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State of Maine Leased Building Energy Efficiency Requirements (2003)

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January 3, 2003

STATE OF MAINE

Leased Building Energy Efficiency Requirements

Requirements contained herein are drawn primarily from documents published by recognized and established standards organizations, including: the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE), The International Code Council (ICC), and the Federal Energy Management Program (FEMP).

1. COMPLIANCE REQUIREMENTS

- 1.1** A building or complex of buildings complies with this standard if the requirements of 1.1.2 and 1.1.3 have been met and recorded on Form A.
- 1.2** A person or persons determining compliance shall state in writing that the operating and maintenance requirements of Section 2 have been met.
- 1.3** A person or persons determining compliance shall state in writing that the building and equipment modification requirements of Sections 3, 4 and 5 have been met.

Exception: No individual requirement need be met that would compromise the historical integrity of a building or part of a building designated by a governmental body in a manner indicating the value of long-term preservation in its existing state (such as historical monuments, buildings, etc.). **If an individual requirement does not affect the historical integrity of said building(s), the requirement shall be adhered to.**

2. OPERATION AND MAINTENANCE

This section establishes requirements for the operation and maintenance of existing buildings.

2.1 INFORMATION AND FEEDBACK

- 2.1.1** The person who controls the energy used by a building shall maintain easily accessible records of the energy used by that building for at least the past two years or since occupancy, if the building is less than two years old.
- 2.1.2** All equipment shall be maintained according to its manufacturer's instructions.
- 2.1.3** A log of events shall be kept and maintained that includes such items as: replacement of equipment, major repairs, damage by wind or flood or fire, and building modifications.

2.1.4 The fluid content and direction of flow shall be clearly marked on all visible pumps and pipes.

2.2 BUILDING ENVELOPE

2.2.1 Exterior Joints: Exterior joints around windows and door frames, between wall and foundation, between wall and roof, between wall panels, at penetrations of utility services through walls, floors and roofs, and all other openings in the building envelopes shall be caulked, gasketed, weather-stripped, or otherwise sealed. Obsolete dumbwaiter shafts, chimneys, and other air chases shall be capped and caulked or otherwise sealed.

2.3 HEATING, VENTILATING, AND AIR-CONDITIONING SYSTEMS

2.3.1 Temperature Setbacks. When the building is not occupied during heating season, the interior temperature is to be setback to not greater than 60 deg. F.

Exception: A building is exempted from such setback of temperature if the capacity of the heating system is not sufficient to cause recovery to comfortable temperatures in time for occupancy. In such cases, a minimum setback is to be determined by observation.

2.3.2 Air Conditioning Shutdown. When the building is not occupied during cooling season, any central air conditioning systems or individual window units are to be shut down.

2.3.3 Ventilation Systems

2.3.3.1 Ventilation System Operation. When the building is not occupied, outdoor air supply and interior exhaust fans are to be shut down or reduced to a minimum acceptable rate.

Exceptions:

1. Systems serving areas designed for continuous operation
2. Where restricted by health and life safety codes.

2.3.3.2 Ventilation System Maintenance. Ventilation system components shall be maintained in accordance with the systems Operation and Maintenance Manual or as summarized in Table 2.3.3.

**Table 2.3.3
Minimum Ventilation System Maintenance Activity**

Item	Activity	Min. Frequency*
Filters and air cleaning devices	A	According to O&M Manual
Outdoor air dampers and actuators	B	Every three months or in accordance with O&M Manual
Humidifiers	C	Every three months of use or in accordance with O&M Manual
Dehumidification coils	D	Regularly when dehumidification occurs, but no less than once per year or as specified in O&M Manual
Drain pans and other adjacent surfaces subject to wetting	D	Once per year during cooling season or as specified in O&M Manual
Outdoor air intake louvers, bird screens, mist eliminators, and adjacent areas	E	Every six months or as specified in O&M Manual
Sensors used for dynamic minimum outdoor air control	F	Every six months or periodically in accordance with O&M Manual
Air-handling systems except for units under 2000 cfm	G	Once every five years
Cooling towers	H	In accordance with O&M Manual or treatment system provider
Floor drains located in plenums or rooms that serve as air plenums	I	Periodically according to O&M Manual
Equipment/component accessibility	J	
Visible microbial contamination	K	
Water intrusion or accumulation	K	

