

HIGH PERFORMANCE TRAYS(TCMV, TDV)

Weakness of Conventional trays

Poor Liquid Flow Distribution

- Uneven bubbling activity / Stagnant liquid pools

High Liquid Hydraulic Gradient

- Low bubbling activity at tray inlet / Poor vapor distribution

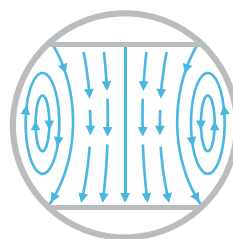
Non-Optimized Downcomer Design

- Oversized downcomer / Premature downcomer flooding

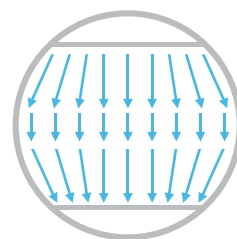


Background

Conventional trays typically form stagnant liquid pools on both sides of the tray decks (left). To eliminate this inherent stagnant liquid pool, it is necessary to improve liquid flow distribution across the tray floor. As shown in the Figure (right), uniform plug-flow liquid distribution eliminates liquid back-mixing and the formation of stagnant liquid pools. As a result, plug flow distribution improves tray efficiency and also minimizes the tray tendency to foul. The High Performance Tray technology consists of various design know-how that help, not only improve column throughput and efficiency, but also extend the column run-time.



Conventional Trays
Stagnant Liquid Pool



High Performance Trays
Liquid Plug Flow

High Performance Tray Design

Mini Valve & Micro Dispersion Valve

Mini valves which are available for round and rectangular type valves, with the design feature of directional flow promotion devices help eliminate stagnant liquid pools and promote uniform liquid plug flow and froth densities across the entire bubbling area.

Directional promotion devices eliminate fouling material settling on the tray deck and thus serve to extend the column run time.



TCMV



TCMVF



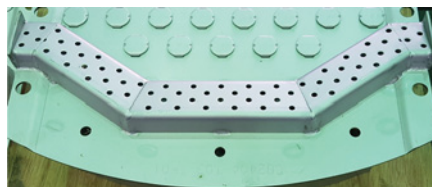
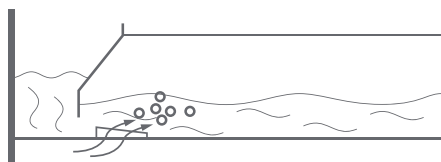
TCMVFD



TRMVF

Inlet Bubble Promotors

The High Performance Tray is designed with unique inlet bubble promotors, shown in the following figures, to allow for froth initiation near the inlet area of the active panels. The froth initiation helps minimize/eliminate the liquid gradient on the tray and promotes uniform froth distribution across the entire tray active area, which results in higher tray capacity and operating flexibility.



Apply Downcomer Optimization

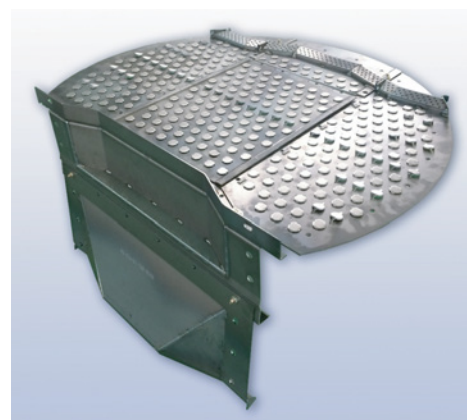
- Optimize bubbling area
- Downcomer area distribution
- Use vapor tunnel and relief downcomer concepts

Advantages of TPT's High Performance Trays (TCMV(F), TRMVF, TDV)

Features	Advantages
Greater effective active area	Higher capacity
Special contact device	Higher capacity & efficiency
Longer effective flow path	Higher efficiency
Directional flow	Improved liquid distribution
Bubble promotor	Higher capacity & efficiency due to froth initiation

When compared with typical conventional valve/sieve trays, High Performance Trays offer:

- Higher capacity - typically 20-40%
- Higher tray efficiency - typically 5-15%
- Lower pressure drops - typically 15-20%
- Higher turn down flexibility, and
- Longer column run-time.



HIGH PERFORMANCE TRAYS

De-entrainment Device

The objective of High performance trays with de-entraining devices is to effectively eliminate entrainment in such operation cases. Another benefit is additional wetted solid surface area for enhanced vapor and liquid contact.

The de-entraining device, comprised of a plurality of baffles, is situated in the disengagement zone below the tray. The baffles act as spray deflectors by intercepting entrained spray. Liquid then falls as droplets toward the active area.

When operating under the spray regime, the High performance trays with de-entraining device can result in an increase of approximately 10%-20% additional hydraulic capacity over trays without such a device. It has been successfully applied in commercial distillation columns and are proven effective, with technical advantages, under variable conditions.

