

**DEVELOPMENT SERVICES – BUILDING INSPECTION****INSPECTION GUIDELINES:
KITCHENS****INSPECTION CODE:** 220, 235, 243, 246 101**SCOPE:** RESIDENTIAL**APPLICABLE CODES:** 2016 CBC, CRC, CPC, CMC, CEC, CALGreen, CEnC, and PAMC

The information provided in this document is general and intended as a guide only. Each project is unique and additional requirements may be enforced as deemed appropriate.

IMPORTANT

- ☐ Failure to complete the items below prior to inspection may result in a re-inspection fee.

REQUIRED INSPECTIONS

1. All Trades (Inspection 220)
 - Inspection to verify rough mechanical, electrical, plumbing, and framing. See the “All Trades” inspection guidelines for more information.
2. Insulation (Inspection 235)
 - Applicable to exterior walls only. See the “Insulation” inspection guidelines for more information.
3. Drywall (Inspection 243)
 - See the “Drywall” inspection guidelines for more information.
4. Electrical Torque (Inspection 246)
5. Final Inspection (Inspection 101)

PRE-INSPECTION

- ☐ When upgrading the gas meter size due to installation of new equipment, or if gas meter has been removed due to unsafe or unoccupied structure, please contact Water Gas Waste Water (WGW) at 650-496-5940 for an inspection. The gas stub-out must be in compliance with WGW standards and a green tag must be applied at the gas stub-out prior to Building Final. See the “Gas Meter Release” inspection checklist for all requirements.

INSPECTION**MECHANICAL**

- ☐ Environmental duct exhaust shall terminate not less than 3’ from a property line, 10’ from a forced air inlet, and 3’ from openings into the building. Environmental exhaust ducts shall not discharge onto a public walkway. (CMC 502.2.1)
- ☐ An exhaust fan shall be installed in the kitchen with a minimum capacity to exhaust 100 cfm for demand-controlled or 5 air changes per hour (ach) for continuous ventilation. (ASHRAE 62.2-2013)

- ☐ Makeup air shall be provided to replenish air exhausted by the ventilation system. Makeup air shall be located as to avoid recirculation of contaminated air within enclosures. See the "Makeup Air" inspection checklist for more information. (ASHRAE 62.3-2013)
- ☐ Ducts used for domestic kitchen ranges shall be of metal and shall have smooth interior surfaces. (CMC 504.3)
- ☐ Any new duct shall be sealed with UL 181 non-cloth tape and insulated with a minimum R value of 4.2 and shall be supported every 5'. (CMC 603.8, CMC 603.10, CMC 604.0)
- ☐ Household cooking appliances shall have a vertical clearance above the cooking top of not less than 30" to combustible material or metal cabinets. A minimum of 24" is permitted where (CMC 921.3.2, CMC 921.4.2):
 - ☐ The underside of the combustible material or metal cabinet above the cooking top is protected with not less than 1/4" insulating millboard covered with sheet metal not less than 0.0122" thick.
 - ☐ A metal ventilating hood of sheet metal not less than 0.0122" is installed above the cooking top with a clearance of not less than 1/4" between the hood and the underside of the combustible material or metal cabinet, and the hood is as wide as the appliance and is centered over the appliance.
 - ☐ A listed cooking appliance or microwave oven installed over a cooking appliance is installed per the manufacturer's installation instructions. Microwave ovens shall comply with UL 923.
- ☐ Open-top broiler units shall be provided with a metal ventilating hood of not less than 0.0122" with a clearance of 1/4" between the hood and the underside of combustible material or metal cabinets. A clearance of 24" shall be maintained between the cooking top and the combustible material or metal cabinet, and the hood shall be as wide as the open-top broiler and centered over the unit. (CMC 923.3)

ELECTRICAL

- ☐ Electric household cooking appliances designed for permanent installations shall be installed in accordance with the manufacturer's installation instruction and comply with UL 858. (CMC 921.1)
- ☐ Verify that at least (2) 20-ampere branch circuits were provided for small-appliances at the kitchen. (CEC 210.11(C))
- ☐ Small-appliance circuits shall not supply disposals, dishwashers, and other appliances. (CEC 210.52(B)(2))
- ☐ The rating of any cord-and-plug-connected utilization equipment not fastened in place shall not exceed 80% of the branch-circuit rating. (CEC 210.23(A)(1), CEC 210.23(B))
- ☐ Provide dedicated circuits for kitchen hoods. (CEC 210.52(B)(2))
- ☐ No lighting shall be on the required 20-amp small-appliance branch circuit. (CEC 210.52(B)(2))

