JIV1202

DAIKIN

WATER COOLED VRV APPLICATION REFERENCE

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Organization:
DAIKIN INDUSTRIES, LTD.
AIR CONDITIONING MANUFACTURING DIVISION

Scope of Registration:
THE DESIGN/DEVELOPMENT AND MANUFACTURE OF COMMERCIAL AIR CONDITIONING, HEATING, COOLING, REFRIGERATING EQUIPMENT, HEATING EQUIPMENT, RESIDENTIAL AIR CONDITIONING EQUIPMENT, HEAT RECLAIM VENTILATION, AIR CLEANING EQUIPMENT, COMPRESSORS AND VALVES.

JMI-0107

Organization:
DAIKIN INDUSTRIES (THAILAND) LTD.

Scope of Registration:
THE DESIGN/DEVELOPMENT AND MANUFACTURE OF AIR CONDITIONERS AND THE COMPONENTS INCLUDING COMPRESSORS USED FOR THEM

JQA-1452

EC99J2044

All of the Daikin Group's business facilities and subsidiaries in Japan are certified under the ISO 14001 international standard for environment management.

Dealer

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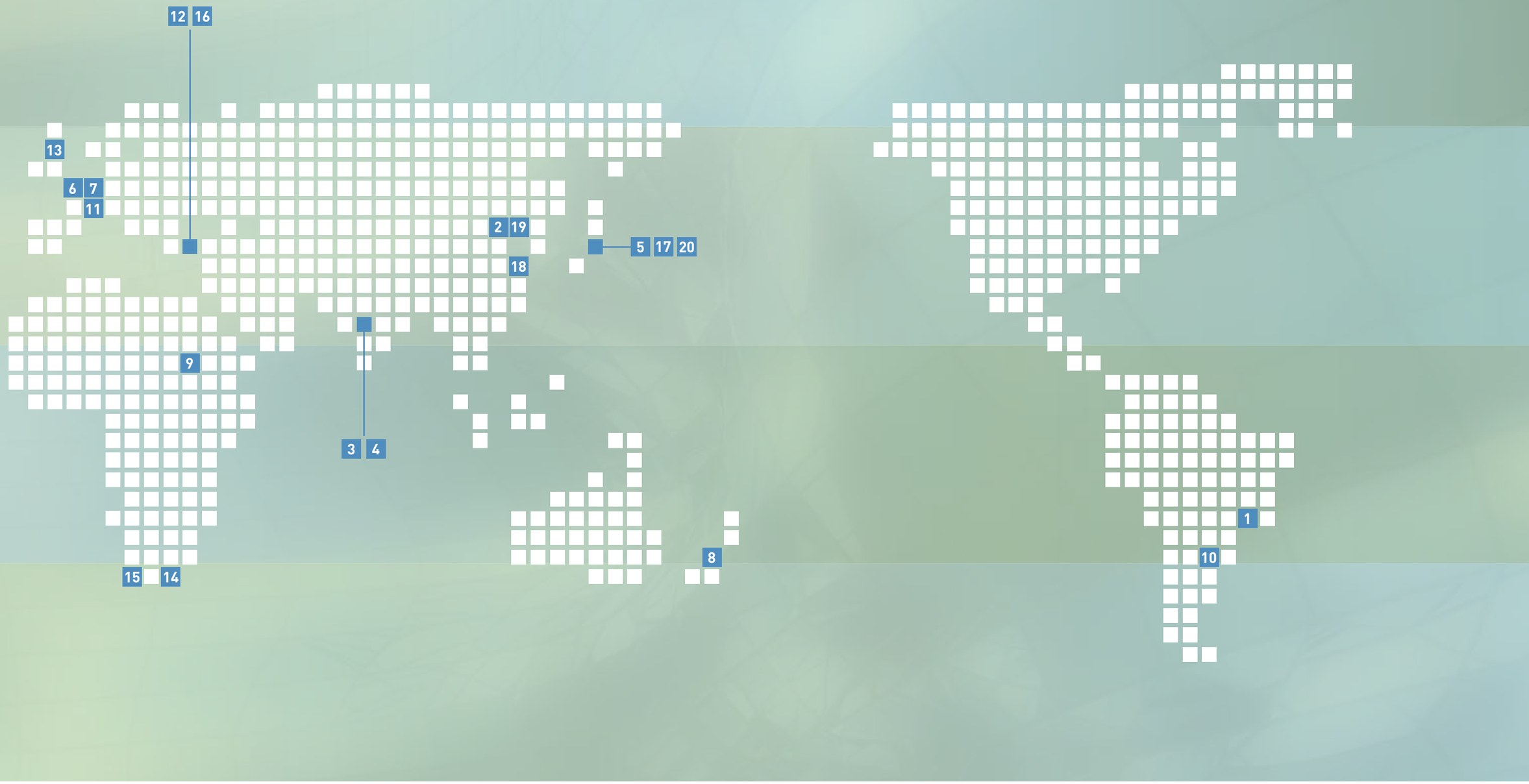
Message

Daikin Industries launched the world's first air-cooled VRV system in 1982. Highly evaluated within the market for features such as individual control, energy-saving operation, flexible design, easy installation and maintenance, it was followed by the release of the water-cooled VRV system in 2002. The water-cooled VRV system is recognized for its high performance, high quality, and high reliability. It is widely applied in office buildings, hotels, shopping centers, hospitals, stadiums and residential use, from small buildings to skyscrapers with over 30 stories.
As buildings become larger, installing the outdoor units within limited space is a growing issue for architects. The water-cooled VRV system is an optimal solution for any building because its flexible layout makes it possible to install condensers indoors. It is also optimal for renovation from chiller system, since existing cooling towers and water piping can be reused. Just adding a BP unit, a heat recovery system capable of simultaneous cooling / heating operation can be provided. Furthermore, use of geothermal heat is innovative and environmentally friendly solution that might grow more popular in the future.
This brochure shows just a part of our many successes around the world. We are confident you will appreciate how neatly the VRV system fits into a variety of architectures, application and weather conditions.

Yoshihiro Mineno
General Manager
Global Operations Div.

GLOBAL MAP OF DAIKIN PROJECTS



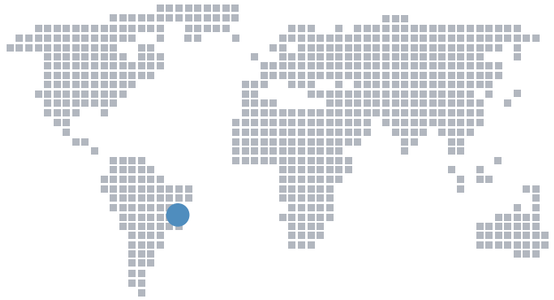
* These numbers correspond to the numbers listed before each project name.

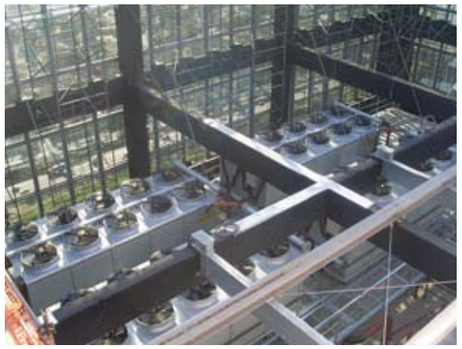
INDEX

1 São Paulo, Brazil
Banco Santander S.A.

PROJECT OUTLINE

Location	São Paulo, Brazil
Application	Office
Number of floors	31F
Project year	2009
Total floor area	101,458 m²





EQUIPMENT

Outside unit

RWEYQ10M	×	9
RWEYQ20M	×	9
RWEYQ30M	×	44

Indoor unit

FXSQ-20	×	29	FXSQ-63	×	159
FXSQ-25	×	2	FXSQ-80	×	94
FXSQ-32	×	91	FXSQ-100	×	61
FXSQ-40	×	50	FXSQ-125	×	944
FXSQ-50	×	10	FXSQ-250	×	2

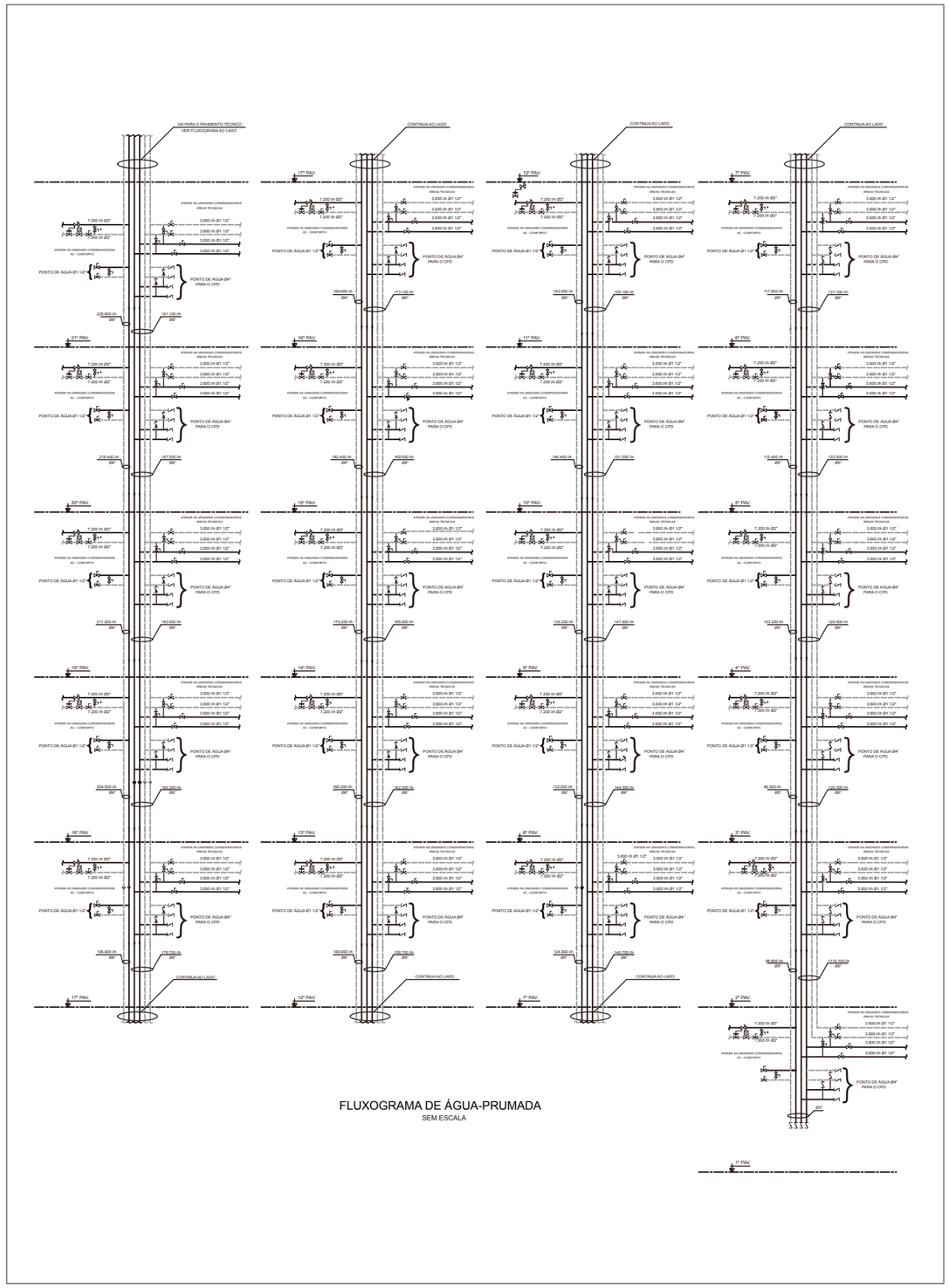
Others

Control system:
IPU'S × 9
Interface for BACnet® × 9

PROJECT COMMENTARY

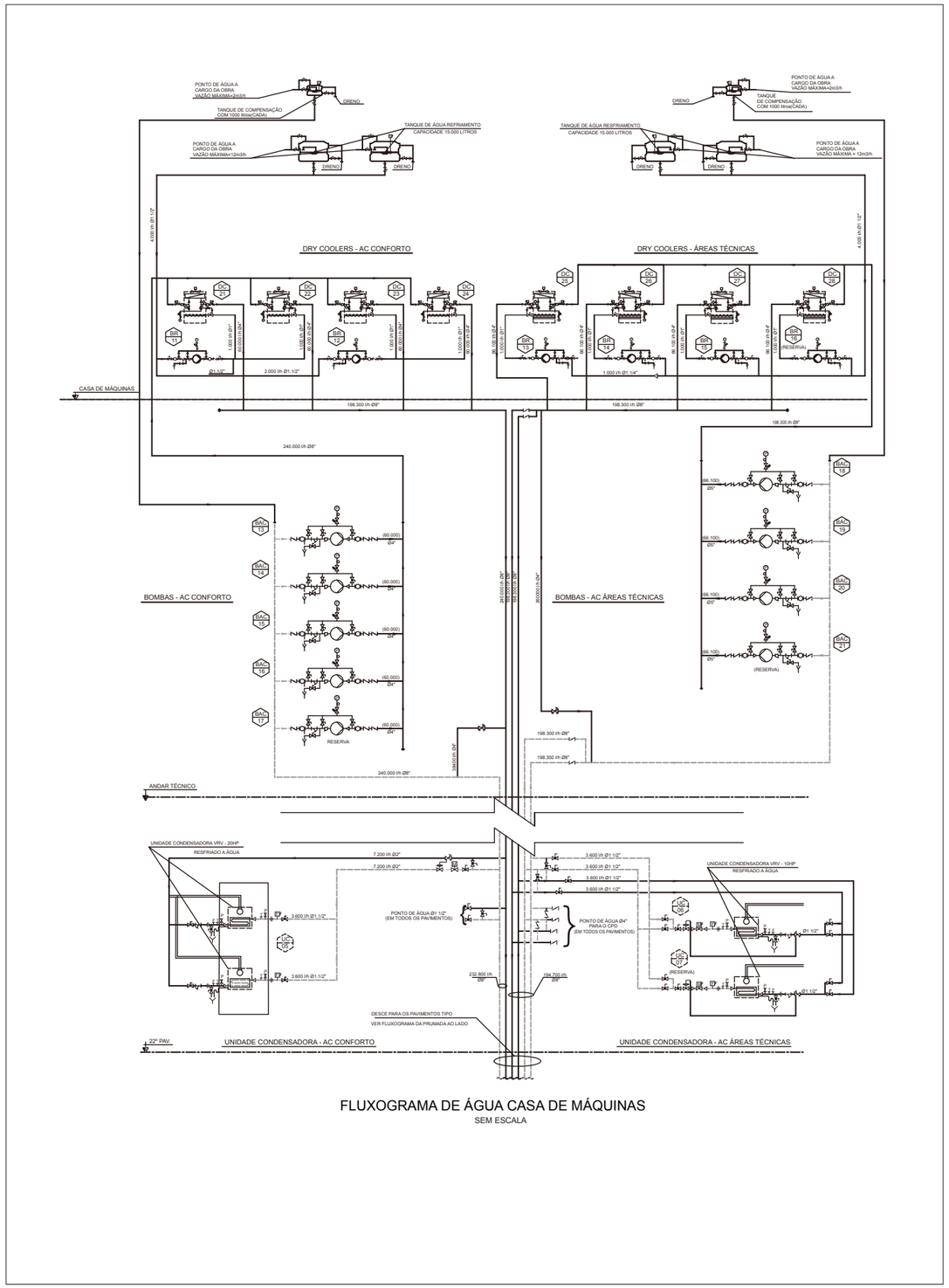
The Santander Tower is a worldwide reference of high technology allied with Green Building Certification. With its high energetic efficient system, it attends the LEED Certification.
It's the first undertaking in Latin America that uses a Water-cooled VRV system, with 4,450 HP capacity. With its hybrid design and flexible installation, each zone has its own temperature control. The microprocessed system allied to a high technology software allows the remote control of the system by the Building Automation System.

