

## **SPECIFICATION #09566**



### **ESCO B-30-5FG & AB-200**

**Specifications for an ESCO B-30-5FG low pressure metering and dispensing machine to process a multi-component polyurethane with a graphite filled polyol.**

#### **Machine throughput:**

- 10 to 30 lb/min (~240 grams/sec max)
- Based on a material nominal ratio of 1:2 (Isocyanate:filled polyol + neat polyol)
- Ratios are variable within individual metered stream output capacities

#### **Mixing head:**

- ESCO series M500-5-SPL five component dynamic mixing head
- *Material injection and recirculation of Isocyanate neat and filled polyols will be done with plunger style injector valves with independent actuation*
  - *Note: plunger valves do not have external calibration feature and must be manually removed from the mixing head for wet calibration checks*
- Plunger style solvent injector valve
- Conical style mixer
- Mechanical type shaft seal
- Servo motor drive with variable speed control
- 1000-5000 RPM speed range
- Return line valves for pressure balancing

#### **Solvent Flush System:**

- 5 gallon stainless steel tank
- 110 P.S.I. pressure rating
- Nylon core supply hose to mixing head
- *Solvent media to be water based Bruce's magic juice*
- *Automatic operation: air purge-flush-rinse-air*
- *Rinse water source by customer fed to connection point on the machine*

#### **Isocyanate System:**

##### **Metering System:**

- 3.3 - 10 lb/min based on a specific gravity of 1.2
- 200 cps viscosity at 75°F operating temperature
- Positive displacement gear type metering pump with magnetic shaft coupling
- Variable speed motor

- Mild steel construction

**Tank System:**

- 20 gallon working capacity, mild steel, non-code construction
- Rated for 15 psi
- Nitrogen (dry air) blanketing system with regulator and relief valve
- Drain and shut off valves
- Fixed speed electric agitator
- Operate, low and high level sensors with level controls for manually initiated automatic refill from drums or totes
- Sight tube for visual level indication

**System Accessories:**

- Flexible hoses
- Mild steel rigid lines
- Basket style strainer on pump inlet
- Pressure transducer with local display & switching output for over pressure protection
- Secondary pressure display located near mixing head

**Drum Pump Refill:**

Pump operation is integrated with the level controls for the Isocyanate tank. Includes the following features:

- Air operated diaphragm transfer pump
- Maximum viscosity of ~2000 cps.
- Pumps have polypropylene and PTFE wetted parts
- Transfer hose kit, 8 FT long
- Cam lock type fittings for quick connect-disconnect with refill port on Iso tank
- Desiccant tote vent adapter
- 1 case of replacement cartridge
- Full integration of refill system with machine control

**EG Filled Polyol Systems:**

***Two identical filled polyol metering systems with the following features:***

**Metering Systems:**

- 6.7 - 20 lb/min based on a specific gravity of 1.05 (TBD at time of order)
- ~ 10,000 cps viscosity at 75°F operating temperature
- *ESCO will measure viscosity and density of RCO supplied samples of Polyol with appropriate maximum and minimum filler loading*
- *Positive displacement progressing cavity type pump with hard surfaced mechanical seals*
- Variable speed motor
- Mild steel construction

**Tank Systems:**

- 20 gallon working capacity, mild steel, non-code construction
- Rated for 15 psi
- Nitrogen (dry air) blanketing system with regulator and relief valve

- Drain and shut off valves
- Fixed speed electric agitator with on-off cycling timer
- *Constant level monitor with manually initiated auto refill from batching system*

**System Accessories:**

- Flexible hoses
- Mild steel rigid lines
- Pressure transducer with local display & switching output for over pressure protection
- Secondary pressure display located near mixing head

**Neat Polyol Systems:**

***Two identical neat polyol metering systems with the following features:***

**Metering Systems:**

- 3.3 - 10 lb/min based on a specific gravity of 1.05
- 1400 cps viscosity at 75°F operating temperature
- Positive displacement gear type metering pump with dual flushable lip seals
- Variable speed motor
- Mild steel construction

**Tank Systems:**

- 20 gallon working capacity, mild steel, non-code construction
- Rated for 15 psi
- Nitrogen (dry air) blanketing system with regulator and relief valve
- Drain and shut off valves
- Fixed speed electric agitator
- Operate, low and high level sensors with level controls for automatic refill from drums or totes
- Sight tube for visual level indication

