Communities and Local Government

Air Conditioning System Inspection Report

Equipment Owner's Organisation	
Responsible Site Contact	
Equipment Owner's Address	
UPRN	

Date of inspection	29/06/2010	Date of lodgement	29/06/2010
Assessor name and assessor ID	Behdad yazdani	Address of Assessor's employer	Future BY Energy
Name and ID number of Scheme	Behdad Yazdani		
Related Party Disclosure			
Assessment Software Used	4		

Executive Summary

The building is approximately 100,000 sq ft in gross internal area with a total of approximately 88,000 sq ft of offices consisting of four floors on a site of over 7 acres providing in excess of 320 parking spaces.
The original part of the building was completed in the late 1960s and the new section in 2001 at which time all the finishes and the majority of the mechanical and electrical services were replaced. The remaining core services such as the boiler room and mains transformers and electrical switchboards were replaced in 2006.

Building owners and managers who operate air-conditioning systems have statutory obligations under the Energy Performance of Buildings Directive (EPBD) to ensure that air conditioning inspections are conducted by qualified and accredited air-conditioning inspectors.
All air-conditioning systems with an effective rated output of more than 12kw must be regularly inspected by an energy assessor. If the system has an effective rated output of 12kW or more, the first inspection must be done by 4 January 2011.
The survey and sampling had been carried out based on TM 44 (Inspection of air conditioning systems)
Based on TM44 : The air conditioning system includes large numbers of similar fan coil units and because no evidence can be provided that these have been adequately cleaned and maintained, then the inspector examine a small . The sample is one in fifty in installations
the number examined is sufficient to obtain an indication of the state of maintenance of the units.
The building is heated and comfort cooled by a combination of four pipe and two pipe fan coil units together with panel radiators which are individually thermostatically controlled, where appropriate. Tempered fresh air is supplied via a central air handling unit located in the roof Plant Room. Air is extracted mechanically via a central air handling unit in the Plant Room.

Refrigeration and AC Systems:
Design parameters
External conditions:
Winter - -4 C dry bulb/-4C wet bulb Summer — 28 C dry bulb/19 C wet bulb
Internal conditions:
Winter office area 20 C +/-1 Summer office area 25 C/+/-1 Heat load 120 watts sq m

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General system description: The office areas are air conditioned using a condensate wet fan coil unit system. The fan coil units are
located within the ceiling voids of the office areas. Fan units
have waterside control.

Chilled and Heating Water:
Pipework and supply air ductwork distribute horizontally from the common service riser within the ceiling void to serve the fan coil units. At each floor level condensate is drained to a foul drain. Fan coil units are individually controlled by a Honeywell Zone Manager system. The ceiling void is utilised as a plenum for return air to the fan coil units.
Building Management System (B.M.S):
The boiler pumps chillers and fans are controlled by Trend 1Q241/242, controllers located in 4 control panels located as follows:
1.Room top Plant Room
2.Ground Floor Secondary Plant Room
3.Main Plant Room Boiler Panel
4.Main Plant Room Chiller Panel
All panels are linked and the boiler panel has a smart display unit. The ceiling mounted fan coil units are controlled by Honeywell
Controllers on each floor which are linked and monitored from a panel in the Plant Room. Each unit has its own localised control.
No evidence of maintenace is available as they have a new contract and no documents available from old maintenance company.

System components inspected

The following components of the system were inspected:

System Documentation
Refrigeration Plant
Heat Rejection Equipment
Airborne Cooling and Air Conditioning Systems
Airborne Systems in Air Handling Units and Ducts
Outdoor Air Inlets
System Controls

Key Recommendations

System efficiency, capacity and cooling loads

Consider introducing variable speed drives (VSD) for fans, pumps and compressors. Consider with experts implementation of an energy efficient equipment procurement regime that will upgrade existing equipment and renew in a planned cost-effective programme. Ensure building occupants understand when the various cooling modes of the mixed mode venthation system are in operation to avoid windows being opened when mechanical cooling is on.

