

Wallace & Tiernan® Dry Feed Systems

Series 35-300 Polymer Feed System

The Wallace & Tiernan® Series 35-300 Polymer Systems produce batches of completely activated, fully aged polymer solution from liquid or dry polymer. The systems are designed for efficiency, performance, and economy; the entire process is automatically controlled through all operations. Unique, efficient wetting techniques, thorough mixing, and positive aging logic produce highly reactive polymer solutions. The polymer feed and the dilution water are continuously monitored to maintain the desired concentration and viscosity.

Polymers are very effective as flocculants and coagulants in potable water systems and wastewater treatment. Their application produces a substantial reduction in the amount of conventional chemical required to settle suspended particles. Polymer increases the capture of solids and improves the clarity.

Features

- Packaged Systems, pre-tested and pre-wired
- Wide choice of capacities for custom-sized arrangements
- High yield polymer production
- Positive aging
- Automatic monitoring of water-to-chemical ratio
- Highly effective wetting techniques
- Central control system
- Solution from dry or liquid polymers

Applications

The Wallace & Tiernan® polymer systems are ideal for potable and wastewater treatment of industrial processes, including:

- Sedimentation of municipal water, sewage, and industrial wastes.
- Settling of hydrous metal oxides in metal-finishing water.
- Improving solids capture and supernatant clarity; increases throughput in centrifugation of alum muds.

Key Benefits

- Limited operator interface
 - Easy conversion from either liquid or dry modes
 - Weighing of dry chemical is not required
 - Positive wetting and programmed
- Gravity settling of steel mill wastes, zinc, chromate, latex and sugar mill wastes, and tannery wastewater.
 - Brine clarification in recovering magnesium compounds from seawater.
 - Clarification of beet and sugar cane juice.
 - Thickening of coal refuse; dewatering aid for vacuum filters and drying beds, sludge conditioning for improved dewatering in secondary wastewater treatment.
 - Imparting a charge to the filter media.
 - In filtration of alum muds, sewage sludges and fermentation broths as a filter aid.
 - Increasing retention of fillers, pigments and other wet-end additions on cylinder paper machines.



Features

Complete Systems

Series 35-300 Polymer Systems are available in six models with capacities ranging from 5,400 to 86,400 gpd (capacities based on five-minute batch-aging time). Siemens Water Technologies provides complete, coordinated systems and a full range of complementary accessories from the standard line of equipment and components. Polymer systems are delivered pre-tested, prewired, and pre-piped. (Larger arrangements require some wiring and piping between modules.) This assures performance-ready systems and fast trouble-free installation.

Fully Automatic

The batch production of completely activated and fully aged polymer solution is automatically controlled through all stages. The ratio of polymer to water is precisely regulated. Timers control mixing and aging periods. Automatic level controls monitor solution levels in tanks. The operating sequence of the feeder, wetting unit, and mixer are electrically interlocked with electric level sensors and timers.

High Efficiency Wetting

The Wallace & Tiernan® Series 35-300 Polymer Systems use two unique, highly effective wetting techniques. In the lower capacity arrangements, high-velocity nozzles (in the Wallace & Tiernan® patented Jetspray Wetting unit) generate a strong water bombardment inside a wetting chamber. The hydraulic activity creates a downdraft in the chamber that draws polymer into the powerful spray pattern. Additional spray nozzles direct water on the interior wall to minimize material build-up. A unique cone-educator wetting unit is used in the higher-capacity unit. As polymer is metered into the cone-shaped unit, a powerful water stream causes water to swirl around the inside of the cone. The induced water vortex covers the wall of the cone with water. The velocity effectively disperses the polymer for thorough wetting and prevents build-up. An orificed disc in the dilution water piping directs high velocity water jets on the pre-wetted polymer as it exits the cone. The impact acts to break up any lump formations and to further dispense the polymer. An educator downstream mixes and moves the polymer solution to the tanks for additional mixing and aging.

Operator Responsibility and Labor Minimized

Automatic feeding eliminates the need to weigh dry chemical for each batch. The potential for error is removed. Keeping the hopper filled with dry polymer is the only manual operation.

