What are Walls and Enclosure Systems?

Worksheet

A wall is a vertical building element that encloses or divides space; an enclosure system is the layered assembly (structure, insulation, barriers, cladding) that together control structural loads and environmental performance.

Questions

1. A wall has k = 1.0 W/(mK) and thickness 0.25 m. What is its U-value?

A) 4.0 W/mK
B) 0.25 W/mK
C) 2.5 W/mK
D) 1.25 W/mK

2. Which wall type carries structural load down to the foundation?

A) Partition wall
B) Curtain wall
C) Bearing wall
D) Screen wall

3. A lower U-value means:

A) Worse insulation
B) Better insulation
C) Thicker wall always
D) Heavier wall always

4. What does a weather-resistive barrier do?

A) Blocks bulk water while letting vapor escape
B) Carries structural loads
C) Provides the interior finish color
D) Increases thermal conductivity

5. An uninsulated concrete wall is 0.2 m thick with thermal conductivity k = 1.7 W/(mK). Find its U-value.

6. A wall has a 0.1 m mineral-wool insulation layer with k = 0.04 W/(mK). Find its U-value.

7. A brick wall is 0.3 m thick with k = 0.6 W/(mK). Find its U-value and compare it to the insulated wall in Example 2.

8. Define: What is a bearing wall?

9. Define: What is a curtain wall?

10. Define: What is U-value?

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Answer Key

1. A) 4.0 W/mK - U = k/d = 1.0/0.25 = 4.0 W/mK.

2. C) Bearing wall - A bearing wall transfers gravity loads from above directly to the foundation.

3. B) Better insulation - Lower U-value means less heat passes through - better insulation.

4. A) Blocks bulk water while letting vapor escape - It keeps liquid water out while still letting water vapor exit the wall assembly.

5. U = k / d U = 1.7 / 0.2 = 8.5 W/mK (poor insulation)

6. U = k / d U = 0.04 / 0.1 = 0.4 W/mK (well insulated)

7. U = k / d = 0.6 / 0.3 = 2.0 W/mK Compared to Example 2 (0.4 W/mK), this wall loses 5 more heat per m per degree.

8. A wall that carries structural loads from floors/roof directly down to the foundation.

9. A non-load-bearing exterior wall (often glass) hung from the building's structural frame.

10. Thermal transmittance - how much heat passes through a wall per m per degree of temperature difference; lower is better insulated.

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