

ING Headquarters (ING House), Amsterdam,
Netherlands, Meyer en van Shooten Architecten.



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The purpose of this research paper is to document the ING headquarters (ING House) located in Amsterdam, Netherlands, as it has been deemed the largest and most expensive sustainable development in Europe to date. The building will be described in terms of site, scope and design. The main environmental approaches used in this project, the hybrid double skin, the natural subterranean aquifer, and the climate facades

will be described, and their relative successes or failures will be analysed. The impact of the broad adoption of these principles into architectural discourse will subsequently be discussed.

The ING group, one of the world's largest, most innovative and competitive financial service corporations, decided to build a new corporate command centre in 1997 for its most important employees. The commission went to a local pair of Dutch architects, Roberto Meyer and Jeroen van Schooten. "Owned and occupied by the client, it is intended to embody the values of that organization to the outside world."¹ The building itself was intended to reflect the fast moving pace of the company, as well as expressing to all observers that the company embodies trust, as expressed by its transparency, responsibility, as reflected by its environmental sensitivity, and flexibility, through the adaptability and openness of its spaces. "Transparency, innovation, eco-friendliness and openness were the main starting points for the design."² Even the location of the building itself indicates an allied and revolutionary company. Situated

along Amsterdam's ring road, "the location is at the junction of two areas"³. The site is flanked on the west by the low lying landscape of the Nieuwe Meer lake, and on the east by the high rises of the new Zuidas financial district. The A10 motorway charges past the northern end of the site, but the building has been sensitively placed on the site in order to maintain views of the landscape which surrounds the site for the motorists through the building's entrance level to the meadows beyond. As the building sits a mere 25 metres from the highway, the architects were forced to find a solution to the problem of noise and exhaust fumes.⁴ The form of the edifice was entirely the informed by its context. The body of the building was raised to the level of the elevated highway on 16 steel V-shaped legs. The Vs come together in colossal cylinders resting on pins in big steel blocks which are sunk into the ground.⁵ The narrowness of the site lent itself to a slender and elongated building, and the wedge shaped elevation suggests reconciliation between the vastly different landscapes on either side. The building starts off low on the western end near the lake and

meadow, and gradually rises to its full 11 storey height on the eastern end to fit into its cosmopolitan setting. The building

The structure of the ING House is constructed entirely of steel, allowing for a double skin façade, which almost seems independent of its structure. A double skin "is essentially a pair of glass skins separated by an air corridor ranging in width from a few inches to several feet."⁶ This double skin allows for "the aerodynamic Machine Age aesthetic"⁷ and seamless transitions between glass and aluminium cladding along its exterior uninterrupted surface. "There are three principal types of dual-layered glass facades: buffer, extract air, and twin face, which differ slightly in regard to ventilation and potential reduction of a building's energy demand."⁸ This building incorporates a Hybrid double skin, which boasts of the benefits of the Twin-Face Façade and the Extract-Air Façade typologies. The elements of the Twin-Face typology integrated within the design are the conventional fixed insulating curtain wall system, which prevents heat loss in the winter, along with an outer skin of single

glazing. The exterior glass skin is primarily for the protection of the air cavity contents, in this case, operable shading devices as well as circulation stairwells in certain areas. The exterior glazing works as a solar gain collector, which transports heat into the building in the winter, and it also incorporates vents to extract excess heat in the summer. The key elements of the twin-face typology are the operable windows in the insulating curtain wall.⁹ A regular twin face would also incorporate operable openings in the exterior skin, however this double skin does not. Rather, as in typical Extract-air typologies, fresh air is provided via the HVAC system. The cavity in between the glass skins is undivided and becomes a part of the HVAC system, allowing for the air to pass through the entire height of the façade. Since the motorway along the north façade would induce exhaust fumes into the ventilation system, the fresh air “is drawn into the space between the two glass skins through the belly”¹⁰ from the clean side of the building (away from the motorway). In addition, “the air from one façade is directed to the opposite in order to incorporate natural

ventilation.”¹¹ The heated air in the cavity is either distributed into the HVAC system, or is extracted to the exterior.¹²

