# Energy Efficiency Certification Form

**Building Standards Department**

Each individual responsible for the design of the subject building shall affix their seal and signature in the applicable box below thereby certifying that , pursuant to Article 2.1.1.11 of the Ontario Building Code, the energy efficiency of such building has been designed and will be constuctued to good engineering practice such as described in ASHRAE/IES Standards 90.1-1989 "Energy Efficient Design of New Buildings except Low Rise Residential Buildings" and the "Guidelines for the interpretation of ASHRAE/IES 90.1-1989"issued by the Ministry of Housing.

**Application Number**

| Project Name: | Project Address: |
|---|---|

PROFESSIONAL STAMP BY **ARCHITECT**:
CERTIFIED BY:

Signature Date(YY/MM/DD)

Name and Title

Address

City Province

PROFESSIONAL STAMP BY **MECHANICAL**
CERTIFIED BY:

Signature Date(YY/MM/DD)

Name and Title

Address

City Province

PROFESSIONAL STAMP BY **ELECTRICAL**
CERTIFIED BY:

Signature Date(YY/MM/DD)

Name and Title

Address

City Province

PROFESSIONAL STAMP BY **OTHER**
CERTIFIED BY:

Signature Date(YY/MM/DD)

Name and Title

Address

City Province

APPLICATION NUMBER

## ASHRAE/IES 90.1 COMPLIANCE SUMMARY — Form 90.1sm

| Project Name: | Project Address: | |
|---|---|---|
| Designer Name: | Designer Signature: | Date: |

## Basic Requirements

The building design complies with the Basic Requirements of the following sections:

| Section Reference | | Compliance Column | Additional Forms |
|---|---|---|---|
| 5.4 | ELECTRIC POWER | ☐ Yes | |
| 6.4 | LIGHTING | ☐ Yes | |
| 7.4 | AUXILIARY SYSTEMS & EQUIPMENT | ☐ Yes | |
| 8.4 | BUILDING ENVELOPE | ☐ Yes | |
| 9.4 | HVAC SYSTEMS | ☐ Yes | |
| 10.4 | HVAC EQUIPMENT | ☐ Yes | |
| 11.4 | SERVICE WATER HEATING SYSTEMS AND EQUIPMENT | ☐ Yes | |
| 12.4 | ENERGY MANAGEMENT | ☐ Yes | |

**Method of Additional Compliance:**

☐ **System/Component Method**

☐ **Building Energy Cost Budget Method**

## System/Component Method

The building design complies with the requirements of:

| | | | |
|---|---|---|---|
| Section 6 LIGHTING | _____ Prescriptive Criteria (6.5)<br>_____ System Performance Criteria (6.6) | ☐ Yes | |
| Section 8 ENVELOPE | _____ Prescriptive Criteria (8.5)<br>_____ System Performance Criteria (8.6) | ☐ Yes | |
| Section 9 HVAC SYSTEMS | Prescriptive Criteria (9.5) | ☐ Yes | |
| Section 11 SERVICE WATER HEATING | Prescriptive Criteria (11.5) | ☐ Yes | |

## Building Energy Cost Budget Method

The building design complies with the requirements of Section 13 of the Standard because the Design Energy Cost is equal to, or less than, the Energy Cost Budget as calculated in accordance with the requirements of ASHRAE/IES 90.1 ☐ Yes

**Notes:**

Building design must comply with all Basic Requirements.

Building design must comply with either the System/Component Method or the Building Energy Cost Budget Method. Indicate which method was selected.

Within the System/Component Method, indicate whether the Prescriptive Criteria or the System Performance Criteria was used for Lighting and Envelope compliance.

APPLICATION NUMBER

## ASHRAE/IES 90.1 COMPLIANCE INFORMATION FOR PLANS AND INSPECTION Form 90.1ci

### NOTICE TO BUILDING PERMIT APPLICANTS

**The following information must be detailed on the building plans, where the pertinent section of Standard 90.1 applies to the building design.**

