



JIV1601A

TOTAL AIR CONDITIONING SOLUTIONS

VRV SYSTEM

Dealer

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10/16 AD

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JIV1601A

RIGHT EQUIPMENT IN THE RIGHT PLACE

DAIKIN can offer the best solution by having both *VRV* and applied system.
We provide a comfortable yet energy-saving air conditioning system by making the best mix of the two systems that matches the needs of each space.

VRV System

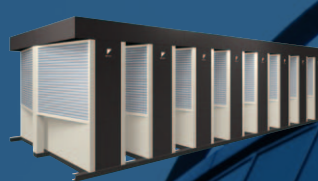
For small to mid-size spaces such as hotel rooms and tenant offices, where operation hours and usage condition vary, DAIKIN offers comfortable air conditioning with the latest energy-saving technology and individual control.



BEST MIX

Applied System

For large spaces such as entrance halls and shopping malls, DAIKIN offers effective air conditioning with large capacity / large air flow applied system. It's also suitable for massive outside air processing for the whole building.



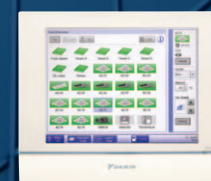
Chiller



Airhandling unit

Control System

VRV and applied system can be centrally managed by DAIKIN control system which realizes effective management of air conditioning for large and complicated applications.



intelligent Touch Manager

CONTENTS

- P.3 OFFICE / SHOP**
TERRACE SQUARE
- P.7 OFFICE / LABORATORY**
TECHNOLOGY AND INNOVATION CENTER
- P.11 OFFICE / HOTEL / SHOP**
ABENO HARUKAS
COSTANERA CENTER
- P.15 OFFICE / RESIDENCE / SHOP**
AKASAKA K-TOWER
- P.17 OFFICE**
SUMITOMO FUDOSAN SHINJUKU GRAND TOWER
TOKYO TATEMONO UMEDA BUILDING
CRYSTAL TOWER
- P.23 HOTEL**
PORTA FIRA
CHII LIH RESORT
- P.27 RESIDENCE / SHOP**
SHENYANG SEVEN STAR MANSION
GRAND CENTRAL DALIAN

TERRACE SQUARE



©SS Tokyo

Project Outline

- Location : Tokyo, Japan
- Completion : 2015
- Number of floors :
17F + 3F(Penthouse) + B2F
- Height : 90m
- Total Floor Area : 52,836 m²

Project Overview

A 17story office building located in the center of business and culture with state-of-the-art facilities and lush greenery.

Product Information

• Air-conditioning

[VRV]

High sensible heat type × 248

VRV 3 Heat Recovery × 206

VRV 4 Heat Recovery × 42

PA × 27 (97HP)

[Applied system]

Air Cooled High Efficiency Modular

Chiller × 5

Air handling unit × 7

• Ventilation

DESICA (*) (1,000m³ / h type) × 225

*Heat Pump Desiccant HumidityControl OA unit

• Control

Connected with BMS through DAIKIN BACnet interface

Issue / Requirements

- 1) Clarity of the billing system
- 2) Individual AC control
- 3) Preparation for additional AC
- 4) Maximization of tenant space
- 5) Easy maintenance
- 6) Neat building exterior design



©SS Tokyo

DAIKIN's Solution

1) Power Proportional Distribution (=PPD)

This function was adopted as an advantage of VRV to calculate the power consumption of each tenant. It makes it easy to handle zone changes due to tenant renewal.

2) Detailed zoning enabled by VRV

Each floor is divided into 48 zones with simultaneous cooling / heating enabled by VRV heat recovery system.

3) Wide range of capacity in 2HP increments (VRV)

Easy to add capacity in case of heat load increase.

4) Adopting ceiling mounted duct type indoor units

Placing indoor units in the ceiling saved space used for a machine room

5) AHU for large space air conditioning

For large spaces and high ceilings, such as the entrance hall and the large meeting room, installing VRV indoor units would be too many for maintenance thus AHU was adopted.

6) Collective installation on the rooftop

To avoid making extra space for the equipment, chillers and most of the outdoor units were installed on the rooftop. Considering noise to the neighbor building, acoustic absorption was attached to the top of the units.

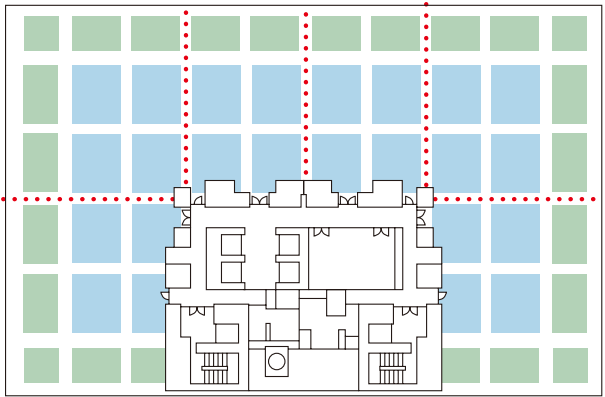


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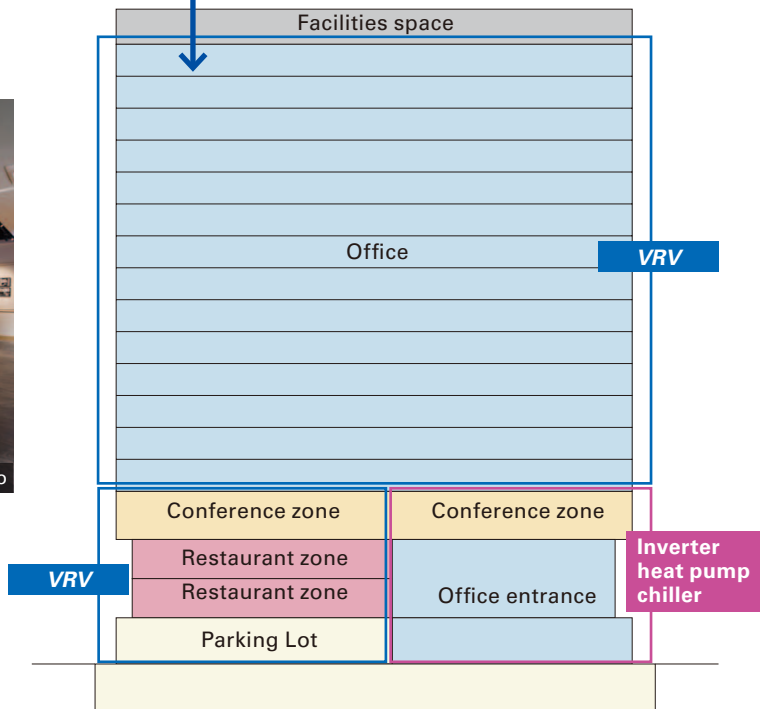


