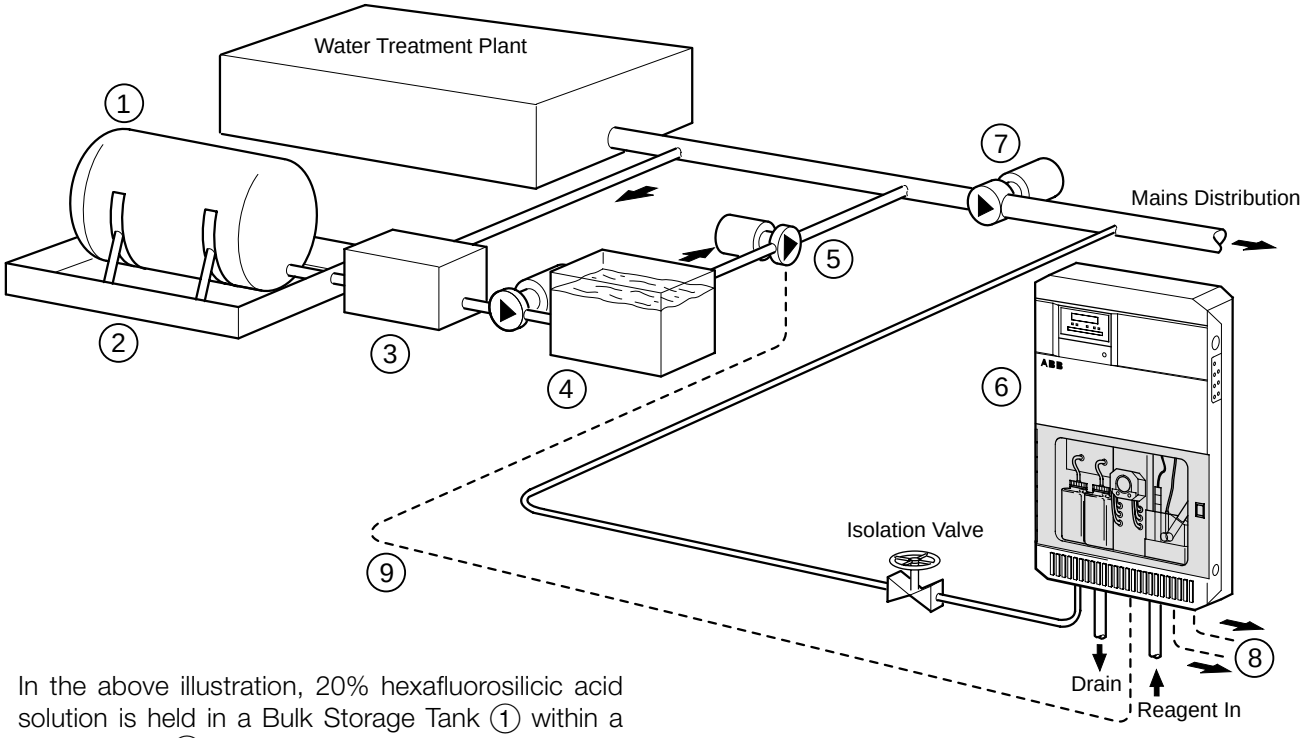
Fluoride Monitoring in Potable Water Treatment



In the above illustration, 20% hexafluorosilicic acid solution is held in a Bulk Storage Tank ① within a bunded area ②. To prepare it for use, the solution is pumped through an Automatic Dilution Plant ③ (reducing the concentration to 2% for ease of dosing control) to a Day Tank ④.

The Day Tank ④ holds approximately one day's supply of acid. To prevent the possibility ofoverdosing (due to plant failure) it is only replenished once in any 24 hour period.

A fluoride injection pump ⑤ connected to the outlet line from the Day Tank pumps the dilute solution into the potable water supply. Sample supply to the 8231 fluoride monitor ⑥ is taken after the main supply pumps ⑦ to ensure adequate mixing and therefore that a representative sample is taken.

The fluoride injection pump ⑤ is typically variable speed/ variable stroke. Pump speed is determined by the plant flow throughput and the pump stroke is controlled by the output ⑨ from the 8231 fluoride monitor ⑥.

Examples of typical alarm levels and settings for the above installation are:

- low concentration alarm ⑧ – set to activate at 0.8 mg/l^{-1} fluoride,
- high concentration alarm ⑧ – set to activate at 1.2mg/l^{-1} (also set to shut down the fluoridation plant),
- an alarm delay set to hold alarms for 5 minutes before activation.
- calibration points: 0.5mg/l^{-1} F and 1.5mg/l^{-1} F (as required by the Drinking Water Inspectorate – DWI – in the UK).

Why use a Fluoride Monitor?

- An on-line fluoride monitor:
  - continuously monitors the fluoride content of water leaving the plant – *thus ensuring compliance with legislative requirements,*
  - initiates fail-safe plant shutdown if a monitor/controller fails,
  - ensures the final treated water complies with regulatory requirements (DWI within the UK).

Why use ABB?

- Our monitor offers unrivalled accuracy across the measurement range – accuracies better than ±5% of reading or ±0.1mg/l^{-1} can be achieved.
- Low on-going costs – reagent, operating and maintenance.
- Minimal maintenance – routine operator involvement is only:
  - a four-weekly replenishment of reagent,
  - a twelve-monthly service, guaranteed through the use of specially developed long-life pump tubing.
- The single consumable spares kit included with the monitor:
  - includes 2-years supply of all necessary spares and peripheral items (from date of commissioning),
  - has no hidden extras.
- Our products feature proven reliability – we have over 100 years of process instrumentation experience.
- Full installation, commissioning and routine servicing is available.

What ABB Products are Suitable?

- **Model 8231 Fluoride Monitor**
  - Electronics protection to IP65.
  - Uses a fluoride ion-selective and reference electrode pair manufactured by ABB – mounted in a temperature controlled flowcell.
  - Two high/low concentration alarms can be generated and sent back to main control unit.
  - Diagnostics displayed locally and available as master alarm for transmission back to a main control unit.
  - Current output (one as standard, second optional) can be expanded to show an expanded window of the overall range of the monitor and can be output to a local recorder or DCS system.
  - Programmable delay and hysteresis functions avoid false alarms causing subsequent control problems.
  - Optional serial communications link for computer interface is available.
  - Calibration points (automatic two-point calibration) can be set closely to the legal dosed limit of 1.0mg/l F, eg. 0.5mg/l at 1.5mg/l F^{+1} thereby ensuring maximum accuracy at the control point of 1.0mg/l F^{-1}.

Associated ABB Products for use in Potable Water Treatment Plant

Analytical Applications

- Ammonia monitors on the inlet and final treated outlet water.
- Nitrate monitors at the de-nitrification stage to control nitrate removal and at the final treated outfall to ensure that discharge consent limits are met.
- Phosphate monitors on the inlet and final treated water (if phosphoric acid addition being made).
- pH transmitters on the inlet, coagulation, lime addition and final treated water.
- Dissolved oxygen monitors (with type 9408 measuring system) for reservoir storage.
- Turbidity monitors on the inlet, clarifiers, filters and final treated water.
- Process recorder for validation of measurements.

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