DESIGN DRAWING



FLUXOGRAMA DE ÁGUA-PRUMADA
SEM ESCALA

Fig-1 Piping Diagram



FLUXOGRAMA DE ÁGUA CASA DE MÁQUINAS
SEM ESCALA

Fig-2 Piping Diagram

2 Beijing, China
News Plaza

PROJECT OUTLINE

Location	Beijing, China
Application	Office
Number of floors	20F
Project year	2009
Total floor area	125,000 m²

DESIGN DRAWING

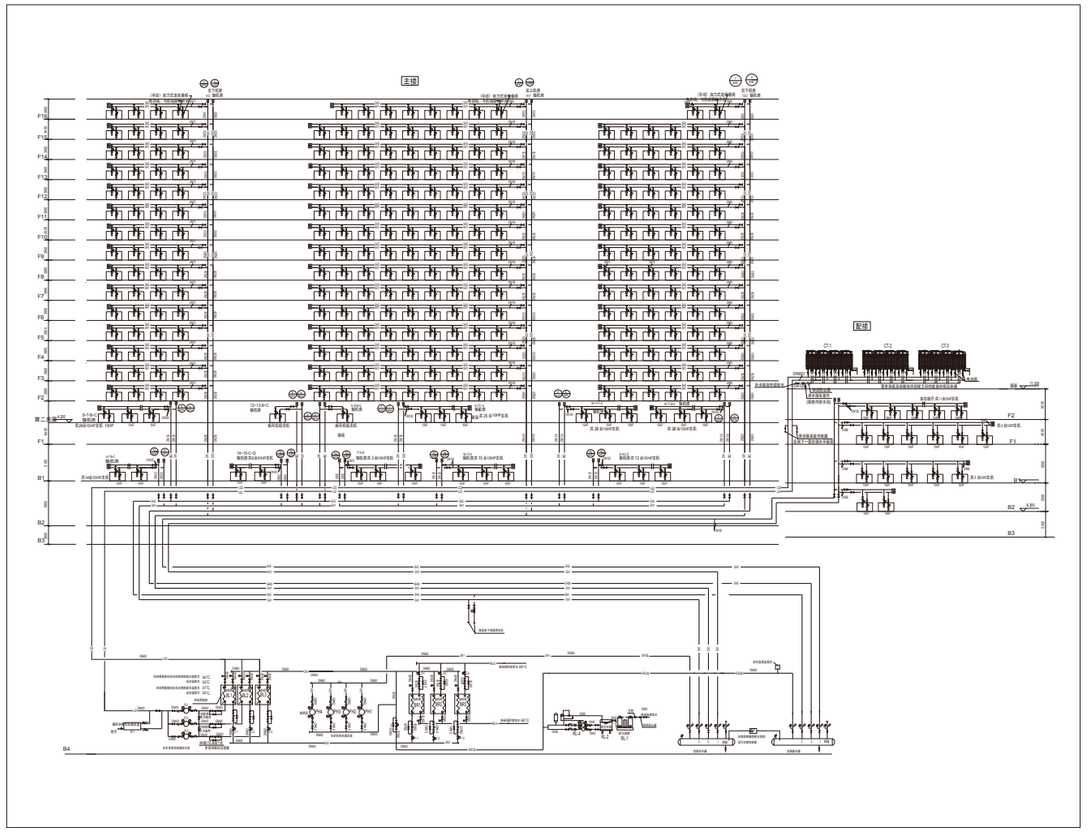


Fig-1 Piping Schematic Diagram

EQUIPMENT

Outside unit	Indoor unit	Others
RWEYQ10M × 14 RWEYQ20M × 53 RWEYQ30M × 85	FXSQ FXDQ × 1,729	Control system: intelligent Manager Interface for BACnet® × 9

PROJECT COMMENTARY

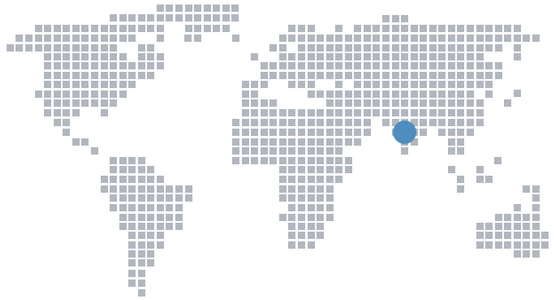
Followings are reasons to install water cooled VRV system for this project.
1. Individual operation is necessary because foreign newspaper medias will be tenants.
2. There is no place for the outdoor units of air cooled VRV.
3. The owner of the building prefer new technology.

Heat source in winter is gas boiler for this building.

3 Pune, India
Kirloskar Brothers Ltd.

PROJECT OUTLINE

Location	Pune, India
Application	Office
Number of floors	4F
Project year	2009
Total floor area	11,600m^2



EQUIPMENT

Outside unit

RWEYQ10MY1	×	2
RWEYQ20MY1	×	5
RWEYQ30MY1	×	18
RXYQ12PAY6	×	1
RXYQ16PAY6	×	2

Indoor unit

FXFQ25PVE	×	50
FXFQ32PVE	×	40
FXFQ40PVE	×	60
FXFQ50PVE	×	23
FXFQ63PVE	×	14
FXFQ80PVE	×	9
FXFQ100PVE	×	3
FXFQ125PVE	×	2
FXDQ25PBVE	×	3
FXDQ50NAVE	×	5
FXDQ63NBVE	×	6
FXMQ40PVE	×	1
FXMQ80PVE	×	2
FXMQ100PVE	×	1
FXMQ125PVE	×	2
FXMQ200MAVE	×	14
FXMQ250MAVE	×	10
FXAQ32MAVE	×	10
FVYCP450MR	×	2

Others

AC unit

Split System × 4

Control System

intelligent touch Controller × 4
Interface for use in BACnet® × 1

DESIGN DRAWING

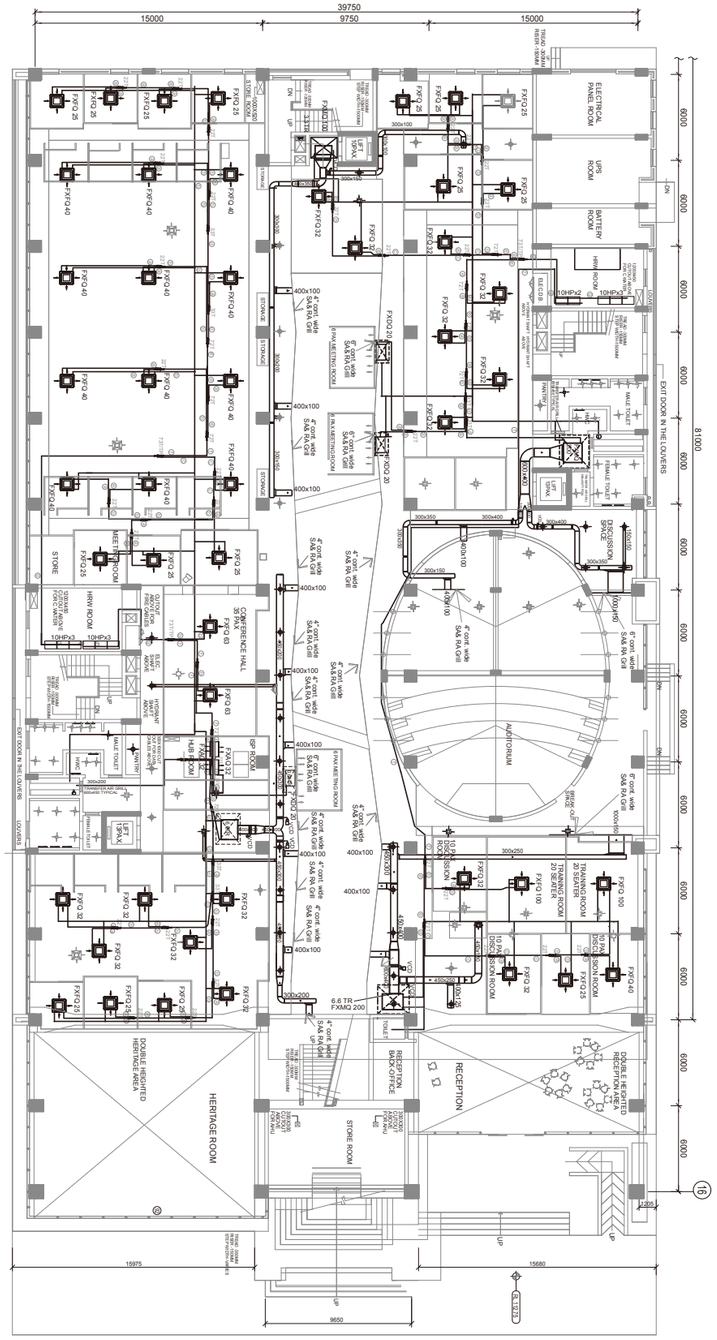


Fig-1 Ground Floor Plan

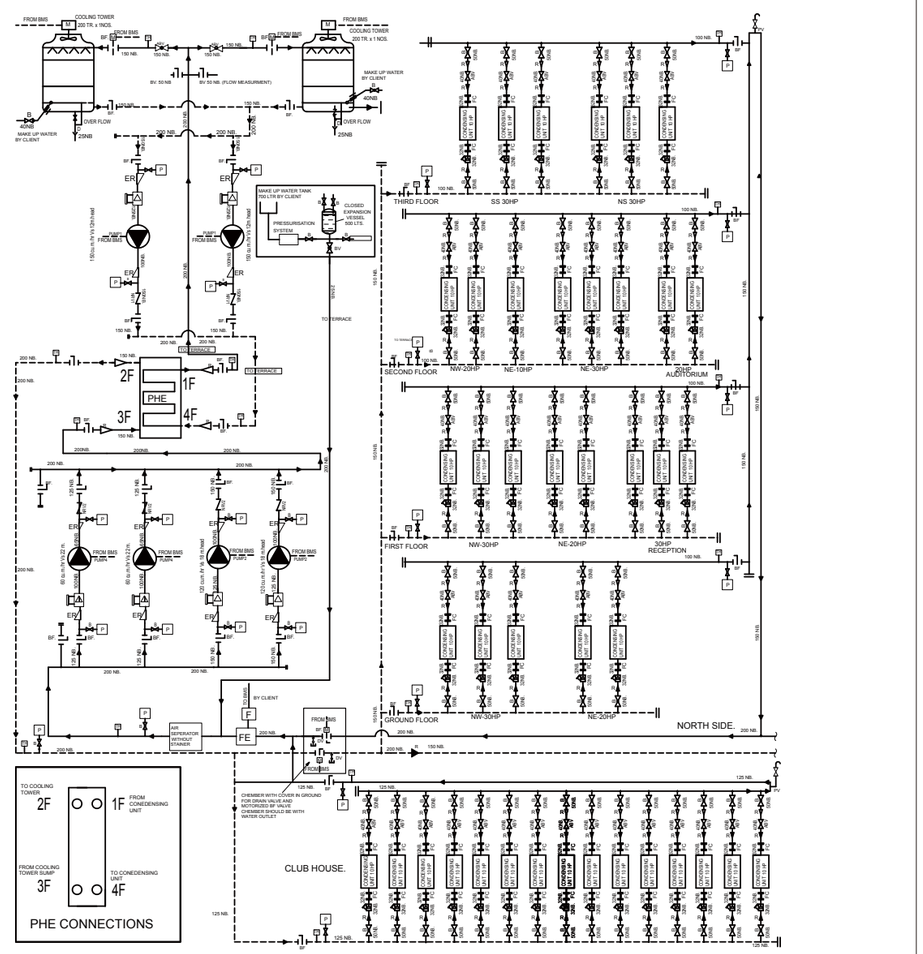


Fig-2 Water Piping Diagram

PROJECT COMMENTARY

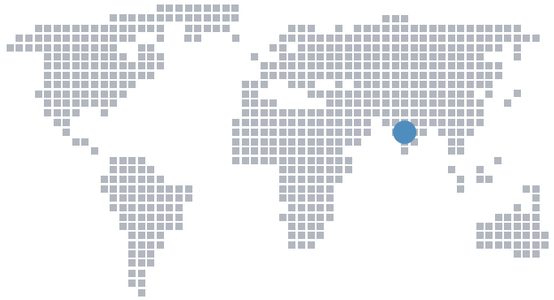
Customer was keen to use emerging new technology, at the same time planning for LEED Platinum Rated Building. Water Cooled-VRV system was selected due to its important feature - high COP which means lower running cost and some other key unique features like wide variety of indoor units, low noise level, smaller external footprint of the units, high energy efficient system & control system is provided via interface through Bacnet gateway to the building automation system.

This office building is India's first WC-VRV system & Certified as " **LEED PLATINUM RATED BUILDING** " by Indian Green Building Council. Consultant have opted for WC-VRV system because of its energy saving feature, high reliability, high efficiency & Enviromental friendliness (R410A Refrigerant).

