



## SPECIFICATION PUMPING SYSTEMS ACCESSORIES

### ITEM NO. 1 OSHA ENTRANCE TUBE – SAFETY REQUIREMENTS

#### 36" DIAMETER ENTRANCE TUBES

1. When the vertical distance from the floor of the station to the top of the entrance tube exceeds 30 feet, an OSHA approved stage landing or safety-climb fall prevention system must be provided. Landing platform modules must be located in the entrance tube such that the vertical distance from the top of the entrance tube to the bottom of the landing platform module, or floor-to-floor of landing platform modules, does not exceed 30 feet. Consult the factory if you have any questions in regard to the placement of the OSHA approved stage landings.
2. The OSHA approved safety-climb fall prevention system may be installed in the field after the station is shipped. This is an acceptable substitute for the OSHA stage landing, and will be provided by Smith & Loveless, in accordance with the above distance requirement, when the landing platform module is not specified.
3. Reference should be made to current State and Local Safety Codes which, if more stringent, shall govern.

#### 44" DIAMETER ENTRANCE TUBES

1. When the vertical distance from the floor of the station to the top of the entrance tube exceeds 20 feet, an OSHA approved stage landing, maintenance lift or safety-climb fall prevention system must be provided. Landing platform modules must be located in the entrance tube such that the vertical distance from the top of the entrance tube to the bottom of the landing platform module, or floor-to-floor of landing platform modules, does not exceed 20 feet. Consult the factory if you have any questions in regard to the placement of the OSHA approved stage landings.
2. The OSHA approved safety-climb fall prevention system may be installed in the field after the station is shipped. This is an acceptable substitute for the OSHA approved stage landing, and will be provided by Smith & Loveless, in accordance with the above distance requirement, when the landing platform module or a maintenance lift is not specified.
3. Reference should be made to current State and local safety codes which, if more stringent, shall govern.

#### (1) ENTRANCE TUBE

For entrance tube specifications, refer to individual sections. (See entrance tube safety requirements in this section.)

#### (2) MAINTENANCE LIFT (DRAWING 38D46)

##### GENERAL

The pump station shall be equipped with a power-operated maintenance lift unit, designed and manufactured to contribute to the personal safety of the operator, and to facilitate access to the station. The lift shall have a maximum rated carrying capacity of 440 pounds and, when fully loaded, shall move at a rate not to exceed 35 feet per minute.

##### CONSTRUCTION

The maintenance lift unit shall consist of a frame of welded steel construction, operating on guide rails securely welded to the sides of the ladder in the entrance tube and lift station. The aluminum grating floor of the lift shall have an area of not less than four (4) square feet, and shall be easily removable for emergency exit or entrance to the station by means of the ladder. The lift shall be enclosed by framework guards on both sides securely bolted in place.

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The guards shall be of welded steel construction, and shall incorporate integral ladder rungs to facilitate entry to, and egress from, the lift when stopped at the top of the entrance tube. Solid steel toeboards shall be provided across the base of the guardwork on both sides. A collapsible folding gate shall be provided on the front of the lift, as shown on drawings. A safety switch on the gate shall prevent movement of the lift if the gate is not completely secured in the closed position. The lift shall be so constructed as to operate with a clearance directly to the front (of at least four inches) measured from any point between the toeboard and entrance tube.

The lift shall be maintained in proper alignment by two needle bearing guide wheels traveling on each side of the guide rails. Two additional guide wheel assemblies shall be installed at each guide rail to absorb any side thrust imparted to the lift.

The drive unit shall consist of a 1-1/2 HP, 1200 RPM, \_\_\_\_\_ volt, 3-phase, ball bearing electrical motor operating through a self-locking, non-reversible helical worm gear reduction unit, and equipped with an electrically released, mechanically operated brake to stop the lift upon power or control failure, and to prevent coasting of the lift during normal operation. The gear reduction unit shall have two output shafts.

The motor and reduction gear unit shall incorporate two drive drums on each output shaft so that movement of the lift shall be accomplished by two 3/8" diameter steel supporting cables. Each cable shall be capable of supporting the entire weight of the lift, plus the maximum rated load of 440 lbs., with a safety factor of not less than eight.

To facilitate electrical connections, a looping control cord, complete with heavy-duty, four conductor jacketed cable shall be located midway of travel in the entrance tube. The cord shall be of ample length to permit full travel of the lift. The cord shall enter the lift through the strain relief bushing, which is designed to prevent a strain on the conductors themselves.

To facilitate installation and maintenance, access panels on the front of the lift unit shall be removable to gain access to the operating components.

