

Information on Feeder Systems ProMinent Australia

Powders that ProMinent have provided packages for:

Sodium fluoride

Sodium silicofluoride

PAC

Soda ash

Lime

Alum

Potassium permanganate

Calcium Hypochlorite



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Components that might be supplied with a Feeder package

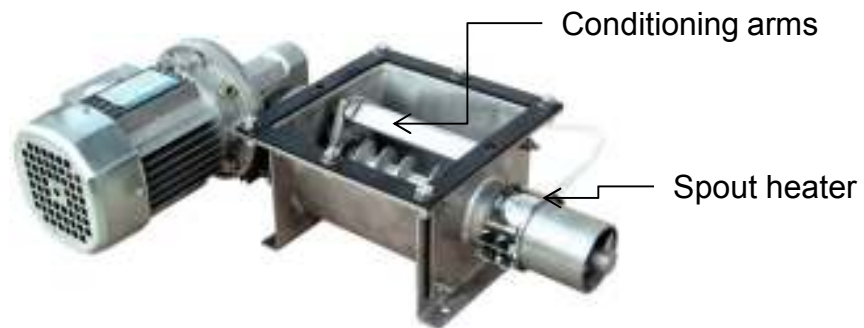
- Powder Feeder
- Slide gate
- Hopper
- Hopper 'loader'
- Solution tank or tanks with stirrers
- Eductor and wetting cone
- Dilution tank with transfer pump
- Metering pump
- Control panel



Pressurised water supply



Types of Feeders



ProMinent single screw feeder with
Open wire,
Wire with solid shaft
Solid screw
Conditioning arm



Tomal multi-screw feeders



ProMinent 25mm
'progressive' solid
screw

Control of feeders

- Variable frequency drives 6:1 & 35:1 with pulse duration
- Pulse duration
- Combination of both the above
- Mechanically variable gearbox

Feeder Accessories



Handwheel operated slide gate



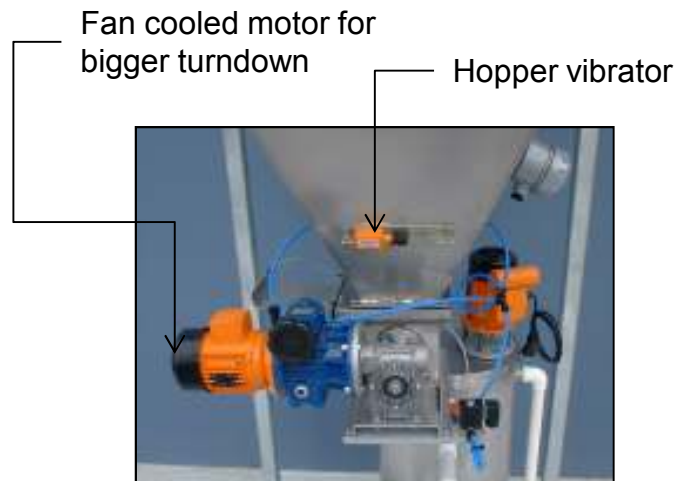
Vibrator, spout heater & spout closure



Slide gate
Single or double action



Pneumatic slide gate



Manual gearbox



Compressor

Hoppers

Hoppers can be round or square section and may come with:

- Load cells for measuring the weight in the hopper
- Hand-wheel slide gate
- Pneumatic Slide gate
- Low level switch in the powder hopper
- High level switch in the hopper
- High Level Switch in the wetting cone

Materials :Stainless steel, mild steel, HDPE



Vibrator on side of hopper



Storage hopper is generally designed to hold several days of PAC at peak dosing rate to maximise time between loading.

