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2 **ORDINANCE NO.**

3 **AN ORDINANCE REPEALING AND REPLACING ARTICLE 12 OF CITY**
4 **CODE CHAPTER 25-12 TO ADOPT THE 2009 INTERNATIONAL ENERGY**
5 **CONSERVATION CODE AND LOCAL AMENDMENTS.**

6 **BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF AUSTIN:**

7 **PART 1.** City Code Chapter 25-12 (*Technical Codes*) is amended to repeal Article 12
8 (*Energy Code*) and replace it with a new Article 12 to read as follows:

9 **ARTICLE 12. ENERGY CODE**

10 **§ 25-12-261 ENERGY CODE**

11 (A) The International Energy Conservation Code, 2009 Edition, published by the
12 International Code Council, Inc. (2009 International Energy Conservation
13 Code), is adopted and incorporated by reference into this section with the
14 deletions and amendments in Subsections (B) and (C) and Section 25-12-
15 263 (Local Amendments to the Energy Code).

16 (B) The following provisions of the 2009 International Energy Conservation
17 Code are deleted:

18 Section 101.4.3	Section 201.3	Table 402.1.1
19 Table 402.1.3	Section 402.4.2	Section 402.4.2.1
20 Section 402.4.2.2	Section 402.5	Section 403.2.1
21 Section 403.2.2	Section 403.4	Section 403.8
22 Section 404.1	Section 405.2	Section 503.2.9
23 Section 503.2.9.1	Section 503.2.9.2	Section 503.2.9.3
24 Section 505.2.4		

25 **§ 25-12-262 CITATIONS TO THE ENERGY CODE**

26 In the City Code “Energy Code” means the 2009 International Energy Conservation Code
27 adopted by Section 25-12-261.

§25-12-263 LOCAL AMENDMENTS TO THE ENERGY CODE

The following provisions are local amendments to the 2009 International Energy Conservation Code. Each provision in this section is a substitute for an identically numbered provision deleted by Section 25-12-261(C) or an addition to the Energy Code.

101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of the Energy Code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with the Energy Code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with the Energy Code if the addition alone complies or if the existing building and addition comply with the Energy Code as a single building.

Roofs without insulation in the cavity and where the insulation is exposed during reroofing shall be insulated either above or below the sheathing. Re-roof projects must comply with Sections 402.7 or 502.5 as applicable.

Exceptions: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.
6. Alterations that replace less than 50% of the luminaries in a space, provided that such alterations do not increase the installed interior lighting power.
7. Alterations that replace only the bulb and ballast within the existing luminaries in a space provided that the *alteration* does not increase the installed interior lighting power.

201.3 Terms defined in other codes. Terms not defined in the Energy Code that are defined in the Building Code, Electrical Code, Fire Code, Mechanical Code, the

1 Plumbing Code, Residential Code or the Solar Code have the meaning ascribed to them
2 as in those codes.

3 **302.2 Exterior design conditions.** The design parameters in Table 302.2 shall be used
4 for calculations under the Energy Code.

5 **TABLE 302.1**

6 **EXTERIOR DESIGN CONDITIONS**

<u>CONDITION</u>	<u>VALUE</u>
Winter ^a , Design Dry-bulb (°F)	30
Summer ^a , Design Dry-bulb (°F)	99
Summer ^a , Design Wet-bulb (°F)	74
Climate Zone	2A
For SI: deg C=[(deg F)-32]/1.8.	

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14 ^a The outdoor design temperature shall be selected from the columns of 99 percent
15 values for winter and 0.4 percent values for summer from tables in the 2005
16 Handbook of Fundamentals published by ASHRAE. Adjustments shall be
17 permitted to reflect local climates, which differ from the tabulated temperatures, or
18 local weather experience determined by the building official.
19

TABLE 402.1.1**INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U- FACTOR	GLAZED FENESTRATION SHGC	CEILING R- VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT WALL R-VALUE	SLAB R-VALUE & DEPTH	CRAWL SPACE WALL R-VALUE
2	0.51	0.60	0.30	30 ^a	15 or 13+2 ^b	4/6 ^c	13	0	0	0

^aAir-impermeable insulation of R-21 or greater may be used if mechanical equipment and air distribution system are located entirely within the building thermal envelope. "Air-impermeable" shall be defined as having an air permeance not exceeding 0.02 L/s-m² at 75 Pa pressure differential tested according to ASTM E 2178 or ASTM E 283.