- ☐ Where two or more branch circuits supply devices or equipment on the same yoke or mounting strap, a means to simultaneously disconnect the ungrounded conductors supplying those devices shall be provided at the point at which the branch circuits originate. For example, handle ties at garbage disposal and dishwashers are required for single yokes. (CEC 210.7)
- ☐ All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the kitchen shall have ground-fault circuit-interrupter (GFCI) protection and be accessible (CEC 210.8(A))
- ☐ GFCI protections shall be provided for outlets that supply dishwashers. (CEC 210.8(D))
- ☐ Tamper-resistant receptacles are required on all 125-volt, single-phase, 15- and 20-ampere receptacles. (CEC 406.4(D)(2)(a))
- ☐ Cables and raceways must be a minimum of 1-1/4" from the edge of framing members or install 1/16" thick plates. (CEC 300.4(A))
- ☐ Junction boxes and similar enclosures shall be accessible and shall have working clearances (CEC 110.26(A), CEC 314.29)
 - Install grounding pigtails in metal boxes.
- ☐ Where more than (3) current-carrying conductors are stacked or bundled, stackers shall be used to secure the conductors instead of staples.
- ☐ An upgrade of the existing electrical service may be required based on the number of and ampacity of new and existing circuits.
- ☐ Check the electrical panel for new wiring and labeling.
- ☐ For nonmetallic boxes and conduit bodies, wiring shall be secured to the box. (CEC 314.17(C))
- ☐ All switches, outlets, and junction boxes shall be flush with the finished surface. (CEC 314.20)
- ☐ Nonmetallic-sheathed cable, such as Romex, shall be supported every 4-1/2' and within 12" of every cabinet, box, fitting and within 8" of plastic receptacle boxes. (CEC 334.30)
- ☐ A receptacle shall be installed at each wall countertop space that is 12" or wider, and receptacles shall be installed such that it is not more than 2' at any point along wall line. (CEC 210.52(C)(1))
- ☐ At least (1) receptacle shall be installed at each island countertop and peninsular countertop space when the countertop space has a long dimension of 24" or a short dimension of 12" or greater. (CEC 210.52(C)(2), CEC 210.52(C)(3))
- ☐ Countertop spaces separated by rangetops, refrigerators, or sinks shall be considered as separate countertops. (CEC 210.52(C)(4))

- Receptacles shall be located on or above, but no more than 20" above the countertop. Receptacles are permitted to be mounted not more than 12" below the countertop and where the countertop does not extend 6" beyond the support base. (CEC 210.52(C)(5))

