

TYPICAL SPECIFICATIONS

SKID MOUNTED BULK BAG SYSTEM **SLURRY TANK SYSTEM**

1.01 Scope

The contractor shall furnish all labour, materials, equipment and incidentals required and deliver, and place into satisfactory operation, one complete Skid Mounted Bulk Bag System as specified herein and as shown on the plans.

1.02 Related Work

- A. Concrete work is included in Section ()
- B. Electrical Work is included in Section ()
- C. Instrumentation is included in Section ()
- D. Piping, valves and appurtenances, except as specified herein is included in Section ()
- E. Instrumentation, except as specified herein is included in Section ()
- F. Painting is included in Section ()

1.03 Submittals

The contractor shall obtain from the system supplier and submit as a minimum the following information for the Skid Mounted Bulk Bag System:

- A. Data Sheets and Shop Drawings for approval per Section ():
 - General Arrangement
 - Process and Instrumentation
 - Single Line AC Control System Schematic
 - Three Line AC Control System Schematic
 - Field Wiring Diagram
 - Description of Sequence of Operation
 - Shop Drawings for custom fabricated items
 - Cut Sheets for Standard items

- B. Operation and Maintenance Manuals per Section (), to be submitted upon shipment of equipment giving:
 - General Description
 - Active Components - Detailed Description
 - Controls and Electrical Schematic
 - PLC Programming Logic
 - Startup and Operation Instructions

Individual Component O&M Manuals
List of Manufacturer's recommended spare parts

1.04 Reference Standards

- A. National Building Code NBC 1995
- B. Universal Building Code (UBC, 97)
- C. National Electric Code (NEC)
- D. Canadian Electrical Code
- E. American National Standards Institute (ANSI)
- F. Canadian Standards Association (CSA)
- G. American Society of Manufacturing Engineers (ASME)

1.05 Quality Assurance

- A. The equipment shall be the product of a manufacturer who is regularly engaged in chemical feed system design and supply.
- B. The major components of the Skid Mounted Bulk Bag System shall be furnished by a single supplier to ensure full coordination of all units and to establish a single source of responsibility and control over the system
- C. The manufacturer must have installed and had in satisfactory operation for a period of not less than five (5) years a minimum of five (5) installations of similar size.
- D. The drawings and specifications covered by this section are based on the equipment manufactured by Stanco Projects Ltd.

Part 2 - PRODUCTS

2.01 Design Requirements

The Skid Mounted Bulk Bag system shall be designed to receive, store, feed and prepare chemical solutions ready for use by the owner. The intent of this specification is to provide a complete operating system that will automatically respond to changes in process conditions. As a minimum the system shall be designed for the following:

- A. Chemical Data
 - Chemical _____
 - Shipping container size _____
 - Bulk Density _____
- B. Capacities:
 - Hopper Storage Capacity : _____ Cu.Ft. min.
 - Feed Rate: _____ lbs/hr design
 - Slurry/Solution Concentration _____ %
 - Slurry/Solution Feed rate _____ usgph
- B. Electrical classification for the area is "Unclassified"

The system shall receive the bulk chemical in bulk bags with an average weight of 1 ton. The bulk bags shall be lifted into position by means of **a fork lift /an integral overhead crane assembly**. Once the connection is made to the receiving hopper the contents of the bulk bag shall

be transferred to the hopper. Displaced air shall be vented through a **vent sock/integral dust collector assembly**.

Flow of chemical from the hopper shall be assisted by means of flow promotion devices into a flexible screw conveyor, which will transport the chemical to the make down system tank. The screw conveyor shall meter the chemical at an adjustable rate into the slurry makedown system. Chemical slurries shall be prepared automatically in response to level signals from the slurry tank.

a) Pumps will re-circulate the slurry in a recycle loop with the slurry being added to the process through automatically operated pinch valves at the use point(s) in response to a plant supplied signal on **pH/flow. OR**

b) Metering pump(s) will automatically deliver prepared solution to the use point as required in response to plant supplied signals.

A main control panel shall control and indicate the status of components in the system. With exception of hopper filling, all activities of the Skid Mounted Bulk Bag system shall be operable in an automatic mode without supervision.

