



Thermal Performance of Complex Fenestration Systems: Skylights, Greenhouse Windows and Curtainwalls

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EXECUTIVE SUMMARY

A recently developed standard, CSA A440.2, provides a method to rate regular windows and sliding glass doors for energy performance. In addition to other doors, which are being addressed in another standard, CSA A453, there are a few additional fenestration products found in Canadian buildings. This report specifically addresses problems of obtaining U-values for some complex window systems: skylights, greenhouse windows and curtainwalls.

Examples of these products are examined for energy performance using guarded-hot-box testing and detailed computer simulation.

Considerable difficulty was found both in testing and simulating these products. However reasonably good agreement was found between testing and simulation for a flat skylight and for a curtainwall, less with a domed skylight and a greenhouse. Film coefficients and thermal bridging caused concern.

Noteworthy was the fact that all products tested had substantially higher U-values than even standard vertical windows, let alone high-performance windows. Recommendations are made for further development of test procedures, further testing and extension of CSA standards to cover these products.

RÉSUMÉ

La norme CAS A440.2, récemment établie, fournit une méthode d'évaluation de la performance énergétique des fenêtres ordinaires et des portes coulissantes. En plus des autres portes, régies par la norme CSA A453, il existe d'autres produits de fenestration que l'on retrouve dans le bâtiment canadien. La rapport porte sur les difficultés posées par l'évaluation de la valeur U sur certains systèmes de fenêtres complexes: puits de lumière, fenêtres de serre et murs-rideaux.

On étudie la performance énergétique de certains produits à titre d'exemples à l'aide de boîtes d'essais thermique et de simulation par ordinateur.

ON a rencontré de nombreux obstacles en voulant mettre à l'essai ou simuler ces produits. Les puits de lumières plats ainsi que les murs-rideaux ne présentèrent pas trop de difficultés comparativement aux serres et aux puits de lumière en coupole. Les coefficients de film et les ponts thermiques suscitèrent particulièrement l'attention.

Il faut noter que tous les produits étudiés comportaient des valeurs U plus élevées que dans le cas des fenêtres ordinaires verticales, sans mentionner les fenêtres haute performance. Des recommandations sont faites pour élaborer des procédures d'essais, faire plus d'essais et élaborer les normes CSA afin d'englober ces produits.

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