

Air conditioning inspection report

Victoria House
1 Leonard Circus
London
EC2A 4DQ

Report number
2460-5299-8070-5198-7005

Valid until
2 November 2028

Executive summary

The primary aim of the report is to give the building owner, or operator, information about the performance of the systems and plant and to identify opportunities to save energy and cut operating costs. This report identifies any operating anomalies; no-cost/low-cost savings and capital investment opportunities; the size and appropriateness of refrigeration plant in relation to cooling loads and the effectiveness of current maintenance regimes.

Included within this report will be a description of the air conditioning services, system efficiencies and approximate sizing of the system compared to industry guidelines and suggested improvements, which could be made to increase the system efficiency.

Whilst some items with regard to Health and Safety may have been noted, this should not be taken as a complete Report on Health and Safety. Similarly, whilst some items may refer to replacement of life expired plants, this should not be taken as a complete life cycle replacement report.

For the purpose of the report, samples have been taken in accordance with CIBSE TM44 guidelines. Samples taken from each area demonstrate the age, condition and method of control. The report is based on a visual inspection only. No equipment or plant was removed or stripped down.

BUILDING

The subject property is a modern three storey detached structure, constructed of steel and concrete with external brick elevations with a pitched and flat roof and fitted with double glazing. The building is located within Victoria House, Leonard Circus, London and operates as offices, occupying the basement, ground, first, second and third floors, consisting of approximately seventeen air-conditioned areas. Occupancy hours are 09:00 to 18:00 Monday to Friday and has an approximate maximum occupancy of 250 persons.

There were 7no VRF systems installed on the roof of the building. 7 no Mitsubishi VRF systems served the 1st , 2nd and 3rd floor's offices and meeting rooms.

The cooling load was estimated to be 125W/m². (based on BSRIA guidelines in TM44 for office areas)

Building Regulations Approved Document Part L 2nd tier documentation provides guidance suggesting that the plant should not be more than 20% oversized. This should be adopted as means of comparison to stay in-line with current standards.

COOLING EQUIPMENT

The cooling systems were installed around 2016, 2017 & 2018. The systems were charged with R410A refrigerants and have inverter driven compressors which improve efficiency.

TERMINAL UNITS

The ceiling cassette units were installed to deliver the conditioned air to the internal areas.

CONTROL SYSTEM

The equipment was controlled via three Mitsubishi Electric AE200 wall mounted LCD centralised controllers.

DOCUMENTATION

An asset list and maintenance records were provided prior to the inspection. Floor areas were measured on site for the ones whose access were provided. Rest of them were estimated to the best of knowledge.

MAINTENANCE

Maintenance was carried out on the systems by registered F-gas contractors.

SAMPLING

Sampling of the installed systems was carried out in accordance with TM44 guidelines. These state that all the primary cooling plant (chillers and AHUs with cooling coils) must be inspected. When inspecting the terminal units a 2% sample of the total units must be inspected with a minimum of five units. If this sample is inconclusive (where the inspection has identified a problem or area of concern) then further units should be sampled. If the site

is well maintained and well managed and the initial sample does not reveal any issues that would warrant further investigation then the sample remains at 2% with a minimum of five units. For split systems the sample should represent 10% of the systems on site with a minimum of three units. Again, if this sample is inconclusive (where the inspection has identified a problem or area of concern) then further units should be sampled. In accordance with the current DCLG guidelines these units are chosen so as to be representative of the varied ages and models installed at the site.

EQUIPMENT INSPECTED

1no Mitsubishi (45 kW) R410A VRF System Condenser
1no Mitsubishi (28 kW) R410A VRF System Condenser
1no Mitsubishi (50 kW) R410A VRF System Condenser
3no Mitsubishi Ceiling Cassettes
3no Centralised Controllers

OBSERVATIONS

The condenser units were found to be in good condition and operating well. There was no evidence of any refrigerant leaks around the compressors, and the refrigerant pipework was found suitably insulated. The condenser heat exchangers were found in clean condition.

The terminal units inspected were in good working order and provided good airflow to their respective areas except. The filters and supply grilles were found to be clean and clear of obstructions.

The last reported F-gas inspection took place on 31.08.23.

The above points are expanded upon and further suggestions made in the recommendations section. Whilst there is no requirement to carry out the recommendations, the inspection and report will benefit the owner or manager only if its findings are acted upon.

Key recommendations

Efficiency

SYSTEMS CONSIDERED EFFICIENT: The systems on site use modern inverter technology and would be considered as comparatively efficient. They appear to be well maintained and in good condition. No recommendations can be made to improve the efficiency of the units.

SIZING OF UNITS: 1 of the units are found more than expected in sizing with the room. When it becomes time to replace the HVAC systems, the sizing capacity should be re-assessed rather than replacing with like for like systems. There may be scope to reduce the overall cooling capacity and combine this with latest technology to reduce energy consumption.

Maintenance

ADEQUATE MAINTENANCE: The cooling systems at this site appear to have received a good level of planned maintenance which is in line with industry standards. It is important that this level of maintenance is carried forward in the future as poorly maintained systems will have reduced efficiency and increased energy consumption.