| Section Reference | | Compliance Column | Inspection Column |
|---|---|---|---|
| **5.4.1** | Single line drawing of electrical distribution system c/w locations of provision for check metering | | |
| **5.4.2** | Transformer schedule, including maximum losses permitted | | |
| **5.4.3** | Electric motor schedule, including maximum losses permitted | | |
| **6.4.1** | Exterior lighting fixture, lamp and ballast schedule<br>Interior lighting fixture, lamp and ballast schedule | | |
| **6.4.2** | Lighting controls schedule | | |
| **7.4.2** | Freeze protection boiler schedule, including rating and minimum efficiency | | |
| **8.4.1** | Insulation levels required in walls, roof, and floor<br>Window schedule, including type, U-value, shading coefficient, and VLT | | |
| **8.4.5** | Door schedule, including type, U-value and maximum air leakage | | |
| **8.4.8** | Skylight schedule, including U-value of fenestration and curb, shading coefficient, and VLT | | |
| **9.4.3** | Temperature control schedule, including maximum/minimum setpoints, and deadband | | |
| **9.4.4** | Off-hour control schedule c/w provision for closing exhaust/outdoor air | | |
| **9.4.7** | Outdoor/exhaust air schedule | | |
| **9.4.8** | Pipe insulation schedule, including R-value and thickness<br>Duct insulation, sealing, and leak testing schedule | | |
| **9.5 & 10.4.1** | HVAC equipment schedule, including rated capacities, minimum efficiencies, economizer ratings, fan ratings, and pump ratings | | |
| **9.5.2** | System temperature reset control schedule | | |
| **11.4.1 11.4.2** | SWH equipment schedule, including rated capacities and minimum efficiencies | | |
| **11.4.3** | SWH pipe insulation schedule, including R-value and thickness | | |
| **11.4.5** | Fixture schedule for showerheads, and lavatories in public washrooms, including flow rates and total flow | | |
| **11.4.6** | Pool heater schedule, including equipment ratings and minimum efficiencies | | |

APPLICATION NUMBER

## SECTION 6 LIGHTING — Form 6-4

| Project Name: | Project Address: | |
|---|---|---|
| Designer Name: | Designer Signature: | Date: |

## Basic Requirements

| Section Reference | | Compliance Column | Additional Forms |
|---|---|---|---|
| **6.4.1** | **LIGHTING POWER** | | |
| 6.4.1.1 | Exterior Lighting Power Allowance (ELPA): _____kW<br>Exterior Connected Lighting Power (CLPe): _____kW<br>CLPe ≤ ELPA | ☐ Yes | Form 6-4a or LTGSTD21 Exterior Screen |
| | Interior Lighting Power Allowance (ILPA): _____kW<br>Interior Connected Lighting Power (CLPi): _____kW<br>CLPi ≤ ILPA | ☐ Yes | |
| | ILPA calculated by: ☐ Prescriptive Criteria (Section 6.5)<br>☐ System Performance Criteria (Section 6.6) | | |
| **6.4.2** | **LIGHTING CONTROLS** | | |
| 6.4.2.1 | Each enclosed space has controls to turn lights off | ☐ Yes | |
| 6.4.2.2 | Each enclosed space has required number of control points | ☐ Yes | |
| 6.4.2.3 | The minimum number of lighting controls is provided | ☐ Yes | Form 6-4b or LTGSTD21 Controls Screen |
| 6.4.2.6 | Controls are readily accessible to personnel occupying space | ☐ Yes | |
| 6.4.2.7 | Hotel/Motel guest rooms have master switch(es) | ☐ Yes or ☐ N/A | |
| 6.4.2.8 | Exterior lighting not intended for 24 hr use has timer or photocell control | ☐ Yes or ☐ N/A | |
| **6.4.4** | **BALLASTS** | | |
| 6.4.4.1.1 | Fluorescent lamp ballasts meet or exceed the BEF of Table 6-4 | ☐ Yes or ☐ N/A | |
| 6.4.4.3 | Fluorescent lamps use multiple lamp ballasts with tandem wiring | ☐ Yes or ☐ N/A | |
| 6.4.4.4 | Fluorescent lamp ballasts have a power factor ≥ 90% | ☐ Yes or ☐ N/A | |

**Notes:**
N/A - not applicable: i.e. system not in building, exception from standard applies, etc.
LTGSTD21 - lighting computer program provided with the standard.