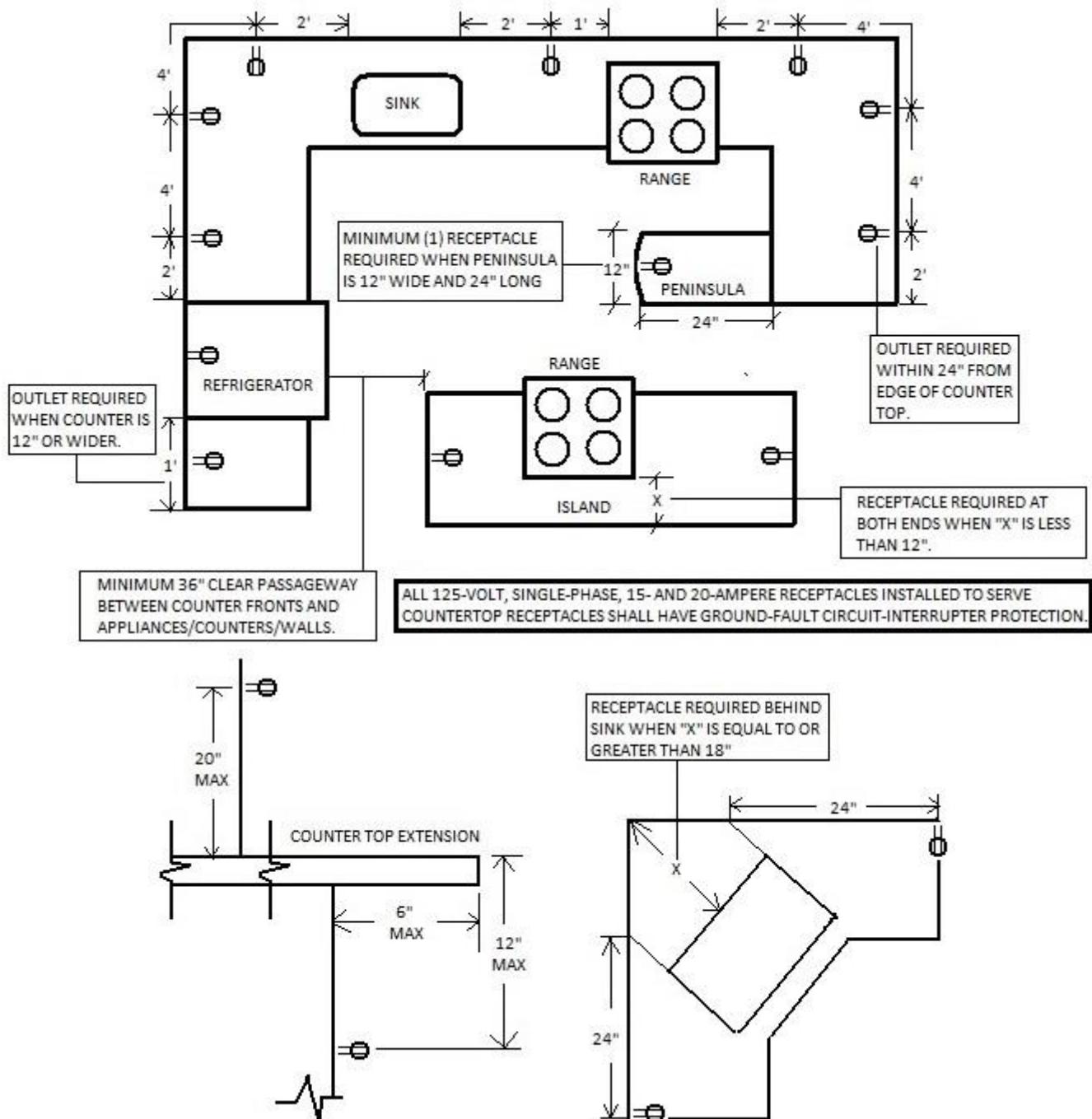
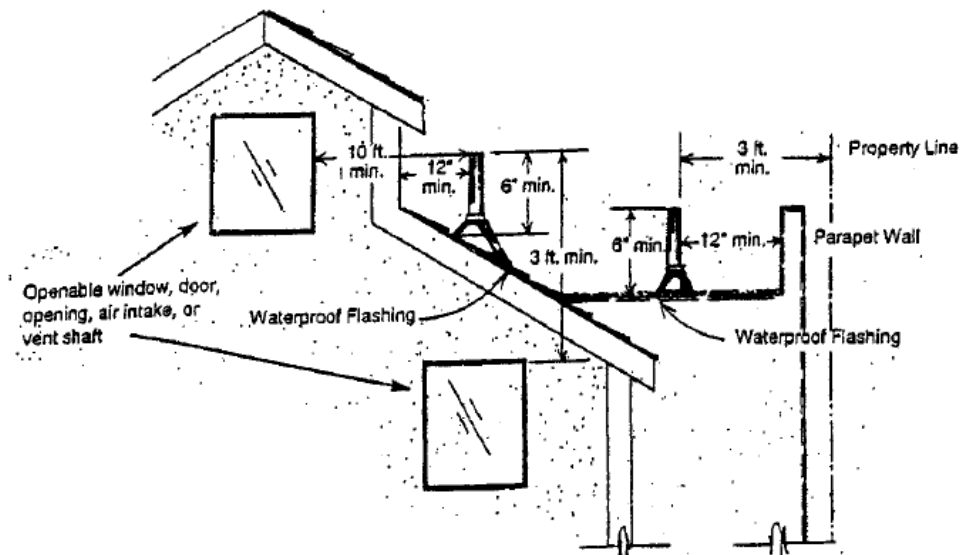


