

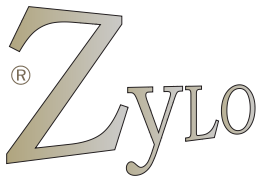


® Zylo



Preformed Pipe Casings and Pipe Boxing

A Guide to Heat Loss Calculations



Introduction

There are two components to heat loss from a room :-

(1) Losses due to natural or mechanical ventilation

Ventilation Loss = Mass of Air x Specific Heat x Temperature Difference (inside to outside)

(2) Losses through the various structural components

Structural Loss = Area of Structure x "U" value x Temperature Difference (inside to outside)

Ventilation heat losses, especially in modern highly insulated homes tend to be the largest component of room heating requirements.

Losses between rooms are generally ignored unless one room is unheated and there is a large temperature difference between the two.

Structural losses through external windows, walls, roofs and floors are calculated individually assuming a design condition of -1°C outside.

It is common practice to add 10% to the total calculated losses as a safety margin before selecting a radiator.

Example

Room Temperature 21°C, when outside temperature is -1°C (22°C temperature difference)

Room volume = 45m³, Air Change Rate = 2, Specific Heat Factor = 0.33

Area of External Wall = 12m², Area of Glazing = 2m², Area of Floor = 15m²

Area of ceiling - no heat loss as room above is heated

Ventilation loss = 45 x 2 x 0.33 x 22 = 653

External Walls = 12 x 0.6 x 22 = 158

Glazing = 2 x 5.6 x 22 = 246

Floor = 15 x 0.8 x 22 = 264

subtotal 1321

+10% 132

Radiator Size = 1453 Watts

Ventilation Losses

Ventilation losses from rooms are estimated using the following formulae :-

$$\text{Heat Loss (W)} = \text{Room Volume (m}^3\text{)} \times \text{Air Change Rate} \times 0.33 \times \text{Room to Outside Air Temperature (}^\circ\text{C)}$$

The constant 0.33 is derived from the following calculation:

$$\frac{(1.01 \times 1000 \times 1.2)}{3600}$$

Where:

- 1.01: Specific Heat (kJ/kg°C)
- 1000: kJ to Joules
- 1.2: Air Density (kg/m³)
- 3600: Hours to Seconds

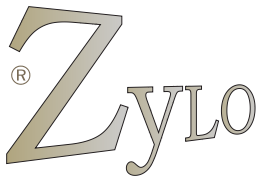
The amount of heat required for ventilation purposes is dependant upon the volume of air within the space and the rate at which it is refreshed by natural leakage. This infiltration of fresh air is known as the air change rate and is based upon the estimated number of air changes per hour for a given room volume.

The tabulated data on this page shows typical air change rates for various room usage. The data should only be treated as a guide. Rooms with ill fitting doors and windows will have higher infiltration rates than those stated.

Bathrooms and kitchens with fans installed should have calculated air change rates based upon the duty of the fan.

Recommended Room Temperatures	
Living Room	21
Dining Room	21
Bathroom	21
Kitchen	18
Hall	18
Bedroom	18

Typical Air Change Rates (per hour)	
Living Room	1.5
Dining Room	1.5
Bathroom	2.0
Kitchen	2.0
Hall	2.0
Bedroom	1.0



Treat the following information as a guide only, and always refer to manufacturers data when ever possible.

"U" Values - Floors (domestic size)	
Solid Floor (2 sides external)	0.50
Solid Floor (4 sides external)	0.75
Suspended Timber (uninsulated)	0.65
Modern Build (insulated)	0.22

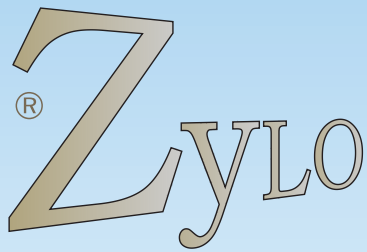
Thermal Resistance Values (R)	
Ri (walls)	0.125
Ri (ceilings)	0.150
Ro (walls)	0.060
Ro (roofs)	0.050
Air Space	0.200

"U" Values - Roofs	
Flat Roof (50mm insulation)	0.90
Pitched Roof (100mm insulation)	0.40
Pitched Roof (150mm insulation)	0.28
Modern Build (insulated)	0.20

Thermal Conductivity Values (k)	
Brickwork	0.70
Concrete	0.42
Hardboard	0.20
Plaster	0.47
Plasterboard	0.17
Rock wool	0.04
Sandstone	1.70
Softwood	0.12

"U" Values - Windows	
Single Glazing	6.0
Roof Glazing	6.5
Double Glazing	2.6
Modern Build (sealed, coated)	1.8

"U" Values - Walls	
Brick, Cavity, Block	1.0
Brick, Cavity, Insulated Block	0.5
Brick, Cavity, Insulated Timber Frame	0.3
Modern Build (insulated)	0.3



About Us

BSMW Products Ltd manufacture a wide range of commercial radiator covers, heater guards and pipe casings.

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