All fabricated steel components of the maintenance lift unit shall be protected from corrosion by a single heavy inert coating of **VERSAPOX®**, excepting cable, drums, control panel and gear motor. The finish coating shall be as formulated by Smith & Loveless for abrasion and corrosion resistance.

## SAFETY FEATURES AND CONTROLS

A maintenance lift control panel having a NEMA 12 enclosure shall be provided, securely mounted inside the pump station. Separate motor controllers shall be used for each direction of travel, and each controller shall be equipped with thermal overload relays, sized to prevent operation with loads in excess of 150% of rated capacity. The entire maintenance lift unit control system shall operate on 115-volt, single-phase, 60 cycle AC service.

The maintenance lift unit shall be equipped with level operated Up/Down control switches on the lift and on the maintenance lift control panel in the pump station. Control switches shall be of a type that requires constant pressure for operation. A two-position selector switch on the lift shall determine which of the two control switches will control the movement of the lift.

A red, mushroom-head pushbutton marked "EMERGENCY STOP" shall be installed on the lift. The EMERGENCY STOP switch shall be normally closed, and momentary operation of the switch shall de-energize a normally ON control system to stop movement of the lift in any direction. Following momentary operation of EMERGENCY STOP switch, the control system will remain de-energized until manually reset by operation of a shielded pushbutton on the lift.

An undercar safety switch covering the entire area of the bottom of the lift shall operate if the lift is obstructed in its downward travel by a force exceeding four pounds. This switch shall be normally closed, and actuation shall cause the switch to maintain an open circuit. Following actuation, the switch must be manually reset.



Two (2) independent sets of travel limit switches shall be installed in the hoistway. One pair of limit switches shall be adjusted to stop movement of the lift at each end of its normal travel by interrupting the control circuits of the motor controllers. These switches shall stop the lift in its direction of travel, while still allowing movement in the opposite direction. The second set of limit switches shall be adjusted to prevent further movement of the lift in either direction, should the lift not be stopped by the normal travel limit switches. These terminal limit switches shall operate an independent controller to interrupt the power circuit to both motor controllers. All limit switches shall be of the normally closed, direct mechanical action-type.

A centrifugal over-speed actuator shall be provided. The over-speed device shall be actuated by the movement of the car in relation to the guide rails. At a prescribed over-speed, the actuator shall trip two (2) self-locking safety stopping devices.

A safety feature to stop travel of the lift in the event of a cable failure shall be provided. This feature will consist of attaching the ends of the two lift supporting cables to each end of a teeter-totter bar. A clevis arrangement centered beneath the teeter bar supports the lift car. The teeter bar will actuate a switch when a slack or broken cable causes the teeter to tilt. Actuation of the switch will shut down the gear motor.

## OPERATION

After completion of installation of the pumping station and connection of the electrical service, as well as the installation of lift cables by the contractor, competent factory-trained personnel, assisted by the contractors personnel, shall test and adjust all maintenance lift controls and safety devices for safe and proper operation.

If required by State or local codes, any permits for the installation or operation of the lift shall be obtained by the owner.

### (3) OSHA APPROVED STAGE LANDING (DRAWING 28C886)

\_\_\_\_\_ OSHA approved stage landing(s) shall be provided as shown on the drawings. Each stage landing shall be a rigidly fixed barrier incorporating an offset landing platform module that prevents an individual from falling past the intermediate landing to a lower level.

### (4) ENTRANCE TUBE WITH WALK-IN DOOR

The entrance tube shall be extended above grade 8'-0", and shall be provided with an industrial-type door and frame. The door shall provide a minimum opening of 2'-0" x 6'-7", with the doorsill 10" above grade.

A removable, bolt-down entrance tube cover shall be provided to facilitate equipment maintenance. (*Reference notes on entrance tube safety requirements*).

### (5) ADDITIONAL ANODES

Refer to general product specification for description. Quantities in excess of standard offering can be so noted.

### (6) ADDITIONAL MECHANICAL SEALS

Refer to general product specification for description. Quantities in excess of standard offering can be so noted.

### (9) ALARM SYSTEMS – ALARM INITIATING DEVICES

#### A. UNDERGROUND STATIONS

**HIGH WET WELL LEVEL** – An adjustable, snap action, diaphragm type pressure switch shall be provided to sense a high water level condition. The switch shall be connected to the bubbler line, and shall activate a contact to indicate the high water condition.



**LOW WET WELL LEVEL** – An adjustable, snap action, diaphragm-type pressure switch shall be provided to sense a low water level condition. The switch shall be connected to the bubbler line, and shall activate a contact to indicate the low water condition.

