



MECHANICAL SERVICES ROUTINE MAINTENANCE

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CHILLED BEAMS

Three Monthly (3M)

- Check all pipework connections to chilled beams.
- Check mounting fixings are tight and secure

Yearly (Y)

- Check operation of safeties

VRV SYSTEM – AIR CONDITIONING UNIT

INDOOR

Three Monthly (3M)

- Check and clean air filter as necessary
- Check operation for undue noise and vibration and all mounting bolts are secure
- Check condensate drain tray and pipework for free draining

Yearly (Y)

- Clean fluff and dust from coils
- Check operation of safeties
- Tighten all electrical connections
- Check regulating valve

OUTDOOR

Three Monthly (3M)

- Check general tidiness and condition of unit
- Check mounting fixings are tight and secure
- Advise owner of any undue rust/corrosion to unit
- Check refrigerant piping and connections are secure
- Check condition of piping insulation is adequate

Yearly (Y)

- Check outdoor unit for congested or damaged fins
- Check unit for sufficient refrigerant
- Clean & straighten fins
- Check operation of safeties
- Check all electrical connections are tight and secure

CHILLER

Monthly (M)

General

- Check for water leaks.
- Rectify and report to engineer
- Check for excessive noise and vibration and report to engineer.
- Check for excessive temperatures and pressures as below. Report adverse conditions.
- Check for full refrigerant charge.

Gauge Readings

With compressors running record:

- Compressor discharge pressure.
- Compressor suction pressure.
- Compressor oil pressure.
- Chilled water flow temperature.
- Chilled water return temperature.
- Condenser water flow temperature.
- Condenser water return temperature.
- Condenser air on temperature.
- Condenser air off temperature.

Crank Case Heaters

- Check operation of heaters.

Compressor Oil Levels

- For compressors off line check and record crankcase oil levels.
- Record oil level of operating (after compressors have been in operation for at least 30 minutes).
- Record quantity of oil added.

Three Monthly (3M)

Liquid Line, Sight Glass & Moisture Indicators

- Check temperature drop across line filter/drier (where fitted).
- Wash condenser coil and comb and coil damage.
- Non-running compressors may be started to complete checks required.
- Non-completed monthly checks should be done concurrently.

Compressor Unloaders

- Check sequence and operation of compressor unloaders and unloader controls.
- Record adjustments made to unloaders and maintained mean suction pressure.

Liquid Line, Sight Glass & Moisture Indicators

- Leak test all refrigerant circuits. Rectify minor leaks, immediately advise engineer of any major leakages found.

Leak Test of Refrigerant

- Leak test all refrigerant circuits. Rectify minor leaks, immediately advise engineer of any major leakages found.

Six Monthly (6M)

Chiller Set General

- Check TX valve superheats.
- Check and report condition of mountings.
- Clean chiller equipment surfaces and immediate plant area.
- Check condition of chiller set paintwork.

Compressor Motor

- Check all terminals for tightness.
- Record amperage draw on each phase and load level.

Safety Controls

- Check operation of all safety controls external to machine by simulation of fault.

Chilled Water Low Temp. Thermostat

- Check operation and calibration.

Chiller Load Controller

- Check operation and calibration.

Safety Controls

- Operational check on all safety & operating controls, (Setpoints shall be strictly in accordance with chiller set manufacturer's specifications.)
- Carry out "Controls Quick Test" in accordance with Carrier's instructions.

Yearly (Y)

Chiller Set General

- Inspect and clean condenser coils. (Refer manufacturer's instructions included in operating and maintenance manuals.)
- Clean and inspect suction strainers/driers where fitted.
- Ensure filter drier has been changed at least once during the year.

Compressor Motor

- Disconnect mains power terminals and perform insulation resistance test strictly in accordance with equipment manufacturer's procedures.
- Record readings taken.

Compressor Oil

- Obtain laboratory test of sample of used compressor oil for acidity and metal content levels (if acidity is indicated refer to schedule for service procedure.)
- Forward laboratory report to engineer. If oil does not meet specification then after confirmation by the engineer, drain compressor oil and recharge with new oil to compressor manufacturer's requirements.
- Clean oil strainer screen.
- Clean suction strainer screen.

As Required

Acidity Rectification

Service procedure to rectify acidity in compressor oil:

- Drain crankcase.
- Clean all strainers as above.
- Obtain laboratory test of new oil sample prior to use and recharge with new oil to manufacturer's specification.
- Install replacement covers in liquid and suction line driers where fitted.
- Obtain new laboratory test of oil sample on next scheduled maintenance visit. If acidity condition is still indicated, repeat service procedure until negative acidity reading is obtained.
- Leak test refrigerant circuit.

HOT WATER BOILER AND FLUE

Three Monthly (3M)

- Examine fusible link system.
- Check all safety devices, controls and alarms, including low water, control and limit thermostats.