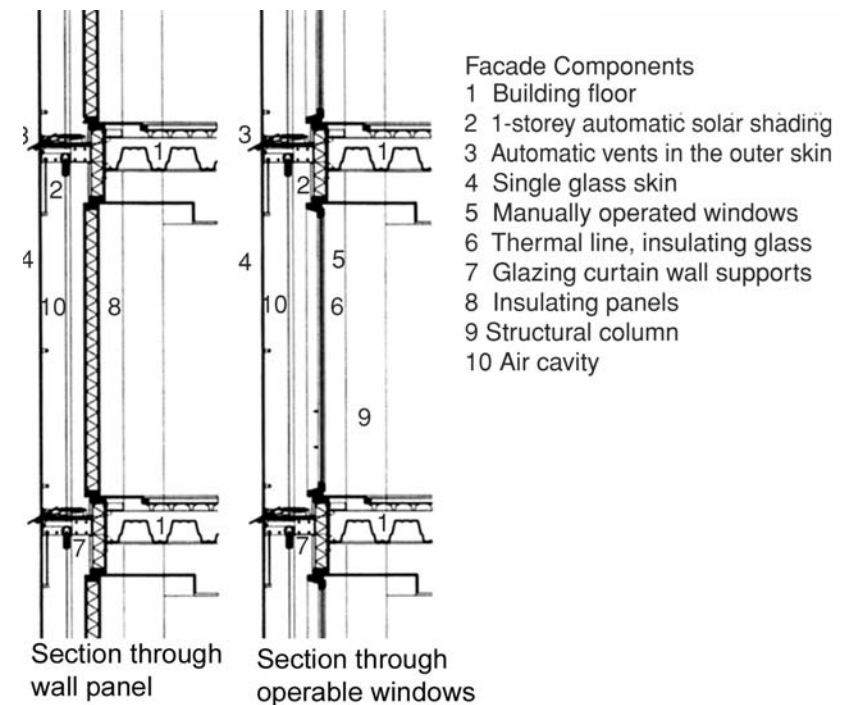


Figure 1: wall sections through double skin facade¹³

The Ventilating techniques of the ING house are integrated throughout the building. “From each office,

workers can operate their own windows by computer or remote control, automatically closing off the space from the central climate control.”¹⁴ The eight gardens scattered throughout the building as well as the cavities between the glass facades incorporate interior atrium spaces through which stack effect circulates air. These natural ventilation techniques are used as the primary heating and cooling source of the building but on very hot or cold days, the mechanical ventilation is used. The HVAC system accesses a subterranean natural aquifer beneath the building for heat and cold storage and circulation using heat pumps.

“The heat pump system and thermal energy storage system are connected by a two pipe distribution system. One pipe carries warm water, and one pipe carries cold water. For heating, the heat pump system with an individual pump withdraws water from the warm pipe and rejects water to the cool pipe after withdrawing thermal energy. For cooling, the process is reversed.”¹⁵ This heated or cooled water from the aquifer is run through chill ceilings from the cold layer to the warm layer in order to produce energy for the climate installations.¹⁶