ACTIVITY CODE:

- A Maintain according to O&M Manual.
- B Visually inspect or remotely monitor for proper function.
- C Clean and maintain to limit fouling and microbial growth.
- D Visually inspect for cleanliness and microbial growth and clean when fouling observed.
- E Visually inspect for cleanliness and integrity and clean when necessary
- F Verify accuracy and recalibrate or replace as necessary.
- G Measure minimum quantity of outdoor air. If flow rates are less than 90% of minimum required rates of ventilation air, the system shall be adjusted or modified to bring them above 90%.
- H Treat to limit the growth of microbiological contaminants.
- I Maintain to prevent transport of contaminants from the floor drain to the plenum.
- J Keep clear the space provided for routine maintenance and inspection.
- K Investigate and rectify.

* Minimum frequencies may be increased or decreased if indicated in the O&M Manual.

2.4 SERVICE HOT WATER SYSTEMS.

2.4.1 Service (domestic) hot water shall not be hotter than 120 deg. F. measured at the closest tap to the water heater.

Exception: Systems dedicated to heating water for sterilization purposes or systems utilizing a water heater to meet domestic hot water and space-heating loads are exempted.

2.4.2 Circulating Hot Water Systems: Circulating hot water systems shall be arranged so that the circulating pump(s) will be turned off (automatically or manually) when the hot water system is not in use, (i.e. nights, weekends, etc.).

2.5 LIGHTING

2.5.1 Lighting Operation.

2.5.1.1 Lights shall be turned off in unoccupied rooms, except those required for emergency egress or a similar special purpose. Standard light switches may be replaced with automated controls, such as occupancy sensors, interval timers, or timed switches to meet this requirement.

2.5.1.2 Lights shall be turned off in areas adequately and properly illuminated by daylight. Standard light switches may be replaced with automated controls, such as photocell switches or automatic dimming systems to meet this requirement.

2.5.2 Lamp Maintenance/Replacement

2.5.2.1 Continuously burning incandescent lamps of 100 watts or less shall be replaced with compact fluorescent lamps to provide equal light output as long as such lamps have size and weight compatible with the fixture.

2.5.2.2 Mercury vapor lamps shall be replaced with metal halide or high-pressure sodium lamps of equal or greater light output, but fewer watts.

2.5.2.3 PAR incandescent flood lamps or spot lamps shall be replaced with a lower wattage tungsten halogen flood or spot lamp.

2.5.2.4 When the deterioration of lenses, diffusers, and shielding mechanisms reduces original light output by 20% or more, they shall be cleaned to a condition where output is at least 95% of the original or be replaced.

2.6 Chilled Drinking Water

Electric water coolers shall not produce water cooler than 55 deg. F. Compressor operation shall be restricted when there is no need for chilled water.

3. BUILDING AND EQUIPMENT MODIFICATIONS

This section establishes requirements for building and equipment modifications in existing buildings only. **When any major component or system of the building is modified or replaced, or the building itself is significantly altered, that component, system, or altered building section shall conform to the requirements of this section.** Additions to existing buildings, and all new construction must comply with the most recent ASHRAE Energy Standards as per existing Maine law, (currently Standard 90.1-2001, *Energy Standard for Buildings Except Low-Rise Residential Buildings*).

3.1 BUILDING ENVELOPE

This section establishes requirements for building envelope systems.

