SECTION 467341 - DIGESTER HEATING EQUIPMENT

Note that this section has only been edited for NYSOGS standardization and has not been technically edited. The design engineer shall make all technical edits specific to the project for this section.

This Section includes heating equipment to maintain a desired operating temperature in anaerobic digesters used in stabilization processes for wastewater residuals.

1. GENERAL
	* + 1. SUMMARY
				1. Section Includes:

Heat exchanger.

Water and sludge circulating pumps.

Boiler burning equipment.

Controls.

* + - * 1. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section as well as Sections required to describe complete system or assembly requirements.

Section 235239 - Fire-Tube Boilers: Boilers for heating water supply to digester heating system.

Section 400567.39 - Pressure-Relief Valves: Heat exchanger tubing.

Section 404223 - Process Equipment Insulation: Heat exchanger insulation and jacketing.

* + - 1. REFERENCE STANDARDS

List reference standards included within text of this Section, with designations, numbers, and complete document titles.

* + - * 1. American Welding Society:

AWS D1.1 - Structural Welding Code - Steel.

* + - * 1. ASME International:

ASME Boiler and Pressure Vessel Code (BPVC) Section IV - Heating Boilers.

ASME Boiler and Pressure Vessel Code (BPVC) Section VIII - Pressure Vessels.

ASME Boiler and Pressure Vessel Code (BPVC) Section IX - Welding, Brazing, and Fusing Qualifications.

* + - * 1. National Electrical Manufacturers Association:

NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

NEMA ICS 1 - Industrial Control and Systems: General Requirements.

NEMA ICS 2 - Controllers, Contactors and Overload Relays Rated 600 V.

NEMA ICS 3 - Medium Voltage Controllers Rated 2,001 to 7,200 V AC.

NEMA ICS 4 - Application Guideline for Terminal Blocks.

NEMA ICS 6 - Industrial Control and Systems: Enclosures.

* + - * 1. National Fire Protection Association:

NFPA 58 - Liquefied Petroleum Gas Code.

* + - * 1. UL:

UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures.

UL 508 - Industrial Control Equipment.

UL 845 - Motor Control Centers.

* + - 1. PREINSTALLATION MEETINGS
				1. Convene minimum [**one week**] [**<\_\_\_\_\_\_\_\_> weeks**] prior to commencing Work of this Section.
			2. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: Submit manufacturer information describing materials of construction, fabrication, and protective coatings.
				5. Shop Drawings: Indicate materials and equipment, including wiring and control diagrams, performance charts and curves, installation and anchoring requirements, fasteners, and other details.
				6. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
				7. Welder Certificates: Certify welders and welding procedures employed on Work, verifying [**ASME**] [**AWS**] <**\_\_\_\_\_\_\_\_**> qualification within previous 12 months.

Include separate Paragraphs for additional certifications.

* + - * 1. Manufacturer Instructions:

Submit detailed instructions on installation requirements, including storage and handling procedures, anchoring, and layout.

Submit installation, selection, and hookup configuration, with pipe and accessory elevations.

Submit hanging and support requirements and recommendations.

* + - * 1. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
				2. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.
				3. Qualifications Statements:

Coordinate following Subparagraphs with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer and installer.

Submit manufacturer's approval of installer.

* + - 1. CLOSEOUT SUBMITTALS
				1. Project Record Documents: Record actual locations and final orientation of equipment and accessories.
			2. QUALITY ASSURANCE

Include this Article to specify compliance with overall reference standards affecting products and installation included in this Section.

In following Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Perform Work according to <**\_\_\_\_\_\_\_\_**> standards.

Include following Paragraph only when cost of acquiring specified standards is justified.

* + - * 1. Maintain <**\_\_\_\_\_\_\_\_**> [**copy**] [**copies**] of each standard affecting Work of this Section on Site.
			1. QUALIFICATIONS

Coordinate following Paragraphs with requirements specified in SUBMITTALS Article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
				2. Installer: Company specializing in performing Work of this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience [**and approved by manufacturer**].
				3. Welders: [**AWS**] [**ASME**] qualified within previous 12 months for employed weld types.
			1. DELIVERY, STORAGE, AND HANDLING
				1. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
				2. Store materials according to manufacturer instructions.
				3. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Provide additional protection according to manufacturer instructions.

