



# Hi-GARD® and MARD Rotary Distributors

Water Technologies

**SIEMENS**



# The ideal way to distribute clarified wastewater to biological contact beds.



Since the 1930s, the Rotary Distributor has been the preferred method of applying clarified wastewater to aerobic biological contact beds used in trickling filters. Continuing technological advances have improved the efficiency of this process greatly by permitting higher flushing intensities. Today, simple construction, installation, operation and maintenance make the Hi-GARD and MARD designs the industry's most advanced and logical choice for use with all types of biological contact beds.

## **Hi-GARD® Combines Energy Efficiency with Process Efficiency**

The trickling filter aerobic biological process is one of the most cost-effective methods of treating municipal and industrial wastewaters. First used near the turn of the century, this process is still used because of its energy efficiency compared to other alternatives. In addition, the Environmental Protection Agency allows its use to meet secondary biological treatment effluent standards.

The Hi-GARD design incorporates all the desirable features of the original GARD, but dramatically increases the flow capacity per arm. This state-of-the-art design features a trapezoidal cross-section arm with adjustable, large-diameter, non-clogging orifices integrated into it to distribute the flow. The design also

incorporates an inclined plane for gravity actuation, a sealless overflow weir, and corrosion-resistant aluminum construction.

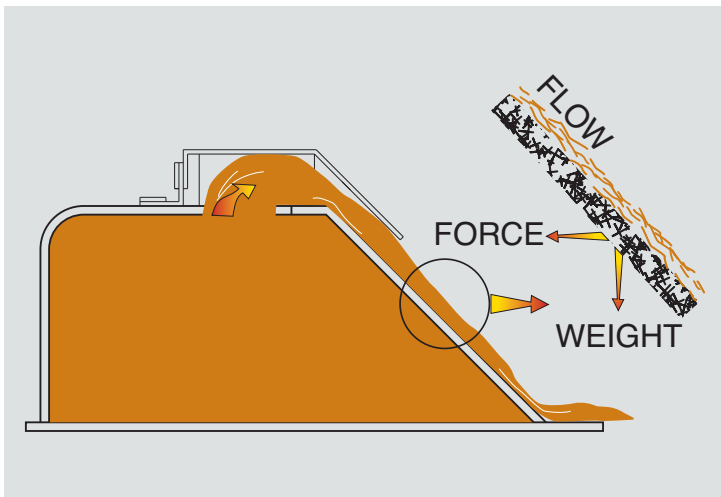
The operational results are optimal rotational speed and, consequently, enhanced process efficiency— with exceptionally low maintenance. Hi-GARD overcomes the limitations of traditional designs to meet today's high flow rate requirements.

A motor-actuated design, the MARD, is available for applications that require extremely high flushing intensities.

## **Hi-GARD and MARD operation is very simple.**

Water enters the unit from the bottom through an inlet pipe encased in the concrete pier that supports the distributor. As water travels upward, it flows over the inlet weir. The highest water level is measured at the crest over this weir. Operating head for the units is considered from the top of the filter media to the crest over the weir.

The sealless overflow weir is the transition from the stationary center column to the rotating drum. The water level in the rotating drum will rise and fall with the flow rate.



*Gravity Actuation – The simple, effective way to produce turning force. One key design feature of the Hi-GARD is the large size, non-clogging orifices made possible by the gravity actuated design.*



*A Hi-GARD unit, assembled at the factory, has large diameter, non-clogging orifice.*

In gravity-actuated units, water flows into the arm and is distributed through orifices located on top of the arm. The orifices serve as natural vents to eliminate air binding in the arm. As water passes through the orifices, a deflector shield directs it down the inclined slope of the arm. The water traveling down and off the inclined plane provides the rotational force to turn the unit.

Motorized (MARD) units include rectangular arm sections to minimize thrust generated by the water travel. A gearmotor provides the rotational force to turn the unit. By utilizing a no-thrust design, wear on the gearmotor is minimized at all flow rates. Speed of rotation is manually controlled by a variable frequency controller.

### **Hi-Gard and Mard Require Fewer Arms**

Because it is not limited by nozzles and jets, the Hi-GARD integral reactor arm design allows the use of fewer arms. Obviously, the fewer arms required, the more cost-effective a rotary distributor. Hi-GARD arms have been designed to handle 11,000 GPM (gallons per minute) and are capable of even higher values.

The Hi-GARD integral reactor arm design provides better flow distribution over flow variations of greater than 3 to 1. This maximizes flushing intensity without the use of high/low arms that require special baffles and weirs

within the rotating center column drum. Minimizing speed variations is also important for optimizing flushing intensity. In one Hi-GARD installation, a 370% change in flow rate resulted in only a 21% change in the rotational speed of the distributor.

