# APPENDIX E, WORKSHEET E-1 (Fuel Gas Code).

## IFGC Appendix E, Worksheet E-1

Residential Combustion Air Calculation Method

(for Furnace, Boiler, and/or Water Heater in the Same Space)

**Step 1:** Complete vented combustion appliance information.

Furnace/Boiler:

_____ Draft Hood (Not fan assisted) _____ Fan Assisted & Power Vent _____ Direct Vent Input: _____ Btu/hr

Water Heater:

_____ Draft Hood (Not fan assisted) _____ Fan Assisted & Power Vent _____ Direct Vent Input: _____ Btu/hr

**Step 2:** Calculate the volume of the Combustion Appliance Space (CAS) containing combustion appliances.

The CAS includes all spaces connected to one another by code compliant openings. CAS volume:____$ft^3$

**Step 3:** Determine Air Changes per Hour (ACH)[1]

Default ACH values have been incorporated into Table E-1 for use with Method 4b (KAIR Method). If the year of construction or ACH is not known, use method 4a (Standard Method).

**Step 4:** Determine Required Volume for Combustion Air.

**4a.** Standard Method.

Total Btu/hr input of all combustion appliances (DO NOT COUNT DIRECT VENT APPLIANCES) Input:_____ Btu/hr

Use Standard Method column in Table E-1 to find Total Required Volume (TRV) TRV: _____ $ft^3$

If CAS Volume (from Step 2) ***is greater than*** TRV then no outdoor openings are needed.

If CAS Volume (from Step 2) ***is less than*** TRV then go to **STEP 5.**

**4b.** Known Air Infiltration Rate (KAIR) Method

Total Btu/hr input of all fan-assisted and power vent appliances (DO NOT COUNT DIRECT VENT APPLIANCES) Input: _____ Btu/hr

Use Fan-Assisted Appliances column in Table E-1 to find Required Volume Fan Assisted (RVFA) RVFA: _____ $ft^3$

Total Btu/hr of all non-fan-assisted appliances Input: _____ Btu/hr

Use Non-Fan-Assisted Appliances column in Table E-1 to
Find Required Volume Non-Fan-Assisted (RVNFA) RVNFA:_____$ft^3$

Total Required Volume (TRV) = RVFA + RVNFA

TRV = _____ + _____ = _____ $ft^3$

If CAS Volume (from Step 2) ***is greater than*** TRV then no outdoor openings are needed.

If CAS Volume (from Step 2) ***is less than*** TRV then go to **STEP 5.**

**Step 5:** Calculate the ratio of available interior volume to the total required volume.

Ratio = CAS Volume (from Step 2) **divided by** TRV (from Step 4a or Step 4b)

Ratio = _____ / _____ = _____

**Step 6:** Calculate Reduction Factor (RF).

RF = 1 ***minus*** Ratio RF = 1 - _____ = _____

**Step 7:** Calculate single outdoor opening as if all combustion air is from outside.

Total Btu/hr input of all Combustion Appliances in the same
CAS (EXCEPT DIRECT VENT) Input: _____ Btu/hr

Combustion Air Opening Area (CAOA):

Total Btu/hr ***divided by*** 3000 Btu/hr per $in^2$

CAOA = _____ / 3000 Btu/hr per $in^2$ = _____$in^2$

**Step 8:** Calculate Minimum CAOA

Minimum CAOA = CAOA ***multiplied by*** RF

Minimum CAOA = _____ x _____ = _____$in^2$

**Step 9:** Calculate Combustion Air Opening Diameter (CAOD)

CAOD = 1.13 ***multiplied by the square root of*** Minimum CAOA

CAOD = 1.13 Minimum CAOA = _____in

[1] If desired, ACH can be determined using ASHRAE calculation or blower door test. Follow procedures in Section G304.