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Air Conditioning System Inspection Report

Improvement options

Engage experts to review overall ventilation strategy and propose an investment programme for upgrading and/or switching to alternative solutions to [m prove effectiveness and energy efficiency. Engage experts to propose and set up an air conditioning servicing and maintenance regime and implement it, Review the air conditioning energy performance report and seek to implement any outstanding recommendations for action. Engage experts to review the HVAC control systems settings and propose alterations and/or upgrades and adjust to suit current occupancy patterns. Consider with chefs and kitchen managers implementing a training programme and monitoring systems with incentives. Consider with chefs and kitchen managers implementing an energy efficiency plan including maintenance and servicing provisions and operational targets, monitoring and incentives. Engage experts to propose and set up an air conditioning servicing and maintenance regime and implement it

Alternative solutions

Consider installing building mounted photovoltaic electricity generating panels. Consider installing building mounted wind turbine(s). Consider installing automated controls and monitoring systems to electrical quipment and portable appliances to minimise electricity waste. Consider installing high speed shutter doors to loading bays. Consider installing heat recovery to catering refrigeration condensers in order to aid with HWS generation or to heat room air. Engage experts to review overall air conditioning strategy and propose an investment programme for upgrading and/or switching to alternative solutions. Consider a programme of fitting energy meters to lifts and escalators as part of the service and maintenance regime Enable power save settings and power down management on computers and associated equipment Consider engaging with building users to economise equipment energy consumption with targets, guidance on their achievement and incentives.

Other recommendations

Consider applying reflective coating to windows and/or fit shading devices to reduce unwanted solar gain. Ensure building occupants understand when the various cooling modes of the mixed mode ventilation system are in operation to avoid windows being opened when mechanical cooling is on. Consider to install run around coil between Main Extract system and fresh supply for the restaurant area. Consider installing External shading in the existing building to reduce heat gain. Provide a short guidance for thermostats and place it next to the thermostat. Replace R-22 refrigerant with new refrigerant(the chiller is in a very good condition and no need to replace the whole system. Replace traditional spot lights with LED spot lights. Consider installing occupant sensor for main corridors in first and second floor.

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Pre Site visit work items:

Equipment Owner	
Organisation Name	
Equipment Owner/Manager Name	
Street Address	
City	

Equipment Operator (if different from owner)	
Organisation Name	
Responsible Site Contact	
Street Address	
City	

Accredited inspector details			
Inspector Name	Behdad yazdani		
Inspector Number		Accreditation Scheme	Behdad Yazdani
Trading Name	Future BY Energy		
Trading Address	139 St Elmo Rd, Shepherds Bush, W12 9DY		

Insurance Details					
Insurance Company	Brit Insurance		Policy Number	BRT-3	
Start Date	15/10/2009	Expiry Date	14/10/2010	PI Limit (£)	100000

Inspection Details			
UPRN	165346680000	RRN	
Date of inspection	29/06/2010	Date of lodgement	
Effective rated output of the all air-conditioning in the building?	632		

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Note: Request following information from client and complete the following checklist. The inspector should examine the relevant documentation and systems as far as possible to check that the installed equipment is as described. If the documentation is not available, then an additional part of this procedure is to locate the equipment and assemble a minimum portfolio of relevant documentation.

Record Checklist Pre Inspection Information			
Level	Information Required	Reviewed	Not Available
Essential	Itemised list of installed air conditioning and refrigeration plant including product makes, models and identification numbers.	X	
	Cooling capacities, with locations of the indoor and outdoor components of each plant.	X	
	Description of system control zones, with schematic drawings.	X	
	Description of method of control of temperature.	X	
	Description of method of control of periods of operation.	X	
	Floor plans and schematics of air conditioning systems.	X	
Desirable	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 or replenishing with refrigerant.		
	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	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.	X	
	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	X	
	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.	X	

Site visit work items:
Cooling Plant

Number of Units	2

Cooling Plant Equipment inspected Note: Verify information provided by client is correct by way of inspection and insert actual verified information in fields below.	
Unit Identifier	CHILLER 1 - CGA600
Manufacturer	TRANE
Description	88190 GLOBEY
Model / Reference	ECGLA600A7
Serial Number	J1155856
Year plant installed	2001
Rated Cooling Capacity (kW)	150
Refrigerant Type	R-407C
Location	Outside plantroom
Areas / Systems Served	New extension

Note below any discrepancy between information provided by client and on site information collected:

Cooling Plant Equipment Visual inspection		
Item / Guidance notes	Inspection Notes	Guidance Recommendation
Is heat rejection plant operational?	Yes ☒ No ☐ If no then provide details :	Not Appropriate