Liquid-Dry Chemical Capability

The Wallace & Tiernan® Series 35-300 Polymer Systems can prepare aged polymer solution from both dry chemical and liquid concentrate. A switch on the control panel sets the operating mode. Conversion from either the dry or liquid mode requires only simple adjustment to the supply connections.

Engineered for Performance

All operations are controlled from the control panel, which can be mounted onsite or remote. Feed rate and aging time can be adjusted without shutdown. The system is designed for

automatic operation but manual overrides are provided for water, feeder, and mixer operation. It is easy to flush the system and recalibrate for a polymer solution with different ionic characteristics, viscosity or concentration.

Savings from Operating Efficiency

Precise system controls maintain the optimum water to polymer ratio. Positive wetting and programmed aging helps the polymer reach the most effective molecular weight and produce the highest yield of reactive solution from these expensive chemicals.

Design and Operation

The Wallace & Tiernan® polymer systems are available in six capacity models. There are two types: integrated systems with capacities to 27,600 gpd and high capacity, "flip-flop" systems that can handle 86,400 gpd. (Capacities based on five-minute aging time).

Integrated Systems

Integrated systems (Models 15, 25, 50, and 100) are three level, stacked arrangements with the feeder, wetting unit, and mixer mounted at the upper level over the mixing-aging tank the solution metering tank is at floor level. The stacked tanks are of stainless steel construction for increased structural strength in the Model 25, 50, and 100 systems. Control panel is mounted at convenient eye level.

Dry polymer is loaded into the hopper of the volumetric feeder. Agitating plates in the hopper walls are designed to prevent caking or material arching. A rotating feed screw carries the dry chemical to the discharge where a hydraulically operated feed-spout isolating valve releases polymer into the wetting chamber. A heater on the stainless steel spout minimizes caking of the polymer through condensation. In the integrated systems, high velocity jets in the patented Wallace & Tiernan® Jetspray Wetting Unit develop a dynamic spray pattern. The turbulent hydraulic activity within the wetting chamber creates a vacuum that promotes the gravity flow of the dry polymer and minimizes polymer dusting. Offset nozzles inside the chamber simultaneously flush the interior wall to prevent material build-up. The clear Lucite chamber provides easy observation of wetting action and can be easily removed for adjusting spray nozzles or routine maintenance. The wetted polymer passes into the mixing-aging tank. When the tank is at capacity, the high-level sensor stops the chemical feed and water flow. A slowspeed mixer gently agitates the solution without severing the polymer's long molecular chains. When the mixing and aging cycle is completed, the aging timer opens the transfer valve and aged solution flows (by gravity) to the metering tank below. When the level in the mixing-aging tank reaches its low point, a low level sensor causes the transfer valve to close. Feeder and wetter will then resume operation and the cycle repeats.

"Flip-Flop" Systems

In the "flip-flop" systems (Models 200 and 400), the feeder-wetting unit, and control panel are mounted on a steel frame stand. Tanks are mounted separately and have interconnecting

pipng with ball valves. A steel bridge supports the mixers and mixer control box. Each tank has its own mixer and level sensor probe unit. The volumetric feeder discharges a measured flow of dry polymer through the hydraulically operated isolation valve into a cone shaped wetting unit. A high velocity stream of water enters at the top of the cone and swirls around the inside, keeping the wall covered with water. The indoced-water vortex thoroughly wets the polymer. A strong spray from an offset nozzle at the base of the cone prevents caking and clogging. Dilution water, passing through a multiple-orifice disk, impacts on the polymer as it discharges from the cone. An eductor farther downstream disperses the wetted polymer and carries it to the tank. The mixer starts when polymer solution begins to enter the tank or, using the time delay, when the solution in the tank reaches a certain pre-set level.