APPLICATION NUMBER

## ENVELOPE SUMMARY — Form 8-5

| | | |
|---|---|---|
| Project Name: | Project Address: | |
| Designer Name: | Designer Signature: | Date: |

| Prescriptive Criteria | | | | Compliance Column | Worksheets |
|---|---|---|---|---|---|
| **Internal Load Density (ILD)** _____ W/ft² | | | | | |
| | **Design** | | **Requirement** | | |
| **Fenestration Properties** | | | | | |
| Gross wall area (GWA) | _____ | | | | |
| Fenestration Area (FA) | _____ | | | | |
| Fenestration U-Value | _____ | | | | |
| Fenestration SCx | _____ | | | | |
| Fenestration PF | _____ | | | | ☐ Marked up ACP Table |
| Window-wall ratio (FA/GWA) | _____ | ≤ | _____ | ☐ Yes | |
| | **Design** | | **Requirements** | | |
| **Wall Design** | | | | | |
| Heat capacity (HC) | _____ | | | | |
| Insulation position | _____ | | | | |
| U-Value | _____ | ≤ | _____ | ☐ Yes | |
| | **Design** | | **Requirements** | | |
| **Other Envelope Components** | | | | | |
| U-Values | | | | | |
| Roof | _____ | ≤ | _____ | ☐ Yes | |
| Wall adjacent to unconditioned space | _____ | ≤ | _____ | ☐ Yes or ☐ N/A | |
| Floors over unconditioned space | _____ | ≤ | _____ | ☐ Yes or ☐ N/A | |
| R-Values | | | | | |
| Walls below grade | _____ | ≥ | _____ | ☐ Yes or ☐ N/A | |
| Slab-on-grade ☐ Horizontal ☐ Vertical | _____ | ≥ | _____ | ☐ Yes or ☐ N/A | |
| Width _____ Height _____ | | | | | |

**Notes**

N/A - not applicable: i.e. system not in building, exception from standard applies, etc.

MARKHAM

**APPLICATION NUMBER**

## SECTION 9 HVAC SYSTEMS — Form 9-4

| Project Name: | Project Address: | |
|---|---|---|
| Designer Name: | Designer Signature: | Date: |

## Basic Requirements

| Section Reference | | Compliance Column | Additional Forms |
|---|---|---|---|
| **9.4.1** | **LOAD CALCULATIONS** | | |
| 9.4.1.1 | Load estimate as per ASHRAE _____ or other method _____ | ☐ Yes | |
| 9.4.1.2 | Indoor Design Conditions: _____ °F DB ( _____°C)<br>_____ °F WB/% RH ( _____°C) | ☐ Yes | |
| 9.4.1.3 | Outdoor Design Conditions: _____ °F ( _____°C) | ☐ Yes | |
| 9.4.1.8 | Safety Factor:_____% (10% Maximum) | ☐ Yes | |
| 9.4.1.9 | Heating Warm-up Factor:_____% (30% maximum) | ☐ Yes | |
| | Cooling Cool-down Factor:_____% (10% maximum) | ☐ Yes | |
| **9.4.2** | **SEPARATE AIR DISTRIBUTION SYSTEMS** | | |
| 9.4.2.1 | Air distribution systems for process loads are separate from those for comfort loads | ☐ Yes or ☐ N/A | |
| **9.4.3** | **TEMPERATURE CONTROLS** | | |
| 9.4.3.1,2 | One temperature control for each HVAC system and one per zone, minimum | ☐ Yes or ☐ N/A | |
| | Thermostatic controls meet setpoint requirements: heating 55 °F or lower; cooling 85 °F or higher; deadband of 5 °F minimum. | ☐ Yes or ☐ N/A | |
| **9.4.4** | **OFF-HOUR CONTROLS** | | |
| 9.4.4.1 | Each system is equipped with automatic controls for setback/shutdown | ☐ Yes or ☐ N/A | |
| 9.4.4.2 | Air intake & exhaust systems reduce or close on system setback/shutdown | ☐ Yes or ☐ N/A | |
| 9.4.4.3 | Systems for non-simultaneously operating zones expected to operate > 750 h/yr have isolation devices and controls | ☐ Yes or ☐ N/A | |
| **9.4.5** | **HUMIDITY CONTROL** | | |
| 9.4.5.1 | Humidifiers have a humidity control with 30% RH or lower setpoint | ☐ Yes or ☐ N/A | |
| | De-humidifiers have a humidity control with 60% RH or higher setpoint | ☐ Yes or ☐ N/A | |
| **9.4.7** | **VENTILATION SYSTEMS** | | |
| | Ventilation systems designed as per ASHRAE 62-1989, and as per Guidelines | ☐ Yes or ☐ N/A | |
| **9.4.8** | **MATERIALS AND CONSTRUCTION** | | |
| 9.4.8.2,3 | System insulation for pipes meets requirements of Table 9-1 or Equation 9-1, and for ducts Table 9-2 | ☐ Yes or ☐ N/A | |
| 9.4.8.4 | Duct construction as per SMACNA publications | ☐ Yes or ☐ N/A | |
| | If design static pressure > 3 in. wc, leak test is specified | ☐ Yes or ☐ N/A | |
| | If design static pressure is 0.25 to 2 in. wc and ducts are outside conditioned space, sealing as per SMACNA Seal Class C is specified | ☐ Yes or ☐ N/A | |
| **9.4.10** | **COMPLETION REQUIREMENTS** | | |
| 9.4.10.1 | An operating & maintenance manual to be provided to owner as specified | ☐ Yes | |
| 9.4.10.2,3 | Air and water balancing procedures which comply are specified | ☐ Yes | |
| 9.4.10.4 | Testing, calibrating and adjusting of controls systems are specified | ☐ Yes | |