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Is area around the heat rejection plant clear of obstructions and debris?	Yes ☒ No ☐ If no provide information and description of obstructions:	Not Appropriate
Is chiller plant operational?	Yes ☒ No ☐ If no then provide details:	Not Appropriate
Is area around the chiller plant clear of obstructions and debris?	Yes ☒ No ☐ If no provide information and description of obstructions:	Not Appropriate
Is there any possibility of air recirculation through the condenser?	Yes ☐ No ☒ If yes provide information and description of obstructions:	Not Appropriate
Is general condition of chiller and associated central plant in good order?	Yes ☒ No ☐ If no provide description of dilapidations:	Not Appropriate
Are condenser heat exchangers undamaged/ un-corroded and clean?	Yes ☒ No ☐ If no provide description:	Not Appropriate
Is insulation on primary circulation pipe work well fitted and in good order?	Yes ☒ No ☐ If no provide detail :	Not Appropriate
Is the chiller unit placed clear from warm air discharge louvers?	Yes ☒ No ☐ If no provide detail :	Not Appropriate
Locate compressors and ensure they are operational or can be brought into operation	Yes ☒ No ☐ If no explain problem:	Not Appropriate

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Centralised Cooling System Inspection Checklist

Cooling Plant Detailed Inspection Notes

Item	Guidance notes	Inspection Notes	Guidance Recommendation
Appropriately Sized Cooling Plant	Compare system sizes with likely loads. Section 4 TM44 contains simple procedures for assessing whether refrigeration systems and air supply systems are likely to be oversized.	**Following Information Required:** Total Occupants: 83 Total Floor Area: 1425 Occupant density /m^2: 17 person/m^2 Lower level heat gain: 100 W/m^2 Upper level heat gain: 100 W/m^2 Installed Cooling Capacity: 150 kW **The installed size is deemed:** More than Expected ☐ Less than Expected ☐ As Expected ☒	Occupant 83 Floor area: 1425 m2 Occupant density: 1425/83=17.2 Lower heat gain: TM44=100 W/m2 Upper level heat gain = 100(TM44) no need for additional load Expected Capacity = 100 W/m2 x 1425 = 142.5 kW As the load is in +_ 15% of the installed load it is in a Expected range
Refrigerant used	Identify the refrigerant used.	Refrigerant name: R-407C	
	Indicate where and F-Gas Regulations inspections may be required.	F-Gas refrigerant requiring regular leakage inspection? Yes ☒ No ☐	
Refrigeration Charge	In operation observe the temperature difference across the refrigeration compressor.	**Refrigeration Temperature:** Pre compressor: 11 Post Compressor: 5 Ambient: 25	
	Compared with the ambient temperature in the plant room / outside air.	**The temperature deemed:** More than Expected ☐ Less than Expected ☐ As Expected ☒	
Refrigeration leaks	Note whether refrigeration heat exchangers show signs of oily staining that could indicate refrigerant leakage. If	Are there any signs of a refrigerant leak?	This units is charged with 15 kg of R-407. How ever there is no sign of leakage, but

	present, check whether any attention to this is noted in the maintenance records.	Yes ☐ No ☒ If yes provide comment regarding the incident and how it has been rectified:	leakage test is still required. Based on F gas Regulation (The F Gas Regulation1. This is EC Regulation 842/2006) the operator of the system must ensure that air conditioning systems containing 3 kg or more of F gas (including R-407C) is checked for leakage by certified personnel on a regular basis (every year).No evidence of leak test was found in the site.
Water cooled chillers (cooling towers and evaporative condensers)	If the refrigeration equipment includes water cooled chillers check that adequate water flows are available through the cooling towers or evaporative condensers to achieve efficient heat transfer. Also check that the water pressure drops across them are in accordance with design or commissioning data if gauges or test points are available and accessible. Check to ensure that	Is the chiller water cooled Yes ☐ No ☐ If yes insert detail as follows: Flow Reading Condenser 0 l/s Commissioning flow rate 0 l/s Yes ☐ No ☐	Not Appropriate

