

What Is Natural Lighting and Daylighting?

Worksheet

Daylighting uses windows, skylights, light shelves and reflective surfaces to distribute natural light throughout interior spaces; performance is quantified by the Daylight Factor: $DF = (E_i / E_o) \times 100$.

Questions

1. What does the Daylight Factor formula $DF = (E_i/E_o) \times 100$ measure?
 - A) The ratio of interior to exterior sound levels
 - B) The percentage of exterior illuminance reaching an interior point
 - C) The total lumens produced by a light fixture
 - D) The building's solar heat gain
2. Interior illuminance is 400 lux, exterior is 20,000 lux. What is the Daylight Factor?
 - A) 2%
 - B) 0.5%
 - C) 5%
 - D) 20%
3. As distance from a window increases, Daylight Factor typically:
 - A) Increases steadily
 - B) Stays constant
 - C) Decreases
 - D) Becomes negative
4. What device redirects daylight deeper into a room while shading the area below?
 - A) A light shelf
 - B) A thermal mass wall
 - C) A vapor barrier
 - D) An HVAC diffuser
5. A room has an interior illuminance of 500 lux while the exterior illuminance under an overcast sky is 10,000 lux. Find the Daylight Factor.
6. A deep classroom measures 150 lux at the back wall when the exterior illuminance is 15,000 lux. Find the Daylight Factor at that point.
7. A well-daylit office near a window reads 900 lux interior with 12,000 lux exterior. How does its Daylight Factor compare to a minimum recommended DF of 2%?
8. Define: What is daylighting?
9. Define: What is the Daylight Factor (DF)?
10. Define: What DF is generally considered well-daylit?

Answer Key

1. B) The percentage of exterior illuminance reaching an interior point — DF expresses interior illuminance as a percentage of simultaneous exterior illuminance under an overcast sky.
2. A) $2\% \text{ — } DF = (400/20,000) \times 100 = 2\%$.
3. C) Decreases — Daylight intensity drops off with distance from the window, so DF decreases toward the back of a room.
4. A) A light shelf — A light shelf bounces daylight off its top surface onto the ceiling, pushing light farther into the space.
5. $DF = (E_i / E_o) \times 100$ $DF = (500 / 10,000) \times 100$ $DF = 5\%$
6. $DF = (150 / 15,000) \times 100$ $DF = 1\%$
7. $DF = (900 / 12,000) \times 100 = 7.5\%$ 7.5% is well above the 2% minimum recommended for adequate daylighting
8. Designing windows, skylights and layouts to bring natural light into a building, reducing the need for electric lighting.
9. The ratio of interior illuminance to exterior illuminance (under an overcast sky), expressed as a percentage: $DF = (E_i/E_o) \times 100$.
10. A DF of about 2% or higher is typically considered adequately daylit for most tasks; below 2% often feels dim and requires supplemental lighting.

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