



- SESSION 1 - 2015 Michigan Energy Code (MEC) Update (3 Technical)
- Per SMACNA Standard (TAB, Duct Design) and ASHRAE (90.1.2013) ASHRAE Detroit Members: AM Session is eligible for (X) Professional Development Hours (PDH). SMACNA Detroit will supply completion certificates to attendees.

# ASHRAE 90.1 -2013 Chapter 6

## Energy code for Mechanical Equipment

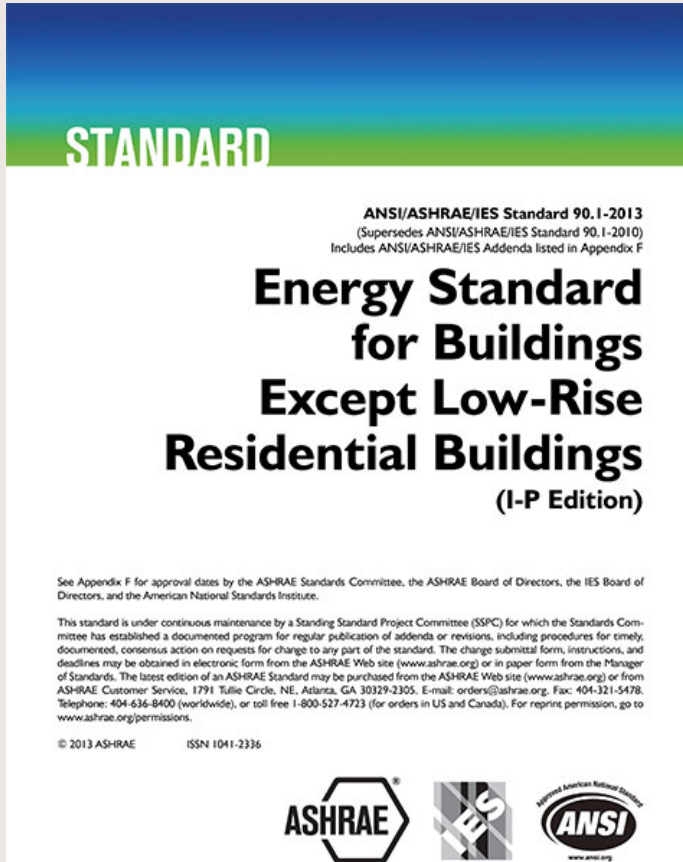
SESSION 1 - 2015 Michigan Energy Code  
(MEC) Update (3 Technical)

Covering code compliance to the mechanical provisions of Chapter 6 requirements for Simplified approach (installation less than 25,000 square feet, no more than two stories and single HVAC zone). Including plan review and field verification of areas of specialty.

# ADOPTION OF CODE

- Filed with the Secretary of State May 23, 2017
- These rules take effect 120 days after filed with the Secretary of State
- History: 2010 AACCS; 2017 MR 10, Eff. Sept. 20, 2017.
- PART 10 A
- Michigan Uniform Energy Code R  
408.31087 - 408.31099
- ANSI/ASHRAE/IESNA standard 90.1-2013 (hereafter the
- standard), including appendices A, B, C, D, and G,

# ASHRAE 90.1 -2013



- The ICC Energy code is written to choose the IECC Energy code or the ASHRAE 90.1
- Michigan Only allows
- ASHRAE 90.1