* + - 1. EXISTING CONDITIONS
				1. Field Measurements:

Verify field measurements prior to fabrication.

Indicate field measurements on Shop Drawings.

* + - 1. WARRANTY

This Article extends warranty period beyond one year. Extended warranties may increase construction costs and Owner enforcement responsibilities. Specify warranties with caution.

* + - * 1. Furnish [**five**] <**\_\_\_\_\_\_\_\_**>-year manufacturer's warranty for digester heating equipment.
1. PRODUCTS
	* + 1. PERFORMANCE AND DESIGN CRITERIA
				1. Automatic control of digester operating temperature at [**95**] <**\_\_\_\_\_\_\_\_**> deg. F, plus or minus [**0.5**] <**\_\_\_\_\_\_\_\_**> deg. F
				2. Minimum Sludge Heating Capacity: <**\_\_\_\_\_\_\_\_**> Btu/h based on heating <**\_\_\_\_\_\_\_\_**> gpm of sludge.
				3. Boiler Maximum Operating Pressure: [**30**] <**\_\_\_\_\_\_\_\_**> psig
			2. HEAT EXCHANGER
				1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=12744&mf=04&src=wd):

DESIGNER TO PROVIDE TWO MANUFACTURERS AND APPROVED EQUIVALENT FOR ALL LISTED PRODUCTS.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

In following Subparagraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

Furnish materials according to <**\_\_\_\_\_\_\_\_**> standards.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Comply with ASME Section VIII and furnish ASME "U" stamp.

Type:

[**Water-to-sludge**] [**Sludge-to-sludge**].

[**Water bath**] [**or**] [**concentric tube**].

Tubes:

Number: [**2**] [**12**] [**24**] <**\_\_\_\_\_\_\_\_**>.

Length: [**10**] [**20**] <**\_\_\_\_\_\_\_\_**> feet

End Fittings: Removable for cleaning.

Tube Diameter:

Inner Sludge: [**4**] [**6**] <**\_\_\_\_\_\_\_\_**> inches

Outer Water: [**6**] [**8**] <**\_\_\_\_\_\_\_\_**> inches

* + - * 1. Materials:

Tubes: [**Steel**] [**Ductile iron**] <**\_\_\_\_\_\_\_\_**>.

Fittings: [**Cast iron**] <**\_\_\_\_\_\_\_\_**>.

End Plates: [**Steel**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Jacket:

Factory fabricated.

Shell Minimum Thickness:

Sides: [**16**] <**\_\_\_\_\_\_\_\_**> gage

Top and Bottom: [**3/16**] <**\_\_\_\_\_\_\_\_**> inch

Insulation:

As specified in Section 404223 - Process Equipment Insulation.

Material: Fiberglass.

Thickness: [**2**] <**\_\_\_\_\_\_\_\_**> inches

* + - * 1. Accessories:

Integral water back-flushing connections.

Pressure Relief Valves:

As specified in Section 400567.39 - Pressure-Relief Valves.

Size: Full line.

Circulating Pumps:

Water: As recommended by heat exchanger manufacturer to provide turbulent flow across sludge tubes.

* + - 1. BOILERS
				1. As specified in Section [**235239 - Fire-Tube Boilers**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

Description:

Furnish draft fans, combustion safety controls and equipment, breeching and stacks, fuel system, and accessories.

Draft Fan: Designed for corrosive application.

* + - * 1. Burning Equipment:

Description: Dual fuel burning equipment, capable of burning either digester gas or [**No. 2 fuel oil**] [**natural gas**] [**liquid petroleum gas (LPG)**].

Fuels:

Editing following Subparagraphs based on type of fuel being used for Project.

Digester Gas:

Approximate Heating Value: [**600**] <**\_\_\_\_\_\_\_\_**> Btu/ cu. ft

Specific Gravity: [**0.8**] <**\_\_\_\_\_\_\_\_**>.

Natural Gas:

Approximate Heating Value: [**1,000**] <**\_\_\_\_\_\_\_\_**> Btu/ cu. ft

LPG:

Approximate Heating Value: [**2,500**] <**\_\_\_\_\_\_\_\_**> Btu/ cu. ft

Piping and Equipment: Comply with NFPA 58.