Tanks are used alternately in a flip-flop sequence with two electirc operated ball valves controlling the flow-in and flow-out for both tanks. When the first tank is filled to capacity, the high-level sensor casues te feeder to shut down. Water will continue to flow for a brief period to fluch out the cone and piping. The mixing and agining in the first tank will continue for a period preset on the aging timer. When the aging cycle is complete, the agining timer will actuate the two electric operated ball valves. One changes the flow path so that polymer solution fro the wetting unit is now routed to teh seconde tank. The other ball valve will route the discharge of the aged polymer in the first tank to a metering pump. When the aged-polymer level in the first tan reaches its low limit and the agining cycle in the second tank is complete, the ball valve will switch over and the aged polymer is the second tank will be routed to the metering pump. The controls will then start mixing the water flow to the cone and the dilution water pressure will open the flapper vlave on the feed spout. After a time delay the feeder will resume operation, feeding dry polymer to the cone-eductor wetting unit. The positive-aging-logic function will not allow the system to meter un-aged polymer.

Controls

The control panel for the stacked systems, Model 15, 25, 50 and 100, has running lights that indicate power on, liquid or dry operating mode, mixing-water flow, mixer on, and transfer valve open. There is an alarm light for low-water pressure. (Lowhopper level and low-solution-level alarms are optional.) The feed-rate indicator, feed-rate-control potentiometer, aging timer reset and alarm-acknowledgment button are all conveniently located on the control panel. For Models 200 and 400, the system controls, including disconnect switch, indicators, running lights and alarm lights are all conveniently displayed and easily accessible on the centralized control panel. The panel includes: feed rate meter and control knob, aging timer, liquid-dry mode selector switch, and auto-off manual switches for feeder, mixers, and mixing-water flow. Running lights indicate the operation taking place in each tank. Alarm lights for low-water pressure, cone overflow, and solution overfeed are standard. Alarm lights for lowhopper level and high-tank level are optional. Reset button is conveniently mounted for reactivation alarms. A separate mixer control panel is mounted on the mixer bridge between the two tanks. This panel features a disconnect switch and an auto-off safety switch for each tank mixer.

Liquid-Polymer Mode

When any of the Wallace & Tiernan® Polymer Systems are to be operated in the liquid polymer mode, simple connections are provided for liquid polymer hook-up to the systems. An optional metering pump is used to draw from the liquid polymer supply. In Models 15, 25, 50 and 100, the liquid polymer concentrate is fed through the wetting unit; in Models 200 and 400, it is introduced after the eductor. After that point, system operation in the liquid mode is the same as operation in the dry mode.

Technical Data

Capacity

System capacity is a function of tank size, solution-aging time, and metering rate. Typical capacities (at five- and 30-minute aging times, 0.5 % solution concentration) for each model are listed below.

Operating Range

20:1.

Accuracy

Batch repeatability is within 3%.

Viscosity Limits

Model 15-5000cps; all others, 10,000cps (cps as measured with Brookfield Viscometer, no. 3 spindle at 3 rpm).

Dry Polymer Feeder

Screw-type with electric variable-speed control. High-speed continuously adjustable gearbox ratios and four-step drive pulleys produce maximum theoretical feedrates of 0.8 to 2.4 cu. ft. per hour with 1½-inch feed screw (Models 15 and 25), and 4.0 to 12.0 cu ft per hour with 2½ inch feed screw (Models 50, 100, 200, and 400). Operating range is 20: 1, extendable to 60:1. Hopper has a capacity of 1.6 cu ft and is designed for easy cleaning and corrosion resistance. Upper hopper is fiberglass; hopper-wall agitators are Buna-N; the feed screw, trough, and discharge spout are stainless steel. Feed rate is controlled manually from a potentiometer on the system control panel with speed (feed rate) readout on a meter calibrated 0-100% of capacity.

