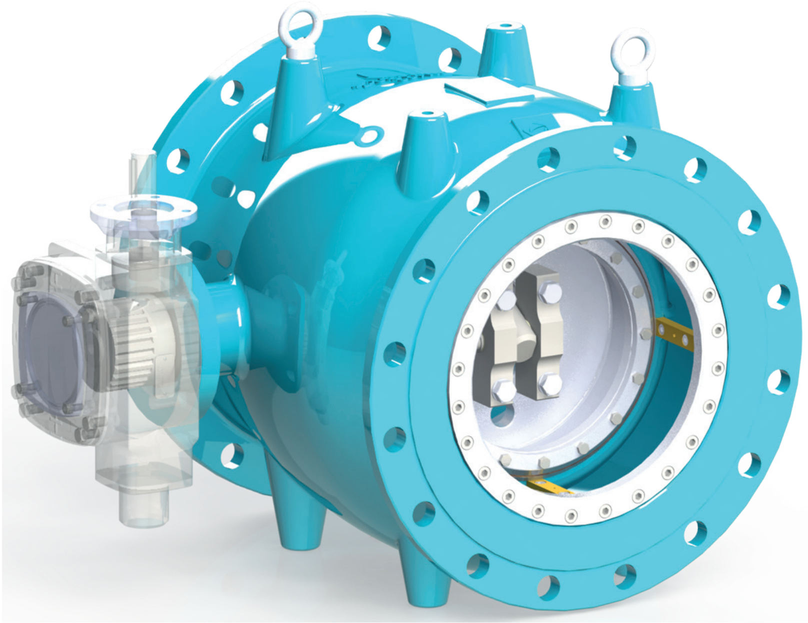
F500-AIR • PLUNGER FLOW CONTROL VALVE FOR AIR APPLICATIONS



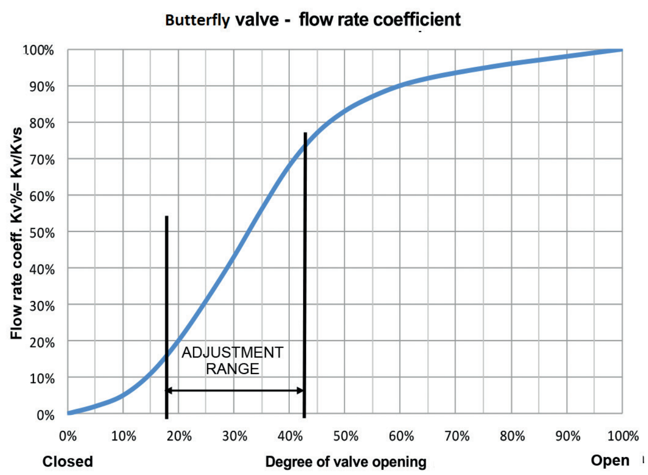
Plunger flow control valve for air application is usually installed downstream of blowers in water treatment plants to blow air into tanks (of oxidation, primary treatments, ...).
They can be used with gases such as: air, nitrogen, carbon dioxide. They cannot be used with flammable, hazardous, or corrosive gases.

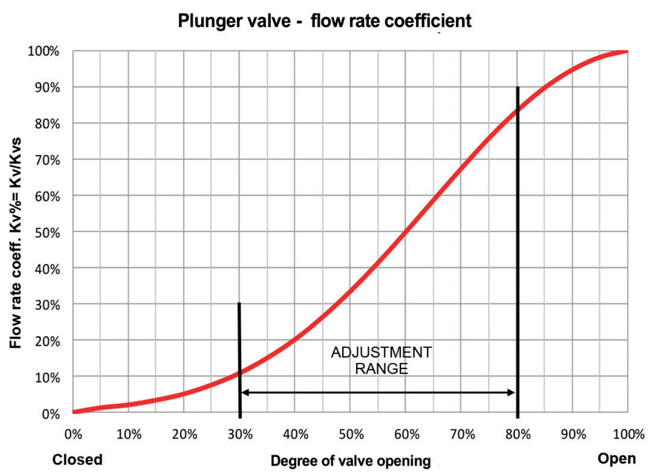
ADVANTAGES

- Fine-tuning to control air flow according to the concentration levels of dissolved oxygen in the tank
- Optimisation of blower functioning resulting in overall energy savings for the system
- Lower maintenance costs as the reduced power surges on the blowers allows – in combination with and adequate scheduled maintenance – to extends the life of the blowers.