Nozzle or jet-type distributors require the operator to unplug and flush small diameter orifices frequently to maintain uniform wastewater distribution. Hi-GARD's integral reactor arms have large orifices to eliminate these problems. Quick-opening cleanout gates allow fast and effective flushing.

### **Aluminum Construction Reduces Maintenance**

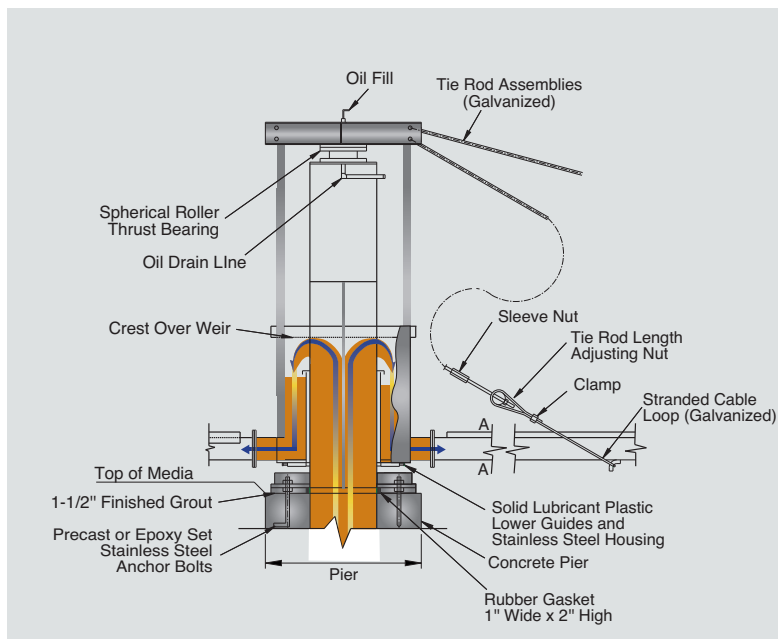
All wetted parts are fabricated of corrosion-resistant, long-lasting aluminum. Aluminum construction eliminates the sandblasting and painting or galvanizing required for steel rotary distributors. An aluminum rotary distributor is also inherently lighter and easier to install than a steel distributor.

Non-wetted metal parts include a heavy-duty steel bearing housing, stainless steel fasteners, and hot dipped galvanized tie rods and sway braces. Stainless steel tie rods and sway braces can be used if desired.

# Designed for simple, effective operation. Engineered for reliability and efficiency.



All-aluminum 50 ft. diameter, 2-arm Hi-GARD.



Details of the mast bearing design with all-aluminum center column.

## Hi-Gard and Mard Eliminate Mechanical Pressure Seals

Most competitive designs have a mechanical pressure seal located between the stationary center inlet pipe and rotating center column. This seal can leak, requiring maintenance and periodic replacement. Instead of a mechanical seal, the Hi-GARD and MARD designs feature an overflow weir within the center column to prevent any leakage.

## Our Bearings Have a Life Expectancy of 30 Years

The Hi-GARD design uses a spherical roller thrust or locked race bearing. The bearing is top (mast) mounted to eliminate any danger of flooding with wastewater, which can displace the lubricant and cause the bearing to fail prematurely.

Lower guides are located below the rotating drum to prevent tipping of the rotary distributor. Made of high-density solid lubricant-impregnated plastic, these lower guides bear against a stainless steel wear strip when an unbalanced load is applied. During balanced operation, the guides do not come into contact with the wear strip. The lower guides and wear strip can be periodically submerged in wastewater with no detrimental effect.

Hi-GARD bearings are designed to have a B10 life expectancy of 30 years – two to three times that of many competitive designs.