**LOSS OF AIR IN BUBBLER SYSTEM** – An adjustable, snap action, diaphragm-type pressure switch shall be provided to sense a low air pressure condition. The switch shall be connected in the bubbler supply line, and shall actuate a contact to indicate a low-pressure condition. An orifice shall be installed in the supply line, downstream from the mercury switch, in order to maintain adequate back-pressure.

**NOTE:** *Not appropriate for other than direct-air bubbler system.*

## B. Wet Well Mounted Pump Stations

**Intrinsically Safe Relay** – A relay to provide low current isolated switching for a float switch and/or other device.

**Low Temperature Alarm** – A preset thermo-disc shall be mounted on the station control panel to activate an alarm signal if the temperature under the fiberglass hood falls below 34°F.

### FLOAT SWITCH CONTROL

**HIGH WET WELL LEVEL** – An adjustable mercury displacement switch shall be provided to sense a high water level condition. The switch shall hang into the wet well, and shall activate a contact to indicate the high water condition.

**LOW WET WELL LEVEL** – An adjustable mercury displacement switch shall be provided to sense a low water level condition. The switch shall hang into the wet well, and shall activate a contact to indicate the low water condition.

### BUBBLER SYSTEM CONTROL

**HIGH WET WELL LEVEL** – An adjustable snap action, diaphragm type pressure switch shall be provided to sense a high water level condition. The switch shall be connected to the bubbler line, and shall activate a contact to indicate the high water condition.

**LOW WET WELL LEVEL** – An adjustable snap action, diaphragm type pressure switch shall be provided to sense a low water level condition. The switch shall be connected to the bubbler line, and shall activate a contact to indicate the low water condition.

**LOSS OF AIR IN BUBBLER SYSTEM** – An adjustable snap action, diaphragm-type pressure switch shall be provided to sense a low air pressure condition. The switch shall be connected in the bubbler supply line, and shall actuate a contact to indicate a low-pressure condition. An orifice shall be installed in the supply line, downstream from the mercury switch, in order to maintain adequate back-pressure.

**NOTE:** *Not appropriate for other than direct-air bubbler system.*

## C. PUMP STATION COMMON OPTIONS

**THREE-PHASE POWER FAILURE** – A relay with double pole, double throw contacts to monitor and protect against phase loss (single-phasing), under voltage (brownouts) and phase reversal (improper sequence). Automatically resets when three-phase service returns to normal.



## Adjustable Operating Voltage

158 – 224  
430 – 480

## Drop Out Voltage

171 – 243  
387 - 432

**SINGLE-PHASE POWER FAILURE** – A relay with single pole, double throw contacts shall be provided and mounted in the main control panel to signal failure of the 115-volt control power supply.

**PUMP FAILURE – NON-CLOG PUMP NO. \_\_\_\_\_** – A multi-sensor switch shall be provided on the external arm of the discharge check valve for Pump No. \_\_\_\_\_ to detect failure of the pump to delivery normal operating pressure. An auxiliary time delay relay shall be provided to prevent an alarm signal during pump startup period.

**STATION FLOODING** – A float-actuated switch shall be supplied to detect a station flooding condition.

**UNAUTHORIZED ENTRY** – An adjustable timer shall be provided in the control panel to signal unauthorized entry into the pump station. The timer shall be activated whenever the entrance tube cover is opened/fiberglass cover on wet well mounted pump stations.

A key operated switch shall be provided on the station control panel to provide authorized personnel a means to deactivate the alarm before the timer completes its cycle.

**OPERATOR ASSIST ALARM** – A momentary contact, manually operated switch shall be mounted on the fact of the station control panel, and shall actuate an alarm signal when operated. This switch shall function as an emergency operator assist alarm, and provide for testing of the alarm system.

## **ALARM SYSTEMS – ALARM DEVICES**

**ALARM LIGHT 120 VAC** – A vapor-proof light fixture with 50 watt lamp for outdoor pole mounting.

- With red globe and guard.
- With green globe and guard.
- With amber globe and guard.
- With clear globe and guard.

**ALARM HORN 120 VAC** – A vibratone-type horn mounted on a weather-tight box suitable for pole mounting.

**ALARM BELL 120 VAC** – A vibratory-type bell mounted on a weather-tight box suitable for pole mounting.

**HORN OR BELL SILENCE SWITCH WITH AUTOMATIC RESET RELAY** – A push to silence pushbutton with control relay to automatically reset the alarm circuit to the ready condition after the fault is cleared.

