

Attachment 1: Design Guideline for Electric Ready Buildings

San Francisco Building Code Section 106A.1.17, Exception (1) requires Mixed-Fuel Buildings to be as “Electric-Ready” as feasible. Electric Ready is defined as:

***ELECTRIC-READY.** A building, project, or portion thereof that contains electrical systems and designs that provide capacity for a future retrofit of a Mixed-Fuel Building to an All-Electric Building. Electric-Ready includes sufficient space, drainage, electrical conductors or raceways, bus bar capacity, and overcurrent protective devices.*

Design Guideline for Electric Ready Buildings is adapted from California Energy Codes & Standards Program 2019 Model Electric Readiness Code (www.localenergycodes.com), and provided as a reference for how to fulfill the Electric-Ready requirements of San Francisco Building Code Section 106A.1.17, Exception (1).

Since exceptions are limited to the specific areas or systems where All Electric design is physically or technically infeasible, even in Mixed Fuel Buildings nearly all systems will be All-Electric.

These guidelines do not require the design of electric replacement systems and as such do not necessarily assure that the conversion to all-electric will be directly feasible in all cases. Instead, the requirements specify power equivalencies for provision of a given service via all-electric and offer flexibility regarding locations for replacement equipment. These guidelines do not include space and ventilation requirements for engineered systems (e.g., space or water heat systems serving multiple dwelling units or large spaces), and as such, conversion to all-electric will be dependent upon the ability to provide these components. Future upgrades of the utility-side electric power service may require additional space for equipment. For the reasons stated above, permit applicants are encouraged to prepare an initial design for future replacement with electric systems to address future locations for heat absorption, transfer and distribution equipment, as well as electric power systems.

Electric Ready Guidelines for Residential (Type R Occupancy)

General

New residential Mixed-Fuel Buildings that are Electric Ready provide capacity for a future retrofit to facilitate the installation of all-electric equipment for all equipment requiring provision of fuel gas, and future de-commissioning of all gas piping, connections. An Electric Ready design provides space, drainage, installs electrical conductors or raceways, reserves bus bar capacity, and reserves space for overcurrent protective devices for future replacement of all gas-dependent equipment with all-electric equipment. and for equipment serving individual units only, service panel capacity and pre-wired and installed overcurrent protective devices.

Space Heat

Systems using natural gas heating equipment shall include the following components for each gas terminal or stub out:

Equipment serving individual dwelling units:

1. A dedicated 240 volt, 30 amp or greater electrical circuit for a future electric replacement heater;
2. The circuit shall terminate within 3 feet from the designated future location of an electric replacement heater with no obstructions into a listed cabinet, box or enclosure labelled "For Future Electric Space Heater";
3. The circuit shall be served by a dedicated double pole circuit breaker in the electrical panel labeled with the words "For Future Electric Space Heater"; and

EXCEPTION. If a 240 volt 30 amp or greater electrical circuit exists for space cooling equipment, an additional circuit for space heating is not necessary.

Equipment serving multiple dwelling units or common areas

1. Equipment serving multiple dwelling units or common areas shall have conductors or raceway installed with termination points at the main electrical panel (via subpanels panels, if applicable) and at a location no more than 3 feet from each gas outlet or a designated location of future electric replacement equipment. The conductors or raceway and any intervening subpanels shall be sized to meet the future electric power requirements as specified below and in the "Conductor, Raceway and Subpanel Sizing" Section below.
 - A. 24 amps at 240 volts per dwelling unit, or
 - B. The electrical power required to provide equivalent functionality of the gas powered equipment as calculated and documented by a licensed design professional associated with the project.

EXCEPTION: If permanent space cooling equipment is installed for all of the affected dwelling units, the raceway and/or conductors serving the cooling equipment may be sized to accommodate the future electric space heating equipment.

Electric Ready Guidelines for Residential (Type R Occupancy- Continued)

Water Heat

Systems using natural gas or propane water heating equipment shall include the following components for each gas terminal or stub out:

Equipment serving individual dwelling units

Equipment serving individual dwelling units shall be located in an area that is at least 3 feet by 3 feet by 7 feet high.

Equipment serving multiple dwelling units or common areas

Install conductors or raceway with termination points at the main electrical panel (via subpanels panels, if applicable) and into a listed cabinet, box or enclosure at a location no more than 3 feet from each gas outlet or a designated location of a future electric replacement water heater labelled "For future water heater". The conductors or raceway and any intervening subpanels shall be sized to meet the future electric power requirements as specified below and in the "Conductor, Raceway and Subpanel Sizing" Section below.