**Notes:**

HVAC - Heating, Ventilating and Air Conditioning

N/A - not applicable: i.e. system not in building, exception from standard applies, etc.

APPLICATION NUMBER

## SECTION 9 HVAC SYSTEMS — Form 9-5

| Project Name: | Project Address: | |
|---|---|---|
| Designer Name: | Designer: Signature: | Date: |

## Prescriptive Criteria

| Section Reference | | Compliance Column | Additional Forms |
|---|---|---|---|
| **9.5.1** | **SYSTEM AND EQUIPMENT SIZING** | | |
| 9.4.1.2 | Systems and equipment capacity match loads calculated as per 9.4.1 | ☐ Yes or ☐ N/A | |
| **9.5.2** | **ZONE CONTROLS** | | |
| | Zone thermostats and humidistats operate HVAC supply in sequence, and prevent: reheating; recooling; mixing of heated and cooled air; other simultaneous heating and cooling of the zone. | ☐ Yes or ☐ N/A | |
| **9.5.3** | **ECONOMIZER CONTROLS** | | |
| 9.5.3.1 | Each fan system has an air or water economizer | ☐ Yes or ☐ N/A | |
| 9.5.3.2 | Economizers can provide partial cooling with mechanical cooling system | ☐ Yes or ☐ N/A | |
| 9.5.5.3 | Economizer operation does not increase heating energy use | ☐ Yes or ☐ N/A | |
| **9.5.4** | **FAN SYSTEM DESIGN CRITERIA** | | |
| 9.5.4.2 | Fan power of constant volume systems at design ≤ 0.8 W/cfm | ☐ Yes or ☐ N/A | Form 9-5a |
| 9.5.4.3 | Fan power of VAV systems at design ≤ 1.25 W/cfm | ☐ Yes or ☐ N/A | Form 9-5a |
| | VAV fans 75 hp and greater require 50% power @ 50% airflow, or less | ☐ Yes or ☐ N/A | |
| **9.5.5** | **PUMPING SYSTEM DESIGN CRITERIA** | | |
| 9.5.5.3 | Systems with modulating valves are designed for variable flow, 2:1 min. | ☐ Yes or ☐ N/A | |
| **9.5.6** | **SYSTEM TEMPERATURE RESET CONTROLS** | | |
| 9.5.6.1 | Air systems have temperature reset control | ☐ Yes or ☐ N/A | |
| 9.5.6.2 | Hydronic heated or chilled water systems have temperature reset control | ☐ Yes or ☐ N/A | |

**Notes:**
N/A - not applicable: i.e. system not in building, exception from standard applies, etc.

APPLICATION NUMBER

## SECTION 10 HVAC EQUIPMENT — Form 10-4

| Project Name: | Project Address: | |
|---|---|---|
| Designer Name: | Designer Signature: | Date: |