4 Pune, India
SUZLON Energy Ltd.

PROJECT OUTLINE

Location	Pune, India
Application	Office
Number of floors	4F
Project year	2009
Total floor area	24,980m^2



EQUIPMENT

Outdoor unit

RWEYQ30MY1	× 17	RXYMQ5PVE	× 1
RWEYQ20MY1	× 33	RXYQ5PAY6	× 3
RWEYQ10MY1	× 4	RXYQ8PAY6	× 5
		RXYQ12PAY6	× 1
		RXYQ16PAY6	× 5
		RXYQ18PAY6	× 2
		RXYQ36PAY6	× 1

Indoor unit

FXFQ32PVE	× 28	FXDQ20PBVE	× 85
FXFQ40PVE	× 9	FXDQ25PBVE	× 63
FXFQ50PVE	× 55	FXDQ32PBVE	× 45
FXFQ63PVE	× 67	FXDQ40NBVE	× 47
FXFQ80PVE	× 78	FXDQ50NBVE	× 40
FXFQ100PVE	× 52	FXDQ63NBVE	× 12
FXFQ125PVE	× 29	FXAQ25MAVE	× 3
FXMQ100PVE	× 23	FXAQ32MAVE	× 8
FXMQ80PVE	× 3	FXAQ40MAVE	× 2
FXMQ125PVE	× 7	FXAQ50MAVE	× 1
FXMQ200MAVE	× 8	FXAQ63MAVE	× 30
FXMQ250MAVE	× 7		

Others

AC unit

Split System	× 4
SkyAir	× 3

Control System

intelligent Manager Ⅲ	× 4
Interface for use in BACnet®	× 1

DESIGN DRAWING

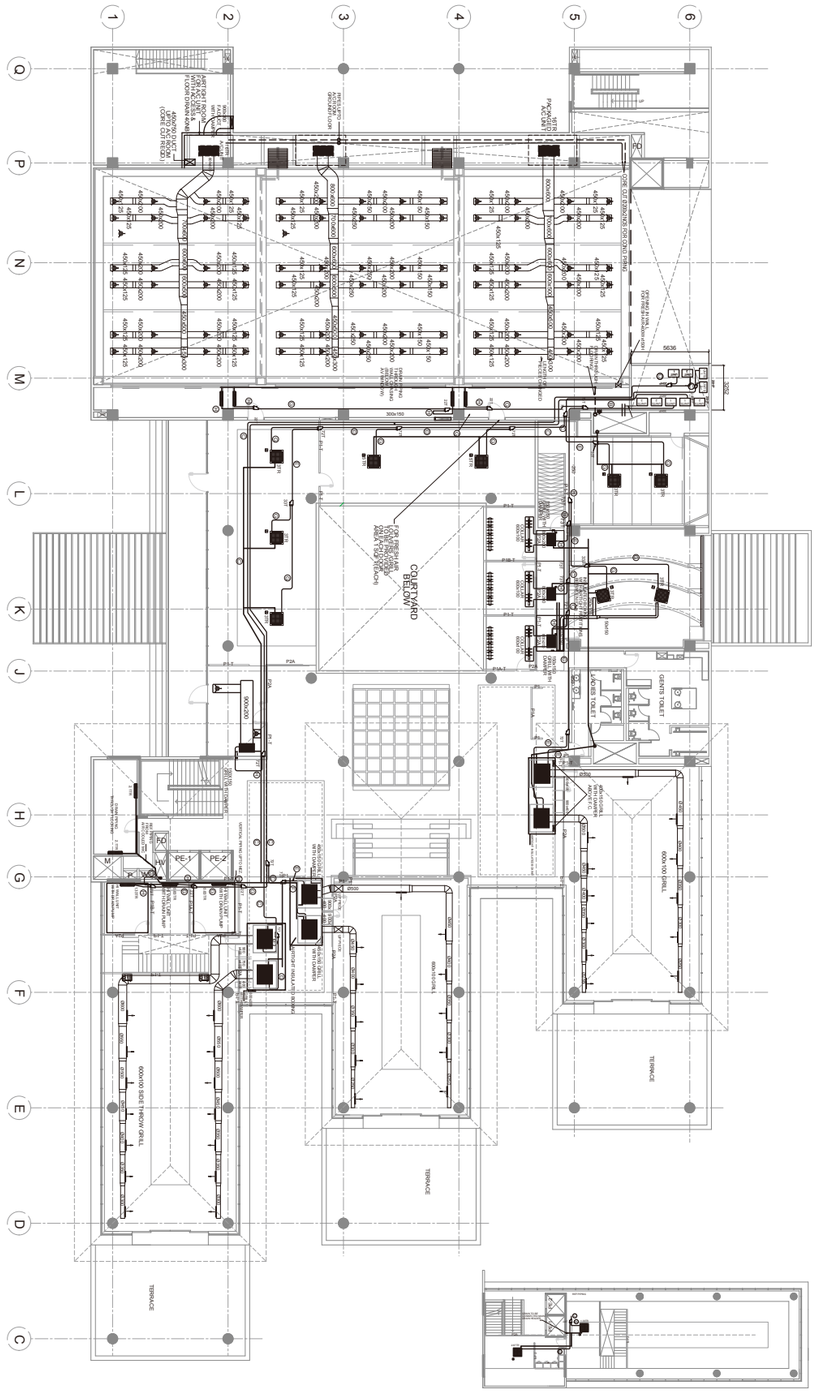


Fig-1 Design Drawing, Piping Drawing Indoor Unit and Outside Unit Location

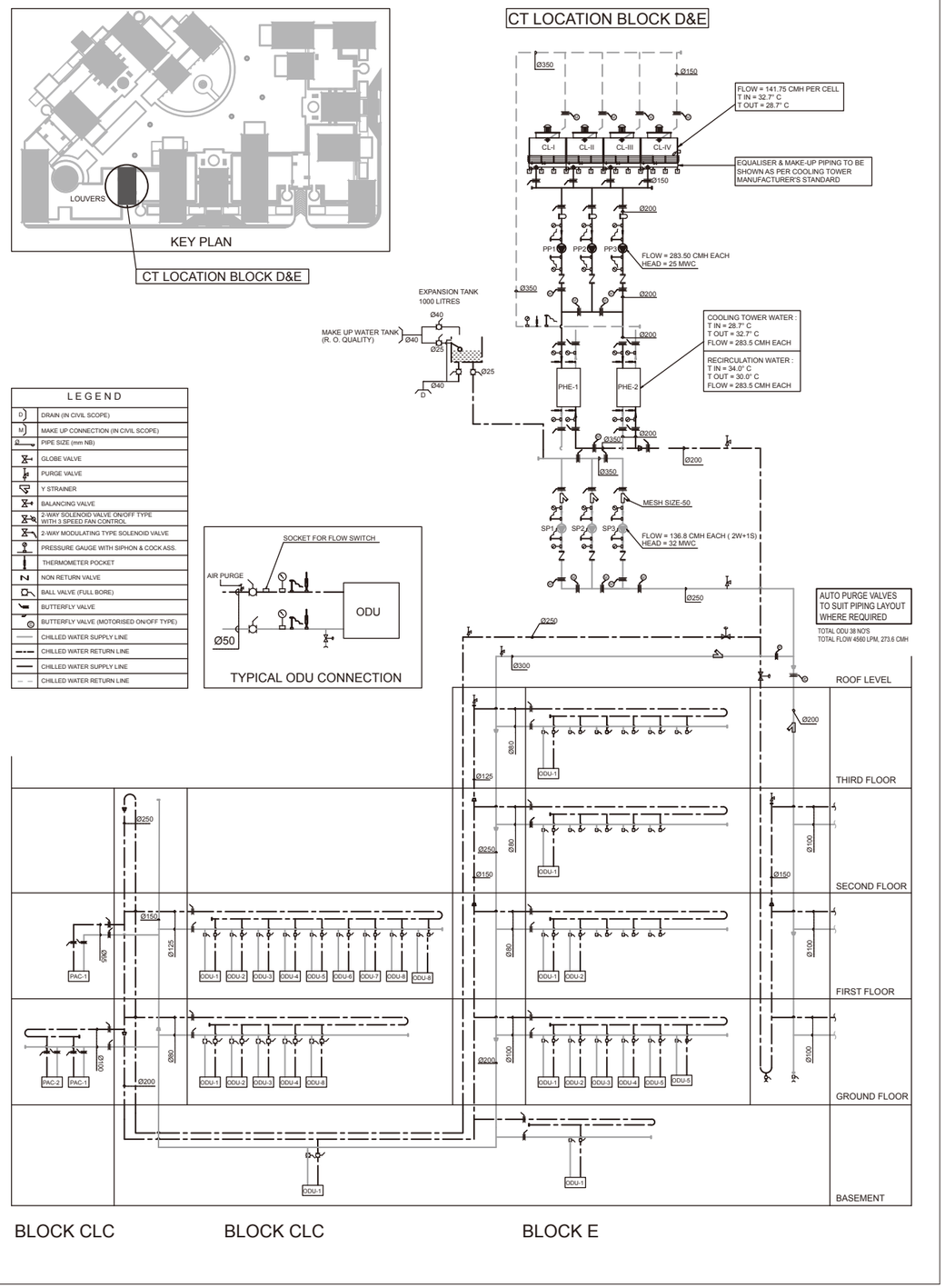


Fig-2 Cooling Water Diagram

DESIGN DRAWING

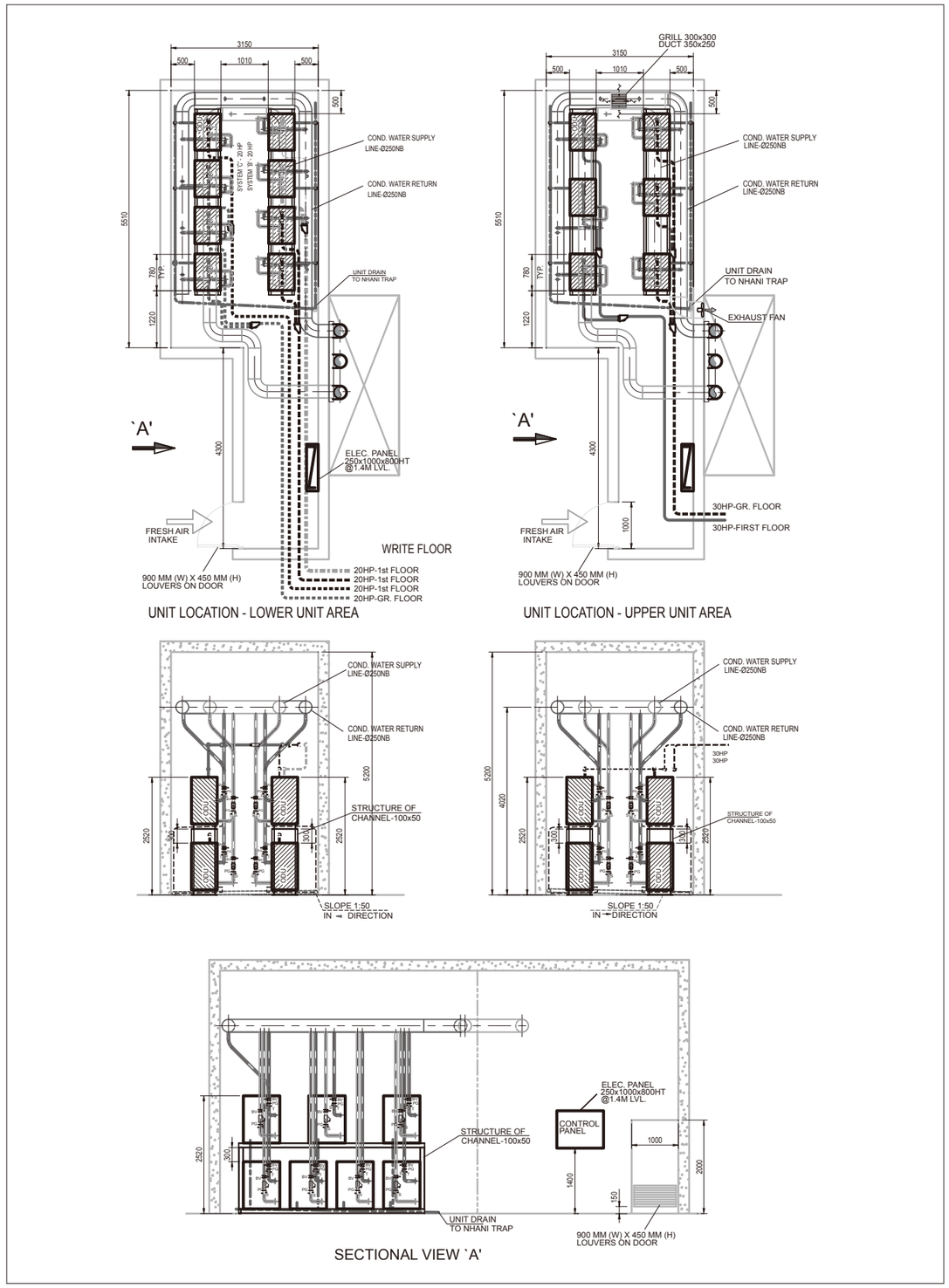


Fig-3 Outside Unit Location

PROJECT COMMENTARY

Suzlon Energy is a global wind power company based in India. Suzlon Market Share worldwide (Combined with Repower) is 8% thereby making Suzlon the 5th largest wind turbine manufacturing group in the world.

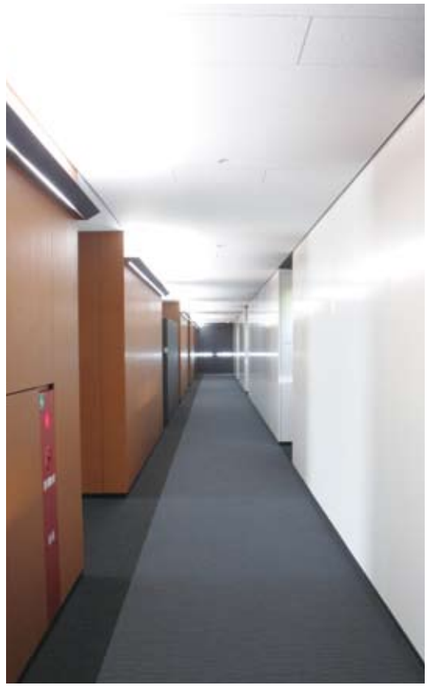
Water Cooled-VRV system was selected due to its important feature - high COP and other key unique features like wide variety of indoor units, low noise level, smaller external footprint of the units.
Also this Office building is separated in blocks, and it was difficult by using Central air-conditioning system (Chiller) to accomodate bulky units & running chilled water piping in space available for installation.

This office building is also being planned as a Green Building project installed with WC-VRV system and this project is being prepared for "LEED RATING" certification.
Consultant have opted for WC-VRV system because of its energy saving feature, high reliability and high efficiency.