3.1.1 Envelope Insulation Criteria

3.1.1.1 Walls, above grade: Above-grade wood -framed cavity walls shall be insulated to an R-value of not less than R-19. Steel-framed buildings shall be insulated to not less than R-13 + R-3.8 ci (continuous insulation). Mass walled (concrete, concrete block, etc.) shall be insulated to not less than 9.5 ci.

3.1.1.2 Roofs: For above deck insulation, not less than R-19 ci, otherwise not less than R-24 for metal buildings and R-38 for wood truss and other attic spaces.

Exception: In buildings designed to rely on heat loss to reduce snow load to design levels, insulation values that meet the snow melt requirements will be permitted. Engineering reports that document this need are required.

3.1.1.3 Floors Over Unheated Spaces: Insulation of not less than R-30. This R-value may include carpet, carpet padding and other flooring material. Mass floors shall be insulated to not less than 8.3 ci.

3.1.1.4 Floors Over Semiheated Spaces: Insulation of not less than R-13. This R-value may include carpet, carpet padding and other flooring material.

3.1.2 Windows: Windows shall be at minimum, double-glazed, low-e, with an R-value of not less than R-2 (U-0.5).

3.1.3 Doors: Replacement manufactured doors shall be certified and labeled indicating that they meet the appropriate ANSI (American National Standards Institute) air infiltration requirements.

3.2 PIPING INSULATION

3.2.1 Piping Insulation. All piping serving as part of a heating or cooling system shall be thermally insulated in accordance with Table 3.4.1.

Exceptions:

- (a) Factory-installed piping within HVAC equipment
- (b) Piping that conveys fluids that have a design temperature between 55 deg. F. and 105 deg. F.
- (c) Where it can be shown that the heat gain or loss to or from piping without insulation will not increase building energy costs.

Table 3.2.1
Minimum Pipe Insulation
(thickness in inches)

FLUID	NOMINAL PIPE DIAMETER	
	[1.5"	> 1.5"
Steam	1.5	3.0
Hot Water	1.0	2.0
Chilled water, brine, or refrigerant	1.0	1.5

3.3 DUCT AND PLEMUM INSULATION AND SEALING

3.3.1 Air-Handling (Duct) System Insulation. All air-handling ducts and plenums installed as part of an HVAC air distribution system shall be thermally insulated with a minimum of R-5 insulation when located inside of the building envelope or in unconditioned spaces. When located outside the building envelope, the minimum insulation shall be R-8. When located within the building envelope, the duct or plenum must be separated from the building exterior by a minimum of R-8 insulation.

Exceptions:

- (a) Factory-installed plenums, casings or ductwork furnished as part of HVAC equipment.
- (b) Where it can be shown that the heat gain or loss to or from ductwork without insulation will not increase building energy costs.

3.3.2 Duct Sealing. All joints, longitudinal and transverse seams, and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), or other recognized methods for sealing ductwork. **Duct tape** is not permitted as a sealant on any metal duct.

3.4 SERVICE WATER SYSTEMS.

3.4.1 Faucets. Faucets other than lavatory fixtures shall provide a flow rate of no greater than 2.0 gpm.

3.4.2 Lavatory Fixtures

3.4.2.1 Lavatory sinks shall be equipped with flow control devices that limit the flow of hot water to 0.6 gallons per minute.

3.4.3.2 Showers shall be equipped with showerheads that limit total flow to a maximum of 2.5 gallons per minute.

3.4.3.3 Toilets shall operate with no more than 2 gallons per flush.

3.4.3.4 Urinals shall operate with no more than 1 gallon per flush.

3.5 LIGHTING SYSTEMS. When lighting systems are replaced, the replacement lighting shall conform to this subsection.

3.5.1 Automatic Lighting Shutoff. Interior lighting in buildings larger than 5000 ft² shall be controlled with an automatic control device to shut off lighting in all spaces. This may be accomplished by using occupancy sensors, time of day control, or other systems that respond to an unoccupied area.

