INFORMATION SHEET 1

Jackson Engineering Advisers are specialist Building Services Engineers.

This information sheet is offered as an aid to Building Owners and Managers as a guide to plant life expectancies. We trust you will find it of value.

Please contact us if you require assistance with:

- Building Services Plant Condition Audit.
- Building Services Plant Operational Audit.
- Continuous Commissioning programme – (Building Performance Management).

PLANT LIFE EXPECTANCY

When dealing with existing buildings and their Building Services plant and equipment it is essential that the future life expectancy for an individual item of plant is considered and understood.

In order to estimate the future life expectancy for items of plant and equipment it is important to consider the following:

This could be achieved by undertaking a building survey focusing on the following:

- Visual survey of the physical condition of the plant in operation.
- Benchmarking plant performance against an appropriate performance standard (i.e. end user comfort levels, energy usage, etc.).
- Review of the existing service and maintenance records or discussion with the existing service provider.

Such reviews would enable an engineer to assess the plant condition and estimate the remaining life expectancy before there is a significant increase in the risk of plant failure.

FACTORS THAT INFLUENCE LIFE EXPECTANCY

The table below provides indicative life expectancies for typical items of plant and equipment found within most buildings. However during the life cycle of a system there are many other factors that can influence the actual life of a system component, such as:

- External Environment – Polluted atmospheres due to urbanisation or proximity to airports, motorways, exposure to severe elements, and coastal conditions - i.e. salt-laden air which exists in many New Zealand locations.
- Internal Environments – Ideally these need to be dry and corrosion free.
- Technology Changes – System and equipment advances may reduce the life expectancy particularly where installed systems become unsupported by manufacturers due to next generation advances and older technologies becoming obsolete. A recent example of this is the rapidly developing VRF / VRV technology (Variable Refrigerant Flow/Volume systems).
- Design and Specification – Commercial buildings, especially those constructed in the 1980's, may show significant variations between the original design intent and the actual conditions / performance observed. This can result from changes in use, building fit-outs, poor maintenance and changes in end-user.

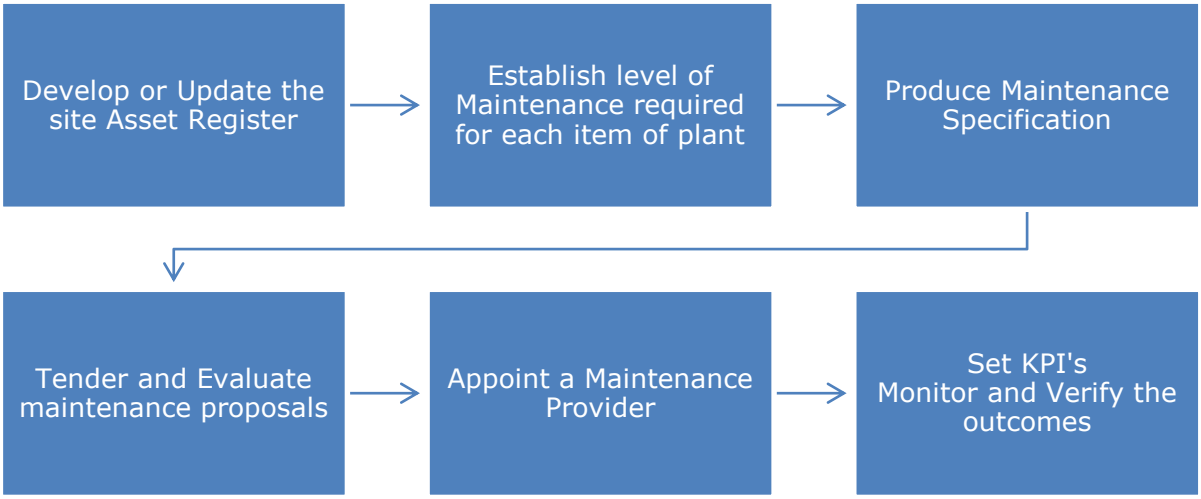
- Unoccupied / Closed-down Buildings – Where systems have been out of action due to buildings being unoccupied. E.g. electric motors can absorb moisture when left off for long periods, causing issues and possible failure when they are restarted.
- Maintenance – If the standard of maintenance has not been provided in accordance with the minimum standard maintenance criteria and manufacturers recommendations.
- Hours of Operation – The indicative figures referenced in the life expectancy table are based on a 12-hour operational day 5 days per week and 8 hours during a weekend period. Plant serving extended hours facilities such as call centres, data centres etc. will have a correspondingly shorter lifespan
- Installation Quality – The indicative figures referenced in the life expectancy table assume a high standard of installation and quality control has been implemented. Including adequate space allowance to facilitate proper maintenance.