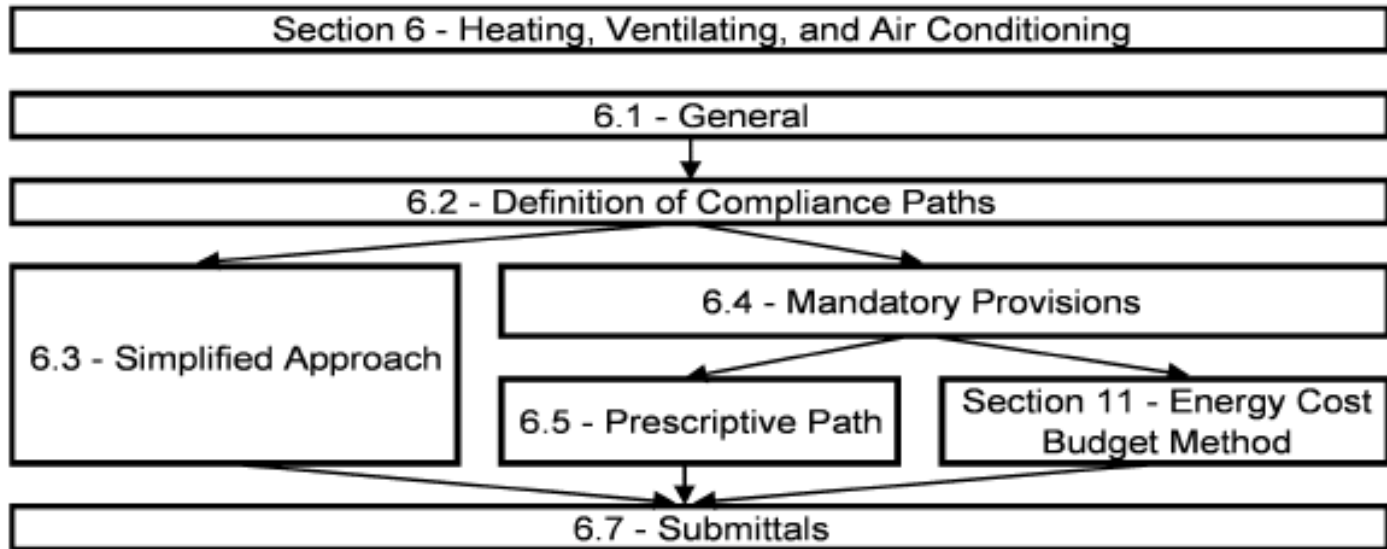
# Existing buildings per Part 10A

- Additions.
- Alterations.
- Ordinary repairs exempt from permit
- and abatement of wear due to normal service conditions shall not be subject to the
- requirements for repairs in this section.
- Spaces undergoing a change in occupancy that would result in an
- increase in demand for either fossil fuel or electrical energy shall comply with this code.

# HVAC EXISTING

- New HVACR equipment as a direct replacement comply minimum efficiency requirements.
- There is exception PTAC Units.
- New Ducts & Piping
- Compliance not required: Repairs.
- Associated equipment.
- Refrigerant Change
- Equipment relocation
- Ducts where space won't allowed.

# COMPLIANCE PATHS FOR CHAPTER 6





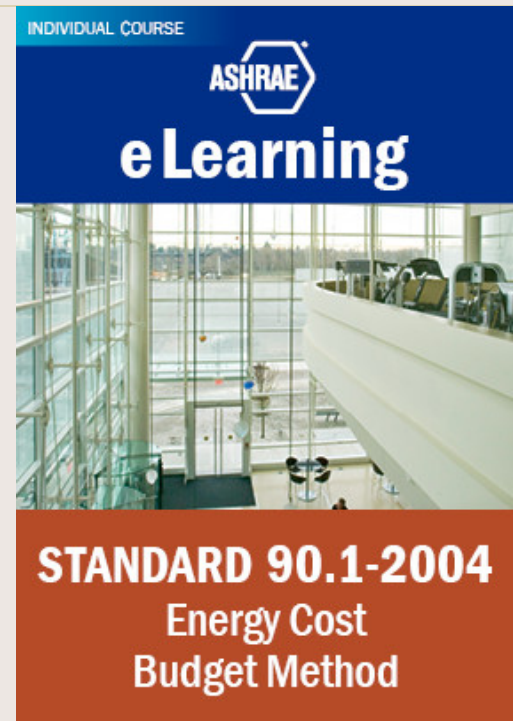
# COMPLIANCE PATHS

---

- Section 6.3, “Simplified Approach Option for HVAC Systems”
- Section 6.4, “Mandatory Provisions”
- Section 6.5 Prescriptive Path