^b13+2" means that R-13 cavity insulation plus R-2 insulated sheathing. If structural sheathing covers 25% or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25% of the exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.

^cThe second R-value applies when more than half the insulation is on the interior of the mass wall.

TABLE 402.1.3**EQUIVALENT U-FACTORS**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	WOOD FRAME WALL U-FACTOR	MASS WALL U-FACTOR	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
2	0.51	0.6	0.035	0.079	0.165	0.064	0.36	0.477

402.4.2 Testing of the building thermal envelope for infiltration. Leakage of the building thermal envelope shall not exceed Seven (7) Air Changes per Hour (ACH) when

1 tested with a blower door at a pressure of 33.5 pounds per ft² or 50 Pascals. Testing shall
2 occur after rough in and after installation of penetrations of the building envelope,
3 including penetrations for utilities, plumbing, electrical, ventilation and combustion
4 appliances. Testing shall be performed by an independent third-party technician
5 approved by the building official.

6 During testing:

- 7 1. Exterior windows and doors, fireplace and stove doors shall be closed, but
8 not sealed;
- 9 2. Dampers shall be closed, but not sealed, including exhaust, intake, makeup
10 air, backdraft and flue dampers;
- 11 3. Interior doors shall be open;
- 12 4. Exterior openings for continuous ventilation systems and heat/enthalpy
13 recovery ventilators shall be closed and sealed;
- 14 5. Heating and cooling system(s) shall be turned off; and
- 15 6. Supply and return registers shall not be sealed.

16 Documentation verifying thermal envelope air leakage equal to or less than seven ACH
17 shall include the following information:

- 18 1. Address of residence;
- 19 2. Name and company of technician performing testing;
- 20 3. Date of final test; and
- 21 4. Test results as numerical ACH.

22 **Exceptions:** Existing construction where the volume of the conditioned area is
23 unchanged and additions that cannot be physically separated from the existing
24 construction.

25 **402.4.6. Attic bulkheads.** Residential buildings having a vented attic extending over
26 conditioned and unconditioned spaces shall have bulkheads or other permanent means of
27 retaining insulation to the required depth over the conditioned space.

28 **402.5 Moisture control.** The building design shall not create conditions of accelerated
29 deterioration from moisture condensation. Above-grade frame walls, floors and ceilings,
30 not ventilated to allow moisture to escape, shall be provided with an approved vapor
31 retarder. The vapor retarder shall be installed on the exterior side of the framing. A
32 vapor retarder shall not be installed on the interior or conditioned side of the building

assembly. A vapor retarder is not required where other approved means to avoid condensation are provided.

402.6 Radiant barrier. A roof radiant barrier with an emittance of 0.05 or less as tested in accordance with ASTM C-1371 or ASTM E-408 is required. The radiant barrier shall be installed according to the manufacturer's instructions.

A roof radiant barrier is not required for:

1. Roofs covered with clay or concrete tile having a solar reflectance of .40 or greater.
2. Roofs covered with other materials having a solar reflectance of .50 or greater.
3. Residential buildings with sealed attics.
4. Residential buildings with mechanical equipment and all duct work located wholly within the conditioned space.
5. Existing construction where there is no modification to the roof framing structure.

402.7 Attic ventilation. Attic ventilation shall be installed in accordance with the City of Austin Mechanical Code. Ventilation shall not be provided where it introduces unconditioned air into the thermal envelope of the building.

403.2.1 Insulation. Supply and return ducts located outside the thermal envelope shall be insulated to a minimum of R-8.

Exceptions:

1. Ducts or portions thereof located within the building thermal envelope.
2. Supply and return boots and plenums may be insulated to a minimum of R-6 if the rated efficiency of the installed cooling equipment is 14 SEER or higher.

