SECTION 221429 - SUMP PUMPS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			1. SUMMARY
				1. Section Includes:

Terminology and descriptions for pumps used in this Section are from HI 1.1-1.2.

Submersible sump pumps.

Wet-pit-volute sump pumps.

Sump-pump basins and basin covers.

Packaged drainage-pump units.

* + - * 1. Related Requirements:

Retain subparagraph below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 221329 "Sanitary Sewerage Pumps" for effluent and sewage pumps.

* + - 1. SUBMITTALS
				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: For each type of product indicated. [Include construction details, material descriptions, dimensions of individual components and profiles.] [Include rated capacities, operating characteristics, electrical characteristics, furnished specialties and accessories, and installation instructions for the sump basin, frame, and cover.]
				5. Shop Drawings:

Include plans, elevations, sections, and [**mounting**] [**attachment**] details.

Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

Include diagrams for power, signal, and control wiring.

* + - 1. CLOSEOUT SUBMITTALS
				1. Operation and Maintenance Data: For pumps and controls, to include in operation and maintenance manuals.
			2. DELIVERY, STORAGE, AND HANDLING
				1. Retain shipping flange protective covers and protective coatings during storage.
				2. Protect bearings and couplings against damage.
				3. Comply with manufacturer's written instructions for handling.
1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. PERFORMANCE REQUIREMENTS
				1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
				2. UL Compliance: Comply with UL 778 for motor-operated water pumps.
			2. SUBMERSIBLE SUMP PUMPS

Retain "Sump-Pump Basins and Basin Covers" Article if retaining this article.

Insert drawing designation. Use these designations on Drawings to identify each product.

If Project has more than one type or configuration of sump pump, coordinate first paragraph below with schedule on Drawings. See sample schedule in the Evaluations.

* + - * 1. Submersible, Fixed-Position, Single-Seal Sump Pumps <**Insert drawing designation**>:

Description: Factory-assembled and -tested sump-pump unit.

Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sump pump as defined in HI 1.1-1.2 and HI 1.3.

Pump Casing: Cast iron, with strainer inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.

Impeller: Statically and dynamically balanced, [**ASTM A48, Class No. 25 A cast iron**] [**ASTM A532, abrasion-resistant cast iron**] [**and**] [**ASTM B584, cast bronze**], [**semiopen**] <**Insert design**> design for clear wastewater handling, and keyed and secured to shaft.

Pump and Motor Shaft: Stainless steel[**or steel**], with factory-sealed, grease-lubricated ball bearings.

Seal: Mechanical.

Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.

Verify that pump selected has motor feature in "Motor Housing Fluid" subparagraph below, if either option is required, or delete.

Motor Housing Fluid: [**Air**] [**Oil**].

Retain one of two "Controls" subparagraphs below. Controls in first subparagraph are rod-and-float type.

Controls:

Enclosure: NEMA 250, [**Type 1**] [**Type 4X**] <**Insert type**>.

Switch Type: Pedestal-mounted float switch with float rods and rod buttons.

Retain "Automatic Alternator" subparagraph below for duplex pump units. Revise if unit includes three or more pumps.

Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.

Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than 60 inches.

High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120 V ac, with transformer and contacts for remote alarm bell.

Controls in first subparagraph below are float- and pressure-switch types.

Controls:

Enclosure: NEMA 250, [**Type 1**] [**Type 4X**] <**Insert type**>; [**pedestal**] [**wall**] mounted.

Switch Type: [**Mechanical-float**] [**Mercury-float**] [**Pressure**] <**Insert type**> type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.

Retain "Automatic Alternator" subparagraph below for duplex pump units. Revise if unit includes three or more pumps.

Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.

High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with [**mechanical-float, mercury-float, or pressure**] <**Insert type**> switch matching control and electric bell; 120 V ac, with transformer and contacts for remote alarm bell.

Control-Interface Features:

Two subparagraphs below are optional control features.

Remote Alarm Contacts: For remote alarm interface.

Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:

On-off status of pump.

Alarm status.

If Project has more than one type or configuration of sump pump, coordinate paragraph below with schedule on Drawings. See sample schedule in the Evaluations.