Six Monthly (6M)

- Check boiler room is clean. Check any air inlet grilles into boiler room are free from obstruction.
- Examine flue pipe and cleaning door, etc. for obvious signs of flue gas leaks, corrosion and security.
- Examine flue and chimney for leaks, corrosion and damage.
- Check relief valves operate at correct settings. Check drains are clear.
- Examine boiler's panels for damage corrosion and security.
- Examine boiler door seal and refractory.

Yearly (Y)

- Clean boiler by bringing up to operating temperature before opening. Clean tubes with brushes provided. Use proprietary cleaning agent if hard scale is present.
- Remove and clean explosion door. Clean smoke outlet box. Replace gasket and tighten only two full turns.
- Clean and examine boiler back plate. Remove and build-up between tube ends.
- If boiler is closed down for summer period, after cleaning spray interior with oil graphite mix and close and seal boiler.
- Examine holding down bolts. Tighten if required.
- Check boiler drain for leaks.
- Check fixings and security of flue.

IN-LINE CIRCULATING PUMP

Three Monthly (3M)

- Check pump for excessive noise and vibration.
- Check gland and mechanical seals for water leaks.

Yearly (Y)

- Check tightness of electrical terminals.
- Inspect for water leaks around flanged connections.
- Check direction of rotation.
- Clean air intake and extract grilles on motor fan guard, and blow out windings.
- Clean labels, identification markers and manufacturers' name plate markings.
- Test starting and running currents, supply voltage and record results.

IN-LINE CIRCULATING PUMP (with Variable Frequency Speed Controller)

Three Monthly (3M)

- Check pump for excessive noise and vibration.
- Check gland and mechanical seals for water leaks.

Yearly (Y)

- Check tightness of electrical terminals.
- Inspect for water leaks around flanged connections and pressure tapplings.
- Check direction of rotation.
- Clean air intake and extract grilles on motor fan guard, and blow out windings.
- Clean labels, identification markers and manufacturers' name plate markings.
- Test starting and running currents, supply voltage and record results.
- Remove speed controller filter and vacuum.

Three Yearly (3Y)

- Vacuum inside of speed controller, clean fan blades.

PACKAGED HEATPUMP (CHILLED WATER & HOT WATER)

Three Monthly (3M)

- Check the compressor oil colour. New oil is clear. Oil contaminated with moisture or foreign material will discolour. Change the oil if necessary.
- Check the compressor oil levels. Top up if necessary.
- Check the refrigerant circuits for leaks.
- Check for excessive noise or vibration.
- Check tightness of all electrical terminations.
- Check pressure gauges are within normal operating range when compressor is running.
- Remove any debris from around condensers.

Six Monthly (6M)

- Check operation of microprocessor controls. Check and test all controls, safety cut-outs, flow switches, etc.
- Check expansion valve operation and super heat settings.
- Check all temperature and pressure sensors are securely in position.

Yearly (Y)

- Check compressors for refrigerant and oil leaks.
- Check supply and control voltages.
- Check compressor thermal overload setting.
- Drain, inspect and refill the compressors with new oil as per manufacturers' instructions.
- Change oil and refrigerant filters.
- Examine condenser fan blades, keys, guards, and couplings for security, alignment and wear. Repair and clean as necessary.
- Check and clean condenser fins of coil. Straighten as required.
- Check refrigerant charge, operating pressures, temperatures and oil pressure.
- Inspect all fittings, etc. for refrigerant leaks.

Three Yearly (3Y)

- Check all anti-vibration mounts and anchors are secure. Tighten as required.
- Examine cladding, insulation and vapour barriers for damage and condensation.
- Clean heat exchanger. De-scale with a proprietary cleaning agent to manufacturer's instructions. Neutralise chemicals and flush clean.

FEED & EXPANSION TANK

Yearly (Y)

- Ensure float make-up valve controls OR pump controls OR mains pressure controls are operating correctly and are maintaining the correct water level/pressure.
- Check and clean overflow drains and trays.
- Report any excessive impurities or sediment build-up.
- Ensure tank lid is in good condition and securely fitted.

PNEUMATIC EXPANSION SYSTEM

Three Monthly (M)

- ❑ Check system operating pressure (1.5bar). Top up as required. Should frequent top up be necessary, check system for leaks.

Yearly (Y)

- ❑ Check operation of pressure reducing valve on filling set. Clean if required.
- ❑ Check holding down bolts on expansion vessel and seismic restraints if fitted.
- ❑ Check calibration of pressure gauge fitted to system.

WATER CHEMICAL TREATMENT

Six Monthly (6M)

- ❑ Test sample of water system for nitrite concentration as detailed on Product Data sheet supplied with test kit.
- ❑ Test pH level with dip papers.
 - Test results should fall in the following ranges:-
 - nitrite concentration 1000 - 2500 mg/litre
 - pH 9 to 11

 - If outside these values, dose accordingly.

PLEASE NOTE:

The above 6 monthly test only applies when the system is under normal operation. Additional tests and dosing shall be required if the system is drained down or water is lost from the system.

