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HEATING AND VENTILATING REGULATIONS

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Chapter 27.01

TITLE AND SCOPE

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27.01.035	Specialty Solar Code.
27.01.040	Existing Equipment.
27.01.050	Alternate Materials and Methods of Construction

27.01.010 Title.

This shall be known as Title 27, Heating and Ventilating Regulations and will be referred to herein as “this Code.”

27.01.020 Purpose.

The purpose of this Code is to provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation, and maintenance of heating, ventilating, comfort cooling, refrigeration systems, incinerators, and other miscellaneous heat-producing appliances.

27.01.030 Scope.

(Amended by Ordinance Nos. 150873, 158654, 162693, 166110, 166438, 169905, 174891, 176956, 177414, 178745, 181359 and 184140, effective September 29, 2010.)

- A. Mechanical Specialty Code. The provisions of the State of Oregon Mechanical Specialty Code, 2010 Edition, as published by the International Code Council as the International Mechanical Code, 2010 Edition along with the International Fuel Gas Code, 2009 Edition, and as amended by the Building Codes Division of the Oregon Department of Consumer and Business Services, are hereby adopted by reference. The Mechanical Specialty Code is on file in the Development Services Center of the City of Portland.

Unless specifically provided for in other Chapters of this Code, where requirements of this Title do not provide for or are not fully detailed with regard to processes, methods, specifications, equipment testing and maintenance standards of design performance and installation, and other pertinent criteria, applicable standards and recommendations of the National Fire Protection Association (hereinafter referred to as N.F.P.A.) as set forth in its National Fire Codes, current edition shall apply.

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In the following Chapters references may have been made to equipment not governed by this Code, in which case other Code or Codes shall apply.

- B.** One- and Two-Family Dwelling Code. The provisions of the State of Oregon, One- and Two-Family Dwelling Specialty Code, 2008 Edition, as published by the International Code Council, as the International Residential Code, 2006 Edition, and amended by the Building Codes Division of the Oregon Department of Consumer and Business Services, is hereby adopted by reference. The One- and Two-Family Dwelling Specialty Code is on file in the Development Services Center of the City of Portland.

27.01.035 Solar Installation Specialty Code.

(Added by Ordinance No. 185798, effective December 12, 2012.) The provisions of the State of Oregon Solar Installation Specialty Code 2010 Edition, as published by the Building Codes Division of the Oregon Department of Consumer and Business Services, are hereby adopted by reference. The Solar Installation Specialty Code is on file in the Development Services Center of the City of Portland.

27.01.040 Existing Equipment.

Heating, ventilating, comfort cooling or refrigeration systems, incinerators or other miscellaneous heat-producing appliances lawfully installed prior to the effective date of this Code may have their existing use, maintenance or repair continued if the use, maintenance or repair is in accordance with the original design and location and is not a hazard to life, health, or property.

All heating, ventilating, comfort cooling, or refrigeration systems, incinerators or other miscellaneous heat-producing appliances, both existing and new, and all parts thereof, shall be maintained in a safe and sanitary condition. All devices or safeguards which are required by this Code in heating, ventilating, comfort cooling, or refrigeration systems, incinerators or other miscellaneous heat-producing appliances when installed, altered, or repaired, shall be maintained in good working order. The owner or his designated agent shall be responsible for the maintenance of heating, ventilating, comfort cooling, refrigeration systems, incinerators, or other miscellaneous heat-producing appliances.

27.01.050 Alternate Materials and Methods of Construction.

The provisions of this Code are not intended to prevent the use of any material or method of construction not specifically prescribed by this Code, provided any such alternate has been approved.

The Building Official may approve any such alternate provided he finds that the proposed design is satisfactory and complies with the provisions of this Code, and that the material, method, or work offered is, for the purpose intended, at least the equivalent of that prescribed in this Code in quality, strength, effectiveness, fire resistance, durability, and safety.

The Building Official shall require that sufficient evidence or proof be submitted to substantiate any claims that may be made regarding its use.

