



Triangular Wave Technical Memo

TWT is the world's leading manufacturer and supplier of chemical-free fluid management products based on its patented TWT triangular waveform technology. TWT's chemical-free fluid treatment and management methods have been accepted for use around the world by governments, industry, and individuals, who all enjoy the increased safety, extended equipment life cycle, and decreased operating costs that the TWT systems deliver.

To: Distributors and Engineering Depts.

Date: August 2001

Fluid-Fed Equipment and TWT Deposit Control Installation Update Determining Points of Treatment and Optimum (commercial/Industrial) Installation Configurations

The ability of the Triangular Wave Technologies Deposit Control Systems to inhibit scale and biofilm deposits and to remove preexisting deposits is dependent upon the proper application and installation of the products purchased from TWT Inc. **Water chemistry must be taken into consideration.**

We have established that certain configurations are preferred for certain uses, and that if correctly installed in these configurations, the TWT Deposit Control Systems will deliver even greater performance than may have been previously experienced, providing the optimum end-to-end fluid management and treatment solutions available.

Every application has areas called **reaction zones**. These areas represent locations in a system where the fluid is exposed to different types of changes, that affect its behavior.

Mechanical: change in pressure, velocity, direction, flow patten (pumps, aerators, agitators, etc.)

Thermodynamic: changes in temperature (heat exchangers, evaporators, boilers, spray nozzles, etc.)

Physiochemical: change in concentration, state (membranes, cooling towers, filters, main/makeup water inlets, etc.)

It is in the **reaction zones** where the particles in the fluid, due to the changes to which they are exposed, are more likely to form scale or biofouling. There are many systems, which, due to their nature, will have multiple reaction zones. In general, it is the reaction zone(s) where the TWT Deposit Control Treatment should be focused. In these cases, the size and conditions of the system will play an important role in determining the need for one or multiple sized units. (according to pipe size and material)

Our suggested considerations for optimal installation of the TWT Deposit Control System:

The Deposit Control System will provide the means to keep deposits (calcium, lime, etc.) in solution for extended periods, if not disturbed. The ability of the fluid to retain the deposits in solution is decreased (but not eliminated) by fluid disturbances (e.g., pressure changes) high temperature conditions (flashing, boiling, etc.) and changes in concentration (fluid conditions).

In Automatic Fill Systems, a Fill Solenoid Valve/Float Valve will be used to control the fluid level in the fill system. Where a large pressure change takes place immediately downstream of the valve, TWT recommends that the Reaction Chamber and/or the on-site wrap be located downstream from the solenoid/float valve to avoid this pressure change point.

When water boils and is evaporated, the calcium and other dissolved solids remain and form deposits. These deposits will be softer and more easily removed when treated by the TWT system. In most cases the system self cleaning ability will wash away any potential build up, allowing for a significant reduction in maintenance procedures. If a heating system can be operated without boiling/flashing on the surface of the heating element, a significant reduction in deposits will be obtained.

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As the fluid temperature is lowered from boiling, the ability of the TWT-treated water to hold the deposits in solution increases. TWT recommends that a reaction chamber and/or onsite wrap be located upstream of (before) any heating system, and where possible downstream (after) the heating system, to further ensure the ability of the fluid to retain the deposits in solution.

When fluid is heavily saturated with deposits (change in concentration / fluid condition), the ability of the TWT Deposit Control System to treat fluids and hold deposits in solution is decreased but not eliminated. Under these conditions TWT recommends that you upsize (increase the oscillating electrical field) in the Deposit Control System to meet and ensure the highest level of performance for these conditions.

For these and other special requirements and installations, TWT will work directly with you to custom design fluid management solutions and system configurations for your industry-specific needs in an operational and costs effective manner. Examples of custom design for these products include designation of the appropriate deposit control system in the appropriate reaction zones to enhance and guarantee balanced treatment throughout the system, custom reaction chambers to meet size restraints and/or to allow for longer dwell time, as well as upgraded microprocessor design to meet the challenges of unusual circumstances.

In order to ensure the greatest level of performance and satisfaction in your work with the TWT Deposit Control Systems and our other fluid management products, we recommend that you use the systems analysis worksheets (provided on CD) and contact our engineering staff, who will be pleased to work closely with you to determine the optimal installation for your needs and provide the best range of fluid management solutions.

TWT products make sense from an operational, economic and safety points of view. Ownership of the TWT System will afford you and customers significant savings over a short period of time and even greater savings over the life cycle of the equipment.

NOTE:

Triangular Wave Technologies Patented Deposit Control Systems enhance the life cycle and operating efficiency of all filtration, disinfection, and purification systems.

Properly installed, a clean, corrosion-free delivery system is restored and maintained in an environmentally safe and chemical-free manner. The result is clean pipes and tubing with no biofilm, and reduced bacterial contamination.

Thank you

Triangular Wave Technologies, Inc.