Controls

TIME SCHEDULES: Easy gains with regard to reducing energy consumption are available by ensuring that HVAC equipment is time scheduled and only operates when required. Continually check equipment time schedule programmes match actual current occupancy times. Cooling systems should only operate during core operational hours.

SPLIT SYSTEM TEMPERATURE SET POINTS: It is recommended that the client adopts different control strategies depending on the season. In winter the control should be put in heat mode and set to 19/20 deg C. In summer the months the control should be put in cooling mode and set to 23/24 deg C. In the more changeable spring and autumn months the control should be put in auto mode and set to 21/22 deg C. In auto mode a dead band of around 2 degrees is set by most manufacturers.

GUIDANCE NOTICES FOR CORRECT OPERATION: Where there is easy access to the controllers, staff may input set points that do not facilitate efficient operation. Guidance notices on how to operate the system in an efficient manner should be considered. Ensure guidance notices are placed near controllers explaining how to operate the controller in an efficient manner. Organisation set point temperatures/settings should be highlighted.

PROGRAM OFF TIME ON CONTROL: Program an OFF time on all controllers so that even if the systems are left on during the day they will automatically turn off at the end of the day. This is particularly important in areas of infrequent use like meeting rooms where systems could be left running unnecessarily for long periods without anyone knowing. Excessive run times increase energy costs and reduce the life of the system.

Management

INSTALL SUB-METERING: Consider installing sub-metering on all the air conditioning equipment and its associated plant as part of an overall energy monitoring/energy management scheme. Monitoring can give vital information about energy use and waste. As a rule of thumb, a well executed monitoring and targeting program will achieve energy savings of between 5%-10%.

GUIDANCE NOTICES ON WINDOWS: Do not open the windows when the air conditioning system is in operation. The system efficiency will be severely compromised and unnecessary energy consumption will arise. Ensure guidance notices are placed near windows warning not to open them when the AC system is in operation.

Subsystems inspected

VOL001/SYS001 2ND FLOOR ZONE 2

Volume definitions	VOL001 Victoria House London
Description	Mitsubishi VRF System
Effective rated cooling output	45 kW
Area served	2ND FLOOR ZONE 2
Inspection date	3 November 2023
Cooling plant count	1
AHU count	0
Terminal units count	13
Sub system controls count	1

VOL001/SYS002 2ND FLOOR ZONE 1

Volume definitions	VOL001 Victoria House London
Description	Mitsubishi VRF System
Effective rated cooling output	28 kW
Area served	2ND FLOOR ZONE 1
Inspection date	3 November 2023
Cooling plant count	1
AHU count	0
Terminal units count	8
Sub system controls count	1

VOL001/SYS003 FIRST FLOOR WEST

Volume definitions	VOL001 Victoria House London
Description	Mitsubishi VRF System
Effective rated cooling output	50 kW
Area served	FIRST FLOOR WEST
Inspection date	3 November 2023
Cooling plant count	1
AHU count	0
Terminal units count	14
Sub system controls count	1

Pre-inspection records requested

Essential records

These records were reviewed:

- Itemised list of installed air conditioning and refrigeration plant including product makes, models and identification numbers
- Cooling capacities, with locations of the indoor and outdoor components of each plant
- Description of system control zones, with schematic drawings
- Description of method of control of temperature
- Description of method of control of periods of operation.
- Floor plans and schematics of air conditioning systems.

Desirable records

These records were reviewed:

- Reports from earlier inspections of air conditioning systems, and for the generation of an energy performance certificate
- Records of maintenance operations carried out on refrigeration systems, including cleaning indoor and outdoor heat exchangers, refrigerant leakage tests, repairs to refrigeration components replenishing with refrigerant

These records were not available:

- Records of maintenance operations carried out on air delivery systems, including filter cleaning and changing, and cleaning of heat exchangers
- Records of calibration and maintenance operations carried out on control systems and sensors, or BMS systems and sensors
- Records of sub-metered air conditioning plant use or energy consumption
- For relevant air supply and extract systems, commissioning results of measured absorbed power at normal air delivery and extract rates, and commissioning results for normal delivered delivery and extract air flow rates (or independently calculated specific fan power for the systems)

Optional records

These records were not available:

- An estimate of the design cooling load for each system (if available). Otherwise, a brief description of the occupation of the cooled spaces, and of power consuming equipment normally used in those spaces
 - Records of any issues or complaints that have been raised concerning the indoor comfort conditions achieved in the treated spaces
 - Where a BMS is used the manager should arrange for a short statement to be provided describing its capabilities, the plant it is connected to control, the set points for the control of temperature, the frequency with which it is maintained, and the date of the last inspection and maintenance
 - Where a monitoring station, or remote monitoring facility, is used to continually observe the performance of equipment such as chillers, the manager should arrange for a statement to be provided describing the parameters monitored, and a statement reviewing the operating efficiency of the equipment
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Cooling plants

Cooling plant 1

Unit Identifier	VOL001/SYS001 2ND FLOOR ZONE 2
Component Identifier	VOL001/SYS001/CP1 2ND FLOOR ZONE 2

Equipment Inspected

Rated Cooling Capacity (kW)	45
Description (type/details)	VRF System Condenser
Location of Cooling Plant	ROOF
Manufacturer	Mitsubishi
Model/Reference	PURY-P400YLM-A1
Refrigerant Charge (kg)	30
Refrigerant Type	R410A
Serial Number	6ZW01965
Year Plant Installed	2016
Areas/Systems Served	2ND FLOOR ZONE 2

Note below any discrepancy between information provided by client and on site information collected, or any information of additional relevance to the cooling plant/system:

Temperature readings were taken of the air entering and leaving the evaporator unit to ensure that the cooling plant was functioning correctly. These values have been entered in the refrigeration section under pre-compressor and post compressor but are actually air on and air off values.