- Mounted in the station control panel.
- Mounted in a separate NEMA 1 enclosure.
- Mounted in a separate weatherproof enclosure.
- Mounted in a separate NEMA 1 enclosure with red fault indicating panel-mounted light.



**PUSH-TO-TEST** – Push-to-test feature added to the silence pushbutton to indicate the alarm devices and system is in normal operating condition.

**MANUAL HORN OR BELL SILENCE SWITCH** – An On/Off switch to disable the audible alarm.

- Mounted in a weather-tight box suitable for pole mounting.
- Mounted in the station control panel.

**NOTE:** *The On/Off must be manually reset after the fault is cleared to place the alarm circuit in the ready condition. Because of this, Smith & Loveless recommends the silence switch with automatic reset described above.*

## REMOTE TELEMETERING

**REMOTE ALARM PANEL** – An alarm panel to show faulty conditions shall be provided for installation at a remote location.

The panel shall operate from a 115-volt AC power supply at the remote point. The panel shall include rectifiers and necessary devices to supply filtered direct current to conform to telephone system requirements.

The fault sensors to be used with this panel shall be of the normally closed type, and shall open to indicate an alarm condition. The system shall be failsafe, so that an opening in the telephone line shall indicate a failure.

The panel shall indicate an alarm condition by a red light, as a visual indication and a horn as an audible signal. A silencing switch shall be provided to turn off the horn.

Mounted in a NEMA 1, compact, sheet steel cabinet with hinged door. The switches indicating light and horn shall be mounted on the door.

## (10) ALARM SYSTEM ACCESSORIES

**12-VOLT DC BATTERY CHARGER** – Storage batteries and charger shall be supplied to furnish power for alarm conditions in cases of power failure.

The storage batteries (Two 3-cell, 6-volt) shall be maintenance-free lead-calcium battery concealed in high impact, heat-resistant, and permanently sealed containers.

The battery charger shall be solid-state, capable of restoring battery to full charge within 12 hours after a discharge, not exceeding 1.5 hours. Brownout protection is standard, and will activate the unit when AC line voltage drops below 85 volts.

**ALARM LIGHT 12 VOLTS DC** – A vapor-proof light fixture with 50 watt lamp for outdoor pole mounting.

- With red globe and guard.
- With green globe and guard.
- With amber globe and guard.
- With clear globe and guard.

**ALARM HORN 12 VOLTS DC** – A vibratone-type horn mounted on a weather-tight box suitable for pole mounting.



**HORN SILENCE SWITCH** – An On/Off switch mounted in a weather-tight box suitable for pole mounting.

## **(14) RUNNING TIME METER**

A running time meter shall be supplied for each pump to show the number of hours of operation. The meter shall be enclosed in a dust and moisture-proof molded plastic case. The flush mounted dial shall register in hours and tenths of hours up to 99,999.9 hours before repeating. The meter shall be suitable for operation from a 115-volt, 60 cycle supply.

## **(15) ELECTRIC HEATER**

A 1300/1500 watt, dual range, electric heater with automatic circulating fan, thermostat control and an On/Off switch is to be provided. The heater is to be operated by connection to the convenience receptacle located on the control panel.

## **(17) LARGER SUCTION LINES**

**LARGER SUCTION LINES FOR DUPLEX PUMP STATIONS** – Refer to general product specification for description.

## **(18) SIDE DISCHARGE**

The common discharge pipe and the discharge outlet shall be \_\_\_\_\_ inch, Class 150, cast-iron pipe projecting through the side wall of the station, with a plain-end just outside the pump chamber.

## **(19) PRESSURE GAUGE ON PUMP DISCHARGE**

A pressure gauge with a brass stop valve and manual air relief fittings shall be installed at the discharge of each pump.

## **(20) TOOLBOX**

A metal toolbox complete with the following tools shall be provided. This complement of tools shall include all tools necessary to replace the pump mechanical seal.

1. 9/16" x 1/2" Box End Wrench
2. 3/4" x 5/8" Open End Wrench
3. 15/16" x 1" Open End Wrench
4. 1-1/8" Socket
5. 8" T-Handle 11" x 1/2" Drive
6. 1/2" x 5-1/2" Drive Extension
7. 6" Pipe Wrench
8. #3 Rawhide Mallet
9. Ratchet-Type Hoist
10. Motor Lifting Bar
11. Lint-Free Cloth
12. Multi-Purpose Grease

## **(21) TRANSFORMER**

A (2) (3) (5) KVA insulating-type transformer shall be provided to supply power for lights, controls and auxiliary devices. The transformer shall have 240/480 volt primary, 120/240 volt secondary, Class F insulation, with temperature rise not to exceed 115° C above a 40° C ambient. The core and coil assembly shall be given a double dip and bake. The coil shall be protected by a metal housing to prevent damage.

