BINDERENGINEERING
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VACOMASS®

Proposal #210524-R1

for

City of Key West Wastewater Treatment Plant

Key West, Florida

Aeration Control Valves

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Binder Engineering GmbH

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1. Background

The plant has 4 aeration control zones, with maximum and average flow rates per the following:

Airflows in scfm	Zone 1	Zone 2	Zone 3	Zone 4	Total
Maximum	1,241	1,260	1,532	952	4,984
Average	1,034	1,047	1,273	790	4,143

For the purpose of valve sizing, based on the assumption that plant loading in Key West is very seasonal, and using the conventional wisdom that minimum flows are mostly lower than calculated, we will conservatively assume a minimum flow of one quarter of average flow. Based on our limited knowledge of the plant piping, we recommend that the arrangement of valves and flow meters be reviewed and discussed.

2. Technical Proposal

2.1 Elliptic Diaphragm Control Valve Description (EDCV)

The **VACOMASS® Elliptic diaphragm control valve (EDCV)** is a technically optimized sliding gate control valve with gas-tight shut-off and an elliptical control aperture. It is used for precise and low-loss control of air flow and distribution in the aeration tanks of a wastewater treatment plant. The valve has a falling flow axis to achieve sensitive control of normal and tangential flows (e.g. after elbows).

The main features of the valve are:

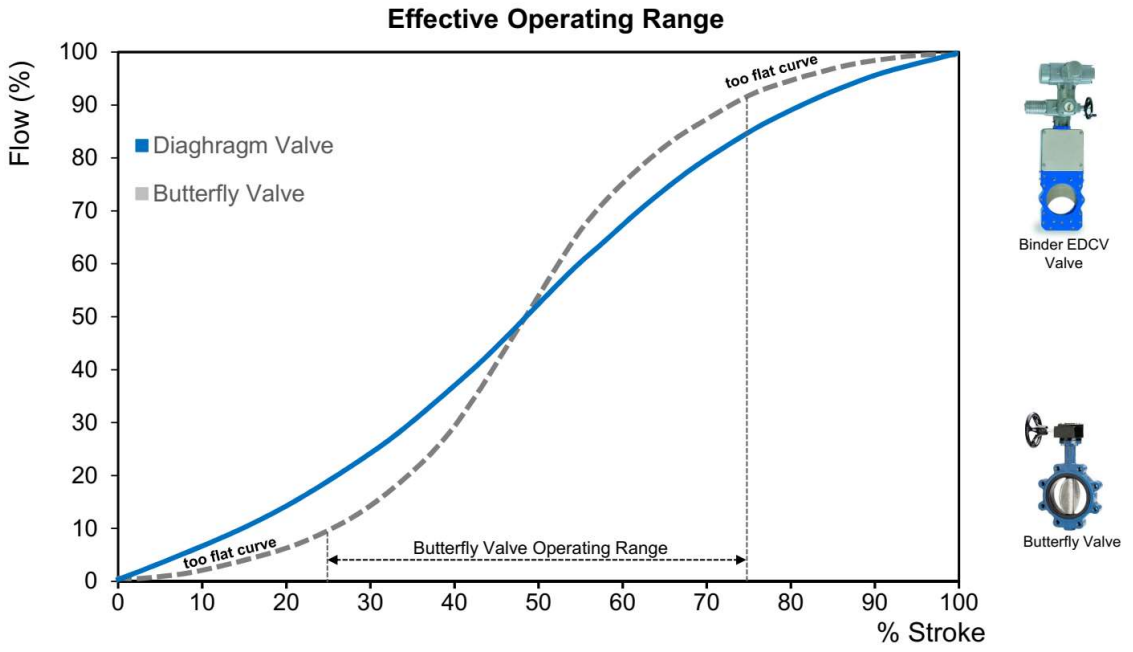
- Gas-tight shut-off allows the use in swing zones or intermittently aerated tanks without need for additional isolation valves.
- At 100% stroke, the valve opens the entire pipe diameter with no air restriction whatsoever for minimum pressure loss.
- Design with an elliptic shaped control orifice with a falling flow axis: the flow remains partially attached to the wall, which leads to pressure recovery and reduced total pressure drop of the valve during operation.
- The valve is designed with an integrated pressure wave breaker to reduce noise emissions when valve is fully open.
- Valve positioning repeatability is less than 0.45% of the full open range (100% open)
- 20 actuator-turns for 100% stroke provides accurate valve positioning for precise airflow control.
- The geometry of the control aperture provides a significantly larger range of control than butterfly valves or comparable triangular, square, pentagonal or hexagonal diaphragm valves.
- Valve sizing is based on given airflow rates and is designed for optimal control performance at average airflows.
- Design and construction of the valve with corrosion-proof sliding gate in 316 stainless steel; Teflon/ Carbon/ Viton seals for ambient and media temperatures up to + 300°F; stainless steel fasteners, and self-lubricating and hermetically-sealed stainless-steel spindle to protect against dry running, humidity and dust particles – reduces costs for operation and maintenance. The housing material is galvanized carbon steel St. 37, three-layer coated (passivation, powder-coated epoxy, and powder-coated UV resistant layer of Polyurethane RAL 5020). Structural length is according to DIN 3202/K1, flange borings with threads are made according to DIN 2501/ PN10.
- For limited straight pipe runs (less than 15XD upstream of the valve) a compact configuration with specific calibration and stroke compensation is available.

