NRCC to Evaluate Performance of "Warm-Edge" Windows

Despite the growing interest in new "warm-edge" windows with special insulative edge spacers, there is little or no good documentation of their practical benefit with regard to energy efficiency or condensation resistance. How much better are Marvin windows, for example, which are made with the new PPG "InsulEdge" edge spacer (see ***EDU***, September 1992), than other windows with ordinary aluminum spacers? Even more important, of the 10 or so different types of warm-edge spacers on the market, which is best?

These questions should soon be answered by the results of a comprehensive study now underway at National Research Council Canada (NRCC), which will assess the relative performance of the following nine types of window edge spacers:

- Conventional aluminum;
- Tremco "Swiggle Strip";
- Edgetech "Super Spacer";
- Halima thermally broken metal spacer;
- PPG "InsulEdge";
- Nichols Homeshield insulative spacer;
- Omniglass fiberglass spacer;
- Edgetech silicone spacer; and
- Southwall "InsulEdge."

Phase I of the NRCC study, completed last year, compared the relative performance of four types of spacers but provided little practical data for assessing their benefit in installed windows. Phase II, now underway, should provide useful "apples-to-apples" comparison of the nine spacers. According to project leader Hakim Elmahdy at NRCC, the results will be available in August.

For more information, contact Hakim Elmahdy, Institute for Research in Construction, National Research Council Canada, Building M-20, Montreal Road, Ottawa, ON K1A 0R6, Canada; (613) 993-9752.

PRODUCTS

Fans for Central Exhaust Ventilation Systems

Exhaust ventilation systems use a single remote fan to exhaust indoor air from one or more rooms through a system of ductwork and grilles. Ten manufacturers now sell exhaust fans that are specifically intended for residential central ventilation systems. The 43 models listed in the cross-reference chart on page 11 include a variety of fans and systems, ranging from single-port exhaust fans to complete engineered systems.

Background vs. Spot Ventilation

One key factor to consider when selecting hardware and designing a central exhaust system is whether it will provide background ventilation, spot ventilation, or both.

Background ventilation is intended to maintain indoor air quality throughout a house by providing continuous fresh air at a relatively low rate (15 cubic feet per minute per person). Spot ventilation, on the other hand, is for removing air contaminants such as odors and moisture at their sources, using intermittent, high-capacity (50 to 150 cfm) exhaust. Some manufacturers and designers prefer to install separate systems for each type of ventilation; others prefer to use one system for both.

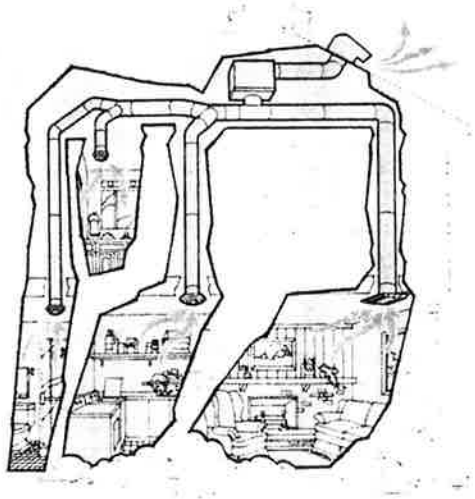

Figure 1 — A central exhaust ventilation system is more effective and quieter than simple bathroom and kitchen exhaust fans, yet generally less expensive than a balanced system with heat recovery ventilator.
Source: NuTone.

Fan America recommends the separate system approach. Its EVS system (Figure 6) is designed for background ventilation only. It includes special flow regulators (made by American Aldes) that maintain a constant exhaust rate from each room, regardless of fan speed or pressure. For

spot ventilation from bathrooms and kitchens. Fan America recommends a separate system from its MVP line.

Several manufacturers design their systems for dual-purpose background and spot ventilation.