HOT WATER & CHILLED WATER DISTRIBUTION PIPEWORK

Three Monthly (3M)

- Check water pressure, top up as necessary.
- Check all isolating valves and regulating valves are fully open or against locked open setting.

Six Monthly (6M)

- Examine all pipe fittings, valves, cocks, safety valves, air eliminators, etc. for leaks and corrosion. Repair if necessary.
- Check pipe strainers, open and clean.

Yearly (Y)

- Operate all Plant Room line valves.
- Operate both auto and manual air eliminators.
- Check auto air eliminators for leaks and replace air valve if necessary with circulation pump switched off.
- General inspection of insulation and cladding for deterioration and piping for leaks.
- General inspection of hangers and supports.
- Check and calibrate gauges and thermometers
- Strip and inspect check valves.
- Check line strainers and clean.
- Check all valve glands and re-pack if necessary.
- Repair any damaged paintwork - wire brush, zinc primer and two coats of the appropriate colour and finish.

Three Yearly (3Y)

- Examine all pipe fittings, hangers, anchors and brackets. Tighten and repair as necessary.
- Examine cladding, insulation, vapour barriers for damage. Paint and repair as necessary.
- Check gauges for accuracy.
- Drain feed and expansion tank, clean the inside of any silt.

Five Yearly (5Y)

- Drain system and visually check pipes for corrosion. Clean and re-treat system as required.
- Check pipe identification and paint.
- Re-balance and commission system.

VALVES & FITTINGS

Isolating Valves Yearly (Y)

- ❑ Test all isolating valves for operation and check for leaks or damage, replacing any worn parts and repacking gland as necessary.

Check Valves Yearly (Y)

- ❑ Isolate and disassemble the unit. Check and clean the body and plate for foreign matter or scale build-up.
- ❑ Inspect the plate seat and seal for damage. Replace if necessary.
- ❑ Inspect the spring return action. Replace spring if necessary.

Strainers Yearly (Y)

- ❑ Isolate, remove and clean the mesh bucket. Check and clean the body and plate for foreign matter or scale build-up.

MOTORISED CONTROL VALVES

Yearly (Y)

- Test all control valves for operation and check for leaks or damage, replacing any worn parts and repacking gland as necessary

HEATING & COOLING COILS

Six Monthly (6M)

- Check for air build-up, vent coil.

Three Yearly (3Y)

- Examine coils for cleanliness and damage. Vacuum and comb fins. Repair if necessary.
- Examine casings for corrosion and by-pass. Paint and repair if necessary.
- Drain coils and flush out.

Five Yearly (5Y)

- Check coils for output.

MAINTENANCE PROCEDURE FOR HEATING AND COOLING COILS

- ❑ The primary maintenance considerations for finned air heating and cooling coils are cleanliness of the heat transfer surface and freedom from corrosion and leakage.
- ❑ In the best of filtered systems, coil fins and tubes can become clogged with dust, fluff, lint, etc., which may become the source of external corrosion in addition to reducing heat transfer efficiency.
- ❑ The frequency of cleaning will depend upon the cleanliness of the air flowing through the coil. If used for heating or cooling, outdoor air with intakes close to street level in areas with a high degree of pollution, more frequent inspections will be required than would be where intakes are high and air pollution light.
- ❑ Therefore, cleaning should be carried out at least once a year and more often if the coil is subject to heavier dust loading conditions.
- ❑ Cleaning may be accomplished in some cases by hand brushing, but for multiple rows, a compressed air jet is the best means when necessary. More thorough cleaning can be obtained by means of a steam gun followed by compressed air for drying off the coil.
- ❑ Initial steam cleaning may be necessary in cases where viscous oil type air filters precede the coils and oil mist is carried over on the coil fins.
- ❑ For severe cases, the coil must be removed from the installation and sprayed with a mild alkali cleaning solution followed by a very thorough steam rinsing and compressed air drying.
- ❑ It is essential when cleaning coils in-situ that adequate precautions are taken to collect any dust or moisture blown off the coils from passing into the air conditioning duct system.
- ❑ The coil casing should also be inspected for rust, and cleaned and painted when necessary. The coil mounting bolts should be checked and tightened and any evidence of excess vibration noted.

AIR FILTERS

Three Monthly (3M)

- ❑ If combined pressure drop across the filters exceeds 'Dirty Filter Resistance' pressure setpoint measured by pressure transducer, clean or replace filters.

Yearly (Y)

- ❑ Inspect filter holding frames and housing for signs of air leaks especially air by-passing filters. Replace seals if necessary.
- ❑ Check housing for dirt. Vacuum clean both up-stream and down-stream of housings.
- ❑ Check pressure transducer accuracy against inclined manometer.
- ❑ Check condition and sealing of pressure transducer tubes.

Five Yearly (5Y)

- ❑ Check housings and frames for corrosion. Paint or repair as required.