2.2 VACOMASS® Control Valve Performance

Binder's Diaphragm Control Valves require at least 0.12 psi differential pressure to reliably control airflow (compared to a minimum of 0.5 psi for a butterfly valve). For the evaluation, a pressure loss of 0.135 psi was selected to account for possible system imbalances. The valve types, sizes, and performances are shown in the table below at air temperature of 200 ^{o}F and header pressure of 10 psig.

Zone	Valve Type	Valve Size	Max. airflow			Avg. airflow			Min. airflow		
			scfm	dp	% open	scfm	dp	% open	scfm	dp	% open
1	EDCV	5"	1,241	0.135	75.6%	1,034	0.135	71.8%	259	0.135	41.2%
2	EDCV	5"	1,260	0.135	76.0%	1,047	0.135	72.0%	262	0.135	41.5%
3	EDCV	5"	1,532	0.135	80.7%	1,273	0.135	76.2%	318	0.135	46.5%
4	EDCV	5"	952	0.135	70.2%	790	0.135	65.9%	198	0.135	34.6%

At maximum loading and a differential pressure of 0.135 psi the valve will be open between about 70% and 80%. At average flows it will open from about 66% to 76%, and at the assumed minimum flows it will open from about 35% to 47%. This shows that the valve has ample range for both higher and lower flowrates, should they occur in practice.



2.3 Elliptic Diaphragm Control Valve

Four (4) 5-inch VACOMASS® Elliptic Diaphragm Control Valve (EDCV) with:

- Lugged valve body with ANSI hole pattern
- Stainless Steel moving parts, galvanized valve body, Teflon/Carbon seals
- Permalube spindle lubrication
- Modulating duty 460V/3Ph ROTORK IQM Actuator per the following features:
  - Optimized for minimum step size
  - Control box double sealed against actuator body
  - 24VDC optically isolated control inputs for open/stop/close/alarm
  - 4 – 20 mA position control and position feedback
  - Internal space heater
  - 6 selectable relay outputs, eg. open, closed, local/remote

Total budget price for four (4) 5-inch EDCV: $62,300

(Price is Ex-works Ulm, Germany)

Above prices does not include shipping and handling or on-site support.

3. Shipping

Estimated sea freight (DDP) for above listed products: $1,500

Delivered-Duty-Paid (DDP) by sea to Key West WWTP, Key West, FL including packing, custom duties, import duties, in-land freight to the plant, not including sales taxes.

4. Warranty:

Binder warranties that the body of the VACOMASS® Control Valve is free from defects in workmanship and materials for a period of twelve (12) months from equipment start-up or eighteen (18) months from delivery, whichever occurs first. Damage from improper installation or external force is excluded. The actuator is subject to manufacturer's warranty unless otherwise contractually agreed upon.

5. Lead Time

Submittals: 2-3 weeks after the receipt of the down payment
Manufacturing time: 14-16 weeks after the approval of the submittals
Shipping and custom clearance: 4-5 weeks

6. **Payment Terms:**
   - 30% by bank transfer or bank check after submittal approval
   - 60% by bank transfer or bank check before shipping
   - 10% after start-up or 90 days after delivery to the site, whichever occurs first.

7. **Appendix** (Attached Files):
   Attached Files:
   VACOMASS® elliptic diaphragm control valve brochure

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