## Basic Requirements

| Section Reference | | Compliance Column | Additional Forms |
|---|---|---|---|
| **10.4.1** | **MINIMUM EQUIPMENT EFFICIENCY:** Equipment efficiencies meet/exceed requirements of Tables 10-1 to 10-10 | ☐ Yes | Form 10-4a |
| **10.4.3** | **EQUIPMENT CONTROLS** | | |
| 10.4.3.1 | Controls for heat pumps with supplementary heaters prevent heater operation when heating loads can be met by heat pump, minimize use of supplemental heat for setback recovery and defrost, and have an emergency heat position with indicator light | ☐ Yes or ☐ N/A | |
| **10.4.4** | **HEATING EQUIPMENT:** Full-load and part-load energy consumption data, and information on energy supply operating latitude to be provided to owner | ☐ Yes | |
| **10.4.5** | **MAINTENANCE:** Operating and maintenance information to be provided as required | ☐ Yes | |

**Notes:**
N/A - not applicable: i.e. system not in building, exception from standard applies, etc.

APPLICATION NUMBER

## SECTION 11 SERVICE WATER HEATING SYSTEMS AND EQUIPMENT Form 11-4

| Project Name: | Project Address: | |
|---|---|---|
| Designer Name: | Designer Signature: | Date: |

## Basic Requirements

| Section Reference | | Compliance Column | Additional Forms |
|---|---|---|---|
| **11.4.1** | **Sizing of Systems:** Load estimate as per ASHRAE ___ or other method ___ | ☐ Yes | |
| **11.4.2** | **Equipment Efficiency:** equipment efficiencies meet/exceed requirements of Table 11-1 | ☐ Yes | Form 11-4a |
| **11.4.3** | **PIPING INSULATION** | | |
| | Type of system: _____ Circulating _____ Non-circulating | | |
| 11.4.3.1 11.4.3.2 | Pipe insulation conforms to Table 9-1 or Equation 9-1, as required for system type | ☐ Yes | |
| **11.4.4** | **CONTROLS** | | |
| 11.4.4.1 | Temperature controls capable of adjustment down to 90 °F | ☐ Yes or ☐ N/A | |
| 11.4.4.1.1 | Separate remote heaters installed for outlets requiring temperatures > 120 °F | ☐ Yes or ☐ N/A | |
| 11.4.4.1.2 | Circulating systems have "Off" timer or control | ☐ Yes or ☐ N/A | |
| **11.4.5** | **EQUIPMENT AND CONTROL REQUIREMENTS FOR THE CONSERVATION OF HOT WATER** | | |
| 11.4.5.1 | Showerheads limit flow to 3.0 USGPM (11 L/m) | ☐ Yes or ☐ N/A | |
| 11.4.5.2 | Lavatories in public facility restrooms meet flow rate, total flow, and temperature requirements | ☐ Yes or ☐ N/A | |
| **11.4.6** | **SWIMMING POOLS** | | |
| 11.4.6.1 | All pool heaters meet the efficiencies levels of Table 11-1 and have a readily accessible On/Off switch | ☐ Yes or ☐ N/A | |
| 11.4.6.2 | Heated swimming pools have pool covers | ☐ Yes or ☐ N/A | |
| 11.4.6.3 | Swimming pool pumps and electric pool heaters have time switches | ☐ Yes or ☐ N/A | |

**Notes:**
N/A - not applicable: i.e. system not in building, exception from standard applies, etc.

APPLICATION NUMBER

## SECTION 11 SERVICE WATER HEATING AND EQUIPMENT Form 11-5

| Project Name: | Project Address: | |
|---|---|---|
| Designer Name: | Designer Signature: | Date: |

## Prescriptive Criteria

| Section Reference | | Compliance Column | Additional Forms |
|---|---|---|---|
| **11.5.4** | **COMBINATION SERVICE WATER HEATING OR SPACE HEATING EQUIPMENT** | | |
| | Selection meets the requirements of this section, including efficiency | ☐ Yes or ☐ N/A | |
| **11.5.5** | **ADDITIONAL EQUIPMENT EFFICIENCY MEASURES** | | |
| 11.5.5.2 | Gas fired water heaters using indoor air for combustion have a flue damper | ☐ Yes or ☐ N/A | |
| 11.5.5.3 | Storage water heaters for non-circulating systems have heat traps | ☐ Yes or ☐ N/A | |

**Notes:**
N/A - not applicable: i.e. system not in building, exception from standard applies, etc.

APPLICATION NUMBER

## Section 13 BUILDING ENERGY COST BUDGET METHOD — Form 13

| Project Name: | Project Address: | |
|---|---|---|
| Designer Name: | Designer Signature: | Date: |