WASHING INSTRUCTIONS FOR WASHABLE AIR FILTERS

- ❑ Record dirty reading on filter differential pressure gauge (if fitted) and turn 'Off' fan in air conditioning/ventilating unit.
- ❑ Remove filter frames/media from air conditioning/ventilating unit.
- ❑ Remove filter media from frame and place media in large plastic bag. (Note: in the case of small filters or where there are small numbers of filter panels, frames and media may be washed without removing media.
- ❑ Vacuum clean filter frames, Plantroom floor and air conditioning/ventilating unit filter housing, mixing box and surface of heat transfer coil.
- ❑ If a spare set of filter frames are provided, install these in unit and carry out Step No. 12 before proceeding with instruction No.6. Note also comments in Item No.11 relating to the installation of filter frames to housings.
- ❑ Take filter media to washing location (outside) and place in washing tub. **DO NOT OVERFILL TUB.** Wash media in batches if necessary.
- ❑ Leave to soak for ½ to 1 hour.
- ❑ **IMPORTANT - DO NOT POKE WITH STICK OR VIOLENTLY AGITATE - JUST LEAVE TO SOAK.**
- ❑ Remove filters from tub and place flat, face down on draining grip (such as walkway grid mesh) so that Clean Air Side (the side that has the harder backing) is uppermost.
- ❑ With hand-held trigger spray gun (attached to garden hose with normal domestic pressure - around 350 kPa) spray cold water onto filter (in opposite direction to air flow) to rinse out dirt and detergent.
- ❑ **DO NOT: USE HIGH PRESSURE FIRE HOSES OR DIRECT JETS OF WATER.**
- ❑ Leave filters to drain (peg on end of media to drying line). If filters are washed in their frames, they can be placed on an angle against the wall to dry.
- ❑ **DO NOT : WRING OUT, FORCE DRY BY HOT AIR HEATER, DRAPE OVER HOT PIPES OF PLACE NEXT TO BOILERS.**
- ❑ When dry, return media to Plantroom, refit to filter frames, store in cardboard box ready for next filter change or install in air conditioning/ventilation unit. When refitting frames to unit, check that air by-pass is prevented between frames and housing and that air sealing strips on frames are undamaged.
- ❑ Turn 'On' fan in unit and record clean reading on filter differential pressure gauge (if fitted). After all media have been cleaned, sign off filter cleaning task as complete on maintenance check list.

Note: The above instructions are based on Viledon filter manufacturer Ipsco Sales & Manufacturing Ltd. recommendations.

INSTRUCTIONS FOR HEPA FILTERS

HEPA filters should only be removed by the manufacturer or an agent approved by the manufacturer. HEPA filters installed in extract/exhaust systems may contain contagious dusts and bacteria or viruses. In these cases, special protective equipment including respiratory protection, isolation procedures and filter bagging is required. Only experienced operators should carry this out.

Please contact IPSCO Ltd ph: (09) 276 3639 for all HEPA filter testing and/or replacement.

Note: The above instructions are based on the recommendations from HEPA filter manufacturer Ipsco Sales & Manufacturing Ltd.

HEAT RECOVERY WHEEL

Monthly (M) – Initial first month only

- Check drive belt for wear. Replace if signs of wear.
- Adjust tensioning spring to maintain proper tension.
- Check for abnormal noise or vibration from drive motor.

Three Monthly (3M) Initial 3 month period only

- Check drive belt for wear. Replace if signs of wear.
- Adjust tensioning spring to maintain proper tension.
- Check for abnormal noise or vibration from drive motor.
- Inspect and clean rotor if dirt build up present.
- Check air sealing brush for gaps or signs of wearing. Adjust or replace as required.

Six Monthly (6M)

- Check drive belt for wear. Replace if signs of wear.
- Adjust tensioning spring to maintain proper tension.
- Check for abnormal noise or vibration from drive motor.
- Inspect and clean rotor if dirt build up present.
- Check air sealing brush for gaps or signs of wearing. Adjust or replace as required.
- Check for abnormal noise or vibration from bearing. Grease or replace as required.

HEAT RECOVERY UNIT

Three Monthly (3M)

- Check for noise and vibration.
- Check anti-vibration mountings for security isolation.

Yearly (Y)

- Clean filters.
- Grease motor if lubrications fitted - see manufacturer's recommendations.

Two Yearly (2Y)

- Clean heat exchanger core.

Three Yearly (3Y)

- Replace motor bearings, if required.

PACKAGE UNIT/AHU

Three Monthly (3M)

A. Supply Air Fan (Centrifugal)

- Check fan and bearings for overheating, noise and excessive vibration.
- Check belts for wear. Adjust tension as necessary.
- Check flexible duct connections
- Check all guards are securely mounted.

B. Electric Motor

- Check bearings for overheating.
- Check motor and drive for overheating, noise and excessive vibration.
- Check condition of cable, terminal box and isolator.

