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CASE STUDY

Arts Center

Facility at a glance

Name

The Esplanade—Theatres on the Bay

Location

Singapore, Malaysia

Facility size

More than a ten-acre complex

Issue

Controlling sound, temperature and humidity

Solution

(4) 1000-ton water-cooled centrifugal chillers,
(1) 500-ton water-cooled centrifugal chiller,
(2) 80-ton air-cooled chillers and multiple
low noise air handlers

Singapore's *The Esplanade—Theatres on the Bay* Benefit from the Quiet Sound of Daikin

In Singapore's magnificent new international venue for the performing arts—*The Esplanade—Theatres on the Bay*—Daikin chillers and air handlers quietly take center stage.

A dream—thirty years in the planning, six years in construction and another three months in the testing—has literally come to fruition in Singapore's *The Esplanade*. Located on prime waterfront land by Marina Bay, the multi-activity performing arts facility's main architectural feature consists of two huge, domed Mero latticed supporting structures that comprise the roof. These two outer shells are shaped like durians, a prickly fruit popular with Singaporeans. Completed in October 2002, the more than ten-acre complex includes five auditoriums, several outdoor performance spaces and a mix of offices, stores and apartments.

Created to serve as "an arts center for everyone," *The Esplanade* faced many challenges in creating an atmosphere that would appeal to residents and visitors alike in the multi-ethnic city of Singapore. With its Chinese Malay, Indian populations and a large international community, Singapore by its very nature fosters a variety of many different musical tastes. Those tastes were taken into account in the design of the auditoria for *The Esplanade—Theatres on the Bay*.

Hosting such divergent groups as Asian dance groups, Peking Opera, visiting foreign orchestras, informal jazz, cathedral-style organ recitals and pop rock concerts, the acoustics of *The Esplanade* theatres had to be designed to accommodate speech as well as amplified and unamplified musical instruments. For this reason, the auditoria were created from the inside out, with specially designed clarity-maximizing acoustics. Even the heating, ventilation and air conditioning equipment was subject to strict acoustical parameters. That's why *The Esplanade* chose Daikin chillers and air handlers for this prestigious project.

The Daikin equipment consists of four 1000-ton 6.6kV water-cooled centrifugal chillers, one 500-ton water-cooled centrifugal chiller, two Daikin 80-ton air-cooled chillers and multiple low noise air handlers to meet the acoustical requirements for the 1,800 seat concert hall which features reverberation chambers complemented by an adjustable acoustic canopy to suit any performance ranging from a full symphony to a solo recital. With some of the lowest noise levels in the industry, Daikin chillers and air handlers were the perfect choice for *The Esplanade—Theatres on the Bay* concert halls.

Daikin chillers offer the lowest footprint per ton, an ideal solution for a venue like *The Esplanade—Theatres on the Bay* where space is at a premium. In addition to taking up less space in the equipment rooms, Daikin centrifugal chillers also use environmentally friendly HFC-134a refrigerant for increased efficiency.

Because it is close to the equator, Singapore's climate is tropical and characterized by constant high temperatures and humidity. Controlling the temperature and humidity is key to providing a comfortable environment for the audience and the performers, as well as the finely tuned musical instruments that may be adversely affected by too much humidity. Reliable Daikin chillers have proven themselves to be up to this challenge.

But the real test for the Daikin chillers and air handlers is the acoustics. Only five concert halls in the world can compare with the state-of-the-art acoustic features available at *Esplanade*. Daikin chillers and air handlers contribute to creating this unique acoustical achievement.

Quietly keeping everyone comfortable in this resplendent venue, Daikin chillers and air handlers take center stage when it comes to controlling the environment.