Aldes and Therma-Stor Products make two-speed fans that switch from low-speed background ventilation to high-speed spot ventilation. The high-speed boost is controlled by a timer, humidistat, manual switch, or occupancy sensor. The Aldes VMP-K (Figure 7) can provide simultaneous background and spot ventilation using special self-balancing flow regulators that maintain low-flow background ventilation levels to some rooms while allowing high-speed exhaust from others.

The Aereco "Demand-Controlled Ventilation System" (Figure 9) provides the most flexible control of all the systems listed in the cross-reference chart. A constant-speed fan maintains near-constant depressurization throughout the ductwork. Individual "exhausters" in each room control the air flow out of that room. The exhauster in one room can vary the exhaust rate to provide continuous or spot ventilation, without affecting flow rates in other rooms. In other words, the system is capable of simultaneously supplying varying combinations of background and spot ventilation, depending on the needs of individual rooms or zones.

Finally, almost any of the single-speed fans can be used for combined background and spot ventilation by adding manually operated variable speed control. The home occupant varies the speed manually to switch back and forth between background and spot ventilation.

Airflow Capacity

The airflow rate delivered by a fan in a ducted system varies with the airflow resistance or "static pressure" of the duct system. The greater the static pressure (expressed in "inches water gauge" or "in. w.g."), the lower the flow rate. In residential central ventilation systems, the static pressure is typically between 0.2 and 0.6 in. w.g.

The airflow capacities listed in the cross-reference chart (column 4) are at either 3/8 or 0.4 in. w.g. static pressure (whichever was available from the manufacturer). For systems with unusually long (or short) duct systems, the actual airflow delivery will deviate from the value in the chart.

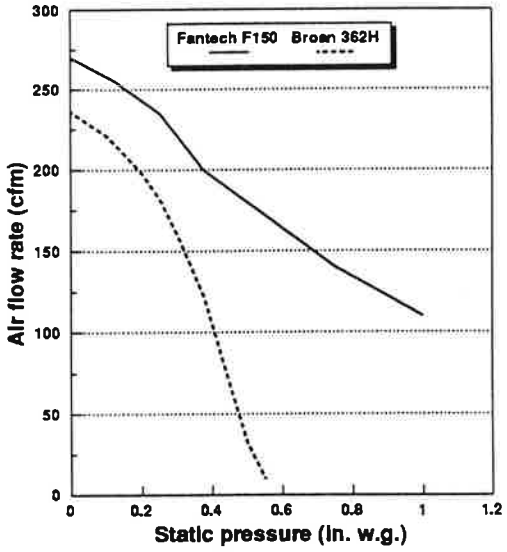

Figure 2 — Fan curve for Broan Lo-Sone 362H and Fantech F150 exhaust fans.

Most manufacturers' specification sheets include charts or graphs showing airflow capacity over a range of static pressure. Those data allow the designer to predict actual air delivery for any particular duct system. They also give a general picture of how sensitive a fan may be to changes in static pressure.

The graph in Figure 1 shows air flow delivery versus static pressure for the Broan Lo-Sone 362H and Fantech F150. Notice that the Fantech is less sensitive to increasing static pressure above 0.3 in. w.g., making it more suitable for systems with long or complex duct configurations.

Sound Ratings

The cross-reference chart does not include sound ratings, simply because there is presently no good way to make "apples-to-apples" comparisons for remote ducted fans (although the industry is working on it).

Some of the fans listed in the chart have sone ratings according to the Air Movement and Control Association (AMCA) standard for commercial fans. Others are rated according to a different test developed by AMCA's Home Ventilating Institute (HVI) Division for residential products. And some have decibel ratings according to customized tests devised by their manufacturers.