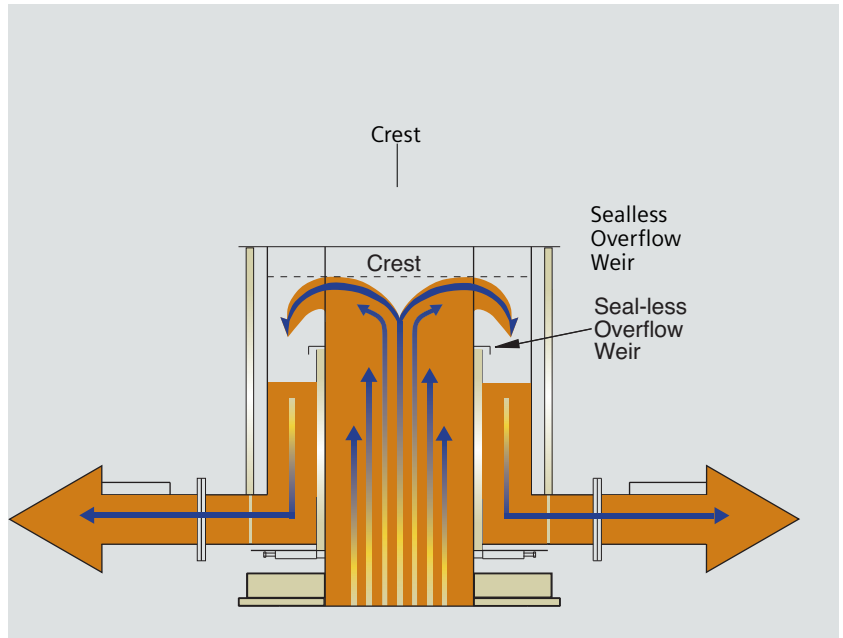


Hi-GARD arm provides even distribution of flow.

# Designed for virtually any new or retrofit installation.



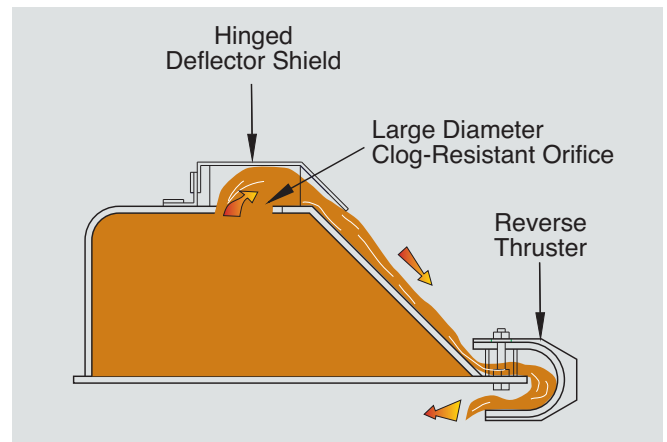
A MARD unit showing motor and enclosed drive.



Section of the sealless overflow weir.

## Optional Reverse Thrusters Increase Flushing Intensity

A high flushing intensity (SK rate) is often required to maximize trickling filter efficiency. The Hi-GARD design provides the fewest arms possible to optimize the flushing intensity. However, when a higher intensity is required, installation of reverse thrusters onto the arms reduces the rotational speed and further increases the SK rate. Reverse thrusters simply redirect the wastewater flow off the back of the arm towards the front, effectively slowing the unit to between 0.15 and 0.50 rpm without jeopardizing uniform flow distribution. (Hi-GARD rotary distributors without reverse thrusters typically have rotational speeds from 0.50-1.50 rpm.)

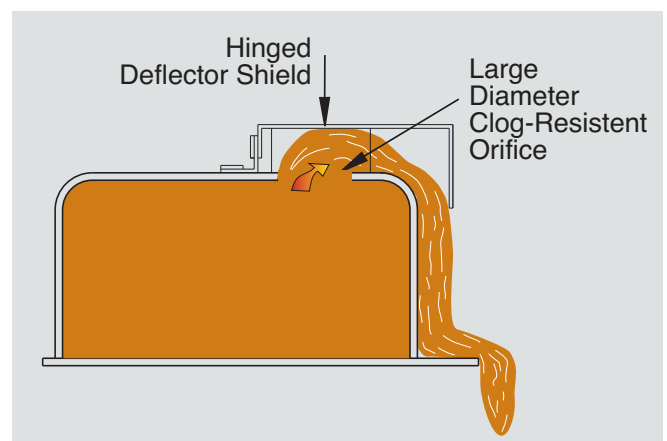


A section of the Hi-GARD arm showing the reverse thruster.

## Motor Actuated Rotary Distributor (MARD) Is Also Available

When even higher flushing intensities are required, the MARD (Motor Actuated Rotary Distributor) design, capable of rotational speeds less than 0.15 rpm, is available. The MARD is driven by a constant speed electric motor with a variable frequency controller. Otherwise, the MARD offers all of the same features and advantages of a standard Hi-GARD rotary distributor.

The special, no-thrust design of the MARD arms allows the motor to do the work without the interference of changing thrust patterns during flow variations.



A section of the MARD arm.

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East Tel: +1.508.849.4600

Central and International Tel: +1. 515.268.8400

West Tel: +1.719.622.5320

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