

GE Oil & Gas

Masoneilan\* Valves

SteamForm\*

84000 Series

Steam Conditioning Solutions



# 84000 Series SteamForm\* Valve

GE's Masoneilan\* SteamForm\* valve combines 15 years of proven pressure reduction performance with an advanced, patented desuperheating technology design. Available with a wide selection of performance enhancing configurations, Masoneilan\* valves from GE offer the **optimized** solution for virtually every steam conditioning application:

- Thermally Compensated Trim for High Temperature Cycling
- High Performance Spray Nozzles for Accurate Temperature Control
- Multi-Stage Lo-dB\* Trim for High Pressure Reduction
- Fast Stroking Speeds for Turbine Bypass Quick Response
- Patented Flow Profiler for Enhanced Desuperheating Performance

## Full Range of Options for Spray Water Control

Masoneilan products from GE complement SteamForm\* valve technology with a full line of spray water control valves ranging from the single-stage pressure control of the 21000 Series valve, through the high-end, multi-stage LincolnLog\* valve solution for anti-cavitation.

## Instrumentation Technology for Improved Process Yields

GE's Masoneilan\* products provide leading micro-processor based field instrumentation technology that maximizes plant operating margins by improving process yields, while reducing plant operating and maintenance costs. Award winning HART\* communicating Smart Valve Interface (SVI\*) and Fieldbus Valve Positioner (FVP\*) digital positioners from GE help users realize improved asset effectiveness resulting in higher returns on investment. These digital positioners deliver improved process yields through patented tuning algorithms that optimize valve control performance.



GE's Masoneilan\* FVP\* - Foundation Fieldbus™ Positioner Controller

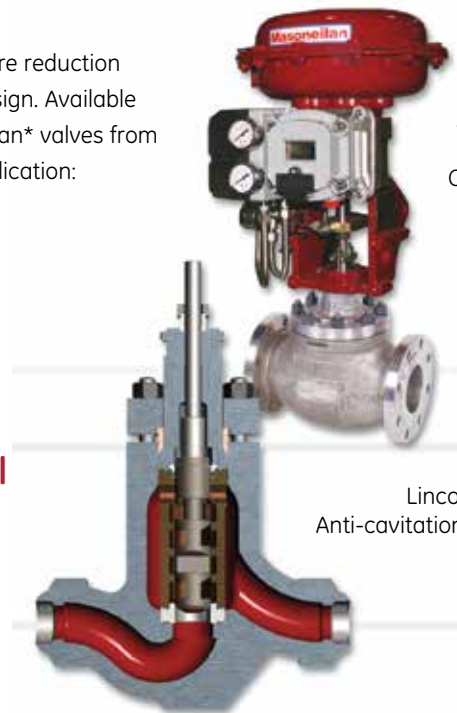


GE's Masoneilan\* SVI\* II AP Advanced Performance Digital Positioner

## A High Degree of Application Flexibility

Steam conditioning requirements and plant operating practices vary across every industry. Process plants require steady operation and precise steam temperature control to improve the performance of downstream equipment such as paper machines or other auxiliary equipment. Power plants rely on fast response and low noise performance to cycle their plants and manage turbine trips. Each of these environments calls for a specific range of operating criteria, including inlet and outlet pressures, temperature limits, thermal cycling of equipment, and operating rangeability.

Because the SteamForm\* valve has a wide range of options, it's compatible with all facets of process steam operation, from noise control to temperature control, fast opening operation to tight shutoff, and daily start-stop to smooth continuous control. Each SteamForm\* valve solution is designed to meet specific customer requirements for steam conditioning, ensuring a proper fit and long-term success in operating performance.