* + - * 1. Submersible, Fixed-Position, Double-Seal Sump Pumps <**Insert drawing designation**>:

Description: Factory-assembled and -tested sump-pump unit.

Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sump pump as defined in HI 1.1-1.2 and HI 1.3.

Pump Casing: Cast iron, with strainer inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.

Impeller: Statically and dynamically balanced, [**ASTM A48, Class No. 25 A cast iron**] [**ASTM A532, abrasion-resistant cast iron**] [**and**] [**ASTM B584, cast bronze**], [**semiopen**] <**Insert design**> design for clear wastewater handling, and keyed and secured to shaft.

Pump and Motor Shaft: Stainless steel[**or steel**], with factory-sealed, grease-lubricated ball bearings.

Seals: Mechanical.

Verify that pump selected has feature in "Moisture-Sensing Probe" subparagraph below, if required, or delete.

Moisture-Sensing Probe: Internal moisture sensor and moisture alarm.

Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.

Verify that pump selected has motor feature in "Motor Housing Fluid" subparagraph below, if either option is required, or delete.

Motor Housing Fluid: [**Air**] [**Oil**].

Retain one of two "Controls" subparagraphs below. Controls in first subparagraph are rod-and-float type.

Controls:

Enclosure: NEMA 250, [**Type 1**] [**Type 4X**] <**Insert type**>.

Switch Type: Pedestal-mounted float switch with float rods and rod buttons.

Retain "Automatic Alternator" subparagraph below for duplex pump units. Revise if unit includes three or more pumps.

Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.

Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than 60 inches.

High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120 V ac, with transformer and contacts for remote alarm bell.

Controls in first subparagraph below are float- and pressure-switch types.

Controls:

Enclosure: NEMA 250, [**Type 1**] [**Type 4X**] <**Insert type**>; [**pedestal**] [**wall**] mounted.

Switch Type: [**Mechanical-float**] [**Mercury-float**] [**Pressure**] <**Insert type**> type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.

Retain "Automatic Alternator" subparagraph below for duplex pump units. Revise if unit includes three or more pumps.

Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.

High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with [**mechanical-float, mercury-float, or pressure**] <**Insert type**> switch matching control and electric bell; 120 V ac, with transformer and contacts for remote alarm bell.

Control-Interface Features:

Two subparagraphs below are optional control features.

Remote Alarm Contacts: For remote alarm interface.

Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:

On-off status of pump.

Alarm status.

* + - 1. WET-PIT-VOLUTE SUMP PUMPS <**Insert drawing designation**>

Retain "Sump-Pump Basins and Basin Covers" Article if retaining this article.

Insert drawing designation. Use these designations on Drawings to identify each product.

If Project has more than one type or configuration of sump pump, coordinate first paragraph below with schedule on Drawings. See sample schedule in the Evaluations.

* + - * 1. Description: Factory-assembled and -tested sump-pump unit.
				2. Pump Type: Wet-pit-volute, single-stage, separately coupled, overhung-impeller, centrifugal sump pump as defined in HI 1.1-1.2 and HI 1.3.
				3. Pump Casing: Cast iron, with strainer inlet and threaded connection for NPS 2 and smaller and flanged connection for NPS 2-1/2 and larger discharge piping.
				4. Impeller: Statically and dynamically balanced, [**ASTM A48, Class No. 25 A cast iron**] [**ASTM A532, abrasion-resistant cast iron**] [**and**] [**ASTM B584, cast bronze**], [**semiopen**] <**Insert design**> design for clear wastewater handling, and keyed and secured to shaft.
				5. Sleeve Bearings: Bronze. Include oil-lubricated, intermediate sleeve bearings at 48-inch- maximum intervals if basin depth is more than 48 inches, and grease-lubricated, ball-type thrust bearings.
				6. Pump and Motor Shaft Coupling: Flexible, capable of absorbing torsional vibration and shaft misalignment.
				7. Pump Discharge Piping: Factory or field fabricated, [**galvanized, ASTM A53, Schedule 40, steel pipe with ASME B16.1, Class 125, cast-iron flanges and flanged fittings or ASME B16.4, Class 125, gray-iron threaded fittings**] <**Insert pipe material**>.
				8. Support Plate: Cast iron or coated steel; strong enough to support pumps, motors, and controls. See "Sump-Pump Basins and Basin Covers" Article for requirements.
				9. Shaft Seal: Stuffing box, with graphite-impregnated braided-yarn rings and bronze packing gland.
				10. Motor: Single speed; grease-lubricated ball bearings and mounting on vertical, cast-iron pedestal.