Exceptions:

- (a) Areas designated as security or emergency areas that must be continuously lighted.
- (b) Lighting in stairways or corridors that are elements of the means of egress.

3.5.2 Space Control. Each space enclosed by ceiling height partitions shall have at least one control device (switch) to independently control the general lighting within the space. The control device may be manually activated or by an occupancy sensing device.

3.5.2.1 Bi-Level Switching. Each area served by a manual control shall also allow the occupant to reduce the lighting load by at least 50%.

Exceptions:

- (a) Areas that have only 1 luminaire.
- (b) Corridors, storerooms, rest rooms, or public lobbies.

3.5.3 Additional Controls. Special lighting applications such as task lighting, accent lighting, case lighting, etc. must be controlled separately from general space lighting.

3.5.4 Exterior Lighting Controls. Automatic switching or photocell controls shall be provided for all exterior lighting not intended for 24-hour operation. Time switches shall have 7-day and seasonal schedule adjustment capabilities.

3.5.5 Interior Lighting Power Density. Lighting power density (W/ft²) may be calculated by either of the two methods described in 3.5.5.1 or 3.5.5.2.

3.5.5.1 Space-by-Space Lighting Power Density Option. Lighting power density (W/ft²) for listed activity areas shall not be greater than that listed in Table 3.5.4.

Table 3.5.5
Lighting Power Allowance
Space-by-space method

Area/Activity	W/ft²
Office Enclosed	1.5
Office Open	1.3
Conference	1.5
Classroom/Training	1.6
Lobby	1.8
Corridor	0.7
Restroom	1.0
Active Storage	1.1
Inactive Storage	0.3

3.5.5.2 Total Building Area Lighting Power Density Option. Lighting power density (W/ft²) for the entire building shall not exceed 1.3 W/ft² (office buildings only).

3.5.6 Fluorescent Lamps and Ballasts

3.5.6.1 Low-Mercury T-8 (or smaller diameter) fluorescent lamps, with electronic ballasts shall be the primary choice for general office space lighting.

Exception: Dimming circuits with specific design criteria.

3.5.6.2 Ballast Sharing. One-lamp or three-lamp fluorescent luminaires, recess-mounted within 10 ft. center-to-center of each other or pendant or surface mounted within 1 ft. of each other, and within the same room, shall be tandem wired to eliminate unnecessary use of single-lamp ballasts.

3.5.6.3 Ballast Efficacy Factor: Fluorescent lamp ballasts shall meet or exceed the minimum ballast efficacy factor (BEF) as shown in Table 3.5.6.3.

Exceptions:

- (a) Not specifically designed for starting at temperatures below 40 deg. F.
- (b) Not specifically designed for use with dimming controls.

**Table 3.5.6.3
Fluorescent Lamp Ballast Efficacy Factor**

Lamp Type	# of Lamps	Minimum BEF ⁽¹⁾	Best Available BEF
Four-Foot and U-Tube Lamps			
T8, 32 Watts	1	2.54 or higher	3.00
	2	1.44 or higher	1.54
	3	0.93 or higher	1.06
	4	0.73 or higher	0.79
Eight-Foot Lamps			
T8, 59 Watts	2	0.80 or higher	0.81

1. Ballast Efficacy Factor (BEF) is the ratio of the ballast factor (BF) to input watts; it measures the efficiency of the lamp/ballast system relative to others using the same type and number of lamps.

3.5.6.4 Ballast Power Factor. All ballasts shall have a power factor of 90% or greater.

Exceptions:

- (a) Ballasts for circline and compact fluorescent lamps and low-wattage high-intensity discharge lamps of 100W or less.
- (b) Dimming ballasts.

3.5.7 Exit Signs. Illuminated exit signs shall be low energy consumption units, lit either by LED lamps or by electroluminescent (LEC) technology. **Photoluminescent Exit signs shall not be permitted.**

3.6 ELECTRIC MOTORS. When electric motors rated at 1 hp and above are replaced, the replacement motor shall meet the following standards.