5 Osaka, Japan
Hommachi Minami Garden City

PROJECT OUTLINE

Location	Osaka, Japan
Application	Office
Number of floors	26F + B2F
Project year	2011
Total floor area	46,820.3 m²



EQUIPMENT

Outside unit	Indoor unit	Others
RWEYP280A x 72	FXYMP112A x 6	Total heat exchanger
RWEYP224A x 10	FXYMP90A x 65	VAM800 x 8
	FXYMP71A x 66	VAM500 x 11
	FXYMP56A x 91	
	FXYMP45A x 23	
	FXYSP36M x 22	

DESIGN DRAWING

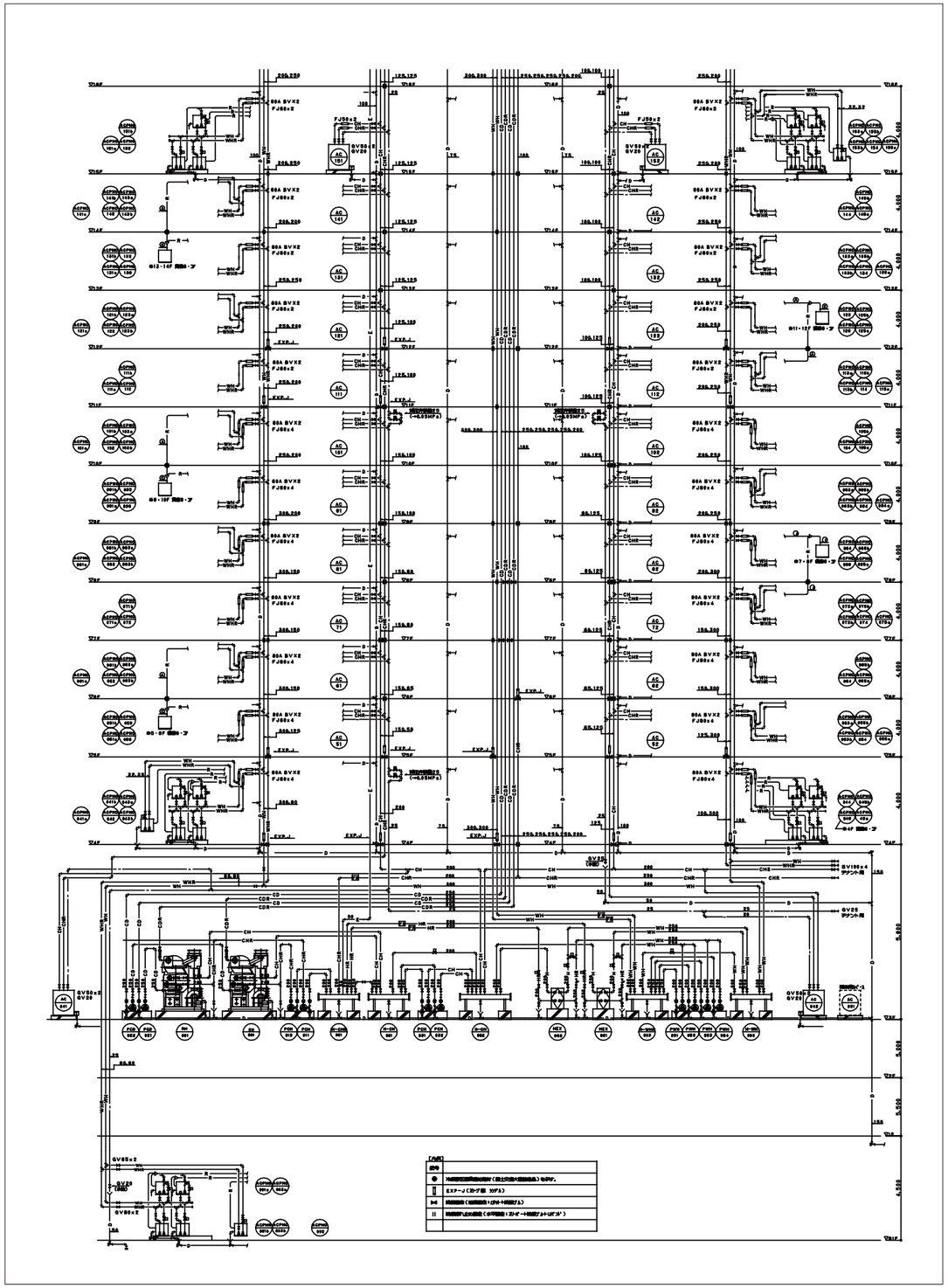


Fig-1 Piping Diagram for Heating Source by Absorption Chiller

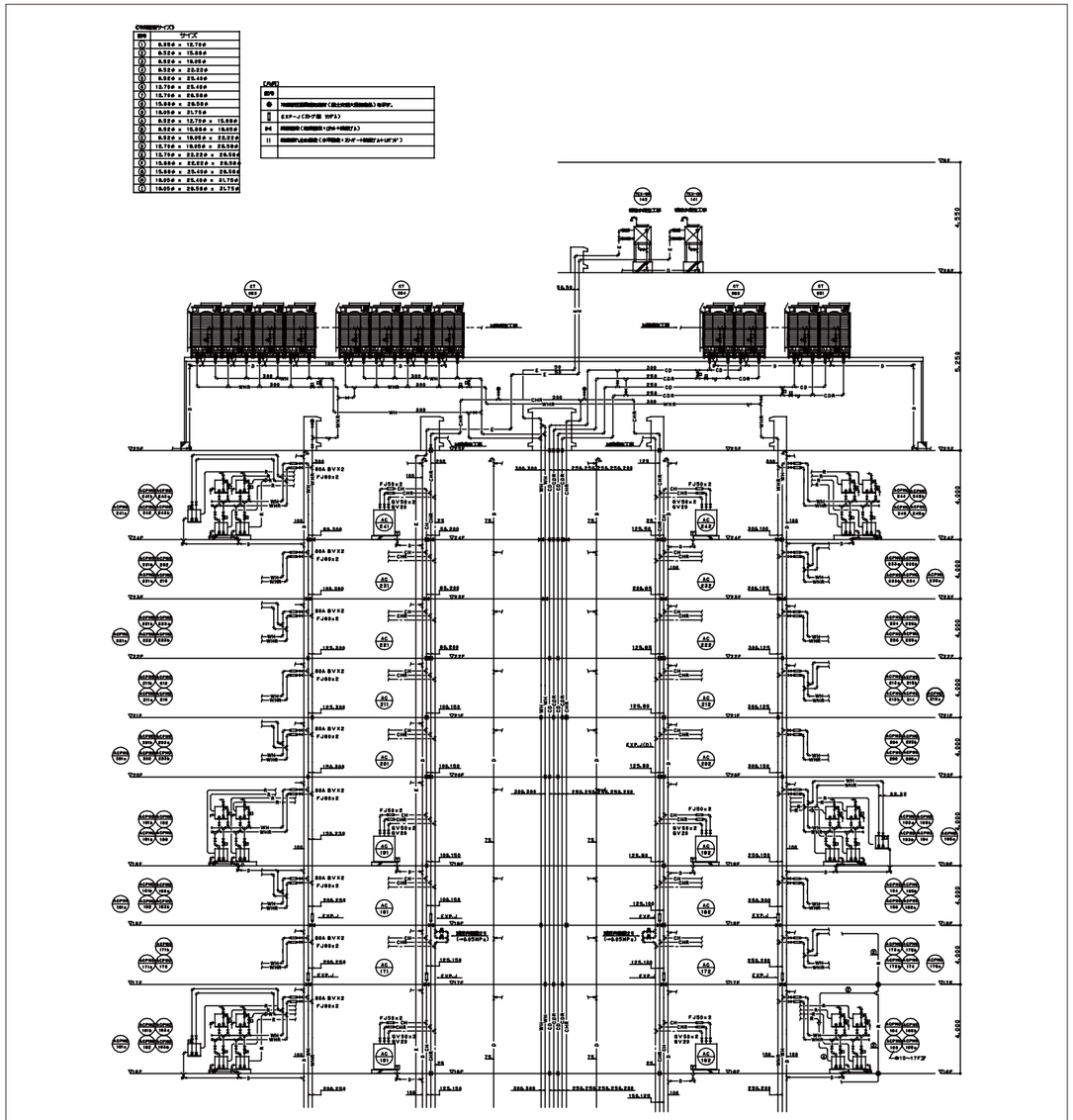


Fig-2 Piping Diagram for VRV WIII

PROJECT COMMENTARY

Air-cooled package system is used for 1st floor entrance lobby. 4th floor to 24th floor office area is air-conditioned by water-cooled VRV system. The reasons why water-cooled VRV is selected for this building are as follows.

There are 4 requests from owner. First request is individual control since this building is tenant office building and working time of each tenant is different.

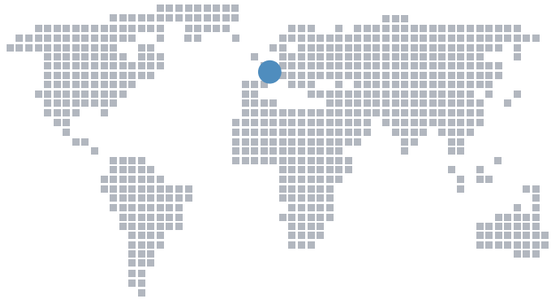
Second reason is installation space. This building applies glass exterior design and there is no space for air-cooled outdoor units to be installed. Third reason is long piping length for high raised building. Last one is energy saving system.

Feature of water-cooled VRV matches these requests. All facility of this building (including air conditioning system) is controlled by BMS which is installed in control room of basement floor.

6 Almelo, Netherlands
Magna Porta Almelo

PROJECT OUTLINE

Location	Almelo, Netherlands
Application	Office
Number of floors	14F
Project year	2007
Total floor area	5,130 m²



EWWP065KAW
- Water cooled heatpump chiller
- Refrigerant: R407C
- Scroll compressor (2 x)
- 75 kW

Floor heating on ground floor

EQUIPMENT

Outside unit	Indoor unit	Others
RWEYQ10 × 17	Ground floor; FXZQ units Other floors; FXSQ units	EWWP065KAW (Water cooled heatpump chiller) Control system: 2 VKM units per floor intelligent Manager

DESIGN DRAWING

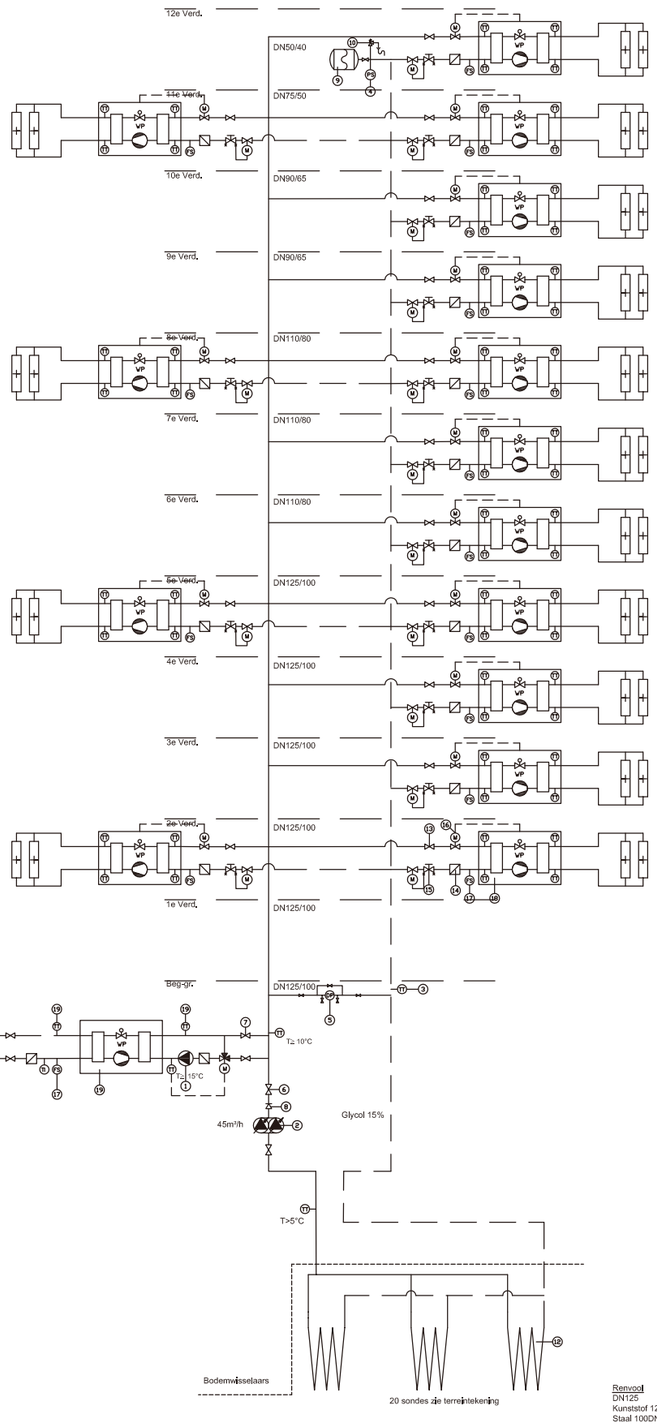


Fig-1 Piping Schematic Diagram

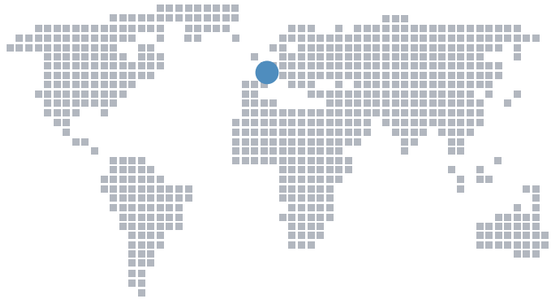
PROJECT COMMENTARY

This building is an unique builidng using geothermal heat. The dimension of the piping system in the ground are as follows; 75 meter long, 12 meter width and 40 meter (high) into the ground. 100 holes are drilled into the ground.
Each room is individually controlled and simultaneous cooling and heating is possible by heat recovery system. Electricity consumption per tenant can be monitored by using kWh measurement and intelligent Manager system.