Retain one of two "Controls" paragraphs below. Controls in first paragraph are rod-and-float type.

* + - * 1. Controls:

Enclosure: NEMA 250, [**Type 1**] [**Type 4X**] <**Insert type**>.

Switch Type: Pedestal-mounted float switch with float rods and rod buttons.

Retain "Automatic Alternator" subparagraph below for duplex pump units. Revise if unit includes three or more pumps.

Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.

Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than 60 inches.

High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120 V ac, with transformer and contacts for remote alarm bell.

Controls in first paragraph below are float- and pressure-switch types.

* + - * 1. Controls:

Enclosure: NEMA 250, [**Type 1**] [**Type 4X**] <**Insert type**>; [**pedestal**] [**wall**] mounted.

Switch Type: [**Mechanical-float**] [**Mercury-float**] [**Pressure**] <**Insert type**> type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.

Retain "Automatic Alternator" subparagraph below for duplex pump units. Revise if unit includes three or more pumps.

Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.

High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with [**mechanical-float, mercury-float, or pressure**] <**Insert type**> switch matching control and electric bell; 120 V ac, with transformer and contacts for remote alarm bell.

* + - * 1. Control-Interface Features:

Two subparagraphs below are optional control features.

Remote Alarm Contacts: For remote alarm interface.

Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:

On-off status of pump.

Alarm status.

* + - 1. SUMP-PUMP CAPACITIES AND CHARACTERISTICS

If Project has more than one sump pump, delete this article and schedule sump pumps on Drawings. See sample schedule in the Evaluations.

* + - * 1. Unit Capacity: <**Insert value**> gpm.
				2. Number of Pumps: [**One**] [**Two**] <**Insert number**>.
				3. Each Pump:

Capacity: <**Insert value**> gpm.

Total Dynamic Head: <**Insert value**> feet.

Speed: <**Insert rpm**>.

Discharge Size: <**Insert value**> NPS.

Electrical Characteristics:

Motor Horsepower: <**Insert value**> hp.

Volts: [**120**] [**240**] [**277**] [**480**] <**Insert value**> V ac.

Phases: [**Single**] [**Three**].

Hertz: 60.

* + - * 1. Unit Electrical Characteristics:

Full-Load Amperes: <**Insert value**> A.

Minimum Circuit Ampacity: <**Insert value**> A.

Maximum Overcurrent Protection: <**Insert value**> A.

* + - 1. SUMP-PUMP BASINS AND BASIN COVERS

Retain this article if retaining one of or both "Submersible Sump Pumps" and "Wet-Pit-Volute Sump Pumps" articles.

Sump-pump basins are typically round with space for simplex or multiplex pumps.

* + - * 1. Basins: Factory-fabricated, watertight, cylindrical, basin sump with top flange and sidewall openings for pipe connections.

If Project has more than one type or configuration of sump-pump basin, delete "Material" subparagraph below and schedule sump-pump basin material on Drawings. See sample schedule in the Evaluations.

Material: [**Cast iron**] [**Fiberglass**] [**Polyethylene**] <**Insert material**>.

Reinforcement: Mounting plates for pumps, fittings, and accessories.

Retain "Anchor Flange" subparagraph below if required to anchor basin to concrete slab in case of ground-water problems.

Anchor Flange: Same material as or compatible with basin sump, cast in or attached to sump, in location and of size required to anchor basin in concrete slab.

Sump-pump basin covers are typically round with openings for simplex or multiplex pumps.

* + - * 1. Basin Covers: Fabricate metal cover with openings having gaskets, seals, and bushings; for access to pumps, pump shafts, control rods, discharge piping, vent connections, and power cables. Include cover thickness schedule; showing sump size and minimum cover thickness for both steel and cast iron.