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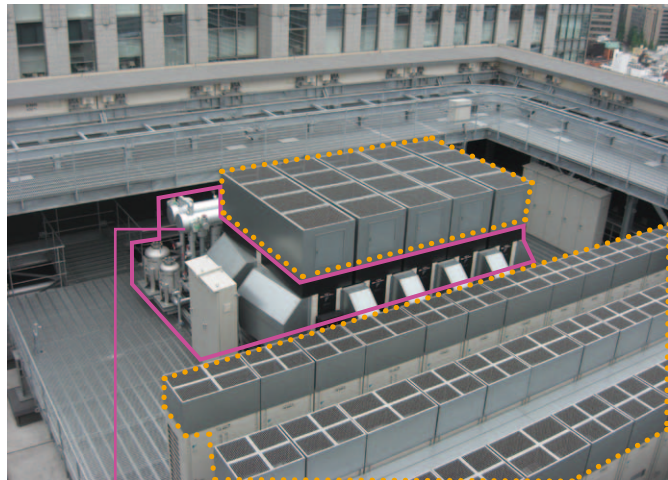
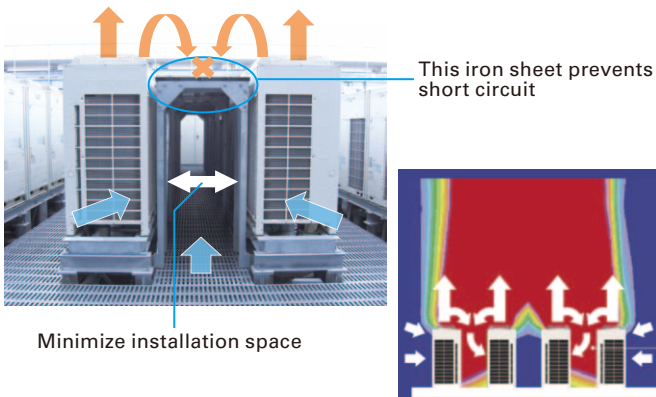
TERRACE SQUARE



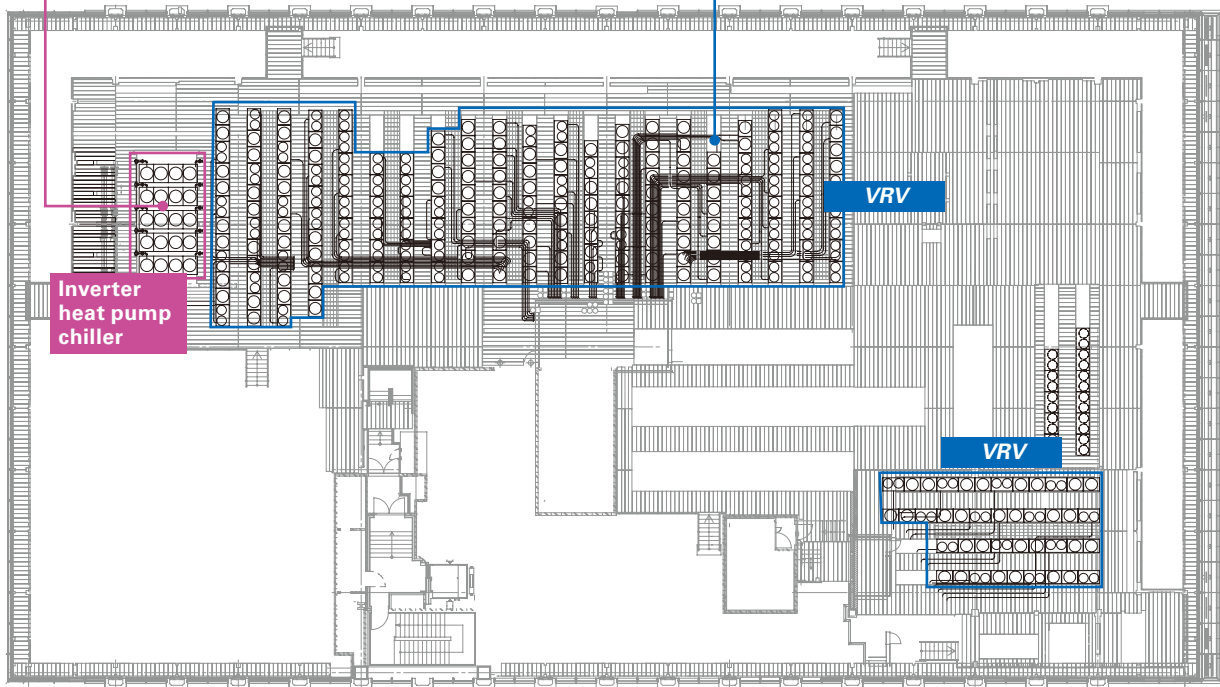
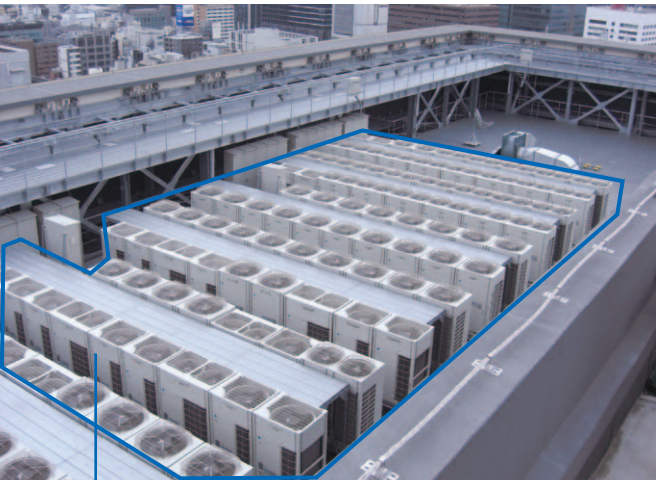
Interior zone Perimeter zone
..... Dividable zone



A plate was installed between the outdoor units making a tunnel for airflow to prevent short circuit.



Acoustic Absorption



Roof top

TECHNOLOGY AND INNOVATION CENTER



Project Outline

- Location : Osaka, Japan
- Completion : 2015
- Number of floors : 6F + B1F
- Total floor area : 47,911.86m²
Office area : 19,800m² Laboratory area : 28,000m²

Project Overview

- The Technology and Innovation Center (TIC) is a new core base of Daikin group's research and new technology development.
- TIC aims to create new value based on the world's best technologies and highly differentiated products. For this reason, people of diverse backgrounds gather across national borders from inside and outside the company to consolidate their strengths and passion in making TIC a venue for the challenge of realizing collaborative innovation.
- Advanced environmental technologies, primarily in the field of air conditioning, are used in the buildings and equipment and serve as a model for solutions that achieve both unrivaled energy efficiency and comfortable indoor environments.

Product Information

Office Area

- **Air-conditioning**
[VRV]
High sensible heat type × 88 Heat recovery × 29
- **Ventilation**
DESICA (*) (1000m³ / h type) × 52 (500m³ / h type) × 40 (250m³ / h type) × 26
(*) Heat Pump Desiccant Humidity Control OA unit

Laboratory Area

- **Air-conditioning**
[VRV]
High efficiency type × 99 Heat recovery × 21
[Applied system]
Air Cooled High Efficiency Modular Chiller × 9 modules × 2
Water Cooled Centrifugal Inverter Chiller × 1
- **Ventilation**
Heat Reclaim Ventilator × 6
- **Control**
Central monitoring system
(Total control of VRV, Chiller, Ventilation, lighting and shade)



Certified LEED PLATINUM
Project type : Building Design and Construction, New Construction
<http://www.usgbc.org/projects/daikin-technology-and-innovation-center?view=overview>

Certified CASBEE S rank
*CASBEE (Comprehensive Assessment System for Built Environment Efficiency)
<http://www.ibec.or.jp/CASBEE/english/index.htm>

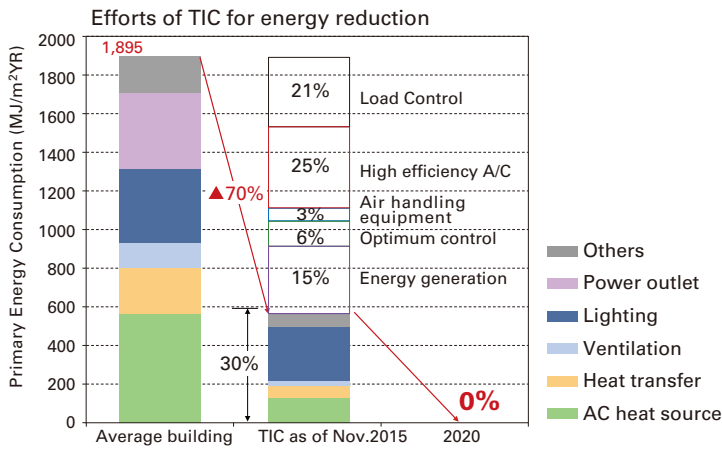
*CASBEE is a system in Japan for comprehensive assessment of environmental performance of buildings. This certification system evaluates buildings whose environmental quality and performance (e.g interior comfort, consideration to landscape) are high with less environmental impact(load) achieved by energy/resource conservation and recycling.