403.2.2. Sealing and testing of air distribution systems for leakage. All ducts, air handlers, filter boxes and building cavities used as ducts shall be sealed. Joints and seams shall comply with the Residential Code. Total leakage of the air distribution system, including the manufacturer's air handler enclosure, shall not exceed 10% of total airflow based on 360 cfm of airflow for each ton of cooling equipment capacity.

The testing procedure shall be based on ASTM E1554, ASHRAE 152, or a generally accepted equivalent method.

Testing shall be performed by an independent third-party technician approved by the building official. Documentation verifying acceptable air distribution system tightness shall be submitted with the final mechanical code compliance package on the jobsite.

Documentation shall include the following:

1. Address of residence;
2. Date of final test;
3. Name and company of technician performing duct testing;
4. Type of test performed (duct pressurization method or other accepted method); and
5. Test results in percentage of airflow CFM.

Exceptions:

1. Ductless equipment.
2. Existing construction with no modification of or addition to the existing ductwork or replacement of mechanical equipment.

403.2.4 Balancing of air distribution system. Volumetric airflow in cubic feet per minute (CFM) shall meet the design/application requirements. Airflow testing shall be performed by an independent third party technician approved by the building official, with all interior doors closed and all blowers operating at cooling speed.

The airflow at each supply register shall be measured. Measurement of supply airflow shall be performed using a flow hood per the manufacturer's instructions. Supply registers with a design airflow exceeding 35 CFM shall have a measured airflow of within +/- 20% of design airflow. Supply registers with design airflow below 35 CFM but having a measured airflow 60 CFM or higher shall be balanced to bring measured airflow to within +/-20% of design airflow. Documentation shall verify that actual total system airflow is within +/-10 percent of total system design airflow. All documentation shall be submitted with the final mechanical Code compliance package on the job site. Documentation shall include the following:

1. Address of building;
2. Name and company of technician performing the testing; and
3. Date of final test.

Exceptions:

1. Ductless systems.

2. Existing construction with no modification of or addition to the existing ductwork.
3. An addition of 200 square feet or less of conditioned space to existing construction.
4. Systems with a Manual J recommended sizing of 4.5 tons or other size not typically available from manufacturers must be balanced to within $\pm 20\%$ of design air flow as indicated on the Manual J for that building. It is the responsibility for the HVAC contractor to communicate the lack of availability of a properly sized system to the 3rd Party Inspector.

403.2.5 Pressure differential. The pressure difference between each bedroom and adjacent interior area (i.e. hallway) shall not exceed 5 Pascals. The pressure difference between the interior area in the vicinity of the return side of the air handling equipment and the outside of the building shall not exceed -5 Pascals. Testing shall be performed by an independent third party technician approved by the building official, with all interior doors closed and all blowers operating at cooling speed.

Exception: Ductless systems where the supply and return airflow are handled by a single unit within the room.

403.2.6 System static pressure. Total system static pressure with filters installed shall not exceed .8" water column on gas furnaces and .6" water column on electric air handlers. Static pressure testing using a digital manometer or magnehelic shall be performed by an independent third party technician approved by the building official. Documentation verifying static pressure testing results within the allowed ranges shall be submitted with the final mechanical code compliance package on the jobsite. Documentation shall include the following:

1. Address of building;
2. Name and company of technician performing the testing;
3. Date of final test;
4. Procedure used for the test; and
5. Results of the test listing static pressure for applications tested.

Exceptions:

1. Existing construction with no modification of or addition to the existing ductwork, or replacement of mechanical equipment.
2. Ductless systems.

3. Systems where the air handler equipment is housed within the return plenum.
4. Specific systems, excepted by the building official, designed to operate at high static pressure.

403.2.7 Multifamily batch testing. For buildings having three or more dwelling units, a minimum of 15% of the dwelling units in each building must be tested as required by Sections 402.4.2, 403.2.2, 403.2.4, 403.2.5, and 403.2.6. If each tested dwelling unit within the batch meets Energy Code requirements, then all dwelling units in the batch are considered to meet the Energy Code.

403.2.7.1 Initial Testing. The 3rd party testing contractor shall perform all required tests on at least three consecutive dwelling units. Test results must meet Energy Code requirements before batch testing is allowed. Initial testing is required for each new multifamily project. Dwelling units must be within the same building to qualify for inclusion in a batch.

