

## BELGIUM (BE2)

|                       |   |                            |      |                          |        |
|-----------------------|---|----------------------------|------|--------------------------|--------|
| <b>Building name:</b> | IVEG  | <b>Year of completion:</b> | 1999 | <b>Type of building:</b> | Office |
| <b>Design Team:</b>   | Design Architect: M.Mussche; Consultants: Belgian Building Research Institute<br>Consulting engineers: IVEG and Air-Consult Engineering |                            |      |                          |        |



### Site data

| Design conditions winter |      | Design conditions summer |      | Average wind speed (m/s) | Prevailing wind direction | Terrain shielding | Dust pollution | Noise pollution | Latitude | Longitude | Altitude (m) |
|--------------------------|------|--------------------------|------|--------------------------|---------------------------|-------------------|----------------|-----------------|----------|-----------|--------------|
| T                        | g/kg | T                        | g/kg |                          |                           |                   |                |                 |          |           |              |
| n.a.                     | n.a. | n.a.                     | n.a. | n.a.                     | n.a.                      | City              | Intensive      | Moderate        | 51°10' N | 4°22' E   | 10           |

### Design philosophy for IAQ and Thermal Comfort and issues of concern for this building

The IVEG building is a new office building located in a suburban area of Antwerp. IVEG is an interurban association for the distribution of electricity and gas. Although its mission is to sell energy, IVEG is deeply concerned about the reduction of energy consumption. The new building was therefore designed and built with attention to energy consumption and indoor comfort.

The building has two ventilation systems with totally different objectives, covering air quality ventilation and summer cooling:

**Air Quality Ventilation:** Air quality is maintained using an infrared-controlled mechanical ventilation system. Fresh air is mechanically supplied into each office at 30 m<sup>3</sup>/h/person (landscape office) to 40 m<sup>3</sup>/h/person (cellular office) and is extracted from the toilets. Every office has its own infrared presence sensor which restricts supply ventilation to periods in which the office is occupied.

**Intensive Night Ventilation:** To achieve good indoor comfort in summer, an overall strategy was chosen: passive measures (solar shading, good insulation, intelligent lighting) and intensive night ventilation. The objective of this intensive ventilation is to cool down the internal mass of the building with cold external air. The night ventilation is fully natural and mainly based on the stack effect. Air supply is achieved by means of large louvres in the facades, extraction taking place in two large chimneys. The opening of the louvres in the facades and the chimneys is automatically controlled.

## Principle of hybrid ventilation

The ventilation system in the IVEG-building is a hybrid ventilation system because a natural (for summer comfort) and a mechanical ventilation (for IAQ) system coexist. Currently, there is no interaction between the two systems - each has its own goal. If the intensive night ventilation is not efficient enough to obtain good thermal comfort in summer, it is possible to add a cooling unit to the IAQ ventilation system.

## Components used to solve main issues or problems

### *IAQ control*

Mechanical ventilation system with infrared presence detection.

### *Thermal Comfort: active measures*

Intensive night ventilation: Large louvres, with protection against rain, insects and burglary. Large chimney for extraction. The thermal mass must be accessible. In the IVEG-building, there is no false floor. The false ceilings are semi-open. If needed, a small cooling unit can decrease the temperature of the IAQ ventilation air by 2°C.

### *Thermal Comfort: passive measures*

1. Solar shading: vertical external screens.
2. Intelligent lighting: infrared presence detection and independent integrated luminance sensors are used to dim the lighting according to the luminance level on the desk.

### *Energy conservation*

Low-e gas-filled double glazing (central  $U$ -value = 1,2 W/m<sup>2</sup>.K), well-insulated walls (8cm polystyrene) and roof (10cm foam).

### *Temperature control*

Thermostatic radiator valves.

## Control Strategies

*Mechanical ventilation* is controlled by infrared presence detection. The user has no way to interfere with it.

*Intensive night ventilation*: The control strategy for night ventilation is controlled by a central computer and will be optimised in the framework of IEA Annex 35.

*Shading devices*: Each facade is automatically controlled by a meteorological station according to the prevailing solar radiation, wind, rain and temperature conditions. This control can be manually overruled by the user as long as the central computer allows it.

*Heating*: IVEG uses a central heating system with classic radiators and two small condensing gas burners of 60kW each. The thermostatic radiator valves allow users to adjust the heating to their needs.

## Overall performance

Monitoring activities are planned in the framework of IEA Annex 35.