

PREMIER PLASTICS INC.

FLOW OBSERVATIONS

1. In smaller fields, the higher resistance to flow causes the effluent to quickly fill the transport pipe from the bottom up thus driving air out through the vent inside the dosing tank. The transport pipe then runs fully flooded producing the benefit of the full head in the system.
2. In large fields, the lower resistance to flow causes the effluent to run out faster, and equilibrium between the flow in from the Flout and flow out to the field occurs before the air can be purged from the transport pipe.
3. Depending on the size of the field, air will either completely purge, slowly purge over the duration of the discharge or remain trapped in the transport pipe for the duration of the discharge.
4. At higher flow rates from the dosing tank a secondary effect occurs when the discharge is reaching the end of the cycle. The backed up head in the internal vent pipe reduces to the point where the high flow rate effluent sucks air into the flow thus reducing the effective head in the transport pipe. This is indicated by a slower decline in the flow rate profile.
5. At the same residual head, five orifice sizes from 1/8" to 1/4" diameter demonstrated no appreciable difference in squirt height.
6. The flow rate discharge profile graphs indicate the influence of air in the system.
 - Fully flooded flow during the whole cycle will show as a shallow decline in flow rate as the effluent level in the tank declines through the discharge cycle. The steep slope at the end of the cycle reflects drain out of the transport pipe.
 - A more horizontal line indicates that some air is escaping over the entire cycle thus increasing the residual head. The declining head in the tank is offset by increasing residual head.
 - An increasing flow rate over the entire cycle indicates that significant air is escaping throughout the cycle.
 - A flow rate that slopes up, then down indicates that the air has completely purged or reached a steady state part way through the cycle and then declines with the declining head in the tank.
 - Flow rates that show a slow decline towards the end of the cycle indicate that air is being drawn through the vent inside the tank thus reducing the residual head at the field.

Note: measurements of flow rate and residual head were taken at the entry point to the (simulated) field. Piping used for the transport pipe was 2", 3" and 4" dia. clear acrylic.