What Method Do You Currently Use for Process Heating at Temperatures Between 104-212°F? What Improvements are Desired with this Method?

- **Warm Water Circulation**
  - Reduce the time it takes for the Process to reach control temperature; i.e., reduce long batch times.
  - Eliminate the adverse affects on the product caused by uneven heating.
  - Eliminate the loss of heat due to water overflow and radiation from the hot water tank.
  - Improve the work environment by eliminating the hot water tank and the steam vapor and radiated heat it entails.

- **Positive Pressure Steam**
  - Eliminate the adverse affects on the product caused by uneven heating.
  - Eliminate the adverse affects on the product caused by overheating.
  - Eliminate the corrosion and water hammer caused by the back-up of condensate.

- **Alternating Heating and Cooling**
  - Reduce the time it takes for the Process to reach control temperature; i.e., reduce long batch times.
  - Eliminate the adverse affects on the product caused by overshooting.
  - Eliminate the adverse affects on the product caused by undershooting.
  - Eliminate water hammer that occurs during the change between heating and cooling.
  - Control the abnormal temperature increases resulting from exothermic reaction and the heat of friction (plastics).

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**THE SOLUTION IS VACUUM TECHNOLOGY**

- Vacuum Steam Heating System: **VM-H**
- Vacuum Vaporization Cooling System: **VM-C**
- Vacuum Steam Heating & Cooling System: **VM-H&C**

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**Vacuum Steam Heating System**

The Low-Temperature Heating System That EASY-TO-USE

Not Necessary to be an Expert

No complex operations required—settings can be made quickly and easily.

**IMPROVED ENVIRONMENT**

Easy on the Work Environment

The use of vacuum steam eliminates the steam vapor of open hot water systems. This plus the absence of loud noise and water hammer greatly improves the work environment.

**SIMPLE SYSTEM CONFIGURATION**

Minimal Space Requirements

The system's compact design means it can be easily adapted to existing equipment and requires little maintenance.

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**Vacuum Steam Heating Systems VM-H**

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**Conventional Hot Water Heating System**
Uses Vacuum Steam for Stable Process Temperatures and Reduced Heating Time

QUALITY
Heating at Optimum Temperature Means No Overheating of Products

Unstable and excessive heating temperatures can burn or otherwise deform products. To create high-quality products, heating must be done by supplying steam at a stable temperature. TLV’s VM-H vacuum steam heating system controls the steam temperature to within ±1.8 °F of the set value. This enables heating at an even temperature not possible with hot water heating and prevents burning and other related problems.

![Graph showing Vacuum Steam Heating System VM-H](image)

**PRODUCTIVITY**
**Faster Heating**

TLV’s VM-H vacuum steam heating system reduces process times by an average of about 25%. The time required for the temperature of the steam supply to stabilize is also reduced by over 80%, making it a fast, highly productive system.
Vacuum Vaporization Cooling System

**PRODUCTIVITY**
Solves the Problems Typically Experienced with Water Cooling
The TLV vacuum vaporization cooling system cools by vaporizing water. This results in a high film coefficient of heat transfer and reduces cooling time by about 25%. This system is ideal for exothermic reaction processes and other similar applications that require rapid cooling.

**Numerous Applications**
Enables Cooling Below 32°F (0°C)
The VM-C system can be used for a wide variety of applications, from cooling at room temperature to cooling below 32°F (0°C) using brine.

**Energy Savings**
Enables Cooling With Reduced Utility Use
Conventional water cooling requires large quantities of water. In contrast, the TLV vacuum vaporization cooling system cools by vaporizing water, so cooling is possible utilizing only about 20% of the water required by conventional systems.
Vacuum Steam Heating & Cooling System VM-H&C

Heating and Cooling Temperatures Can Be Easily Controlled

QUALITY

Ideal Combination of Heating and Cooling

The VM-H&C system combines the strengths of both vacuum steam heating and vaporization cooling. As process reactions change, the VM-H&C system switches smoothly between heating and cooling, maintaining accurate control of the product temperature.

Conventional Hot Water Heating/Water Cooling Equipment

Computer Control of Process

EASE OF OPERATION
Production Temperature Patterns can be Easily Set

Complex temperature patterns can be easily set and computer-controlled. 24-hour automatic operation is possible.

STABILITY
Alarm Function Provides Added Security

Built-in alarm functions protect the process and provide operational guidance, as well as reporting, in the unlikely event of any system failure.
TLV Technology and Service Can Solve Problems

EVALUATE EXISTING PROCESS
- Clarify problems
- Establish objectives for improvements
- Improve product quality
- Reduce processing time
- Save manpower
- Conserve energy

STUDY THE TECHNOLOGY FOR IMPROVING PROCESS
- Consider available options
- Determine costs
- Decide on system
- Vacuum steam/vaporization cooling vs. alternatives
- Effect of new system on production
- Cost effectiveness of proposal

TLY Services

STEPS IN INTRODUCTION

SPECIALIST SURVEY
The process starts with an analysis of the factory. A careful survey of actual conditions reveals problems that were previously unrecognized.

TESTS USING DEMONSTRATION/PILOT PLANT
The elimination of problems and the effectiveness of introducing new technologies to the heating and cooling processes can be checked utilizing TLV's own Pilot plant.

ENGINEERING
TLV will handle the entire process, from selection of all production equipment including the VM system, to installation and start-up.
in Your Company's Heating and Cooling Process

PLAN INTRODUCTION
ACCEPT OR REJECT PROPOSAL
CARRY OUT INSTALLATION
CONDUCT COMMISSIONING

- Finalize design
- Determine supervision of installation
- Liaise with production
- Commission new system

CONIRMATION OF BENEFITS
HAND OVER TO PRODUCTION
VERIFY ATTAINMENT OF OBJECTIVES

- Training of production personnel
- Monitoring of performance
- Verification of benefits

RESULTS
VM systems currently in use can be found in the following:

By Industry
- Textiles 5%
- Pharmaceuticals 7%
- Food 7%
- Chemical 72%

By Equipment
- Jacket kettle 67%
- Dryer 10%
- Reactor 7%
- Other 13%

By Process
- Heating 14%
- Drying 23%
- Reaction/distillation/concentration 53%

After-Sales Service
TLV provides full follow-up service after installation, from checking operating conditions to maintenance procedures.