Issue

- Achieving ZEB(*) and realizing unrivaled energy efficiency by Daikin's advanced technology.
(*) ZEB : Net Zero Energy Building
- Optimize air conditioning system for the 2 different types of application (Office and Laboratory) within the same building.
- Comfortable office and laboratory for innovation.

DAIKIN's Solution

- TIC realizes unrivaled energy efficiency by installing high efficiency VRV and DESICA to control sensible heat and latent heat individually. The energy consumption of the building is 70% less than that of an ordinary building.(as of November, 2015)
TIC is aiming to achieve 100% by 2020.



- Several cutting edge technologies and under developing technologies are adopted to TIC, and they contribute to energy saving. TIC is a demonstration experiment building for these technologies.
- In the office area, the number of people differs substantially in accordance with the situation. Additionally the heat load varies greatly due to many glass windows. That's why VRV, which can cope with different heat load of the space, is adopted.
- For the entrance area, a prototype water cooled VRV which utilizes geothermal heat and solar heat is adopted to realize a high efficiency system.
- Module type heat pump chiller and centrifugal chiller are adopted for the laboratory area which have large space and many rooms.
These products can provide cool water for experiment use as well.
- Air conditioning system, lighting and shades are monitored and controlled by central monitoring system. These monitored data are gathered and analyzed day by day to realize more comfortable and high energy efficiency building.



CHECK

To explore the rooftop of TIC with aerial view from a drone, please visit our website below or read the QR code.

http://www.daikin.com/products/ac/case_study/tic/index.html

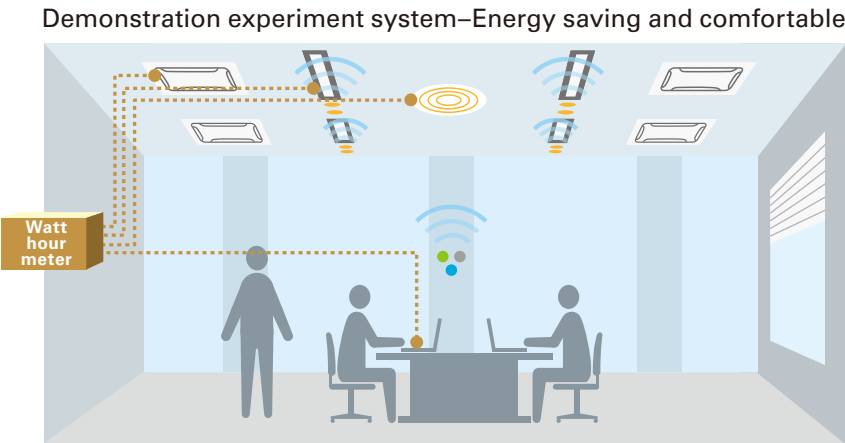
TECHNOLOGY AND INNOVATION CENTER

Advanced air conditioning and energy saving system

There are several advanced technologies and under developing technologies in TIC to achieve energy saving, energy creation and comfortable space. TIC is researching and developing advanced technologies by utilizing their office as demonstration experiment area.

Compatibility with energy efficiency and comfortable environment

Demonstration experiment system is adopted for further energy saving activities to achieve ZEB. Comfort and energy saving performance are evaluated by many sensors attached to the building. The analysis data is used for optimum control of not only air conditioning but also lighting and shades.



Comfort assessment
Finely placed sensors monitor temp., humidity, CO₂, human feeling & illuminance.

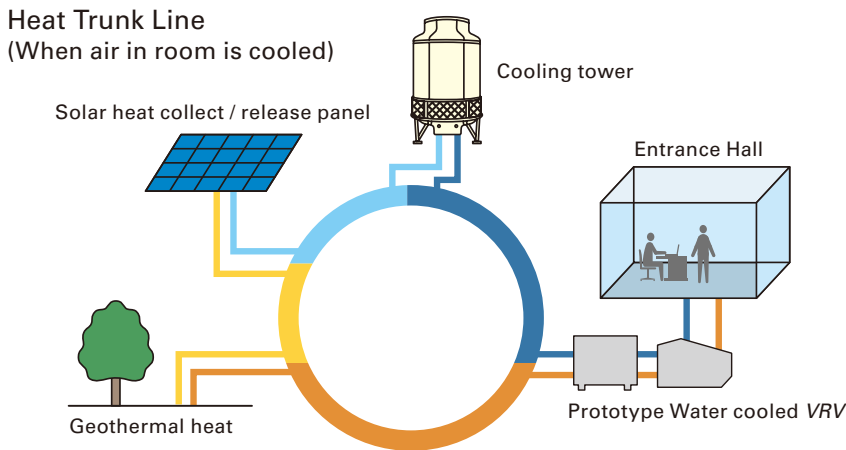
Energy saving assessment
Individual monitoring of air conditioning, ventilation, lighting and office equipment.

Total control of facility
Following facilities are controlled comprehensively.
• Air-conditioning and ventilation
• Lighting : ON/OFF, Illuminance
• Shades : Height, Angle

Air conditioning for entrance area

Water cooled VRV which is under developing prototype is utilized for entrance hall of TIC. This equipment achieves big energy saving thanks to natural energy ;

- Utilization of geothermal heat for cooling / heating water
- Collection / release of heat via Solar heat collect / release panel