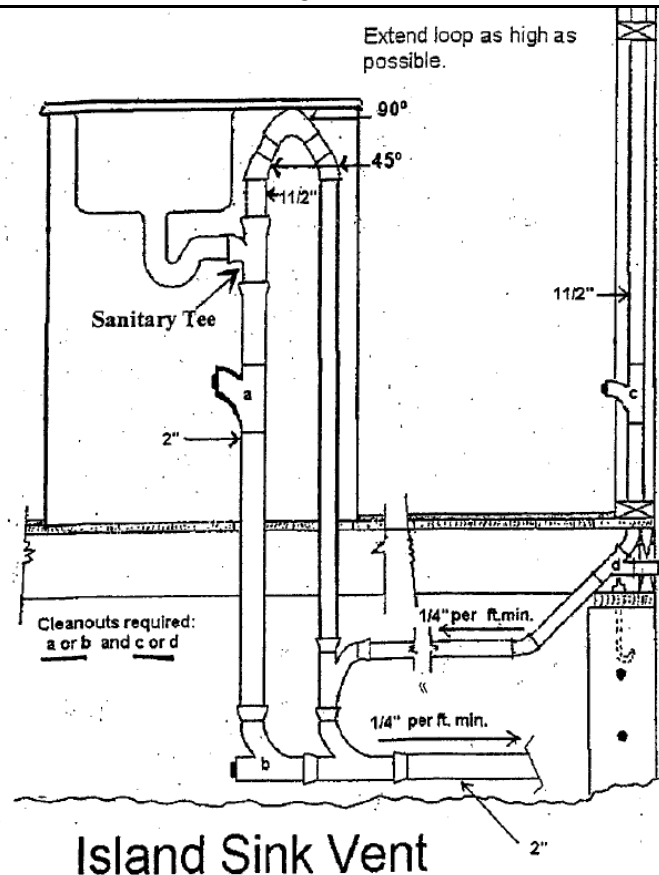
Figure CPA 047 – Kitchen Countertop Receptacles

PLUMBING

- ☐ Drain, waster, and vent (DWV) piping shall be tested at the time of inspection (CPC 712.2, CPC 712.3):
 - Fill with water with no less than a 10' head of water for not less than 15 minutes; the system shall be tight at all points
 - Except for plastic piping, fill the pipe with 5 psi for not less than 15 minutes (CPC 723.1)
- ☐ Each vent shall extend through the roof vertically not less than 6" above the roof and not less than 12" from a vertical surface. They shall be not less than 10' from, or not less than 3' above, an openable window, door, opening, air intake, or vent shaft. Furthermore, they shall not be less than 3' from any direction from a lot line, alley, and street. (CPC 906.1)
 - New penetrations at the roof shall be properly sealed; paint if required.



- ☐ Verify that each vent rises 6" above the flood-level rim of the fixture. Where vents connect to a horizontal drainage pipe, the vent connection must be above the centerline of the drainage piping. (CPC 905.2, CPC 905.3)
- ☐ Dishwashing machines shall be connected to the drainage system with an approved air gap on the discharge side of the dishwashing machine. Listed air gaps shall be installed with the flood-level (FL) marking at or above the floor level of the sink or drainboard, whichever is higher. (CPC 807.3)
- ☐ A minimum 1" airgap separation is required between the flood level sink, tub and water supply outlet. (CPC 603.3.1, CPC Table 603.3.1)
- ☐ Kitchen faucets with flexible water connections shall have an anti-siphon device.
- ☐ Under the kitchen sink: verify that the dish washer hose is properly installed, an air gap discharge hose slopes to a drain pipe, check for leaks, and the electrical outlet faceplate is installed.
- ☐ See the figure that follows for Island Sink venting.