Approved sections

CS2.1 Is the refrigeration plant operational?

Yes

The refrigeration plant was found to be operational.

CS2.2/a Is the area around the refrigeration plant clear of obstructions & debris?

Yes

The area around the cooling plant is clear of obstructions and any potential blockages to airflow.

CS2.2/b Is the general condition of refrigeration and any associated central plant in good order?

Yes

The general condition of cooling plant was good.

CS2.2/c Is the condenser placed clear from warm air discharge louvres?

Yes

This cooling plant is positioned adequately in relation to any adjacent discharge louvers.

CS2.3/a Are compressors operational or can they be brought into operation?

Yes

The compressors were found to be operational during the inspection.

CS3.1/a Is the heat rejection plant operational?

Yes

The heat rejection plant was found to be operational.

CS3.1/b Are condenser heat exchangers undamaged/ un-corroded and clean?

Yes

The condenser heat exchangers were found to be clean and undamaged.

CS3.2/a Is the area around the heat rejection plant clear of obstructions & debris?

Yes

There are no obstructions to the heat rejection process.

CS3.2/b Is the condenser free of any possibility of air recirculation?

Yes

The unit is positioned adequately and there is no potential for the re-circulation of air from itself or from any adjacent source.

CS4.1 Is the insulation on circulation pipe work well fitted and in good order?

Yes

The insulation on the refrigerant pipework appeared to be in good condition.

Appropriately Sized Cooling Plant

Installed Cooling Capacity (kW)	45
Occupant Density (m2/person)	6.2
Total Floor Area served by this plant(m2)	312
Total Occupants served by this plant	50
Maximum Instantaneous Heat Gain (W/m2)	125
The Installed Size is Deemed	As expected

Notes and Recommendations

The current version of the Building Regulations Approved Document Part L documentation provides guidance suggesting that the plant should not be more than 20% oversized. This should be adopted as means of comparison to stay in line with current standards.

The cooling load in this area was estimated to be 125W/m2 (based on BSRIA guidelines in TM44 for office areas).

The actual installed capacity is: 144W/m2

Refrigeration

Post Compressor(°C)	29
Ambient(°C)	12
The Temperature is Deemed	As expected
Refrigerant Type	R410A
Assess the refrigeration compressor(s) and the method of refrigeration capacity control	The system has an inverter driven compressor.

Are there any signs of a refrigerant leak?

No

A visual observation around the main refrigeration components was carried out and there was no evidence of refrigerant leakage.

Montreal/ODS/F-Gas controlled?

Yes

System contains fluorinated greenhouse gases with a global warming potential equivalent to more than 50 tonnes of CO₂.

The F Gas Regulation requires regular leakage checks, repairs and gas recovery from systems to help cut leakage into the atmosphere. Only properly certified personnel can carry out this work, and there are strict rules on labelling of equipment and reporting. Systems containing fluorinated greenhouse gases with a global warming potential higher than 50 tonnes of CO₂ require six monthly leak checks to comply with the F-Gas regulations. In practice this means that any system containing more than 28.18 kg of R407C/23.95 kg of R410A/34.96 kg of R134a require six monthly leak checks. Only properly certified personnel can carry out this work, and there are strict rules on labelling of equipment and reporting. The latest reports should be held in a Building Log Book.

Notes and Recommendations

Temperature readings taken indicate that the cooling plant was operating correctly.

Regular Maintenance

Is there evidence of regular maintenance?

Yes

Planned Preventative Maintenance (PPM) documentation is up to date and was reviewed as part of this inspection.

Is the maintenance undertaken by suitably competent people and in accordance to industry guidelines?

Yes

Maintenance is carried out on the systems by registered REFCOM contractors.

Metering Comparison to appropriate energy benchmarks

Is metering installed to enable monitoring of energy consumption of refrigeration plant?

Yes

Recorded meter reading: 039209.2 Kwh

Is the refrigeration plant connected to a BEMS that can provide out of range alarms?

Yes

This system is linked to a centralised controller that controls and monitors its operation.

Are there any records of air conditioning plant usage or sub-metered energy consumption with expected hours of use per year for the plant?

No

Plant running times are not monitored.

Is the energy consumption or hours of use excessive?

No

No data available.

Water Cooled Chillers (Cooling Towers & Evaporative Condensers)

Is the water flow through cooling towers or evaporative coolers even and efficient, and there is no loss of water?

No

Not applicable as there is no cooling tower or evaporative cooler linked to this system.

Is there a management regime in place to ensure that water is regularly checked and treated to ensure that there is no Legionella risk?