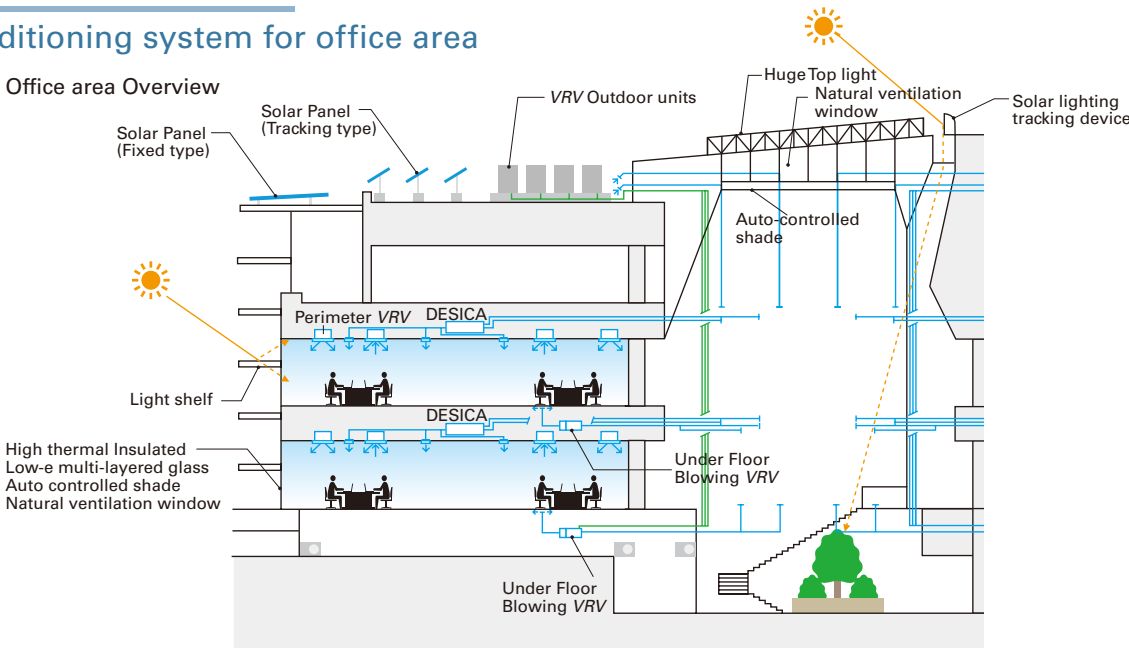


Solar Tracking System for solar power generation

Solar panel with solar tracking system can chase sunlight and it can generate 1.3 times electricity greater than a general fixed type solar panel. In TIC total 300kW of electricity are generated by fixed type and tracking type.



Air conditioning system for office area



Air conditioning system for Laboratory area

Module type heat pump chiller and centrifugal chiller are adopted for the laboratory area. They are utilized for the air conditioning system and also providing cool water for experiment use. VRV is also adopted for the laboratory area and supports air conditioning. Chiller and VRV are managed and controlled all together by a central monitoring system.



ABENO HARUKAS



Project Outline

- Location : Osaka, Japan
- Completion : 2014
- Number of floors : 60F + B5F
- Height : 300m
- Total floor area : approx. 306,000 m²

Project Overview

ABENO HARUKAS is the tallest building in Japan with the height of 300m (as of July, 2016). It is one of the next generation complex building with state-of-the-art technologies of energy saving, environment and design gathered to direct a message to the future world. The building consists of a department store, hotel, office, museum and observatory.

Product Information

- **Air-conditioning**
[VRV]
Heat pump type × 79 for observatory and part of the hotel and office floors
[Applied system]
FCU × 1200
(Main heat source equipment are installed by other supplier)

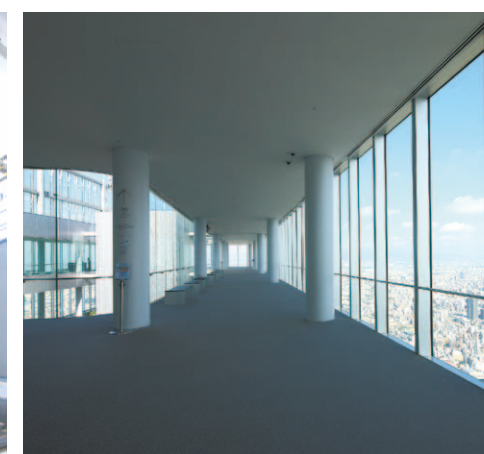
Issue

- Reducing 25% of CO₂ is required compared to a standard building. For this reason, high energy efficiency equipment is essential.
- The number of guests differ substantially between weekdays and weekends. Additionally, the heat load at the observatory vary greatly due to the large glass windows. For this reason, a high performance A/C system which can respond to heat load change flexibly is required.
- Observatory is located at the top of the building 300m apart from the ground. If chiller is used, cooling water will have to be sent from the basement floor making the power consumption of the pump too large.

DAIKIN's Solution

The main air conditioning system of the building is chiller, but Daikin VRV is installed for the following reasons ;

- Flexible installation ability which can handle 300m height.
- Contribution to high energy efficiency with the reduction of power consumption of the pump by installing VRV on the 56th floor.
- Wide variety of indoor units. Slit type outlet adopted not to disturb the panorama view.



Certified CASBEE S rank

*CASBEE
(Comprehensive Assessment System for Built Environment Efficiency)
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COSTANERA CENTER



Project Outline

- Location : Santiago, Chile
- Completion : 2014
- Number of floors :
Tower 2 (64F) Tower 4 (28F)
- Height :
Tower 2 (300m) Tower 4 (110m)
- Total floor area:
Tower 2 (77,000 m²)
Tower 4 (33,000 m²)

Project Overview

The Costanera Center is a business and commercial complex which consists of 4 major towers together with the region’s largest shopping mall.

Tower 2 is the complex’s hallmark skyscraper designed by architect Cesar Pelli , making it the tallest building in Latin America at 300 meters. (As of 2015) Tower 4 is a 28-story office building and a four-star hotel. The complex is located in the financial hub of Santiago, and is owned by Cencosud.



Product Information

- **Air-conditioning**
[VRV]
Tower 2 and 4
Water cooled VRV × 746
(Heat recovery type)
VRV indoor units × 2800
- [Applied system]
Shopping mall
Other supplier

Project Commentary

For the shopping mall, chiller is adopted. For Tower 2 and 4, the Costanera Center engineering team specified water-cooled unified condensing units with heat recovery as the air conditioning system. “Cencosud’s decision drivers were efficient design, the capability of factory and local technical support, local presence, including after-market service, as well as the ability to collaborate closely with the project team,” says Julio Almonacid, general manager at Daikin Air Conditioning Chile, S.A.

As an alternative to traditional chiller plants and centralized equipment, Daikin’s water-cooled VRV systems offer a compact design and lightweight structure that make the equipment ideal for buildings with limited area available for mechanical equipment. Units can be stacked and deliveries to mechanical rooms are easily made via elevators.

“The Daikin VRV modular system allows each tenant to control their occupancy zones. Through this flexible design, each indoor unit in their office spaces is autonomous, permitting independent temperature control. In addition, each tenant can obtain a detailed record of the climate control energy consumption for their particular zone,” Almonacid says. Costanera tenants and visitors also benefit from the Daikin planned preventive maintenance program, which uses a predictive monitoring system with 24 / 7 supervision to assure the VRV systems are fully operational.



AKASAKA K-TOWER



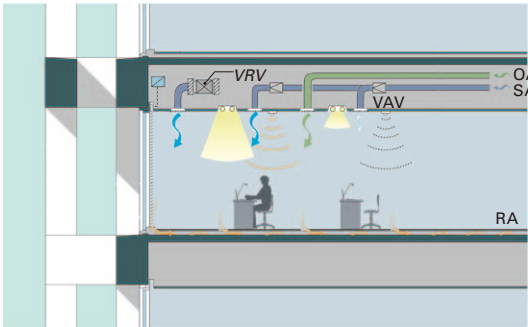
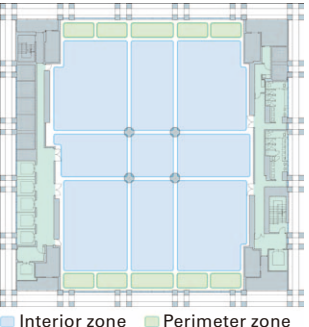
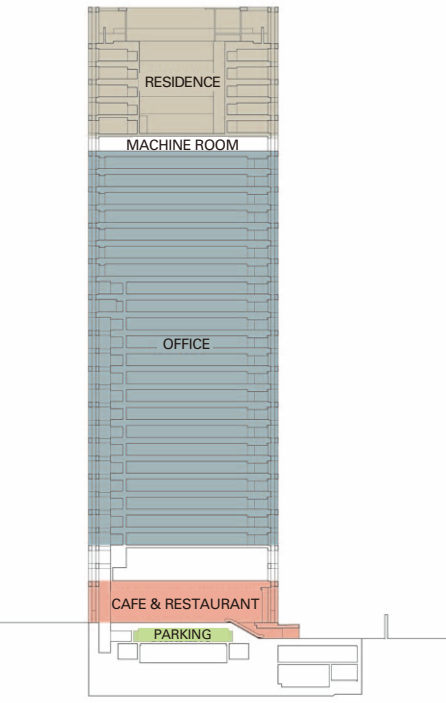
Project Outline