Unfortunately, it is impossible to translate between these various ratings. One rough indicator is motor speed (column 7). In general, noise level varies with motor speed; the slower the better. Keep in mind that the actual noise home occupants hear depends not only on the

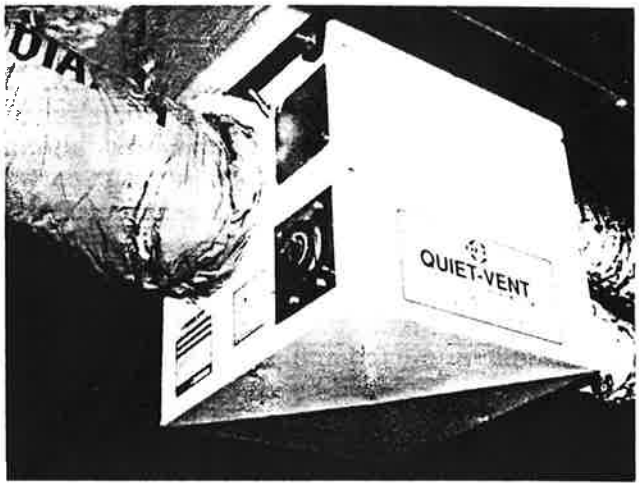

Figure 3 — The Therma-Stor Quiet-Vent is one of only two two-speed multi-port fans on the list. Therma-Stor takes a unique approach to controlling ventilation rate. Rather than continuous low-flow background ventilation, the Quiet-Vent is designed to supply intermittent ventilation at a relatively high flow rate. A seven-day timer, with two-hour intervals, controls low-speed operation. For more ventilation, the home occupant adjusts the timer for more "on" time. High-speed boost is controlled from individual rooms.

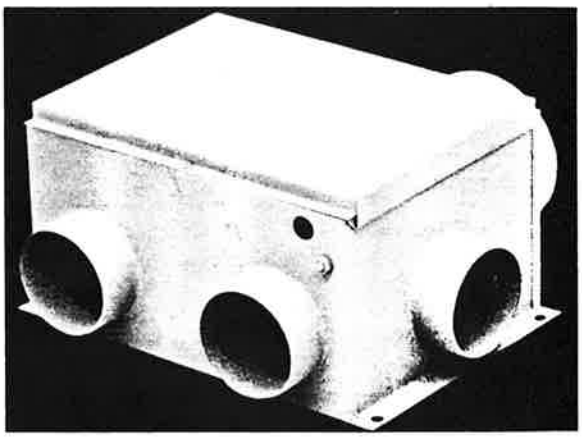

Figure 4 — Fantech's CVS Series multi-port fans come in both two-port and four-port models.

fan, but also on other factors such as duct length and type of mounting.

Power draw and efficiency

The cross-reference chart lists nominal power draw in watts at full speed (column 7). It also lists whether the motor is a "permanent split capacitor" (PSC) type (column 8). PSC motors are generally about twice as efficient as "shaded pole" motors, the most common (and a less expensive), alternative. PSC motors also run cooler, last longer, and are much better for continuous operation than shaded pole motors.

Fan Categories

The cross-reference chart is organized into four main categories: Multi-port "cabinet" fans, in-line "tube" fans, converted ceiling fans, and engineered systems.

Multi-Port "Cabinet" Fans

A residential cabinet fan is basically a "fan in a box" with one or more inlet ports and one outlet port (Figures 3, 4, and 7). Some cabinet fans, such as the Therma-Stor Quiet Vent, include controls in the box. Four companies sell multi-port fans suitable for residential exhaust ventilation systems.

In-line Tube Fans

A "tube" fan is a round centrifugal blower with single round inlet and outlet duct connections (Figures 5 and 6). Because of their relatively

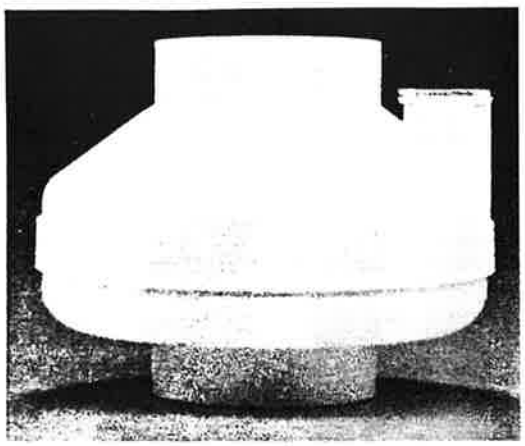

Figure 5 — Fantech tube fan.