Methods of loading powder into hoppers



Manual bag loader



Vacuum loader
from 25 kg bags



Vacuum loader from
top of a bulk bag



Crane and hoist bulk bag unloader
or fork lift - bag unloader

Manual Bag Loader



Also with front pull knife cutter

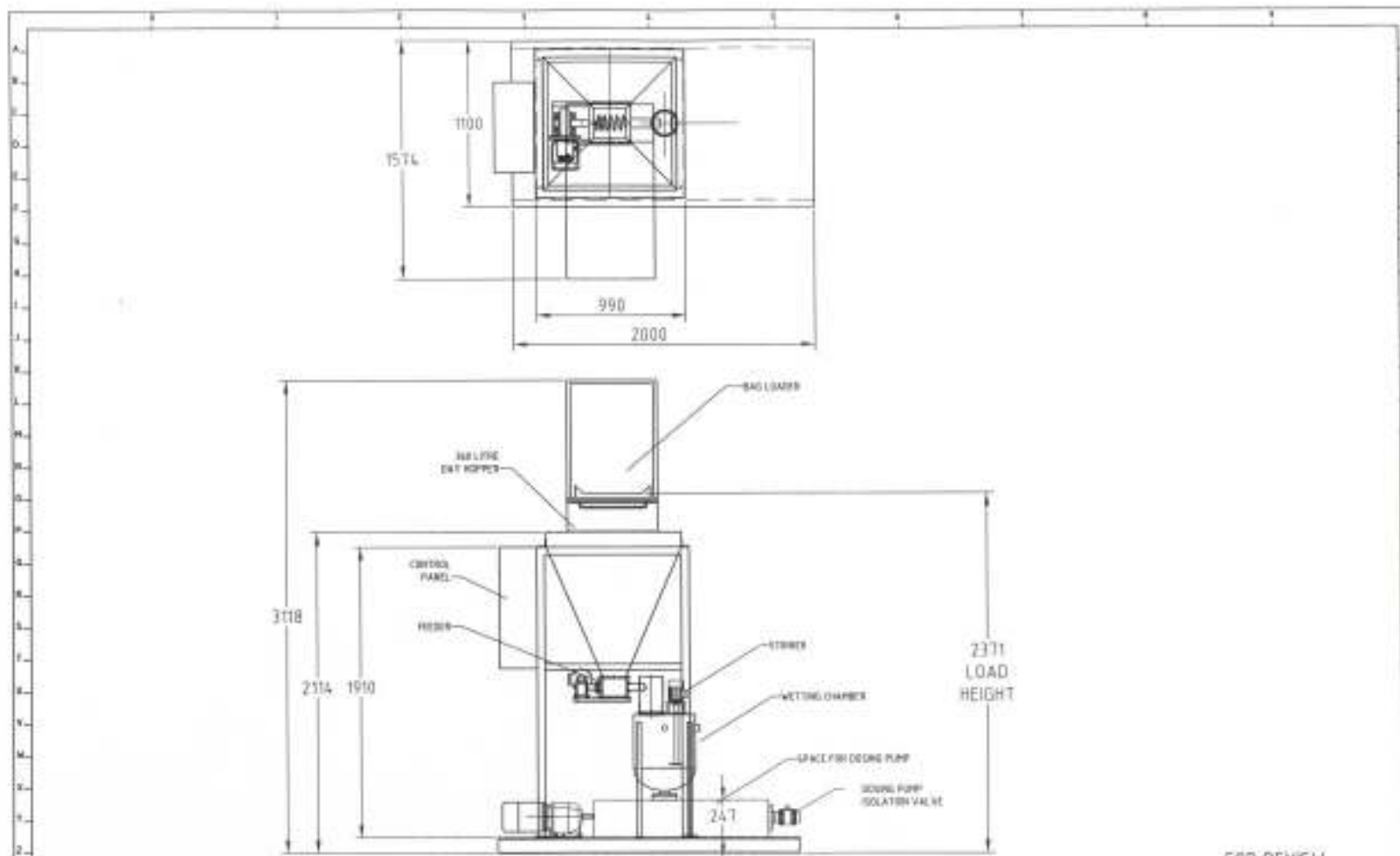


Two sizes are available to suit 800 mm bags (soda ash and fluoride) & 1000 mm bags (PAC, lime).

The door is opened, the bag secured in place by inserting the spike through the top of the bag, the bag is slit with a knife and the door closed allowing the contents of the bag to fall into the hopper.

As the full contents of the bag fall into the hopper there is the same volume of air that needs to escape so we normally fit a vertical riser pipe (100 mm) with filter sock to take this inertia to prevent the airborne powder from trying to escape through overflow pipework, door hinges etc.

A loading platform would normally be required for loading the bags.



FOR REVIEW

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GLEN INNES CC
 PART NUMBER:
 TYPICAL PAC SYSTEM
 WITH BAG LOADER
 DESIGN NUMBER: 14485_GA1

ProMinent®

Vacuum Loader

The ProMinent vacuum transfer system is designed to transfer powder from a 25 kg bag, or container to a hopper or direct to a process.