C. Air Filters

- Check condition of filter medium, frame and for any air bypassing the filter.
- Check the operation of the manometer (if fitted). Record reading.
- Wash washable filters.

Yearly (Y)

A. Casing

- Check casing for breakdown of insulation. Report any deterioration.
- Check for corrosion or breakdown of the paint surface. Report any deterioration.

B. Supply Air Fan

- Lubricate bearings as required.
- Check fan mountings are secure.
- Clean the fan impellers, casings and all surfaces where dust can accumulate.
- On stopping and starting, check flexible connections are not overstressed due to fan movement.

C. Electric Motor

- Check air passages to the motor are clear and clean of dust.

D. Cooling/Heating Coil

- Check and clean coil.
- Clean condensate tray.
- Check condensate tray for free drainage and flush through with a high pressure hose.

E. Dampers

- Check all blades are free to rotate and seal well in the closed position.
- Check all linkages are in sound condition. Lubricate as required.
- Check all parts for corrosion and general deterioration. Report any observed problems.

F. Controls

- Check operation of outside air, return air and exhaust air dampers.
- Check operation of cooling and heating valves.
- Check variable speed drives.

FAN COIL UNIT

INDOOR

Three Monthly (3M)

- Check for undue noise and vibration and all mounting bolts are secure
- Clean filters
- Check condensate drain is free to discharge
- Check condensate tray and pipework for free draining

Yearly (Y)

- Clean fluff and dust from coils
- Check operation of safeties
- Tighten all electrical connections
- Check regulating valve and balancing damper setting

OUTDOOR

Three Monthly (3M)

- Check general tidiness and condition of unit
- Check mounting fixings are tight and secure
- Advise owner of any undue rust/corrosion to unit
- Check refrigerant piping and connections are secure
- Check condition of piping insulation is adequate

Yearly (Y)

- Check outdoor unit for congested or damaged fins
- Clean and straighten fins as required
- Check unit for sufficient refrigerant
- Check operation of safeties
- Check all electrical connections are tight and secure

TEMPERED SUPPLY AIR SYSTEM

Three Monthly (3M)

- Clean filters
- Clean fresh air intake
- Check for undue noise and vibration and all mounting bolts are secure
- Check belt drive tension if applicable

Yearly (Y)

- Check operation of all tempered air elements and safety devices
- Check fan motor for noise and undue vibration
- Check for corrosion/loose supports
- Check earthing arrangements
- Check all electrical connections for tightness

Tasks If Applicable To Model

- Grease bearings
- Check electrical connections
- Check fan guard for security and clearance
- Check belt for alignment
- Measure and record motor currents
- Check exterior condition
- Check condition of weather flashings

NON-TEMPERED SUPPLY AIR SYSTEM

Three Monthly (3M)

- Clean filters
- Clean fresh air intake
- Check for undue noise and vibration and all mounting bolts are secure
- Check belt drive tension if applicable
-

Yearly (Y)

- Check fan motor for noise and undue vibration
- Check for corrosion/loose supports

Tasks If Applicable To Model

- Grease bearings
- Check electrical connections
- Check fan guard for security and clearance
- Check belt for alignment
- Measure and record motor currents
- Check exterior condition
- Check condition of weather flashings

IN-LINE FANS

Three Monthly (3M)

- Check for noise and vibration.
- Check anti-vibration mountings for security isolation and clearances around seismic restraints.

Six Monthly (6M)

- Check flexible duct connection's condition and spacing.
- Check security of motor mountings.

Yearly (Y)

- Check impeller, motor and casing for damage. Repair/replace if required.
- Measure and record motor running current.
- Grease motor if lubrications fitted - see manufacturer's recommendations.

Three Yearly (3Y)

- Replace motor bearings, if required.
- Measure airflow and fan static pressure.

ROOF SUPPLY/EXTRACT UNITS

Three Monthly (3M)

- Check for noise and vibration.
- Check for obstructions in air discharge cowl.

Six Monthly (6M)

- Check security of motor mounts.
- Check security of impeller to shaft.

Yearly (Y)

- Clean impeller, motor and casing.
- Check weatherproof cowl for signs of weather penetration. Check condition of backdraft damper and birdmesh.
- Measure and record running current.

Two Yearly (2Y)

- Grease motor if lubricators fitted - see manufacturers recommendations.

Three Yearly (3Y)

- Replace motor bearings.
- Check impeller balance.
- Measure air flow and fan static pressure.

N.B.: System to be in normal operational state.

PIPEWORK

Yearly (Y)

- Inspect accessible pipework in plantrooms for leaks and deterioration.
- Inspect pipe hangers, valves, gauges and other accessories to ensure they are secure and in good condition. Report findings.
- Inspect joints and compensators. Report on their condition.
- Operate air eliminators within plantroom to ensure the system is free of air.
- Inspect and, if necessary, clean strainer baskets.