2.02 System Components

The Skid Mounted Bulk Bag system shall consist of, but not be limited to, the following components;

- 1) Receiving Hopper
- 2) Hopper Level Sensors
- 3) Flow Promotion Devices
- 4) Flexible screw conveyor
- 5) Slurry tank
- 6) Pumps
- 7) Piping and Valves
- 8) Control System
- 9) Skid Assembly
- 10) Spare Parts

2.02.1 Receiving Hopper

Receiving hopper shall be fabricated of material compatible with the chemical handled and shall be c/w a 60 degree sloped bottom section terminating in a 6" flanged outlet. Hopper to be fabricated of **painted carbon steel, 304/316 stainless steel, FRP** and be complete with hinged, gasketed cover, leg supports, access ladder.

The receiving hopper shall be equipped with provision to vent the displaced air when filling. Supplier to provide a **vent sock/ integral dust collector with exhaust fan**.

Hopper shall be designed for storage of _____ at _____ lb/cu.ft., seismic zone, ___ per UBC, 100 mph wind load and ___ PSF snow load. Minimum working volume shall be _____ cu. ft.

Optional Item

An overhead monorail and crane assembly shall be provided to assist in loading the feed hopper. Crane assembly to be c/w pendant control.

2.02.2 Hopper Level Sensors

Two only capacitance type point level sensor shall be provided for indication of high and low material level in the hopper, c/w a stainless steel probe, solid state integral sensing electronics, DPDT contact and NEMA 4 enclosure. Rotating paddle wheel type level sensors shall not be acceptable.

2.02.3 Flow Promotion Devices

Flow promotion devices shall be provided to ensure positive flow of the contents from the hopper and prevent bridging, jamming, and segregation. Fluidized air pads shall be provided to be located in the cone section of the hopper in addition to an electromagnetic vibrator. All flow promotion devices shall be provided with adjustable timers with the timers located in the main control panel. Air control sets shall be provided to regulate and control the fluidization pads. Compressed air to operate the devices shall be provided by the **owner/contractor**.

2.02.4 Flexible Screw Conveyor

A flexible screw conveyor shall be provided to transfer the chemical to the makedown system. Conveyor shall be sized to feed ___ lbs/hr chemical at a constant rate into the makedown system. Feed rate shall be adjustable. Conveyor flexible tube is to be fabricated of UHMW with a stainless steel screw and a ___ hp gear driven drive unit. Inlet and discharge transitions shall be provided as required. Screw Conveyor shall operate in response to level signals in the transition hopper.

2.02.5 Slurry Tank

A ___ usg **painted carbon steel/304/316 stainless steel/FRP** slurry tank shall be provided for mixing of the chemical and water. Slurry tank shall be c/w interior baffles, a hinged gasketed access manway, overflow, drain c/w valve, and flanged discharge connections. Tank design shall include provision for dust control.

A ___ hP low speed centre mounted agitator shall be provided to ensure positive mixing of the tank contents under wetting conditions. Maximum agitator speed is 350 rpm. Agitator shall be supplied with stainless steel shaft and impellers.

An ultrasonic level device shall be provided to monitor and control the slurry makedown procedure. Indicator is to provide an analog output c/w a minimum of 4 digital relays. Set points shall be programmable by the supplied handheld programmer.

Water system addition assembly shall be supplied consisting of an isolation gate valve, solenoid valve, pressure gauge and a flow meter with adjusting valve. Supply water to be supplied by others at a constant regulated pressure.

2.02.6 A) Slurry Pumps

___ slurry pumps shall be provided with one operating. Pumps shall be of the centrifugal recessed impeller type and be provided with a positive sealing arrangement. Gland seal water arrangements shall not be permitted. Each pump shall be sized to suit the system requirements

and shall be complete with an overhead mounted TEFC drive motor, V-belt drive, guard and base plate.

Pumps shall be manifolded together such that either pump can be used. Each pump shall be supplied with suction and discharge shut off valves. Valves to be Saunders diaphragm type or equal.

Each pump shall be equipped with a **manual/automatic** flushing system.

Design data

Feed rate of slurry	_____	usgpm
TDH	_____	ft.
Line size	_____	”
Slurry concentration	_____	%

B) Metering Pumps

Two (2) chemical feed pumps shall be provided with one operating at a time. Pumps shall be of the positive displacement, mechanical diaphragm design with a non loss motion stroke adjust mechanism. Each pump shall be sized to suit the system requirements with materials of construction to suit the service. Stroke length shall be manually adjustable over a 10:1 range. Pumps shall be driven with a variable speed DC drive motor controlled by an SCR control unit. Pump stroking speed shall be regulated either manually with a potentiometer or automatically by a 4-20 ma signal.