No

Not applicable as there is no cooling tower or evaporative cooler linked to this system.

Humidity Control

Is there separate equipment installed for humidity control?

No

There is no humidity control equipment linked to this system.

Cooling plant 2

Unit Identifier	VOL001/SYS002 2ND FLOOR ZONE 1
Component Identifier	VOL001/SYS002/CP1 2ND FLOOR ZONE 1

Equipment Inspected

Rated Cooling Capacity (kW)	28
Description (type/details)	VRF System Condenser
Location of Cooling Plant	ROOF
Manufacturer	Mitsubishi
Model/Reference	PURY-P250YLM-A1
Refrigerant Charge (kg)	42
Refrigerant Type	R410A
Serial Number	62W03825

Year Plant Installed	2017
Areas/Systems Served	2ND FLOOR ZONE 1

Note below any discrepancy between information provided by client and on site information collected, or any information of additional relevance to the cooling plant/system:

Temperature readings were taken of the air entering and leaving the evaporator unit to ensure that the cooling plant was functioning correctly. These values have been entered in the refrigeration section under pre-compressor and post compressor but are actually air on and air off values.

Approved sections

CS2.1 Is the refrigeration plant operational?

Yes

The refrigeration plant was found to be operational.

CS2.2/a Is the area around the refrigeration plant clear of obstructions & debris?

Yes

The area around the cooling plant is clear of obstructions and any potential blockages to airflow.

CS2.2/b Is the general condition of refrigeration and any associated central plant in good order?

Yes

The general condition of cooling plant was good.

CS2.2/c Is the condenser placed clear from warm air discharge louvres?

Yes

This cooling plant is positioned adequately in relation to any adjacent discharge louvers.

CS2.3/a Are compressors operational or can they be brought into operation?

Yes

The compressors were found to be operational during the inspection.

CS3.1/a Is the heat rejection plant operational?

Yes

The heat rejection plant was found to be operational.

CS3.1/b Are condenser heat exchangers undamaged/ un-corroded and clean?

Yes

The condenser heat exchangers were found to be clean and undamaged.

CS3.2/a Is the area around the heat rejection plant clear of obstructions & debris?

Yes

There are no obstructions to the heat rejection process.

CS3.2/b Is the condenser free of any possibility of air recirculation?

Yes

The unit is positioned adequately and there is no potential for the re-circulation of air from itself or from any adjacent source.

CS4.1 Is the insulation on circulation pipe work well fitted and in good order?

Yes

The insulation on the refrigerant pipework appeared to be in good condition.

Appropriately Sized Cooling Plant

Installed Cooling Capacity (kW)	28
Occupant Density (m2/person)	7.8
Total Floor Area served by this plant(m2)	194
Total Occupants served by this plant	25
Maximum Instantaneous Heat Gain (W/m2)	125
The Installed Size is Deemed	As expected

Notes and Recommendations

The current version of the Building Regulations Approved Document Part L documentation provides guidance suggesting that the plant should not be more than 20% oversized. This should be adopted as means of comparison to stay in line with current standards.

The cooling load in this area was estimated to be 125W/m2 (based on BSRIA guidelines in TM44 for office areas).

The actual installed capacity is: 144W/m2

Refrigeration

Pre Compressor(°C)	25
Post Compressor(°C)	31
Ambient(°C)	12
The Temperature is Deemed	As expected
Refrigerant Type	R410A
Assess the refrigeration compressor(s) and the method of refrigeration capacity control	The system has an inverter driven compressor.

Are there any signs of a refrigerant leak?

No

A visual observation around the main refrigeration components was carried out and there was no evidence of refrigerant leakage.

Montreal/ODS/F-Gas controlled?

Yes

System contains fluorinated greenhouse gases with a global warming potential equivalent to more than 50 tonnes of CO2.

The F Gas Regulation requires regular leakage checks, repairs and gas recovery from systems to help cut leakage into the atmosphere. Only properly certified personnel can carry out this work, and there are strict rules on labelling of equipment and reporting. Systems containing fluorinated greenhouse gases with a global warming potential higher than 50 tonnes of CO2 require six monthly leak checks to comply with the F-Gas regulations. In practice this means that any system containing more than 28.18 kg of R407C/23.95 kg of R410A/34.96 kg of R134a require six monthly leak checks. Only properly certified personnel can carry out this work, and there are strict rules on labelling of equipment and reporting. The latest reports should be held in a Building Log Book.

Notes and Recommendations

Temperature readings taken indicate that the cooling plant was operating correctly.

Regular Maintenance

Is there evidence of regular maintenance?

Yes

Planned Preventative Maintenance (PPM) documentation is up to date and was reviewed as part of this inspection.

Is the maintenance undertaken by suitably competent people and in accordance to industry guidelines?

Yes

Maintenance is carried out on the systems by registered REFCOM contractors.

Metering Comparison to appropriate energy benchmarks

Is metering installed to enable monitoring of energy consumption of refrigeration plant?

Yes

Recorded meter reading: 039082.7Kwh

Is the refrigeration plant connected to a BEMS that can provide out of range alarms?

Yes

This system is linked to a centralised controller that controls and monitors its operation.

Are there any records of air conditioning plant usage or sub-metered energy consumption with expected hours of use per year for the plant?