DUCTWORK SYSTEMS

Yearly (Y)

- ❑ Inspect manual dampers especially for vibration and noise.
- ❑ Check fixture of damper blades to shafts and that all blades move in parallel.
- ❑ Inspect all sundry duct fittings, e.g. sensors, gauges, pitot test hole bungs, etc. for air leakage.
- ❑ Test 20% of fire dampers for freedom of operation. (This is the minimum amount to be tested, as required by the Building Code)

Five Yearly (5Y)

- ❑ Open access panels and inspect duct for cleanliness. Clean as necessary.
- ❑ Check all duct joints for air leakage, reseal if necessary.
- ❑ Check air flows, rebalance if necessary.
- ❑ Check ducts for corrosion.
- ❑ Check duct supports for tightness and vibration isolation.

FIRE DAMPERS

Yearly (Y)

- Check damper for obstructions.
- Check damper closes freely when unlinked.
- Check damper seals properly when closed.
- Reset damper to normal position.
- Check Damper and frame for corrosion or deterioration and check mounting is sound.

N.B. 20% per year shall be completed. Identify all dampers on a schedule showing location and description. Each year update this schedule with the date of maintenance and submit to client.

AIR CURTAIN

Three Monthly (3M)

- Check for excessive vibration or undue noise.
- Check condition of internal surfaces for dust build-up and vacuum.
- Wipe external surfaces with a damp cloth to remove any dust build-up.

SPLIT SYSTEM AIR CONDITIONING UNIT

Three Monthly (3M)

- Check outdoor unit for obstructions blocking condenser coil.
- Observe operation of unit checking for excessive noise, vibration, etc.
- Clean filter on indoor unit.

Six Monthly (6M)

- Check operation of crankcase heater.
- Check condensate drains for blockages and flow.
- Check sight glass for indication of moisture or lack of charge.

Yearly (Y)

- Check gas charge by running system to perform within design capabilities.
- Check electrical connections on outdoor unit control box.
- Check operation of pressure switches.
- Check fixing of condenser unit fan guard.
- Check fan impellers for tightness on shaft.

Three Yearly (3Y)

- Clean indoor and outdoor coils (see attached coil cleaning procedure).
- Leak test refrigerant system.

MOTORISED DAMPERS

Six Monthly (6M)

- Check damper action is smooth over full travel.
- Check position of damper blades when motor is fully open and fully closed.
- Check linkages and bearings for slack and wear.

Yearly (Y)

- Check tightness of electrical terminations.

Three Yearly (3Y)

- Inspect damper blades and housing for cleanliness and signs of corrosion. Clean and touch up as required.

PACKAGED AIR COOLED WATER CHILLER

Monthly (M)

- Check the compressor oil colour. New oil is clear. Oil contaminated with moisture or foreign material will discolour. Change the oil if necessary.
- Check the compressor oil levels. Top up if necessary.
- Check the refrigerant circuits for leaks.
- Check for excessive noise or vibration.
- Check tightness of all electrical terminations.
- Check pressure gauges are within normal operating range when compressor is running.
- Remove any debris from around condensers.

Six Monthly (6M)

- Check operation of microprocessor controls. Check and test all controls, safety cut-outs, flow switches, super heat settings, etc.
- Check expansion valve operation.
- Check all temperature and pressure sensors are securely in position.

Yearly (Y)

- Check compressors for refrigerant and oil leaks.
- Check supply and control voltages.
- Check compressor thermal overload setting.
- Drain, inspect and refill the compressors with new oil as per manufacturers' instructions.
- Change oil and refrigerant filters.
- Examine condenser fan blades, keys, guards, and couplings for security, alignment and wear. Repair and clean as necessary.
- Check and clean condenser fins of coil. Straighten as required.
- Check refrigerant charge, operating pressures, temperatures and oil pressure.
- Inspect all fittings, etc. for refrigerant leaks.

Three Yearly (3Y)

- Check all anti-vibration mounts and anchors are secure. Tighten as required.
- Examine cladding, insulation and vapour barriers for damage and condensation.

COMPUTER ROOM PROCESS COOLERS

Compressor

- Check suction pressure
- Check discharge pressure
- Check HP and LP safeties
- Check and record compressor amps

Supply Air Fans

- Check vee belts for wear
- Check fan bearings for excess temperature/noise
- Check and clean air filters
- Check evaporator coil condition
- Check and clean condensate tray
- Check and clean condensate drain
- Check and record fan motor amps
- Check reheat operation

Humidifier

- Check electrode condition
- Check water strainers
- Check and record humidifier amps
- Check water solenoid
- Check flush cycle operation

Condensers

- Check condenser coil condition
- Clean condenser coils
- Check fan speed controller operation
- Check and record fan motor amperage

Electrical, Controls and Alarms

- Check and record air temperature set point
- Check and record humidity set point
- Check and record air off temperature
- Check and record air on temperature
- Check and record actual humidity
- Check filter condition

General

- Check unit is generally clean
- Check for corrosion and advise if treatment required
- Check general site cleanliness

GAS TRAIN AND BURNERS

Three Monthly (3M)

- Inspect air inlet to burner for blockages.
- Check gas pressure.
- Check flame shape and colour.