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Chapter 27.02

ORGANIZATION AND ENFORCEMENT

Sections:

- 27.02.010 General.
- 27.02.020 Violations and Penalties.
- 27.02.030 Board of Appeals.
- 27.02.031 Powers of the Board of Appeals.

27.02.010 General.

(Amended by Ordinance No. 176955, effective October 9, 2002.) The Building Inspections Director is hereby authorized and directed to enforce all the provisions of this Code.

- A.** Appointees. In accordance with the procedure and with the approval of the Commissioner in Charge of the Bureau of Development Services, the Building Inspections Director may appoint such number of officers, inspectors, assistants, and other employees as shall be authorized and as may be necessary to perform any duty imposed upon him by this Code. Such appointees shall, for the sake of this Code, hereafter be known as building officials, inspectors, or authorized representatives.
- B.** (Amended by Ord. No. 150873, effective Jan. 17, 1981.) Right of Entry. Whenever necessary to make an inspection to enforce any of the provisions of this Code, or whenever the Building Official or his authorized representative has reasonable cause to believe that there exists in any building or upon any premises any condition or Code violation which makes such building or premises unsafe, dangerous, or hazardous, the Building Official or his authorized representative may enter such building or premises at all reasonable times to inspect the same or to perform any duty imposed upon the Building Official by this Code, provided that if such building or premises be occupied, he shall first present proper credentials and request entry; and if such building or premises be unoccupied, he shall first make a reasonable effort to locate the owner or other persons having charge or control of the building or premises and request entry. If such entry is refused, the Building Official or his authorized representative shall have recourse to every remedy provided by law to secure entry.

When the Building Official or his authorized representative shall have first obtained a proper inspection warrant or other remedy provided by law to secure entry, no owner or occupant or any other persons having charge, care, or control of any building or premises shall fail or neglect, after proper request is made as

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herein provided, to promptly permit entry therein by the Building Official or his authorized representative for the purpose of inspection and examination pursuant to this Code.

- C.** Stop Orders. Whenever any work is being done contrary to the provisions of this Code, the Building Official may order the work stopped by notice in writing served on any persons engaged in the doing or causing such work to be done, any such persons shall forthwith stop such work until authorized by the Building Official to proceed with the work.
- D.** Authority to Condemn Equipment. Whenever the Building Official learns or ascertains that any equipment, as defined in this Code, has become hazardous to life, health, or property, he shall order, in writing, that such equipment be restored to a condition of safety or be dismantled or removed from its present location. The written notice shall fix a time limit for compliance with such order. No person shall use or maintain the defective equipment after receiving such notice.
- E.** Liability. The Building Official or any employee charged with the enforcement of this Code, acting in good faith and without malice for the jurisdiction in the discharge of his duties, shall not thereby render himself liable personally and he hereby is relieved from all personal liability for any damage that may accrue to persons or property as a result of any act required or by reason of any act or omission in the discharge of his duties. Any suit brought against the Building Official or employees, because of such act or omission performed by him in the enforcement of any provisions of this Code, shall be defended by the legal department of the jurisdiction until final termination of the proceedings.

27.02.020 Violations and Penalties.

(Amended by Ordinance No. 171797, effective November 26, 1997.) It shall be unlawful for any person, firm, or corporation to erect, install, alter, repair, relocate, add to, replace, use, or maintain heating, ventilating, comfort cooling, or refrigeration equipment in the jurisdiction, or cause the same to be done contrary to or in violation of any of the provisions of this Code. Maintenance of equipment which was unlawful at the time it was installed, and which would be unlawful under this Code if installed after the effective date of this Code, shall constitute a continuing violation of this Code.

In the event the property owner, permit holder or agent fails or neglects to carry out any requirement, or fails to correct any noted violation of this Title, the Director may gain compliance by any of the remedies outlined in Title 3.30.015 of the Code of the City of Portland.

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27.02.030 Board of Appeals.

(Amended by Ordinance Nos. 145373, 146232, 150873, 153620, 162103, 174902 and 176955, effective October 9, 2002.) In order to determine the suitability of alternate materials and types of construction and to provide for reasonable interpretations of the provisions of this Code, a Board of Appeals has been created.