7 Groningen, Netherlands
Ordina Groningen

PROJECT OUTLINE

Location	Groningen, Netherlands
Application	Office
Number of floors	4F
Project year	2008



EQUIPMENT

Outside unit	Indoor unit	Others
RWEYQ10 × 15	FXSQ × 130	Control system: intelligent Manager × 1

DESIGN DRAWING

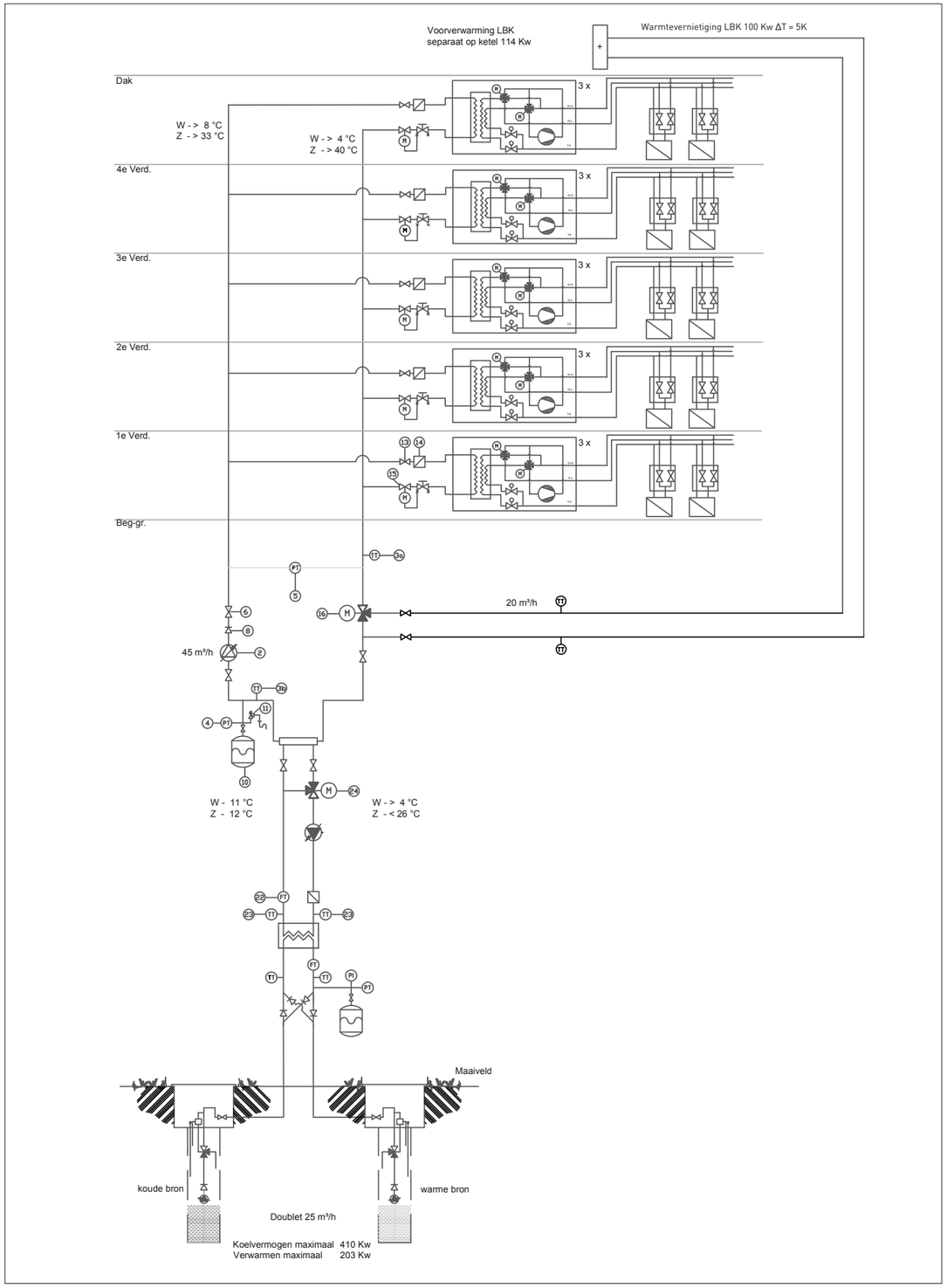


Fig-1 Schematic Diagram

PROJECT COMMENTARY

This building was originally designed with chiller and boiler system. Daikin Water cooled VRVIII heat pump connected to an open source is installed for refurbishment. Air handling unit is used for ventilation. Installation of water cooled VRV units are realised faster than planning. Each room is controlled by Intelligent Manager system.

8 Christchurch, New Zealand
Clarendon Towers

PROJECT OUTLINE

Location	Christchurch, New Zealand
Application	Office
Number of floors	17F
Project year	2010 Retrofit

DESIGN DRAWING

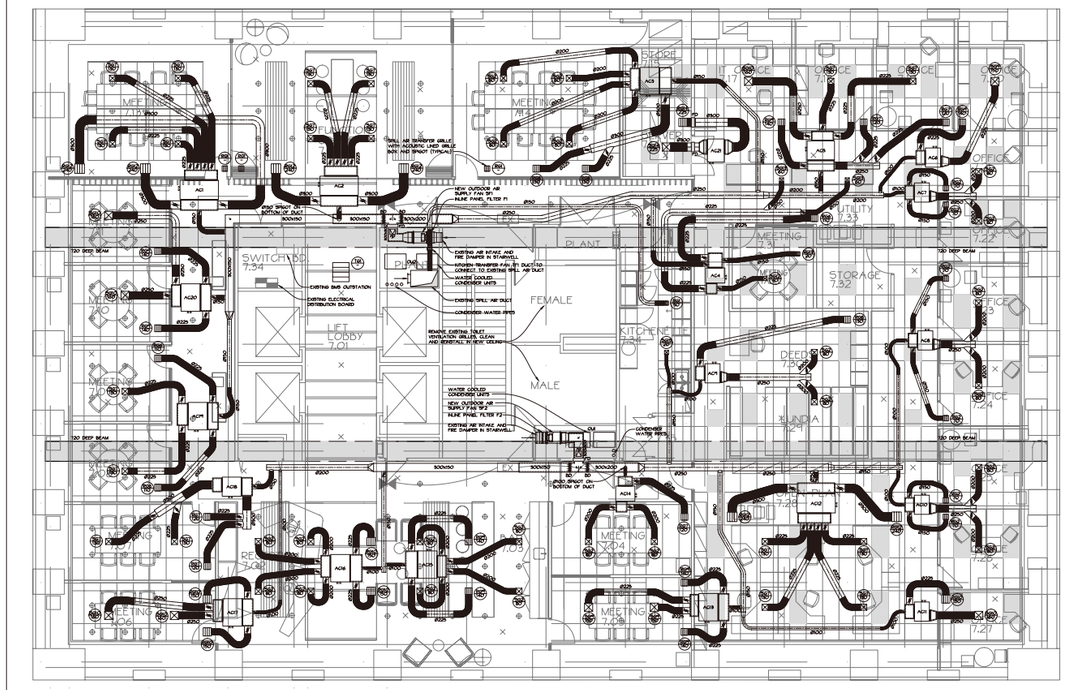


Fig-1 Floor Plan

EQUIPMENT

Outside unit	Indoor unit	Others
RWEYQ10 × 7	FXMQ-PVE × 61	BS Unit × 58 intelligent Touch Controller

PROJECT COMMENTARY

Water-cooled VRV system was chosen instead of Air-cooled VRV due to limited space for condensers around the building.
Condensers are installed in each floor. Existing hydronic circuit, pumps cooling towers were used for the project.
System has demand cards per condenser set (6 in total). intelligent Touch Controller can control majority of system with BMS link to control water pumps / towers plus Di cards.
Daikin was chosen because of high level of service during the initial design process.

9 Khartoum, Sudan
The NTC (National Telecom Corporation) Tower

PROJECT OUTLINE

Location	Khartoum, Sudan
Application	Office
Number of floors	29F
Project year	2008
Total floor area	32,000m²

EQUIPMENT

Outside unit	Indoor unit
235 units	Cassette & Duct type × 473

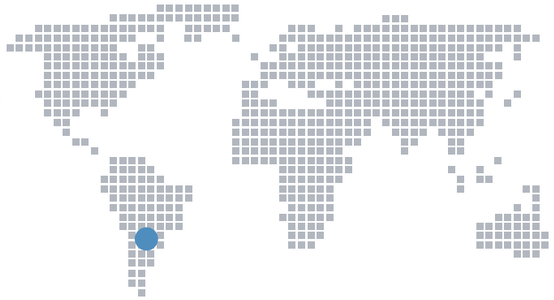
PROJECT COMMENTARY

Water cooled VRV system is installed because of following reasons
1. Suitable for high raised building
2. Easy installation and maintenance
3. Energy saving. Energy consumption can be monitored by intelligent Manager.
4. High outdoor temperature (50°C in summer).

10 Buenos Aires, Argentina
Hospital Finochietto

PROJECT OUTLINE

Location	Buenos Aires, Argentina
Application	Hospital
Number of floors	12F
Project year	2011
Total floor area	17,000 m²



EQUIPMENT

Outside unit			Indoor unit			Others		
RWEYQ8PY17	×	26	FXAQ20MAVE9	×	5	BRC1C62	×	297
RWEYQ10PY17	×	15	FXAQ25MAVE9	×	54	DCS601C51	×	4
RXYQ18PAY1	×	3	FXAQ40MAVE9	×	80	DMS502B51	×	2
RXYQ8PAY1	×	3	FXAQ63MAVE9	×	2			
RXYQ16PAY1	×	7	FXFQ25PVE9	×	5	BSV4Q100PV1	×	20
			FXFQ32PVE9	×	20	BSV6Q100PV1	×	12
			FXFQ40PVE9	×	12	BSVQ250PV13	×	3
			FXFQ50PVE9	×	1	BSVQ160PV13	×	5
			FXFQ80PVE9	×	3	BSVQ100PV13	×	6
			FXFQ63PVE9	×	16			
			FXMQ100PVE	×	2	WGZ100D	×	2
			FXMQ125PVE	×	3	(Water cooled chiller)		
			FXMQ250MAVE	×	1			
			FXAQ32MAVE9	×	59	Control System:		
			FXFQ125PVE9	×	2	Interface for use in BACnet®	×	2
			FXMQ40PVE	×	1	intelligent Touch Controller	×	4
			FXFQ100PVE9	×	1			
			FXAQ50MAVE9	×	30			

PROJECT COMMENTARY

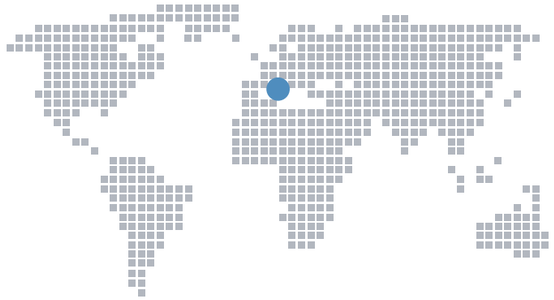
This project uses air-cooled VRV and water-cooled VRV system.
Cooling tower, boiler and geothermal piping are equipped with this system.
The energy saving system is used for this project in order to get the Green Building Certification.

Architects: Font-Alvarado-Sartorio
Thermomecanical company: Arq. Daniel E. Bourguignon & Asoc.

11 Cremona, Italy
Ospizio Soldi

PROJECT OUTLINE

Location	Cremona, Italy
Application	Hospital
Number of floors	3F
Project year	2007
Total floor area	7,500 m²



DESIGN DRAWING

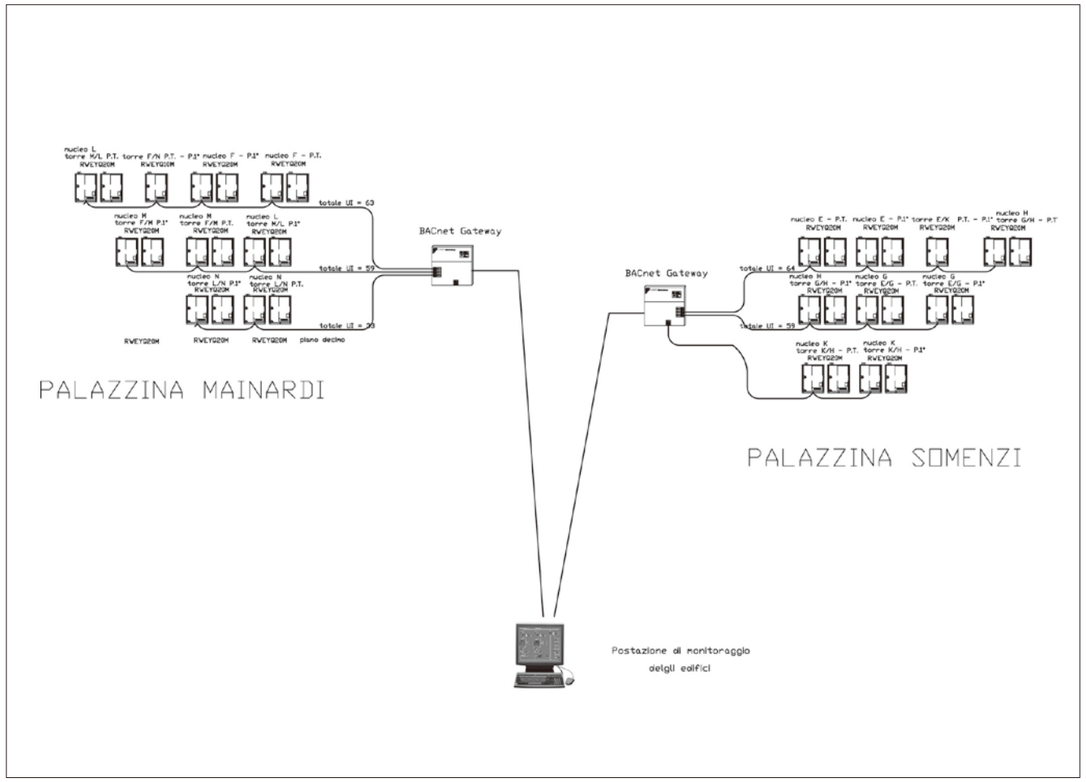


Fig-1 Wiring Diagram

EQUIPMENT

Outside unit	Indoor unit		Others
RWEYQ10M × 2	FXAQ20MA × 79	FXZQ20M8-G × 15	BRC7E618 × 249
RWEYQ20M × 16	FXAQ25MA × 24	FXZQ25M8-G × 19	BRC7E530 × 62
	FXAQ32MA × 88	FXZQ32M8-G × 4	KHRQ22M29H × 61
	FXAQ40MA × 28	FXZQ40M8-G × 13	KHRQ22M64T × 38
	FXAQ50MA × 29	FXZQ50M8-G × 6	
	FXAQ63MA × 1		

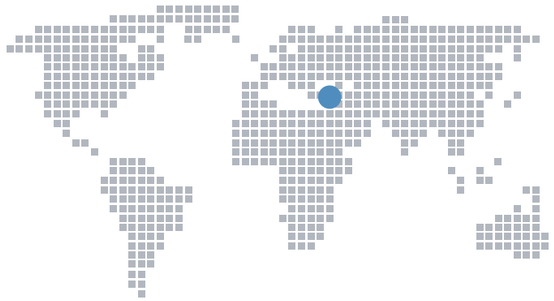
PROJECT COMMENTARY

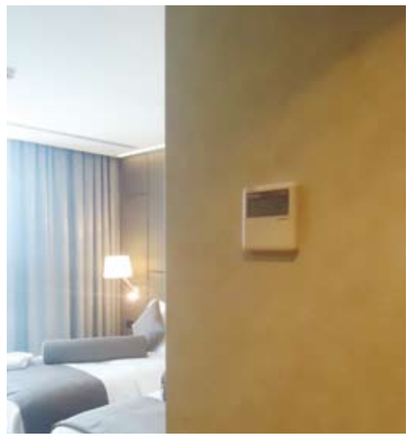
The air conditioning system for this rest home is a VRV WII system. The water is provided from a sink, with an immersion pump powering the circulating condensing circuit. The two buildings, Somenzi and Mainardi, have an extended area, and the system is installed on the third floor. There are outside units (VRV water cooled) in the basement (no air conditioning system), and on the ground and first floors. Installed power: 907 kW, Indoor units: wall mounted and concealed ceiling indoor units. One of the requests was to use spaces in the basement to install outside units, reducing the impact to the landscape of outside unit installation. Another important factor was its better energy efficiency, especially during the summer period. The rest home already had a heating plant, a burlap heating system (teleriscaldamento), and with the VRV system they also have a backup plant for the winter. And the fast installation that this system offered was important too. The installation was completed without inconveniencing the rest home guests. At this moment there is no centralized control system installed. Infrared remote controllers are used for regulation.