- Location : Tokyo, Japan
- Completion : 2012
- Number of floors : 30F + B3F
- Height : 158m
- Total floor area : 53,777m²

Product Information

- **Air-conditioning**
[VRV]
High sensible heat type × 59
(Heat recovery + Heat pump)

[Applied system]
Centrifugal Chiller
530RT × 2, 260RT × 1
Absorption Chiller 733kW × 2
(Above chillers : Other supplier)
AHU × 180
FCU × 90
- **Ventilation**
AHU(Outdoor air processing type)
- **Control**
Dedicated control system for the building
(Total control of VRV and AHU)



Project Overview

Located in the center of Tokyo surrounded by government buildings and historical commercial area, Akasaka K-Tower stands as a landmark of the community.

The 30-story complex building consists mainly of offices together with residences and shops.

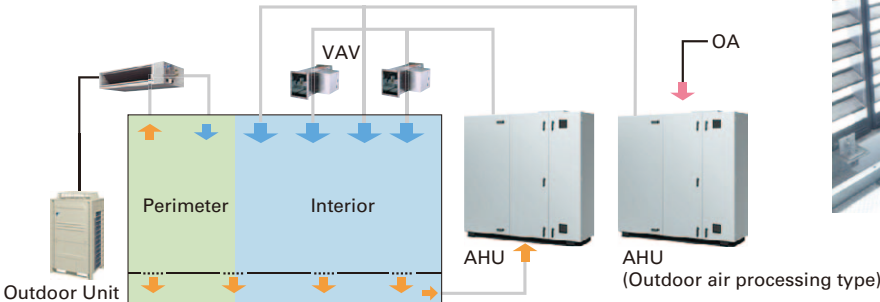
By gathering the latest technology of Kajima Corporation, it keeps high level of safety, comfort and functionality while achieving the Japanese highest standard of CO₂ emission reduction for tenant offices by implementing state-of-the-art energy saving technology.

Project Commentary

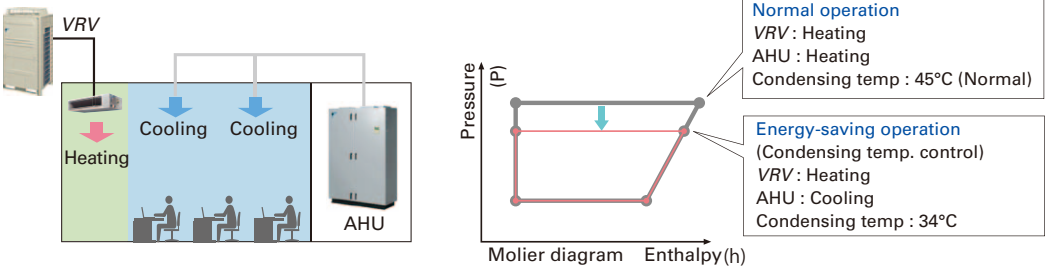
The air conditioning of this building is separated by zones, where the perimeter is taken care by VRV and the interior by AHU. The heat load of the perimeter zone relatively fluctuates compared to the interior zone due to the sunlight from the window. Therefore, individual air conditioning is done by Heat Recovery type VRV. The load of the interior zone is mainly from people and computers so it is processed by AHU while the outdoor air processing type AHU takes care of the fresh air.

The issues were to reduce the loss of mixed air of cooling and heating done in the same space and to raise the evaporation temperature of VRV when the load is small.DAIKIN made a control system that considers the VRV and AHU as one system and monitored the condition of AHU and controlled the evaporation temperature of VRV at the same time.

Thus, DAIKIN was adopted as the optimum system that could handle above requirements.



Condensing temperature of VRV is controlled to reduce the loss of mixed air of cooling and heating



Certified CASBEE S rank

*CASBEE
(Comprehensive Assessment System for Built Environment Efficiency)
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SUMITOMO FUDOSAN SHINJUKU GRAND TOWER



Project Outline

- Location : Tokyo, Japan
- Completion : 2011
- Number of floors : 40F + B3F
- Height : 193m
- Total floor area : 180,024.51m²

Project Overview

This building is located at Shinjuku, the sub center of Tokyo. It's one of the tallest buildings in this area. The spacious tenant floors, size of each 25m x 102m, have no pillars. This structure can realize a very flexible office layout.

Product Information

- **Air-conditioning**
[VRV]

Heat recovery x 767
Indoor unit x 2405

[Applied system]
Air-cooled chiller x 15 + FCU

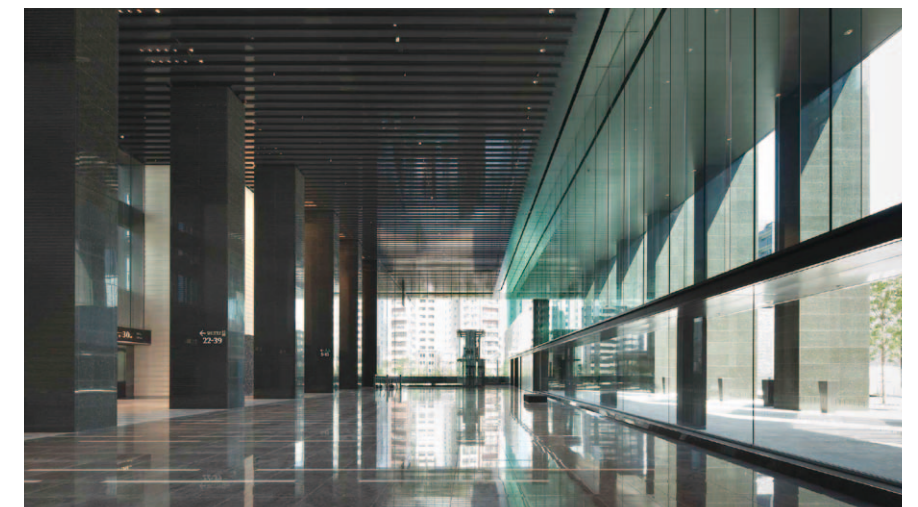
Issue

- Higher electricity consumption for cooling due to many OA equipment and overpopulation. Even in winter, cooling is necessary.
- Special care for the heat load at perimeter zone is necessary due to the large glass windows.
- Due to the no-pillar structure, layout of each floors can vary flexibly. The office floor is divided into 63 zones. (43 zones for interior, 20 zones for perimeter)

Therefore, individual operation for each zone is necessary.

DAIKIN's Solution

- Variable heat load of each floor is processed by simultaneous operation of heating and cooling by Heat Recovery type VRV. Additionally, the perimeter zone has dedicated air conditioning to handle the heat load from the huge glass windows.
- Daikin's air cooled chiller is adopted for the large entrance space which consists of 1500m² x 4 stories.
- Outdoor units are located at balconies of each floor and perfect airflow design is realized by completely separating suction and discharge air. Thanks to this design, the air-conditioning system can perform its maximum capacity with no short circuit.