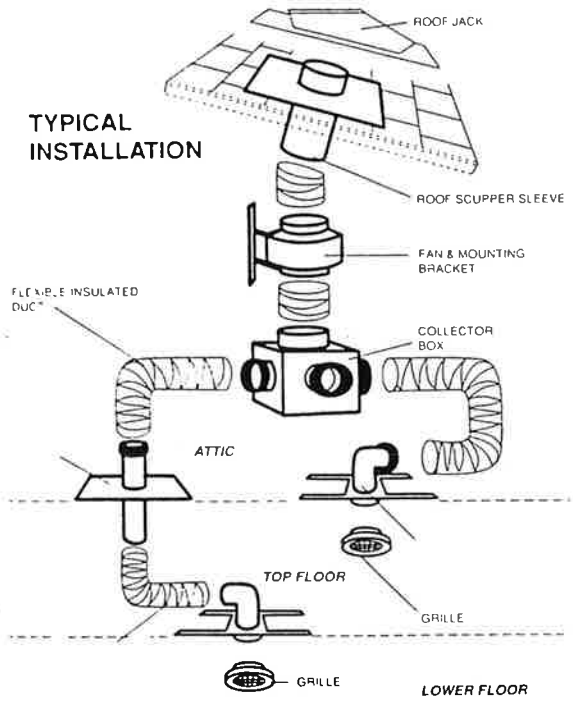

Figure 6 — Fan America's Engineered Ventilation System (EVS) consists of a single-speed Kanalflakt tube fan with multi-port collector box and Aldes constant airflow regulators. It is intended for low-flow continuous background ventilation. For spot ventilation, Fan America recommends its MVP package, which uses manually adjustable exhaust vents rather than the Aldes airflow regulators.

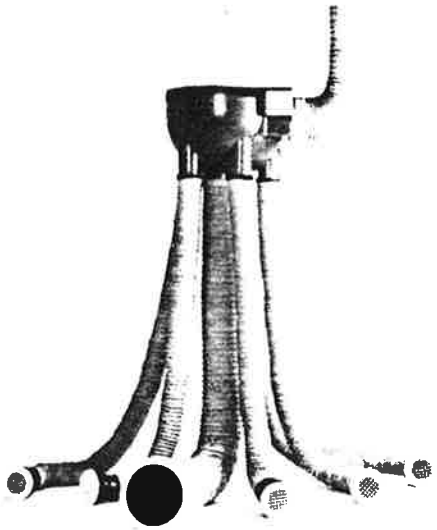

Figure 7 — The Aldes VMP-K is a two-speed fan with three or five small inlets for bath and bedroom exhaust and one large inlet for kitchen exhaust.
The Aldes system uses unique "constant airflow regulators" (CARs) in the inlet ports of the fan or in the room exhaust grilles. These regulators contain a pressure-sensitive bulb that varies the grille aperture and provides constant flow rates regardless of the static pressure of the duct system. The Aldes system is capable of providing simultaneous background and spot ventilation to different areas of the home.

good performance over a wide range of static pressures, tube fans have been popular for some difficult exhaust applications, such as sub-slab radon control. For multi-zone applications, they can either be combined with a multi-port collector box (Figure 6) or "Y" duct connectors.

Converted Ceiling Fans

Four manufacturers offer modifications of their regular ceiling fans to turn them into single-port cabinet fans for ducted applications. The square ceiling grille is replaced by an adapter plate with a duct connector collar. Product literature often refers to this as an "in-line" application.

Engineered Fan Systems

Three companies sell complete engineered exhaust ventilation systems consisting of a central blower that is carefully matched to a variety of accessories. The three brands of systems are quite different, ranging from the relatively simple Fan America EVS system (Figure 6) to the very sophisticated Aereco "Demand-Controlled Ventilation System" (Figure 9).