GAS

- ☐ Provisions for a range must be present, either as a capped off gas line or a 220 volt outlet installed in the wall. If the stove is wired directly, it shall be hooked up for inspection.
- ☐ Appliance shutoff valves and convenience outlets shall serve a single appliance and shall be within 6' of the appliance it serves. (CPC 1212.3.1, CPC 1212.5)
- ☐ Gas piping shall be tested with a pressure of 10 psi for no less than 15 mins. (CPC 1213.3)
 - Required pressure tests of 10 psi or less shall be with gauges of 0.10 psi increments or less. (CPC 318.2)
- ☐ Gas appliance connectors shall not extend from one room to another, through any wall, floor, partition, or appliance housing. Verify that the connector is properly sized and listed for the appliance that it serves. DO NOT reuse old connectors. (CPC 1212.3, CPC 1212.3.1)

FRAMING

- ☐ Kitchens shall have a ceiling height of not less than 7' and a clear passage way of not less than 3' between counter fronts and appliances or counter fronts and walls. (CRC R305.1, CBC 1208.1)
- ☐ Use 2x6 studs when installing plumbing pipes 3" or larger. For a 2x6, the maximum hole is 3-5/8"; for a 2x4, the maximum whole is 2-1/8".

- ☐ When piping or ductwork necessitates cutting, notching, or drilling the top plate, a 0.054 inch (16 ga), 1-1/2" wide, galvanized metal tie shall be fastened across at each side with not less than (8) 10d nails; see Figure R602.6.1. (CRC R602.6.1)
- ☐ Fireblocking shall be provided at the following locations (CRC R302.11):
 - Furred spaces and parallel rows of studs or staggered
 - Vertically at ceiling and floor levels, e.g balloon framed walls w/o top plates
 - Horizontally at intervals not exceeding 10'
 - Interconnections between vertical and horizontal spaces, such as soffits, cove ceilings, etc.
 - Openings around vents, pipes, ducts, cables, and wires at ceiling and floor levels with an approved material to resist the free passage of flame and products of combustion
- ☐ Fireblocking shall consist of the following (CRC R302.11.1)
 - 2" nominal lumber
 - (2) 1" nominal lumber with broken lap joints
 - (1) 23/32" wood structural panels with joints backed by 23/32" wood structural panels
 - (1) 3/4" particleboard with joints backed by 3/4" particleboard
 - (1) 1/2" gypsum board
 - 1/4" cement-board millboard
 - Batts or blankets of mineral wool or glass fiber or other approved material as to be securely retained in place
 - Cellulose insulation (in accordance with ASTM E119 or UL 263)

GREEN BUILDING

- ☐ Plumbing fixtures shall comply with the following (CALGreen 4.303):

PLUMBING FIXTURE	MAX FLUSH/FLOW	PRESSURE
Kitchen Faucets	1.8 gallons per minute	60 psi

INSULATION

- ☐ Where a T-24 page is not present, insulation with the following R-values shall be used (CEnC 150.0(b), (c)):
 - R-13 for 2x4 walls
 - R-19 for 2x6 walls
 - R-13 for opaque non-framed assemblies
 - R-19 for raised floors separating conditioned space from unconditioned space
 - R-30 for ceiling and rafters
 - R-6 for supply/return ducts and plenums
- ☐ See the "Insulation" inspection checklist for other requirements.

LIGHTING

- ☐ Recessed downlight luminaires in ceilings shall be listed for zero clearance insulation contact (IC) and be certified as airtight (AT). (CEnC 150.0(k)1C)
- ☐ For more information regarding residential lighting requirements, please see the [California Lighting Technology Center guides](#).
- ☐ All installed luminaires shall be high efficacy in accordance with Table 150.0-A. (CEnC 150.0(k)1A)

**TABLE 150.0-A
CLASSIFICATION OF HIGH-EFFICACY LIGHT SOURCES**

HIGH-EFFICACY LIGHT SOURCES	
Luminaires installed with only the lighting technologies in this table shall be classified as high efficacy	
Light sources in this column, other than those installed in ceiling recessed downlight luminaires, are classified as high efficacy and are not required to comply with Reference Joint Appendix JA8	Light sources in this column shall be certified to the Commission as High Efficacy Light Sources in accordance with Reference Joint Appendix JA8 and be marked as meeting JA8.
1. Pin-based linear or compact fluorescent light sources using electronic ballasts. 2. Pulse-start metal halide. 3. High pressure sodium. 4. GU-24 sockets containing light sources other than LEDs. ^{a, b} 5. Luminaires with hardwired high frequency generator and induction lamp. 6. Inseparable SSL luminaires that are installed outdoors. 7. Inseparable SSL luminaires containing colored light sources that are installed to provide decorative lighting.	8. All light sources in ceiling recessed downlight luminaires. Note that ceiling recessed downlight luminaires shall not have screw bases regardless of lamp type as described in Section 150.0(k)1C. 9. GU-24 sockets containing LED light sources. 10. Any light source not otherwise listed in this table and certified to the Commission as complying with Joint Appendix 8.