Balcony for outdoor units



TOKYO TATEMONO UMEDA BUILDING



Project Outline

- Location : Osaka, Japan
- Completion : 1989 Renewal : 2012
- Number of floors : 14F + B4F
- Total floor area : 16,394m²

Product Information

• Air-conditioning

Before renewal

Absorption chiller + AHU
Heat recovery GHP

After Renewal

Heat recovery GHP 48HP
(Other supplier)

[VRV]

Heat recovery type × 25
Heat pump type × 30

[Applied system]

Air Cooled High Efficiency Modular
Chiller × 3
AHU 68HP (Other supplier)

• Ventilation

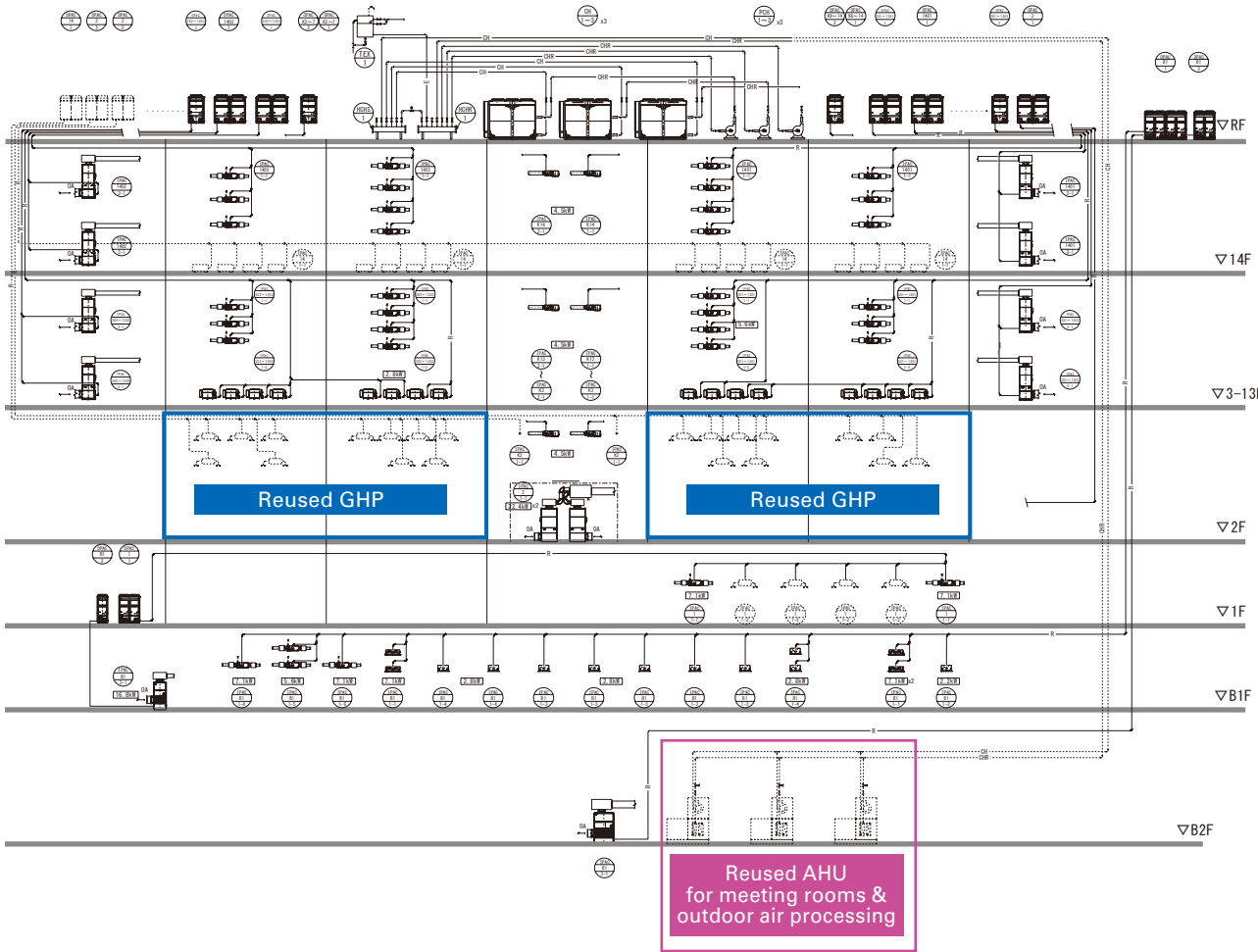
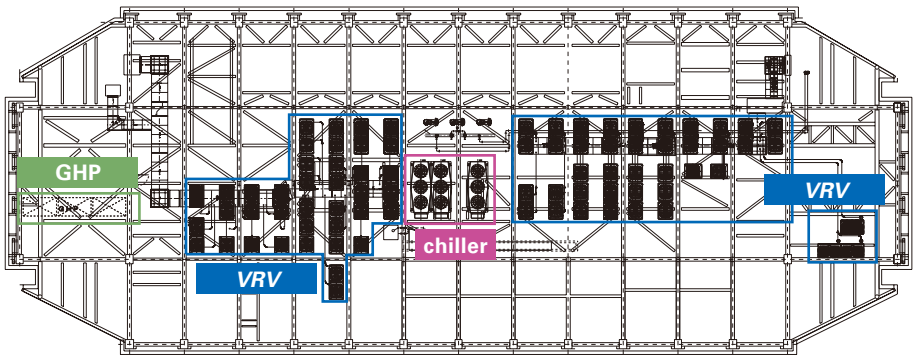
VRV outdoor air processing unit × 50
AHU × 3 (Other supplier)

• Control

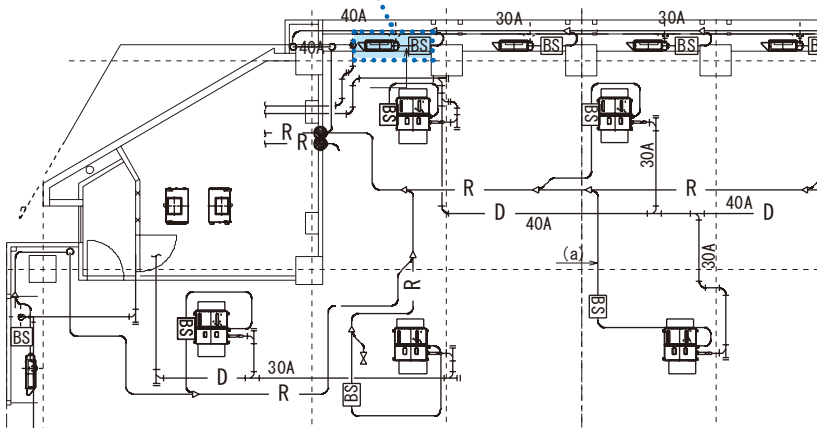
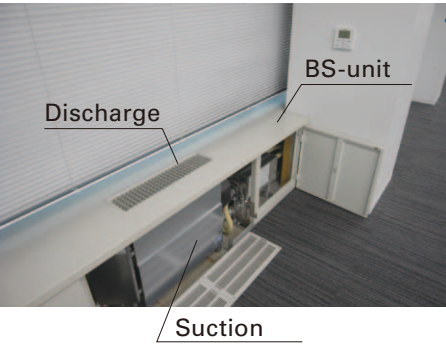
I Manager

Project Commentary

A 14 story multi tenant office building located in the center of busy Osaka City. One of the remarkable point of this project is that the AC system was replaced to VRV + Chiller from absorbtion chiller when the building changed from a single owner to a multi tenant building. The heat recovery system of VRV could meet the requirement for simultaneous operation of cooling and heating.