Centralised Cooling System Inspection Checklist

	the water is treated and regularly checked to ensure that there is no Legionella risk. See HSE L8			
Regular Maintenance	Record whether there is evidence of a regular inspection and maintenance regime carried out by suitably competent people. Record and comment on the frequencies and scope of maintenance to the air conditioning equipment and systems in relation to industry guidelines. This, and the dates of most recent maintenance may also need to be referred to during the 'physical' inspection.	Are there records of regular maintenance		As the building doesnt have any logbook preparing a LOGBOOK based on TM31 is very important. Based on The Pressure Systems Safety Regulacons 2000, vapour compression refrigeration system where the installed power exceeds 25 kW requires a written scheme of examination. Users and owners of pressure systems are required to demonstrate that they know : 1- The safe operating limits, principally pressure and temperature, of their pressure systems, 2- They need to ensure that a suitable written scheme of examination is in place before the system is operated. 3- They also need to ensure that the pressure system is actually examined in

		Yes ☐ No ☒ Is the maintenance undertaken by suitably competent people Yes ☒ No ☐ Provide comment regarding maintenance frequencies in relation to industry guidelines: There is no evidence of regular maintenace in the site.	accordance with the written scheme of examination.No evidence of this written scheme test was found in the site.

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Metering	Is metering installed to enable monitoring of energy consumption of refrigeration plant. Is a BEMs installed in the building which can warn about out of range alarms?	Yes ☒ No ☐ If yes, record meter reading 63.52 Yes ☒ No ☐ If No then provide details	Not Appropriate
Humidity Control	Is there separate equipment installed for humidity control?	Yes ☐ No ☐	Not Appropriate

Cooling Plant Equipment inspected Note: Verify information provided by client is correct by way of inspection and insert actual verified information in fields below.	
Unit Identifier	CHILLER 2 - RTAA-214
Manufacturer	TRANE
Description	Air cooled chiller
Model / Reference	ERTAA-214
Serial Number	EKI-1878
Year plant installed	1998
Rated Cooling Capacity (kW)	490
Refrigerant Type	R-22
Location	ouside plantroom
Areas / Systems Served	Existing building

Note below any discrepancy between information provided by client and on site information collected:

Cooling Plant Equipment Visual inspection		
Item / Guidance notes	Inspection Notes	Guidance Recommendation
Is heat rejection plant operational?	Yes ☒ No ☐ If no then provide details :	Not Appropriate
Is area around the heat rejection plant clear of	Yes ☒ No ☐	Not Appropriate

obstructions and debris?	If no provide information and description of obstructions:	
Is chiller plant operational?	Yes ☒ No ☐ If no then provide details:	Not Appropriate
Is area around the chiller plant clear of obstructions and debris?	Yes ☒ No ☐ If no provide information and description of obstructions:	Not Appropriate
Is there any possibility of air recirculation through the condenser?	Yes ☐ No ☒ If yes provide information and description of obstructions:	Not Appropriate
Is general condition of chiller and associated central plant in good order?	Yes ☒ No ☐ If no provide description of dilapidations:	Not Appropriate
Are condenser heat exchangers undamaged/ un-corroded and clean?	Yes ☒ No ☐ If no provide description:	Not Appropriate
Is insulation on primary circulation pipe work well fitted and in good order?	Yes ☒ No ☐ If no provide detail :	Not Appropriate
Is the chiller unit placed clear from warm air discharge louvers?	Yes ☒ No ☐ If no provide detail :	Not Appropriate
Locate compressors and ensure they are operational or can be brought into operation	Yes ☒ No ☐ If no explain problem:	Not Appropriate

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Centralised Cooling System Inspection Checklist

Cooling Plant Detailed Inspection Notes

Item	Guidance notes	Inspection Notes	Guidance Recommendation
Appropriately Sized Cooling Plant	Compare system sizes with likely loads. Section 4 TM44 contains simple procedures for assessing whether refrigeration systems and air supply systems are likely to be oversized.	**Following Information Required:** Total Occupants: 328 Total Floor Area: 5575 Occupant density /m^2: 17 person/m^2 Lower level heat gain: 100 W/m^2 Upper level heat gain: 107 W/m^2 Installed Cooling Capacity: 490 kW **The installed size is deemed:** More than Expected ☐ Less than Expected ☐ As Expected ☒	Occupant 328 Floor area: 5575 m2 Occupant density: 5575/328=17 Lower heat gain: TM44=100 W/m2 Upper level heat gain = 100 (TM44) no additional load require Cooling capacity = 100 W/m2 x 5575 = 557.5 kW 490 x 0.15 (Acceptable range) + 490 = 563 kW As the load is in +_ 15% of the installed load it is in a Expected range
Refrigerant used	Identify the refrigerant used.	Refrigerant name: R-22	
	Indicate where and F-Gas Regulations inspections may be required.	F-Gas refrigerant requiring regular leakage inspection? Yes ☒ No ☐	
Refrigeration Charge	In operation observe the temperature difference across the refrigeration compressor.	**Refrigeration Temperature:** Pre compressor: 11 Post Compressor: 5 Ambient: 25	
	Compared with the ambient temperature in the plant room / outside air.	**The temperature deemed:** More than Expected ☐ Less than Expected ☐ As Expected ☒	
Refrigeration leaks	Note whether refrigeration heat exchangers show signs of oily staining that could indicate	Are there any signs of a refrigerant leak?	This units is charged with 56 kg of R-22. How ever there is no sign of leakage,