A pneumatically actuated valve at the bottom of the collection unit is used to dump the collected powder into the hopper, and to isolate the hopper from the vacuum when operating.

There is a second valve on the suction side of the loader to prevent powder from blowing out of the wand during the cleaning cycle.

Many vacuum loaders from opposition companies do not have actuated valves





The ProMinent Vacuum Transfer System is available in 2 models

Model A is 240 Volt and would empty a 25 litre bag of fluoride or soda ash in 5.0 to 6.0 minutes.

Model B is 415 Volt and would empty a 25 litre bag in 3.0 to 3.5 minutes

Each unit includes:

- Collection unit

- Compressed air handling system

- Hand held vacuum wand

- Vacuum motor

- Air supply (either a compressor or plant air)

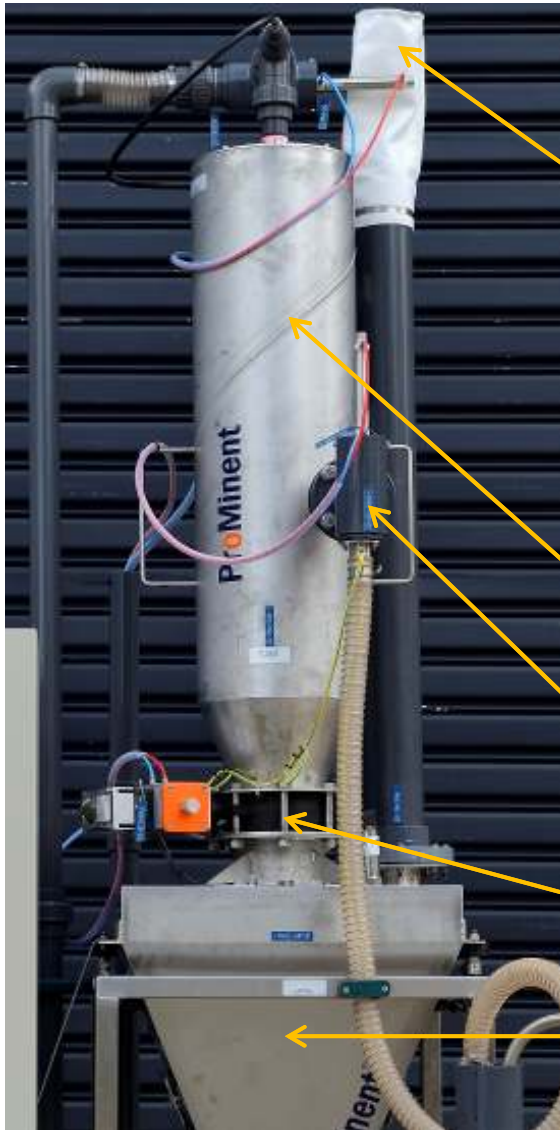


With the vacuum loader switched on, the wand is inserted into the container or open bag. The vacuum motor will operate for 40 seconds (or longer) before stopping.

At this point, the inlet valve will close, and the dump valve will open, allowing the collected powder to drop into the hopper.

A cleaning cycle will then begin. Once the cleaning cycle has completed, the dump valve will close, the inlet valve will open and the vacuum motor will start again.

Vacuum Loader



Air displacement filter

Collection Chamber

Inlet Valve

Dump Valve

Storage Hopper



Vacuum Wand

Bulk Bag Unloaders



Bulk bag loader with crane and hoist unloading from the bottom of the bag



Bulk bag unloader

with crane & hoist



with forklift loading

Bag is on spring loaded supports



Various levels of dust tight bag tie downs are available



Dust extractor, valved between hopper and bag unloader



Frame for holding bulk bag

Vacuum Loader unloading from top of Bulk bag



ProMinent Australia designed their own bulk bag unloader for emptying the bag from the top via a suction wand.

Two vacuum units are used, one to ensure continuous vacuum while transferring and the other to keep a continuous negative pressure on the clamp ring to prevent dust escaping.

Bag is emptied from the top via a suction wand and is positioned in place by pneumatic lifting rams.

The vacuum loader filter bags act as the dust extractor



Bag trolley with pneumatic ram

Bag clamp coupling With ring of vacuum



Various system hydraulics



With motive water pressure at 4.5 to 5.0 bar director ejector feed is suitable for transferring and injecting against 1 bar.

