

## **TYPICAL SPECIFICATIONS**

### **SKID MOUNTED BULK BAG SYSTEM** **DIRECT FEED APPLICATION**

#### **Part 1 - GENERAL**

##### **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 \_\_\_\_\_ % max.
  - Pressure at chemical feed application point \_\_\_\_\_ psig
  - Motive water pressure available \_\_\_\_\_ psig
- C. 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 volumetric feeder hopper in response to level signals in the hopper. The volumetric feeder will deliver chemical to the wetting cone/eductor assembly in response to owner supplied flow/pH signals. The wetting cone/eductor assembly shall thoroughly wet the chemical and entrain the chemical in the dilution water stream. A static mixer shall be supplied to further mix the chemical prior to delivery to the application point.

A 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) Volumetric screw feeder
- 6) Wetting cone/ Eductor assembly
- 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, and 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 Sensor**

One only capacitance type point level sensor shall be provided for indication of 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 feeder hopper.

### **2.02.5 Volumetric Feeder**

A loss in weight volumetric screw feeder shall be provided to accurately meter and monitor the chemical into the wetting cone assembly. The feeder shall be designed to feed up to \_\_\_\_\_#/hr and be fabricated of 304 SS c/w a progressive pitch helix stainless steel screw, conditioning screw, and a variable speed DC drive motor with 4-20 ma receptacle for remote speed control. The drive controller shall be equipped for up to a 60:1 turndown and be PWM rated. An extension feed hopper with a min. volume of \_\_\_\_\_ cu. ft. shall be supplied equipped with a vent sock. The feeder shall be equipped with a 24" sq. platform scale of 304 SS construction with a single load cell of flexure design for digital weighing. A loss in weight microprocessor based controller shall be provided c/w NEMA 4 enclosure, touch screen interface, totalizer, instantaneous and cumulative feed registers, programmable monitoring and alarm devices.

A feeder support frame of epoxy coated carbon steel shall be provided to elevate the feeder assembly above the wetting cone assembly.

### **2.02.6 Wetting Cone/Eductor**

A wetting cone/eductor assembly shall be provided to thoroughly wet the dry chemical. The wetting cone shall be fabricated of SS with a min. diam. of 2' and be c/w inspection hatch, flush nozzles with adjustable flow valves, product inlet, vent, overflow, level control and suction

connections. A float valve arrangement shall be provided to prevent air entrainment into the solution. A high level probe shall be provided to monitor overflow from the wetting cone. The eductor shall be fabricated of cast stainless steel sized for the application parameters. An in line static mixer of 304 S construction shall be provided downstream of the eductor to ensure positive mixing.

Design Data

Feed rate of _____	X-Y #/hr
TDH _____	,
Line size _____	”
Motive water pressure _____	psig
Pressure at application point _____	psig

**2.02.6 Water Supply and Piping**

Potable grade water shall be supplied by the owner at the skid boundary at a min. pressure of \_\_\_\_\_ psig and a min. flow of \_\_\_\_\_ usgpm. If necessary a booster pump shall be provided to increase the eductor motive water pressure. Booster pump to be fabricated of SS construction and be supplied by Grundfoss or equal.

Skid piping to include instrumentation for low water pressure indication, pressure gauge and a magnetic flow meter on the solution line to provide accurate flow measurement of the solution. Flowmeter to be manufactured by Rosemount or equal.

**2.02.7 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. 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
  - Feeder
- Status indication light for the hopper low level and hopper levels.
- Allen Bradley SLC series programmable logic controller, factory programmed for automatic control of all sequences.
- HMI interface with 6” screen for display and control of feed variables
- Motor starters as required for equipment supplied.

- Alarm light, audible alarm, and silence pushbutton for failure conditions:

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.

### **2.02.8 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.

#### **2.02.8.1 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.