In air applications, use of a dissipating cylinders (or slotted cylinders) optimises valve operation by modifying the adjustment curve according to actual needs. In this way, the obturator stroke can be adjusted according to the change in the flow rate.
There are dissipating cylinders available which feature gradually increasing pressure drop.

COMPARISON OF BUTTERFLY VALVE OPERATION VS. PLUNGER VALVE OPERATION F500 E F560 TIS AIR



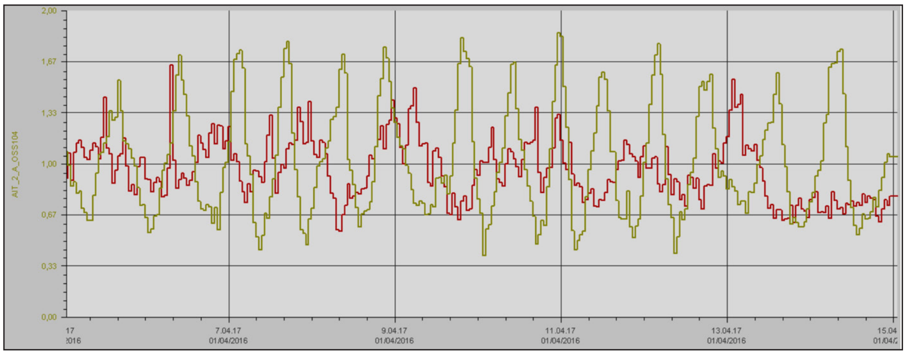


Example of flow rate adjustment on tank aeration system with **butterfly valve:** shut-off valves, with narrow adjustment range:

NOT optimal adjustment

Example of flow rate adjustment on tank aeration system with **plunger valve**: valves designed for adjustment, with the possibility of varying the degree of opening over a very wide range. It also allows very slight opening for low flow rates:

Optimal adjustment



Graph comparing changes in the concentration of dissolved oxygen in the tank (in mg/l) following adjustment with a plunger valve (red line) and a butterfly valve (green line).

PRESSURE DROP

The flow rate - pressure drop relationship for plunger valves for air is expressed by the formula (1), which is valid in subsonic flow conditions:

$$Qn = 514\ K_V * [(\Delta P * P_{out} / (\rho n\ (T_{in}+273))]^{0.5} \quad [Nm^3/h] \qquad (1)$$

Where:

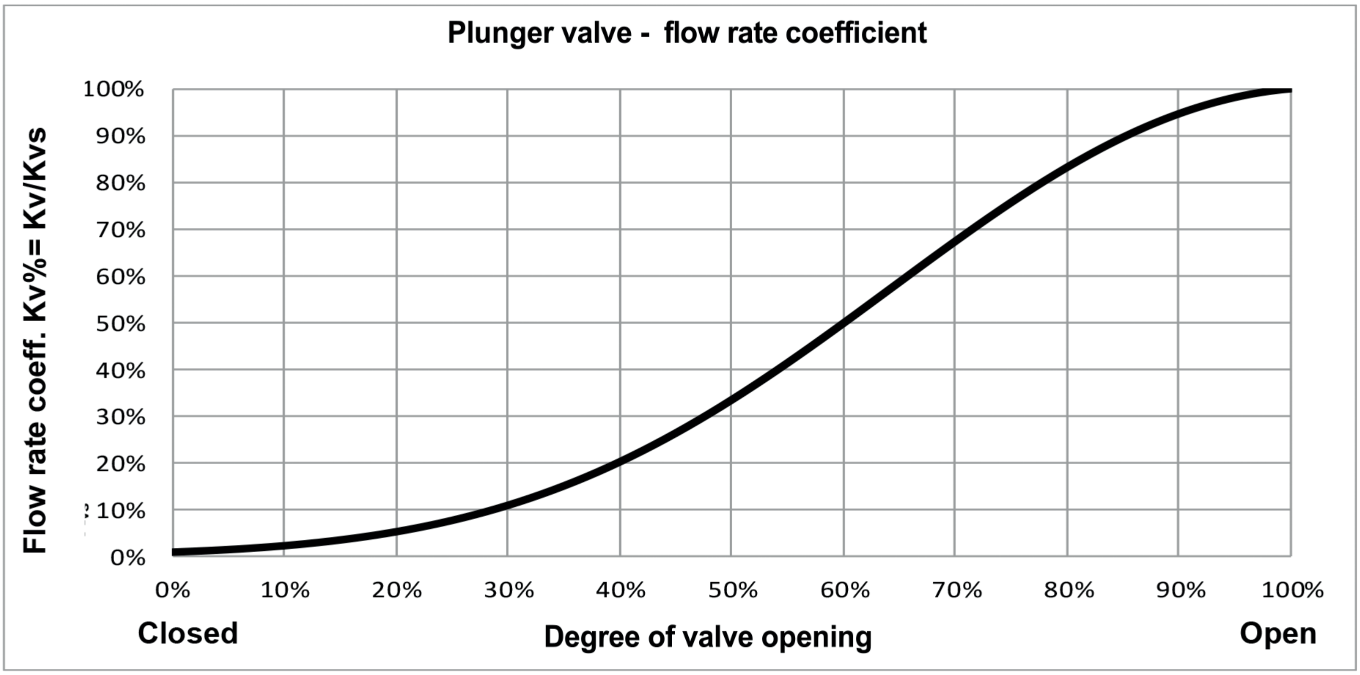
- Qn = flow rate [Nm^3/h] (normal-m^3/h in standard conditions (0°C, 1 absolute bar)
- ΔP = pressure drop [bar]
- P_{out} = downstream pressure [absolute bar] (atmospheric pressure = 1 absolute bar)
- ρn = fluid density [kg/m^3] in standard conditions (0°C, 1 bar absolute)
- K_V = flow coefficient [m^3/h]
- T_{in} = Inlet temperature [°C]