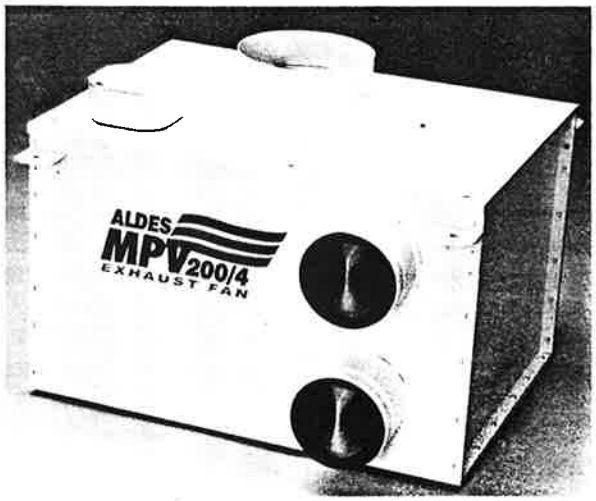

Figure 8 — The Aldes MPV 200/4 multi-point cabinet fan is a two-speed fan, used most commonly in multi-family applications. The unique "constant airflow regulators" are visible in the two open ports.

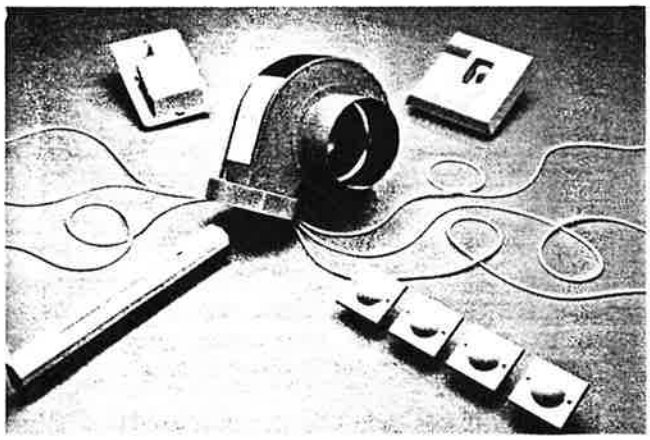

Figure 9 — Probably the most sophisticated hardware on the list, the Aereco ventilation system creates constant depressurization throughout the duct system. "Exhausters" in each room control the airflow rate from that room. Like the Aldes system, the Aereco system is capable of providing simultaneous background and spot ventilation to different areas of the home.

Key to Exhaust Fan Cross-Reference Chart

[1]Approximate trade cost for fan only. [Exceptions: the Fan America EVS and Premium packages include grilles, ducts, and roof jack; converted ceiling fans include an "in-line" adapter plate.]

[2]Fan airflow rate at 3/8 in. w.g. or 0.4 in. w.g. static pressure. For engineered systems with constant flow regulators the listed CFM rating is typical of the system in its spot ventilation mode.

[3]Nominal wattage at full rated speed.

[4]Fan speeds: 1 = single speed; 2 = two-speed

*Fans in engineered systems with automatic flow regulators do not use fan speed to determine flow rates in the same way that other fans do. The Aereco VPH 080, for example, is a single-speed 1,100 rpm fan that teams up with self-regulating "exhausters" to give desired flow rates.

[5]Nominal full-rated speed.

[6]Y = permanent split capacitor motor; N = shaded pole motor.