ACTIONS TO MAXIMISE LIFE EXPECTANCY OF BUILDING SERVICES PLANT & EQUIPMENT

With a focus and emphasis on existing buildings the key to maximising Building Services plant life expectancy is maintenance. Without appropriate and adequate levels of maintenance, significant increases in unforeseen failures and a consequent reduction in operating life can be expected.

Adopting a suitable maintenance policy / strategy will not only improve life expectancy, it will ensure that standards are maintained within the following areas: health & safety (i.e. legionella, refrigerants, etc.), energy use, environmental conditions & energy efficiency.

SIX steps to good maintenance:



For further information / advice regarding plant life expectancy or maintenance contract procurement contact Jackson Engineering Advisers Ltd.

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INDICATIVE LIFE EXPECTANCIES (MECHANICAL SERVICES ONLY)

Source: Chartered Institute of Building Services Engineers (CIBSE) – Guide M

EQUIPMENT ITEM	INDICATIVE LIFE (YEARS)	GENERAL REMARKS & COMMENTS FROM RECENT EXPERIENCE
HEATING SOURCE		
Boiler Plant	20-25	Water treatment is very important. Boiler failures can occur within 5 years unless appropriate water treatment & condition monitoring is undertaken
Boiler Electrodes / Combustion Controls / Instrumentation	8-12	High level of regular maintenance required
Dosing Pots / Fans (High Temp) / Flue (Mild Steel) / Water Treatment Equipment	15	Flue (Mild Steel) - depends on Thickness of Metal and Corrosion Protection
Flue (Stainless Steel)	30	Check Quality of Stainless Steel
Gas Burners	15-20	High level of regular maintenance required
Gas Distribution System for Boiler Plant	40	
COOLING SOURCE		
Chillers (Centrifugal / Reciprocating / Absorption / Screw)	20-25	Maintenance costs may depend on availability of refrigerants such as R11 or R22
Air Cooled or Evaporative Condensers / Dry Air Coolers	20-25	Dry air coolers - Consider thickness/quality of galvanising Condenser coil treatment and regular washing is essential in coastal environments such as Auckland and Wellington. Failures of untreated coils have been witnessed within 5 years of installation Chiller frame corrosion can also be an issue
Stainless Steel / Ceramic - Cooling Towers	30-35	Higher capital cost
Timber Construction / Galvanised Metal / Epoxy Treated Metal - Cooling Towers	10-15	Quality of timber preservation can extend life / Consider thickness / quality of galvanising
Plastic Construction / Plastic Coated Metal - Cooling Towers	20-25	Consider thickness / quality of plastic Consider thickness, bonding / quality of plastic coatings

WATER INSTALLATIONS		
Chilled Water Storage Vessel (Galvanised / Copper / Mild Steel)	20	Galvanised not suitable for soft water or softened water
Plate Heat Exchanger	15	Subject to regular cleaning
Shell and Tube Heat Exchanger	25	
PUMPS		
Base Mounted / Centrifugal / Commercial Circulating (Dual Type)	20	
Boiler Feed Pumps / Pipework Mounted Circulating Pumps	15	
Condensate Circulating Pumps / Glandless Circulating Pumps	10	
PRESSURISATION SYSTEMS		
Chilled Water / Heating / Combined Heating & Chilled Water	20	
Expansion Vessel (Unvented Hot Water)	15	
PIPEWORK SYSTEMS & COMPONENTS		
Bellow: Expansion (Steel) / Flexible (Steel)	10	
Bellow: Flexible (Rubber)	8	
Condensate Pipework System / Condensate Collection Vessel	12	Consider type of material, wall thickness and water treatment
Expansion vessels - Open	10	
Expansion vessels - Closed (with Membrane)	15	
Pipework: Copper (open or closed)	45	Consider tube thickness and quality of copper.
Pipework: Steel (open or closed)	25	
Pipework: Galvanised Steel (closed)	35	
Pipework: Galvanised Steel (open)	25	
Pipework: Refrigerant Pipework Systems	30	
Pipework: uPVC	20	Small bore uPVC can become brittle with age, especially where used as condenser water e.g. Hydronic units

