

Tower Technical Bulletin

Tray designs for extreme fouling applications

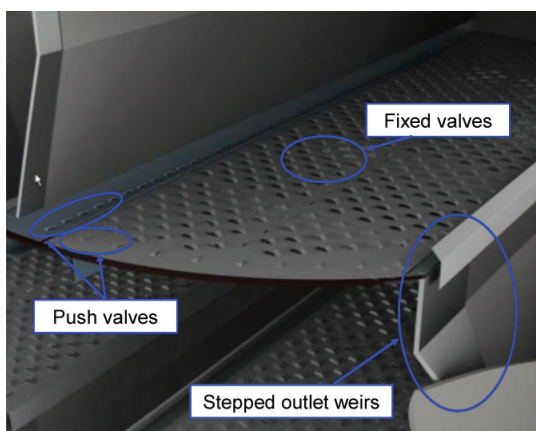
Background

Today refiners experience a lot of problems with processing of opportunity or heavy crudes. Such crudes have very high sulfur content and require the addition of amine scavengers before desalting. These amines decompose in the heater and create ammonium chlorides in the presence of water in the top of the crude tower. Dissolved salts start to precipitate and crystallize when the solution becomes saturated and water is vaporized. Such fouling starts to grow below and above trays and is hard to remove because deposits are firmly attached to the surface. Eventually, tray orifices become blocked and pressure drop increases drastically, creating a situation where the column needs to be shut down to have the trays replaced or cleaned. Other traditionally fouling services such as sour water strippers and FCC and Coker fractionators face these challenges as well.

Historically, standard raised orifice devices such as Sulzer V-Grid™ valves have proven to be resistant to scale and fouling. However, in such aggressively fouling environments, special designs need to be considered.

Anti-fouling VG AF™ Trays

Industrial practice shows that trays with large, elevated orifices operate substantially longer in fouling services. The large orifices take longer to foul and the raised design keeps the opening away from the heavier sediment near the tray deck. In these difficult applications, Sulzer typically uses large fixed valves such as SVG or LVG valves in combination with push valves and a stepped outlet weir. The push valves keep the liquid and solids moving uniformly across the tray deck and the stepped outlet weir keep the solids from accumulating at the end of the tray deck. This design can often increase column run lengths by a factor of 2-3 as compared to conventional designs.

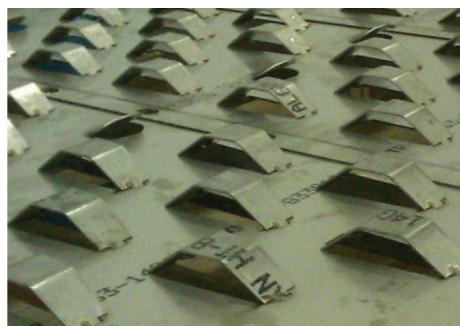


Sulzer VG AF™ Tray Features

SVG-H™ Valves: Solutions for Extreme Conditions

While the above solution is ideal for fouling from sediment, it does not completely address the issues of severe particle deposition. In these applications, fouling materials deposit and grow on all surfaces including the underside of the trays and around the edges of the deck orifice. This fouling material then gradually closes the orifice opening from around the perimeter. Run lengths for small valves in these cases are not long. Such applications require very large openings with large side valve open area.

Sulzer has developed special high lift SVG-H valves for these services. These valves have the proven trapezoidal V-Grid shape with very large openings to resist fouling from particle deposition. The lift of these valves may be larger than 0.7" (17 mm) and can be adjusted depending on the fouling severity.



Tray Deck with SVG-H™ and Push Valves

When used in combination with VG AF anti-fouling tray features, the SVG-H valve can delay deposition fouling substantially. A general rule of thumb would be that run length should increase proportional to the valve lift. In many cases, that results in a 50-100% increase in run length over previous best available fouling resistant tray technology.

The Sulzer Refinery Applications Group

Sulzer Chemtech has over 50 years of operating and design experience in refinery applications. Sulzer has the know-how and the technology to provide reliable, high performance designs in severely fouling applications.

Sulzer Chemtech, USA, Inc.

8505 E. North Belt Drive | Humble, TX 77396
Phone: (281) 604-4100 | Fax: (281) 540-2777
TowerTech.CTUS@sulzer.com
www.sulzerchemtech.com