Journal of Architectural Engineering Technology
ISSN: 2168-9717
Liua, JAET 2021, 10:12
Persepective
Open Access

Building Envelope Design and its Functions

Bin Liua*

Department of Architecture and Civil Engineering, Tsinghua University, Beijing, China

***Corresponding author:** Dr Bin Liua, Department of Architecture and Civil Engineering, Tsinghua University, Beijing, China, E-mail: Binliua@445.edu.cn

Received date: December 09, 2021; **Accepted date:** December 23, 2021; **Published date:** December 30, 2021

Citation: Liua B (2021) Building Envelope Design and its Functions. J Archit Eng Tech 10: 259.

About the Study

Building envelope design is a specialist field of architectural and engineering practise that incorporates all aspects of building science and climate management. All of the components of the outer exterior that maintain a dry, heated, or cooled inside environment and permit climate management are referred to as the building envelope (or building enclosure). The physical barrier between a building's conditioned and unconditioned environments, including resistance to air, water, heat, light, and noise transfer, is known as the building envelope.

The building envelope's various functions may be divided into three categories:

- Support (structural and dynamic stresses to resist and transmit)
- Seize control (the flow of matter and energy of all types)
- Complete the task (to meet desired aesthetics on the inside and outside)

The control function is at the heart of good performance, and it concentrates on rain control, air control, heat control, and vapor control, in that order.

Water and water vapor control

Rain control is critical, and there are a variety of ways for doing so, including ideal barriers, drained screens, and mass / storage systems.

One of the primary functions of a roof is to keep water out. There are two types of roofs: flat and sloped. Flat roofs can have a slope of up to 10 or 15 degrees, but they are designed to withstand standing water. Pitched roofs are made to shed water, not to prevent standing water from forming due to wind-driven rain or ice damming. As a second layer of protection, most residential pitched roofs are covered with an underlayment material beneath the roof covering material. Domestic roofs can also be vented to aid in the removal of moisture from leaks and condensation.

Although walls are not subjected to the same level of water exposure as roofs, they nonetheless leak. Barrier, drainage, and surface-sealed walls are the three types of water-resistant wall systems. Barrier walls, such as concrete and some brick walls are designed to collect water but not enable it to permeate the wall. Drainage walls, such as hollow walls, allow water that leaks into the wall to flow away. Rain screen and pressure equalization wall systems, for example, can be vented to help with drying. Sealed-surface walls prevent water from penetrating the siding materials outside surface.

Although most materials do not stay sealed for extended periods of time, and this system is restricted, conventional residential building generally considers walls as sealed-surface systems, relying on siding and an underlayment layer known as house wrap. Basements can become wet through the walls or the floor. Basement waterproofing and drainage keep the walls dry, but a moisture barrier under the floor is required.

Air control

Controlling air flow is crucial for maintaining interior air quality, reducing energy consumption, preventing condensation (and so extending the life of the building), and providing comfort. The passage of air through the enclosure (the assemblage of materials that performs this function is referred to as the air barrier system) or through components of the building envelope (interstitial) itself, as well as into and out of the interior area, is controlled (which can affect building insulation performance greatly). As a result, air management encompasses the prevention of wind washing (cold air flowing through insulation) and convective loops, which are air movements within a wall or ceiling that can account for 10% to 20% of total heat loss.

The base, roof, walls, doors, windows, and ceiling, as well as their associated barriers and insulation, are all physical components of the envelope. The dimensions, performance, and compatibility of materials, manufacturing process and details, connections, and interactions are the primary determinants of the building enclosure system's efficacy and longevity.

Thermal envelope

The thermal envelope, also known as the heat flow control layer, is a component of the building envelope that may be located elsewhere, such as in the ceiling. An insulated attic floor is the major thermal control layer between the inside of the home and the outside, although the entire roof is part of the building envelope (from the surface of the roofing material to the interior paint finish on the ceiling).

The use of an infrared camera to view temperature anomalies on the inside and external surfaces of a structure is known as building envelope thermography. Infrared image analysis can help discover moisture concerns such as water ingress or interstitial condensation. Thermal bridging, insulation continuity, and air leakage are other sorts of anomalies that can be discovered, but they need a temperature difference between the interior and outside ambient temperatures.