WATER SOFTENERS:		
Base Exchange	30	
De-Alkalisation / De-Ionisation	20	
Water Treatment Plant	15	
INSULATION		
Pipework / Ductwork / Tank (Moulded or Blanket Type)	30	Consider fire and smoke rating Some closed cell foam insulation is breaking down before this time, especially if continuously wet, such as 24/7 chilled water plants
Fire Insulation (Intumescent) for Pipes and Ducts	20	Inspection for damage required at frequent intervals
VALVES		
Commissioning / Supply-Side Shut-Off / Mild Steel	25	
Motorised Control Valves / Glands	15	
Motorised Control Valve Actuators	10	
Cast Iron / Copper	30	
Glandless	20	
TERMINAL UNITS		
Radiant Heaters (Hot Water)	20	
Aluminium / Steel / Cast Iron - Radiators	20-25	Water condition & materials in the system are important
Radiator Paint	5	Use correct type of paint
Underfloor Electric Heating	20	
Underfloor Heating by Plastic Pipes (Concrete Encased)	30	Suggest a long-term bonded warranty is obtained; Consider quality of plastic pipe
Chilled Ceiling Panels	25	Flexible water pipework connections 10 years (depending on type)

Chilled Beams / Induction Units / Reheat Units	20	Flexible water pipework connections 10 years (depending on type)
Computer Room Air Conditioning / Double Duct Terminal Units / Fan Coil Units / VAV Units /	15	FCU's & VAV boxes often exceed this time if well maintained
Split Systems / VRV or VRF Units	10	Redundant technology and/or corrosion issues can reduce life expectancy below 10 years. VRV / VRF systems can suffer from poor installation (pipework leaks, poor evacuation etc.) and poor maintenance or remedial work Outdoor unit coil treatment is essential in coastal environments
Fans - Axial / Roof Mounted Units	15	Life likely to be reduced if fan motor in air stream
Centrifugal Fans	20	Life likely to be reduced if fan motor in air stream
Propeller Fans	10	
DUCTWORK INSTALLATIONS:		
Galvanised Ductwork (Rectangular and Circular)	40	
Plastic / Flexible Ductwork	15	Expansion / risk of mechanical damage to be considered
Attenuators	25	Consider type of lining, adhesive and fixing of acoustic material
Coils (Aluminium Fins)	15	Consider quality and thickness of aluminium fins and exposure to adverse and wet external conditions Coil treatment essential for coastal environments
Coils (Copper Fins)	25	Consider operational duty (Wet surfaces)
Coils (Electric)	10	Will typically last longer if air is well filtered & coils are kept clean
Dampers (Automatic / Manual)	15-20	May be less for outside air dampers in wet / coastal environments

External Louvres (Steel Painted / Anodised Aluminium)	20-25	Early signs of corrosion must be dealt with. Regular cleaning is important to avoid possible breakdown of surface coating
Filters (Automatic / Electrostatic / Activated Carbon / Panel)	15-20	Excludes media
Filters (Primary Washable)	10	8 hours/day; 5 days/week
Filters (Primary Disposable)	0.5	8 hours/day; 5 days/week
Filters (Secondary Pleated and Bag Types)	1	8 hours/day; 5 days/week
Filters (High Efficiency Particulate Arresting (HEPA))	2	8 hours/day; 5 days/week
Fire Dampers (Curtain Type)	10	Must be cleaned and checked for corrosion. Drop testing mandatory
Grilles and Diffusers (Anodised Aluminium / Painted Metal)	25-30	
Extract Hoods	30	
Thermal Wheels	15	
Steam Humidifiers (Electric / Direct)	8-10	Maintenance is very important. Scale & corrosion issues with Hard water will reduce life
PACKAGED AIR HANDLING/CONDITIONING UNITS:		
External	15	Consider type of corrosion protection Life may be less in coastal environments
Internal	20	
Terminal Units (Air Systems)	25	
CONTROLS		
BMS Head End (Supervisor) / Operating System	5	Regular software updates are required
BMS Outstations / Plant Controller Remote Display Panels	10	Redundancy due to technology advances can be an issue
BMS Communications Network (Hardwiring)	25	Should be 'Future proofed' with additional cable wireways
Electric Controls	20	

Electronic Controls / Hydraulic Valve Actuators	10	
Sensors	8	Periodic loop tuning and calibration should be considered
Control Valves / Control Dampers / Variable Speed Drives	15	
Pneumatic Controls - Air Compressor / Pneumatic Controls / Dryer / Receiver / Valves, Connections	20	
Pneumatic Valve Actuators	15	
Electronic or Pneumatic Interfaces / Hydraulic Valve Actuators	10	
Gas / Refrigerant - Leak Detection	10	
Water Leak Detection	15	