EXHAUST FAN CROSS-REFERENCE CHART

MANUFACTURER	MODEL	COST [1]	AIR FLOW CAPACITY (cfm) [2]	POWER DRAW (watts) [3]	SPEEDS[4]	MOTOR SPEED (rpm) [5]	MOTOR PSC?[6]	INLET DUCT SIZE[7]
MULTI-PORT FANS								
Broan	MP100	$135	95	50	1	2,750	Y	4,6
	MP140	$155	135	85	1	2,950	Y	4,6
	MP200	$185	190	140	1	2,950	Y	4,6
	MP280	$215	270	190	1	1,650	Y	4,6
	SP100	$120	95	50	1	2,850	Y	6
	SP140	$125	135	85	1	2,900	Y	6
	SP200	$135	190	140	1	3,000	Y	6
Fantech	CVS190	$155-$210	140	89	1	1,490	Y	4
	CVS275	$180-$240	205	158	1	2,150	Y	4
	CVS300	$230-$310	270	107	1	1,470	Y	4
	CVS400	$275-$365	300	148	1	1,500	Y	5
Therma-Stor	Quiet-Vent	$235	305	110	2	1,400	Y	4,6
Reversomatic	DB200	$90	161	21	1	1,570	N	4
	DK260	$110	208	30	1	1,485	N	5
	DB300	$115	270	75	1	1,550	N	5
	QDB300	$135	140	75	1	1,050	N	5
See also, Aldes VMP-K and MPV 200/4 under "engineered systems"								
IN-LINE TUBE FANS:								
Fantech	F100	$115-$155	78	48	1	3,140	Y	4
	F150	$125-$165	200	90	1	2,500	Y	6
	F160	$150-$200	259	100	1	2,150	Y	6
	F175	$180-$240	265	150	1	2,700	Y	6
	F200	$185-$250	285	100	1	2,150	Y	8
Rosenberg	R100	$95	86	50	1	2,900	Y	4
	R125	$95	103	50	1	2,900	Y	5
	R150	$150	226	90	1	2,350	Y	6
See also Fan America under "engineered systems"								
CONVERTED CEILING FANS								
Broan	Lo-Sone 361H	$125	106	100	1	1,625	N	3.25x10
	Lo-Sone 362H	$130	122	115	1	1,250	N	3.25x10
	Lo-Sone 363H	$135	216	165	1	1,625	N	3.25x10
NuTone	QT200	$130	125	118	1	1,550	N	7 or 3.25x10
	QT300	$135	215	168	1	1,600	N	7 or 3.25x10
Penn Ventilator	Z81	$125	170	130	1	1,110	Y	8x12
	Z10	$155	310	147	1	1,080	Y	8x14
	Z101	$165	320	157	1	955	Y	8x14
Reversomatic	QCF300	$160	166	25	1	1,200	N	6x12
	QCF400	$190	185	30	1	1,080	N	8x12
	QCF500	$220	280	75	1	1,050	N	8x18
ENGINEERED SYSTEMS								
Aereco	VPH 080	$180-$220	200	38	*	1,100	Y	6
Aldes	VMP-K	$315-$330	200	65	2*	1,800	Y	3,6
	MPV200/4	$315	180	55	*	1,550	Y	4
Fan America	EVS/6-075	$235	55-75	90	*	2,300	Y	4
	EVS/6-100	$255	100	90	*	2,300	Y	4
	EVS/6-140	$305	140	100	*	2,150	Y	4
	MVP/ Premium I	$140-$165	64-100	48	1	3,140	Y	5
	MVP/ Premium II	$220-$235	94-165	90	1	2,300	Y	5

Contact Information

American Aldes Ventilation Corporation
Northgate Center Business Park
4537 Northgate Court
Sarasota, FL 34234-2124
(813) 351-3441, Fax: (813) 351-3442

Broan Mfg. Co., Inc.
926 W. State Street
Hartford, WI 53027
(414) 673-4340

Can-Aereco Ventilation, Inc.
40 Kodiak Crescent, Unit 11
Downsview, ON M3J 3GS, Canada
(416) 398-3533, Fax: (416) 398-5308

DEC International, Inc.
Therma-Stor Products Group
P.O. Box 8050
Madison, WI 53708
(800) 533-7533

Fan America, Inc.
1748 Independence Blvd., Suite F-5
Sarasota, FL 34234
(813) 359-3616, Fax: (813) 359-3523

Fantech, Inc.
1712 Northgate Blvd., Suite B
Sarasota, FL 34234
(813) 351-2947, Fax: (813) 355-0377

