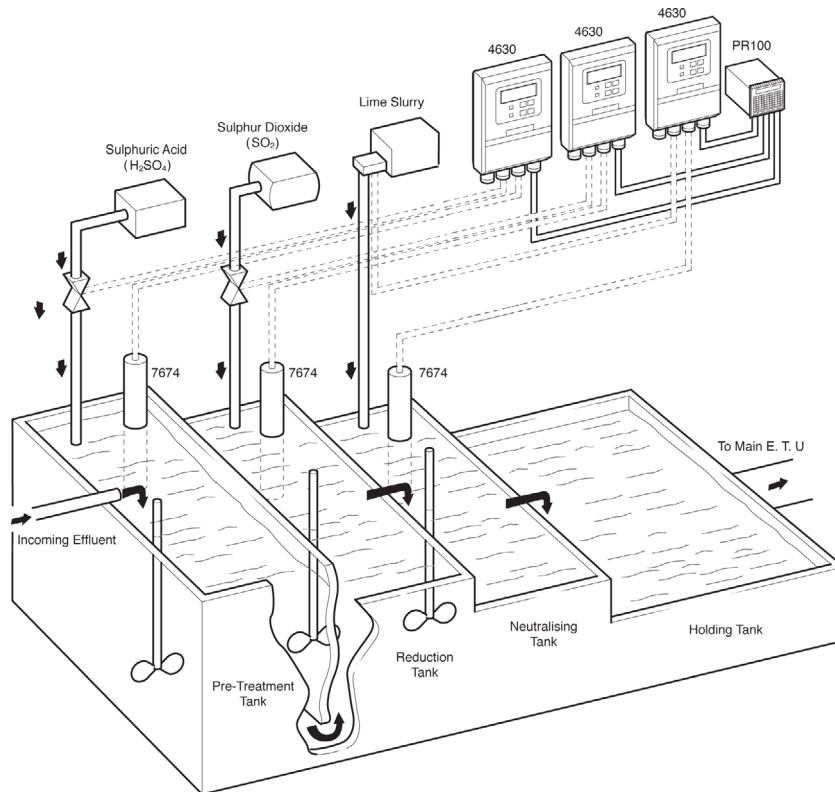


pH / ORP measurement Chromate treatment in electroplating industry

Electroplating industry



Note. Values given below are typical but each plant has its own characteristics that must be determined by laboratory tests for optimum results.

Measurement and control of chromate treatment plant in the electro-plating industry using pH and redox

In the illustration above, the incoming chrome waste is first treated with sulfuric acid to adjust the pH level to 2.5 (approximately) which is the optimum pH for the reduction of the dichromate ion to chromic ion by sulphur dioxide.

The chrome waste at 2.5 pH is then passed to a secured tank where the sulphur dioxide is added. The reduction is sensed by a plating platinum electrode (redox / ORP) with the control point set at 200 mV (typically) to allow for a small residual level of sulphur dioxide. The tank should have a holding capacity of a minimum of 6 minutes to ensure the reaction is completed.

In the final tank, the pH is raised to between 8.0 and 8.5 to allow the chromium to be precipitated as a hydrated oxide in a holding tank.

The holding time is approximately 1.5 to 2 hours depending upon the chrome content. The sludge can then be pumped away with the effluent being discharged to waste.

Why use pH/redox for the treatment of chromate?

The customer needs:

- To ensure that the dichromate ions in the solution have been reduced to chromic ions.
- To ensure that the effluent discharge meets the discharge consent limits.
- To use the minimum quantity of chemicals to keep costs to a minimum.

Why use ABB instrumentation?

- Rugged, virtually maintenance-free sensor system – minimizes risk of damage and keeps maintenance to an absolute minimum.
- Advanced sensor technology – provides industrialized sensor system to minimize the risk of physical damage.
- Easy to fit sensors and simplified maintenance – eliminates the need for skilled technicians.

- Low operating costs – long life sensor designed to minimize risk of damage.
- Replaceable liquid junction – extends the life of the sensor and provides the opportunity to replenish KCl electrolyte to further increase sensor life.
- Easy-to-use 4600 Series instruments designed to be used by operators with virtually no experience of measurement.
- Back-lit LCD provides easy-to-read display in all environments.
- Simple automated calibration procedure – avoids the risk of operator error.
- Automatic buffer recognition – eliminates operator error.
- IP66/NEMA 4X case – protects instrument in corrosive atmosphere.
- Multilingual software – switchable for use throughout the world.
- Programmable current output for customer flexibility, choice of:
 - 0 to 10mA
 - 0 to 20mA
 - 4 to 20mA
- Security level protection – prevents unauthorized tampering.
- pH/Redox (ORP) programmable – same instrument is used for pH and redox.
- Two alarm relays/setpoints – provide all the control features necessary for the addition of chemical reagents.
- Automatic temperature compensation – eliminates errors caused by temperature fluctuations.
- Wide range of recorder options provides single source supply – one stop shopping.

What ABB products are suitable?

- Model 4630/500 wall-mounted pH/Redox transmitter/controller,
or
- Model 4635/500 panel-mounted pH/Redox transmitter/controller.
- Model 7674/000 multi-dip pH system.
- Model 7674/000 multi-dip redox system.

Associated ABB instrumentation product applications

- Temperature measurement of process liquids.
- Liquid level control of the treatment/reagent tanks.

Installation

- It is essential to site the sensor system where the true effect of the chemical dosing can be measured (for example, avoid positioning the sensor too close to the dosing reagent to ensure true mixing of the reagent).

- Ensure that the sensor is never left in air and is always immersed in solution.
- Emphasise the importance of agitation of the sample to encourage mixing of the sample and reagent.
- Ensure all extension leads are watertight and use IP65 minimum junction box with silica gel driers.
- Ensure there is sufficient excess connection cable to remove systems from the tank for easy buffering routines.

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