1. 24 amps at 240 volts per dwelling unit, or
2. 1.2 kVA for each 10,000 Btus per hour of rated gas input or gas pipe capacity, or
3. The electrical power required to provide equivalent functionality of the gas powered equipment as calculated and documented by a licensed design professional associated with the project.

Clothes Drying

Buildings plumbed for natural gas or propane equipment shall include the following components for each gas terminal or stub out:

Equipment serving individual dwelling units

1. A dedicated 240 volt, 30 amp or greater electrical receptacle within 3 feet of the equipment and accessible with no obstructions;
2. The receptacle shall be labeled with the words "For Future Electric Clothes Dryer"; and
3. A double pole circuit breaker in the electrical panel labeled with the words "For Future Electric Clothes Dryer".

Electric Ready Guidelines for Residential (Type R Occupancy- Continued)

Clothes Drying, Continued

Equipment serving multiple dwelling units or common areas

Equipment serving multiple dwelling units or common areas shall include conductors or raceway installed with termination points at the main electrical panel (via subpanels panels, if applicable) and at a location no more than 3 feet from each gas outlet or a designated location of future electric replacement equipment. The conductors or raceway and any intervening subpanels shall be sized to meet the future electric power requirements as specified below and in the “Conductor, Raceway and Subpanel Sizing” Section below.

1. 24 amps at 240 volts per dwelling unit, or
2. 0.85 kVA for each 10,000 Btus per hour of rated gas input or gas pipe capacity, or
3. The electrical power required to provide equivalent functionality of the gas powered equipment as calculated and documented by a licensed design professional associated with the project.

Combined Cooktop and Oven or Stand Alone Cooktop

Buildings plumbed for natural gas or propane equipment shall include the following components for each gas terminal or stub out:

1. A dedicated 240 volt, 40 amp or greater circuit and 50 amp or greater electrical receptacle located within 3 feet of the equipment and accessible with no obstructions;
2. The electrical receptacle shall be labeled with the words “For Future Electric Range” and be electrically isolated; and
3. A double pole circuit breaker in the electrical panel labeled with the words “For Future Electric Range”.

Stand Alone Cooking Oven

Buildings plumbed for natural gas or propane equipment shall include the following components for each gas terminal or stub out:

1. A dedicated 240 volt, 20 amp or greater receptacle within 3 feet of the appliance and accessible with no obstructions;
2. The electrical receptacle shall be labeled with the words “For Future Electric Oven” and be electrically isolated; and
3. A double pole circuit breaker in the electrical panel labeled with the words “For Future Electric Oven”.

Electric Ready Guidelines for Residential (Type R Occupancy- Continued)

Pools and Spas

Natural gas or propane equipment pools or spas shall have conductors or raceway installed with termination points at the main electrical panel (via subpanels panels, if applicable) and at a location no more than 3 feet from each gas outlet or a designated location of future electric replacement equipment. The conductors or raceway and any intervening subpanels shall be sized to meet the future electric power requirements as specified below and in the “Conductor, Raceway and Subpanel Sizing” Section below.

1. 0.75 kVA per 10,000 Btus per hour of rated gas input or gas pipe capacity, or
2. The electrical power required to provide equivalent functionality of the gas powered equipment as calculated and documented by a licensed design professional associated with the project.

Service Capacity

Electric load calculations must reflect all loads for systems as installed at the time of new construction, and reflect expected future loads or increases to load as a result of compliance with Electric Ready Design Guidelines.

1. All newly installed electrical panels and subpanels serving common loads in a Mixed-Fuel Building shall have both space for overcurrent protective devices as well as bus bars of adequate capacity to meet all of the building’s potential future electrical requirements as specified in the sections above. The engineer of record shall document future expected total electrical load for the building when modified to All-Electric, in order to affirm adequate capacity of the electrical equipment.

Exception: If the electric load serving entity requires that the electric service be upgraded as a result of the requirements of these guidelines, then adequate physical space must be designated for future installation of panels, switchgear, and bus bars sufficient to meet the building’s future electrical requirements as specified in these guidelines. Upgrade to electric service is not required.

2. All newly installed raceways in a Mixed-Fuel Building between the main electric panel and any subpanels, and the point at which the conductors serving the building connect to the common conductors of the utility distribution system, shall be sized for conductors adequate to serve all of the building’s potential future electrical requirements as specified in these guidelines.

3. The service capacity requirements of this section shall be determined in accordance with the “Conductor, Raceway and Subpanel Sizing” Section below.