**System Accessories:**

- Flexible hoses
- Mild steel rigid lines
- Basket style strainer on pump inlet
- Pressure transducer with local display & switching output for over pressure protection
- Secondary pressure display located near mixing head

**Drum Pump Refill:**

Pump operation is integrated with the level controls for the neat Polyol tank. Includes the following features:

- Air operated diaphragm transfer pump
- Maximum viscosity of ~2000 cps.
- Pumps have polypropylene and PTFE wetted parts
- Transfer hose kit, 8 FT long
- Cam lock type fittings for quick connect-disconnect with refill port on Polyol tanks
- Desiccant tote vent adapter

- 1 case of replacement cartridge
- Full integration of refill system with machine control

**Closed Loop Flow Controls:**

Closed loop flow controls the Isocyanate, Filled Polyol and Neat Polyol streams.

- Coriolis type mass flow meters
- Closed loop flow control with set points entered via operator interface on main panel
- Mass flow display on operator interface on main panel
- Density display/monitoring for filled Polyol

**Tank Heating Systems:**

Electric tank heating for the Isocyanate, Filled Polyols and Neat Polyols with the following features:

- Electric band heaters
- Thermal limit to prevent scotching of material
- Ambient to 100°F maximum operating temperature
- *Insulation blankets coded Iso = Red, Filled Polyol = White and Grey and Neat Polyol = Blue & Green*

**Regenerative Desiccant Air Dryer package:**

- Supplies dry air for water flush dry-out cycle for faster cycling time and more thorough dry out
- Regenerative air dryer to supply air at -40F dew point
- Uses plant compressed air
- Inlet valves, pre-dryer filtration
- 5 gallon receiver tank with relief valve and misc. accessories
- Desiccated air also supports tank blanketing systems

**Machine Frame:**

- Frame is welded tubular steel construction painted ESCO white.
- All metering system components are mounted to the frame
- *ESCO will submit machine layout for approval prior to frame fabrication*

**Mixing Head Support: Mixing Head Boom.**

Mixing head manipulator boom with *pneumatic assisted* raise and lower functions.

- Adjustable range is 18" of travel
- Nominal distance from floor to pour point of 36". (Other heights can be accommodated on request)
- Boom has +/- 45 degrees of pivot.
- Includes "handle bars" for operator manipulation

**Main control panel:**

Main panel is TBD (mounted or free standing), oil and dust tight enclosure operating from a power supply of 240 volts, 3 phase, 60 hertz. The main panel contains the following:

- Main power disconnect with door interlocks
- Allen Bradley PLC

- Necessary fuses
- Emergency stop
- Control transformers and power supplies

**ESCOware Process Control System:**

Control system features the ESCOware operator interface system. Includes consumer type PC and flat panel display (mounted within the main control panel) mouse and keyboard. ESCOware is used for displaying, monitoring and controlling the following process parameters:

- Flow rates and ratios with deviation alarming
- Tank content read-out with level alarming
- Pressures with deviation alarming
- Material temperatures with deviation alarming
- Shot times & mixer speed
- Fault indication and alarm history
- Recipe set up and storage of up to 10 discrete recipes including flow rates, Total ratio, Filled Polyol:Neat Polyol ratio, pour times for each pour section/mold cavity total throughput and mixer speed settings
- Shot data logging
- On-line manuals, assembly drawings and schematics
- Remote support via VPN/Ethernet connection

**Mixing Head Control Station:**

Mixing head control station is mounted *near* the mixing head within reach of the operator. It contains the following controls:

- Mixer start/stop
- Pour start/stop
- Flush start/stop
- Timed/continuous pour selector
- Emergency stop
- *Secondary pressure display located near mixing head exact location TBD as five injector valves will take up much space at mixing head*
- In addition a single pour start/stop button will be located on the operator handle bars on the mixing head

**ESCO AB-200 custom engineered batching and blending system with one of two Polyols, and a single mineral filler.**

**Supplies Polyol-filler blend to the meter mix machine**

**Target batch size:**

- ~200 pounds by weight maximum
- 20 gallons by volume maximum
- 10 gallons minimum batch volume
- Nominal 1.4 specific gravity of blended material
- Targeted batch cycle time is ~40 minutes
- Maximum viscosity of blend is up to 10,000 cps at ambient temperature

- *Two filled polyol systems will be processed on this equipment and it is assumed that the base polyols will be compatible with each other as some residual material will be left over in the batch tank from the previous batch*

