References

Bangkok Airport



Uponor involvement

✓	150000

Bangkok Airport

An Uponor panel cooling system will cool Bangkok's new international airport in combination with a displacement ventilation system.

Project Facts:

Location	Completion
Bangkok, Thailand	2006
Building Type	Product systems
Industrial buildings	Radiant Heating & Cooling
Address	Project Type
Suvarnabhumi Bangkok	New building

Partners

architect
Murphy / Jahn, Inc.

installer
Jardine Matheson (Thailand) Ltd.,
Taikisha (Thailand) Co., Ltd.
22nd Floor, Times Square Building
246 Sukhumvit Road, Klong Toey
Bangkok 10110
Thailand

An Uponor panel cooling system will cool Bangkok's new international airport in combination with a displacement ventilation system. An area of around 150,000 m², this is the approximate surface area of 20 football pitches, will be equipped with Uponor panel cooling. The concourses, from which the gates to the aircraft can be accessed and which surround the terminal in an H format, have a total length of 3.5 km. The total area of the airport site encompasses 32 km². The cooling concept in order to provide both cooling and thermal comfort within the building, two separate systems have been combined. On the one hand, an underfloor cooling system which directly draws off the solar rays absorbed by the floor. This allows the floor to maintain a comfortably cool temperature (a minimum 21°C). On the other hand, a displacement ventilation system with a variable flow volume provides dehumidified fresh and re-circulated air at floor level via an approx. 2m high air diffuser. A very transparent draft has been agreed for the airport, which lays out the requirements for the cooling system. Particularly extensive demands exist due to the very warm climate in the region. The external average temperatures during winter nights lie on 21°C (summer 25°C) and in the daytime it raises up to 31°C (summer 34°C). The sun shines almost constantly from directly above.On many days during the year solar radiation levels reach around 1,000 W/m². The requisite indoor air temperature of 24°C and a relative humidity of between 50 and 60% in the 24h/1 day period during which the airport is in operation, requires constant cooling and dehumidification. It is very important that the direct radiation of the sun's rays is prevented within the building. In order to achieve this large lamellae are used in the roof construction as is a large roof overhang. This means that a natural illumination by way of diffused light occurs, whilst direct sunlight is kept at a distance. The shade concept for the concourses is based on a membrane roof construction which only permits diffused sunlight to pass through. An additionally developed construction with an interior membrane has an internal metallic coating and it is this that prevents the heat radiation exchange between the outer membrane, heated by the sun's rays, and the interior of the building. In addition, this coating reflects the surface temperature of the cooled floor in the manner of a mirror and creates the general feeling of a cooled environment. When coupled with the underfloor cooling, this leads to an impression of a reduction in the overall temperature and increases the thermal comfort within the building. The panel cooling system Uponor Classic provides a maximum cooling load of 70 to 80 W/m². It will also work with a constant preliminary temperature of 13°C and a return temperature of 19°C. The main pipe pitch of the Uponor PE-Xa pipes will be 150 mm, and in partially shaded areas 200 mm. In the concourse the panel cooling system draws off more than half of the total cooling capacity. And this at a temperature differential of only 2 K to the internal air temperature. This is possible due to the large level of radiation which hits the floor. The requisite ventilation system capacity can be halved as a result of the underfloor cooling system. The displacement ventilation system works with a supply air temperature of 18°C. The distributors are built into the supply air outlets, the so-called air-diffusers. The air-diffusers are oval stanchions, in which the Uponor compact distributors stand vertically. Due to a humidity of 55-60% in the supply air (18°C) the dew point lies below 10°C. Under these conditions there is no risk of condensation on the non-insulated distributor at the low preliminary temperature of 13°C.

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