For injecting against pressures above 1 bar, we add a dilution tank and transfer pump

Standard ejector sizes

1000 l/h

2000 l/h

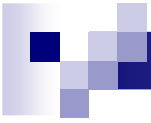
4,500 l/h

Plus 600 l/h for wetting cone



Water pressure package and dilution tank with transfer pump





If injecting into higher than 1 bar a transfer pump is added with a small dilution tank for a quick turnover to remove need for a stirrer

Additional water is added to the dilution tank to reduce the concentration and balance the transfer pump flow

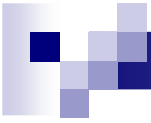
Transfer System Tank

Transfer Pump



Pressurised water supply packages





Dilution tank with transfer pumps



Control panels



Tomal



Polymore



Polyrex liquid polymer



Polyrex dry polymer



Bulk bag unloader



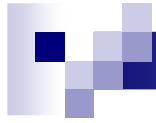
Hopper & feeder



Polyrex dry polymer



Lime silo



Types of Systems

Manual batching systems / Portable Systems

Manual Load

Vacuum Load

Bulk Bag Systems

Manual Batch PAC

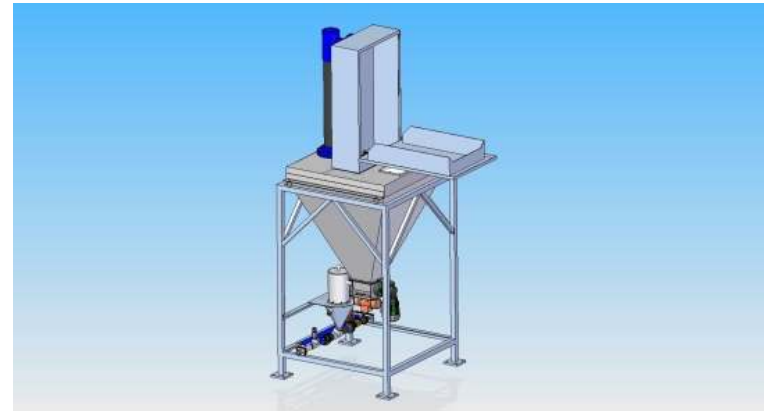
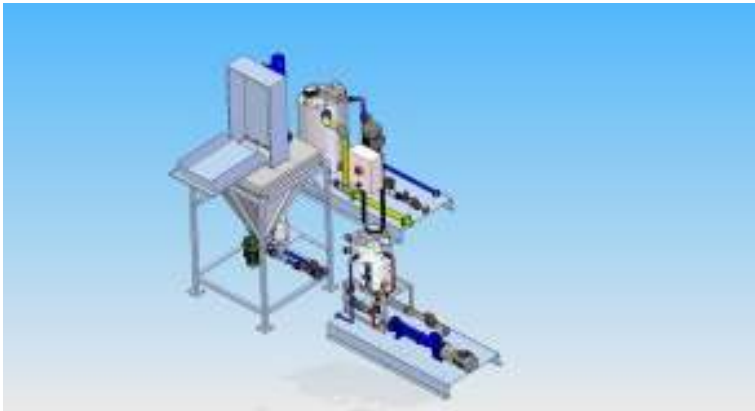
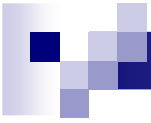
Operator manually feeds PAC into wetting cone/venturi

PAC is kept in suspension by a stirrer

Peristaltic pump or metering pump doses the solution to the mains dosing point. May be difficult to maintain an ideal velocity in the dosing line to prevent settling so regular line flushing may be required