**Batch tank:**

- 20 gallon maximum working volume
- Open top, non-pressure rated with dust cover
- Mild steel construction with outlet port, shut off and drain valves
- Tank is mounted to a high precision scale base
- Scale base resolution +/-50 grams typical
- Electric heating with temperature limiting feature to prevent scotching
- Operating range to 100°F
- Insulation blanket

**Base Polyol Feed Systems:** Batch tank is equipped with two dedicated Polyol feed systems each with the following:

- 1500 cps maximum viscosity at ambient temperature
- Polyol will be transferred to batch tank by air operated diaphragm pump
- Polyol measurement is through the scale base with two speed feed
- Feed source is from a 55 gallon drum or tote with 6ft flexible hose and 2" "cam-lock" type fittings.
- Polyol feed is first component in batch cycle
- Only one polyol is intended to be batched at one time

**Mineral Filler Metering/Feed System:**

Batch tank is supplied by a transfer and feed conveyor with the following features:

- Expandable graphite filler at a nominal 40 pounds per cubic foot bulk density and a nominal particle size of 2mm maximum
- Filler feed via incline helical screw type transfer conveyor equipped with:
  - 6 cubic foot surge hopper with bag break grate hinged cover
  - Cover is interlocked for safety
  - Manual fill of conveyor surge hopper
- Variable speed drive motor for high and low speed feed
- Slide gate shut off valve on outlet
- Set point targeted by scale base feedback

**Batch Mixer:**

The materials are blended by an electric drive batching mixer. The mixer is variable speed and is mounted on a support not connected to the batching tank for increased accuracy and to minimize interference with the batching process.

**Blended Polyol Feed Pump Systems:**

Provides for the recirculation of blended polyol and pressurized feed supply to the customer's processor. One dedicated pump system for each polyol with the following:

- Filled liquid capable air driven transfer pump
- Capable of up to 5 gallons/minute at a viscosity of 10,000 cps

- 8 feet (max.) of flexible hose for feed to processor filled Polyol tanks
- *Transfer hoses fitted with cam lock style connectors for quick connect and disconnect during refill operations*
- *Manual diverter valves for each polyol for refilling each filled polyol tank or recirculation back to batch tank.*
- *Poly is manually selected*

**Batch System Frame:**

- Frame is welded tubular steel construction painted ESCO white.
- Batch tanks, mixer supports and transfer pumping systems components are mounted to the frame
- Transfer conveyor system is an independent unit, caster mounted

**Batch System Control Panel:**

Main panel is mounted to machine frame and is an oil and dust tight enclosure operating from a power supply of 240 volts, 3 phase, 60 hertz. The main panel contains the following:

- Main power disconnect with door interlocks
- PLC
- Necessary fuses
- Emergency stop
- Control transformers and power supplies

**Operator interface and batch control:**

Batching system utilized commercial scale system controls with an Allen Bradley PanelView LCD local operator interface for set point and recipe controls.

**Utility requirements:**

- *Power supply: 240 volts, 3 phase, 60 hertz*
- *Plant air supply: 90-100 P.S.I. at 10-15 SCFM*
- *Metering unit and Batch unit will have independent power and compressed air feeds*
- *Plant/City water at ~40psi*

**Operation and Instruction Manual:**

One hard copy and one CD operations and instruction manual covering the following:

- Operation instructions
- Bill of materials
- Electrical and piping schematics
- Assembly drawings
- Supporting vendor literature and manuals as available
- Recommended spare parts list

**Customer Responsibilities:**

- Acquire all necessary permits, license, etc. to satisfy local codes and pay for any professional fees.
- Provide and make all necessary electrical, air, water, sewer and gas utility connection hook-ups to our connection points
- Provide and make all necessary electrical, air, water, sewer and gas utility connection hook-ups to our connection points as well as any interface connections between ESCO supplied equipment and equipment supplied by others unless specifically agreed to prior to installation
- Provide clear work area for installation of equipment quoted or move and replace any interference to equipment
- Provide all material for testing
- Furnish sufficient lifting equipment at site for installer's use
- Unload and move all materials received at customer's plant to site of installation (prior to installer's arrival).
- Provide storage for equipment for protection from theft or damage.
- All building modifications, such as holes through roof or floor, trenching, pits, pit covers, guard railing, building reinforcing, etc. by others.
- All containment, lighting or sprinkling for fire protection, etc. if required, by customers
- Necessary labor for testing required for start-up