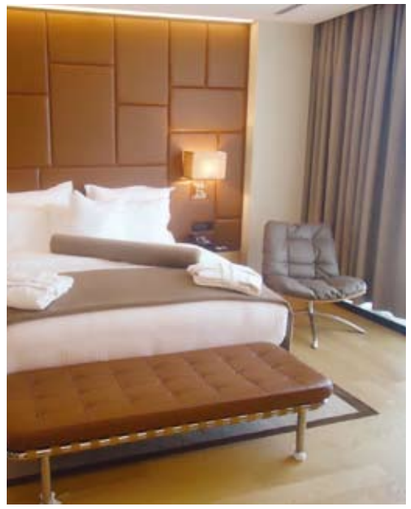
12 Istanbul, Turkey
Hilton Hotel

PROJECT OUTLINE

Location	Istanbul, Turkey
Application	Hotel
Number of floors	25F
Project year	2012
Total floor area	29,000 m²







EQUIPMENT

Outside unit

RWEYQ8/10 × 135

Indoor unit

FXSQ x 316
FXDQ x 8
FXMQ x 32
FXFQ x 10
FXCQ x 9
FXAQ x 6
FXKQ x 2

Others

Heat recovery BS unit

BSVQ	x 282
HRV VKM100G	x 23
BRC1D52	x 391
intelligent Manager	x 2

DESIGN DRAWING

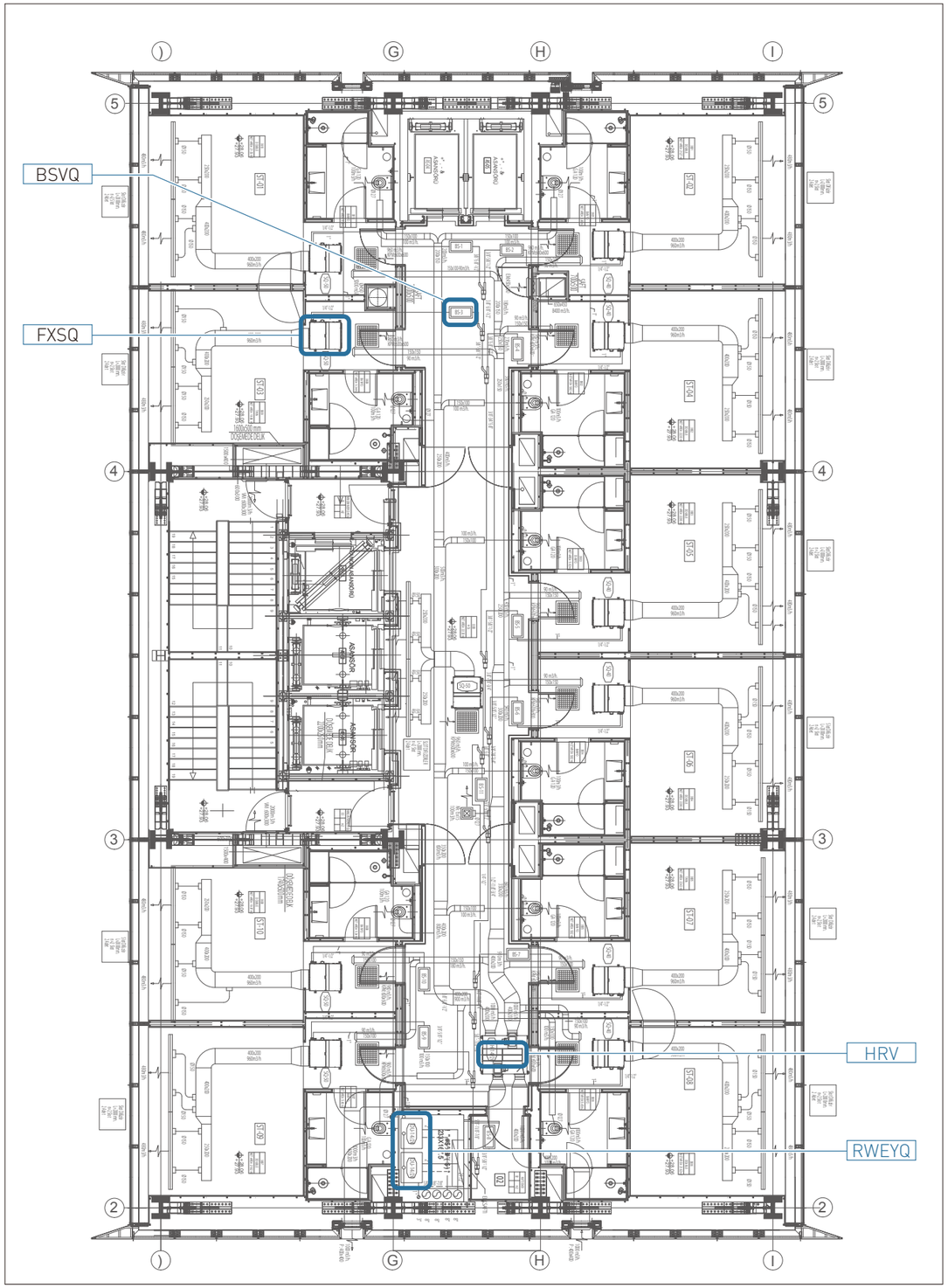


Fig-1 Floor Plan(7-12F)

PROJECT COMMENTARY

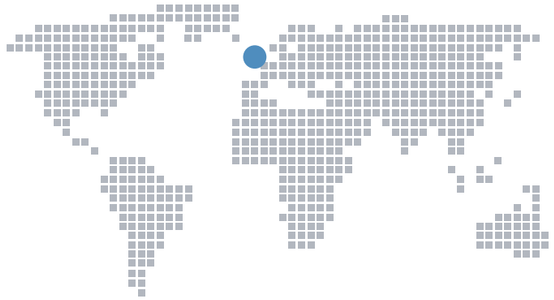
Daikin heat recovery water-cooled VRV system was installed instead of water-cooled chiller system. Outside units and heat reclaim ventilation indoor units are installed in each floor's mechanical room. There are following advantages of VRV system against water-cooled chiller system.

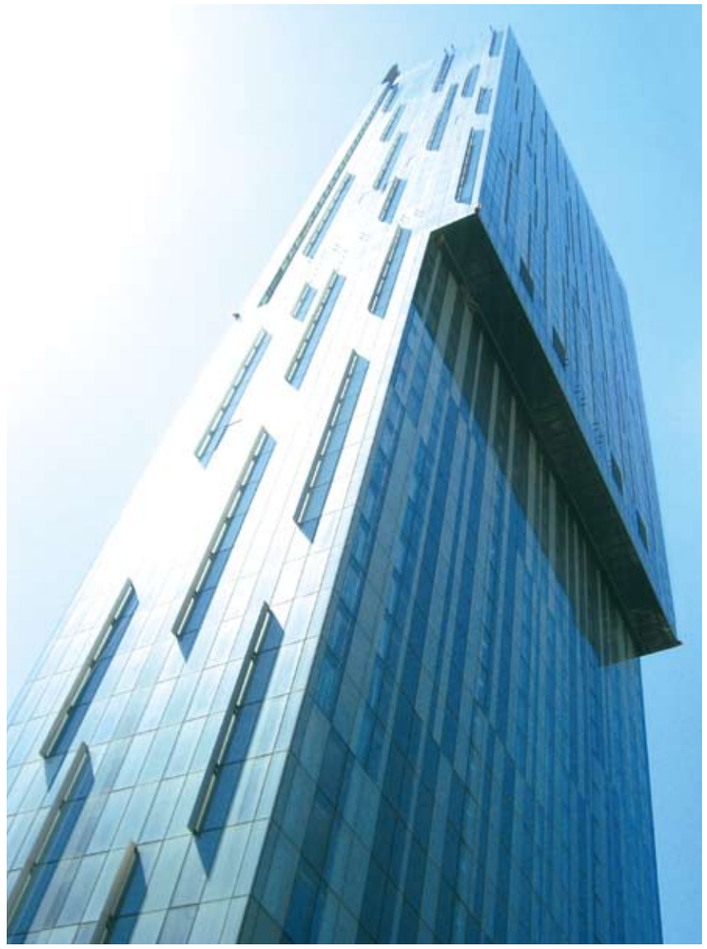
1. Total VRV outside units installation area for each floor is less than water-cooled chiller system installation area up to 50%.
2. VRV outside unit noise level (54 dBA) is lower than water-cooled chiller system (96 dBA).
3. VRV system power supply capacity is lower than 30% against water-cooled chiller system.
4. VRV system do not have start up current.
5. Energy saving with high COP value up to 50%.
6. VRV system needs less service people.
7. VRV system uses 20% lower boiler capacity for building's heating capacity.
8. There is no corrosion in piping when liquid flows because of non using water with fan coils.

13 Manchester, UK
Hilton Hotel Manchester

PROJECT OUTLINE

Location	Manchester, UK
Application	Hotel
Number of floors	49F
Project year	2006





INDOOR UNIT INSTALLATION

This was a typical installation case for application in a hotel bedroom. As this was for residential and individual use, and not commercial use, higher specifications including good appearance, low sound, comfortable distribution and easy control were required.

Returning air intake for indoor unit is located above closet. Air passes across back wall and ceiling and reaches the unit. Grill is not located on ceiling in order to maintain an attractive appearance and to reduce cost.

A fresh air intake is located in the service space.

BS box is also installed in the service space. This equipment is covered with rubber material to decrease refrigerant flow sound.

Refrigerant detector is installed in lower corner of wall. When this sensor catches refrigerant, operation is stopped automatically.

EQUIPMENT

Outside unit	Indoor unit	Others
RWEYQ10 × 35	FXDQ20/25 × 290	BRC2A51

PROJECT COMMENTARY

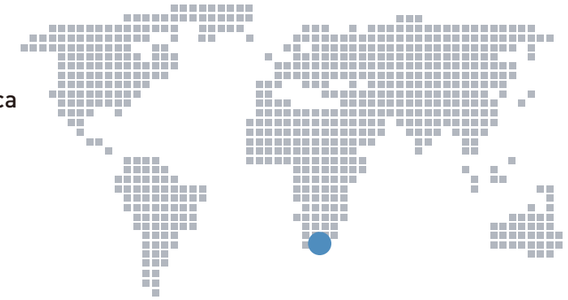
A Daikin water-cooled VRV-WII air conditioning system was selected for this project over a conventional chiller/ LPHW-based 4 pipe fan coil system. The fan coil system did not meet Part 'L' carbon emission requirements and would have required a major redesign of the building. Also, the VRV-WII system provides the client with the added benefit of an enhanced capital allowance and its attendant savings in capital outlay.

System control is provided via simplified room controllers interfaced through a LON gateway to the hotel's 'Fidelio' booking system. Three operating modes are available—'room not booked/unoccupied' with a wide band of control between 18 and 28°C; 'room booked' with a band width of 16 to 26°C; and 'room occupied' operating at a room controller set point of 22°C. Daikin was awarded the project for several reasons. These include: the smaller external footprint of the units; lower capital cost than would be required for four pipe fan coils; a high COP, which means lower running costs; two-stage heat recovery; lower CO_2 emissions; and adaptability to the hotel control system.

14 Port Elizabeth, South Africa
Nelson Mandela Bay Stadium

PROJECT OUTLINE

Location	Port Elizabeth, South Africa
Application	Stadium
Project year	2010



EQUIPMENT

Outside unit	Indoor unit
107 units	238 units

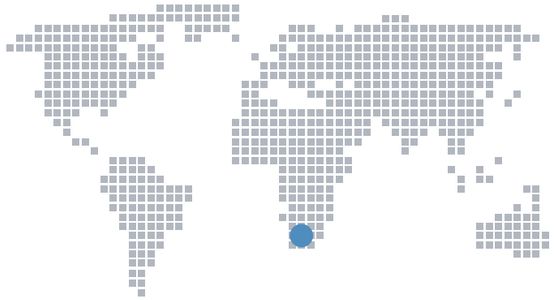
PROJECT COMMENTARY

This stadium is one of the three coastal stadiums built in anticipation of the 2010 FIFA World Cup. It regularly hosts large-scale rugby union and football (soccer) matches.

15 Cape Town, South Africa
Green Point Stadium

PROJECT OUTLINE

Location	Cape Town, South Africa
Application	Stadium
Project year	2010



EQUIPMENT

Outside unit	Indoor unit
63 units	113 units

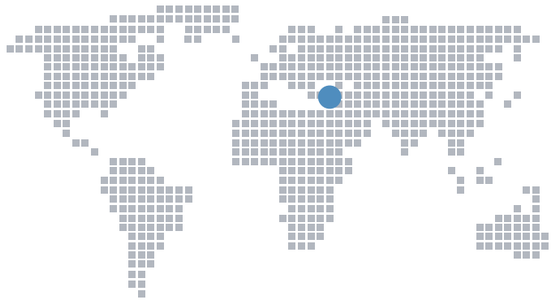
PROJECT COMMENTARY

The stadium is located in Green Point, between Signal Hill and the Atlantic Ocean. This is a newly built stadium that was used for the 2010 FIFA World Cup.