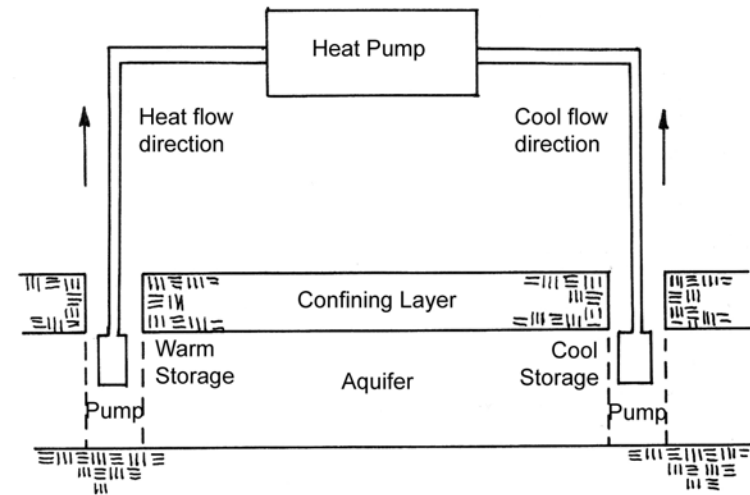
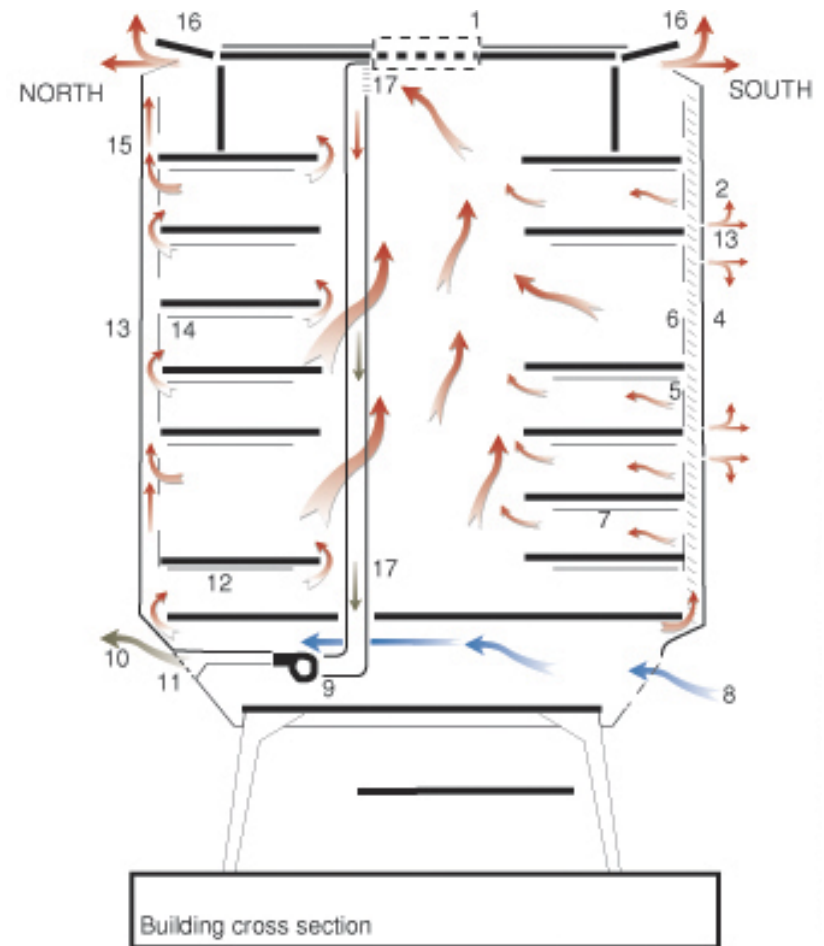


Figure 2: Aquifer heating and cooling system with heat pump¹⁷

In addition to these techniques of environmental design, as the building is clad mainly in glass, floor to ceiling glazing provides heating through daylighting. All windows as well as shading devices are operable, as aforementioned, and can be centrally as well as locally controlled for maximum user comfort. The final environmental approach was to incorporate climate facades into the double skin cladding system. A

computer that regulates the inner climate of the building was installed. Glazed skins of the façade vary depending on their orientation.

On the north facade, next to the highway, the exterior skin buffers the noise and fumes, while on the southern side, louvers with their own motors open and close centrally and open automatically when the temperature along this façade, the warmest one, rises.¹⁸ All operable devices, for example, louvers, windows, and artificial lighting, are wired into the central controls, so that the façade the building may respond mechanically to the behaviour and presence of each individual user. “When a window is opened in a room or a sunshade is raised up, the air conditioner in the room turns itself off. But also, the artificial lighting in the room turns itself off when there is sufficient daylight.”¹⁹ At every This natural breeze reduces the cooling load.



With all of these environmental techniques

incorporated so thoroughly throughout the design of this building, “the quality of the space internally is extremely

ENVIRONMENTAL CONTROLS

- 1)Flue dampers
- 2)1-storey high automatic solar shading
- 3) Automatic vents in the outer skin
- 4) Single glass skin
- 5) Manually operated windows
- 6) Thermal line, insulating glass
- 7) Photocell controlling dimmers
- 8) Fresh air
- 9) Heat recovery
- 10) Air outlet
- 11)Automatic closing valve
- 12)Multi service unit (heating,cooling,ventilation,light and sprinkler system
- 13) Single pane glass
- 14) Thermal line, insulating glass
- 15)Smoke tube
- 16)Automatic Valves
- 17)Ducts from office to atrium