21000 Series Spray Water Control Valves

LincolnLog\* Anti-cavitation Control Valves



84000 Series SteamForm\* Valve

# SteamForm\* Valves

## Pressure Reducing Technology

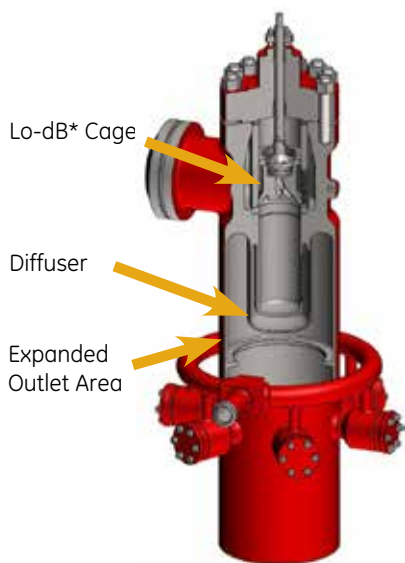
Pressure reduction through a control valve is associated with a release of energy from the steam in the form of noise and vibration. Eliminating these undesirable effects of pressure reduction is the primary design objective of the SteamForm\* valve. The design of the SteamForm\* valve allows GE to offer a wide range of cost effective solutions, from single stage Lo-dB\* trim to multi-stage management trim. Each individual valve solution is engineered for optimization, addressing specific applications needs according to severity and customer specifications.



Single Stage Lo-dB\* Trim

### Lo-dB\* Technology

Smooth control and process stability are key requirements of many process control applications. Critical steam applications are found in pulp & paper mills, specialty chemical plants, oil refineries, and other industries that use a steady steam supply to drive a downstream process. The challenges of these applications, typically requiring low to moderate pressure drop control, are easily satisfied by using drilled hole single stage or double stage low noise (Lo-dB\*) trim.

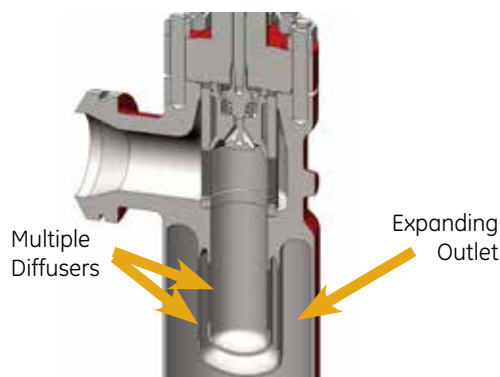


84000 Series SteamForm\* Valve  
Single Stage Lo-dB\* with Diffuser

For more severe pressure drop applications, the SteamForm\* valve can be equipped with a series of diffusers to provide additional stages of pressure reduction. These higher pressure drop applications typically include an expanded valve outlet to accommodate the volumetric expansion of the steam. In addition to reducing noise, the diffuser design also provides a secondary benefit as it disrupts the flow path of the high energy jet exiting the valve trim. This flow transition generates lower noise levels in the downstream pipe, and produces beneficial turbulence to assist with desuperheating.

### Low Noise, Energy Management Technology

Higher pressure-drop applications, such as the “bypass-to-condenser” operations found in power plants, may require a more sophisticated degree of technology to manage high energy levels through the valve. The SteamForm\* valve’s engineered design results in a valve that is optimized for the application. So, when it has to handle high amounts of energy, the valve body and outlet are custom-configured to ensure that flow velocities are acceptable through the entire desuperheating system.



3-Stage Lo-dB\* Trim

The management of pressure reduction and volumetric expansion required in high-energy steam flows is often accomplished with the use of multiple diffusers. This approach creates a series of gradual expansion areas as the steam transitions to outlet conditions. The additional diffusers create back pressure, reducing the amount of pressure drop that is taken across the controlling surfaces of the trim. This minimizes the amount of wear on the controlling surfaces, which protects the shutoff integrity and further ensures long- term, accurate control performance.