403.2.7.2 Batch Identification and Sampling. The builder shall identify a “batch” which is a building where the dwelling units are completed and ready for testing. The third-party testing contractor randomly selects at least 15% of dwelling units from a batch for testing. All units within the batch must be ready for testing (drywall complete, interior door jambs installed, HVAC system installed, and final air sealing completed) before the testing contractor can select the units to be tested.

403.2.7.3 Failure to Meet Energy Code Requirement(s)

1. If any dwelling units within the identified batch fail to meet an Energy Code requirement as a result of testing, the builder will be directed to fix the cause(s) of failure, and 30% of the remaining dwelling units in the batch will be randomly selected for testing regarding the specific cause(s) of failure.
2. If any failures occur in the additional dwelling units, all remaining dwelling units in the batch must be individually tested for Energy Code compliance.
3. A multifamily project with 3 failures within a 6-month period is no longer eligible to use the sampling protocol in that community or project until successfully repeating “Initial Testing.” Sampling can be reinstated after at least 3 consecutive dwelling units are individually verified to meet all Energy Code requirements.
4. No dwelling unit in a batch may be issued a Certificate of Occupancy until testing has been performed and passed on the dwelling unit(s) selected for testing.

1 **403.2.8 Filtration for air distribution systems.** Filters installed in air distribution
2 systems shall have a minimum efficiency reporting value (MERV) rating of 6 or greater.
3 Filters shall be located to prevent unfiltered air from passing through the mechanical
4 equipment.

5 **403.4. Circulating hot water systems.** All circulating hot water piping shall be
6 insulated to a minimum of R-3 or with insulation having a minimum thickness of ½ inch.
7 Circulating hot water systems shall be controlled with either a manual “On” switch and
8 automatic “Off” or a programmable timer that allows the circulating system to operate for
9 a maximum of four hours in a 24 hour period combined, with a thermal control that
10 automatically turns the system off when hot water reaches a point beyond the last hot
11 water runout on the system.

12 Pumps in circulating hot water systems shall be sized in accordance with the Plumbing
13 Code and the piping system manufacturer’s recommendations. A manufacturer’s
14 specification sheet for the installed pump shall be left at the jobsite for review by the
15 building inspector.

16 **403.4.1 Water heating.** Residential Buildings, as defined by Chapter 2 of the 2009
17 International Energy Conservation Code, having existing or planned natural gas service
18 or equivalent district gas service located within the adjacent right-of-way, shall not use
19 electric resistance as the primary means for heating water.

20 Residential Buildings, as defined by Chapter 2 of the 2009 International Energy
21 Conservation Code and not having natural gas service or equivalent district gas service
22 located within the adjacent right-of-way, may install electric resistance water heaters
23 having a minimum efficiency of 93% in conjunction with a preprogrammed water heater
24 timer in lieu of gas fired water heating. The timer shall be preprogrammed to turn the
25 water heater off between the hours of 3:00PM and 7:00PM from June 1 to September 30
26 and from 12:00AM to 4:00AM throughout the year. The timer shall have a readily
27 accessible override, as defined by the building official, capable of restoring power to the
28 water heater for one hour when activated.

29 **Exceptions:**

- 30 1. Electric resistance water heater that is secondary to a primary system where
31 the primary system is documented to provide at least 75% of the hot water
32 from June 1 to September 30 and at least 50% of the hot water from October
33 1 to May 31. The secondary electric resistance water heater in such a system
34 shall be controlled by a pre-programmed timer.
- 35 2. Heat pump water heaters where electric resistance is the secondary means of
36 heating.

1 An additional electric resistance stand alone water heater that meets the requirements of
2 Section 403.4.1 (Water Heating) may be installed to provide adequate hot water to
3 approved appliances or fixtures if one or more of the following conditions apply:

- 4 1. Gas piping or vent piping for the additional gas water heater would require
5 structural alteration;
- 6 2. Gas piping or vent piping for the additional gas water heater would require
7 penetration of a fire resistive assembly;
- 8 3. Gas water heater would require an increase in the size of the gas piping
9 system; or
- 10 4. In an existing building, the existing gas water heater or gas or water piping is
11 located in an inaccessible concealed space.