- A.** Created - Membership - Vacancies. There has been created and established and hereby continued, a Board of Appeals of this Title, consisting of three members, and an alternate for each member, appointed by the Mayor. Members, by experience and training, shall be qualified to pass upon the safety of installations and apparatus regulated by this Code. Appointments shall be made for a term of 3 years. No member shall hear or decide a case in which he is directly or indirectly interested. Vacancies occurring on the Board of Appeals from whatever cause shall be filled by appointment by the Mayor, either permanently or temporarily as the case may demand. Any member of the Board of Appeals may be removed by the Mayor for malfeasance in office, incapacity, or neglect of duty.
- B.** Power of and Appeal to Board. Any applicant for a heating or ventilating permit whose application has been rejected by the Permit Division of the Bureau of Development Services or any person who shall have been ordered by the Inspector to incur expense in the alteration, repair, or construction of a heating or ventilating system may, within 15 days thereafter, appeal from such action by serving upon the Bureau of Development Services a notice in writing of appeal, and the notice or a certified copy thereof shall at once be transmitted to the Board of Appeals. After notice to such parties as the Board may direct, a hearing shall be had, and the Board may by a majority vote affirm, annul, or modify the action of the Bureau of Development Services. The decision of the Board shall have full force and effect. A certified copy of the Board's decision in each appeal shall be delivered to the appellant and a copy filed for record in the Bureau of Development Services. Where unquestionably and clearly, practical difficulties, unnecessary hardship or consequences inconsistent with the general purposes of this Code may result from the literal interpretation and enforcement thereof, the Board of Appeals upon unanimous vote may grant adjustments or variances in a specific case with such conditions and safeguards as it may determine, in harmony with the general purpose, intent, and spirit of this Code, so that the public safety and welfare shall be secured and substantial justice shall be done. If interpretation of the provisions of this Code is required, decisions thereon may be determined by a majority vote of the Board. Materials and methods found equivalent to those called for by the Code may be approved by a majority vote of the Board.
- C.** Fees for appeals. The fees for all appeals are stated in the current approved fee schedule. This schedule will be available at the Development Services Center.

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- D.** Rules to be Adopted. The Board of Appeals from time to time shall adopt such rules for conducting its hearings as the Board may deem proper.

27.02.031 Powers of the Board of Appeals.

(Amended by Ord. Nos. 150873 and 162103, effective Aug. 1, 1989.) Any person aggrieved by the final decision of a Municipal Appeals Board as to the application of any provision of this Code may, within 30 days after the date of the decision, appeal to the Structural Code Advisory Board.

Chapter 27.03

PERMITS AND INSPECTION

Sections:

- 27.03.010 Permits Required.
- 27.03.020 Permits.
- 27.03.030 Validity and Length of Permits.
- 27.03.031 Master Permit/Facilities Permit Program.
- 27.03.035 Commercial and Industrial Minor Mechanical Labels.
- 27.03.040 Heating and Ventilating Fees.
- 27.03.050 Inspection.
- 27.03.060 Request for Inspection.

27.03.010 Permits Required.

(Amended by Ordinance Nos. 162103, 171774, and 172489, effective July 22, 1998.) No person shall install, alter, replace, or repair any heating, ventilating, comfort cooling, or refrigeration equipment unless a permit, or where appropriate a minor mechanical label as outlined in Section 27.03.035, therefor has been obtained from the Building Official except as otherwise provided in this Code.

A permit, or where appropriate a minor mechanical label, shall be obtained for all heating, ventilating, comfort cooling, or refrigeration equipment, moved with, or installed in, any relocated building. A separate permit, or where appropriate a minor mechanical label, shall be obtained for the equipment installed in each separate building, structure, dwelling unit, guest room, office, or suite of offices.

No permits shall be required for the following:

- A.** Any portable heating appliance.
- B.** Any portable ventilating equipment.