**Budget Model (13.4.1 & 13.4.2)**

☐ **Prototype Method** — **Floor Area**

- ☐ Assembly
- ☐ Health/Institutional
- ☐ Hotel/Motel
- ☐ Light Manufacturing
- ☐ Multifamily
- ☐ Office
- ☐ Restaurant
- ☐ Retail
- ☐ School
- ☐ Warehouse

**Total**

☐ **Reference Building Method**

Description

**Annual Energy and Cost**

| **Annual Consumption Summary** | **Budget** | **Proposed** | **Units*** |
|---|---|---|---|
| Space Heating | | | |
| Space Cooling | | | |
| HVAC Auxiliary | | | |
| Misc. Electrical | | | |
| Service Hot Water | | | |
| Interior Lighting | | | |
| Other | | | |
| Other | | | |

**Total Annual Energy Cost** [ ] ≥ [ ] **$/yr**

**ECB** **DECOS**

**Utility Rate Schedules**

Oil:

Electrical:

Gas:

**Computer Program****

**HVAC System Descriptions**

**Budget Design (Table 13-5 or other)**

**Proposed Design**

**Energy Efficiency Features in Proposed Design**

* Units of measure, i. e. kWh, $ft^3$, $m^3$, L

** Name of computer energy performance simulation program

APPLICATION NUMBER

## ASHRAE/IES 90.1 PRESCRIPTIVE ENVELOPE CRITERIA WORKSHEET FORM F - 1

| Location: | Location No. 333 | ACP Table No. 8A-32 |
|---|---|---|

| Internal Load Density (ILD)<br>Typical Building Occupancies | 0.00 - 1.50<br>Multi-family, hotel/motel, warehouse | 1.51 - 3.00<br>Office, some institutional | 3.01 - 3.50<br>Retail, restaurant, school |
|---|---|---|---|
| **Parameter** | | | |
| Projection Factor | | | |
| Maximum Shading Coefficient, SCx | | | |
| Maximum Thermal Transmittance of Fenestration, Uof | | | |
| Fenestration Reference No. (see Table F-1) | | | |
| - Option 1 | | | |
| - Option 2 | | | |
| - Option 3 | | | |
| Maximum Percent Fenestration (window-to-wall ratio, %) | | | |
| Maximum Wall U-value, Uow (heat capacity < 5) | | | |
| Minimum Wall R-value (R=1/U) | | | |
| Maximum Roof U-value, Uor | | | |
| Minimum Roof R-value (R=1/U) | | | |
| Maximum U-value, Wall Adjacent to Unconditioned Space | | | |
| Minimum R-value (R=1/U) | | | |
| Maximum U-value, Floor Over Unconditioned Space | | | |
| Minimum R-value (R=1/U) | | | |
| Minimum R-value, Wall Below Grade | | | |
| Minimum R-value, Unheated Slab on grade | | | |
| - insulation horizontal: 24 in. | | | |
| 36 in. | | | |
| 48 in. | | | |
| - insulation vertical 24 in. | | | |
| 36 in. | | | |
| 48 in. | | | |

MARKHAM

APPLICATION NUMBER

## ASHRAE/IES 90.1 REFERENCE WINDOWS FORM RW-1

### Residential Casement Windows

| Reference Number | U-Value Btu/hr-F-ft2 | (W/m2-C) | SC | Frame | Spacer | Window Type | Coatings | Fills |
|---|---|---|---|---|---|---|---|---|
| RC1 | 0.53 | (2.54) | 0.53 | vinyl | | double | | air |
| RC2 | 0.52 | (2.01) | 0.52 | vinyl | | double | low-e | air |
| RC3 | 0.52 | (1.88) | 0.52 | vinyl | | double | low-e | argon |
| RC4 | 0.54 | (1.77) | 0.54 | vinyl | insulated | double | low-e | argon |
| RC5 | 0.52 | (1.61) | 0.52 | FFV | insulated | double | 1 low-e | argon |
| RC6 | 0.47 | (1.25) | 0.47 | FFV | insulated | triple | 1 low-e | 1 argon |
| RC7 | 0.43 | (1.06) | 0.43 | FFV | insulated | triple | 2 low-e | 2 argon |
| RC8 | 0.46 | (1.06) | 0.46 | FG | insulated | triple | 2 low-e | 2 argon |