16 Istanbul, Turkey
Akasya Residence

PROJECT OUTLINE

Location	Istanbul, Turkey
Application	Apartment
Number of floors	40F
Project year	2012



EQUIPMENT

Outside unit				Indoor unit	Others
RWEYQ10P	× 87	RXYQ12P	× 36	FXCQ × 522	intelligent Manager × 12
RXYQ8P	× 23	RXYQ16P	× 6	FXAQ × 1397	PPD Function
RXYQ10P	× 8	RXYQ18P	× 28	FXSQ × 578	

PROJECT COMMENTARY

This project is a complex project with total site area of 182,000 m² including parks, luxury residential units, sports, recreation and social facilities. Akasya shopping center with multi-purpose theater, cinemas, restaurants and health club are also included in the project. Residential units are composed of phase A and B. Daikin water-cooled VRV system (VRV-WIII) was installed on Phase A because of limited space for installing outside units. Daikin air-cooled VRV system was installed on Phase B. Round flow cassette, 2-way flow cassette and wall mounted indoor units are installed in each room. VRV system with intelligent Manager is the optimum solution to control air conditioning system.

17 Tottori, Japan
Daikin Ales Aoya Global Training Center

PROJECT OUTLINE

Location	Tottori, Japan
Application	Training Center
Number of floors	6F
Project year	2008
Total floor area	16,541 m²

DESIGN DRAWING

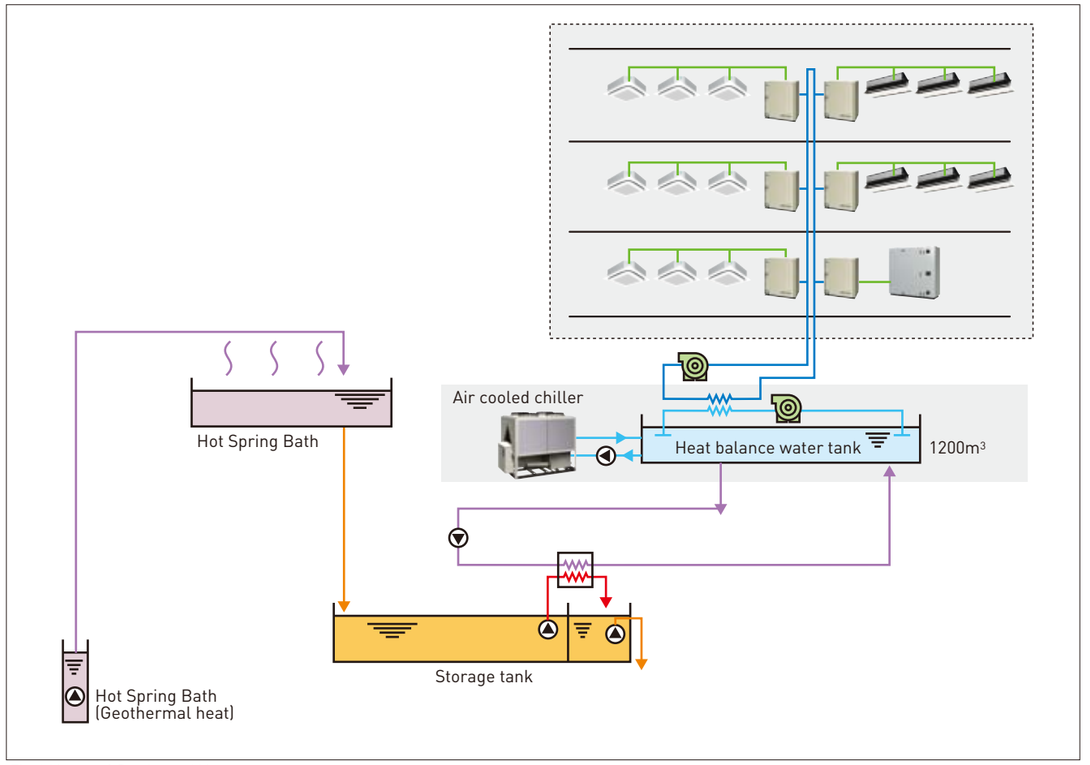


Fig-1 Usage of Geothermal Heat

EQUIPMENT

Outside unit

Water cooled VRV

RWEYP224PR × 25	RWEYP560PR × 20
RWEYP280PR × 25	RWEYP672PR × 6
RWEYP448PR × 16	

Indoor unit

FXYCP × 113 (2-way cassette)	FXYWP × 11 (Wall built-in)
FXYFP × 48 (Round flow cassette)	FXYLP × 1 (Floor standing)
FXYMP × 41 (Duct)	UAV × 4 (Direct expansion AHU)
FXYDP × 13 (Slim Duct)	

PROJECT COMMENTARY

Water-cooled VRV heat recovery system is installed in this facility. Heat recovery system is an optimum solution for hotel application.
Remarkable point in this project is that air conditioning system (for heating) uses natural energy (geothermal heat).
Air-cooled heat pump chiller is operated when geothermal heat is not sufficient.
Heat balance tank is installed to store hot water or cold water made at night and they are used as an energy source of air conditioning system.
Midnight electricity is cheaper than daytime electricity in Japan, thus using electricity at night can reduce electricity cost.
On top of that, heat pump hot water supply system is applied to supply hot water of shower.

18 Shangyu, China
Shangyu Baiguan Building

PROJECT OUTLINE

Location	Shangyu, China
Application	Office / Commercial complex
Number of floors	50F + B2F
Project year	2011
Total floor area	120,000 m²

EQUIPMENT

Air cooled VRV × 5600 HP
Water cooled VRV × 920 HP

DESIGN DRAWING

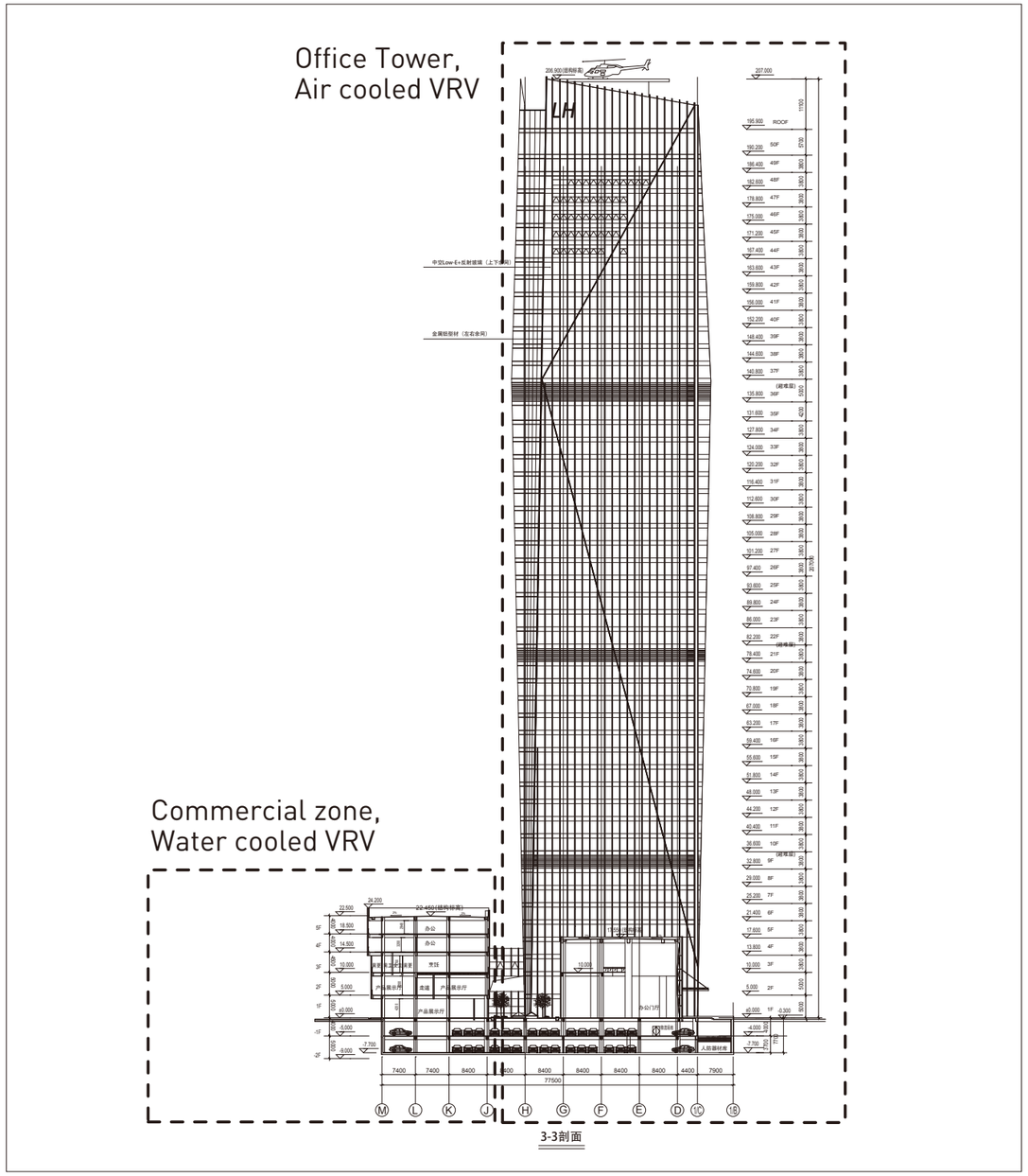


Fig-1 Overall Building Plan

PROJECT COMMENTARY

This builiding is air conditioned by air cooled VRV and water cooled VRV.
Office tower is air-conditioned by air cooled VRV and commercial zone (hall, training gym, restaurant) is air-conditioned by water cooled VRV. VRV is suitable for high raised building like this project because of long refrigerant piping. Other advantages of VRV system are energy saving and small installation space.

19 Dalian, China
Hengze Tiancheng

PROJECT OUTLINE

Location	Dalian, China
Application	Office, Apartment
Number of floors	22F
Project year	2007
Total floor area	110,296 m²

DESIGN DRAWING

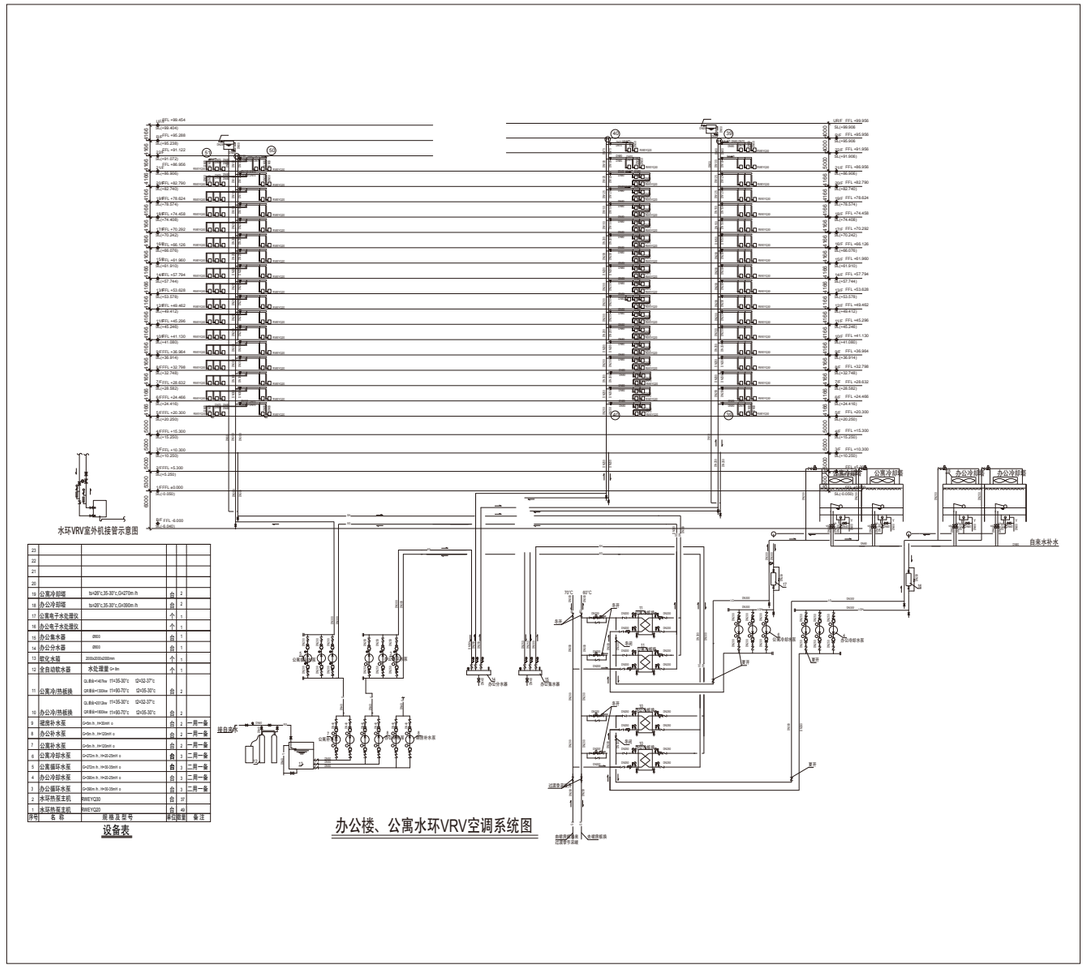


Fig-1 Schematic Diagram

EQUIPMENT

VRV-WII × 2,290 HP
Water cooled chiller × 1,200 HP

PROJECT COMMENTARY

Water cooled VRV is installed because of following reasons;
1. Better heating capacity than competitor's one
2. Individual operation
Heat source in winter is district heating

20 Osaka, Japan
Umeda Hankyu Building

PROJECT OUTLINE

Location	Osaka, Japan
Application	Department Store / Office
Number of floors	41F + B3F
Project year	2010
Total floor area	254,000 m²

EQUIPMENT

Outside unit	Indoor unit	Others
Water cooled VRV × 549	Duct type × 1,441	Packaged air conditioner × 58
Air cooled VRV × 13	Ceiling suspended type × 13	BS Units × 1,043
	Cassette type × 63	