12 **403.4.2 Hot water piping.** All service hot water piping with an internal diameter of $\frac{3}{4}$
13 inch or greater shall be insulated to a minimum of R-3 or with insulation having a
14 minimum thickness of $\frac{1}{2}$ inch. Hot water piping serving the kitchen sink shall be
15 insulated to a minimum of R-3 or with insulation having a minimum thickness of $\frac{1}{2}$ inch
16 along its entire length.

17 **403.6.1 Documentation of heating and cooling equipment sizing.** Documentation
18 verifying the methodology and accuracy of heating and cooling equipment sizing shall be
19 submitted with final mechanical code compliance package. Documentation shall include
20 the following information:

- 21 1. Address of residence;
- 22 2. Name of individual performing load calculations;
- 23 3. Name and version of load calculation software;
- 24 4. Design temperatures (outdoor and indoor) according to the Air Conditioning
25 Contractors of America's (ACCA) Manual J version 8, ACCA Manual N,
26 American Society of Heating, Refrigeration and Air-Conditioning
27 Engineers, U.S Department of Energy standards, or other methodology
28 approved by the City of Austin;
- 29 5. Area of walls, windows, skylights and doors within +/- 10% of architectural
30 plans or actual building;
- 31 6. Orientation of windows and glass doors, infiltration rate, duct loads, internal
32 gains, insulation values, and Solar Heat Gain Coefficient of windows;
- 33 7. Heating and cooling load calculations based on ACCA Manual J version 8.;
34 and

- 1 8. Design supply airflows for each room based on ACCA Manual D or other
2 approved methodology.

3 **403.6.2 Space heating.** In all residential buildings and mixed-use buildings with
4 dwelling units in excess of 500 square feet, the primary source of space heating may not
5 be electric resistance.

6 **404.1 Lighting.** A minimum of 90% of indoor lamps shall be high efficacy or the total
7 connected lighting power must not exceed .6 watts per square foot of interior space. The
8 wattage is the maximum labeled wattage of the luminaires, the specified wattage of the
9 transformer supplying the system, verified through data furnished by the manufacturer, or
10 a combination of methods. Outdoor luminaires that are permanently attached to a
11 structure must be high efficacy and controlled by an integral photocell or an astronomical
12 time clock.

13 **405.2 Mandatory requirements.** Compliance with this section requires that the
14 mandatory provisions identified in Sections 401.2 be met.

15 **501.3 Compliance documentation.** Where required, energy code compliance
16 documentation submitted during the plan review or construction phase of a project must
17 be sealed by a licensed architect or engineer.

18 **502.5 Reflective roofing (Mandatory).** New and replacement roof surfaces with an
19 incline of two inches or less of rise per each 12 inches of horizontal run shall incorporate
20 a roof material having a minimum reflectance of 0.70 or a minimum solar reflective
21 index (SRI) of 78. Roof surfaces with an incline greater than two inches of rise per each
22 12 inches of horizontal run shall incorporate a roof material having a minimum
23 reflectance of 0.35 or a minimum SRI of 29.

24 The reflectance measurement will correspond to ASTM E903-96 (*Standard Test Method*
25 *for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating*
26 *Spheres*), ASTM 1918-97 (*Standard Test Method for Measuring Solar Reflectance of*
27 *Horizontal and Low Sloped Surfaces in the Field*), or ASTM 1549-04 (*Test Method for*
28 *Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar*
29 *Reflectometer*). The SRI calculation method shall correspond to ASTM E1980 - 01
30 (*Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-*
31 *Sloped Opaque Surfaces*).

32 **Exceptions:**

- 33 1. Repairs to roof surfaces when the repair does not exceed the lesser of 50%
34 of the roof surface or 20 squares (2000 sq ft).
35 2. Vegetated roofs or roof top pools.

- 1 3. Portions of roof coverings designed to have building integrated solar
2 Photovoltaic systems permanently adhered to the roof surface.

3 **502.6 Air barrier requirement (Mandatory).** Insulation (including but not limited to
4 loose fill, spray applied cellular fiber insulation as well as other blanket and batts
5 insulation) installed in assemblies more than 60 degrees from the horizontal must be in
6 substantial contact with an air barrier on all sides.

