

WATER SUPPLIES DEPARTMENT
STANDARD SPECIFICATION EM-01-05
CHEMICAL METERING PUMPS

1. **METERING PUMP**

Metering pump for use in water treatment plant shall be variable stroke, positive displacement, reciprocating and hydraulic actuated double diaphragm pump with components such as gears, shafts and reciprocating members contained in a rigid pump body to ensure correct alignment and rigidity. The pump shall be designed for leak-proof operation and trouble free performance. The length of stroke shall be manually adjustable from 0% to 100% by means of a rotary hand wheel with a graduated scale or a micrometer dial while the pump is running or idle. A locking device shall be incorporated to prevent accidental adjustment of pump stroke.

The metered solution shall be pumped through the interior of a flexible process diaphragm which shall be vertically set in the pump head and totally surrounded in non-contaminating intermediate fluid. The intermediate fluid shall be isolated from the hydraulic fluid in the piston cylinder by a disc diaphragm. The process diaphragm shall be compressed and relaxed during the forthstroke and backstroke of the piston respectively. External accessible valves for fluid refill, excessive pressure relief and air purge shall be provided with for the hydraulic system.

The metering pump head shall be made of cast iron or stainless steel grade 316 with diaphragms of polytetrafluoroethylene (PTFE) or similar materials which shall be resistant to the corrosive action of chemicals to be handled. The use of plastic material for pump head and casing shall not be acceptable unless approved otherwise. Rotating parts of the pump shall be dynamically balanced and shall be supported on suitable lubricated bearings to prevent undue vibration. Fixing bolts, nuts and washers shall be of stainless steel grade 316.

The metering pump shall be provided with check valve cartridges which shall be removable to allow inspection and cleaning of the valves and seats. Spring-loaded check valves shall be employed for high viscous solutions as recommended by the manufacturer. Check valve materials shall be resistant to the corrosive action of the chemicals to be handled.

The design of the metering pump shall be such that no thrust shall be transferred to the driving motor. Each pump shall be driven by an electric motor. Ganging of metering pumps to a common driving motor shall not be allowed unless otherwise specified.

The guaranteed metering accuracy over a 10:1 range inclusive of repeatability error shall not exceed 1% of the maximum pump capacity.

The metering pump shall be driven by an electric motor through integral worm reduction gear arrangement. The power driving and reciprocating mechanism shall be immersed in a sealed lubricating oil bath for wear-free operation. The metering pump

driving motor shall be controlled by variable speed drive.

The metering pump shall be equipped with a conductance type diaphragm leak detection system which shall activate a volt-free relay output contact rated at 3A 220V a.c. for remote diaphragm leak alarm indication and pump trip initiation. The leak detecting system shall operate on 220V 50 Hz a.c. and complete with an IP55 local controller enclosure for cable termination.

2. DRIVING MOTOR

The driving motor for the metering pump shall be squirrel-cage induction motor complying with IEC 60034 or other equivalent standards and suitable for 380V 3-phase 50 Hz operation. The metering pump motor shall be suitable for operation with the variable speed drive as specified in WSD Standard Specification E-86-02.

The pump motor shall have cast iron casing totally enclosed to IP55 and fan cooled to IEC 60034-6, IC411 with Class F insulation for Class B operation. The motor shall be suitably de-rated for variable speed operation and for continuous operation at any speed within the specified range. The motor shall be direct coupled to and mounted on a common rigid platform with the metering pump unit. Where necessary, recesses shall be provided in the base plates to accommodate cables.

3. VALVES AND ACCESSORIES

Unless otherwise specified, each metering pump shall be provided complete with the following valves and accessories for installing on the pipework :-

- (a) 1 no. of pressure relief valve
- (b) 1 no. of diaphragm pulsation dampener (single end type) for pump delivery side
- (c) 1 no. of back pressure loading valve

Valves and accessories shall be manufactured from materials compatible with the process solution and tested to 150% of the design pressure of metering pump.

4. PUMP TEST

Metering pumps shall be subject to pressure test to 150% of the design pressure. Works test on metering pumps shall be conducted to verify their performance and metering accuracy.