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- C.** Any portable comfort cooling unit.
- D.** Any steam, hot, or chilled water piping within any comfort heating or cooling equipment regulated by this Code.
- E.** Replacement of any component part or assembly of an appliance which does not alter its original approval and complies with other applicable requirements of this Code.
- F.** Any portable evaporative cooler.
- G.** Any refrigerating equipment which is a part of the equipment for which a permit has been issued pursuant to the requirements of this Code.
- H.** Any unit refrigerating system.
- I.** Replacement of an “in kind” water heater (gas to gas) in the same location when reconnected to an approved, existing chimney or vent system, not requiring the installation of a chimney liner.

27.03.020 Permits.

(Amended by Ordinance. Nos. 150873 and 176955 effective October 9, 2002.)

- A.** Permit Application. To obtain a permit, the applicant shall file an application on forms furnished for that purpose. The application shall contain all information necessary to the lawful enforcement of the provisions of this Code. All applications for permits shall be signed by the owner of the property, by the contractor engaged to do the work, or by an authorized representative of such owner or contractor.
Electric Heating Applications. The applicant for a permit to install an electrical heating system shall furnish on the application, information covering the following:
 - 1.** The total area of the dwelling or apartment;
 - 2.** The ceiling height and area of each room, or space regarded as living quarters;
 - 3.** The location, as to what floor each room or space is located;
 - 4.** The net areas each of exposed walls and exposed openings in each room or space regarded as living quarters;

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5. The type and amount of insulation used;
6. The U factors for ceilings, floors, exposed walls, partitions, windows, and doors;
7. The amount of wattage required to offset the heat loss for each room as required by Section 27.05.021 of this Code;
8. The total heating requirements for the dwelling.

B. Plans and Specifications. When required by the Building Official for the enforcement of any provisions of this Code for the installation of comfort heating systems, comfort cooling systems, absorption systems, ventilation systems, hoods, and any installation within construction required to be fire-resistive or of 1-hour construction, three sets of plans or specifications shall accompany the permit application and be approved before the issuance of the permit.

After approval, one set of plans shall be retained by the Building Official, one set on permanent file with the Bureau of Development Services and the other set shall be returned to the applicant, which set shall be kept on such building or work at all times during which the work authorized is in progress.

When the plans and specifications do not comply with provisions of this Code, the necessary changes or revisions shall be made thereto.

Every plan shall be a print or other type of plan approved by the Building Official. The information contained on the plans shall be clearly legible and specifically indicated. No plan shall be of a scale smaller than 1/8 inch per foot.

Specifications, legibly and definitely stated, shall be included either on the plan or on separate sheets.

The approval of any plans or specifications shall not be construed to sanction any violation of this Code.

No person shall deviate materially from any approved plans or specifications or fail, neglect, or refuse to comply therewith unless permission to do so has been obtained from the Building Official.

The plans or specifications shall show the following:

1. Layout for each floor with dimensions of all working spaces and a legend of all symbols used.
2. Location, size, and material of all piping.
3. Location, size, and materials of all air ducts, air inlets, and air outlets.
4. Location of all fans, warm-air furnaces, boilers, absorption units, refrigerant compressors and condensers and the weight of all pieces of such equipment weighing 200 pounds or more.

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5. Rated capacity or horsepower of all boilers, warm-air furnaces, heat exchangers, blower fans, refrigerant compressors and absorption units.
 6. Location, size, and material of all combustion products, vents, and chimneys.
 7. Location and area of all ventilation and combustion air openings and ducts.
 8. Location of all air dampers and fire shutters.
 9. First sheet of each set of plans and specifications shall show the address of the proposed work and the name and address of the owner or lessee of the premises.
 10. Plans and specifications shall be of sufficient clarity to show that the proposed installation will conform to the provisions of this Code and of all applicable laws, ordinances, rules, regulations, and orders.
- C. Issuance. When the Building Official determines that the information on the application is in conformance with this Code, he shall issue a permit upon receipt of the total fees.

27.03.030 Validity and Length of Permit.

(Amended by Ordinance Nos. 150873, 162103, and 174880, effective October 6, 2000.)

