleaning flushing feature shall be provided to reduce maintenance time.
     21. End of season blow-down feature to evacuate contained water and minerals after 72 hours with no demand for humidification.
     22. Standard Modbus, BACnet IP, and BACnet MSTP protocol communication capability with adaptability for LonWorks. BTL Certified options available.
     23. Keep warm function allows the water temperature in the tank to be maintained at a high temperature for quick response of the unit to a call for humidity.
     24. Integrated Controller with LCD touchscreen and backlit display.

**PART 3 - EXCECUTION**

* 1. Installation:
     1. Install humidifiers and steam dispersion panels per manufacturers' instructions.
     2. Seal humidifier dispersion-tube duct penetrations with flange.
     3. Install with required clearance for service and maintenance.
     4. System shall be rated as class 4 appliance certified for use with exhaust vent type BH or with CPVC venting.
  2. Accessories:
     1. Install accessories in accordance with manufacturer's recommendations.
  3. Commissioning:
     1. Start-up of humidifier to be by factory trained technician.