# SteamForm\* Valves Patented Technology

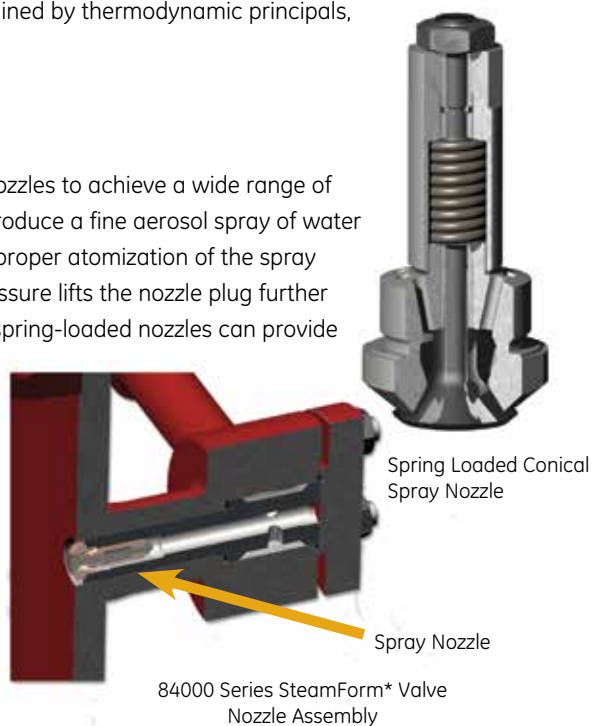
## Desuperheating

The desuperheater section of the Masoneilan\* SteamForm\* valve is designed to reduce the steam temperature by precisely injecting a finely atomized mist of water into a highly turbulent flow region of the valve. While the quantity of water required to meet downstream conditions is routinely determined by thermodynamic principals, the method of water injection is anything but routine.

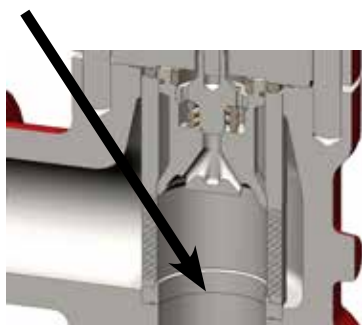
## Variable-Orifice Spray Nozzles

The SteamForm\* valve's design utilizes variable-orifice, spring-loaded spray nozzles to achieve a wide range of temperature control. During low-flow operation, the spring-loaded nozzles introduce a fine aerosol spray of water into the steam line by slowly easing the nozzles off of their seat. This ensures proper atomization of the spray water, even at minimal process flow. As the flow rate increases, the water pressure lifts the nozzle plug further off the seat and opens the orifice to provide a full conical spray pattern. GE's spring-loaded nozzles can provide maximum to minimum CV ratios in excess of 50:1.

The SteamForm\* valve's spray nozzle assembly uses an easy-to-access, downstream water injection system that keeps costs low and makes maintenance easy over the life of the valve. Locating the water injection system downstream of the valve trim eliminates unnecessary thermal stress on the trim, which simplifies the operation of critical components in technically demanding applications.



Flow Profiler



84000 Series SteamForm\* Valve  
Flow Profiler Technology

## Flow Profiler

GE's patented Flow Profiler feature has been designed to maximize temperature control performance and protect the surrounding piping system from thermal stress caused by injecting cold water into hot flowing steam.

Using field-tested technology, the Flow Profiler is sized and positioned to maximize the effectiveness of the SteamForm\* spray nozzles. These nozzles are configured in a radial injection array, out of the core steam flow path, protecting the desuperheating elements from the thermal shock of dramatic temperature swings between main steam and spray water conditions. The Flow Profiler is strategically located to enhance steam turbulence while permitting effective interaction of the water spray with the entire cross section of steam flow.

## Stand-alone Desuperheaters

GE's Masoneilan products' desuperheater uses the SteamForm\* valve's proven Flow Profiler technology, which reduces the length of downstream piping required for the temperature control sensor installation. The Flow Profiler further reduces the thermal stress on the surrounding piping system by shifting the process flow heat transfer region to the center of the pipe and away from the vulnerable pipe wall.



Masoneilan\* Desuperheater with  
Optional Lo-dB Plate

# SteamForm\* Valves

## High Efficiency Performance

### High Rangeability

Many applications use steam conditioning valves to throttle across a wide range of operating conditions. For instance, many installations require the SteamForm\* valve to throttle at startup conditions as the plant comes on line and continue to control as pressure builds up to the plant's maximum capacity. Startup duration may be prolonged and can require the SteamForm\* valve to control at upwards of 50:1 rangeability over this time span. For these applications, the valve uses multiple stages of pressure reduction to properly manage the energy letdown, while preventing excessive noise and vibration across the wide range of conditions.