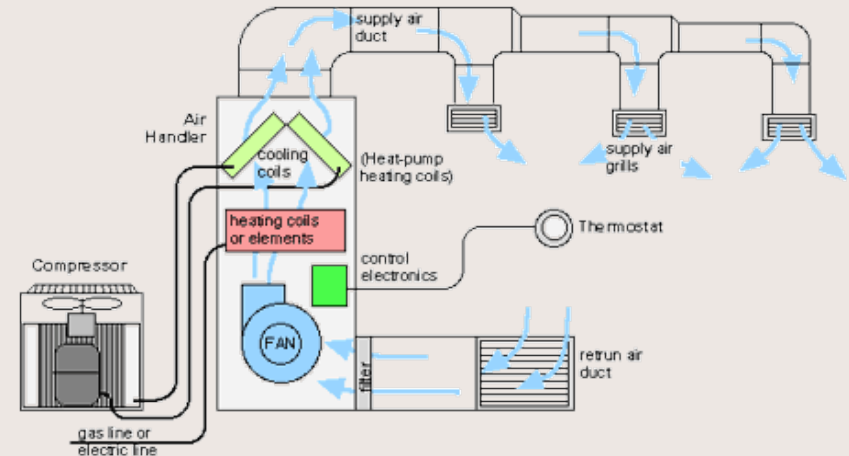


Projects using the Energy Cost Budget Method (see Section 11 of this standard) must comply with Section 6.4, the mandatory provisions of this section, as a portion of that compliance path.



# SIMPLIFIED METHOD

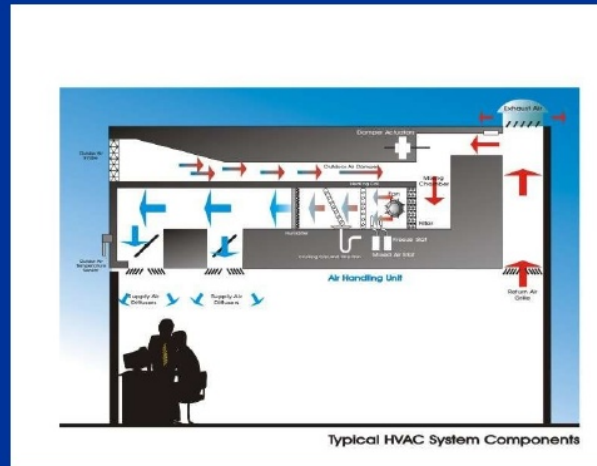
- The building is two stories or fewer in height.
- Gross floor area is less than 25,000 ft<sup>2</sup>.
- Each HVAC system in the building complies with the
- Requirements listed in Section 6.3.2. there are 18 requirements.



# Single HVAC Zone system.

- VAV or Systems using multiple zones
- Cannot be under this path, unless system serves a Single Zone.

## Typical Single Zone HVAC



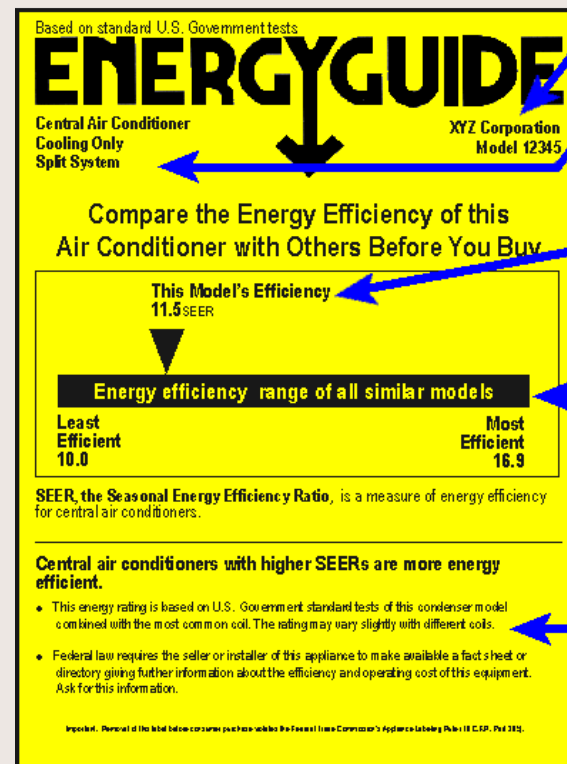
# The equipment must meet the variable flow requirements of Section 6.5.3.2.1.

Each cooling system listed in Table 6.5.3.2.1 shall be designed to vary the indoor fan airflow as a function of load and shall comply with the following requirements:

- Minimum 2 speed blower required for Units larger than 5 ton cooling (65,000 Btu/h)
- Low speed exceed 66% of full speed & draw no more power of full speed of 40%
- Or Modulating air flow.

# Unitary packaged or split-system air conditioner that is either air cooled or evaporative cooled efficiency requirements:

- Table 6.8.1-1 (air conditioners)
- Table 6.8.1-2 (heat pumps)
- Table 6.8.1-4 (packaged terminal and room air conditioners and heat pumps)



Manufacturer and model number.

