



Ductwork

Lesson Standard practice in Minnesota fails to produce efficient ductwork.

Goal Maximize energy efficiency and building durability through properly designed, sealed, and balanced ductwork.

What Happened On the Minnesota Green Communities demonstration projects, problems consistently occurred with ductwork, including duct design, pressure balancing, and duct sealing.

On The Wellstone, plenum and cavity space were designed as fresh air returns, rather than using ductwork. This design results in leaky, inefficient, and uncontrolled air movement. There were last-minute attempts to improve the design, but because of the timing, significant improvements were not possible.

On Viking Terrace, testing revealed high pressures in bedrooms. This was a result of a design that delivered more air to the bedrooms than could move back to the central return, located in the major living space of the apartments, when the only return was under-cut bedroom doors. Particularly in the garden level apartments, the extra pressure could force moist air from the apartments into the walls. Over time it may have resulted in mold problems. After the project was complete, the developers went back and installed jump ducts to resolve the pressure imbalances.

The ducts in three green single family demonstration homes where the ducts were sealed with mastic were tested for tightness. On the first home, the ducts had to be sealed twice because the first time the subcontractor had disregarded the specs and sealed them with tape. The test results showed duct leakage to the outside ranged from 10 to 22 cfm at 25 Pascals, and total duct leakage ranged from 197 to 432 cfm at 25 Pascals. Standard homes by the same developer were tested for a baseline. *The green homes were three to seven times tighter.*

In Viking Terrace kitchens, at least a portion of the ductwork was very leaky. It is part of the reason the kitchen ventilation fans move less air than desired and reduces the energy efficiency.

Relevant Green Communities Criteria:

- 5.1 a, b Energy Efficient Building Design
- 7.5 a, b, c Exhaust Fans
- 7.6 a, b Ventilation



Photo courtesy of Advanced Energy

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Recommendations Use a central ducted return and jump ducts to distribute the air and for make-up air. Do not use wall cavities as returns, and have the mechanical engineer verify that room pressures will be balanced when doors are closed. Require that ducts be sealed with low-VOC, water-based mastic (not tape) and require a visual inspection of the ductwork installation and sealing before signing off on the work and before the walls are closed up around the work.

If possible, specify pressurization testing (duct blasting) for satisfactory completion of the work—at least on a first unit or section of the home.

Take Away In Minnesota, developers should spend extra time with the architects and builders to ensure design is balanced, efficient, and that installation specifications include careful sealing.

For more information on green ductwork, see related Lessons Learned fact sheets: Duct Design, Duct Sealing, Kitchen Ventilation, and Pressure Balancing Between Rooms.

LESSONS LEARNED Minnesota Green Communities Demonstration Projects

This publication is part of a series of lessons learned originating from Minnesota Green Communities demonstration projects. The Minnesota Green Communities initiative is currently the largest green building program in Minnesota, with 497 units completed, 908 under construction, and another 1,645 under development. Eight demonstration projects were funded through the Minnesota Green Communities program. The initiative is completing building performance testing on the demonstration projects, and has gathered lessons learned in several areas.

The Lessons Learned series includes the following publications: Integrated Design, Multifamily Green Rehabilitation, Construction Training and Monitoring, Ductwork, Duct Design, Duct Sealing, Kitchen Ventilation, Radon Testing and Mitigation, Pressure Balancing Between Rooms, Water Efficiency, and Cost Increase Triggers in Plans and Specifications. All publications can be found online at www.mngreencommunities.org.



Minnesota Green Communities, a collaboration of the Greater Minnesota Housing Fund, the Family Housing Fund, and Enterprise, is an initiative designed to foster the creation of affordable, healthier, and more energy-efficient housing throughout Minnesota. The initiative will support the production of affordable housing with markedly reduced energy costs, use of materials beneficial to the environment, conservation-minded land use planning, and attention to the creation of healthy environments and lifestyles for individuals, children, families, and communities. For more information, please visit www.mngreencommunities.org.

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