The flow coefficient with the valve completely open (Kvs) is shown in Table 1 for valves with standard obturator and K20 or K50 dissipating cylinder. Other kinds of dissipating cylinders are available on request.
For partially open obturator conditions, the flow coefficient can be obtained from formula (2)

$$K_V = K_{V\%} \times K_{VS} \qquad (2)$$

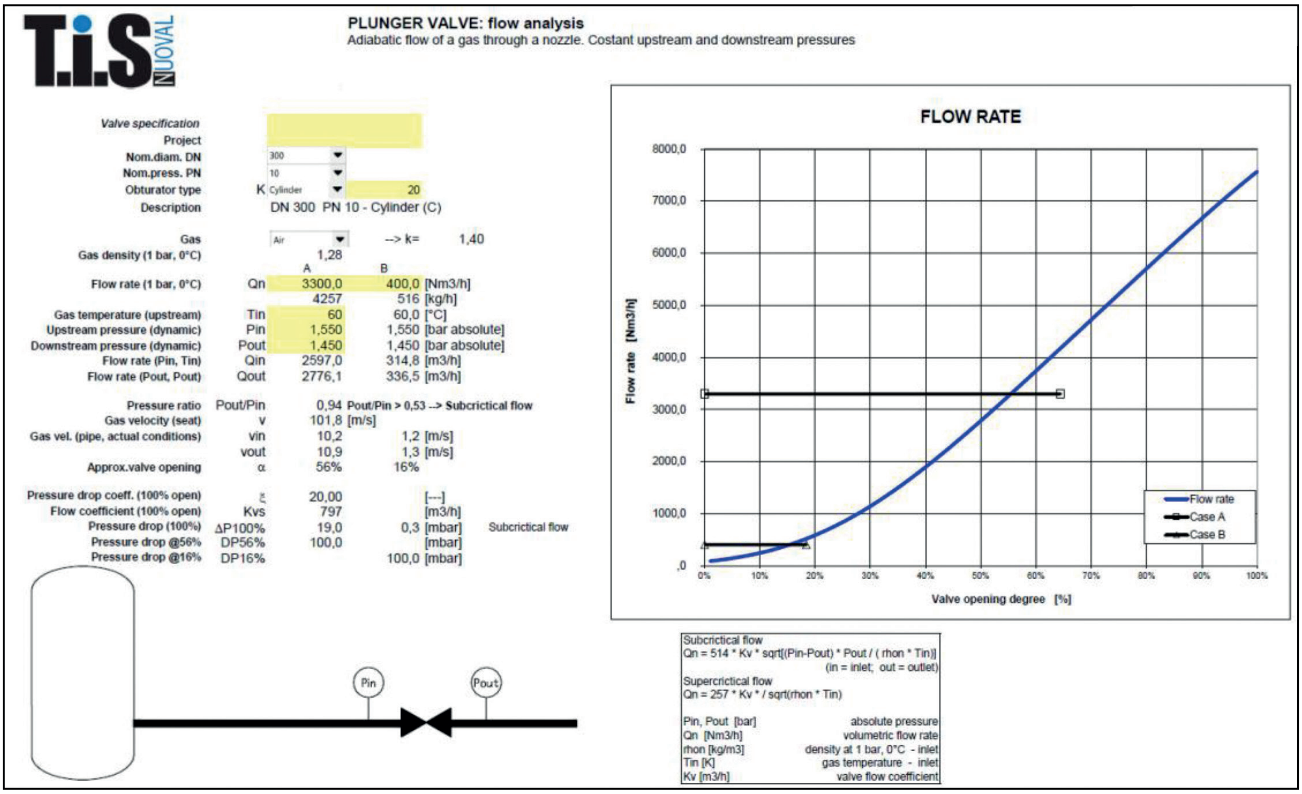
Where:

- $K_{V\%}$ is shown in Diagram 1 as a function of the valve opening degree



PLUNGER FLOW CONTROL VALVES FLOW COEFFICIENT (VALVE 100% OPEN)													
VALVE MODEL		F560				F500							
OBTURATOR TYPE	DN	80	100	125	150	200	250	300	350	400	450	500	600
Standard obturator	Kvs [m³/h]	145	203	310	430	678	1070	1550	2120	2785	3540	4395	6380
K20 dissipating cylinder	Kvs [m³/h]	57	89	138	199	354	553	797	1085	1417	1793	2214	3188
K50 dissipating cylinder	Kvs [m³/h]	36	56	88	126	224	350	504	686	896	1134	1400	2016

FLOW ANALYSIS SOFTWARE



ACCESSORIES

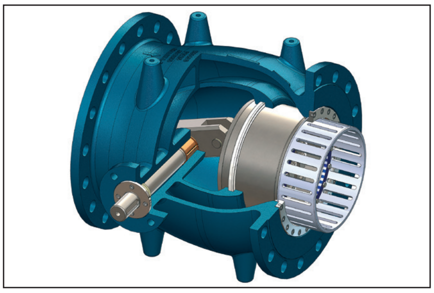
STANDARD VALVE

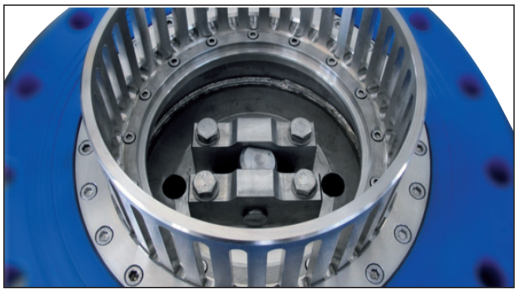
DISSIPATING CYLINDER

DISSIPATING CYLINDERS

Depending on the operating conditions, the valve may be equipped with a stainless steel cylinder bolted to the obturator: the outgoing flow is divided, via adequate sized slots, into several radial jets that collide with each other at the valve axle, downstream of the valve seat.
This accessory allows the energy dissipation to be modulated, modifying the valve adjustment curve according to actual needs.
Standard dissipating cylinders are available.

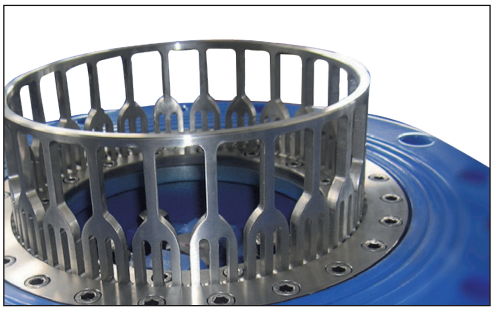
Special cylinders can be supplied based on the actual operating conditions. This way it is possible to obtain, for example, low pressure drops with the valve completely open





DIFFERENT TYPES OF DISSIPATING CYLINDERS

SPECIAL DISSIPATING CYLINDERS



TYPICAL INSTALLATIONS

MAIN DATA FOR THE SIZING OF THE PLUNGER VALVE F500 E F560 TIS-AIR

To ensure correct sizing for plunger valves for air application, which are generally used in treatment plants, the following information should be given:

