APPENDIX 4-1
SKETCHES OF COMMON WALL CONSTRUCTION TYPES

Taken in part from the 1985 ASHRAE Handbook of Fundamentals, American Society of Heating, Refrigerating and Air Conditioning Engineers, Atlanta GA
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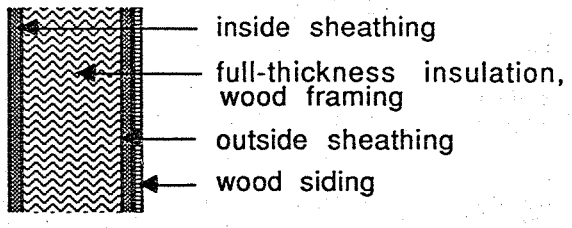
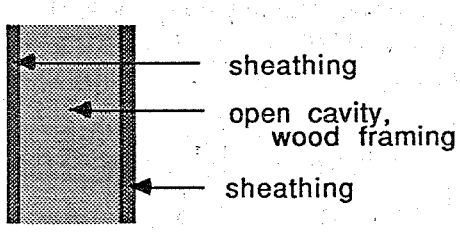
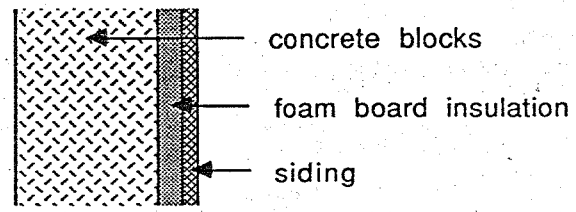
standard wood-framed outside wall



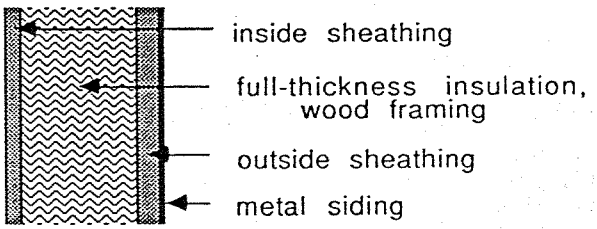
standard wood-framed partition wall



insulated concrete block wall



metal-sided wall with wood framing



APPENDIX 4-2
OVERALL THERMAL RESISTANCES OF GLAZINGS

A. Windows (vertical), no indoor shades, no storm sash

Type	Thermal Resistance, m²K/W Winter	Summer
Single glass, clear,		
surface emittance of 0.84	0.16	0.17
0.60	0.17	0.18
0.40	0.19	0.20
0.20	0.22	0.23
Insulating glass, double,		
5 mm air space, 3 mm glass	0.29	0.27
6 mm air space, 3 mm glass	0.30	0.29
13 mm air space, 6 mm glass	0.36	0.31
Insulating glass, triple,		
6 mm air space, 3 mm glass	0.45	0.40

B. Windows (vertical), no indoor shades, glass outdoor storm sash with 25 mm air space

Type	Thermal Resistance, m²K/W Winter	Summer
Single glass, clear,		
surface emittance of 0.84	0.43	0.36
0.60	0.37	0.29
0.40	0.40	0.29
0.20	0.43	0.36
Insulating glass, double,		
5 mm air space, 3 mm glass	0.48	0.43
6 mm air space, 3 mm glass	0.50	0.45
13 mm air space, 6 mm glass	0.56	0.45
Insulating glass, triple,		
6 mm air space, 3 mm glass	0.67	0.56

C. Adjustment factors for windows (multiply R-values in parts A and B by these factors)

	Wood Frame	Metal Frame
Single glass	1.05 - 1.18	0.91 - 1.00
Double glass	1.00 - 1.11	0.77 - 0.83
Triple glass	1.00 - 1.05	0.67 - 0.77
Storm sash applied over single glass	1.00 - 1.11	0.71 - 0.83
Storm sash applied over double or triple glass	1.00 - 1.05	0.67 - 0.77