Information about features, capacity and size helps you compare brands.

The energy efficiency rating for the product. The higher the number, the more energy-efficient the product, and the less it costs to run.

The range of ratings for similar models, from "less efficient" to "more efficient." This scale shows how a particular model measures up to the competition.

Important information on energy use and operating costs is published in fact sheets and product directories. Installers and contractors are required by law to provide these to you.

# Efficiency Tables

- Single-phase, air-cooled air conditioners <65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.
  - (The National Appliance Energy Conservation Act)
  - All dates have expired manufacture's to be in full compliance.
- Units must be labeled stating In compliance with ASHRAE 90.1 – 2013 Not required on NAECA Units

### **6.4.1.5.1 Mechanical Equipment.**

Mechanical equipment that is not covered by the U.S. National Appliance Energy Conservation Act (NAECA) of 1987 shall carry a permanent label installed by the manufacturer stating that the equipment complies with the requirements of Standard 90.1.

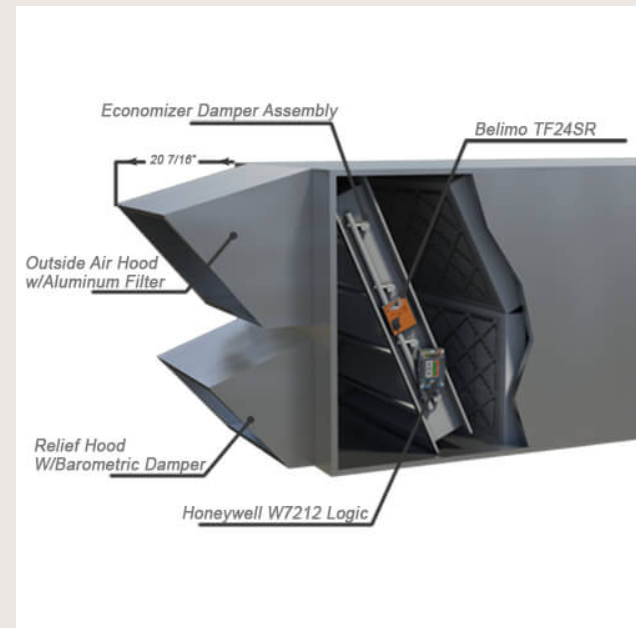


**The system shall have an air economizer meeting the requirements of Section 6.5.1.**

- **Anything above 4.5 tons required.**
- **There are 10 exceptions though.**
- **Churches 20 hours or less.**
- **Hospitals.**
- **Computer rooms is at less than 12 tons.**
- **Residential < 22 tons.**

# Economizers 6.5.1

- 100% of the design supply air quantity
- as outdoor air for cooling.
- Sequenced with the mechanical cooling
- equipment and shall not be controlled by only mixed-air temperature.
- 4 CFM/sq. ft. leakage
- Relief of Excess Outdoor Air.



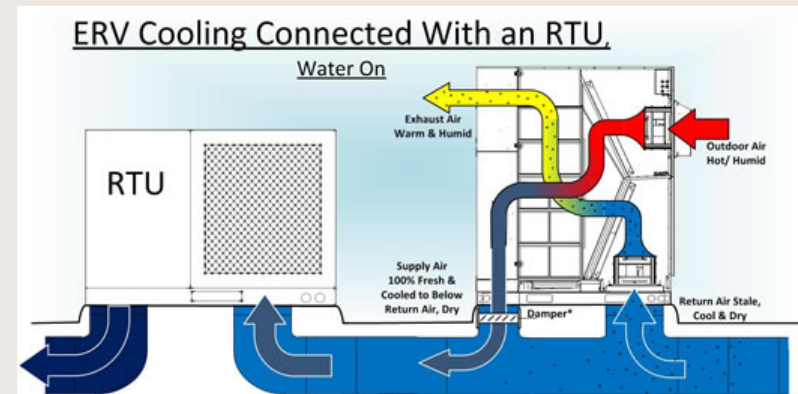
# Heating Efficiency

- **Table 6.8.1-2 (heat pumps)**
- **6.8.1-4 (packaged terminal and room air conditioners and heat pumps)**
- **Table 6.8.1-5 (furnaces, duct furnaces, and unit heaters), an electric resistance heater**
- **Table 6.8.1-6 (boilers).**



# Exhaust air energy recovery requirements of Section 6.5.6.1.

- Rarely found in Simplified systems
- 8000 Hours or more.
- Requires less CFM Percentage of Outside air requires less CFM to qualify.
- Several exceptions.



