

SECTION 44 44 20

AQUEOUS AMMONIA SYSTEM
10/07

PART 1 GENERAL

1.1 SCOPE OF WORK

- a. The aqueous ammonia system specified herein and the sodium hypochlorite system as specified in Section 44 44 13.02, SODIUM HYPOCHLORITE GENERATION SYSTEM, shall be combined into one fully compatible and functional integrated chloramination system, and the integrated system shall be supplied by a single supplier (Supplier).
- b. This Section covers the work to be performed by the Supplier to furnish, complete and functional, the aqueous ammonia (NH₃) system (System) and accessories. Components include, but are not limited to, NH₃ storage tank, chiller, vapor scrubber tank, interconnecting piping, valves, control panel, electrical components and all appurtenances required for a complete and operational system.
- c. The Supplier will design, fabricate, ship to the site, startup, performance test, and furnish to the DISTRICT certification and warranty of the aqueous ammonia system.
- d. The Supplier shall coordinate and be responsible for the supply of all equipment and for providing a complete and functional system.
- e. NH₃ Storage Tank is specified in details in Section 43 40 02, FIBERGLASS REINFORCED PLASTIC (FRP) TANK.
- f. Electrical:
 1. All power, control, and signal wiring to the various components of the System shall be terminated at the System control panels (one panel for the chiller). Contractor shall provide a power circuit as shown on the Drawings.
 2. The electrical drawings show only power feed, control, and signal interface circuiting to the System. The power circuits are between the Motor Control Center and the Aqueous Ammonia System control panel. The control and signal interface circuits are between the plant's main control and the Aqueous Ammonia System control panel. The Contractor shall furnish and install all necessary circuiting (i.e., raceways and conductors), boxes, and related items that may not shown on the electrical drawings but as required and shown on the Aqueous Ammonia System manufacturer's shop drawings for a complete and functional system.
 3. All material supplied and work done under this section shall be in full compliance with Division 26, ELECTRICAL.

1.2 DESIGN REQUIREMENTS

- a. NH₃ Storage Tank: Design tank, including resin selection, wall thickness, methods and locations of support, and stiffener requirements

as specified in Section 43 40 02, FIBERGLASS REINFORCED PLASTIC (FRP) TANK. Design shall be prepared and sealed by designer meeting requirements of Article QUALITY ASSURANCE as specified in Section 43 40 02, FIBERGLASS REINFORCED PLASTIC (FRP) TANK.

b. NH3 Chemical Feed Pumps: As specified in Section 43 32 69, CHEMICAL FEED SYSTEMS and feed pump control panel.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Background and experience information of the Supplier that meet the qualification requirements specified in this Section.

Aqueous Ammonia System: Provide the applicable information specified in the General Conditions and as specified below:

1. Full descriptive information of all components being provided, including manufacturer's catalog sheets, shop drawings indicating all dimensions and equipment weights, and detailed listing of materials specifications.
2. Written instructions as to the recommended methods for unloading, storing, and installing the equipment and recommended lifting and handling procedures.
3. Operations and maintenance manual as specified in the General Conditions.
4. Submit testing results as specified in Paragraph 3.01.
5. Electrical/Instrumentation and Control System design drawings with content and style similar to the Contract Electrical/Instrumentation and Control System Drawings where applicable. Include the following:
 - a. Single-line drawings.
 - b. Electrical power and control plans.
 - c. Elevations of electrical engineered assemblies.
 - d. Wire sizing calculations.
 - e. Installation details.
 - f. Interconnection drawing(s) showing all connections among the NH3 Storage tank, chiller control panel, metering pump controllers, the facility electrical distribution system, and the main control system (PLC) located in the control room. The interconnection drawing(s) shall show termination points on numbered terminals and shall include an English description for each control signal network, or power termination.
 - g. Submit information for electrical material, devices, and

components in full compliance with Division 26, ELECTRICAL. Include descriptive information and catalog cuts on all electrical devices, and controls. Provide motor data sheets and certified motor test reports for all motors supplied under this section.

h. Submit information for Instrumentation and Control System Drawings, materials, instruments, controllers, and components in full compliance with Section 40 99 90 PACKAGE CONTROL SYSTEMS.

1.4 DELIVERY, STORAGE, HANDLING, AND PROTECTION

General: Comply with requirements of the General Conditions and applicable requirements as specified in Section 43 40 02, FIBERGLASS REINFORCED PLASTIC (FRP) TANK.

PART 2 PRODUCTS

2.1 GENERAL

a. All materials of construction shall be suitable for the intended use of this project.

b. The Supplier shall coordinate and be responsible for the supply of all ancillary equipment and for providing a totally integrated and functional system. Ancillary equipment shall include, but not be limited to, the following:

1. NH3 storage tank (TK-62010).
2. Chiller (M-62010 WITH LCP-62010).
3. NH3 vapor scrubber tank (TK-62020).
4. Controls and interfaces.

2.2 ACCEPTABLE MANUFACTURERS

As called out in specific sections.

