

**NORAM**  
**SULFURIC ACID**  
Products and Services

# SMART™ ACID DISTRIBUTORS

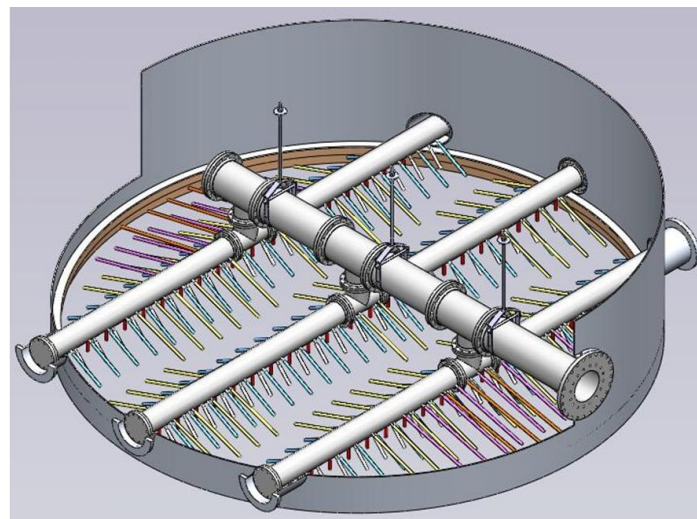


The **NORAM SMART™ Acid Distributor** provides uniform acid distribution in a tower cross-section and minimizes acid spray generation.

The SMART™ Distributor is comprised of a main acid header pipe, which delivers acid to a distributor arms. Distributor arms are sometimes arranged in a radially symmetric layout. Parallel arm designs are used in large towers, whereas single arms are sufficient in small towers. The arms can be supported on brick corbels or by hangers. Downcomers are fitted onto the distributor arms to deliver the acid into the packing domain. The downcomer ends are buried in the packing. The number of irrigation points per unit tower area depends on the irrigation rate, and is typically between 1 and 1.5 irrigation points per square foot of tower cross-sectional area, similar to that used in cast iron troughs.



The acid irrigation pattern provides adequate wetting for the large packing size commonly used in acid towers. Special care is taken in the design of the irrigation point patterns to ensure a slightly higher irrigation rate in the wall region of the tower, where the larger local void fraction of the packing reduces mass transfer efficiency, which can cause wall slippage of SO<sub>3</sub>. The downcomers are assembled from proprietary, threaded venturi orifice adapters. Large diameter FEP tubes are heat shrunk onto the adapters. The assembled downcomers screw directly into the distributor arms. In new acid tower installations, inspection ports are provided which allow clean-out of the SMART™ Acid Distributor without requiring tower entry. The distributor arms penetrate the tower trough nozzles provided on the shell.



By removing flanges, access to the distributor arms is obtained and any debris can be removed with the help of a brush or vacuum hose. Distributor clean-out can be typically completed within a few hours, which means that the acid plant will not cool down significantly and can quickly be brought back on line. The distributor uses heavy wall cast piping or NORAM SX®. These materials are well proven in acid service since 1983 at temperatures up to 240°F and in the strength range of 93-99 percent H<sub>2</sub>SO<sub>4</sub>. The proprietary NORAM venturi orifice adapters are cast in a corrosion and erosion resistant alloy. This material is well proven in valves, and orifice plates handling hot, turbulent, strong sulfuric acid and oleum. The downcomer tubes, which carry the acid from the venturi orifice to the packing, are made of FEP. The full face gaskets of the SMART™ Acid Distributor piping are made of PTFE; bolts and nuts are 304/316 SS.



## Uniform Acid Distribution Throughout Tower Cross-section

Uniform acid distribution is achieved through evenly spaced venturi downcomers discharging inside the packing domain. The head is uniform throughout the distributor piping resulting in even discharge from all downcomers.

## Insensitive to Levelling or Variation in Acid Flow

Sufficient liquid head is provided over the venturi orifice adapters to allow turn-down in acid flow without affecting the uniformity of acid distribution. This feature eliminates the requirement for time-consuming efforts to achieve a level distributor.

## Low Velocity Acid Entry

The velocity of the acid entering the packing domain is low so that spray generation is minimized.

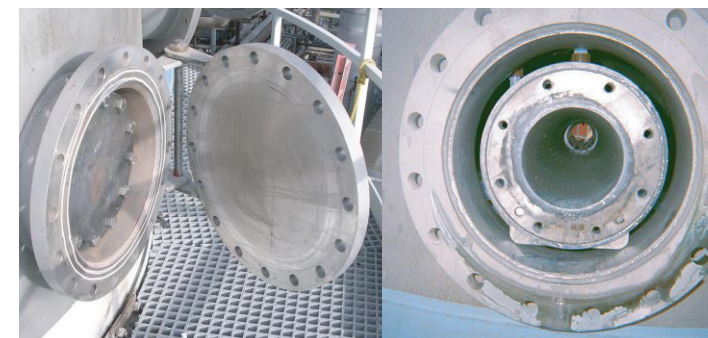


## Gas Flow Restriction Minimized

Elevation of the distributor into the gas space above the packing maximizes the free area for gas flow through the packing. The risk of localized flooding resulting in high pressure drop is minimized.

## Ease of Inspection and Cleaning Through External Inspection Ports

The FEP downcomer tubes are transparent and allow visual confirmation that acid is being discharged from all downcomers. External inspection ports can be provided in the tower wall so that the distributor can be cleaned without requiring tower entry by maintenance staff.



## Improved Personnel Access and Safety

The distributor is located above the packing to facilitate tower access for mist eliminator installation and general maintenance. Maintenance staff can step over and stand on the distributor pipes. The distributor components do not have sharp edges to damage protective gear worn by maintenance staff.

## Use of Corrosion-resistant Materials

The distributor construction materials have been proven successful in sulfuric acid service. The materials have a high tolerance to oleum and dilute acid resulting in low sulfate formation and extended equipment life.

## Layout

The distributor layout minimizes the number of components required in the assembly and reduces spares inventory requirements.

## Ease of Field Repair

All distributor components are bolted assemblies with spare parts readily available from stock.

**NORAM ENGINEERING AND CONSTRUCTORS LTD.**

Suite #1800 – 200 Granville Street  
Vancouver, British Columbia, Canada, V6C1S4  
Tel: 604-681-2030 Fax: 604-683-9164

E-mail: acid@noram-eng.com Website: www.noram-eng.com

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