KRONOS ecochem®

Technical Information 2.03

Transport, Storage and Metering Solutions

FERROFLOC
ferrous chloride solution
KRONOFLOC
ferrous chloride solution
FERRIFLOC
ferric chloride sulfate solution

Precipitants and flocculants based on iron salts are available both in solid form and as solutions. Regardless of the form in which a product is supplied, it is always added in solution.

Liquid precipitants are supplied ready for use, thus eliminating the need for preparation processes, so that they can be used easily and reliably.

1. Transport

1.1 Delivery

The solutions are delivered in rubber-lined road tankers, rail tanks and large containers. The delivery batches weigh between 24 and 27 t, corresponding to approx. 16 to 20 m^3. Purchases of less than 15 t should be avoided as the proportion of transport costs otherwise becomes too high.

Small batches and packaged material are available from chemical dealers.

1.2 Unloading

The tanks are unloaded by gravity or by the pressure of the vehicle's compressed air. Unloading takes approx. 25 minutes with a maximum unloading pressure of 2 bar. Owing to their acid nature, the precipitant solutions are classified as hazardous substances. The relevant regulations must be observed in connection with transport, handling and storage (refer to the Safety Data Sheets of the products).

For unloading operations, this means:

- Protective clothing must be worn, including safety goggles
- The unloading area must be impermeable to liquids
- Tankers with a "dead-man's handle" should be used.

Unloading safety is impaired if the filling nozzle of the storage tank is more than 10 metres away from the road tanker.

2. Storage

All precipitants constitute minor water hazards. Plastics and rubber-lined steel are virtually the only suitable materials for safe storage. Where metal parts are unavoidable, for FERRIFLOC these can be made of titanium or Hasteloy C. Only tantalum may be used with FERROFLOC and KRONOFLOC.

2.1 Storage tanks

In accordance with the information on the size of the delivery batches, as given in Section 1.1, the tank should have an operating volume of no less than 20 m^3 (better 25 m^3). If large quantities are required, the tank volume should be sufficient to hold enough for about six days, so as to ensure reliable coverage of public holidays and/or bans on lorry traffic.

The tanks can be of horizontal or vertical design and may be installed in the open or indoors. The diagram of the storage facility on page 2 shows a flat-bottom tank (Fig. 1).

The following materials are suitable:

PE-HD for flat-bottom tanks
GF-UP with chemical protection layer or PVC liner
Rubber-lined steel

The tanks must have a valid test mark of the appropriate authority. The list of media in the test certificate must include the chemical designation of the precipitant.

Alternatively, the liquid precipitants can be stored in buried tanks (e. g. soaking tanks), provided that the leakproof lining also has a test mark and no metallic materials are used. We recommend annual rinsing of the storage tank.

2.2 Leak protection

The obligatory protection against uncontrolled leaking of the storage tank can be ensured in three different ways:

1. Integrated catch basin with test mark (see diagram)

2. Coated catch basin constructed by the customer (coating with test mark)

3. Double-walled tank with leak indicator, based on a positive or negative pressure system, for which test marks have been awarded.

2.3 Equipment

The following equipment is required for filling and operating the storage tank:

- Overfilling safety device with visual/audible indication (subject to compulsory test marking)
- Level indicator with opto-mechanical function and, possibly, limit contact-switch
- Filling line, preferably DN 80, with angled filling nozzle (45°) with drain connection. Perforated flange connection; to be installed at knee height
- Vent line and/or aeration line, preferably DN 125
- Discharge line (suction line) with strainer and foot valve.

2.4 Filling area

The surface of the ground between tank connection and tank truck connection must be designed so that any escaping precipitant can be collected.

The design usually consists of an asphaltic fine concrete surface sloping down towards a sewer interceptor fitted with a cutoff valve. The interceptor must be of corrosion-proof design and closed only during the unloading operation.

Opinions vary as to the size of the filling area and the necessary collection volume. We recommend consulting the regulations of the local water authorities. When using tankers with a “dead-man’s handle”, the leak volume can be 500 l at most.

