

Heat recovery for 68 Grayston Drive

68 Grayston Drive was characterised by limited roof area, limited electricity and north, east, south and west facing façades that allowed radiant heat to enter the building freely. This was the heating ventilation and air-conditioning (HVAC) challenge that Standard Bank IT division faced when 68 Grayston Drive in Sandton became the division's new head office.

Standard Bank representative Philip Nel explains that the largest design consideration was that the building had limited power supply, with only 100 W per square metre for all electrical and air-conditioning requirements. In addition, Eskom could not offer resources to upgrade the electrical power supply. The bank then decided to use these constraints as a challenge to reduce the building's carbon footprint, considering that an air-conditioning system is the biggest consumer of electricity within a building structure. Selecting an air-conditioning system that would demand less electrical power, use ozone friendly refrigerants, resonate very low ambient noise and remove the need for municipal water would contribute significantly to a building's reduced carbon foot print, and Standard Bank aimed to achieve this.

Once all these factors had been considered, the system selected by the project team was the Mitsubishi Electric City multi heat recovery system. Toon Herman from Toon Herman Consulting Engineers noted that while he did look at an ice storage system, the constraints were such that the storage aspect was far too bulky for the space permitted. Furthermore, due to the building's structural nature, no core drilling could be done to house the piping needed for an ice storage system. Although, plenums had to be applied to accommodate various fans, refrigeration piping and cabling, this was kept at a minimum with the heat recovery system. Within the ceiling void space, large cross beams had to be negotiated and again, due to the flexibility of the Mitsubishi system, flexible ducting could be used as secondary duct runs, giving the installation team the required flexibility. Importantly, to maintain the integrity of the overall performance, the main duct network was made from standard galvanised sheet metal. Toon Herman states, "Energy saving was an important consideration and due to the Mitsubishi system offering high coefficient of performance (COP), the decision to use high quality materials to ensure that this efficiency was transferred into actual performance was of utmost importance."

To further assist with the heat gain and the air-conditioning performance, the east and west façades of the building have mechanical louvers installed. These louvers are controlled via sensors and small actuator motors that automatically rotate the louvers, deflecting the sun's glare depending on the time of day. This function makes a big difference when sizing an air-conditioning system, allowing the selection of smaller capacity units and thereby lowering the demand on electrical consumption.

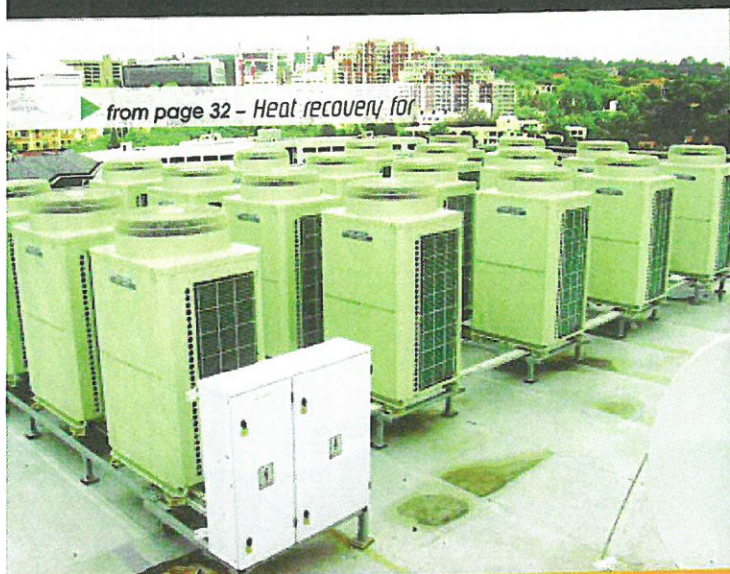
The fundamental benefits of the Mitsubishi Electric heat recovery system is its ability to simultaneously cool and heat different spaces. For example, the need for cooling is common on an early winter's



Mitsubishi's air conditioning system significantly reduced electricity consumption at Standard Bank's head office



The Mitsubishi City Multi, a variable refrigerant flow (VRF) system, can easily achieve up to 30% cost saving over a conventional air conditioning system



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Standard Bank selected the Mitsubishi Electric City multi heat recovery system to "green" its building on Grayston Drive



Inhabitants of Standard Bank's head office are experiencing no discomfort due to the measures taken to reduce electricity consumption

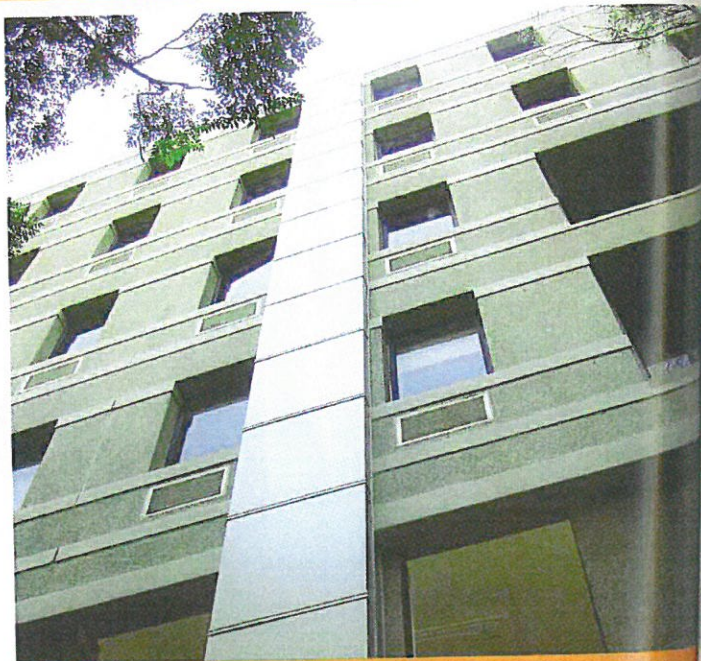
morning on the eastern side of the building. The by-product of this cooling function is captured heat energy. This heat energy that has been absorbed into the system's refrigerant system can then be reused to heat another area of the building or even heat up water housed in large commercial geysers, thereby offering free hot water.

Ten condensing units are positioned on the roof which in itself is a small area. The building consists of five storeys all operating off the same central Mitsubishi Electric heat recovery system. Interestingly, the high security IT laboratory, which operates 24 hours a day, is also connected to the central HVAC system. This is made possible due to the inverter technology adopted by Mitsubishi allowing the system to run at 10% of its full capacity, further reducing the demand on electricity. This flexible approach to capacity usage is extended onto the first floor, a welcome area with several small meeting rooms, including a 20-seat presentation area all connected to the same air conditioning system and all only demanding cooling or heating when required.

Understanding variable flow refrigeration (VRF) by Mitsubishi Electric

The Mitsubishi City Multi is a variable refrigerant flow (VRF) system whereby one outdoor unit can be connected to multiple indoor units. The amount of refrigerant in this installation can be regulated freely according to the load of each indoor unit via the inverter driven compressor in the outdoor unit. Energy consumption is easily achieved because each individual indoor unit can stop and start heating and cooling as needed. Flexibility and efficiency are key factors when selecting a heat recovery system. For example, a heat pump system is adequate for large open-plan offices.

However, offices that are more cellular in structure will require simultaneous heating or cooling according to each individual user's needs. The efficiency of this type of system comes from its ability to use the rejected energy from part of the system and reusing this energy in other areas like heating a room or heating up water to 70 °C. This type of system can easily achieve up to 30% cost saving over a conventional air-conditioning system. ●



Exterior view of Standard Bank's new head office on Grayston Drive

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