ENGINEERING REPORT

TOPIC: R Value Testing Results on Low Temperature Application Damper Products

Report No. 598:11 **APRIL 1998** **By Mike Wiltfong**

Outside air is an important ingredient to any HVAC system. Periodic or constant induction of cold outside air may have a direct impact on coil freeze up. More importantly, is the amount of cold outside air leaking through a damper and driving heating costs up in the building. Good damper designs incorporate materials and construction methods that are proved to perform at these conditions. For leakage tests, Ruskin certifies damper leakage to AMCA 500 requirements. This assures the system designer gets the right outside air damper to limit infiltration of outside air. However, there is no AMCA certification requirements for transmission loss. Therefore, Ruskin contracted an independent third party lab to evaluate several damper alternatives and calculate "R" values. Following are the set up parameters and results for "R" values on three Ruskin models and one competitor's. "R" value can be defined as total resistance rate of energy for a unit area for a specific temperature difference.

For evaluation of thermal transmission properties we have selected the following Ruskin dampers models and one competitor. This will include:

A. Standard non-insulated, Ruskin Model CD50 with low temperature blade seals.

B. Ruskin Model CD TI50 with high density injected foam insulation and thermal isolated breaks.

C. Ruskin Model CD40 x 2 "Air-Gap" damper with thermal transmission isolated frame.

D. Competitor "T's" foam injected thermal break damper with soft side seals.

Sample Configuration:

All samples supplied to the independent testing lab were 24" x 24" O.D. nominal. None with any type of actuating device or other optional equipment.

Purpose:

Outside air control dampers exposed to extreme cold environments may require some type of blade insulation. Thermal breaks are an added feature that reduces cold transmission across the damper. Since each application is unique, Ruskin manufactures many types of dampers for this requirement. The purpose of this testing is to identify the "R" Value efficiencies of each listed Ruskin model and one competitor model we will call competitor "T".

By comparing more than one type of Ruskin Thermal damper, these tests will give system designers a choice, based on actual test conditions, as well as comparisons to our competition.

Test Method:

The thermal transmission properties were determined in accordance with the American Society for Testing and Materials standard test methods ASTM C 976-90 (Reapproved 1996), "Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box" and ASTM C 1199-97, "Measuring the Steady Rate Thermal Transmittance of Fenestration Systems Using Hot Box Methods" at controlled laboratory conditions of 70°F and 50% relative humidity.

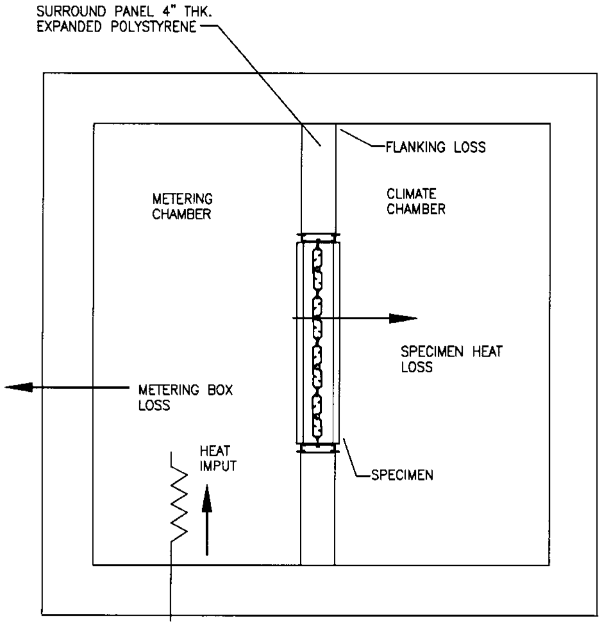
*The Independent Technical Center wall and edge guarded hot box were used to perform the thermal tests. Metering and climatic air chamber air temperatures were maintained at 95°F and 55°F, respectively. Parallel air flow velocities of 38 and 200 fpm were maintained for the metering and climatic chambers, respectively. (See attachment drawings.)