### Thermal Cycling

Thermal stress in a process system can lead to severe damage, including sticking of the control trim, premature valve wear, and even cracking of surrounding piping under extreme temperature swings. The SteamForm\* valve

utilizes a spring loaded trim design to allow for expansion of the trim within the valve. This design permits the trim to respond to short term thermal transient conditions and recovers to normal state when the body and trim reach equilibrium. This feature ensures smooth and accurate trim modulation during all cycles of valve deployment.

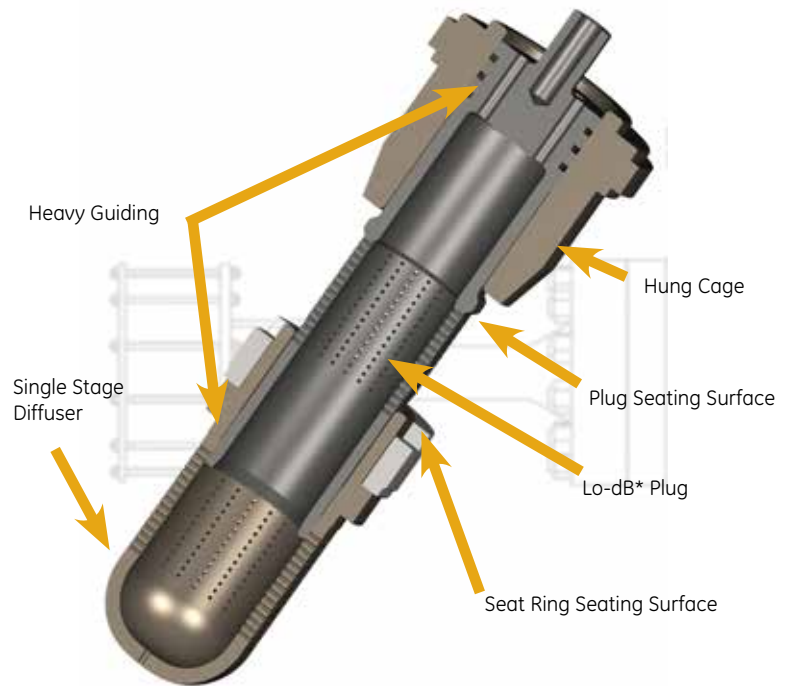
### Long-Term Shutoff

To address unwanted energy loss, The SteamForm\* valve provides tight shutoff options for ANSI/FCI Class IV and Class V leakage, as well as MSS-SP-61. To ensure long-term shutoff integrity, the SteamForm\* valve has a metal-to-metal interface between the plug and seat ring. These surfaces are also hardfaced for durability in high temperature service. GE considers this specification to be one of the most critical for many applications including turbine bypass, as steam leakage directly impacts the efficiency of a plant.

### Fast Response and Precision Control

SteamForm\* valves can be actuated and accessorized for fast opening (less than 1 second) in response to a turbine trip to protect the turbine from undesirable conditions during either startup or an upset condition. The SteamForm\* valve will allow the steam in the system to bypass the turbine and cycle through the plant as if it were online during normal operation. This is much better than the undesirable alternative of tripping the safety valve and venting the steam to atmosphere.

Adding GE's Masoneilan\* SVI\* II AP digital positioner to the SteamForm\* valve provides extreme control accuracy with advanced response to the slightest change in the input signal. The result is reduced plant downtime and improved bottom-line return.



# SteamForm\* Valves

## Flexible Valve Body Design

### Industry Designs

The variations across industries and application-specific operating conditions make customization a necessity for steam conditioning. The SteamForm\* valve's design can be engineered in angle- and globe-style configurations, as well as in cast- and forged-body construction. This design flexibility allows each valve to be custom-fit to our customers' needs.

### Power Industry Designs

Many power industry applications pose greater steam conditioning challenges due to extreme conditions. Today's plants are operating at higher pressures and higher temperatures, and are cycling on and off daily. Extreme duty cycling can be very demanding on any steam conditioning valve, but the SteamForm\* valve offers body configurations to fit high-end trim solutions for these applications.

For high-end solutions, the SteamForm\* valve is available in upper tier ASME class ratings and advanced 9Cr-Mo-V materials to satisfy cyclical service and meet the rigors of today's peaking plants. Thermally compensated trim and multiple pressure drop staging allows the SteamForm\* valve to perform to the demanding specification of modern power plant operations.