- A. Validity. The issuance or granting of a permit or approval of plans and specifications shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of this Code. No permit presuming to give authority to violate or cancel the provisions of this Code shall be valid, except insofar as the work or use which it authorizes is lawful.
- The issuance of a permit based upon plans and specifications shall not prevent the Building Official from thereafter requiring the correction of errors in said plans and specifications or from preventing construction being carried on thereunder when in violation of this Code or of any other ordinance.
- B. Life of Permit Limited. If no inspection approval has taken place within six months after permit issuance, the permit shall become void, and no further heating and ventilating work shall be done at the premises until a new permit has been secured and a new fee paid. Each time an inspection approval is granted, the permit shall be deemed to be automatically extended for six months, until final approval is granted. The Director may extend a permit for one period of six months upon finding that the permittee was unable to commence or continue work for reasons beyond his or her control. Extension requests must be in writing and

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must be received by the Director before the permit expiration date. If an inspection approval has not been granted within this extended time period, the permit shall be void. A permit that has been expired for six months or less may be renewed provided no changes have been made in the original plans and specifications for such work. No permit may be renewed if it has been expired for more than six months. A permit may be renewed only once. If an inspection approval has not been granted within the time period of the permit renewal the permit shall be void. The renewal fee shall be one half the amount required for a new plumbing permit.

C. Suspension or Revocation. The Building Official may, in writing, suspend or revoke a permit issued under provisions of this Code whenever the permit is issued in error or on the basis of incorrect information supplied, or in violation of any ordinance or regulation or any of the provisions of this Code.

D. Investigation Fees: Work Without a Permit.

1. Investigation. Whenever any work for which a permit is required by this Code has been commenced without first obtaining said permit, a special investigation shall be made before a permit may be issued for such work.

2. An investigation fee, in addition to the permit fee, shall be collected whether or not a permit is then or subsequently issued. The investigation fee shall be equal to the amount of the permit fee that would be required by this Code if a permit were to be issued. The payment of such investigation fee shall not exempt any person from compliance with all other provisions of this Code nor from any penalty prescribed by law.

27.03.031 Master Permit/Facilities Permit Program.

(Added by Ordinance No. 172431; amended by Ordinance No.173976, effective January 1, 2000.) The Master Permit/Facilities Permit program is a special inspection program authorized under Oregon Revised Statute 455.190. This program is available to commercial/industrial building owners and building management companies to streamline the approval of maintenance/repair and tenant improvement work on their private facilities.

27.03.035 Commercial and Industrial Minor Mechanical Labels.

(Added by Ordinance No. 171774, effective November 19, 1997.)

A. General. Oregon Revised Statutes Chapter 455.190 establishes special alternative inspections programs for commercial and industrial installations for other than new construction. One of these programs is the Minor Label Program. Implementation rules are found in Oregon Administrative Rules 918-100-000 through 918-100-060. The Bureau will operate the Minor Mechanical Label

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Program in accordance with the Oregon Administrative Rules. The Minor Mechanical Label Program utilizes minor labels in lieu of regular building permits. Random inspections are made to ensure compliance of minor work.

- B. Requirements.** Commercial and Industrial Minor Mechanical Labels may be used in all occupancies (including commercial, industrial, apartment and multi-family installations) except one and two family dwellings. Labels are sold in groups of ten. Labels expire six months from date of purchase and are not refundable. No more than one minor mechanical label may be used on any single project. A single project is defined as not more than one minor label used per calendar month for each address, suite or tenant space.
- C. Work Allowed.** The following work may be done under a Minor Mechanical Label:
1. Moving or replacing duct work not involving fire dampers or penetrations of fire walls, fire assemblies or floors;
 2. Moving or replacing grills in duct work;
 3. Replacing existing heating, cooling and ventilation equipment (minor alteration of gas piping and venting permitted to allow for unit configuration).
- D. Violations.** It is unlawful to violate the requirements of this section. The Director may enforce the requirements of this Chapter by any of the remedies in Portland City Code 3.30.015.
- E. Expiration.** Minor mechanical labels expire within six months from date of purchase, and are not refundable.

27.03.040 Heating and Ventilating Fees.

(Replaced by Ordinance No. 174902, effective September 13, 2000.)