Loading of powder can be dusty





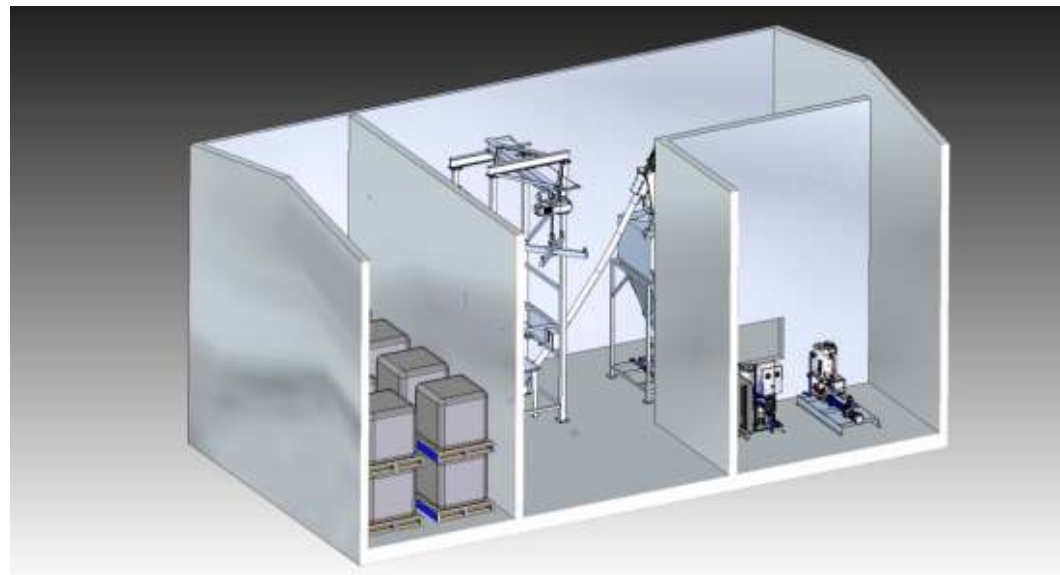
Vacuum Load PAC Systems

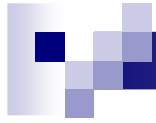


- Operator vacuums PAC from a 25kg bag
- Vacuum Loader transfers PAC to storage hopper
- Screw Feeder feeds PAC to wetting cone/venturi
- System design allows for a large powder storage minimising loading time

Some guides we would use when quoting packages

- For PAC constant transfer varying solution strength, max 3% solution
- Retention time for lime and soda ash in mixing tank 5 minutes
- Max solution strength for lime 5%
- Max solution strength for soda ash 5%
- Max strength for potassium permanganate 3%
- If dosing or transferring lime under 500 l/h use a metering pump with flexible tubing
- Retention time for sodium silicofluoride minimum 10 minutes





Typical examples

Of Lime, PAC, Soda ash and Potassium permanganate



To provide a PAC preparation and dosing package

to dose up to 50 mg/litre into a water supply of approximately 180 l/sec.

We offer a package consisting of a vacuum loader, hopper, powder feeder and a wetting cone/eductor for direct transfer to the injection point.

The wetting cone/eductor offered ensures the powder is fully wetted and is suitable for transferring against pressures of up to 1 bar. We included for a mechanically variable gearbox to adjust the dose rate and included for an AC variable frequency controller to accept a 4-20 mA signal for flow pacing.

To inject against pressures above 1 bar we offer a dilution tank and transfer pump to transfer against, say 4 bar. This system is constant transfer with varying solution strength. We can offer a continuous batch makeup with metering pumps if preferred at a slightly higher price.

The wetting assembly will require water at approx 2,000 l/h for the eductor and 600 litres for the wetting cone at around 4.5 bar. An additional 1,000 l/h is required at the dilution tank if a dilution tank is to be used. If pressure water is not available at 4.5 to 5 bar then we offer a break tank and pressure pump.

PAC package consisting of:

Vacuum loader in 304 SS

Hopper in 304 SS with

Vibrator

2 Pad heaters

Inertia pipe with filter sock

Slide gate (handwheel type)

Feeder in 316 SS with manual 5:1 gearbox

Wetting cone eductor assembly

Control Panel with AC frequency controller

Inlet water supply with

Rotameter

Flow control for eductor cone rinse water

Compressor for vacuum loader

Dilution tank assembly (for injection against pressures higher than 1 bar)

c/w

Float valve

Transfer pump Spectra progressive cavity

Based on a flow rate of 2000 l/h through the ejector and a 600 l/h through the wetting cone and a dosing rate of 50 mg/litre into 140 l/second, the percentage of PAC through the wetting cone/eductor is 0.97%. The offered package would handle up to a solution strength of 3%.

Whenever PAC dosing is stopped, the system continuous to run for a predetermined period to flush out the system and transfer line.



Lime Preparation and dosing Package

We have offered the lime dosing packages in 2 ways.


- Firstly we offer with a constant transfer rate and the solution strength being varied in proportion to a 4-20 mA signal.
- Secondly a constant solution is made up and dosed with a metering pump in proportion to the mA signal.

