APPENDIX E

PROCEDURE FOR ACCOUNTING FOR SERIES AND PARALLEL HEAT FLOW PATHS

E1: For envelope assemblies containing metal framing: The Ui shall be determined by using one of the following methods:

1. Results from laboratory or field test measurements. One of the procedures specified in 780 CMR 3108.2 shall be used.
2. The thermal resistance of those roof and wall assemblies listed in Tables E-1 and E-2 shall be corrected using the following procedures:

The total resistance of the heat flow path (Rt) is determined from the Equation E-1:

$$Rt = Ri + Re$$

Where:

R = 1/U
Rt = the total resistance of the envelope assembly.
Ri for: i = 1 to n, is the resistance of the series elements.

Re is the equivalent resistance of the element containing the parallel path, and the value of Re is:

Re = R value of insulation x Fc
(where Fc is the parallel path correction factor)

The Parallel Path correction Factors (Fc) may be obtained from tests conducted using procedures listing in 780 CMR 3108.2. Parallel Path Correction Factors for some envelope assemblies are listed in Tables E-1 and E-2.

Table E-1
ROOFS: PARALLEL PATH CORRECTION FACTORS[1]

Bridged R-Value	0	5	10	15	20	25	30	40	45	50	55
Correc-tion Factor	1.0	0.96	0.92	0.88	0.85	0.79	0.76	0.73	0.71	0.69	0.67

Note 1. Table E-1 values are based upon: Metal trusses with 4-ft. spacing that penetrate the insulation, and 0.66 inch diameter crossmembers every one ft.

Table E-2
WALL SECTIONS WITH METAL STUDS: PARALLEL PATH CORRECTION FACTORS

Size of Members	Gauge of Stud	Spacing of Framing	Cavity Insulation R-Value	Correction Factor
2 x 4	18 - 16	16" o.c.	R-11	0.50
2 x 4	18 - 16	24" o.c.	R-11	0.60
2 x 6	18 - 16	16" o.c.	R-11	0.40
2 x 6	18 - 16	24" o.c.	R-11	0.45

Table E-3
CALCULATION PROCEDURES FOR EVALUATING ALL SERIES AND PARALLEL HEAT FLOW PATHS

		BRIDGE TYPE	
		Metal	Non-Metal
Type of Material to whuch bridge is attached	Metal	Thermal Bridges in Sheet Metal Construction Method	Parallel Path
	Non-Metal	Zone Method	Parallel Path

3. For elements with internal metallic structures bonded on one or both sides to a metal skin or covering, the "Thermal Bridges in Sheet Metal Construction," the calculation procedure as specified in "Thermal Bridges in Sheet Metal Construction," *Studies in Building Physics* (Johannesson, Gudni. 1981. Division of Building Technology, Lund Institute of Technology, Lund, Sweden. Report of TVBH-3007) shall be used.
4. For elements other than those covered above, the zone method described in Chapter 23 of the ASHRAE Handbook, 1985 Fundamentals Volume shall be used. The formulas on pages 23.13-.14 shall be used for calculation.

E2: For envelope assemblies containing Non-metal Framing, the Ui shall be determined from results from one of the laboratory or field test measurements specified in 780 CMR 3108.2 or from the ASHRAE series parallel method. Formulas in Chapter 23, page 23.2 of the ASHRAE Handbook, 1985 Fundamentals Volume shall be used for these calculations.

NON-TEXT PAGE