- A.** All required fees are stated in the Fee Schedule adopted by City Council. Fees will be updated annually or on an as needed basis. The approved Fee Schedule will be available at the Development Services Center.
- B.** Permit and plan check fees will, as a general rule, be refunded when the services covered by the fee have not commenced, and the permit or plan review fees were paid incorrectly due to an error on the part of the City. When a permit applicant requests a refund, but the City was not at fault in accepting payment, fees shall be retained to cover the cost of plan review or inspections actually performed and 20 percent of the amount remaining. State surcharge fees are only refundable when a

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permit was issued in error. Requests for refunds must be made within six months of payment or permit issuance, whichever is later. Refunds are to be made to the same person or firm who paid the fee within three months of the request. Exceptions to the above requirements may be made by the Director or designee.

27.03.050 Inspection.

All equipment for which a permit is obtained under this Code shall be inspected by the Building Official. No portion of any equipment intended to be concealed by any permanent portion of the building shall be concealed until inspected and approved. When the installation of any equipment is complete, a second or final inspection shall be made. Equipment regulated by this Code shall not be connected to the fuel or power supply until authorized by the Building Official.

EXCEPTION: The requirements of this Section shall not be considered to prohibit the operation of any heating equipment installed to replace existing heating equipment serving an occupied portion of a building, in the event a request for inspection of such heating equipment has been filed with the Department not more than 48 hours after such replacement work is completed, and before any portion of such equipment is concealed by any permanent portion of the building. A final inspection approval may, upon notice, be revoked by the Building Official if he finds that the heating, ventilating, comfort cooling, or refrigeration equipment fails in any respect to comply with the requirements of this Code, or that the installation is unsafe, dangerous, or a hazard to life or property.

27.03.060 Request for Inspection.

The Building Official may require that every request for inspection be filed at least 1 day before such inspection is desired. Such request may be in writing or by telephone at the option of the Building Official. It shall be the duty of the person requesting inspection of any equipment regulated by this Code to provide access to and means for proper inspection of such equipment. The Building Official shall not be liable for any expense entailed in the removal or replacement of any material required to allow the inspection.

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Chapter 27.05

EQUIPMENT-GENERAL

(Amended by Ord. No. 144249, and
150873, passed Dec. 18, 1980,
effective Jan. 17, 1981.)

27.05.021 Capacity.

Every dwelling unit and guest room shall be provided with heating facilities capable of maintaining a room temperature of 68 degrees Fahrenheit or 20 degrees Celsius at a point 3 feet or 91.44 centimeters above the floor in all of the City of Portland habitable rooms Chapter 53, Energy Conservation, State Building Code, shall regulate the design and construction of the exterior envelopes and selection of heating, ventilating and air conditioning systems and equipment.

- A.** The annual degree days is 4,792 for heating and is 300 for cooling. The design temperature is 23 degrees Fahrenheit for winter and 85 degrees Fahrenheit for summer.
- B.** Indoor design temperature shall be 68 degrees Fahrenheit for heating and 78 degrees Fahrenheit for cooling.

Chapter 27.19

ELECTRIC HEATING SYSTEMS

Sections:

- 27.19.050 Serving Utility Requirements.
- 27.19.051 Requirements for Converting Electrical Energy to Thermal (Heat) Energy.
- 27.19.052 Electrical Service Capacity.
- 27.19.053 Electric Floor Furnaces.
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- 27.19.055 Electric Heating-Resistance Cable Type.
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27.19.050 Serving Utility Requirements.

Evidence shall be submitted that adequate electrical service will be available and provided by the local utility company. The labeled voltage of the equipment shall be within 5 percent of the service voltage provided.

27.19.051 Requirements for Converting Electrical Energy to Thermal (Heat) Energy.

- A.** The total rating (or adjusted rating) of heat emission devices in each room or space to be heated shall equal or exceed the calculated B.T.U. heat loss of such room or space, except that in bedrooms to be heated, a tolerance of not more than 20 percent less than the calculated B.T.U. required to offset the B.T.U. heat loss from such room will be allowed providing such deficiency is made up in other areas regarded as living area when computing the total calculated B.T.U. required for the dwelling.
- B.** The total rating (or adjusted rating) of the heat emission devices shall equal or exceed the calculated B.T.U. aggregate heat loss of all the rooms or spaces heated where used as living quarters.
- C.** The output in B.T.U. of each heat generating and emission unit shall be computed at the location where the electrical energy is converted to thermal (heat) energy. The conversion of electrical energy to thermal (heat) energy shall be considered at an efficiency of 100 percent providing the labeled voltage of the equipment is within 5 percent of the service voltage. Where the labeled voltage of a heat generating or emission unit is greater or less than 5 percent of the service voltage, an adjusted rating of the heat generating or emission unit shall be used in determining the B.T.U. output.