The SteamForm\* valve is ideally suited for large pressure-drop applications, such as turbine bypass, that result in a large change in the steam density. Each SteamForm\* valve body is engineered for expanded outlet options, so that the change in steam density does not result in excessive velocity  $p$  at any point within the valve. Additionally, each valve is engineered with an optimized number of spray water nozzles and complimentary spray water valve to accurately control downstream steam temperature across conditions ranging from start-up, to normal operation to turbine trip.

### Process Industry Designs

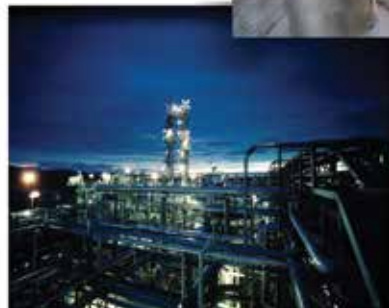
Not all plants operate alike, and many process steam applications, such as those found in pulp and paper mills or oil refineries, may operate under less demanding conditions. For these applications, a compact cast body design is available in both angle and globe style configurations. For many process letdown applications, steam is conditioned with only a minor pressure drop to meet the needs of a lower pressure header. An easy-to-install globe-style SteamForm\* valve design can handle these small pressure differential applications.



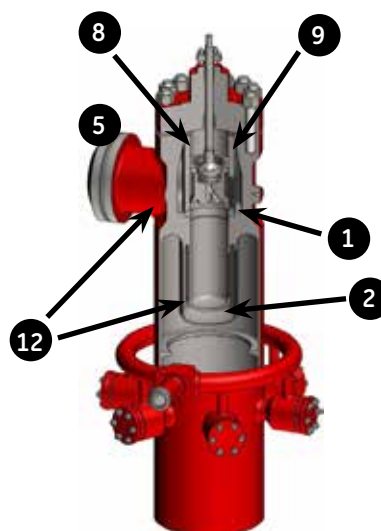
84000 SteamForm\* Forged Body Valve



84000 SteamForm\* Globe Style Valve



# SteamForm\* Valves Features & Benefits



| FEATURE   |  | ADVANTAGE   | END USER BENEFIT  |                     |
|-----------|--|---|---|---------------------|
| <b>1</b>  | Metal-to-Metal Hardfaced Seating                   | Long-Term, Reliable Tight Shutoff                                       | Increased Plant Performance & Efficiency                      | REVENUE ENHANCEMENT |
| <b>2</b>  | Multiple Stages of Pressure Reduction              | High Rangeability (Turndown)  | Smooth Transition Starts & Ramp-up                            |                     |
| <b>3</b>  | SVI* II AP Positioner                              | Fast Response Bypass System, Precision Control                          | Prevents Over-Pressure  |                     |
| <b>4</b>  | High Performance Actuation                         | Stability and Control Reliability                                       | Higher Product Yield  |                     |
| <b>5</b>  | Forged/Cast Angle & Globe Configurations           | Made to Fit Existing Piping Designs                                     | Flexible, Engineered Installation                             | COST REDUCTION      |
| <b>6</b>  | Flow Profiler Desuperheater Technology             | Reduced Downstream Piping Requirements and Enhances Temperature Control | Reduced Piping Cost   |                     |
| <b>7</b>  | Multiple Spray Water Control Valve Options         | High Performance Control, Cavitation Elimination                        | Longer Trim Life  |                     |
| <b>8</b>  | Quick Change Trim Option                           | Easy Installation and Maintenance                                       | Reduced Downtime  | RISK MITIGATION     |
| <b>9</b>  | Thermally Compensated Trim                         | Prevent Thermal Expansion & Trim Sticking                               | Protects Trim   |                     |
| <b>10</b> | Outlet Area Desuperheating                         | Protects Critical Trim from Thermal Shock                               | Reduces Valve Damage & Trim Erosion                           |                     |
| <b>11</b> | Spring Loaded Spray Nozzles                        | High Performance Desuperheating   | Protects Downstream Piping & Equipment from High Temperatures |                     |
| <b>12</b> | Multi-Stage Designs for High Pressure Applications | Prevents System Vibration   | Reduced Equipment Damage                                      |                     |

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