7 **Exception:** Air impermeable insulation. Air impermeable insulation is defined as:
8 A material having an air permeance equal to or less than 0.02 L/s-m² at 75 Pa
9 pressure differential tested according to ASTM E2178 or E283.

10 **503.2.4.6 Overhead door HVAC shut-off devices.** Overhead, cargo, and other loading
11 dock style doors that comprise part of the building thermal envelope shall be equipped
12 with a means for automatically shutting off the heating, cooling and humidity control
13 equipment that serves the area or zone that includes the door. The shut off shall activate
14 prior to the door being 25% open. A shut off override, designed to be used when vehicles
15 are parked in the doorway, may be included on doors equipped with weatherseals per
16 section 502.4.6. The override must automatically deactivate when the vehicle is
17 removed.

18 **Exceptions:**

- 19 1. Where HVAC equipment must remain on for safety, sanitation or other
20 health related reasons.
21 2. Radiant heating systems.

22 **503.2.9 Mechanical systems commissioning and completion.** The requirements in
23 503.2.9.1 are applicable to new buildings of less than 10,000 gross square feet. The
24 requirements in 503.2.9.2 are applicable to new buildings of 10,000 gross square feet of
25 conditioned space or greater.

26 **503.2.9.1 Mechanical systems completion for new buildings of less than 10,000 gross**
27 **square feet.** Prior to passing the final mechanical inspection, the design professional
28 shall provide evidence of system completion in accordance with Sections 503.2.9.1.1
29 through 503.2.9.1.3.

30 **503.2.9.1.1 Air system balancing.** Each supply air outlet and zone terminal device shall
31 be equipped with means for air balancing in accordance with the requirements of the
32 mechanical code. Discharge dampers are prohibited on constant volume fans and variable
33 volume fans with motors 10 hp (18.6 kW) and larger.

34 **503.2.9.1.2 Hydronic system balancing.** Individual hydronic heating and cooling coils
35 shall be equipped with means for balancing and pressure test connections.

1 **503.2.9.1.3 Manuals.** The construction documents shall require that an operating and
2 maintenance manual be provided to the building owner by the mechanical contractor and
3 to the building official upon request. The manual shall include, at least, the following:

- 4 1. Equipment capacity (input and output) and required maintenance actions.
- 5 2. Equipment operation and maintenance manuals.
- 6 3. HVAC system control maintenance and calibration information, including
7 wiring diagrams, schematics, and control sequence descriptions. Desired or
8 field determined setpoints shall be permanently recorded on control
9 drawings, at control devices or, for digital control systems, in programming
10 comments.
- 11 4. A complete written narrative of how each system is intended to operate.

12 **503.2.9.2 Mechanical systems and energy code commissioning and completion**
13 **requirements for new buildings of 10,000 gross square feet of conditioned space or**
14 **greater.** Mechanical System Commissioning is a process that verifies and documents
15 that the selected building systems have been designed, installed, and function according
16 to the owner's project requirements and construction documents. For the purposes of this
17 ordinance, it also means that the requirements of the currently adopted energy code and
18 amendments, as applicable to the mechanical systems, have been met. The
19 commissioning authority shall be responsible for the preparation and/or compilation of all
20 documentation related to this section. Drawing notes shall require commissioning and
21 completion requirements in accordance with this section. Drawing notes may refer to
22 specifications for further requirements. Copies of all documentation shall be given to the
23 owner and be made available to the building official upon request in accordance with
24 Sections 503.2.9.2.1 through 503.2.9.2.6.

25 **503.2.9.2.1 Qualifications.** The project commissioning authority shall be a certified
26 Commissioning Authority bearing one of the following certifications:

- 27 1. Association of Energy Engineers – Certified Building Commissioning
28 Professional (CBCP);
- 29 2. AABC Commissioning Group – Certified Commissioning Technician
30 (CxT);
- 31 3. American Society of Heating, Refrigeration and Air-Conditioning Engineers
32 – Commissioning Process Management Professional (CPMP);
- 33 4. Building Commissioning Association – Certified Commissioning
34 Professional (CCP); or
- 35 5. Licensure as a Registered Professional Engineer in the State of Texas.