No

Plant running times are not monitored.

Is the energy consumption or hours of use excessive?

No

No data available.

Water Cooled Chillers (Cooling Towers & Evaporative Condensers)

Is the water flow through cooling towers or evaporative coolers even and efficient, and there is no loss of water?

No

Not applicable as there is no cooling tower or evaporative cooler linked to this system.

Is there a management regime in place to ensure that water is regularly checked and treated to ensure that there is no Legionella risk?

No

Not applicable as there is no cooling tower or evaporative cooler linked to this system.

Humidity Control

Is there separate equipment installed for humidity control?

No

There is no humidity control equipment linked to this system.

Cooling plant 3

Unit Identifier	VOL001/SYS003 FIRST FLOOR WEST
Component Identifier	VOL001/SYS003/CP1 FIRST FLOOR WEST

Equipment Inspected

Rated Cooling Capacity (kW)	50
Description (type/details)	VRF System Condenser
Location of Cooling Plant	ROOF
Manufacturer	Mitsubishi
Model/Reference	PURY-P450YNW-A
Refrigerant Charge (kg)	37
Refrigerant Type	R410A
Serial Number	73W00253
Year Plant Installed	2018
Areas/Systems Served	FIRST FLOOR WEST

Note below any discrepancy between information provided by client and on site information collected, or any information of additional relevance to the cooling plant/system:

Temperature readings were taken of the air entering and leaving the condenser unit to ensure that the cooling plant was functioning correctly. These values have been entered in the refrigeration section under pre-compressor and post compressor but are actually air on and air off values.

Approved sections

CS2.1 Is the refrigeration plant operational?

Yes

The refrigeration plant was found to be operational.

CS2.2/a Is the area around the refrigeration plant clear of obstructions & debris?

Yes

The area around the cooling plant is clear of obstructions and any potential blockages to airflow.

CS2.2/b Is the general condition of refrigeration and any associated central plant in good order?

Yes

The general condition of cooling plant was good.

CS2.2/c Is the condenser placed clear from warm air discharge louvres?

Yes

This cooling plant is positioned adequately in relation to any adjacent discharge louvers.

CS2.3/a Are compressors operational or can they be brought into operation?

Yes

The compressors were found to be operational during the inspection.

CS3.1/a Is the heat rejection plant operational?

Yes

The heat rejection plant was found to be operational.

CS3.1/b Are condenser heat exchangers undamaged/ un-corroded and clean?

Yes

The condenser heat exchangers were found to be clean and undamaged.

CS3.2/a Is the area around the heat rejection plant clear of obstructions & debris?

Yes

There are no obstructions to the heat rejection process.

CS3.2/b Is the condenser free of any possibility of air recirculation?

Yes

The unit is positioned adequately and there is no potential for the re-circulation of air from itself or from any adjacent source.

CS4.1 Is the insulation on circulation pipe work well fitted and in good order?

Yes

The insulation on the refrigerant pipework appeared to be in good condition.

Appropriately Sized Cooling Plant

Installed Cooling Capacity (kW)	50
Occupant Density (m2/person)	5.4
Total Floor Area served by this plant(m2)	270
Total Occupants served by this plant	50
Maximum Instantaneous Heat Gain (W/m2)	125

The Installed Size is Deemed

More than expected

Notes and Recommendations

The current version of the Building Regulations Approved Document Part L documentation provides guidance suggesting that the plant should not be more than 20% oversized. This should be adopted as means of comparison to stay in line with current standards.

The cooling load in this area was estimated to be 125W/m² (based on BSRIA guidelines in TM44 for office areas).

The actual installed capacity is: 186W/m²

When it becomes time to replace the HVAC systems, the sizing capacity should be re-assessed rather than replacing with like for like systems. There may be scope to reduce the overall cooling capacity and combine this with latest technology to reduce energy consumption.

Refrigeration

Pre Compressor(°C)	12
Post Compressor(°C)	4
Ambient(°C)	12
The Temperature is Deemed	As expected
Refrigerant Type	R410A
Assess the refrigeration compressor(s) and the method of refrigeration capacity control	The system has an inverter driven compressor.

Are there any signs of a refrigerant leak?

No

A visual observation around the main refrigeration components was carried out and there was no evidence of refrigerant leakage.

Montreal/ODS/F-Gas controlled?

Yes

System contains fluorinated greenhouse gases with a global warming potential equivalent to more than 50 tonnes of CO₂.

The F Gas Regulation requires regular leakage checks, repairs and gas recovery from systems to help cut leakage into the atmosphere. Only properly certified personnel can carry out this work, and there are strict rules on labelling of equipment and reporting. Systems containing fluorinated greenhouse gases with a global warming potential higher than 50 tonnes of CO₂ require six monthly leak checks to comply with the F-Gas regulations. In practice this means that any system containing more than 28.18 kg of R407C/23.95 kg of R410A/34.96 kg of R134a require six monthly leak checks. Only properly certified personnel can carry out this work, and there are strict rules on labelling of equipment and reporting. The latest reports should be held in a Building Log Book.

Notes and Recommendations

Temperature readings taken indicate that the cooling plant was operating correctly.