Power Requirements

Model	Volts	Phase	Amps
Total System			
15	115	1	15
Control and Feeder Circuits			
25, 50, 100	115	1	6
200, 400	115	1	7.5
Mixer Motors			
25, 50	115 or 230	1	9 or 4
100	230	1	8
200	460	3	5
400	460	3	7

Capacities

Model	GPD	Aging Time	Dry Polymer req'd per day
15	5400 1290	5 mins (180 batches of 30 gals each) 30 mins (43 batches of 30 gals each)	224 lb. 52 lb.
25	8125 2535	5 mins (125 batches of 65 gals each) 30 mins (39 batches of 65 gals each)	338 lb. 106 lb.
50	16320 4800	5 mins (136 batches of 120 gals each) 30 mins (40 batches of 1200 gals each)	680 lb. 200 lb.
100	27600 10500	5 mins (92 batches of 300 gals each) 30 mins (35 batches of 300 gals each)	1150 lb. 436 lb.
200	61750 1900	5 mins (130 batches of 470 gals each) 30 mins (40 batches of 4700 gals each)	2576 lb. 774 lb.
400	86400 38400	5 mins (72 batches of 11300 gals each) 30 mins (32 batches of 1130 gals each)	3538 lb. 1508 lb.

Optional Metering Equipment

Siemens Water Technologies offers a full line of metering pumps for polymer system applications. These include the Encore® 700 and Chemtube® 200 and 2000 metering pumps.

The Encore® 700 metering pump is a mechanically operated non-loss of motion diaphragm unit. Maximum capacity is 7600 GPH for a single head version and 15,200 GPD with a double head. Feed rate via stroke length can be adjusted manually or automatically via an electronic positioner. In addition, stroke speed can be automatically controlled by varying the speed of a DC or inverter duty motor via an SCR or Variable frequency drive. For more information see Product Sheet WT.440.400.000.IE.PS.

The Chemtube® 200 and 2000 pumps are hydraulically actuated diaphragm units. Maximum capacity of the Chemtube® 200 is 1440 GPD for the simplex arrangement and 2880 for the double simplex version. Maximum capacity of the Chemtube® 2000 is 12,600 GPD for the single head arrangement and 25,200 GPD for the double simplex arrangement.

Both the Chemtube® 200 and 2000 pumps are available with the same control features as described for the Encore® 700 units.

Water Requirements

Models 15 and 25; 12 gpm at 40 psi minimum pressure; Model 50 and 100; 35 gpm at 50 psi minimum pressure; Models 200 and 400, 80 gpm at 55 psi minimum pressure. Maximum water pressure for all models is 125 psi. (Water supply and temperature limits are 35°F to 100°F.)

The mixing-water-supply line has a pressure gauge, pressure switch, solenoid valve, flow controller and a shut-off valve, all preceding the wetting unit. The flow controller maintains

constant flow by a pressure sensitive variable orifice. If line pressure falls to less than set minimum, the pressure switch will interrupt system operation, activate the control-panel alarm light, and closed contacts for optional remote alarm. The solenoid valve is electrically interlocked with tank level controls and the aging timer for automatic control of mixing water supply.

Tanks

Model 15, 40 gal. (30-gal. batch) rectangular molded plastic; Model 25, 90 (65), Model 50, 150 (120), Model 50, 390 (300) gal. rectangular stainless steel; Model 200, 550 (475), Model 400, 1500 (1200) gal. cylindrical polyethylene.

Motor Characteristics

Dry feeder: 1/6 hp, 90 volt dc TENV, 4 amps
 Mixer: ½ hp 115/230 volt. 1-ph, 60 Hz
 1½, 2 hp 230/460 volt, 3ph, 60 Hz;
 Metering pump: (induction motor) ¼ or ½ hp, 115/230 volt, 1 ph, 60 Hz; (variable-speed motor) ¼ or ½ hp, 115 volt, 1ph, 60 Hz
 Pump controls: 115 volt, 1 ph, 60 Hz, 4.5 amps.

Temperature

Water: 35-100°F; Ambient: 35-125°F.

Dimensions

For dimensions see literature: Model 15, WT.350.300.100; Model 25, WT.350.100.106; Model 50, WT.350.100.108; Model 100, WT.350.100.110; and Models 200 and 400, WT.350.100.102.

Shipping Weight

Model 15, 480 lb; Model 25, 500 lb; Model 50, 625 lb; Model 100, 1100 lb; Model 200, 1500 lb; Model 400, 1700 lb. (Tank weight not included for Models 200 and 400. For ea. 550 gal tank, add 175 lb; ea. 1500 gal tank, add 315 lb.)