DATE: ____________________

CUSTOMER: ____________________

PROJECT: ____________________

PLANT TYPE: ____________________

TANK n°: ____________________

- Fluid: air from volumetric compressor (usual for treatment plants; specify if different) (*)

-Type of diffusers (usually micro-perforated diaphragms) or other device: : ____________________

- Maximum flow rate of the air generation system :	____________	Nm^3/h
- Maximum flow required for each plunger valve :	____________	Nm^3/h (*)
- Typical average flow rate for each plunger valve :	____________	Nm^3/h
- Minimum flow rate for each valve :	____________	Nm^3/h (*)
- Operating pressure at the valve inlet :	____________	relative bars (*)
- Required valve outlet pressure: :	____________	relative bars (*)
- height of sewage above the diffusers :	____________	meters
- Maximum room temperature :	____________	°C
- Maximum temperature of the fluid (air) flowing through the valve :	____________	°C (*)

(*): mandatory information

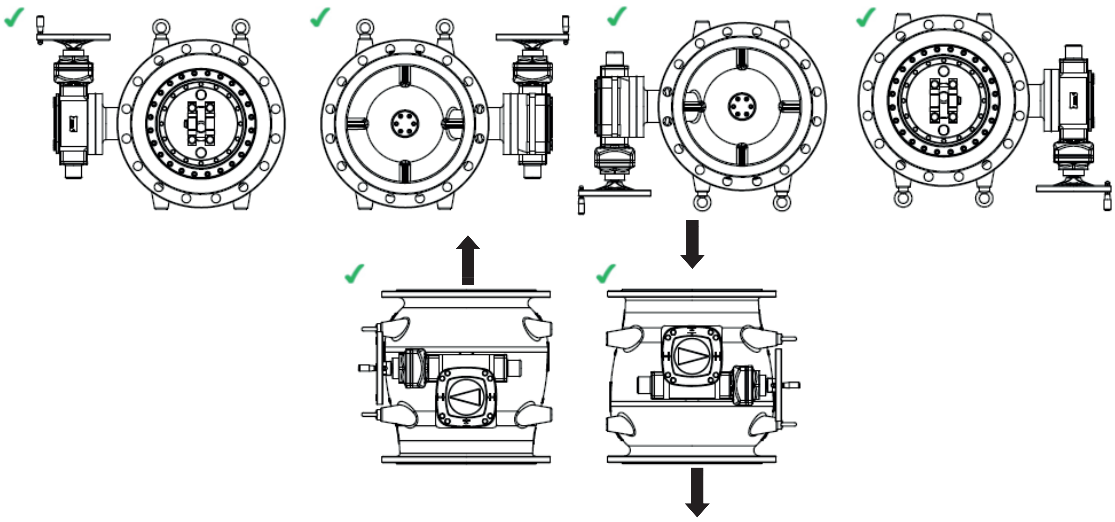
NOTE:

Nm^3/h refers to atmospheric pressure and 0°C

Atmospheric pressure = 0 relative bar

INSTALLATION POSITION

PERMITTED



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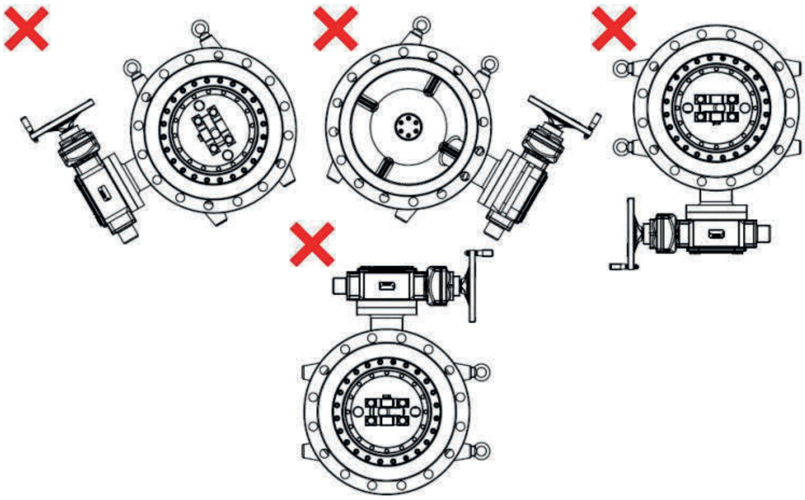

FOR SPECIAL APPLICATION PLEASE CONTACT US