**TABLE 6.5.6.1-1 Exhaust Air Energy Recovery Requirements for Ventilation Systems Operating Less than 8000 Hours per Year**

Zone	% Outdoor Air at Full Design Airflow Rate						
	≥10% and <20%	≥20% and <30%	≥30% and <40%	≥40% and <50%	≥50% and <60%	≥60% and <70%	≥70% and <80%
	Design Supply Fan Airflow Rate, cfm						
3B, 3C, 4B, 4C, 5B	NR	NR	NR	NR	NR	NR	NR
1B, 2B,5C	NR	NR	NR	NR	≥26000	≥12000	≥5000
6B	≥28,000	≥26,500	≥11000	≥5500	≥4500	≥3500	≥2500
1A, 2A, 3A, 4A, 5A, 6A	≥26,000	≥16,000	≥5500	≥4500	≥3500	≥2000	≥1000
7,8	≥4500	≥4000	≥2500	≥1000	>0	>0	>0

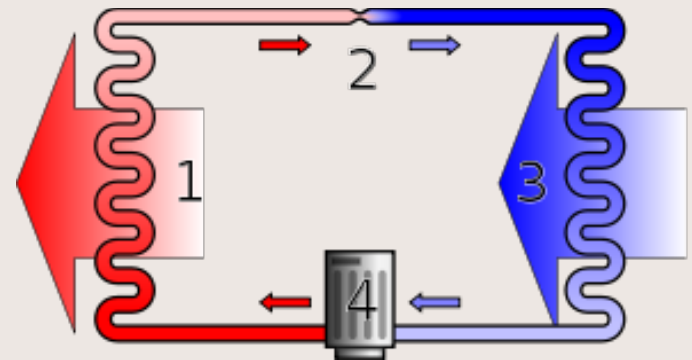
NR—Not required

**The system shall be controlled by a manual changeover or dual setpoint thermostat.**

- **Systems serving spaces other than hotel/motel guest**
- **rooms, and other than those requiring continuous operation, which have both a cooling or heating capacity greater than 15,000 Btu/h and a supply fan motor power greater than 0.75 hp, shall be provided with a time clock that (1) can start and stop the system under different schedules for seven different day types per week,**

# Heat pump Auxiliary Heat

- **Controls shall be provided**
- **that prevent supplemental heater operation when the**
- **heating load can be met by**
- **the heat pump alone during**
- **both steady-state operation**
- **and setback recovery.**





# REHEAT NOT ALLOWED.

**The system controls shall not permit reheat or any other form of simultaneous heating and cooling for humidity control.**

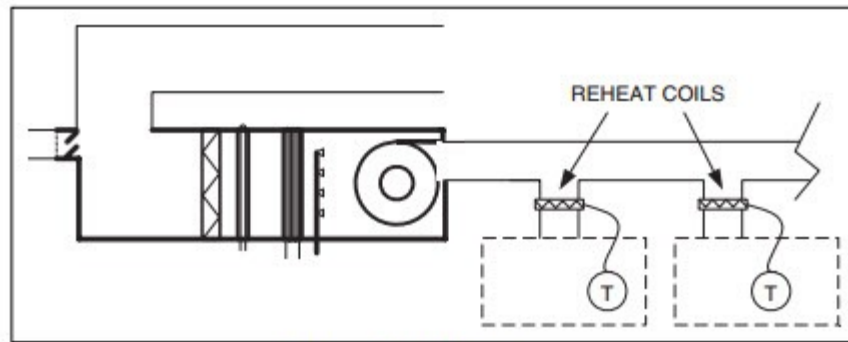


Figure 2.14 Reheat System

# HVAC Piping Insulation

- **TABLE 6.8.3-2**
- **TABLE 6.8.3-1**
- **Temperature of fluids for > 60 degree up to 105 degrees exempt**
- **1/2" Minimum.**
- **Insulation exposed to weather shall be suitable for outdoor service, e.g., protected by aluminum, sheet metal, painted canvas, or plastic cover.**
- **Cellular foam insulation shall be protected as above or painted with a coating that is water retardant and provides shielding from solar radiation.**