1 **503.2.9.2.2 Commissioning form.** A completed commissioning form shall be submitted
2 to the plan review department during permitting in a format approved by the building
3 official. The Commissioning form will summarize the Owner's HVAC Project
4 Requirements, provide a listing of the equipment and the quantity of equipment to be
5 tested, and describe the equipment sequences of operations to be tested (or a reference to
6 the sequence of operations included with the construction drawings or specifications). A
7 minimum of 20% of the installed equipment shall be tested in a manner consistent with
8 standard engineering practices.

9 **503.2.9.2.3 Systems adjusting and balancing.** All HVAC systems shall be balanced in
10 accordance with generally accepted engineering standards. Air and water flow rates shall
11 be measured and adjusted to deliver final flow rates within the tolerances provided in the
12 product specifications. Test and balance activities shall include as a minimum the
13 following items:

- 14 1. Air systems balancing: Each supply air outlet and zone terminal device shall
15 be equipped with means for air balancing in accordance with the
16 requirements of the Mechanical Code. Discharge dampers are prohibited on
17 constant volume fans and variable volume fans with motors 10 hp (18.6 kW)
18 and larger. Air systems shall be balanced in a manner to first minimize
19 throttling losses then, for fans with system power of greater than 1 hp, fan
20 speed shall be adjusted to meet design flow conditions.

21 **Exception:** Fan with fan motors of 1 hp or less.

- 22 2. Hydronic systems balancing: Individual hydronic heating and cooling coils
23 shall be equipped with means for balancing and measuring flow. Hydronic
24 systems shall be proportionately balanced in a manner to first minimize
25 throttling losses, then the pump impeller shall be trimmed or pump speed
26 shall be adjusted to meet design flow conditions. Each hydronic system shall
27 have either the ability to measure pressure across the pump, or test ports at
28 each side of each pump.

29 **Exceptions:**

- 30 1. Pumps with pump motors of 5 hp or less.
31 2. When throttling results in no greater than 5% of the nameplate
32 horsepower draw above that required if the impeller were trimmed.

33 **503.2.9.2.4 Functional performance testing.**

34 **503.2.9.2.4.1 Equipment functional performance testing.** Equipment functional
35 performance testing shall demonstrate the correct installation and operation of
36 components, systems, and system-to-system interfacing relationships in accordance with
37 approved plans and specifications. This demonstration is to prove the operation, function,

1 and maintenance serviceability for each of the Commissioned systems. Testing shall
2 include all modes of operation, including:

- 3 1. All modes as described in the Sequence of Operation;
- 4 2. Redundant or automatic back-up mode;
- 5 3. Performance of alarms; and
- 6 4. Mode of operation upon a loss of power and restored power.

7 **Exception:** Unitary or packaged HVAC equipment listed in Tables 503.2.3 (1)
8 through (3) that do not require supply air economizers.

9 **503.2.9.2.4.2 Controls functional performance testing.** HVAC control systems shall be
10 tested to document that control devices, components, equipment, and systems are
11 calibrated, adjusted and operate in accordance with approved plans and specifications.
12 Sequences of operation shall be functionally tested to document they operate in
13 accordance with approved plans and specifications.

14 **503.2.9.2.5 Preliminary commissioning report.** A preliminary report of commissioning
15 test procedures and results shall be completed and provided to the Owner. The report
16 shall be identified as “Preliminary Commissioning Report” and shall identify:

- 17 1. Itemization of deficiencies found during testing required by this section
18 which have not been corrected at the time of report preparation.
- 19 2. Deferred tests which cannot be performed at the time of report preparation
20 due to climatic or occupancy conditions.
- 21 3. Climatic conditions required for performance of the deferred tests.

22 **503.2.9.2.6 Acceptance.** Mechanical Systems, or portions thereof, required by the
23 Energy Code to comply with this section shall not pass the mechanical rough inspection
24 until such time that the building official has received a letter, in a format approved by the
25 building official, from the Engineer of Record that states that the commissioning process
26 is either complete or ongoing and current as of the date of inspection. At the request of
27 the building official, a copy of the Preliminary Commissioning Report, as identified in
28 section 503.2.9.2.5, shall be made available for review.