### Residential Picture Windows

| Referenece Number | U-Value Btu/hr-F-ft2 | (W/m2-C) | SC | Frame | Spacer | Window Type | Coatings | Fills |
|---|---|---|---|---|---|---|---|---|
| RP1 | 0.48 | (2.75) | 0.74 | vinyl | | double | | air |
| RP2 | 0.38 | (2.14) | 0.71 | vinyl | | double | low-e | air |
| RP3 | 0.34 | (1.92) | 0.68 | vinyl | | double | low-e | argon |
| RP4 | 0.25 | (1.41) | 0.64 | vinyl | | triple | 1 low-e | 1 argon |
| RP5 | 0.23 | (1.30) | 0.64 | FFV | insulated | triple | 1 low-e | 1 argon |
| RP6 | 0.18 | (1.02) | 0.57 | FFV | insulated | triple | 2 low-e | 2 argon |
| RP7 | 0.16 | (0.93) | 0.56 | FG | insulated | triple | 2 low-e | 2 argon |

### Commercial Sliding Windows

| Reference Number | U-Value Btu/hr-F-ft2 | (W/m2-C) | SC | Frame | Spacer | Window Type | Panes | Fills |
|---|---|---|---|---|---|---|---|---|
| CS1 | 0.59 | (3.33) | 0.75 | TBA | one metal | double | clear, clear | air |
| CS2 | 0.58 | (3.32) | 0.30 | TBA | one metal | double | grey, clear | air |
| CS3 | 0.47 | (2.69) | 0.55 | TBA | one metal | double | bronze, low-e | air |
| CS4 | 0.44 | (2.52) | 0.67 | TBA | two metal | triple | clear, clear, clear | air, air |
| CS5 | 0.39 | (2.20) | 0.25 | TBA | two metal | triple | grey, clear, low-e | air, air |
| CS6 | 0.33 | (1.87) | 0.49 | TBA | insulating and metal | triple | bronze, clear, low-e | air, argon |
| CS7 | 0.33 | (1.86) | 0.23 | FFV | insulating | triple | grey, clear, low-e | air, air |
| CS8 | 0.29 | (1.66) | 0.59 | FFV | insulating and metal | triple | clear, clear, low-e | air, air |
| CS9 | 0.29 | (1.66) | 0.23 | FFV | insulating and metal | triple | grey, clear, low-e | air, air |
| CS10 | 0.27 | (1.54) | 0.23 | FFV | insulating and metal | triple | grey, clear, low-e | air, argon |

### Commercial Picture Windows

| Reference Number | U-Value Btu/hr-F-ft2 | (W/m2-C) | SC | Frame | Spacer | Window Type | Panes | Fills |
|---|---|---|---|---|---|---|---|---|
| CP1 | 0.56 | (3.17) | 0.82 | TBA | one metal | double | clear, clear | air |
| CP2 | 0.56 | (3.16) | 0.32 | TBA | one metal | double | grey, clear | air |
| CP3 | 0.47 | (2.67) | 0.53 | FFV | one metal | double | green, green | air |
| CP4 | 0.40 | (2.27) | 0.74 | TBA | two metal | triple | clear, clear, clear | air, air |
| CP5 | 0.33 | (1.90) | 0.28 | TBA | two metal | triple | grey, clear, low-e | air, air |
| CP6 | 0.32 | (1.82) | 0.69 | FFV | two metal | triple | clear, clear, clear | air, air |
| CP7 | 0.29 | (1.63) | 0.72 | FFV | one insulating | double | clear, low-e | argon |
| CP8 | 0.26 | (1.47) | 0.66 | FFV | two metal | triple | clear, clear, low-e | air, air |
| CP10 | 0.26 | (1.47) | 0.40 | FFV | two metal | triple | green, clear, low-e | air, air |
| CP11 | 0.21 | (1.17) | 0.66 | FFV | insulating and metal | triple | clear, clear, low-e | air, argon |
| CP12 | 0.20 | (1.16) | 0.25 | FFV | two metal | triple | grey, clear, low-e | air, argon |

**Notes:**
**Frame: TBA - thermally broken aluminum; FFV - foam filled vinyl; FG - fibreglass**
**Spacer, Panes & Fills: - notes reference from outermost space inwards**