Energy Efficient Design and Construction Recommendations

Building design and construction should address the following objectives for design, construction, commissioning, operation and maintenance for better energy efficiency

| Building Structure | Mechanical Systems | Occupant Considerations |
|---|---|---|
| • Thermal transmission through heat loss and heat gains should be reduced by the specification and installation, with proper attention to detail and quality assurance, of increased levels of thermal insulation.<br>• Insulation systems should be installed such that they reduce convective, conductive and radiative heat losses and gains.<br>• Moisture gain resulting in decreased thermal and structural performance should be controlled.<br>• Fenestration systems should be selected according to climate, building orientation, interior comfort, day lighting, ventilation, furnishing durability and egress requirements. | • Indoor air quality should be facilitated by the installation of a controlled mechanical ventilation system. Heat recovery is recommended in severe heating climate zones.<br>• Only sealed combustion or power vented direct combustion appliances should be installed in occupied spaces.<br>• Thermal and peak load reductions derived from improving levels of insulation, air tightness and fenestration performance of the building envelope should be evaluated in the sizing of equipment.<br>• The domestic hot water system should meet high efficiency standards. Options for reducing water consumption are recommended.<br>• Solar energy for hot water heating should be considered.<br>• Efficient illumination design and lighting systems should be used. Natural lighting of spaces should be considered prior to specifying electric illumination systems.<br>• Other lighting fixtures should use compact fluorescent lamps.<br>• Major appliances should meet high-energy efficiency standards using current appliance ratings. | • A comprehensive operations manual should be provided to occupants, which includes necessary operating, maintenance and repair information so that the performance of the building can be maximized.<br>• Systems that provide control over space conditioning, hot water or lighting energy use should be clearly marked. Information relating to the operation and maintenance of such systems should be provided to occupants. |

*Based on **Energy and Environmental Building Association**, Bloomington, 2006*

Design and Construction Recommendations for Occupant Safety, Health and Comfort

In no case should the application of energy efficient or resource efficient design or construction strategies, materials, equipment or appliances violate safety codes and standards. The construction should provide a healthy living and working environment. It should also provide a comfortable living and working environment.

| Building Structure | Mechanical Systems | Occupant Considerations |
|---|---|---|
| • Recognized structural design shall be employed to resist live, static and wind loads.<br><br>• Selection of construction materials that have low emission rates of toxic materials; foundations designed to exclude entry of soil gas; and implementation of moisture control measures are recommended.<br><br>• The building envelope should facilitate the comfort of occupants | • Mechanical systems shall be designed and constructed to facilitate occupant safety.<br><br>• A controlled mechanical ventilation system should be provided to facilitate occupant health.<br><br>• The mechanical systems should facilitate the comfort of occupants. | • Information relating to the safe operation of the building and mechanical systems shall be provided to occupants. Information relating to safe maintenance of installed mechanical systems shall also be provided.<br><br>• Information relating to the healthy operation of the building and its mechanical systems should be provided to the occupants.<br><br>• Information relating to the comfortable operation of the building and its mechanical systems should be provided to the occupants |

*Based on* ***Energy and Environmental Building Association****, Bloomington, 2006*

Design and Construction Recommendations for Indoor Environment

Energy efficient and resource efficient construction should provide comfortable indoor conditions.

| Building Structure | Mechanical Systems | Occupant Considerations |
|---|---|---|
| • The building and site should provide effective drainage measures to control rainfall runoff and to prevent entry into the building.<br>• The building foundation should be designed and constructed to prevent the entry of moisture and other soil gases.<br>• Building assemblies should be designed and constructed to permit drying of interstitial spaces.<br>• Building assemblies should be designed and constructed to prevent airflow into insulation systems from both the interior and exterior.<br>• Materials, adhesives and finishes with tested low emission rates should be selected. | • Controlled mechanical ventilation systems shall be installed.<br>• Where combustion appliances are used, only sealed direct combustion or power vented systems should be installed in habitable spaces. Gas cooktops and gas ovens should only be installed in conjunction with exhaust fans.<br>• Forced air systems should be designed to provide balanced airflow to all conditioned spaces and zones.<br>• Filtration systems should be provided for forced air systems which provide a minimum atmospheric dust spot efficiency<br>• Indoor humidity should be maintained | • Occupants should be provided with an operator's manual containing specific operating instructions on how to maintain a healthy indoor environment.<br>• Control systems should include advisory display or indicative modes to alert occupants to "trouble" or "failure" conditions. |

*Based on* ***Energy and Environmental Building Association****, Bloomington, 2006*