Floor standing type : perimeter zone



CRYSTAL TOWER



Project Outline

- Location : Bucharest, Romania
- Completion : 2011
- Number of Floors : 15F + B4F
- Height : 72m
- Total floor area : 16,900m²

Product Information

- **Air-conditioning**
[VRV]
Water Cooled VRV × 67
Air Cooled VRV × 2
Indoor unit × 289

[Applied system]
Air-cooled multi-scroll chiller × 1
Air-cooled screw chiller × 1
- **Control**
LonWorks gateway

Project Overview

Crystal Tower, a landmark building located in central Bucharest, is home to the Romanian headquarters of ING bank. The tower's striking and innovative architecture is matched by a number of innovative and sustainable features which meant it achieved a BREEAM Excellent rating at the design stage. Along with the use of natural light, the building features intelligent and innovative heating and ventilation systems working with the building's double skin glass facade to reduce energy consumption and create a perfect climate for occupants.



Project Commentary

The climate of the building's ground floor and 14 office floors are controlled by water-cooled VRV with variable water flow technology and the restaurant by air-cooled VRV. The water-cooled VRV system is connected to 280 Daikin concealed ceiling duct units and 600x600 cassettes, while the restaurant's needs are served by a conventional VRV air-to-air unit linked to ducted indoor units. On the terrace there is a 700kW chiller providing cool water for the air handling units serving the entire building and a 150kW chiller for cooling the server rooms. Water-cooled VRV is the main contributor to total HVAC energy efficiency due to its two-stage heat recovery system while individual thermal control and comfort is realized on each floor and space. Problem-free connection between DAIKIN units and the Lon Works BMS system ensures the building's total energy consumption is properly monitored and controlled.



BREEAM :
Design Phase Excellent rating Green Building
of the year 2012(ROGBC)
Environmental Social & Sustainability award(ESSA)



PORTA FIRA



Project Outline

- Location : Barcelona, Spain
- Completion : 2010
- Number of Floors : 28F
- Height : 113m
- Total floor area : 34,688m²

Product Information

- **Air-conditioning**
[VRV]
VRV III x 74
Heat recovery type x 60,
Indoor unit x 664

[Applied system]
Air cooled Chiller x 2 (50HP)
- **Control**
i Manager + ACNSS

Project Overview

Hotel Porta Fira is considered one of the best skyscraper in the world and has been awarded the prestigious "EMPORIS AWARD 2010" architectural award. It is situated in one of Barcelona's areas of greatest economic expansion, in an unbeatable location for accessing the centre of Barcelona and El Prat airport.



Project Commentary

Daikin was chosen to meet the high standards of comfort for this unique hotel. The customer is a strong supporter of DAIKIN's quality and has been installing Daikin equipment since 1996. This project reinforces Daikin's position as a leader in the air conditioning of large scale structures, able to provide solutions that stand out not only for their accuracy and reliability, but also for their energy efficiency.

For control system, I Manager was adopted to control the access to the air conditioning system as well as preventive and predictive maintenance tracking and monitoring of all components by DAIKIN (ACNSS) for 24/7. The supervision and monitoring system ensures uninterrupted and optimal operation of the facility, which affects the reliability of the installation.



CHII LIH RESORT



Project Outline

- Location : Taitung, Taiwan
- Completion : 2015
- Number of floors :
Hotel(6F+B1F) Villa(68 units)
- Total Floor Area : 120,000m²

Project Overview

Tai Tung Vacation Village Resort is the largest project ever being developed in hotel resort industry of Taiwan. Full lineup of Daikin products offers the total solution to the owner's demand in all aspects of hotel service.

Product Information

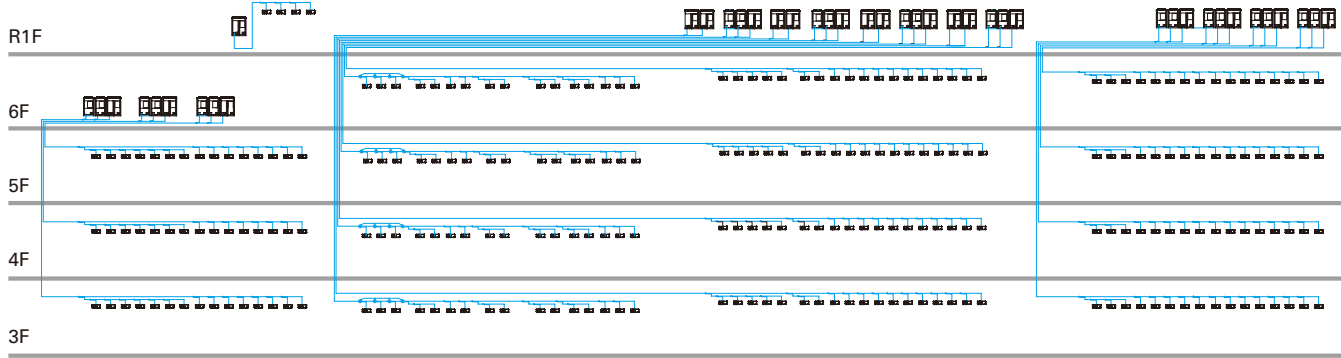
- **Air-conditioning**
[VRV]
VRV III × 42
Indoor unit × 249
- [Applied system]
McQuay Screw type 300RT × 2
- [Others]
Sky air × 65
Split / Multi × 83
- **Control**
i Touch Manager

Project Commentary

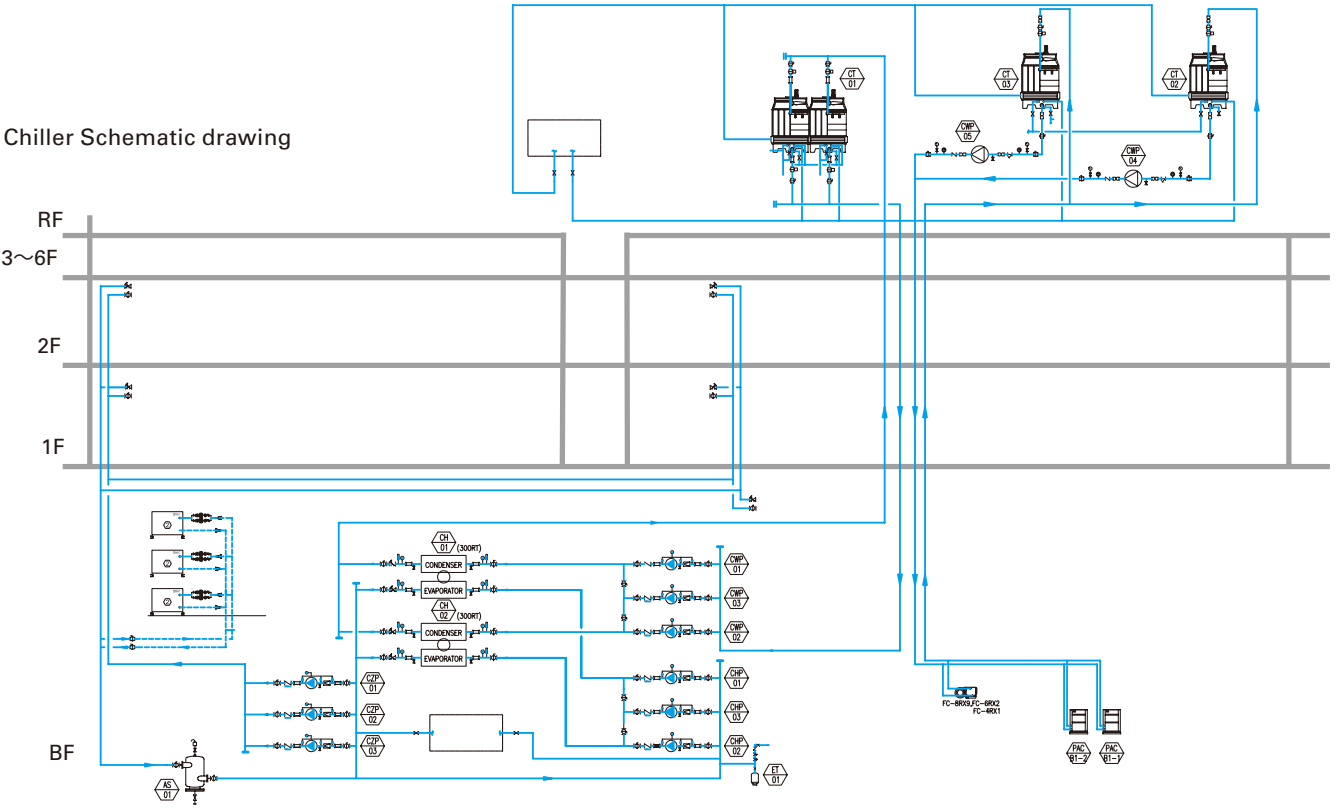
Due to limited budget, the resort owner was inclined to using chiller for all applications. Nevertheless, Daikin sales team had convinced him that energy efficiency of using VRV or chiller varies greatly from different applications. Thus, in order to achieve optimal performance, it is essential to design a system that works at its best to the usage at each zone. Therefore, Daikin had proposed VRV and water cooled chillers for the hotel zone, whereas Sky air and Split / Multi systems for the villa zone. The unified central control system, iTM was also the key factor to adopt Daikin products.