2.3 SERVICE CONDITIONS

All system appurtenances and material of construction shall be fully suitable for the expected range of temperature, chemical environment, and mechanical stresses under standby, operating, and post-operational modes. All piping, valves, electrical, and duct connections shall also be designed specifically for operation under the criteria described in this section.

2.4 EQUIPMENT SUMMARY

The following is a summary of equipment capacities and sizes. The NH3 vapor scrubber tank shall be 24 inches in diameter by 3 feet high carbon steel epoxy-coated ATM tank as detailed in the Drawings.

Description/Quantity	Capacities	Service Conditions
NH3 Storage Tank (1 unit)	1000 gal.	19 Aqueous Ammonia Environment: Indoors
NH3 Tank Chiller	Lower 1000 gallons	Environment: Indoors

Description/Quantity	Capacities	Service Conditions
(1 unit)	aqueous ammonia from 85 degree F to 50 degree F storing temperature within 10 hours	

2.5 EQUIPMENT DESCRIPTION

2.5.1 Aqueous Ammonia Storage Tank

1. Provide one (1) 1000-gallon aqueous ammonia storage tank.
2. Tank shall be equipped with proper connections for fill, vapor return, pump suction, chiller probe, temperature probe, level sensor, vent, and overflow and drain as specified in Section 43 40 02, FIBERGLASS REINFORCED PLASTIC (FRP) TANK.
3. The vent shall be piped to the NH3 vapor scrubber tank as shown in the Drawings.
4. Fill line shall be connected as shown on the drawings.
5. Requirements for instruments associated with the storage tank as shown on the Drawings are detailed in Section 40 99 90 PACKAGE CONTROL SYSTEMS and 40 95 00, PROCESS CONTROL for instrument components.

2.5.2 Aqueous Ammonia Tank Chiller

1. General: All package controls shall be in accordance with general control requirements and component qualities specified in Section 40 99 90 PACKAGE CONTROL SYSTEMS, and as follows:
 - a. The process and instrumentation diagrams and these Specifications depict the minimum functional requirements of the control system provided under this section. The system supplier shall provide all additional instrumentation and controls necessary to provide a safe and operable system in accordance with standards listed under this section. The specific controls proposed shall be subject to the approval by the Engineer and shall be submitted as specified under Article SUBMITTALS herein.
2. The chiller shall be capable of lowering the aqueous ammonia (with full 1000 gallons stored in the tank) temperature from 85 degrees F to 50 degree F within 10 hours at an ambient temperature of 120 degree F. The system supplier shall calculate the power load for the chiller and confirm the designed power supply capacity is adequate for the chiller application.
3. The chiller's condensing unit shall be outdoor, air-cooled, as manufactured by Bohn Refrigeration Products.
4. Provide a chiller temperature probe and sensor cable or capillary of required length to monitor the temperature inside the aqueous ammonia tank.
5. Identification: Panel number as shown on the Process and Instrumentation Drawings, Aqueous Ammonia Chiller control panel.

6. NEMA 4X enclosure. Provide all components and functions as shown on drawings and specified herein.
 - a. Power supply: 120/240 VAC.
7. Lights, Pushbuttons and Switches:
 - a. Shall comply with requirements in Section 40 99 90 PACKAGE CONTROL SYSTEMS.
8. Control panel shall include the following operator controls and indicators as a minimum:
 - a. Common failure alarm light, amber.
 - b. Chiller running light, red
 - c. Power on light, white.
 - d. Hand/Off/auto selector switch.
9. System Operation and Control Requirements:
 - a. The chiller shall automatically start/stop according to the temperature sensor in the aqueous ammonia liquid when the selector switch is in AUTO.
 - b. In HAND the chiller shall start.
 - c. In OFF the chiller shall stop.
10. Control Panel Electrical Requirements:
 - a. Power: 120/240 volts, single-phase, 60 Hz.
 - b. Main Disconnect: Fused switch or circuit breaker.
 - c. Provide branch circuit breakers for feeding all ancillary equipment requiring power.
 - d. Control power transformer with fuses on primary and secondary wiring. Size the transformer for all process equipment requiring 120V ac power.

2.6 SPARE PARTS AND SPECIAL TOOLS

Aqueous Ammonia System as specified in Article EQUIPMENT DESCRIPTION of this Specification Section: Manufacturer's standard set of spare parts and special tools.

PART 3 EXECUTION

3.1 TESTING

NH3 tank chiller: Conduct tests to verify the chiller test meets the performance requirements for the chiller as described in the specifications.

3.2 WARRANTY

NH3 Chiller: One year unlimited warranty.

3.3 MANUFACTURER'S SERVICES

a. A manufacturer's representative for the equipment specified shall be present at the job site and/or classroom designated by the DISTRICT for the minimum man-days listed for the equipment and services hereinunder, travel time excluded:

1. NH3 Storage Tank and Chiller: Provide fabricator's representative at site for installation assistance, inspection and certification of proper installation for specified component, subsystem, equipment, or system.

b. Setup services and training of DISTRICT's personnel shall be at such times as requested by the DISTRICT.

-- End of Section --