## **(22) WET WELL LEVEL GAUGE**

A low-pressure diaphragm gauge with a 2-1/2" dial calibrated 0" – 100" of water shall be connected to the air bubbler system to indicate the sewage level in the wet well.





## **(26) WET WELL SIMULATING VALVE**

A valve shall be provided in the bubbler air supply line to simulate various sewage levels in the wet well. This valve shall facilitate checking and adjustment of the bubbler pressure switches and pump controls.

## **(28) GENERATOR INTERLOCK H. L. (HIGH-LEVEL) PUMP**

Provisions shall be made in the control circuit of the lift station to facilitate locking out the standby pump when the emergency generator set is powering the station. An interlock consisting of a normally closed auxiliary contact shall be supplied with the emergency generator controls by the generator manufacturer. This normally closed contact shall be wired to the terminal blocks provided in the lift station control panel by the lift station manufacturer. The interconnecting wiring shall be supplied and connected by the installing contractor.

## **(30) WET WELL DEBRIS BASKET AND WINCH**

A wet well basket and winch assembly shall be supplied suitable for mounting in the wet well near the wet well manhole cover. The basket shall screen the incoming sewage to the wet well, and be easily removable for periodic cleaning.

The assembly shall be placed directly under the manhole cover, in such a manner as to avoid interfering with the closing of the cover, yet to allow easy access for operation and servicing. The winch shall be mounted on a bracket attached to the inside wall of the wet well with suitable anchor bolts of cinch anchors.

Two 1-1/2" diameter galvanized guide rails shall be anchored at the winch bracket and at the bottom of the wet well to facilitate raising and lowering of the debris basket and basket carrier.

The winch shall be a 350 lb. Capacity, one cable safety worm gear winch having a 16:1 gear ratio. A removable winch operating handle extension shall be furnished with the winch, so as to allow the operator to crank the winch from outside the wet well. The winch shall be fitted with an idler pulley mounted on the winch bracket to allow the basket to be raised to a maximum height and prevent binding of the cable. The winch cable shall be 14" diameter stainless steel, and be of the aircraft type.

The debris basket shall be suitable for an inlet pipe of \_\_\_\_\_ diameter, and be made of Type 304 stainless steel 9-gauge wire welded to form a 2" x 2" mesh screening basket.

## **(38) WATERTIGHT LID**

The top of the entrance tube shall be constructed of 1/4" thick steel plate. A continuous flange shall be provided on the top of the tube to attach it to the vertical cylinder. A rubber gasket shall be provided to seal the top piece to the entrance tube. The entrance tube top shall be blasted and painted with **VERSAPOX**® paint. A 24" diameter watertight manway opening shall be provided in the top of the entrance tube. It shall consist of a cast cover, hinged at one side, and with provisions for padlocking the cover closed on the other, and shall be suitably gasketed to prevent water from entering the station, should the site be inundated. The manway cover shall be sealed closed by multiple paddle-type cam latches, which shall not require tools to open or close. 4" Steel couplings shall be provided in the side of the entrance tube to allow for connection of external vent lines, provided by the installing contractor, which shall be carried to an elevation of at least 18" above the maximum flood level, and provided with return bends. A watertight conduit connection shall be provided in the side of the entrance tube, as shown on the drawing.

## **(43) TIME DELAY RELAY TO PREVENT SIMULTANEOUS STARTING**

Adjustable time delay relays shall be provided to prevent simultaneous starting of the pump motors after power failure.

## **(45) INSULATED HOOD**

The wet well mounted pump station shall be enclosed by a hinged, insulated fiberglass cover, complete with drip lip, cutouts for ventilation system and hasp to allow the pump station to be locked with a padlock. The insulation shall be minimum 1" urethane.



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## **(48) PHASE CONVERTER PILOT RELAYS**

Terminals and/or pilot relays shall be provided in the lift station control panel to facilitate connection to an external phase converter unit.

**NOTE:** *The Consulting Engineer should designate the type/Manufacturer of phase converter.*

## **(53A) BASE1-BASE2-AUTO ALTERNATOR SELECTOR SWITCH**

A 3-position selector switch shall be mounted on the face of the control panel to allow selection of either pump as the lead pump, or to allow for automatic alternation.