For both systems we suggest the dosing line be kept as short as possible. If the dosing point is a long way from where the pumps are to be located consider using carrier water.

For the constant transfer system the powder feeder output is flow paced via the 4-20 ma signal to the AC frequency controller and the amount dosed per litre is adjusted manually via a manually variable gearbox.



Constant transfer varying solution strength lime package



With the constant transfer system, when the dosing is stopped the automatic flushing system will allow water to run for an adjustable period after the powder has stopped, to flush the tank, pump and transfer line. Also with this system, the transfer rate is always at the maximum flow rate helping to prevent lime settling out in the line. Lime will settle out whenever the dosing is stopped. Ideal pipe velocity is from 1 to 3 m/s.

With a batch make-up system it has to be decided as to what is to be flushed. Solenoid valves can be fitted to shut down the discharge from the solution tank, provide water to the metering pump for an adjustable time to flush the dosing line, but this does not clear the tank or the outlet solenoid valve. It may not be an option to completely flush the solution tank depending upon the volume of the tank.



Varying solution strength constant transfer

Lime from the hopper is metered into the solution tank via the powder feeder. The feeder capacity can be varied via the mechanical variator and can be flow paced from a 4-20 mA signal when both solution strength and flow pacing is required.

The powder is metered into the solution tank where it is mixed into the make-up water. A stirrer ensures the solution is thoroughly mixed before being transferred to the injection point. A float valve keeps a constant level in the solution tank and a low level switch is fitted to prevent dry running of the pump.

Constant solution strength varying transfer

The constantly stirred solution tank would make up between levels. Once the bottom level is reached, water at a regulated rate fills the tank while powder is being added to make up a 3% lime solution. This solution is metered in proportion to a 4-20 mA flow signal with a metering pump, helical rotor, or tube pump.

With this varying metering the risk is in low dosing rates resulting in low velocity in the dosing line leading to lime settling out. Minimum velocity 1-3 m/s.



Lime (varying solution) package on a galvanised skid and consisting of:

Mixing tank 100 litre c/w
Float valve
Low level switch
Inlet, outlet and overflow pipework
Stirrer 1400 rpm
Control panel with
AC Variable frequency controller
Manual bag Loader 1000mm
125 Litre 304 Stainless Steel Hopper with
Low level sensor
Heaters
Vibrator
Powder feeder in stainless steel with
Spout heater
Mechanical variator
Solid screw
Conditioning arms
Slide Gate
PVC Pipework
Pump skid consisting of
Sigma 2 Transfer pump
2 Flow switches
Load valves
Relief valve
All on PE skid
Price for above package

Lime (constant solution) package on a galvanised skid and consisting of:

Mixing tank 1000 litre c/w
Float valve
Low, middle and high level switches
Inlet, outlet and overflow pipework
Stirrer 1400 rpm
Mixing tank 1000 litre c/w
Float valve
Low, middle and high level switches
Inlet, outlet and overflow pipework
Stirrer 1400 rpm
Control panel
Manual bag Loader 1000mm
125 Litre 304 Stainless Steel Hopper with
Low level sensor
Heaters
Vibrator
Powder feeder in stainless steel with
Spout heater
Mechanical variator
Solid screw
Conditioning arms
Slide Gate
Pump skid consisting of
Sigma 2 metering pump
2 Flow switches
Load valves
Relief valve
All on PE skid
PVC Pipework
Price for above package

Unless otherwise noted, the following applies to or is included with our offer:

Equipment built in accordance with Australian Standard 3000. Any special site specific requirement would be an additional price. Where PLCs are required they will be Allen Bradley.

Potassium Permanganate preparation and dosing

Request from our client was to dose up to a 5 mg/litre of potassium permanganate into a flow of 100 l/second.

Our offer was for a 1,800 litre preparation tank with

- Timed slow speed stirrer
- Tomal vacuum loader for unloading the 25 kg containers
- Transfer pump, VonTaine mag drive (transfer time 10 mins)
- 3,000 litre dosing tank
- Control panel





A complete 25 kg container is prepared at 2.5% = 1000 litres. This is stirred until fully dissolved and the transferred into the dosing tank ready to be metered into the water supply with a ProMinent metering pump in proportion to a flow 4-20 mA signal.

Dosing at the above rate and assuming the water supply operates for 12 hours per day the 3000 litre dosing tank would last for 31/2 days.