DESIGN DRAWING

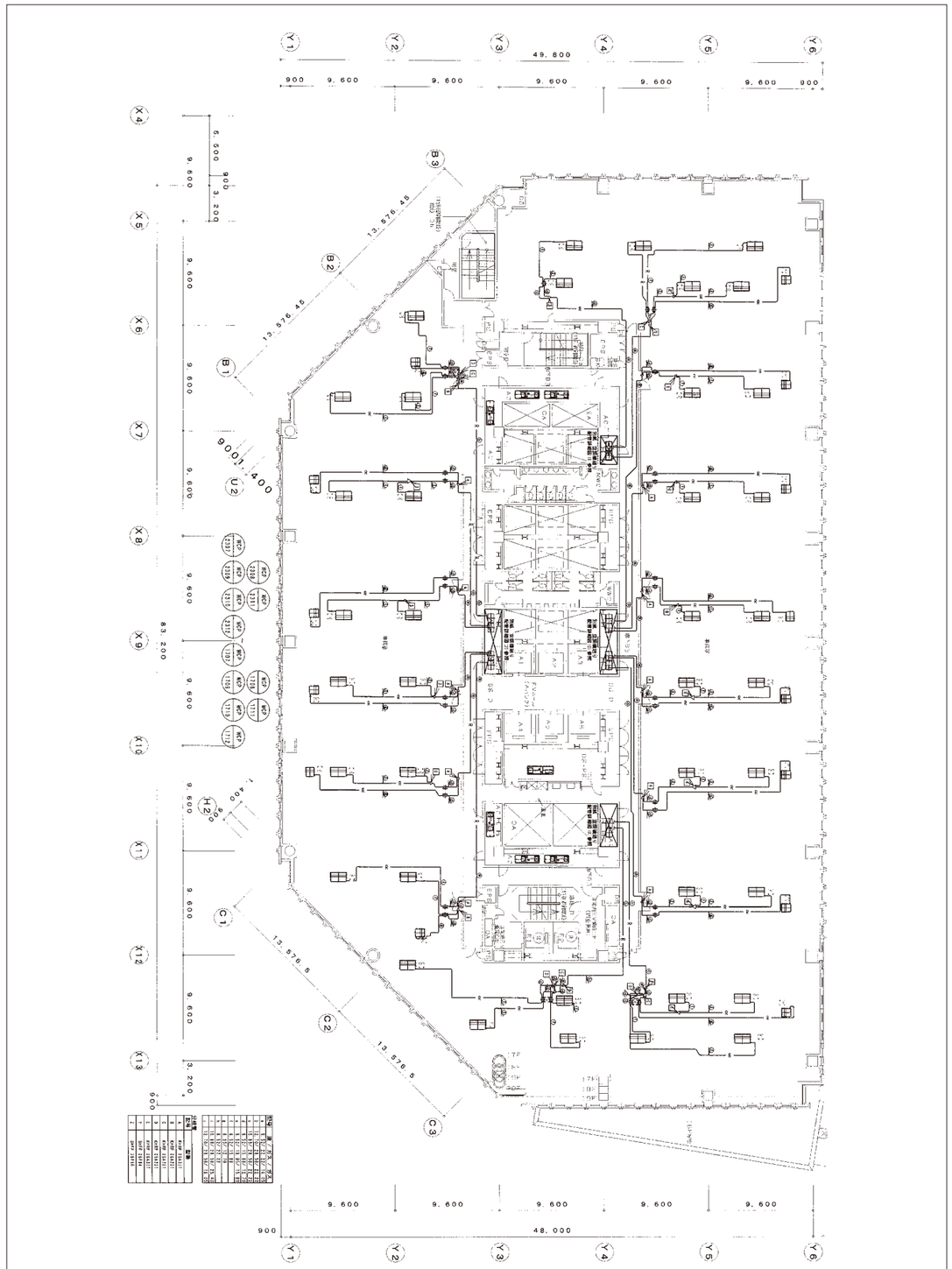


Fig-1 Floor Plan (17-23F)

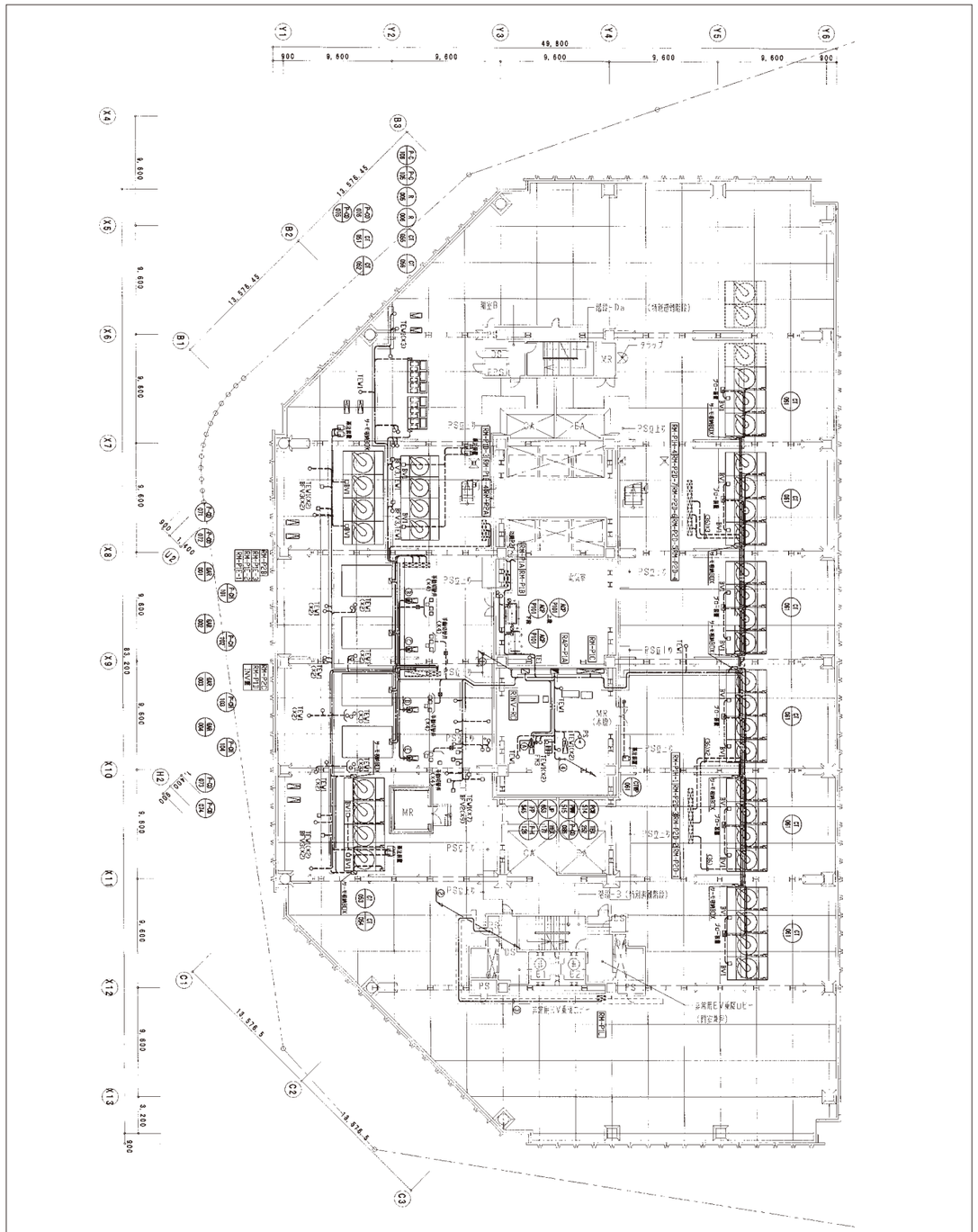


Fig-2 PH1F Floor Plan

DESIGN DRAWING

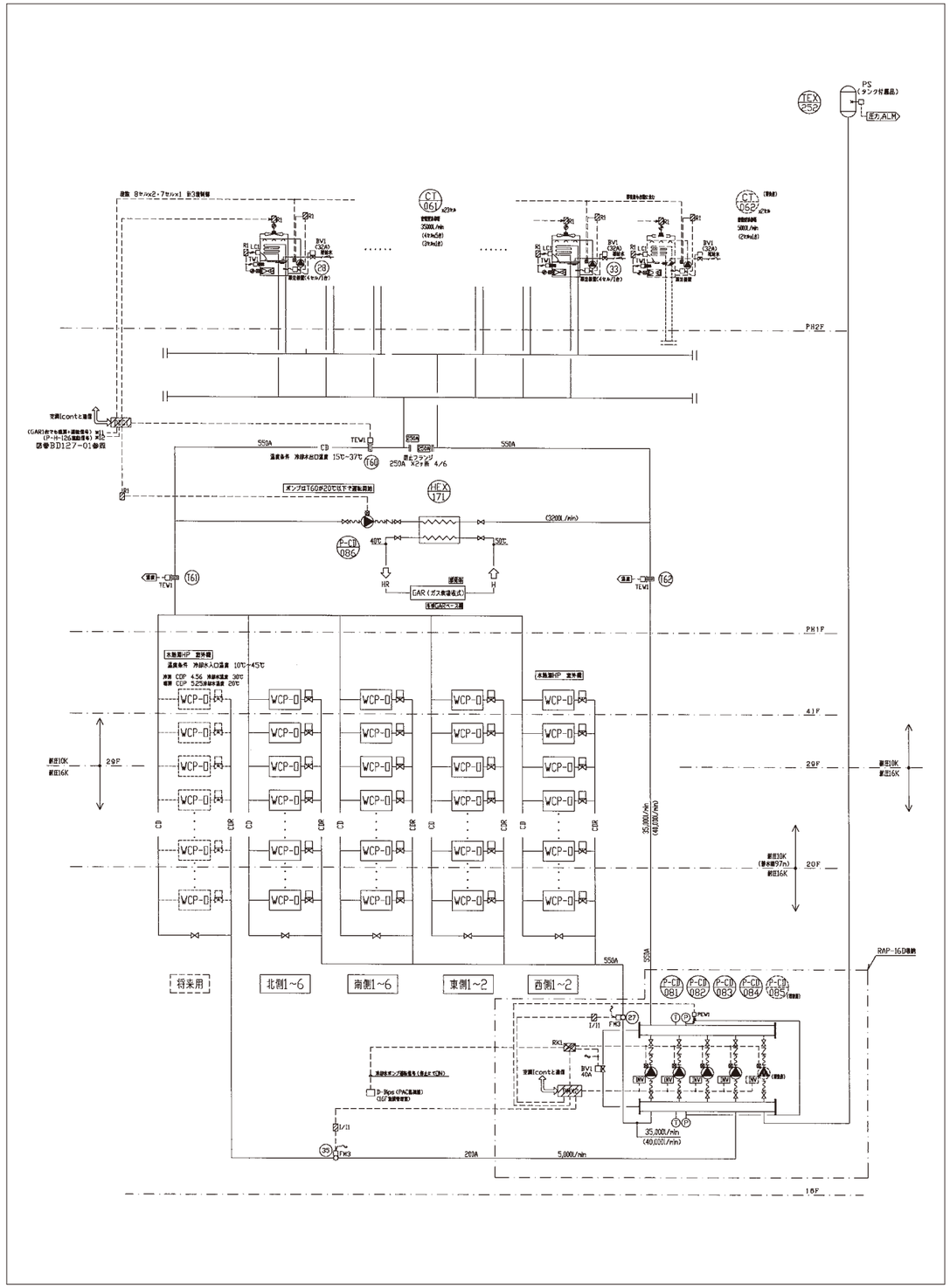


Fig-3 Schematic Diagram

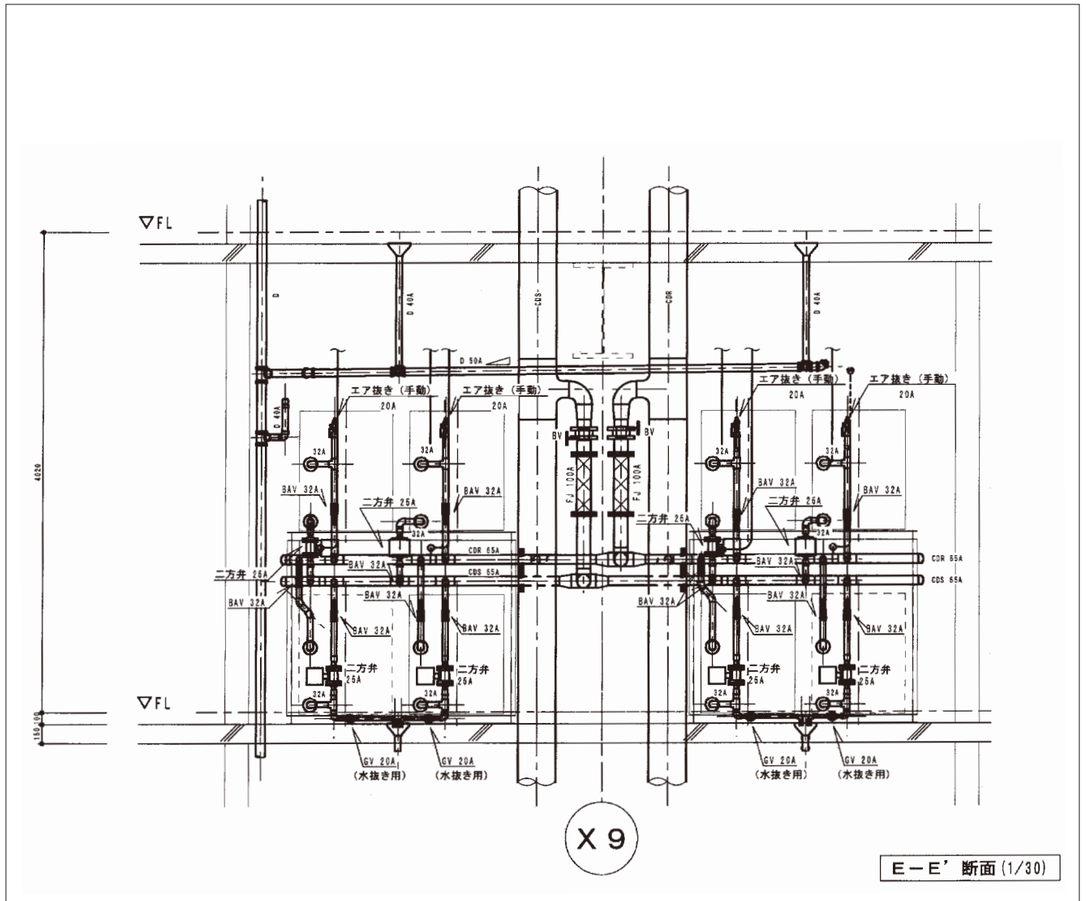


Fig-4 Piping Diagram

PROJECT COMMENTARY

The Umeda Hankyu Building houses one of the biggest department stores in Japan.
Since the Umeda Hankyu Building was opened in 1929 as the world's first department store associated with a railway terminal, many extensions have been made to this building and it has aged. It is now completely rebuilt to become a new earthquake-proof complex.
After rebuilding, there are 41 stories above ground and 2 below (for a total of 187 meters in height). There are offices in the upper stories, with the department store in the lower ones (13 stories above ground and 2 below).
This building has a water-cooled VRV air conditioning system, which makes it a leading-edge building with important energy-saving features.