Electric Ready Guidelines for Residential (Type R Occupancy- Continued)**Conductor, Raceway and Subpanel Sizing**

1. Raceway and subpanel capacity shall be sized to be large enough to meet the requirements at the service voltage.
2. The electrical capacity requirements may be adjusted for demand factors in accordance with the California Electric Code, Title 24, Part 3, Article 220.
3. For purposes of gas pipe equivalence, gas pipe capacity shall be determined in accordance with the California Plumbing Code, Title 24, Part 5, Section 1208.4.

Condensate Drains

The conductors or raceway required in space heating and domestic hot water shall terminate in areas that have condensate drains that are:

1. No less than $\frac{3}{4}$ inch in diameter;
2. Compliant with the California Plumbing Code, Title 24, Part 5, Section 814; and
3. No more than two inches higher than the floor.

EXCEPTION. If the design includes bus bar capacity, raceway or conductor capacity, space and condensate drainage necessary for the installation of electrical equipment that can serve the intended function of the gas equipment, as calculated and documented by a licensed design professional associated with the project.

Electric Ready Guidelines for Non-Residential (All Occupancies other than R)

General

New nonresidential Mixed-Fuel Buildings shall have electrical systems and designs that provide capacity for a future retrofit to facilitate the installation of all-electric equipment for all gas equipment plumbing connections. This includes space, drainage, electrical conductors or raceways, bus bar capacity, and space for overcurrent protective devices.

Circuit Capacity

A Mixed-Fuel Building shall have conductors or raceway installed with termination points at the main electrical panel (via subpanels panels, if applicable) and at a location no more than 3 feet from each gas outlet or a designated location of future electric replacement equipment. The conductors or raceway and any intervening subpanels shall be sized to meet the future electric power requirements, as specified below, at the service voltage. The capacity requirements may be adjusted for demand factors in accordance with the California Electric Code, Title 24, Part 3, Article 220. Gas flow rates shall be determined in accordance with the California Plumbing Code, Title 24, Part 5, Section 1208.4.

Domestic Hot Water

For equipment serving nonresidential space, common areas or multiple dwelling units, 1.2 kVA for each 10,000 Btus per hour of rated gas input or gas pipe capacity or the electrical power required to provide equivalent functionality of the gas-powered equipment as calculated and documented by a licensed design professional associated with the project.

Space Heating

For equipment serving nonresidential space, common areas or multiple dwelling units, the electrical power required to provide equivalent functionality of the gas-powered equipment as calculated and documented by a licensed design professional associated with the project.

EXCEPTION. If permanent space cooling equipment is installed for all of the affected conditioned space the conductors or raceway serving the cooling equipment may be increased in size to accommodate the future electric space heating equipment.

Clothes Dryer

Provide 0.85 kVA for each 10,000 Btus per hour of rated gas input or gas pipe capacity for commercial dryers, or the electrical power required to provide equivalent functionality of the gas-powered equipment as calculated and documented by a licensed design professional associated with the project.

Electric Ready Guidelines for Non-Residential (All Occupancies other than R - continued)

Pools and Spas

Provide either:

- a. 0.75 kVA per 10,000 Btus per hour of rated gas input or gas pipe capacity, or
- b. The electrical power required to provide equivalent functionality of the gas-powered equipment as calculated and documented by a licensed design professional associated with the project.

Electric Readiness: Service Capacity

Electric load calculations must reflect all loads for systems as installed at the time of new construction, and reflect expected future loads or increases to load as a result of compliance with Electric Ready Design Guidelines.

All newly installed electrical panels and subpanels in a Mixed-Fuel Building shall have both space for overcurrent protective devices as well as bus bars of adequate capacity in the main electrical panel and any subpanels to meet all of the building's potential future electrical requirements as specified in these guidelines. The engineer of record shall document future expected total electrical load for the building when modified to All-Electric, in order to affirm adequate capacity of the electrical equipment.

Exception: If the electric load serving entity requires that the electric service be upgraded as a result of the requirements of these guidelines, then adequate physical space must be designated for future installation of panels, switchgear, and bus bars sufficient to meet the building's future electrical requirements as specified in these guidelines. Upgrade to electric service is not required.

All newly installed raceways in a Mixed-Fuel Building between the main electric panel and any subpanels, and the point at which the conductors serving the building connect to the common conductors of the utility distribution system, shall be sized for conductors adequate to serve all of the building's potential future electric loads as specified in these guidelines.

Electric Readiness: Condensate Drains

The conductors or raceway required for domestic hot water and space heating systems shall terminate in areas that have condensate drains that are:

- a. No less than $\frac{3}{4}$ inch in diameter;
- b. Compliant with the California Plumbing Code, Title 24, Part 5, Section 814; and
- c. No more than two inches higher than the floor.