D. Greenhouse Glazings

Material (includes surface resistance)	Unit Area Thermal Resistance, m²K/W
Glass, single	0.16
Glass, double, 6 mm air space	0.25
Polyethylene film, single	0.14
Polyethylene film, double, 100 mm space	0.25
Fiberglass reinforced panel	0.15
Double panel, acrylic or polycarbonate	0.35

Notes:

a. Winter conditions are -18 C outdoor air, 21 C indoor air, and 24 km/hr (6.67 m/s) wind speed.
b. Summer conditions are 32 C outdoor air, 24 C indoor air, solar radiation of 782 W/m², and 12 km/hr (3.33 m/s) wind speed.
c. Manufacturer's data should be consulted for more accurate data for specific products, especially for thermally improved windows.
d. Data obtained from the ASHRAE Handbook of Fundamentals. Consult that reference for more detail and other glazing configurations.

APPENDIX 4-3
OVERALL THERMAL RESISTANCES OF DOORS

A. Wood doors, no storm doors

Type	Thermal Resistance, m²K/W Winter	Summer
Flush doors		
hollow core, 35 mm thick	0.37	0.39
hollow core, 44 mm thick	0.38	0.40
with single glazing	0.28	0.33
solid core, 35 mm thick	0.45	0.46
solid core, 44 mm thick	0.53	0.55
with single glazing	0.38	0.40
with double glazing	0.48	0.49
solid core, 57 mm thick	0.65	0.68
with single glazing	0.43	0.44
with double glazing	0.53	0.55
Panel doors		
11 mm panels, 35 mm thick door	0.31	0.33
11 mm panels, 44 mm thick door	0.33	0.34
with single glazing	0.26	0.28
with double glazing	0.35	0.37
29 mm panels, 44 mm thick door	0.45	0.46
with single glazing	0.29	0.30
with double glazing	0.40	0.42

B. Wood doors, with storm doors, winter conditions only

Type	Thermal Resistance, m²K/W wood storm door	metal storm door
Flush doors		
hollow core, 35 mm thick	0.59	0.55
hollow core, 44 mm thick	0.61	0.55
with single glazing	0.53	0.49
solid core, 35 mm thick	0.68	0.63
solid core, 44 mm thick		
with single glazing	0.61	0.55
with double glazing	0.70	0.65
solid core, 57 mm thick	0.88	0.84
with single glazing	0.65	0.61
with double glazing	0.76	0.70
Panel doors		
11 mm panels, 35 mm thick door	0.53	0.48
11 mm panels, 44 mm thick door	0.55	0.49
with single glazing	0.49	0.43
with double glazing	0.57	0.52
29 mm panels, 44 mm thick door	0.68	0.63
with single glazing	0.52	0.46
with double glazing	0.63	0.57

C. Steel doors

Type	Thermal Resistance, m^2K/W Winter	Summer
Solid urethane foam core, no thermal break, 44 mm thick, no storm door	0.44	0.45
Solid urethane foam core, with thermal break, 44 mm thick,		
no storm door	0.93	0.98
wood storm door	1.10	
metal storm door	1.03	

Notes:

a. Data is based on nominal door size of 1.12 m by 2.03 m.
b. Winter conditions are −17.8 C outdoor air temperature, 21.1 C indoor air temperature, and 24 km/hr (6.67 m/s) wind speed.
c. Summer conditions are 31.7 C outdoor air temperature, 23.9 C indoor air temperature, and 12 km/hr (3.33 m/s) wind speed.
d. Wood storm door values are for 50% glass area; metal storm door values are for any glass area.
e. Flush door values are for 17% glass area; double glazing with 6.35 mm air space.
f. Panel door values are for 55% panel area; glazed panel door values are for 33% glass area and 22% panel area; double glazing with 6.35 mm air space.
g. Data obtained from the ASHRAE Handbook of Fundamentals.