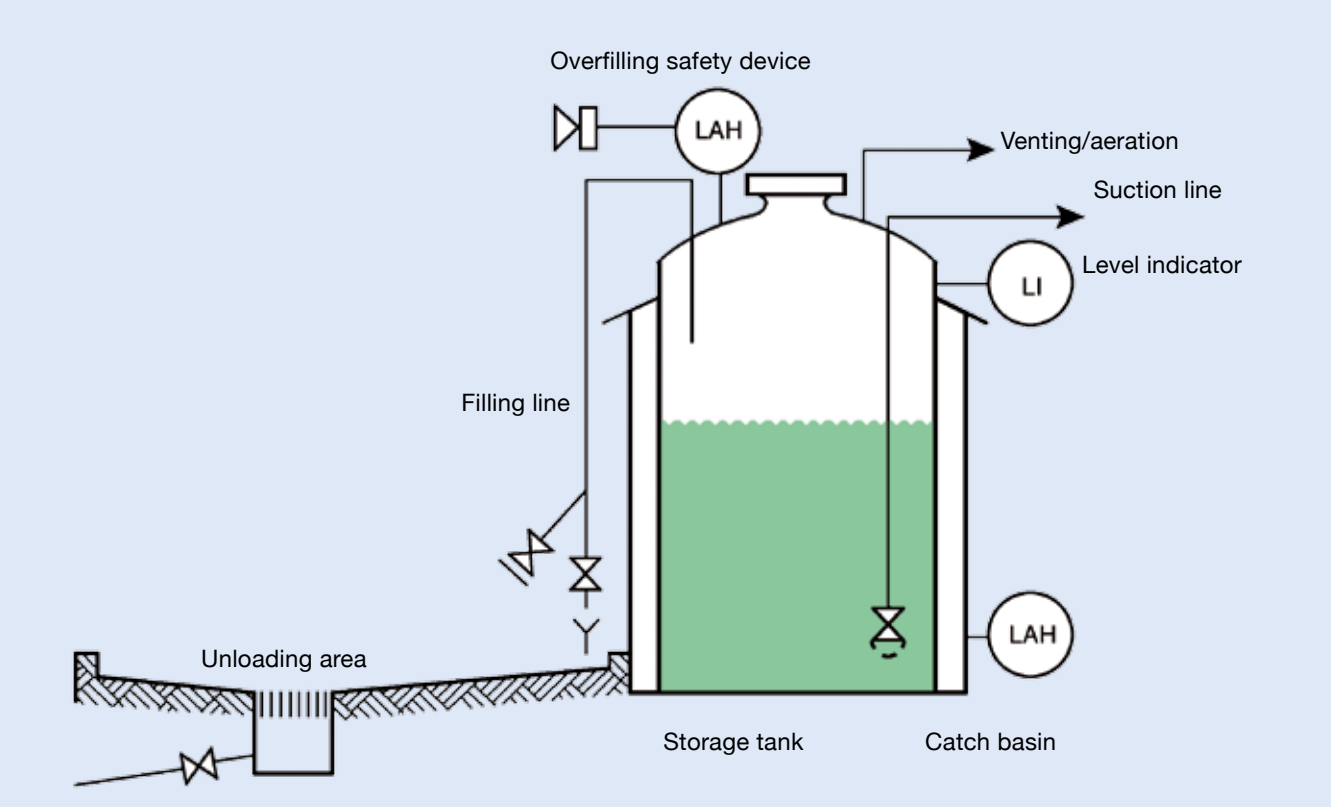

Fig. 1: Storage installation for solutions

3. Metering

Metering diaphragm pumps are best used for withdrawing the solution from the storage tank, metering it and transporting it to the dosing point.

The metering installation (Fig. 2) consists of the following individual components, the material used generally being PVC:

- Suction line from the storage tank.
- Suction-side fittings, comprising: valves, priming aid and dirt trap.
- Diaphragm or piston diaphragm metering pump with plastic head and PTFE-coated diaphragm.
- Pressure-side fittings, comprising: shut-off valve, pressure-maintaining valve, overflow valve, pulsation damper, possibly flowmeter, measurement point and pressure gauge.
- Catch basin with leak sensor below the metering installation.
- Metering line made of fibre-reinforced pressure hosing, installed in protective piping with inspection chambers.
- Possibly a receiver pump with piping and fittings.

The dosing point should be located in such a way that it is accessible and easily visible. Good mixing conditions (turbulence) should also be ensured.

The suction capacity of diaphragm pumps is limited, and their metering capacity varies, depending on the suction level. Furthermore, in the case of low flow velocities and tall storage tanks, the column of liquid may be interrupted by the accumulation of air. A constant metering flow can be achieved by additionally installing a receiver above the pump. This can also be done by feeding the metering pump from the pressure line of a feed pump (Fig. 2, left-hand pump).