Regular Maintenance

Is there evidence of regular maintenance?

Yes

Planned Preventative Maintenance (PPM) documentation is up to date and was reviewed as part of this inspection.

Is the maintenance undertaken by suitably competent people and in accordance to industry guidelines?

Yes

Maintenance is carried out on the systems by registered REFCOM contractors.

Metering Comparison to appropriate energy benchmarks

Is metering installed to enable monitoring of energy consumption of refrigeration plant?

Yes

Recorded meter reading: 054359.8 Kwh

Is the refrigeration plant connected to a BEMS that can provide out of range alarms?

Yes

This system is linked to a centralised controller that controls and monitors its operation.

Are there any records of air conditioning plant usage or sub-metered energy consumption with expected hours of use per year for the plant?

No

Plant running times are not monitored.

Is the energy consumption or hours of use excessive?

No

No data available.

Water Cooled Chillers (Cooling Towers & Evaporative Condensers)

Is the water flow through cooling towers or evaporative coolers even and efficient, and there is no loss of water?

No

Not applicable as there is no cooling tower or evaporative cooler linked to this system.

Is there a management regime in place to ensure that water is regularly checked and treated to ensure that there is no Legionella risk?

No

Not applicable as there is no cooling tower or evaporative cooler linked to this system.

Humidity Control

Is there separate equipment installed for humidity control?

No

There is no humidity control equipment linked to this system.

Terminal units

Terminal unit 1

Unit	VOL001/SYS001 2ND FLOOR ZONE 2
Component	VOL001/SYS001/TU1 2ND FLOOR ZONE 2
Description of unit	Ceiling Cassette
Cooling plant serving terminal unit	VOL001/SYS001/CP1 2ND FLOOR ZONE 2
Manufacturer	Mitsubishi
Year installed	2016
Area served	2ND FLOOR ZONE 2
Discrepancies noted	There were no notable discrepancies with regards to information provided on the systems and that which was observed on-site.

CS4.1 Insulation

Is the pipework adequately insulated?

Yes

Is the ductwork adequately insulated?

Yes

CS4.2 Unit condition

Are the terminal units in good working order?

Yes

The assessor made the following notes and recommendations:

- The terminal unit was seen to be in a good condition.

CS5.1, CS5.2 Grilles and air flow

Do air delivery openings provide good distribution?

Yes

The assessor made the following notes and recommendations:

- The terminal unit was positioned adequately to ensure good air circulation.

Is there evidence of tampering with diffusers?

No

The assessor made the following notes and recommendations:

- There was no evidence of any tampering with diffusers.

Are chilled and hot water being supplied to terminals simultaneously?

No

The assessor made the following notes and recommendations:

- Not applicable to this unit.

Are there any records of occupant complaints regarding air distribution?

No

The assessor made the following notes and recommendations:

- No record of complaints.

CS5.3, CS5.4, CS5.5 Diffuser positions

Is there potential for air to short-circuit from supply to extract?

No

The assessor made the following notes and recommendations:

- The terminal unit was positioned adequately to ensure good air circulation.

Is the position of partitioning or furniture adversely affecting performance?

No

The assessor made the following notes and recommendations:

- The system performance is not being adversely affected by furniture or partitioning.

Is the control and operation adequate?

Yes

The assessor made the following notes and recommendations:

- The control and operation of this unit appeared to be fine.

Terminal unit 2

Unit	VOL001/SYS002 2ND FLOOR ZONE 1
Component	VOL001/SYS002/TU1 2ND FLOOR ZONE 1
Description of unit	Ceiling Cassette
Cooling plant serving terminal unit	VOL001/SYS002/CP1 2ND FLOOR ZONE 1
Manufacturer	Mitsubishi
Year installed	2017
Area served	2ND FLOOR ZONE 1

Discrepancies noted

There were no notable discrepancies with regards to information provided on the systems and that which was observed on-site.

CS4.1 Insulation

Is the pipework adequately insulated?

Yes

Is the ductwork adequately insulated?

Yes

CS4.2 Unit condition

Are the terminal units in good working order?

Yes

The assessor made the following notes and recommendations:

- The terminal unit was seen to be in a good condition.

CS5.1, CS5.2 Grilles and air flow

Do air delivery openings provide good distribution?

Yes

The assessor made the following notes and recommendations:

- The terminal unit was positioned adequately to ensure good air circulation.

Is there evidence of tampering with diffusers?

No

The assessor made the following notes and recommendations:

- There was no evidence of any tampering with diffusers.

Are chilled and hot water being supplied to terminals simultaneously?

No

The assessor made the following notes and recommendations:

- Not applicable to this unit.

Are there any records of occupant complaints regarding air distribution?

No

The assessor made the following notes and recommendations:

- No record of complaints.

CS5.3, CS5.4, CS5.5 Diffuser positions

Is there potential for air to short-circuit from supply to extract?

No

The assessor made the following notes and recommendations:

- The terminal unit was positioned adequately to ensure good air circulation.

Is the position of partitioning or furniture adversely affecting performance?

No

The assessor made the following notes and recommendations:

- The system performance is not being adversely affected by furniture or partitioning.

Is the control and operation adequate?