Yearly (Y)

- Clean combustion air fan blades and air inlets. Check air control damper position matches burner rating. Lock air flap if adjustments are made.
- Clean burner air diffuser and gas nozzle. Check air disc position matches rating.
- Check pilot and main gas trains for leaks.
- Clean and check ignition electrode for wear and cracks (including probe). Reset electrode if required. Clean cell viewing head if UV cell fitted in lieu of probe.
- Check burner operating sequence with gas shut-off. Observe ignition spark. Check flame signal is reliable with gas on.
- Check air pressure switch setting and burner lockout.
- Check and adjust main and pilot gas governors if required.
- Check combustion efficiency by flue gas analysis, CO and CO₂ on main flame. Adjust air gas mix if required (9% CO₂ + 4.5% O₂ is acceptable, ratio CO to CO₂ must not exceed 0.02).
- Check covers and locking devices are secure. Test burner operation.
- Check all control settings and safety limits.
- Clean labels, identification markers and manufacturer's name plate markings.
- Remove terminal box cover and ensure terminations and connections are mechanically and electrically sound.
- Test earth continuity and effectiveness, and record results.
- Test running currents, supply voltage and record results.
- Test insulation resistance of windings and record results.
- Lubricate bearings to manufacturer's instructions if required.

Three Yearly (3Y)

- Check burner fan motor bearings, seals, etc. and renew as necessary.
- Check damper linkages for slack and wear.
- Remove end plates and check rotor and state of pole faces for signs of wear and magnetic out of balance. Inspect windings.

GAS PIPEWORK

Yearly (Y)

- Check pipework supports and earthquake restraints for security.
- Check condition of colour coded paintwork and pipe labels.

Five Yearly (5Y)

- Leak test pipework at 1.5 times working pressure over 15 minutes. No discernable drop in pressure should be detected. Brush all joints with 2% Teepol in water solution and leave five minutes.

HEAT EMITTERS AND ASSOCIATED EQUIPMENT
(Radiators, Radiant Panels, Unit Heaters, Convectors etc.)

Six Monthly (6M)

- In season, check equipment is producing heat. If not, check isolating valves and vent for any air build up.
- Examine isolating, regulating and control valves, air cocks and local pipework for leaks and corrosion. Repair as necessary.
- Check settings on thermostatic radiator valves.

Yearly (Y)

- 1. Examine wall fixings and panels, repair and tighten as necessary.
- Check unit heaters for obstruction to inlet and outlet.

Three Yearly (3Y)

- Remove unit heater panels and inspect for cleanliness. Vacuum casing and coils if necessary.
- Check fins for bypass. Comb fins if required.

Five Yearly (5Y)

- Check radiators and panels for corrosion. Repaint or repair as necessary.
- Check heat outputs and rebalance system, if required.

FUME CUPBOARD

Three Monthly (3M)

- Check side inlets for air obstruction.
- Check operation of fan.

Six Monthly (6M)

- Check operation of sliding door.
- Check operation of all services within the cupboard and duplicate controls mounted on the exterior.

Yearly (Y)

- Check fume cupboard housing for cracks.
- Check all fittings for tightness and operation.
- Check direction and velocity of air flow with door up and down.
- Check ductwork and fans at access panels for signs of chemical accumulation. If chemicals present, wash down with approved solvent.

WARNING: Check with the fume cupboard operators that no harmful chemicals are in the extract system. If such chemicals are present, take appropriate precautions.

VARIABLE AIR VOLUME CONTROL BOXES

Yearly (Y)

- Check thermostat maximum and minimum voltages settings.
- Check thermostat temperature calibration.

Three Yearly (3Y)

- Reset control thermostat to minimum and maximum:
 - Check damper linkages move freely and check for wear and tear.
 - Check damper motor drive is firmly clamped to shaft and correctly positioned.
 - Check air flow increases when the thermostat is placed on minimum.

Five Yearly (5Y)

- Check box maximum and minimum airflows.

MEDICAL GAS PIPEWORK SYSTEMS

Monthly (M)

- Check manifold couplings and fittings for tightness and leaks. Replace any jointing materials if necessary.
- Check liquid traps, oil traps etc. Clean if necessary.

Six Monthly (6M)

- Change filter cartridges.
- Examine all pipe fittings, valves, etc. for leaks and damage. Repair if required.

Five Yearly (5Y)

- Examine all pipe fittings, hangers, anchors and brackets. Tighten and repair as necessary.
- Leak test all pipelines at 1.5 times their working pressure. Brush all joints with 2% Teepol in water solution and leave for five minutes.
- Leak test all outlet cocks. Replace if worn.
- Clean system as required.
- Check pipe identification and re-apply if necessary.

MEDICAL VACUUM SYSTEM

Weekly (W)

- Check pumps for excessive noise and vibration.
- Check liquid traps.