NuTone
Madison and Red Bank Roads
Cincinnati, OH 45227-1599
(800) 543-8687

Penn Ventilator Co., Inc.
Red Lion and Gantry Roads
Philadelphia, PA 19115
(215) 464-8900, Fax: (215) 677-1647

Reversomatic Heating & Mfg. Ltd.
790 Rowntree Dairy Road
Woodbridge, ON L4L 5V3, Canada
(416) 851-6701, Fax: (416) 851-8376

Rosenberg Inc.
P.O. Box 130603
St. Paul, MN 55113
(612) 639-0846, Fax: (612) 639-2107

Other Manufacturers and Distributors Not in the Cross-Reference Chart

APV Vent-Axia, Inc.
230 Ballardvale Street, Building B
Wilmington, MA 01887
(800) 456-4735

Vent-Axia is an English manufacturer specializing in axial fans. The company will begin making its Powerfan line of centrifugal in-line tube fans in the US later this year.

Fasco Industries, Inc.
Consumer Products Division
P.O. Box 150
810 Gillespie Street
Fayetteville, NC 28302
(800) 334-4126

Fasco is a major fan manufacturer that sells one line of centrifugal exhaust fans for remote residential use. The "Super Q" line of converted ceiling fans is manufactured for Fasco by Penn Ventilator. Fasco also makes the blower for Therma-Stor's Quiet Vent multi-port fan.

Kanalflakt, Inc.
(813) 359-3267 (same address as Fantech)

Kanalflakt tube fans are identical to Fantech fans, although they come in different capacities. Kanalflakt is a sister division of Fantech. Fantech models are marketed through wholesalers to builders, contractors, and installers, while Kanalflakt models are marketed to design engineers and specifiers.

Tjernlund Products, Inc.
1601 9th Street
White Bear Lake, MN 55110-6794
(800) 255-4208, Fax: (612) 426-9547

Tjernlund is a manufacturer of power venters, duct boosters, combustion air fans, and commercial blowers. The company also sells Fantech tube fans as the Tjernlund M-Series and P-Series.

Heat Traps for Water Heaters

Heat traps are commonly mentioned as a cost-effective way to reduce standby losses from water heaters. Often pictured as a looped pipe section on the hot-water outlet, they prevent heat from bleeding off by convection. While a field-fabricated pipe loop apparently works, a more engineered approach is to use special one-way valves installed at the tank inlet and outlet connections.

Heat Trap, the brand name

"Heat Trap" is actually a trade name for a single product manufactured by The Perfection Corporation of Madison, Ohio. Heat Trap "dielectric fittings for water heaters" consist of 3-inch-long threaded tubes with plastic liners and internal "ball and seat" valves (Figure 1). They are installed in pairs on the hot-water outlet and cold-water inlet. The cold-side version has a light plastic ball that floats up to its seat when there is no flow. Conversely, the hot-side version has a heavy ball that sinks down to its seat when there is no flow.

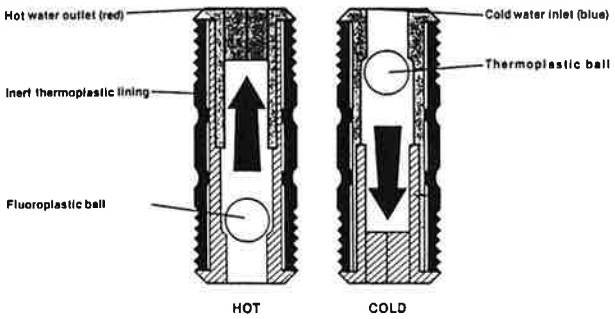

Figure 1 — A plastic ball in the body of each Heat Trap prevents standby convection losses when there is no flow through the water heater. In the hot-pipe version, the ball sinks to seat at the bottom. In the cold-pipe version, the ball floats to seat at the top.

Perfection promotes the product as an energy saver and as an anti-corrosion device. The second claim is justified by the plastic liner, which prevents dissimilar tank and pipe metals from coming into contact.

Heat Traps can be identified on a water heater by an arrow and the word FLOW, or by the red