	refrigerant leakage. If present, check whether any attention to this is noted in the maintenance records.		but leakage test is still required. Based on EC Regulation No 2037/2000 (This is EC Regulation on HCFC refrigerant. This Regulation aims to reduce emissions of HCFC) the operator of the system must ensure that air conditioning systems containing 30 kg or more of HCFC refrigerant (including R22) is checked for leakage by certified personnel on a regular basis (every 6 motns).No evidence of leak test was found in the site. Legislation bans the supply of new R22 refrigerant used to service equipment from 31st December 2009. Only reclaimed or recycled R22 refrigerant may be used from January 2010 and then only until 31st December 2014. Systems operating on R22 refrigerant will be classed as “not serviceable” from December 2014 A complete ban

		Yes ☐ No ☒ If yes provide comment regarding the incident and how it has been rectified:	of R22 refrigerant, including reclaimed or recycled will become effective on 31st December 2014. I recommend to consider replacing the R-22 with R-407c or other refrigerant by the end of 2013. Engage an expert to check the possibility of introducing new refrigerant and changing all settings and temperature/pressure setting points

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Water cooled chillers (cooling towers and evaporative condensers)	If the refrigeration equipment includes water cooled chillers check that adequate water flows are available through the cooling towers or evaporative condensers to achieve efficient heat transfer. Also check that the water pressure drops across them are in accordance with design or commissioning data if gauges or test points are available and accessible.	Is the chiller water cooled Yes ☐ No ☐ If yes insert detail as follows: Flow Reading Condenser 0 l/s Commissioning flow rate 0 l/s	Not Appropriate
	Check to ensure that the water is treated and regularly checked to ensure	Yes ☐ No ☐	

	that there is no Legionella risk. See HSE L8		
Regular Maintenance	Record whether there is evidence of a regular inspection and maintenance regime carried out by suitably competent people. Record and comment on the frequencies and scope of maintenance to the air conditioning equipment and systems in relation to industry guidelines. This, and the dates of most recent maintenance may also need to be referred to during the 'physical' inspection.	Are there records of regular maintenance Yes ☐ No ☒ Is the maintenance undertaken by suitably competent people Yes ☒ No ☐ Provide comment regarding maintenance frequencies in relation to industry guidelines: As there is no evidence of regular maintenance, preparing a logbook based on TM 31 is highly recommended.	Based on The Pressure Systems Safety Regulacons 2000, vapour compression refrigeration system where the installed power exceeds 25 kW requires a written scheme of examination. Users and owners of pressure systems are required to demonstrate that they know : 1- The safe operating limits, principally pressure and temperature, of their pressure systems, 2- They need to ensure that a suitable written scheme of examination is in place before the system is operated. 3- They also need to ensure that the pressure system is actually examined in accordance with the written scheme of examination.No evidence of this written scheme test was found in the site.
Metering	Is metering installed to enable monitoring	Yes ☒ No ☐	Not Appropriate

	of energy consumption of refrigeration plant. Is a BEMs installed in the building which can warn about out of range alarms?	If yes, record meter reading 104.6 Yes ☒ No ☐ If No then provide details	
Humidity Control	Is there separate equipment installed for humidity control?	Yes ☐ No ☐	Not Appropriate

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Centralised Cooling System Inspection Checklist

Air Handling Systems:

Number of Units	1

Note: For safety reasons, it will be necessary for air handling fans in air distribution systems to be turned off in order to gain access inside air handlers or ductwork to examine components such as fans, drives, filters, heat exchangers and control dampers. The building manager should arrange safe access for the inspector.