Reinforcement: Steel or cast iron, capable of supporting foot traffic for basins installed in foot-traffic areas.

If Project has more than one type or configuration of sump-pump basin, delete "Capacities and Characteristics" paragraph below and schedule sump-pump basins on Drawings. See sample schedule in the Evaluations.

* + - * 1. Capacities and Characteristics:

Capacity: <**Insert value**> gal.

Diameter: <**Insert value**> inches.

Depth: <**Insert value**> inches.

Inlet No. 1:

Drainage Pipe Size: <**Insert value**> NPS.

Bottom of Sump to Centerline: <**Insert value**> inches.

Type: [**Flanged**] [**Hubbed**] [**Threaded**] outside.

Inlet No. 2:

Drainage Pipe Size: <**Insert value**> NPS.

Bottom of Sump to Centerline: <**Insert value**> inches.

Type: [**Flanged**] [**Hubbed**] [**Threaded**] outside.

Inlet No. 3:

Drainage Pipe Size: <**Insert value**> NPS.

Bottom of Sump to Centerline: <**Insert value**> inches.

Type: [**Flanged**] [**Hubbed**] [**Threaded**] outside.

Sidewall Outlet:

Discharge Pipe Size: <**Insert value**> NPS.

Bottom of Sump to Centerline: <**Insert value**> inches.

Type: [**Hubbed inside**] [**Hubbed outside**] <**Insert type**>.

Cover Material: [**Cast iron**] [**Steel with bituminous coating**] [**Cast iron or steel with bituminous coating**] <**Insert material**>.

Cover Diameter: <**Insert value**> inches, but not less than outside diameter of basin top flange.

Manhole Required in Cover: [**Yes**] [**No**].

Vent Size: [**Not required**] <**Insert NPS**>.

* + - 1. PACKAGED DRAINAGE-PUMP UNITS

Units in first paragraph below are complete with a pump and controls, and are typically installed in a pit. Units have limited applications and capacities.

Insert drawing designation. Use these designations on Drawings to identify each product.

* + - * 1. Packaged Pedestal Drainage-Pump Units <**Insert drawing designation**>:

Description: Factory-assembled and -tested, automatic-operation, freestanding, sump-pump unit.

[Manufacturers:](http://www.specagent.com/Lookup?ulid=2323) Subject to compliance with requirements, provide products by one of the following:

[Liberty Pumps](http://www.specagent.com/Lookup?uid=123457101861).

[Little Giant; a Franklin Electric brand](http://www.specagent.com/Lookup?uid=123457101862).

[Pentair Aurora](http://www.specagent.com/Lookup?uid=123457101867).

Or equal.

Pump Type: Wet-pit-volute, single-stage, separately coupled, overhung-impeller centrifugal pump as defined in HI 1.1-1.2 and HI 1.3.

Pump Casing: Corrosion-resistant material, with strainer inlet, design that permits flow into impeller, and vertical discharge for piping connection.

Impeller: Aluminum, brass, or plastic.

Motor: With built-in overload protection and mounted vertically on sump pump column.

Power Cord: Three-conductor, waterproof cable of length required, but not less than 72 inches, with grounding plug and cable-sealing assembly for connection at pump.

Control: Float switch.

Units in first paragraph below are complete with a pump, basin and cover, piping, and controls. Units have limited applications and capacities.

* + - * 1. Packaged Submersible Drainage-Pump Units <**Insert drawing designation**>:

Description: Factory-assembled and -tested, automatic-operation, basin-mounted, sump-pump unit.

[Manufacturers:](http://www.specagent.com/Lookup?ulid=2324) Subject to compliance with requirements, provide products by one of the following:

[Bell & Gossett; a Xylem brand](http://www.specagent.com/Lookup?uid=123457101877).

[Liberty Pumps](http://www.specagent.com/Lookup?uid=123457101872).

[Little Giant; a Franklin Electric brand](http://www.specagent.com/Lookup?uid=123457101873).

[Zoeller Company](http://www.specagent.com/Lookup?uid=123457101875).