Notes:

- a. GU-24 sockets containing light sources such as compact fluorescent lamps and induction lamps.
- b. California Title 20 Section 1605(k)3 does not allow incandescent sources to have a GU-24 base.



DEVELOPMENT SERVICES – BUILDING INSPECTION

INSPECTION GUIDELINES: MAKEUP AIR

INSPECTION CODE: 220

SCOPE: RESIDENTIAL

CODES ENFORCED: 2016 CBC, CRC, CPC, CMC, CEC, CALGreen, CEnC, and PAMC

The information provided in this document is general and intended as a guide only. Each project is unique and additional requirements may be enforced as deemed appropriate.

BACKGROUND

Most homes have several appliances with exhaust fans that remove air. Therefore, makeup air is the air that “makes up” for the air that is removed by exhaust fans operating individually or concurrently (from bathrooms, clothes dryers, kitchen range hoods, to name a few).

Without makeup air, a negative pressure condition could exist from the operation of one or more exhaust fans, and possibly affect the operation of fuel burning appliances and life safety of occupants if appliances are back-drafted or plumbing trap seals defeated.

ASHRAE Standard 62.2 requires that the vent system for combustion appliances be properly installed, as specified by the instructions from the appliance manufacturer and by the California Building Code. ASHRAE Standard 62.2 includes a provision intended to prevent backdrafting where one or more large exhaust fans are installed in a home with atmospherically vented or solid fuel appliances. **If the two largest exhaust fans have a combined capacity that exceeds 15 CFM/100 square feet of floor area, then makeup air must be provided** (see the example in the following page from the 2016 California Residential Compliance Manual).

This provision applies only when the atmospherically vented appliance is inside the pressure boundary of the house and does not include a summer cooling fan that is designed to be operated with the windows open. Direct-vent appliances are not considered “atmospherically vented.” The two largest exhaust fans are normally the kitchen range hood and the clothes dryer (if located inside the dwelling unit pressure boundary). Large-range hoods, particularly downdraft range hoods, can have capacities of 1,000 CFM or more. A problem with this requirement can be solved in one of three ways:

1. All atmospherically vented combustion appliances can be moved outside the pressure boundary of the house (to the garage or other similar space).
2. The flow rate of one or more of the fans can be reduced so that the combined flow is less than 15 CFM/100 square feet.
3. Makeup air can be provided to offset the net exhaust rate.

EXAMPLE**Question:**

A 3600 square foot custom home has four bedrooms. The kitchen will have a high-end range hood that has three speeds, nominally 1000 CMF, 1400 CMF and 1600 CMF. The house will be heated with an atmospherically vented gas furnace located in the basement. If I am using a central exhaust fan for the whole-building ventilation of 75 CMF, and there is a clothes dryer installed, how much makeup air is needed?

Answer:

You must use the high speed value for the range hood of 1600 CMF. The clothes dryer will have a flow that is assumed to be 150 CFM for sizing purposes. These two flows must be added together for a total exhaust capacity of 1750 CFM. Since the whole-building ventilation fan is not one of the two largest exhaust fans, it does not figure into the makeup air calculation. Using the equation in the last page, there must be at least 1750 CMF of makeup air provided.

$$15 \text{ CMF } (3600\text{SF}/100\text{SF}) = 1210 \text{ CMF} < 1750 \text{ CMF} \therefore \text{Makeup air is required}$$

INSPECTION**EXHAUST FANS**

- ☐ Verify that an exhaust fan has been installed at each kitchen and bathroom, and each shall be either one of the following two (ASHRAE 62.2 – 2013 5.1, CMC Table 403.7):
 - A demand-controlled mechanical exhaust system meeting the exhaust airflow rates of Table 5.1
 - Designed to be operated as needed by the occupant