VRV Schematic drawing



Chiller Schematic drawing



SHENYANG SEVEN STAR MANSION 沈阳七星公馆



Project Outline

- Location : Shenyang, China
- Completion : 2012
- Number of floors : 30F
- Total floor area :
Residential : 90,000m²
Shop : 40,000m²

Project Overview

Standing as the landmark of Shenyang, Seven Star Mansion is a complex building of 130,000m² boasting its international architectural style to match the luxurious lifestyle . It was also an important governmental project of the year 2012. The critically examined high level material and sophisticated quality of details have made this building a representative architecture that would stay in people's mind for a long time. The reflection glass curtain wall makes the exterior of the whole building simple and strong.

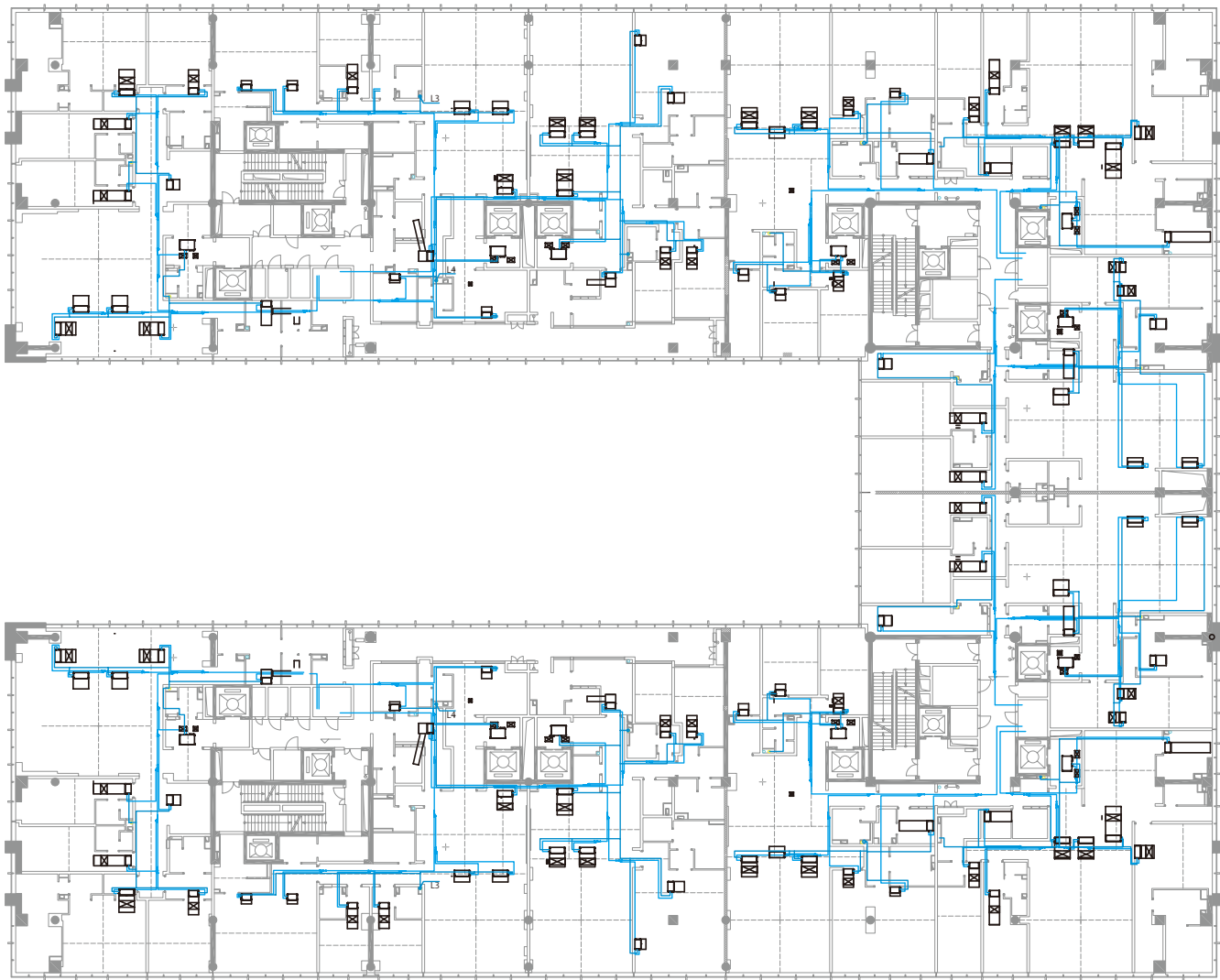
Product Information

- **Air-conditioning**
[VRV]
Water Cooled VRV × 172

[Applied system]
Absorption Chiller 600USRT × 2
+ FCU (Other supplier)

Project Commentary

VRV was adopted to meet the needs of individual air conditioning for small and independent spaces. The silent noise of VRV was also an advantage for the residential floors. For the large space of commercial zones, absorption chiller was adopted for same operation time and high ceilings.



GRAND CENTRAL DALIAN 恒泽·天城



Project Outline

- Location : Dalian, China
- Completion : 2007
- Number of floors :
 - Shop + restaurant (1F~4F)
 - Service apartment (Bldg. A: 5F~22F)
- Office (Bldg. B: 5F~25F)
- Height : 100m
- Total floor area : 110,296m²

Project Overview

Located strategically on Jinma Road in the central business district of the Dalian Development Area, Grand Central Dalian consists by two towers, one for service apartments promising both comfort and convenience, and the other for a high-end shopping center and offices.

Product Information

- **Air-conditioning**
 - [VRV]
 - Water Cooled VRV 2290 HP
 - [Applied system]
 - Screw Chiller 400USRT × 3 + FCU
- **Control**
 - i Manager

Project Commentary

Having good relationship with dealers, proposal of water cooled VRV was an advantage for DAIKIN since competitors were relatively less than air cooled VRV. The possibility of individual control was also the key factor for adopting VRV. 60% of the offices are using VRV. Large spaces such as the entrance hall and shopping center, are air conditioned by DAIKIN screw chiller.