Figure 2: Cross section through building²⁰

high.”²¹ As a result of the building being raised to the level of the motorway, none of the views from the building are interrupted by the motorway. The eight gardens, each with their own character, that are scattered throughout the building generally consist of double height courtyard areas with planted pots. These green spaces allow views across the plan and from one floor to another.²² Each worker thus has a fully daylight workspace and a green view, either internally or externally. The architects suggested that green views from all workspaces would improve the atmosphere and workers’ concentration.”²³ The double skin façade along with the innovative ventilation system effectively block the noise and fumes from the motorway. “Two-layer facades improve sound insulation properties by 5 to 30 decibels, depending on the layout of the floors.”²⁴ The open plan implies the building’s transparent nature from the inside as successive storeys intermingle and offer recurrent glimpses from one to another²⁵. As the ING House was designed to be utilised for at least 50 to 100 years, the design had to provide sufficient flexibility inside for future

developments in work situations.²⁶ Once again, the open plan does contribute exactly this quality to the space. Durability and cost effectiveness was also a main concern. "The architect predicts that the natural ventilation system should pay for itself within seven years if properly maintained."²⁷ "According to some estimates by environmental engineers, certain types of ventilated facades show energy savings of 30 to 50 percent."²⁸

The combination of all of these environmental principles seems to have been relatively successful, as every aspect of the sustainable building design is operating in the manner it was expected to. The only potential problem could be such a great reliance on technology to assume control of the mechanical devices. The mere presence of such mechanisms in such a vast quantity could pose a problem, should the devices begin to deteriorate. The replacement costs of such high-tech devices could prove costly, although given the undisclosed budget of the project and the nature and economic stability of ING group, this hardly seems like an issue. This does, however become an issue when the

broad adoption of such techniques is considered. If every building in the future were designed and executed with the environmental sensitivity and ingenuity of Meyer and van Schooten, the environment would suffer far less. The average building, if incorporating such sustainable developments into daily operation, would definitely experience fewer operational costs and perhaps even experience a longer building lifespan. The main problem with incorporating such issues into design is the initial cost which some companies or developers simply may not be able to or want to afford. Perhaps the only way to ensure responsible environmental design is to follow in the footsteps of the Europeans who have incorporated environmental sustainability into laws. Until then, the capitalist nature of North American business will not make allowances for environmentally friendly buildings.

Following the documentation and description of design and main environmental principles, it is clear that the overall environmental principles incorporated in the ING Headquarters building are both very efficient and innovative, despite the initial construction costs. The

broad adoption of such environmental principles would avoid energy emissions and would yield much lower energy costs. An endeavour to incorporate such building techniques would ameliorate the environment greatly.

¹ World Architecture. No.112, January 2003. "Amazing Feat." Kieran Long. p.44.

² <http://www.meyer-vanschooten.nl/projects/INGgroupheadquarters>

³ <http://www.meyer-vanschooten.nl/projects/INGgroupheadquarters>

⁴ Architectural Record. Volume 191, No. 1, January 2003. "ING Group Headquarters, the Netherlands." Tracy Metz. p. 98.

⁵ Metz, Tracy. p.100.

⁶ Architectural Record. Volume 188, No.7, July 2000. "Using Multiple Skins to Clad Buildings." Werner Lang and Thomas Herzog. p. 171.

⁷ Metz, Tracy. p.94.

⁸ Lang, Werner, Herzog, Thomas. p. 173.

⁹ Lang, Werner, Herzog, Thomas. p. 176.

¹⁰ Metz, Tracy. p. 100.

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http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/ds/ING.PDF

¹²

http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/ds/ING.PDF

¹³

http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/ds/ING.PDF

¹⁴ Metz, Tracy. p.100.

¹⁵ Schaetzle, Walter, Brett, C. Everett, Grubbs, David M., Seppanen, Marvin S. "Thermal Energy Storage In Aquifers." New

York, Oxford, Toronto, Sydney, Paris, Frankfurt: Pergamon Press, 1980. p.110.

¹⁶ Metz, Tracy. p.100.

¹⁷ Schaetzle, Walter et.al., p.7.

¹⁸ Long, Kieran. p.47.

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http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/ds/ING.PDF

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http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/ds/ING.PDF

²¹ Long, Kieran. p.47.

²² Long, Kieran. p.48.

²³ Metz, Tracy. p.102.

²⁴ Lang, Werner, Herzog, Thomas. p. 173.

²⁵ <http://www.meyer-vanschooten.nl/projects/INGgroupheadquarters>

²⁶ Metz, Tracy. p.98.

²⁷ Long, Kieran. p.47.

²⁸ Lang, Werner, Herzog, Thomas. p. 173.