Instrumentation:

Twenty (20) special limits, 30 gage, type T, copper/constantan thermocouple sensors were used to measure the metering and climatic chamber specimen surface temperatures. The sensors were area weighted with respect to the damper components to provide an average surface temperature. Surround panel surface, chamber air and baffle surface temperatures were measured in accordance with ASTM C 976, Section 5.7, (ref. dwg C).

Sample Preparation:

The damper was mounted in the center of a 96 x 96 x 6 inch surround panel and tested. A cal-



GUARDED HOT BOX SET-UP

ibration test was performed on the 6 inch polystyrene panel to determine the panel flanking loss. All dampers were closed tight on the metering chamber side to prevent air infiltration between the chambers.

RESULTS:

Ruskin Model CD50 with no insulation.

"R" Value 0.043

Ruskin Model CD TI50 with integral thermal break and high density injected insulating foam.

"R" Value 0.549

Ruskin Model CD40x2 with integral thermal break frame and air gap barrier.

"R" Value 0.764

Competitor "T" with injected foam blade and soft side seals.

"R" Value 0.242

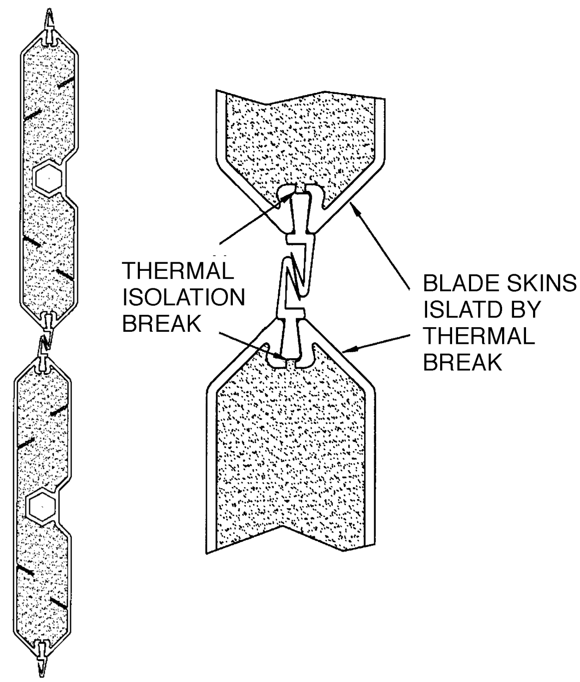
Summary:

Ruskin models CD TI50, and CD40x2 surpassed the "R" valve rating of competitor "T" by at least a 2 to 1 margin. Even against injected foam blades with thermal breaks, CD40x2 still out performed all models tested because of the air gap and thermally isolated frames.

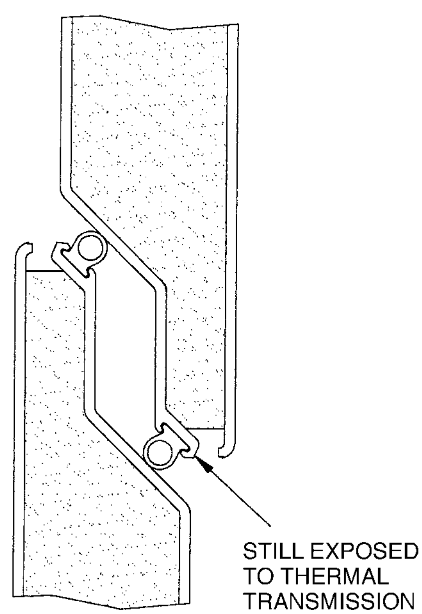
Ruskin's model CD TI50 dampers include a thermal break and standard Ruskin compressible side jamb seals. Competitor "T" also utilizes a foam injected blade with thermal break but provides less cross section than the comparable Ruskin CD TI50. Ruskin model CD TI50 is available standard with a 5 inch frame for easy installation.

Observation of the CD TI50 blade overlap versus the competition, reveals Ruskin's use of the blade edge seal to reduce thermal transmission from blade skin overlap (ref. dwg. A). Competitor "T" blade configuration still permits thermal transmission from front to back of the blade skins. (ref dwg B).

*Actual test reports and lab location available upon request from Ruskin.



RUSKIN CD TI50
FIGURE A



COMPETITOR "T"
FIGURE B