The adjusted B.T.U. rating =
 $3413 \times (\text{Service voltage})^2$
(Label voltage) ² X KW name plate rating

27.19.052 Electrical Service Capacity.

(Repealed by Ord. No. 144049; passed and effective July 14, 1977.)

27.19.053 Electric Floor Furnaces.

For self-contained heating units in the form of electric floor furnaces which are intended to heat spaces other than the room or space in which the device is located, the following requirements shall apply:

- A.** The distance between the heater outlet and the center of any space to be heated by it, shall not exceed 18 feet (20 feet for kitchens) measured through the center of the intervening openings;

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- B.** There shall not be more than one doorway and one archway between the heater outlet and any space or room to be heated by it;
- C.** A return inlet shall not be located in the bathroom, in a space used for storage purposes or in any other confined space;
- D.** A separate manual disconnect shall be provided for each heating device;
- E.** Thermostatic control shall be provided within the heated space, except that no thermostatic control shall switch any combination of heater elements totaling more than 7 kilowatts simultaneously;
- F.** Heating units of any type located in halls where openings are provided with doors, or in other limited areas which may confine the heat output of the device, shall be provided with thermostatic control or other air temperature limiting device, located within a hall or other limited area, to control the air temperature of the hall or other limited area in which the heating unit is located.
(This may be a thermostat located in the hall or other limited area containing the heating device, arranged to operate in series with other thermostatic controls located elsewhere.)
- G.** An unobstructed passageway, not less than 2 feet in width, shall be provided on at least one side of a flat register type floor furnace, to permit passage without stepping over or on the register.
- H.** Flat register floor furnaces shall not be placed closer than 6 inches to any wall. Wall register floor furnaces shall not be placed closer than 6 inches to a wall corner. Floor furnaces shall be placed so that a door in the open position, or draperies and similar combustible materials, cannot be closer than 12 inches to the register.

27.19.054 Electric Central Heating Systems.

- A.** Central heating systems of the forced air type shall conform to the general installation requirements of this Code. The equivalent KW capacity of such a system shall equal the calculated heat loss of the living quarters of the dwelling in B.T.U. per hour, at design conditions, plus not less than 10 percent greater than the total building heat loss in size, when it is the only source of heating. The total output of such a system in B.T.U. shall be computed at the location where the thermal (heat) energy is converted and/or transferred to the circulated air.
- B.** For resistance electric heating elements the conversion of electric energy to thermal (heat) energy shall be considered at an efficiency of 100 percent.

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- C. For electrically operated heat pump equipment, acceptable evidence of equipment heating performance characteristics shall be provided and the equivalent KW capacity determined therefrom.

27.19.055 Electric Heating-Resistance Cable Type.

- A. Resistance cable shall not be installed in walls.
- B. Cables may be installed in ceilings or poured masonry floors. Cables shall not extend beyond the room in which they originate. Cables shall not be installed in closets, over cabinets which extend to the ceiling, under walls or partitions, or over walls or partitions which extend to the ceiling, except that single runs of cable may pass over partitions where embedded. This requirement shall not prohibit low-temperature heat sources in closets to control relative humidity.
- C. Cables shall be separated at least 8 inches from lighting fixtures, outlets and junction boxes, and 2 inches from ventilating openings and other such openings in room surfaces, or sufficient area shall be provided to assure that no heating cables will be covered by surface mounted lighting units.
- D. A separate manual disconnect shall be provided for each space heated.
- E. Thermostatic control shall be provided in each heated space, except that no individual thermostatic control shall switch any combination of heaters totaling more than 7 kilowatts.
- F. Thermostatic controls shall not be installed on cable until the wattage has been inspected by a Building Official and approval posted on the job.

