

**T Level Technical Qualification in
Maintenance, Installation and
Repair for Engineering and
Manufacturing**

**Employer-Set Project
(8730-033)**

**Project Brief
Summer 2023**

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Version	Date	Change detail	Section/Page
v1-0	03/03/23	New document	N/A
v1-1	22/03/23	Amendment to unit of measure should be milligrams per litre.	Page 3, under heading 'The project', paragraph 2.

The employer

WaterFix Solutions are a contracting company who supply specialist servicing and repairs of equipment and engineering processes used in the water supply and treatment industry. You are a newly qualified service engineer working for WaterFix Solutions.

The service provided ensures that water processing can continue when issues arise, without affecting the supply of water or compromising on the quality of drinking water provided to the general public.

The project

The client, A2B Water, is a water company, who own a chlorine dosing system, which provides clean drinking water.

The function of the chlorine dosing system is of high importance. If the dosing of chlorine is too high in the water, it may lead to illness and fatalities amongst water drinkers. As stated in the relevant regulations and guidance, the concentration levels of the drinking water must be less than 4 parts per million (or 4 milligrams per litre) to be considered safe for human consumption.

A2B Water supply the chlorine dosing system which is located at a remote small farm and provides drinking water to several outbuildings. The system is located within a pumpstation building on the farm.

A2B Water have contacted your employer, raising an issue that the flow meters used in the chlorine dosing process are causing an error code to display on the control panel. A2B Water has relayed that the issue may be due to pulsating fluid flow, as a consequence of the pump within the dosing system not functioning correctly. The system was installed and commissioned by a third party some years ago which is out of warranty.

A2B Water has requested you explore the different strategies that could be used to investigate the fault and provide a list of potential causes.

Once potential causes have been identified, they would like to understand what solutions could be put in place to rectify the fault. As part of this activity, they have also asked for this to include research into potential modifications to the system. The modifications should aim to improve the overall system process, minimising the risk of fault recurrence and future failure.

A2B Water have also requested a preventative and routine maintenance schedule as part of the work.

Figure 1 outlines the chlorine dosing system showing the relationship between the parts of the system, including the physical distance between the chlorine tank and the water tank. Each part within the system is numbered and labelled in Table 1.

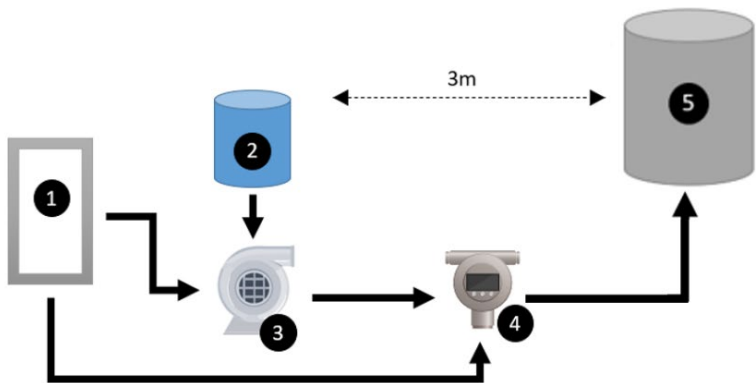


Figure 1 – Layout of the System

Part Number	Part Name
1	Control panel
2	Chlorine tank
3	Pump
4	Flowmeter
5	Water tank

Table 1 - Parts

The system processes water as below:

- The chlorine is fed from the chlorine tank (2) via the pump (3), through the flow meter (4) and pushed into the water tank (5).
- The flow meter (4) is connected to the inlet pipe of the water tank (5), located after the pump (3).
- The flow meter (4) consists of flow sensors, which allow the flowrate to be monitored at the control panel (1).
- The chlorine tank (2) is situated 3 metres apart from the water tank (5) with the bases positioned at the same height.

A2B Water has provided the specifications for the existing system including the pump, control panel, flowmeter and both tanks.

Specification

Introduction

A2B Water require services relating to the maintenance and repair of a chlorine dosing system they provide to a small farm. The requirement is to identify the potential causes of the reported issue. This will be reported and explained to A2B Water, along with a review of the appropriateness of existing parts. This will be followed by valid solutions and suggestions for the system modifications.

The following information should be noted:

- Components already installed.
- Issues identified with the chlorine dosing pump.
- The flow meter is displaying an error.
- The reading error is intermittent.
- The flow of the chlorine is not consistent.

Technical specification of the system

System parts	Specification requirement
Pump	Solenoid driven/controlled Stainless steel Flowrate up to – 50 L/min IP55 Single Phase – 230/110 V
Control panel	IP 55 protected Fuse protected Controller, switchgear, solenoids already installed LED indicators and Visual Display Unit ON/OFF function
Water tank	Dosing tank Capacity: 100 L Diameter: 500 mm Height: 680 mm
Chlorine tank	Chlorine storage Capacity: 30 L Length: 700 mm Width: 165 mm Height: 310 mm
Flow meter	Siemens 5100 W IP67 protected Stainless steel Corrosion resistant Pre-installed onto the existing pipework (pipework diameter 3 inch) Pressure 16 Bar Maximum flowrate 10 m/s Temperature -40 °C to +70 °C Electromagnetic conduction Magnetic coil sensors

	Induction voltage of the sensor is equal to the flowrate.
Other specifications	Velocity of chlorine: 11.02 m/s
Access for the storage facility of the system	The following factors must be considered when planning for the work: • The chlorine dosing system is located within a pumpstation, in a remote location. • The pumpstation can be accessed both day and night as long as prior agreement and arrangements have been made. • To gain entry to the area, environmental regulations and procedures must be adhered to. • Safe gas zone entry procedures and pre-entry checks must be followed. • Breathing apparatus needs to be obtained, worn, condition checked and inspection in date. • Calibrated gas monitor to be obtained, checked and worn. • Consideration of the arrangements and information for the chlorine substance must be acknowledged.

Budget

A2B Water has budgeted for the services to be provided, including hours spent and any new components required, to be £4k.

Timescale

You have five days to complete the project, two days planning and three days to implement the rectifications and modifications to the system. The duration of the investigation, diagnosis and modifications of the system will depend on available resources and responses to the project. Exceeding three days for implementing any modifications will have a severe impact on the efficiency of the system.

Get in touch

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