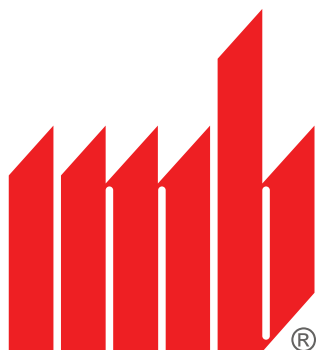


SPINTUBE™ Replacement Bundles



A Chart Industries Company



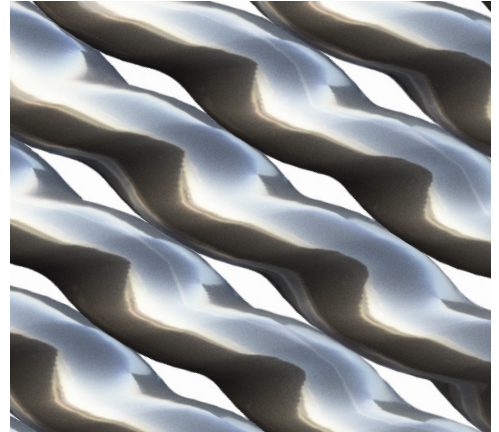
Cooler By Design.™

SPINTUBE™ Replacement Bundles

Enhance the performance of your Shell and Tube Heat Exchanger (S&T HEX) with SPINTUBE™ Replacement Bundles by Chart IMB - Industrie Meccaniche di Bagnolo.

SPINTUBE replacement bundles can be retro-fitted to any TEMA type S&T HEX and provides increased thermal performance and reduced pressure drop.

The construction of SPINTUBE bundles allows inspection and cleaning with the same methods and techniques used for conventional S&T HEX's. Flow induced vibrations are completely eliminated.



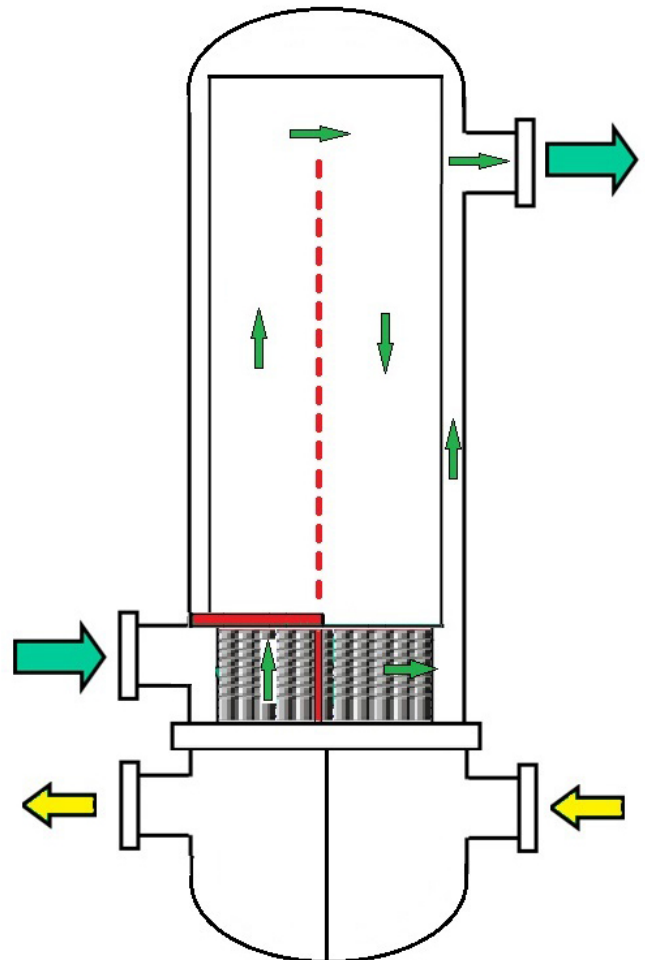
SPINTUBE bundles are particularly beneficial in plant upgrades and debottlenecking and are compatible with any cross-flow or longitudinal bundle configuration.

Shell-side Longitudinal vs. Cross Flow

- Shell-side geometry that minimizes recirculating eddies, bypassing and leakage, providing the most effective use of pressure drop.
- The amount of recirculation and back-mixing that occurs in cross-flow segmental baffle bundles penalizes the effective MTD more than it does in longitudinal shell-side flow in SPINTUBE bundles.
- Compared to conventional segmental baffle heat exchangers, for the same pressure drop, shell-side heat transfer coefficients are higher, or shellside pressure drop is lower for the same heat transfer coefficient.