Six Monthly (6M)

- Check operation of system automatic controls.
- Examine all fittings, valves, etc. for leaks and corrosion. Repair as required.
- Check pump bearings and lubricate as per manufacturer's data.
- Check drive motor bearings and lubricate as necessary.

Yearly (Y)

- Check tightness of electrical terminals.
- Replace stuffing box packing as per manufacturer's data.
- Inspect all pipework for damage, security of hangers, etc.

Five Yearly (5Y)

- Return pump to manufacturer for overhaul.

HEATER BATTERIES

Yearly (Y)

- Check high limit safety thermostat setting and function. Check air pressure switch.
- Check tightness of electrical terminations.
- Check security of finned elements.
- Check and log run current.
- Check operation of fan proving switch.

Five Yearly (5Y)

- Check cleanliness of finned elements and heater battery housing. Vacuum clean if required.
- Check heater operating current.

STEAM HUMIDIFIERS

Monthly (M)

- Check low output lamp on full load. Replace cylinder should lamp remain on.
- Flush boiling vessel several times by manually.

Six Monthly (6M)

- Clean strainer disc fitted to feed water supply pipe.

Yearly (Y)

- Check condition of steam feed pipes, drain hoses, feed hoses, etc.
- Check condition of duct steam distribution pipe.
- Check condition of feed and drain valves. Dismantle and clean.
- Check operation of all signal lamps.

PANEL HEATERS

Monthly (M)

- In season, check equipment is producing heat.

Six Monthly (6M)

- Check setting on thermostats. Confirm operation.

Yearly (Y)

- Examine wall fixings and panels, repair and tighten as necessary.
- Check unit heaters for obstruction to inlet and outlet.
- Check high limit safety thermostat setting and function.
- Check tightness of electrical terminations.
- Check and log run current.

Three Yearly (3Y)

- Remove unit heater panels and inspect for cleanliness. Vacuum the casing and coils if necessary.
- Check fins for bypass. Comb fins if required.

Five Yearly (5Y)

- Check panels for corrosion. Repaint or repair as necessary.
- Check heat outputs and test system, if required.

ELECTRONIC AND ELECTRIC CONTROLS

Six Monthly (6M)

- Check time settings.
- Check setpoints.

Yearly (Y)

- System control check in conjunction with BMS supplier.(If applicable)
- Check alarms and safeties.

MECHANICAL SERVICES SWITCHBOARD

Three Monthly (3M)

- Visual inspection of internals for overheating.

Yearly (Y)

- Check operation of all starters, contactors and relays.
- Check overload setpoints and adjust as necessary.
- Check ratings on all fuses.
- Replace burnt out indicator lamps.
- Rectify chattering contactors.
- Check operation of variable speed drive starters and record the setting on the controls.
- Vacuum clean cabinets internally.

CONTROL PANELS

Three Monthly (3M)

- ❑ Check all indicating lights and replace faulty lamps.
- ❑ Visually inspect interior of control panel for any irregularities such as coil noise, terminal connections, loose cabling, and internal heating.

Yearly (Y)

- ❑ (N.B.) - This work should be carried out by a registered electrician.
- ❑ Check labels, trifoliate tallies, mimic diagrams, and circuit identity charts are in position and up to date.
- ❑ The mechanical action of switches, circuit breakers, contactors, relays and other control devices to ensure free movement, correct operation and simultaneous making and breaking of contacts.
- ❑ Check fuse, circuit breaker, and protective relays for fitting rating and class.
- ❑ Check overload settings, ensure correct operation.
- ❑ Check locks, interlocks and safety devices.
- ❑ Check instruments, meters, and measuring devices.
- ❑ Test visual and audible alarms.
- ❑ Test earthing arrangements.
- ❑ Check general cleanliness of cabinet interior and all electrical equipment.
- ❑ Lubricate switch mechanisms, circuit breakers, contactors and control devices to manufacturer's instructions.

Three Yearly (3Y)

- ❑ Check cable supports and fixing.
- ❑ Check the insulation of terminal wiring and ensure connections are mechanically and electrically sound.
- ❑ Test panel in accordance with part IX of N.Z. Wiring Regulations.

AUTOMATIC CONTROL SYSTEMS (with Variable Frequency Speed Controller)

Three Monthly (3M)

- Check accuracy of BMS time clock. Reset as required.
- Observe controls action for normal operation.

Six Monthly (6M)

- Check and test operation of alarms.

Yearly (Y)

- Check operation of all control items - thermostats, air quality sensors, controllers, motorised dampers, valves, etc.
- Check sequence of all control systems.
- Recalibrate all control systems.
- Check static pressure controllers. Recalibrate if necessary
- Check 'Fire Shutdown' with Fire Services.
- Check tightness of electrical terminations in fan speed controllers.
- Remove speed controller filter and vacuum.

Three Yearly (3Y)

- Vacuum inside of speed controller, clean fan blades.