Or equal.

Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller centrifugal pump as defined in HI 1.1-1.2 and HI 1.3.

Casing: [**Metal**] <**Insert material**>.

Impeller: [**Brass**] <**Insert material**>.

Pump Seal: Mechanical.

Motor: Hermetically sealed, capacitor-start type, with built-in overload protection.

Power Cord: Three-conductor, waterproof cable of length required, but not less than 72 inches, with grounding plug and cable-sealing assembly for connection at pump.

Pump Discharge Piping: Factory or field fabricated, [**galvanized, ASTM A53, Schedule 40, steel pipe with ASME B16.4, Class 125, gray-iron threaded fittings**] <**Insert pipe material**>.

Control: Motor-mounted float switch.

Basin: Plastic.

If Project has more than one packaged drainage-pump unit, delete "Capacities and Characteristics" paragraph below and schedule packaged drainage-pump units on Drawings.

* + - * 1. Capacities and Characteristics:

Capacity: <**Insert value**>gpm.

Total Dynamic Head: <**Insert value**>feet.

Speed: <**Insert rpm**>.

Discharge Pipe Size: <**Insert value**>NPS.

Electrical Characteristics:

Motor Horsepower: <**Insert value**> hp.

Volts: [**120**] [**240**] [**277**] [**480**] <**Insert value**> V.

Phases: [**Single**] [**Three**].

Hertz: 60.

Full-Load Amperes: <**Insert value**> A.

Minimum Circuit Ampacity: <**Insert value**> A.

Maximum Overcurrent Protection: <**Insert value**> A.

Retain first "Basin" subparagraph below for packaged pedestal drainage-pump units; second, for packaged submersible drainage-pump units.

Basin: Not required.

Basin:

Capacity: [**2 gal.**] [**5 gal.**] <**Insert value**> minimum.

Inlet Connection: [**NPS 1-1/2**] <**Insert pipe size**> minimum.

* + - 1. MOTORS

Default motor characteristics are specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."

* + - * 1. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."

Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

* + - * 1. Motors for submersible pumps shall be hermetically sealed.
1. EXECUTION
	* + 1. EARTHWORK
				1. Excavation and filling are specified in Section 312000 "Earth Moving."
			2. EXAMINATION
				1. Examine roughing-in for plumbing piping to verify actual locations of storm drainage piping connections before sump pump installation.
			3. INSTALLATION
				1. Pump Installation Standards: Comply with HI 1.4 for installation of sump pumps and in full accordance with the manufacturer’s printed installation instructions unless otherwise specified.
			4. CONNECTIONS

Coordinate pump installations and specialty arrangements with Drawings and with requirements specified in piping systems. If Drawings are explicit enough, these requirements may be reduced or omitted.

* + - * 1. Comply with requirements for piping specified in Section 221413 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
				2. Where installing piping adjacent to equipment, allow space for service and maintenance.
			1. FIELD QUALITY CONTROL

Retain "Manufacturer's Field Service" paragraph below to require a factory-authorized service representative to perform tests, inspections, and adjustments.

* + - * 1. Manufacturer's Field Service: Engage a Company Service Advisor to test, inspect, and adjust components, assemblies, and equipment installations, including connections.

Retain "Perform the following tests and inspections" paragraph below to require Contractor to perform tests and inspections.

* + - * 1. Perform the following tests and inspections:

Perform each visual and mechanical inspection.

Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

* + - * 1. Pumps and controls will be considered defective if they do not pass tests and inspections.
				2. Prepare test and inspection reports.
			1. STARTUP SERVICE
				1. [**Engage a Company Service Advisor** **to perform**] [**Perform**] startup service.

Complete installation and startup checks according to manufacturer's written instructions.

<**Insert startup steps if any**>.

* + - 1. ADJUSTING
				1. Adjust pumps to function smoothly and lubricate as recommended by manufacturer.
				2. Adjust control set points.
			2. DEMONSTRATION
				1. [**Engage a Company Service Advisor to train**] [**Train**] Director’s Representative's maintenance personnel to adjust, operate, and maintain[**controls and**] pumps.

END OF SECTION 221429