

WATER SUPPLIES DEPARTMENT
STANDARD SPECIFICATION E-78-02
pH MEASURING INSTRUMENTS

1. DESIGN

The pH measuring instruments shall be microprocessor based, with the measuring system operating on the principle of electrochemical cell using two withdrawable sealed type electrodes in which one shall be the pH measuring glass electrode and the other the standard reference electrode. The electrode system will generate an electro-motive force which will vary with the concentration of the hydrogen ion in the sampled solution. The pH measuring instruments shall be suitable for calibration using buffer solutions.

The electrode system of the pH measuring instruments shall incorporate a device for protecting the reference electrode from contamination. Integrated temperature detector shall be provided for automatic compensation of the solution temperature and continuous temperature monitoring.

The pH measuring instrument shall meet the following design requirements :-

- (a) pH Analyser
- | | |
|----------------------|---------------------------------------|
| Accuracy | : 0.75% of measuring range |
| Sensitivity | : 0.01 pH |
| System response time | : 10 seconds for a 90% pH step change |
| Measuring range | : 0 - 14 pH |
| | : 0 - 100 °C |
- (b) pH Sensor
- | | |
|------------------------------|------------------|
| Sample temperature | : 0 - 50 °C |
| Sample conductivity at 20 °C | : 25 - 300 uS/cm |
| Operating pressure | : up to 600 kPa |

2. CONSTRUCTION

- (a) pH Analyser

The enclosure of the pH analyser shall have a degree of protection of IP65 to BSEN60529 and shall be fabricated from glass reinforced plastic or aluminium with epoxy finish. The analyser shall be suitable for wall mounting and operation at 220V 50Hz a.c. supply. Stainless steel mounting brackets shall be provided for the installation of the equipment.

The pH analyzer shall have analogue outputs for the measured pH and the temperature of the sampled solution. The analogue output signals shall be 4-20 mA d.c. capable of driving a 500 ohm load for remote indication and recording.

A 4-digit backlit LCD indicator shall be provided with the pH analyser for instant display of the measured pH and temperature values. Two signal limit alarms adjustable from 0-100% of the whole measurement range and one equipment failure alarm shall be provided. Alarm of the pH analyser shall include local alarm indication and volt-free relay output contact rated at 2A 220V a.c. for remote alarm annunciation.

Dedicated control keys shall be provided at the pH analyser to allow configuration, calibration, interrogation and access to all built-in functions of the pH measuring system.

(b) pH Sensor

The pH sensor shall operate on low d.c. voltage provided by the pH analyser and include an integral preamplifier for amplifying the measured signals.

The pH sensor shall be supplied with an enclosure fabricated from chemical resistant materials suitable for operation with the sampled solution. Electronic components and wiring terminals shall be installed in an isolated compartment sealed off from the wetted parts of the measuring instrument. The electrode head and electrodes shall be removable from the sensor body for maintenance and inspection. 15 m control cables shall be provided for connecting the pH sensor to the pH analyser.

Flow-through type pH sensors shall have IP65 enclosure to BS EN 60529 suitable for wall mounting by stainless steel brackets. Dip type pH sensors shall have IP68 enclosure. Removable guard for protection of pH measuring electrodes and all stainless steel mounting accessories shall be provided for the installation of the equipment.

An automatic acid cleaning system in the form of spray head cleaning with dilute acid shall be incorporated with the pH sensor to prevent coating or build-up of deposits. Other automatic cleaning system may be considered provided that the pH analyzer is provided for treated water application. The cleaning system shall be suitable for prolonged operation without maintenance and shall not affect the accuracy of the pH measuring instruments. The initiation shall be based on timer or self-diagnostic feedback signal. All accessories required for the automatic cleaning system, such as self-cleaning sets, hose pumps, injector and spray head etc., shall be provided.

- End of this Specification -