29 **503.2.9.2.7 Completion requirements.** The construction documents shall require that
30 within one year after the date of final certificate of occupancy, the documents described
31 in this section be provided to the building owner.

32 **503.2.9.2.7.1 Drawings.** Construction documents shall include as a minimum the
33 location and performance data on each piece of equipment.

1 **503.2.9.2.7.2 Manuals.** An operating manual and a maintenance manual shall be in
2 accordance with industry-accepted standards and shall include, at a minimum, the
3 following:

- 4 1. Submittal data stating equipment size and selected options for each piece of
5 equipment requiring maintenance.
- 6 2. Manufacturer's operation manuals and maintenance manuals for each piece
7 of equipment requiring maintenance, except equipment not furnished as part
8 of the project. Required routine maintenance actions shall be clearly
9 identified.
- 10 3. Names and addresses of at least one *service agency*.
- 11 4. HVAC controls system maintenance and calibration information, including
12 wiring diagrams, schematics, and control sequence descriptions. Desired or
13 field-determined setpoints shall be permanently recorded on control
14 drawings at control devices or, for digital control systems, in programming
15 comments.
- 16 5. A complete narrative of how each system is intended to operate, including
17 suggested setpoints.

18 **503.2.9.2.7.3 System balancing report.** A written report describing the activities and
19 measurements completed in accordance with Section 503.2.9.2.3.

20 **503.2.9.2.7.4 Final Commissioning Report.** A copy of the Final Commissioning Report
21 shall be provided to the Austin Energy Green Building Program within one year of
22 passing the final mechanical inspection. A complete report of test procedures and results
23 identified as "Final Commissioning Report" shall include:

- 24 1. Results of all Functional Performance Tests.
- 25 2. Disposition of all deficiencies found during testing, including details of
26 corrective measures used or proposed.
- 27 3. All Functional Performance Test procedures used during the commissioning
28 process including measurable criteria for test acceptance, provided herein for
29 repeatability.

30 **Exception:** Deferred tests which cannot be performed at the time of report
31 preparation due to climatic or occupancy conditions.

32 **503.2.12 Ventilation filtration and filtration of return air.** Ventilation systems shall
33 incorporate filtration having a minimum efficiency reporting value (MERV) rating of 6 or
34 greater. All return air as well as all air that is either heated, cooled or humidity controlled
35 must be drawn through the air filtration system.

1 **504.8 Electric water heater timers.** For Group R buildings electric resistance water
2 heaters must be installed in conjunction with a preprogrammed water heater timer. The
3 timer shall be preprogrammed to turn the water heater off between the hours of 3:00 p.m.
4 and 7:00 p.m. from June 1 to September 30 and from 12:00 a.m. to 4:00 a.m. throughout
5 the year. The timer shall have a readily accessible override, as defined by the building
6 official administrative rule, capable of restoring power to the water heater for one hour
7 when activated.

8 **505.2.4 Exterior lighting controls.** Lighting for all exterior applications shall have
9 automatic controls that turn off exterior lighting when sufficient daylight is available or
10 when the lighting is not required during nighttime hours. Sufficient daylight shall be
11 determined in accordance with recommended IESNA RP-33-99 (Lighting for Exterior
12 Environments) illuminance levels.

13 Lighting not required or designated for dusk-to-dawn operation shall be controlled by an
14 astronomical time switch. Lighting designated for dusk-to-dawn operation shall be
15 controlled by an astronomical time switch or in series with a photo sensor. Astronomical
16 time switches shall be capable of retaining programming and the time setting during loss
17 of power for a period of at least 10 hours.

18 **Exception:** Lighting for covered vehicle entrances or exits from buildings or
19 parking structures when required for safety, security, or eye adaptation.

20 **PART 2.** This ordinance takes effect on _____, 2010.

21
22 **PASSED AND APPROVED**

23
24 §
25 §
26 _____, 2010 § _____
27 Lee Leffingwell
28 Mayor
29

30
31 **APPROVED:** _____
32 David Allan Smith
33 City Attorney
34

35 **ATTEST:** _____
36 Shirley A. Gentry
City Clerk