27.19.056 Electric Panel - Prefabricated Conductive Materials.

- A. Prefabricated conductive panels shall not extend beyond the room in which they originate.
- B. Panels shall not be installed on walls.
- C. Panels may be mounted on ceilings.
- D. Panels shall be separated at least 8 inches from lighting fixtures, outlets, and junction boxes, and 2 inches from ventilating openings and other such openings in room surfaces, or sufficient area shall be provided to assure that no heating panels will be covered by surface mounted lighting units.

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- E.** A separate manual disconnect shall be provided for each space heated.
- F.** Thermostatic control shall be provided in each heated space, except that no individual thermostatic control shall switch any combination of heaters totaling more than 7 kilowatts.

27.19.057 Resistance Heating Units.

- A.** All resistance heating units installed shall comply with the following:
 - 1.** In accordance with their individual listings.
 - 2.** No part of heater or heaters will be covered or blanketed by a door, draperies, curtains or other combustibles in such a manner as to raise the normal operating surface temperature of the unit.
 - 3.** A separate manual disconnect shall be provided for each space heated.
 - 4.** Thermostatic control shall be provided in each heated space, except that no individual control shall switch any combination of heaters totaling more than 7 kilowatts.

27.19.058 Other Permanently Placed Electric Heaters.

Nothing in the regulations contained in this Chapter shall prohibit the installation of other types of permanently placed electrical heat-generating and emission units not presently covered herein when such units are approved by the Underwriters' Laboratories, Inc., and installed in a manner approved by such Laboratories providing they meet the general provisions of this Chapter and further that a separate disconnect shall be provided in each heated space, except that no individual thermostatic control shall switch any combination of heaters totaling more than 7 kilowatts.

27.19.059 Installation of Resistance Heaters in Air Ducts.

Installation of resistance heaters in air ducts shall be permitted, subject to the following requirements:

- A.** A heater which is to be installed in an air duct or plenum shall be approved for the purpose and shall be installed in the manner approved for the equipment;
- B.** Each such heater installation shall be provided with approved controls, consisting of an air-flow switch or pressure differential switch, which will disconnect the power supply to the heaters in the case of failure of a normal air flow across the heaters for any reason, such as blocked filters, motor failure, broken belts, shafts, or other driving equipment, etc., and shall be provided with an approved

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temperature-limiting control. In addition, a supplementary independent control shall also be provided in each duct heater to prevent overheating. This device shall be manually resettable or replaceable;

- C.** They shall not be located outdoors, unless specifically approved;
- D.** They shall not be installed in downflow systems;
- E.** Except for approved heater assemblies used in conjunction with a heat pump or central air conditioner, the heater shall not be located closer than 4 feet to the flange of the heat pump or air conditioner unit;
- F.** Two or more duct heaters may be installed in a group in duct work when specifically approved for this purpose and under such restrictions as may be necessary to ensure safe operation;
- G.** Duct heaters shall be approved for zero clearance from combustible materials, except that the terminal and/or control box of a duct heater shall have a minimum access clearance of 24 inches to permit servicing and adjustment to the controls;
- H.** An inspection panel with an area of not less than 140 square inches and a minimum dimension of 5 inches shall be provided in the duct immediately adjacent to, and on the upstream side of, each electric duct heater. The panel shall provide access for cleaning dust and debris from the heater and means for checking concealed heat limiters. The panel shall be marked, "Disconnect heater before removing this panel."
 - 1.** EXCEPTION: An access panel will not be required for electric duct heaters of the slide-out type if they are supplied by flexible conduit and -
 - a.** Are readily removable.
 - b.** Weigh less than 50 pounds.
 - c.** Have a maximum dimension of 3 feet for that portion which extends into the duct,
 - 2.** A separate access panel will not be required where the electric duct heater is located within one foot of a removable room grill and the heater is removable through the grill opening;
- I.** Duct and plenum heater controller equipment shall be accessible with the disconnecting means installed at or within sight of the controller.