



ESTABLISHMENT OF A SOLAR HEAT GAIN COEFFICIENT TEST METHOD

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EXECUTIVE SUMMARY

A test procedure has been established for the determination of fenestration solar heat gain coefficient (SHGC) using simulated solar irradiance. In this procedure, a calorimeter cell is used to measure the thermal performance of a full scale window sample under the controlled environmental conditions of an indoor simulator facility. The SHGC of the test sample is determined from the ratio of the measurement of solar heat gain entering the metering cell over the available energy provided by the solar simulator.

A sensitivity analysis is presented to assess the effect of environmental conditions encountered during testing at the National Solar Test Facility and comparison is made to performance simulations under CSA daytime winter design conditions. SHGC measurement using this method are presented for nine high-performance windows. A comparison of these test results with values calculated using the *VISION3* and *FRAME* simulation programs shows good agreement.

The project was commissioned by the CANMET Division of Energy, Mines and Resources Canada, to support the development of testing capabilities for the national window rating and labelling Program. The test procedure draws collectively upon past research undertaken by the Solar Calorimetry Laboratory toward the development of a universal solar simulator based test method and references the extensive work conducted in support of ANSI/ASHRAE Standard 93-1986.

SOMMAIRE

On a établi une méthode d'essai pour la détermination du coefficient de gain thermique solaire (CGTS) d'un fenestrage par simulation de l'éclairement énergétique solaire. Dans cette méthode une cellule calorimétrique est utilisée pour mesurer le rendement thermique d'un échantillon de fenêtre grandeur réelle dans les conditions environnementales contrôlées d'une installation de simulation intérieure. Le CGTS de l'échantillon à l'essai est déterminé à partir du rapport du gain thermique solaire mesuré entrant dans la cellule de mesure à l'énergie disponible fournie par le simulateur solaire.

On présente une analyse de sensibilité destinée à évaluer les effets des conditions environnementales qui régnaient pendant l'essai effectué au Centre national d'essais d'équipements solaires, et on fait une comparaison avec des simulations de rendement dans les conditions diurnes hivernales de calcul de l'ACNOR. Des résultats de mesures du CGTS effectuées avec cette méthode sont présentés pour neuf fenêtres à haut rendement. Une comparaison de ces résultats d'essai avec des valeurs calculées à l'aide des programmes de simulation *VISION3* et *FRAME* montre une bonne compatibilité.

Le projet a été mis en service par la Division de l'énergie de CANMET, d'Énergie, Mines et Ressources Canada, en vue de soutenir la mise au point d'outils d'essai pour le programme national d'évaluation et d'étiquetage des fenêtres. La méthode d'essai est fondée sur l'ensemble des travaux antérieurs de recherche réalisés par la Laboratoire de calorimétrie solaire en vue de mettre au point une méthode d'essai universelle basée sur l'utilisation d'un simulateur solaire, et elle fait référence aux vastes travaux effectués à titre de soutien de la norme 93-1986 de l'ANSI/ASHRAE.