3.6.1 Efficiency rating. Replacement motors must be rated as meeting the efficiency standards designated as NEMA Premium™ or CEE Premium Efficiency motors.

3.5.2 Motor sizing. Motor horsepower should not exceed 125% of the calculated maximum load being served. If a standard motor size is not available within the range, the next largest standard motor size may be used.

4. HEATING, VENTILATION, AND AIR-CONDITIONING EQUIPMENT AND EQUIPMENT MODIFICATION REQUIREMENTS

4.1 GENERAL. HVAC equipment shall be supplied with the information necessary to determine compliance with this standard. Equipment ratings certified under a nationally recognized certification program or procedure, or data furnished by the equipment manufacturer shall be acceptable to satisfy these requirements.

4.2 PERFORMANCE STANDARDS FOR HVAC EQUIPMENT

4.2.1 Gas- and Oil-Fired Boilers. Minimum performance is to comply with Table 4.2.1.

Table 4.2.1 Gas- and Oil-Fired Boilers- Minimum Efficiency Requirements

Equipment Type	Size (Input)	Rating Condition	Minimum Efficiency	Reference Standard
Gas-Fired	<300,000 Btu/h	Seasonal Rating	80% AFUE	DOE 10 CFR Part 430
	μ300,000 Btu/h	Max. and Min. Rated Capacity	80% Thermal Efficiency	H.I. Htg. Boiler Std. 86
Oil-Fired	<300,000 Btu/h	Seasonal Rating	80% AFUE	DOE 10 CFR Part 430
	μ300,000 Btu/h	Max. and Min. Rated Capacity	83% Thermal Efficiency	H.I. Htg. Boiler Std. 86
Oil-Fired (Residual)	μ300,000 Btu/h	Max. and Min. Rated Capacity	83% Thermal Efficiency	H.I. Htg. Boiler Std. 86

4.2.2 Warm Air Furnaces and Combination Warm Air Furnace/Air-Conditioning Units. Minimum performance is to comply with Table 4.2.2.

Table 4.2.2 Warm Air Furnaces and Combination WA/AC Units Minimum Performance Requirements

Equipment Type	Size (Input)	Rating Condition	Minimum Performance	Reference Standard
Gas-Fired & Oil-Fired	<225,000 Btu/hr	Seasonal Rating	78% AFUE	DOE 10 CFR Part 430
Gas-Fired	μ225,000 Btu/hr	Max. Rated Capacity	80% Thermal Efficiency	ANSI Z21.47.90
		Min. Rated Capacity	78% Thermal Efficiency	
Oil-Fired	μ225,000 Btu/hr	Max. and Min. Rated Capacity	81% Thermal Efficiency	U.L. 727-86

4.2.3 Unit Heaters. Minimum performance is to comply with Table 4.2.3.

Table 4.2.3 Unit Heaters Minimum Performance Requirements

Equipment Type	Rating Condition	Minimum Performance	Reference Standard
Gas-Fired	Max. Rated Capacity	78% % Thermal Efficiency	ANSI Z83.8-90
	Min. Rated Capacity	74% % Thermal Efficiency	
Oil-Fired	Max. and Min. Rated Capacity	81% Thermal Efficiency	U.L. 731-88

4.2.4 Water-Source and Groundwater-Source Heat Pumps. Minimum performance standards for electrically operated heat pumps of either type, <135,000 Btu/hr Cooling Capacity is to comply with Table 4.2.4.

