

Retrofit High-efficiency Tube Option

Energy-saving option for Ultra-sorb® and Rapid-sorb®

Retrofit high-efficiency tubes save energy

DRI-STEEM's retrofit high-efficiency dispersion tubes with polyvinylidene fluoride (PVDF) insulation reduce wasted energy by up to 85% by reducing downstream heat gain and condensate production. High-efficiency tubes are available as a retrofit for existing installations.

Steam releases heat as it condenses

Ultra-sorb and Rapid-sorb dispersion assemblies disperse steam into airstreams substantially cooler than the steam. This cool air flowing across uninsulated hot dispersion tubes causes some steam inside the tubes to condense. Steam gives up heat as it condenses. This heat passes easily through uninsulated dispersion tubes into the airstream, increasing downstream air temperature. The amount of condensate produced is directly proportional to downstream air heat gain.

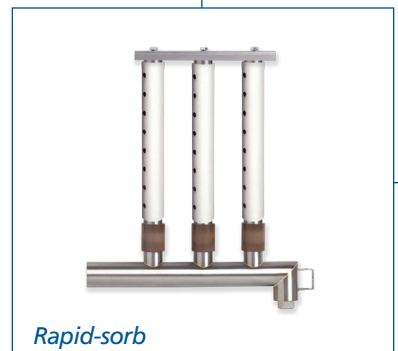
Unwanted downstream heat gain wastes resources

- **Every gallon (8.33 pounds) of condensate produced wastes about 8,000 Btus** — the energy originally used to change that water into steam.
- **Heat added to downstream air increases the cooling load** in applications that humidify and cool simultaneously, wasting energy cooling the unnecessarily heated air.
- **Unnecessary condensate production can cause a humidification system to not meet set point** when steam expected to meet the humidification load becomes condensate. This can require specifying a higher-capacity steam generator.
- **Condensate sent to a drain wastes water and water treatment chemicals** (e.g., softened water, deionized or reverse-osmosis treated water, water treated with boiler chemicals). Note that not all humidification systems return condensate to the steam generator.

Excellent payback possibilities

Retrofit high-efficiency tubes will pay for themselves quickly—usually less than two years. Contact DRI-STEEM at 800-328-4447 or your local DRI-STEEM representative for a payback analysis.

mc_042808_0915

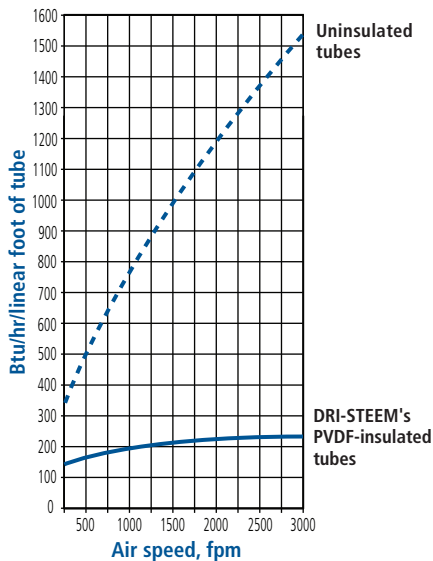


DRI-STEEM[®]
The humidification experts

Retrofit high-efficiency tubes improve performance measurably

Dispersion tube heat loss vs. airspeed

Heat loss vs. air speed at 50 °F for a 3" o.c. tube bank, 1½" dia. stainless steel tubes with 212 °F internal wall temperature



Notes:

- Heat loss calculations based on the following references: Zhukauskas, A. 1987. *Convective Heat Transfer in Cross Flow*. In S. Kakac, R.K. Shah, and W. Ang, eds. *Handbook of Single-Phase Convective Heat Transfer*. New York: John Wiley & Sons, pp. 6.1-6.45.
- PVDF insulation on tube is 1/8" thick and has a thermal conductivity of 0.0185 Btu/hr-ft²-F.

mc_042508_1321

DRI-STEEM Corporation

An ISO 9001:2000 certified corporation

U.S. Headquarters:

14949 Technology Drive • Eden Prairie, MN 55344
800-328-4447 • 952-949-2415 • 952-229-3200 (fax)
www.dristeem.com
sales@dristeem.com

European office: Marc Briers

Grote Hellekensstraat 54 b • B-3520 Zonhoven • Belgium
+3211823595 (voice) • +3211817948 (fax)
E-mail: marc.briers@dristeem.com

Continuous product improvement is a policy of DRI-STEEM Corporation; therefore, product features and specifications are subject to change without notice.

For the most recent product information, visit the literature section of our web site, www.dristeem.com

Ultra-sorb is covered by the following Patents, with additional patents pending: United States Patent numbers 5,126,080; 5,277,849; 5,372,753; 5,376,312; 5,543,090

DRI-STEEM, Rapid-sorb, and Ultra-sorb are registered trademarks of DRI-STEEM Corporation and are filed for trademark registration in Canada and the European community.

© 2009 DRI-STEEM Corporation

Form No. High-Eff-Tube-Retrofit2-1109

The PVDF insulation on high-efficiency dispersion tubes allows up to an 85% reduction in wasted energy by significantly reducing airstream heat gain and condensate production. The energy savings can yield payback in less than one year.

DRI-STEEM co-developed PVDF insulation for humidification applications when no available material could provide significant insulating results, withstand the environmental challenges of steam humidification, and meet strict plenum requirements.

Advanced insulation meets stringent requirements

PVDF is an advanced material commonly used in chemical, semiconductor, medical, defense, and aerospace industries and has the following characteristics:

- **Approved for use in plenums:** Flame spread/smoke developed values are 0/0, exceeding UL 723 (ASTM E84) requirement of 25/50.
- **Rated for high-temperature operation:** Rated for 300 °F (149 °C) continuous operation.
- **Closed-cell structure will not absorb water or support microbial growth.**
- **Will not shift or slip on tubes:** Advanced manufacturing process ensures insulation attaches securely to tubes.
- **Odor free:** virtually no measurable outgassing.
- **Resistant to UV light.**
- **Rugged and durable:** No particle erosion per ASTM C1071 erosion resistance test; does not contain fiberglass.

mc_042508_1320

The performance you expect from DRI-STEEM

Of course, the real test of high-efficiency tubes is performance:

- **High-efficiency tubes reduce airstream heat gain and condensate production by up to 85% compared to uninsulated tubes** — regardless of load or airstream temperature.
- **Condensate reduction correlates directly to energy savings.** Every pound of condensate that does not drain from the dispersion assembly saves about 1,000 Btus — the amount of energy required to boil a pound of water into steam.
- **Condensate reduction allows using smaller steam generators.** With a higher percentage of generated steam meeting the humidification load rather than draining from the dispersion assembly as condensate, steam generators can be downsized in many cases.
- **Adding PVDF insulation to dispersion tubes causes no excessive airflow pressure drop** — the dense, closed-cell insulation provides exceptionally high performance at 1/8" thickness.
- **Energy savings provides product payback in less than one year** for electric humidification systems, and in about 1½ years for natural gas systems.

mc_042508_1322