Mixture of Digester Gas and [**Natural Gas**] [**LPG**]:

Approximate Heating Value: <**\_\_\_\_\_\_\_\_**> Btu/ cu. ft

No. 2 Fuel Oil:

Approximate Heating Value: [**140,000**] <**\_\_\_\_\_\_\_\_**> Btu/ gal

* + - 1. CONTROLS
				1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=12745&mf=04&src=wd):

DESIGNER TO PROVIDE TWO MANUFACTURERS AND APPROVED EQUIVALENT FOR ALL LISTED PRODUCTS.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

In following Subparagraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

Furnish materials according to <**\_\_\_\_\_\_\_\_**> standards.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Digester temperature and burner controllers, sludge circulating pump switchgear, [**induced**] [**forced**]-draft fan motor controls, heat exchanger water circulating pump switchgear[**, and**] <**\_\_\_\_\_\_\_\_**>.

[**Induced**] [**Forced**]-Draft Fans, Motor, and Associated Boiler and Burner Controls: As specified in Section 235239 - Fire-Tube Boilers.

* + - * 1. Enclosure:

NEMA 250 Type 12.

Material: 10-gage steel with continuously welded seams.

Doors:

Type: [**Dual**] [**Single**] swing-out.

Gasketed with neoprene.

Latching Mechanism: Heavy duty, three-point.

Power: 120/240 V, three-phase, four-wire open delta service.

Identification:

Identify control panel components with engraved nameplate mounted on inside of panel.

Identify terminals and wires according to panel wiring diagrams.

Mount components not mounted on front of panel on removable back panel secured to enclosure with collar studs.

Terminate wires leaving panel at terminal strips inside enclosure.

Furnish copper grounding plate inside control panel for terminating ground wires.

Interlocks: As required.

* + - * 1. Selector Switches and Indicating Lamps:

Location: Control panel doors.

Digester Heater Switch: Hand-off-auto.

Fuel Selection Switch: Digester gas-[**oil**] [**natural gas**] [**LPG**]-auto.

Sludge Circulating Pump: Continuous-repeating.

Low boiler water lamp, with alarm horn and silencer.

Boiler high temperature lamp, with alarm horn and silencer.

Digester Temperature Controls: Hand-off-auto.

<**\_\_\_\_\_\_\_\_**>.

* + - * 1. Digester Temperature Controls:

Water Circulation Pump: Automatically controlled by temperature of the sludge passing thermostat located at inlet to heat exchanger sludge tubes.

Repeating Timer: Sludge circulation pump energized for adjustable time interval.

Burner Equipment: Automatically controlled by temperature of the sludge passing thermostat located at inlet to heat exchanger sludge tubes.

Thermometers:

Location: In heat exchanger sludge inlet and outlet.

Range: [**Zero to 150**] [**<\_\_\_\_\_\_\_\_> to <\_\_\_\_\_\_\_\_>**] deg. F

Furnish each thermometer with mounting socket to enable removal without draining sludge tubes.

* + - * 1. Accessories:

Controllers: Comply with NEMA ICS 1.

Circuit Breakers: Comply with UL 489.

Motor Controls and Control Centers: Comply with [**NEMA ICS 1**] [**, NEMA ICS 2**] [**, NEMA ICS 3**] [**, NEMA ICS 4**] [**, NEMA ICS 6**] [**, UL 508**] [**, and**] [**UL 845**].

1. EXECUTION
	* + 1. EXAMINATION
				1. Verify layout and orientation of equipment, accessories, and piping connections.
			2. INSTALLATION
				1. According to manufacturer instructions and as indicated on Drawings.
				2. Pressure Relief Valve: Comply with ASME Section IV.
				3. Ensure that connections with or protrusions through digester cover or walls are gastight.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

In following Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Installation Standards: Install Work according to <**\_\_\_\_\_\_\_\_**> standards.
			1. FIELD QUALITY CONTROL
				1. Testing:

Test for proper operation.

Control System: Start by energizing system equipment and testing operation of hardware and process control logic under supervision of manufacturer's representative and in presence of [**Director’s Representative**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than <**\_\_\_\_\_\_\_\_**> days on Site for installation, inspection, startup, field testing, and instructing Director’s Representative in operation and maintenance of equipment.
				2. Equipment Acceptance:

Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

Make final adjustments to equipment under direction of manufacturer's representative.

* + - * 1. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.
			1. DEMONSTRATION
				1. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Director’s Representative.

END OF SECTION 467341