Table 4.2.4 Water-Source and Groundwater-Source Heat Pumps Minimum Performance Requirements

Equipment Type	Rating Condition	Minimum Performance	Reference Standard
Groundwater Source	High Temperature Rating 70 deg. F.	3.4 COP	ARI 325-85
	Low Temperature Rating 50 deg. F.	3.0 COP	
Water-Source	Standard Rating 70 deg. F.	3.8 COP	ARI 320-86 CTI 201-(86)

4.2.5 Air Source Heat Pumps. Minimum performance is to comply with Table 4.2.5.

Table 4.2.5 Air Source Heat Pumps (3-phase) Minimum Performance Requirements

Product Type and Size	Category	Minimum	Reference Standard
< 65 MBtu/h	Split System or Single Package	11.0 SEER	ARI 210/240
65 - 135 MBtu/h	Split System or Single Package	10.1 EER or 3.2 COP	
> 135 - 240 MBtu/h	Split System or Single Package	9.3 EER or 3.0 COP	ARI 340/360

4.2.6 Unitary Air Conditioners. Minimum performance of air-cooled Unitary Air Conditioners is to comply with Table 4.2.6.

Table 4.2.6 Unitary Air-Cooled Air Conditioners Minimum Performance Requirements (3-phase)

Product Type and Size	Category	Minimum	Reference Standard
< 65 MBtu/h	Split System or Single Package	11.0 SEER	ARI 210/240
65 - 135 MBtu/h	Split System or Single Package	10.5 EER	
> 135 - 240 MBtu/h	Split System or Single Package	10.0 EER	ARI 340/360

4.2.7 Room Air Conditioners. Window air conditioning units shall meet or exceed the minimum Energy Efficiency Ratio (EER) as shown in Table 4.2.7.

Table 4.2.7 Room Air Conditioning Efficiency Standards

Product Type and Cooling Capacity ^[1]	Recommended EER ^[2]	Best Available EER
with louvers ^[3] ; <20,000 Btu/hr	10.7 or more	11.7
with louvers; ≥20,000 Btu/hr	9.4 or more	10.0

1. Cooling Capacity is the amount of cooling that can be provided by the unit (in Btu/hr) at standard rating conditions.

2. EER, or Energy Efficiency Ratio is equal to the measured cooling capacity of the unit (in Btu/hr) divided by its electrical input (in watts) at standard rating conditions. EER is based on DOE test procedure; see 10 CFR 430, Sub-part B, Appendix F.

3. Louvered sides improve the energy performance of window-installed A.C. units by enhancing airflow over the outdoor coil. Units intended for through-the-wall installation require a smooth-sided cabinet (no louvers). Since there is very little range in the efficiencies of unlouvered products for sale, only louvered products are covered in this standard.

4.3 SIMULTANEOUS HEATING AND COOLING SYSTEMS. Systems that employ simultaneous heating and cooling **to the same zone** to achieve comfort conditions shall not be replaced with similar systems. (See also Section 4.4.2 Zone Controls.)

4.4 CONTROLS FOR HEATING, VENTILATION, AND AIR-CONDITIONING (HVAC) SYSTEMS

4.4.1 Temperature Controls

4.4.1.1 Temperature Controls, single zone systems. Each heating and cooling system shall have at least one solid-state programmable thermostat that has the capability for setback or shutdown based on the day of the week and time of day.

4.4.1.2 Temperature Controls, complex zone systems. Each heating and cooling zone shall be controlled by individual thermostatic controls capable of responding to temperature within the zone.

4.4.1.2.1 Off-hour controls. Each zone shall be provided with thermostatic setback controls that are controlled by either an automatic time clock or programmable control system.

4.4.1.2.2 Setback controls. Thermostatic setback controls shall have the capability to set back or temporarily operate the system to maintain zone temperatures down to 55 deg. F. or up to 85 deg. F.

4.4.1.2.3 Dual system controls. Where used to control both heating and cooling, zone thermostatic controls shall be capable of providing a temperature range or deadband of at least 5 deg. F.

Exception: Thermostats that require manual changeover between heating and cooling modes.