Air Handling Systems Equipment Inspection	
Unit Identifier	CCGA
Systems Served from cooling plant	Connected to the two main air cooled chillers
Manufacturer(s)	TRANE
Year systems installed	2001
Location	Roof Plant room
Areas / Systems Served	Whole Building

Note below any discrepancy between information provided by client and on site information collected:

CCGA-07-07 2.960 m3/s

Air Handling System Detailed Inspection Notes			
Item	Guidance notes	Inspection Notes	Guidance Recommendation
Filters	Check condition of intake air filters and check air inlets and outlets for obstruction.	Inlet and filter conditions acceptable Yes ☐ No ☒	Filter was almost blocked how ever the pressure drop was 100 pa which is not high however I would suggest to change the filter more regulary as it will improve the efficiency of whole system
	Note the usual filter changing or cleaning frequency, and the elapsed time since	Filter changes according to measured pressure drop?	Not Appropriate

	the last change or clean, in relation to industry guidance.	Yes ☒ No ☐ If no provide description below:	
Specific Fan Power	Estimate the specific fan power (SFP) of air movement systems, provided that this can be done simply from existing records of the installed fan capacities and the flow rates and pressure drops noted in commissioning records, for comparison with the guidance	Use the guidance in TM44 section 4.4 tables 4.1 Indicative ventilation rates for various types of buildings (Source BSRIA BG14/2003(20) and 4.2 yardstick installed fan capacities (source BSRIA AG1/2000(21)) 1.85 Are air flow rates and system pressures available from commissioning data? Yes ☒ No ☐ [Undertake SFP calculation is it reasonable i.e. less than 3] 3 m3/s = 300 lit/s. this unit consume 5500 watt SFP= 5500/3000 = 1.85 < 2 (Compliance guide-Bulding Regulation 2006) Accepted	Not Appropriate
Fan Rotation	Check for correct rotation of fans. If possible, observe the modulation of multiple fans in response to load changes.	Does the fan rotate in the correct sense? Yes ☒ No ☐ Is speed control or modulation operation Yes ☒ No ☐	Not Appropriate
Condition of Heat Exchangers	Assess condition of heat exchangers. Note whether any heat exchanger surfaces are significantly damaged, or blocked by debris or dust. Where reasonably practical, and where suitable information is available for comparison, the air path resistance across the coil should be measured and compared with the design resistance.	Are heat exchangers in good condition Yes ☒ No ☐ If no provide description below:	No guidance given.
Refrigeration leaks (if DX coil installed)	Note whether refrigeration heat exchangers show	Are there any signs of a refrigerant leak	No guidance given.

	signs of oily staining that could indicate refrigerant leakage. If present, check whether any attention to this is noted in the maintenance records.	Yes ☐ No ☒ If yes provide comment regarding the incident and how it has been rectified:	
Fan and Control	Note the fan type, and method of air speed control. Check the setting and operation of any fresh air/recirculation dampers	Centrifugal fan, As this unit is 100% fresh air there is no inter control between extract and fresh air how ever the amount of fresh air will get control by using manual damper.	No guidance given.
Heat recovery	Identify whether the systems have any energy conservation facilities, e.g. heat recovery, free cooling sequence, and check for evidence that such facilities are/have been functioning.	Energy Conservation features installed:	No guidance given.
Air leakage	Observe the air handling plant and visible air containment including ductwork, floor or ceiling plenums and builders' work shafts for signs of excessive leakage and energy loss.		Not Appropriate
Outdoor air inlets	(a) Locate the inlets for outdoor air. (b) Note any significant obstructions or blockages to inlet grilles, screens and pre-filters. (c) Note where inlets may be affected by proximity to local sources of heat, or to air exhausts.	The inlet is located on the roof in the side of building not facing car park There is no blockage or obstruction There is no source of heat or exhaust air.	No guidance given.