For reasons of operational reliability, the metering pump and pressure-side fittings should be of redundant design. The metering method using recirculation and metering valves is suitable for large quantities and for feeding several dosing points at once. The respective quantities to be metered are taken by opening and closing metering valves controlled via an inductive flowmeter.

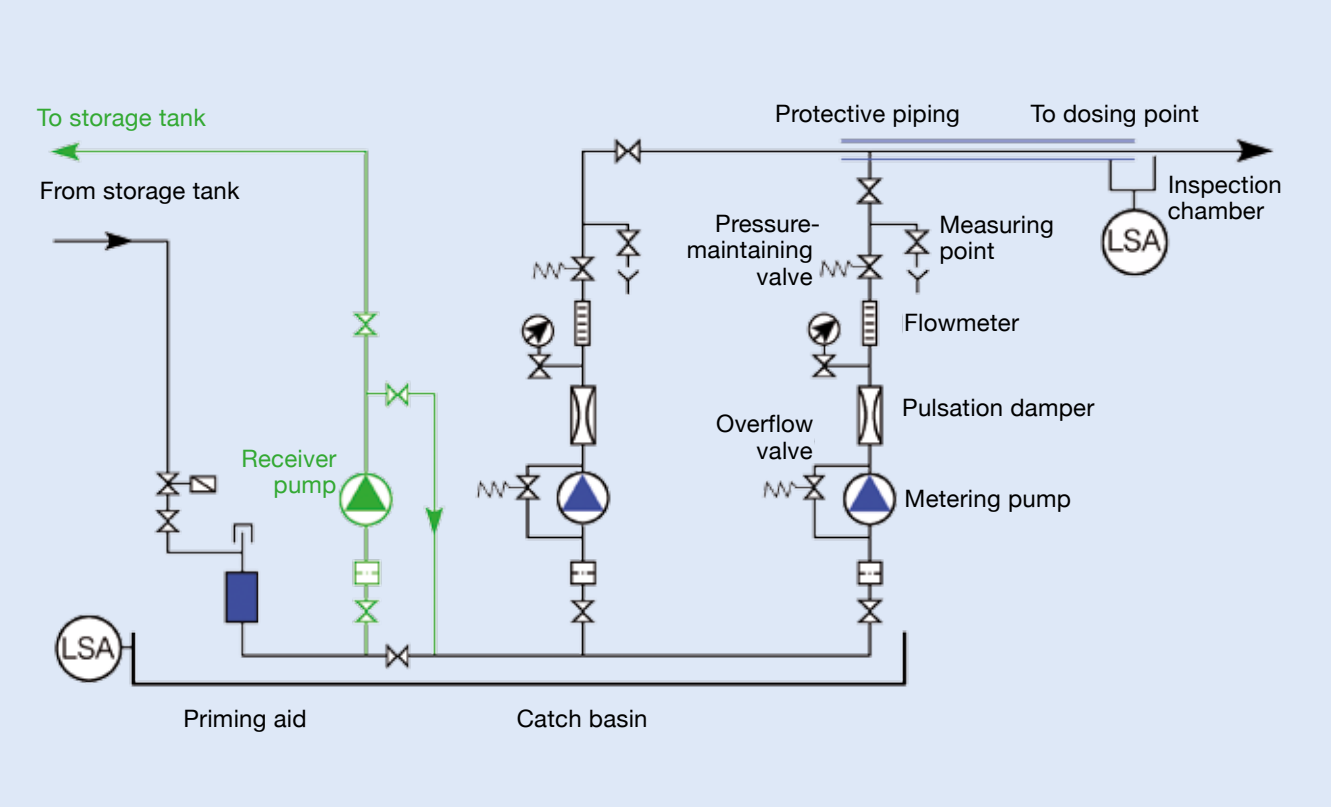

Fig. 2: Metering installation for solutions

4. Control

The metering capacity of diaphragm pumps can be controlled manually via the stroke length. If a frequency converter is connected upstream of the three-phase pump motor, all demands on open or closed-loop control of metering can be fulfilled by varying the speed and/or stroke frequency. The frequency converter can convert either signals from programmable logic controllers (PLCs) or continuous measured-value inputs from on-line measuring instruments.

5. Safety

Before using any of our products, please consult our Safety Data Sheets.

Fig. 3 : Tank and metering station

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