4.4.2 Zone Controls. *Zone* thermostatic controls shall be capable of operating in sequence the supply of heating and cooling energy to the *zone*. Such controls shall prevent (1) *reheating*, (2) *recooling*, (3) mixing or simultaneously supplying air that has been previously mechanically heated and air that has been previously cooled, either by mechanical cooling or by economizer systems and (4) other simultaneous operation of heating and cooling systems to the same zone.

Exceptions:

(a) Zones for which the volume of air that is reheated, recooled, or mixed is no greater than the volume of outside air required to meet the ventilation requirements of ASHRAE Standard 62.

(b) Zones where special pressurization relationships, cross-contamination requirements, or code-required minimum circulation rates exist.

(c) Zones where at least 75% of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered source (including condenser heat) or site solar energy source.

4.5 VENTILATION SYSTEMS CONTROL

4.5.1 Shutoff Damper Controls. Both outdoor air supply and exhaust ducts shall be provided with automatic means to reduce and shut off airflow when the systems or spaces served are not in use.

Exceptions:

1. Systems that are designed for continuous operation.
2. Individual supply systems with a design airflow rate of 3,000 cfm or less.
3. Where restricted by health and life safety codes.

4.6 ENERGY RECOVERY. Energy recovery is required for systems supplying greater than 5,000 cfm and 70% outside air.

4.6.1 Possible heat recovery devices include, but are not limited to: Enthalpy wheels, Heat wheels, Energy Wheels, Desiccant wheels and Membrane, fixed-plate heat exchangers.

4.7 HVAC COMPLETION REQUIREMENTS

4.7.1 System Balancing

4.7.1.1 General. Construction documents shall require that all HVAC systems be balanced in accordance with generally accepted engineering standards.

Construction documents shall require that a written balance report be provided to the owner **and lessee** for HVAC systems serving *zones* with a total conditioned area exceeding 3000 ft². **Balance reports shall be provided by individuals or firms certified by one of the nationally recognized system balancing organizations such as: The National Environmental Balancing Bureau (NEBB); The Testing, Adjusting and Balancing Bureau (TABB); or The Associated Air Balance Council (AABC).**

4.7.1.2 Air System Balancing. Air systems shall be balanced in a manner to first minimize throttling losses. Then, for fans with fan system power greater than 1 hp, fan speed shall be adjusted to meet design flow conditions.

4.7.1.3 Hydronic System Balancing. Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses; then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions.

Exceptions: Impellers need not be trimmed nor pump speed adjusted:

- (a) For pumps with pump motors of 10 hp or less.
- (b) When throttling results in no greater than 5% of the nameplate horsepower draw, or 3 hp, (whichever is greater), above that required if the impeller was trimmed.

4.7.2 System Commissioning. HVAC control systems shall be tested to ensure that control elements are calibrated, adjusted, and in proper working condition. For projects larger than 50,000 ft² conditioned area, except warehouses and semiheated spaces, detailed instructions for commissioning HVAC systems shall be provided by the designer of said system(s).

5. SERVICE WATER-HEATING EQUIPMENT AND EQUIPMENT MODIFICATION REQUIREMENTS

5.1 GENERAL. Service water-heating equipment shall be supplied with the information necessary to determine compliance with this standard. Equipment ratings certified under a nationally recognized certification program or procedure, or data furnished by the equipment manufacturer shall be acceptable to satisfy these requirements.

5.2 EQUIPMENT EFFICIENCY. All water heaters and hot water storage tanks shall meet the criteria of Table 5.2.

Exception: Storage water heaters and hot water storage tanks of more than 140 gallons storage capacity need not meet the standby heat loss requirements of Table 5.2 if the tank surface is thermally insulated to R-12.5 and if a standing pilot light is not used.