Pumps shall be manifolded together such that either pump can be used and supplied with suction and discharge shut off valves. A pulsation dampener shall be provided for the common feed line. Each pump shall be equipped with a pressure relief valve and a back pressure valve. One _____ cc calibration cylinder shall be provided c/w shut off valving.

Design data

Feed rate of solution	_____	usgph
TDH	_____	ft.
Line size	_____	”
Slurry concentration	_____	%

2.02.7 Piping and Valves (Slurry pump usage)

Recycle loop piping shall be supplied as shown on the drawings. Piping material shall be Sch. **40/80** PVC with a diameter of ____”. Care shall be taken to minimize changes in direction. Where bends are required they shall be long radius bends.

The recycle loop shall be supplied with a manually operated pinch valve to maintain system back-pressure located at the return to the slurry tank. An isolation sleeve type pressure sensor shall be supplied on the recycle loop piping. Sensor shall be supplied by Chemline or equal.

Pneumatically operated pinch valve(s) shall be supplied at each application point. Each discharge valve shall be supplied with a manually by-pass assembly. Pneumatic operator shall be controlled by the main control panel logic. Pinch valves shall be Moyno Red Valve or equal.

2.02.8 Control System

Electrical components, shop wiring and design shall be system suppliers standard with the following minimum requirement for control panels: Power supply to be ___v/3 phase/___ cycle with a minimum ___ amp. service

A. Main System Control Panel

For mounting adjacent to slurry tank, one only main control panel complete with the following features:

- Lamicoid graphic system representation
- Main Disconnect Switch
- Transformer
- Circuit breakers or fuses as required
- H/O/A and status indication lights for the following:
 - Fluidization pads and vibrators
 - Screw Conveyor
 - Slurry Agitator
 - Pumps
 - Pinch valve(s)
- Status indication light for the hopper levels and slurry tank levels.
- Allen Bradley SLC series programmable logic controller, factory programmed for automatic control of all sequences.
- Motor starters as required for equipment supplied.

Alarm lights, audible alarm, and silence pushbutton for the following conditions:

- Lime Silo high and low level
- Slurry tank high high and low low levels

It “**is/is not**” intended for the PLC to communicate to the in plant SCADA system via DH+ or equal protocol. Provide program documentation to the Consultant with a list of appropriate variables and parameters to be monitored on the plant HMI.

A plant **flow/pH** signal shall be provided to the system supplier to enable lime system flow/pH based control.

2.02.9 Skid Assembly

The entire system shall be factory assembled on a structural skid c/w all piping and wiring. System shall be factory tested prior to shipment. Installation at the final destination shall be limited to placing the skid in position, connecting a single power source to the control panel and connecting inlet water and slurry piping at the interface points.

2.02.9.1 Spare Parts

The following spare parts shall be provided with the system designed for 2 years operation at design rate. As a minimum these parts will consist of the following:

2.03 Painting

1. The equipment described herein shall be factory primed and painted in accordance with the manufacturer's recommendations.
2. Hopper carbon steel surfaces shall be steel grit blasted to SSPC-SP 6 standards, with one coat baked epoxy primer, 1.5 mil min. DFT and exterior only baked enamel finish coat. Hopper interior area to be coated with Arlon low friction coating 1.5 mil DFT for flow promotion.
3. Machined and polished surfaces, stainless steel, or non-ferrous or galvanized metals are not painted. Drive units and motors are not painted.

2.04 Concrete and Grout for Support Pads

- A. Concrete: Class 1; Follow Section ()
- B. Grout: Non shrink, non corrosive; Follow Section ()

Part 3 - EXECUTION

3.01 Installation

The contractor shall assume full responsibility for installation of the skid system, including connection to anchor bolts as required, grouting of the skid, field piping, power wiring and all supports and miscellaneous hardware not specifically stated herein. This work shall include bringing sources of power, water and compressed air to system supplier's termination points

3.02 Manufacturer's Representative Services

The contractor shall make an allowance in his bid for the performance of startup and operator training by the system supplier or his representative. As a minimum, this allowance shall include for ____ separate trips to the site for the purpose of ____ days for startup and ____ days for operator training.