

**SUPPLEMENT TO DEVELOPMENT
OF A PROCEDURE FOR CALCULATING
TOTAL WINDOW U-VALUE AND SHGC**

PREPARED FOR:

Energy Efficiency Division
Energy Technology Branch/CANMET
Department of Natural Resources Canada
Ottawa, Ontario
DSS Contract No. 23440-0-9646
December, 1991

PREPARED BY:

Enermodal Engineering Limited
368 Phillip Street, Unit 2
Waterloo, Ontario
N2L 5J1
519) 884-6421; Fax: (519) 884-0103

SCIENTIFIC AUTHORITY:

Joël Allarie
Energy Efficiency Division
Energy Technology Branch/CANMET
Department of Natural Resources Canada
580 Booth Street
Ottawa, Ontario
K1A 0E4

CITATION

Enermodal Engineering Limited. *Supplement To Development Of A Procedure For Calculating Total Window U-Value And SHGC*, DSS Contract No. 23440-0-9646. Efficiency and Alternative Energy Technology Branch, Energy, Mines and Resources Canada, Ottawa, Ontario, 1991 (19 pp.)

Copies of this report may be obtained through the following:

Efficiency and Alternative Energy Technology Branch
Energy, Mines and Resources Canada
580 Booth Street, 9th Floor
Ottawa, Ont.
K1A 0E4

or

Document Delivery Service
Library and Documentation Services Division
CANMET
Energy, Mines and Resources Canada
562 Booth Street
Ottawa, Ont.
K1A 0G1

DISCLAIMER

This report is distributed for informational purposes only and does not necessarily reflect the views of the Government of Canada nor constitute an endorsement of any commercial product or person. Neither Canada nor its ministers, officers, employees or agents makes any warranty in respect to this report or assumes any liability arising out of this report.

NOTE

Funding for this project was provided by the Federal Panel on Energy Research and Development, Energy, Mines and Resources Canada.

© Minister of Supply & Services Canada 1992
Catalogue No. M91-7/192-1992E
ISBN. 0-662-19795-X

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE #</u>
Executive Summary	iii
Résumé	iv
1.0 INTRODUCTION	1
2.0 WINDOW FRAME U-VALUES	2
2.1 Methodology	2
2.2 Glass Block U-Values	2
2.3 Patio Door U-Values	4
2.4 Skylight U-Values	5
3.0 REFERENCES	8
APPENDIX A	9
APPENDIX B	13

LIST OF FIGURES

Figure 2.1	Glass Block Configuration	3
Figure 2.2	Skylight Mounting Details	6

LIST OF TABLES

Table 2.1	Calculated U-Values for Patio Doors	4
Table 2.2	Calculated U-Values for Skylights	7
Table 8	FRAME Calculated U-Values for Picture Window Frames	10
Table 9	FRAME Calculated U-Values for Hinged Window Frames	11
Table 10	FRAME Calculated U-Values for Sliding Window Frames	12

EXECUTIVE SUMMARY

This work was carried out under contract for Energy, Mines and Resources Canada (EMR) as part of the CANMET High-Performance Window Project. This project includes support for the development of window performance standards and labelling procedures.

Window thermal performance standards, under development by the Canadian Standards Association (CSA), include procedures for calculating total window performance from component simulation and tabulated values for a wide range of window types. Procedures are based on two EMR computer programs: VISION, supported by the University of Waterloo, provides thermal analysis of simulated glazing systems, and FRAME, developed and supported by Enermodal Engineering Ltd., is a graphic design tool for thermal analysis of window frames.

This report presents ongoing work for the CSA Subcommittee on Energy Evaluation of Windows and has been useful as input to the energy performance standard.

EMR, Ottawa
March 1992

RÉSUMÉ

Cette étude a été conduite sous contrat avec Énergie, Mines et Ressources Canada (EMR) dans le cadre du projet "Fenêtres performantes" de CANMET. La participation à l'établissement de normes et labels concernant l'efficacité thermique des fenêtres fait partie des objectifs de ce projet.

Des normes d'efficacité énergétique des fenêtres, qui sont actuellement établies par l'Association canadienne de normalisation (Acnor), offrent l'option de calculer l'efficacité de la fenêtre complète à partir d'une simulation des composantes de la fenêtre et de valeurs tabulées pour un large éventail de types de fenêtres. La méthode repose sur deux programmes d'ordinateur de EMR: VISION, de l'Université de Waterloo, qui permet l'étude thermique du vitrage simulé, et FRAME, de Enermodal Engineering Ltée, qui est un outil de conception graphique pour l'analyse thermique des cadres de fenêtres.

Ce rapport reflète les travaux en cours du sous-comité Acnor d'évaluation énergétique des fenêtres et joue un rôle important dans l'établissement d'une norme sur l'efficacité énergétique des fenêtres.

EMR, Ottawa
mars 1992