Yes

The assessor made the following notes and recommendations:

- The control and operation of this unit appeared to be fine.

Terminal unit 3

Unit	VOL001/SYS003 FIRST FLOOR WEST
Component	VOL001/SYS003/TU1 FIRST FLOOR WEST
Description of unit	Ceiling Cassette
Cooling plant serving terminal unit	VOL001/SYS003/CP1 FIRST FLOOR WEST
Manufacturer	Mitsubishi
Year installed	2018
Area served	FIRST FLOOR WEST
Discrepancies noted	There were no notable discrepancies with regards to information provided on the systems and that which was observed on-site.

CS4.1 Insulation

Is the pipework adequately insulated?

Yes

Is the ductwork adequately insulated?

Yes

CS4.2 Unit condition

Are the terminal units in good working order?

Yes

The assessor made the following notes and recommendations:

- The terminal unit was seen to be in a good condition.

CS5.1, CS5.2 Grilles and air flow

Do air delivery openings provide good distribution?

Yes

The assessor made the following notes and recommendations:

- The terminal unit was positioned adequately to ensure good air circulation.

Is there evidence of tampering with diffusers?

No

The assessor made the following notes and recommendations:

- There was no evidence of any tampering with diffusers.

Are chilled and hot water being supplied to terminals simultaneously?

No

The assessor made the following notes and recommendations:

- Not applicable to this unit.

Are there any records of occupant complaints regarding air distribution?

No

The assessor made the following notes and recommendations:

- No record of complaints.

CS5.3, CS5.4, CS5.5 Diffuser positions

Is there potential for air to short-circuit from supply to extract?

No

The assessor made the following notes and recommendations:

- The terminal unit was positioned adequately to ensure good air circulation.

Is the position of partitioning or furniture adversely affecting performance?

No

The assessor made the following notes and recommendations:

- The system performance is not being adversely affected by furniture or partitioning.

Is the control and operation adequate?

Yes

The assessor made the following notes and recommendations:

- The control and operation of this unit appeared to be fine.
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-

System controls

Control for VOL001/SYS001 2ND FLOOR ZONE 2

CS8.1 Is the zoning appropriate in relation to anticipated cooling demand?

Yes

The assessor made the following notes and recommendations:

- The zoning for this system appears appropriate.

CS8.2 Note the current indicated weekday and time of day on controllers or BMS against the actual time.

The date and time on the system controller have been set up correctly.

CS8.3/a Note the set on and off periods (for weekday and weekend if this facility is available with the timer).

The timer function on the controls is not being used.

The assessor made the following notes and recommendations:

- The client should investigate the possibility of setting up OFF only timers on the system controller. This would prevent the system from operating outside of occupancy hours and would stop the system being activated until required to by the occupants.

CS 8.3/b Is there a shortfall in timer capabilities?

No

The assessor made the following notes and recommendations:

- The system controller is installed with a fully programmable timer.

CS8.4 Identify and assess zone heating and cooling temperature control sensors. Are the sensor types and locations appropriate in relation to heating and cooling emitters, heat flows or likely temperature distributions in the zone or space?

Yes

The assessor made the following notes and recommendations:

- The temperature sensors are located within the internal unit. The temperature sensors are likely to give an adequate reflection of space temperature throughout the conditioned space.

CS8.5 Note the set temperature in each zone for heating and cooling in relation to the activities and occupancy of zones and spaces in relation to the manager's intent.

The system is set in heating mode at 21 deg C

The assessor made the following notes and recommendations:

- To operate efficiently a temperature of 21 - 23C is recommended. Ensure that users are fully aware of the controllers capabilities and are competent to set controls to maximise efficiency.

CS8.6 Note whether a 'dead band' is, or can be, set between heating and cooling.

In auto mode a deadband of around 2 degrees is set by most manufacturers.

The assessor made the following notes and recommendations:

- It is recommended that the client adopts different control strategies depending on the season. In winter the control should be put in heat mode and set to 19/20 deg C. In summer the months the control should be put in cooling mode and set to 23/24 deg C. In the more changeable spring and autumn months the control should be put in auto mode and set to 21/22 deg C.

CS8.7 Do the sub system controls integrate effectively with the overall system control strategy?

Yes

The assessor made the following notes and recommendations:

- There are no integration issues with this system controller.

CS8.8 Assess the means of modulating or controlling air flow rate through the air supply and exhaust ducts.

Natural ventilation.

The assessor made the following notes and recommendations:

- Air flow in terminal unit modulated by controlling fan speed.

PS3.6 Are guidance notices visible or controls available to inhibit use of cooling equipment whilst windows are open or cooling/heating is on?

No

Limited access.

The assessor made the following notes and recommendations:

- Only management have access to control.

Control for VOL001/SYS002 2ND FLOOR ZONE 1

CS8.1 Is the zoning appropriate in relation to anticipated cooling demand?

Yes

The assessor made the following notes and recommendations:

- The zoning for this system appears appropriate.

CS8.2 Note the current indicated weekday and time of day on controllers or BMS against the actual time.

The date and time on the system controller have been set up correctly.

CS8.3/a Note the set on and off periods (for weekday and weekend if this facility is available with the timer).

The timer function on the controls is not being used.