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Terminal Units:

Number of Units	3

Terminal Unit Equipment Inspection	
Unit Identifier	FAN COIL- G07/E
Systems Served from cooling plant	Feed Two supply grills, Cooled water from Chiller one
Manufacturer(s)	TRANE
Year systems installed	2001
Location	In the middle of the room, in the false ceiling close to the board
Areas / Systems Served	Meeting Room 2358

Note below any discrepancy between information provided by client and on site information collected:

HF0B06DWH5L2

Terminal Unit Detailed Inspection Notes			
Item	Guidance notes	Inspection Notes	Guidance Recommendation
Insulation	Visually inspect the route and condition of the cooling system pipe work serving local areas. Check that pipe work or ductwork (or both) is appropriately insulated.	Is pipe work adequately insulated? Yes ☒ No ☐ Is ductwork adequately insulated? Yes ☐ No ☒ If no provide detail: The duct has broken and there is a big hole in the duct which simply cause no air coming out of the grille The insulation is not properly installed as there are some loose parts in the duct work	Ask a member of your maintenance team to replace the duct completely and fix the insulation.
Unit Condition	Visually check the condition and operation of indoor units.	Are the terminal units in good working order? Yes ☒ No ☐ If no provide comment regarding condition:	Filter nedds to be changes/cleaned
Grilles & Air Flow	Review air delivery openings, grilles or diffusers, and route	Are diffusers /grilles clean and in good order?	Not Appropriate

	by which air is extracted from the spaces.	Yes ☒ No ☐ If no provide comment regarding condition:	
	Note whether these appear to provide good distribution.	Yes they provide good distribution, however using grilles with adjustable vanes would give more flexibility to the occupier of the room.	
	Check that chilled and hot water are not being supplied to terminals simultaneously	Are chilled and hot water being supplied to terminals simultaneously Yes ☒ No ☐	
	Review evidence that occupants find the air delivery arrangements unacceptable – for example check the complaints log (if it is available)	Issues arising from facilities manager's records	
Diffuser Positions	Assess the positioning and geometry of air supply openings in relation to extract openings.	Are air supply grilles positioned well in relation to extract openings? Yes ☒ No ☐ If no provide comment:	Not Appropriate
	Observe if partitioning or furniture is affecting performance.	No effect on performmance	

Terminal Unit Equipment Inspection	
Unit Identifier	FANCOIL-FCU2-108
Systems Served from cooling plant	one supply grille-Feed from chiller two
Manufacturer(s)	TRANE
Year systems installed	2001
Location	False ceiling-Middle of the room
Areas / Systems Served	Meeting Romm 2340

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Centralised Cooling System Inspection Checklist

Note below any discrepancy between information provided by client and on site information collected:

HF0B04DWH5L2

Terminal Unit Detailed Inspection Notes

Item	Guidance notes	Inspection Notes	Guidance Recommendation
Insulation	Visually inspect the route and condition of the cooling system pipe work serving local areas. Check that pipe work or ductwork (or both) is appropriately insulated.	Is pipe work adequately insulated? Yes ☒ No ☐ Is ductwork adequately insulated? Yes ☒ No ☐ If no provide detail:	Not Appropriate
Unit Condition	Visually check the condition and operation of indoor units.	Are the terminal units in good working order? Yes ☒ No ☐ If no provide comment regarding condition:	Filter was blocked, replace or clean the filter
Grilles & Air Flow	Review air delivery openings, grilles or diffusers, and route by which air is extracted from the spaces.	Are diffusers /grilles clean and in good order? Yes ☒ No ☐ If no provide comment regarding condition:	Not Appropriate
	Note whether these appear to provide good distribution.	Yes it does provide good distribution, but I would provide for flexibility to change the grille to adjustable vane grilles.	
	Check that chilled and hot water are not being supplied to terminals simultaneously	Are chilled and hot water being supplied to terminals simultaneously Yes ☒ No ☐	
	Review evidence that occupants find the air delivery arrangements unacceptable – for example check the	Issues arising from facilities manager's records	

	complaints log (if it is available)		
Diffuser Positions	Assess the positioning and geometry of air supply openings in relation to extract openings.	Are air supply grilles positioned well in relation to extract openings? Yes ☒ No ☐ If no provide comment:	Not Appropriate
	Observe if partitioning or furniture is affecting performance.	No effect	

Terminal Unit Equipment Inspection	
Unit Identifier	FANCOIL E/102
Systems Served from cooling plant	two supply grilles/feed from chiller one
Manufacturer(s)	TRANE
Year systems installed	2001
Location	in the false ceiling close to area 2349
Areas / Systems Served	Reception-second floor

Note below any discrepancy between information provided by client and on site information collected:

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Terminal Unit Detailed Inspection Notes			
Item	Guidance notes	Inspection Notes	Guidance Recommendation
Insulation	Visually inspect the route and condition of the cooling system pipe work serving local areas. Check that pipe work or ductwork (or both) is appropriately	Is pipe work adequately insulated?	Engage a member of your maintenance team to fix the insulation

	insulated.	Yes ☒ No ☐ Is ductwork adequately insulated? Yes ☐ No ☒ If no provide detail: The insulation around duct was loose	
Unit Condition	Visually check the condition and operation of indoor units.	Are the terminal units in good working order? Yes ☒ No ☐ If no provide comment regarding condition:	The filter was blocked-Engage a memebr of your maintenance team to replace or clean the filter
Grilles & Air Flow	Review air delivery openings, grilles or diffusers, and route by which air is extracted from the spaces. Note whether these appear to provide good distribution. Check that chilled and hot water are not being supplied to terminals simultaneously Review evidence that occupants find the air delivery arrangements unacceptable – for example check the complaints log (if it is available)	Are diffusers /grilles clean and in good order? Yes ☒ No ☐ If no provide comment regarding condition: Good distribution Are chilled and hot water being supplied to terminals simultaneously Yes ☒ No ☐ Issues arising from facilities manager's records	Not Appropriate
Diffuser Positions	Assess the positioning and geometry of air supply openings in relation to extract openings.	Are air supply grilles positioned well in relation to extract openings? Yes ☒ No ☐ If no provide comment:	Not Appropriate
	Observe if partitioning or		

	furniture is affecting performance.	No effect	

Communities and Local Government

Centralised Cooling System Inspection Checklist

System Controls

Number of Units	0

System Controls		
Unit Identifier	1Q241/242	
Item / Guidance notes	**Inspection Notes**	**Guidance Recommendation**
Assess zoning in relation to factors such as local levels of internal gain, orientation and exposure to solar radiation. Is the zoning appropriate?	Yes ☒ No ☐ If no explain problem:	At the moment we have ability to control floors by floors as an one big zone, and individual fan coil (s) by room thermostat, It would be energy efficient if we can divide each floor to two parts and control them separately.
Note the current indicated weekday and time of day on controllers or BMS against the actual time.	The time and the date are correct.	Not Appropriate
Note the set on and off periods (for weekday and weekend if this facility is available with the timer).	At the moment Fancoils start and stop is 7am-7pm and chiller start stop is 8am-6pm	At the moment Fancoils start and stop is 7am-7pm and chiller start stop is 8am-6pm I recommend to to change chiller time to 6:30 am- 6:30 pm as at the moment fancoils might work for 1 hour without having any cooling capacity in each part of the day, which will not have any effect except air circulation which can be achive by using trickle vents or even openable windows.
Is there a shortfall in timer capabilities?	Yes ☐ No ☒	At the moment Fancoils start and stop is 7am-7pm and chiller start stop is 8am-6pm I recommend to to change chiller time to 6:30 am- 6:30 pm as at

Centralised Cooling System Inspection Checklist

	If yes explain problem:	the moment fancoils work for 1 hour without having any cooling capacity in each part of the day, which will not have any effect except air circulation which can be achive by using trickle vents.
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 ☒ No ☐ If no explain problem:	Each room/fancoil has its individual thermostat connected to it so an operator is able to control the temperature +_ 2.5 to the level of convenience, the only recommendation I would make is put a guidance nest to the each thermostat which inform people regarding to the method of control and setting the thermostat.
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.	Cooling temperature is set to 21 C for all fancoils and individual thermostat able the adjust this figure by +_ 2.5 C.	I recommend changing the set temperature to 23 C, because if they want they can always change it to the figure they want but by changing this setting, further energy savings is possible.
Note whether a 'dead band' is or can be set between heating and cooling.	A member of maintenance team control the dead band between heating and cooling so simultaneous heating/cooling will never happen	Installation of weather compensation device for cooling/heating appliance will improve efficiency of systems and will able you to control indoor temperature more efficient
Assess the refrigeration compressor(s) and the		Not Appropriate

method of refrigeration capacity control.		
Assess means of modulating or controlling air flow rate through air supply and exhaust ducts.	It is been achive by using VCD (volume control damper)installed in all ventilation ducts and branches.	I recommend using supply grills with adjustable vanes, as it give flexibility to occupier of the building/maintenance guy to adjust air flow towards right directions.