Shrouded E to F Conversion

- Shroud allows installing a SPINTUBE "F" bundle in "E" shell with no changes in existing nozzle locations.
- TEMA "F" shell performance is achieved without long leaf seals between long baffle and shell ID.
- For 2 tube side passes, true counter-current flow.

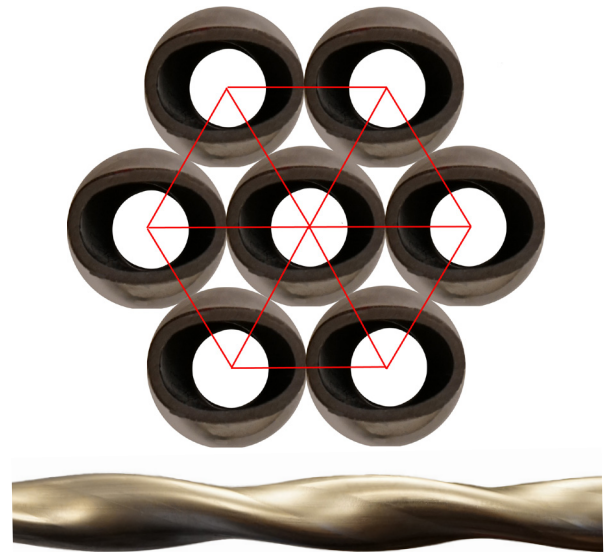


SPINTUBE™ Tube-side Flow

The round tube of a conventional S&T HEx has a uniform cross-section that tends to be less effective in terms of heat transfer performance.

Because of the tangential velocity component, a SPINTUBE™ Replacement Bundle introduces additional turbulence. In the SPINTUBE bundle, tubes are closer to each other (in direct contact) so that the number of tubes per shell diameter is increased.

As a consequence of the increased heat transfer coefficient and surface area, SPINTUBE bundle may improve thermal performance by 20 to 40% versus a traditional tube bundle in the same shell.



SPINTUBE™ Parameters

- No tube material and thickness limitations
- Tube diameter from 3/8" to 1 1/4"
- Tube spin adjusted to particular service

SPINTUBE™ Bundles

- Tubes in direct contact with each other provide a tighter tube pitch (more tubes per shell)
- Retro-fitting an existing shell with a SPINTUBE bundle may increase heat transfer surface area by 20 to 40%
- Tubes in direct contact with each other and firmly wrapped in a bundle are self-supporting, thus eliminating the need for baffles

Maintenance

- Due to cleaning lanes between tubes, SPINTUBE bundles can be cleaned with conventional water-jet methods

Flow Induced Vibrations

- SPINTUBE heat exchangers eliminate potentially damaging flow induced vibrations

Applications

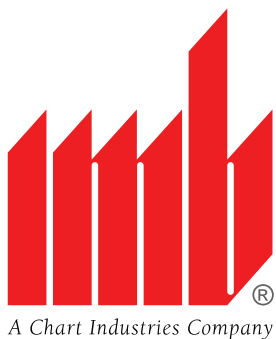
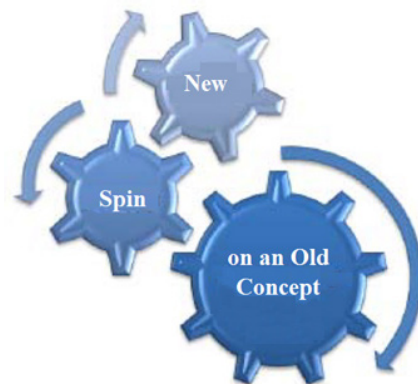
- Crude preheat trains
- Coolers trains (e.g. amine service)
- Condensers
- Reboilers and vaporizers
- Feed-effluent exchangers
 - Horizontal, high pressure (e.g. Hydrocracker)
 - Vertical (Texas Towers)
- Compressor gas coolers



Benefits

Retro-fitting a conventional tube bundle with a SPINTUBE™ Replacement Bundle is the most cost effective and simplest way of improving thermal performance of your existing heat exchanger fleet.

- 20 to 40% improved thermal performance (compared with conventional)
- Improved hydraulic performance (reduced shell-side pressure drop)
- Custom designed solutions
- Minimized project scope
- Improved efficiency and throughput (compared with conventional)
- Vibration problems eliminated
- Easy cleaning



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