**TABLE 5.1 Demand-Controlled Local Ventilation
Exhaust Airflow Rates**

Application	Airflow	Notes
Kitchen	100 cfm (50 L/s)	Vented range hood (including appliance-range hood combinations) required if exhaust fan flow rate is less than 5 kitchen air changes per hour.
Bathroom	50 cfm (25 L/s)	

- A continuous mechanical exhaust system meeting the exhaust airflow rates of Table 5.1
 - Designed and installed to operate without occupant intervention

**TABLE 5.2 Continuous Local Ventilation
Exhaust Airflow Rates**

Application	Airflow	Note
Kitchen	5 ach	Based on kitchen volume.
Bathroom	20 cfm (10 L/s)	

MAKEUP AIR

- ☐ When installed in a closet, clothes dryers shall have an opening of not less than 100 square inches in the door or other approved means. (CMC 504.4.1)
- ☐ Makeup air shall be provided to replenish air exhausted by the ventilation system and air intakes shall be located as to avoid recirculation of contaminated air within enclosures. (CMC 505.5)
- ☐ Where exhaust fans, clothes dryers, and kitchen ventilation systems interfere with the operation of appliances, makeup air shall be provided. (CMC 701.3)
- ☐ Air inlets shall be located a minimum of 10' from known sources of contamination such as a stack, vent, exhaust hood, or vehicle exhaust. The intake shall be placed so that entering air is not obstructed by plantings or other material. Forced air inlets shall be provided with rodent/insect screens (mesh not larger than 1/2"). (ASHRAE 62.2 – 2013 6.8)
- ☐ Two ways to avoid it make up air:
 - Install a residential-size range with an exhaust fan rated at 100 CFM – 200 CFM
 - Perform the calculation and determine if the sum of the two largest exhaust fans does not exceed 15 CFM/100 square feet
- ☐ There are two common methods to providing makeup air:
 - Add makeup air to your HVAC system by outdoor air being ducted to the return duct of a forced-air furnace (FAU) (see Figure CPA 057).
 - Install an air intake duct that brings outdoor air into the conditioned airspace.
 - Note: This duct is required to have an electronically-controlled damper that opens when then the kitchen hood is turned on, providing compensating outdoor airflow that balances the pressure in the conditioned space. Typically the diameter size of the makeup air duct is the same as the kitchen hood duct.

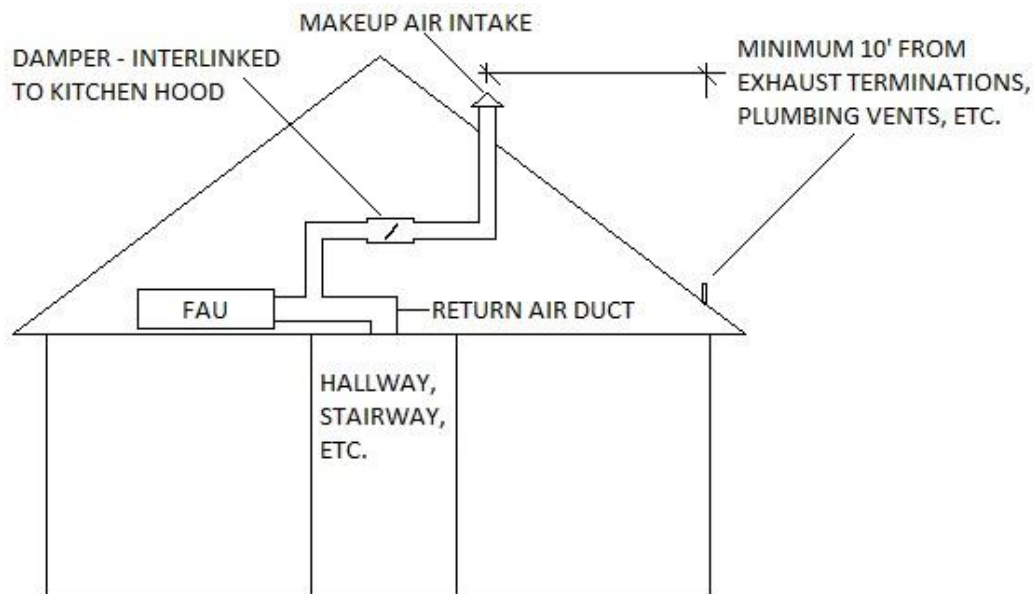


Figure CPA 057 – Makeup Air