The assessor made the following notes and recommendations:

- The client should investigate the possibility of setting up OFF only timers on the system controller. This would prevent the system from operating outside of occupancy hours and would stop the system being activated until required to by the occupants.

CS 8.3/b Is there a shortfall in timer capabilities?

No

The assessor made the following notes and recommendations:

- The system controller is installed with a fully programmable timer.

CS8.4 Identify and assess zone heating and cooling temperature control sensors. Are the sensor types and locations appropriate in relation to heating and cooling emitters, heat flows or likely temperature distributions in the zone or space?

Yes

The assessor made the following notes and recommendations:

- The temperature sensors are located within the internal unit. The temperature sensors are likely to give an adequate reflection of space temperature throughout the conditioned space.

CS8.5 Note the set temperature in each zone for heating and cooling in relation to the activities and occupancy of zones and spaces in relation to the manager's intent.

The system is set in heating mode at 21 deg C

The assessor made the following notes and recommendations:

- To operate efficiently a temperature of 21 - 23C is recommended. Ensure that users are fully aware of the controllers capabilities and are competent to set controls to maximise efficiency.

CS8.6 Note whether a 'dead band' is, or can be, set between heating and cooling.

In auto mode a deadband of around 2 degrees is set by most manufacturers.

The assessor made the following notes and recommendations:

- It is recommended that the client adopts different control strategies depending on the season. In winter the control should be put in heat mode and set to 19/20 deg C. In summer the months the control should be put in cooling mode and set to 23/24 deg C. In the more changeable spring and autumn months the control should be put in auto mode and set to 21/22 deg C.

CS8.7 Do the sub system controls integrate effectively with the overall system control strategy?

Yes

The assessor made the following notes and recommendations:

- There are no integration issues with this system controller.

CS8.8 Assess the means of modulating or controlling air flow rate through the air supply and exhaust ducts.

Natural ventilation.

The assessor made the following notes and recommendations:

- Air flow in terminal unit modulated by controlling fan speed.

PS3.6 Are guidance notices visible or controls available to inhibit use of cooling equipment whilst windows are open or cooling/heating is on?

No

Limited access.

The assessor made the following notes and recommendations:

- Only management have access to control.

Control for VOL001/SYS003 FIRST FLOOR WEST

CS8.1 Is the zoning appropriate in relation to anticipated cooling demand?

Yes

The assessor made the following notes and recommendations:

- The zoning for this system appears appropriate.

CS8.2 Note the current indicated weekday and time of day on controllers or BMS against the actual time.

Displayed: 11.25am - Actual: 11.19am

The assessor made the following notes and recommendations:

- It is recommended that the date and time are programmed so as to allow any timer schedules to operate correctly and efficiently.

CS8.3/a Note the set on and off periods (for weekday and weekend if this facility is available with the timer).

The timer function on the controls is not being used.

The assessor made the following notes and recommendations:

- The client should investigate the possibility of setting up OFF only timers on the system controller. This would prevent the system from operating outside of occupancy hours and would stop the system being activated until required to by the occupants.

CS 8.3/b Is there a shortfall in timer capabilities?

No

The assessor made the following notes and recommendations:

- The system controller is installed with a fully programmable timer.

CS8.4 Identify and assess zone heating and cooling temperature control sensors. Are the sensor types and locations appropriate in relation to heating and cooling emitters, heat flows or likely temperature distributions in the zone or space?

Yes

The assessor made the following notes and recommendations:

- The temperature sensors are located within the internal unit. The temperature sensors are likely to give an adequate reflection of space temperature throughout the conditioned space.

CS8.5 Note the set temperature in each zone for heating and cooling in relation to the activities and occupancy of zones and spaces in relation to the manager's intent.

The system is set in heating mode at 23 deg C

The assessor made the following notes and recommendations:

- To operate efficiently a temperature of 21 - 23C is recommended. Ensure that users are fully aware of the controllers capabilities and are competent to set controls to maximise efficiency.

CS8.6 Note whether a 'dead band' is, or can be, set between heating and cooling.

In auto mode a deadband of around 2 degrees is set by most manufacturers.

The assessor made the following notes and recommendations:

- It is recommended that the client adopts different control strategies depending on the season. In winter the control should be put in heat mode and set to 19/20 deg C. In summer the months the control should be put in cooling mode and set to 23/24 deg C. In the more changeable spring and autumn months the control should be put in auto mode and set to 21/22 deg C.

CS8.7 Do the sub system controls integrate effectively with the overall system control strategy?

Yes

The assessor made the following notes and recommendations:

- There are no integration issues with this system controller.

CS8.8 Assess the means of modulating or controlling air flow rate through the air supply and exhaust ducts.

Natural ventilation.

The assessor made the following notes and recommendations:

- Air flow in terminal unit modulated by controlling fan speed.

PS3.6 Are guidance notices visible or controls available to inhibit use of cooling equipment whilst windows are open or cooling/heating is on?

No

Limited access.

The assessor made the following notes and recommendations:

- Only management have access to control.
-

Assessor's details

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Inspection certificate

[See the air conditioning inspection certificate for this property. \(/energy-certificate/2748-8167-6002-0909-0596\)](#)