Table 5.2 Water-Heating Equipment Minimum Performance Requirements

Category	Type	Fuel	Input Rating	Volume	Energy Factor	Standby Loss	Test Method
NAECA Covered Water-heating Equipment	all	electric	[12 kW	all	μ 0.93	–	DOE Test Proc. 10 CFR, Part 43043
	storage	gas	[75,000 Btu/hr		μ 0.62	–	
	instantaneous	gas	[200,000 Btu/hr		μ 0.62	–	
	storage	oil	[105,000 Btu/hr		μ 0.59	–	
	instantaneous	oil	[210,000 Btu/hr		μ 0.59	–	
Unfired storage tanks	–	–	–	all	–	[6.5Btuh/ft ²	–

Energy Factor measures the efficiency of the water heater by comparing the energy supplied in heated water to the total daily consumption of the water heater.

5.3 WATER HEATING CONTROLS.

5.3.1 Special Temperature Requirements. Where temperatures higher than 120 deg. F. are required at certain outlets for a particular use, separate remote heaters or booster heaters shall be installed for those outlets.

Exception: Where it can be shown that energy cost is not reduced by the application of this requirement or that the total installed cost of the equipment, maintenance, and energy used over the life of the equipment is not reduced.

5.3.2 Circulation Hot Water Systems and Heated Pipes. These systems shall be equipped with automatic time switches or other controls that can be set to turn off the system when use of hot water is not required.

5.4 ADDITIONAL EQUIPMENT EFFICIENCY MEASURES.

5.4.1 Electric Water Heaters. An economic evaluation shall be made on the potential benefit of using an electric heat pump water heater(s) instead of an electric resistance water heater(s). The analysis shall compare the extra installed costs of the heat pump unit with the benefits in reduced energy costs (less maintenance costs) over the estimated service life of the heat pump water heater.

Exception: Electric resistance water heaters used in conjunction with site-recovered or site-solar energy sources that provide 50% or more of the water-heating load.

5.4.2 Gas-Fired Water Heaters. All gas-fired storage water heaters not equipped with a flue damper that use indoor air for combustion and that are installed in conditioned spaces shall be equipped with a vent damper (unless the water heater is already so equipped). The vent damper shall be listed as meeting appropriate ANSI standards and shall be installed in accordance with the manufacturer's instructions and local codes.

Exception: Where the cost of the damper exceeds the value of reduced energy costs over the damper's lifetime.

5.4.3 Point-of Use Water Heaters. Point-of-use water heaters should be considered in applications where hot water use is minimal and their use would reduce annual energy cost.

5.4.4 Heat Traps. Storage water heaters not equipped with integral heat traps and having vertical pipe risers shall be installed with insulated heat traps on both the inlet and outlets. The heat trap shall be installed directly or as close as possible to the outlet fittings.

Exception: Water heaters that are used to supply circulating hot water systems.

FORM A-COMPLIANCE

1. Name of Project: _____
Address: _____

2. Name of person requesting compliance: _____
Address: _____
Telephone: _____

3. Name of person(s) establishing compliance: _____
Address: _____
Telephone: _____
Name: _____
Address: _____
Telephone: _____

4. Application of compliance to (check one):

Building Complex

5. Have the operation and maintenance requirements of Section 2 been met?

Yes No

6. Have the building and equipment modification requirements of Section 3,4 and 5 been met?

Yes No

7. We state that this building complies with the State of Maine Clean Government Initiative Leased Building Energy Efficiency Standards.

Yes No

8. Date: _____

9. Signature of person for whom compliance was determined: _____

10. Signature of person or persons determining compliance: _____

APPENDIX A

BIBLIOGRAPHY

1. *ANSI/ASHRAE/IESNA 100-1995, Energy Conservation in Existing Buildings*, 1996.
2. *ANSI/ASHRAE/IESNA 90.1-2001, Energy Standard for Buildings Except Low-Rise Residential Buildings*, 2001.
3. *ANSI/ASHRAE Standard 62-2001, Ventilation for Acceptable Indoor Air Quality*, 2001
4. International Code Council, *International Energy Conservation Code 2000*, 1999.
5. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Federal Register/ Volume 65, No. 195, 10 CFR Parts 434 and 435, October 6, 2000.