# Duct Insulation & Sealing

- **Ductwork and plenums shall be insulated in accordance with Tables 6.8.2-1 and 6.8.2-2 and shall be sealed in accordance with Section 6.4.4.2.1.**
- **Ceiling Return Air plenums must comply with Chapter 5 building insulation of walls.**
- **Duct pressure testing of all exterior ducts**
- **6.4.4.2.1**

**TABLE 6.8.2-2 Minimum Duct Insulation R-Value,<sup>a</sup>  
Combined Heating and Cooling Supply Ducts and Return Ducts**

Duct Location					
Exterior	Ventilated Attic	Unvented Attic Above Insulated Ceiling	Unvented Attic with Roof Insulation <sup>a</sup>	Unconditioned Space <sup>b</sup>	Indirectly Conditioned Space <sup>c</sup>
<b>Supply Ducts</b>					
R-6	R-6	R-8	R-3.5	R-3.5	None
R-6	R-6	R-6	R-3.5	R-3.5	None
R-6	R-6	R-6	R-3.5	R-3.5	None
R-6	R-6	R-6	R-3.5	R-3.5	None
R-6	R-6	R-6	R-1.9	R-3.5	None
R-8	R-6	R-6	R-1.9	R-3.5	None
R-8	R-6	R-6	R-1.9	R-3.5	None
R-8	R-8	R-8	R-1.9	R-6	None
<b>Return Ducts</b>					
R-3.5	R-3.5	R-3.5	None	None	None

Values, measured in (h·ft<sup>2</sup>·°F)/Btu, are for the insulation as installed and do not include film resistance. The required minimum thicknesses do not consider possible surface condensation. Where exterior walls are used as plenum walls, wall insulation shall be as required by the most restrictive condition of Section 6.8.2.1. Insulation resistance measured on a horizontal plane in accordance with ASTM C518 at a mean temperature of 75°F at the installed thickness. <sup>a</sup> Air plenums, both ventilated and nonventilated. <sup>b</sup> Air plenums with or without exposed roofs above. <sup>c</sup> Air plenums with or without exposed roofs above.

# Air Balance Report required.

- Per Industry Standards see Appendix A



# **Outdoor air intake and exhaust systems shall meet the requirements of Section 6.4.3.4.**

- **Motorized Dampers**
- **300 CFM < Gravity okay.**
- **Damper leakage per 6.4.3.4.**
- **Ventilation outdoor air and**
- **exhaust/relief dampers shall be capable of automatically shutting off during preoccupancy building warm-up, cooldown, and setback**



# **Thermostats shall be interlocked to prevent simultaneous heating and cooling**

- **Where separate heating and cooling equipment serves the**
- **same temperature zone**



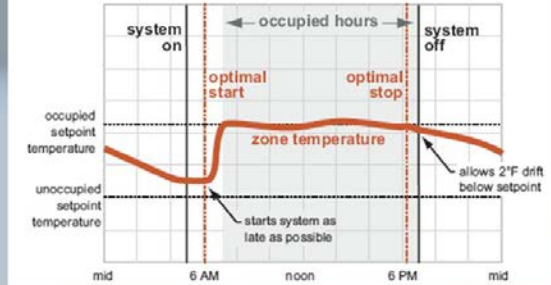


# Optimum start controls

- Required on systems greater than 10,000 cfm.

## Optimum Start/Stop

Figure 1. Optimal start and optimal stop



# Demand control ventilation

- **>25 people per 1000 ft<sup>2</sup>**
- **More than 500 square feet.**
- **Systems with a design outdoor airflow less than**
- **750 cfm.**
- **Where ventilation air is being used for make up air is exempt.**
- Has one of Items
- Air-side economizer
- b. Automatic modulating control of outdoor air damper
- c. Design outdoor airflow greater than 3000 cfm.

# The system complies with the door switch requirements

- Door stays open more than 5 minutes thermostat resets to 55 degree heating & 90 degree Cooling.
- Not required on door with automatic closer.

## 6.5.11 Refrigeration Systems

- R values Coolers & freezers required
- Automatic lights required on display cases motion sensor.
- Most of requirements are mandated by Federal Energy standards.

# Examples:

- 7.5 ton roof top used to Cool office area with ventilation required.
- Replacement boiler with new piping installed.
- New ceiling return plenum used on older existing building where no ceiling plenum was not used before.