

Schedule Title : Packaged Chiller Units

Schedule Ref : 09-02
 Schedule Type : Core
 Schedule Date : 09 Dec 2015
 Schedule Version : 3.0.0
 Unit of Measure : Nr

TASK FREQUENCIES (SERVICE TIMINGS)				
3M (120 mins)		12M (180 mins)		Not Specified
1	2	5	6	7
8	9	10	11	12
13	18	19	20	3
4				
14	15	16	17	

ANNUAL TIMING (MINUTES)
660

SCHEDULE INTRODUCTIONS

WARNING

Chiller units may be operated remotely and it is essential that the equipment be isolated at source before commencing any maintenance work. These notes should be read in conjunction with the manufacturer's recommended maintenance procedures and in particular supplementary work may be required in the case of larger units above 50kW. Many packaged water chillers have microprocessor controls that can be interrogated using passwords. The password is usually at two levels, level one for interrogation and level two for alterations. For service work, access to level one is required. These processors can be used for diagnostic purposes and coupled to pressure transducers can also give pressure readings.

Where the installed power on the refrigeration system exceeds 25kW, a Written Scheme of Examination may be required to comply with the current Pressure Systems Safety Regulations.

Personnel carrying out leak checking, gas recovery or other refrigerant handling activities such as plant installation and maintenance must have a suitable refrigerant handling qualification. These works are covered under the current F-Gas Regulations on fluorinated gases.

The equipment that contains an F-Gas above a certain threshold is to be checked for leaks at specific intervals.

The table below sets out the following information:

- F-Gas thresholds, in tonnes CO2 equivalent, at which leak check intervals are specified.
- Maximum allowed interval between leaks checks for equipment that meets each threshold
- Quantities of commonly used HFC's equal to each threshold

Maximum interval between leak checks:

	CO2 (tonnes)	HFC 134A (kg)	HFC 410A (kg)	HFC 407C (kg)	HFC 404A (kg)	HFC 23	HFC 227ea
1 Year	5	3.5	2.4	2.8	0.2	0.3	1.6
6 Months	50	35	23.9	28.2	2.2	3.4	15.5
3 Months	500	350	239	282	22	34	155

ALWAYS UPDATE RECORDS.

Please refer to the overarching introduction (SFG 00-01) to make sure you are of the correct skill level as indicated within the task schedule to carry out the described works. Ensure you have read and understood the manufacturer's recommendations, carried out risk assessment(s) on each item of plant to identify the correct frequency of maintenance, identified all safety procedures that need to be applied and recorded in order to carry out the work in a safe and reliable manner.

Notes:

The person undertaking the leak test must determine whether the equipment is to be tested under task 3 or task 4 of this schedule depending on the refrigerant used in the system.

SCHEDULE TASKS

Display Order	Item	FQ	Action	Notes	Skilling
1	Status	3M	Check operating status.	<p>Before undertaking the work, check with the building manager that the system does not serve a heat sensitive area such as a computer room. If it does, confirm with the building occupants that they are aware that work is being carried out.</p> <p>Do not only rely on the microprocessor readouts, always check against calibrated equipment if in doubt.</p>	Refrigeration Engineer
2	Refrigeration circuits	3M	Check circuit pressures and superheat temperatures. Check alarm and run lights and remote alarm lights associated with packs.	<p>Refrigeration chillers should be alternated at least every three months by means of the 'lead/leg' selector switch. Where operating information is displayed on central console, check that no discrepancies exist between display and master gauges, if these do occur report and change transducer(s). For non-electronic systems check installed gauges against master gauges.</p>	Refrigeration Engineer
3	Refrigerant Leak Testing (HCFC Gases)		<p>The equipment must be checked for leaks:</p> <ul style="list-style-type: none"> every 12 months if it's 'charged' with (contains) 3kg or more HCFCs and isn't hermetically sealed every 12 months if it's charged with 6kg or more HCFCs and is hermetically sealed every 6 months if it's charged with 30kg or more HCFCs every 3 months, if it's charged with 300kg or more HCFCs 	<p>The use of HCFCs in new equipment was banned in 2001. From 1 January 2015 the use of 'recycled' and 'reclaimed' HCFCs to top-up or service existing equipment is also banned.</p> <p>Old equipment can still be used, but no work that involves breaking into the refrigerant circuits can be carried out.</p> <p>Any leaks found must be repaired within 14 days and the equipment checked again within 1 month to ensure the repair has been effective</p> <p>Do not overlook remote condensers and pay particular attention to bolted joints, sight glass stands and atmospheric relief valve vent.</p>	Refrigeration Engineer
4	Refrigerant Leak Testing (HFC Gases)		<p>The equipment that contains an F-Gas above a certain threshold is to be checked for leaks at specific intervals.</p> <p>The thresholds at which leak check intervals are specified are</p>	<p>Where a system has a refrigerant charge equivalent to or greater than 500 tonnes of CO₂, an automatic leak detection system must be installed on the system to comply with the F-Gas</p>	Refrigeration Engineer

Display Order	Item	FQ	Action	Notes	Skilling
			<p>expressed in terms of CO2 equivalent.</p> <p>They take into account both the quantity of F-Gas in the equipment and the global warming potential of the F-Gas (how much the F-Gas contributes to global warming).</p> <p>The table detailed in the Schedule Introduction sets out the following information:</p> <ul style="list-style-type: none"> F-Gas thresholds, in tonnes CO2 equivalent, at which leak check intervals are specified. Maximum allowed interval between leaks checks for equipment that meets each threshold Quantities of commonly used HFC's equal to each threshold. 	<p>Regulations.</p> <p>If a system that automatically detects leaks is installed, the maximum interval between leak checks is doubled. For example a system that contains F-Gas equivalent to 5 tonnes CO2 only requires testing once every 2 years if a leak detection system is fitted.</p> <p>You can find out global warming potentials of other F-Gases in the List of F-Gases regulated by the EU and use global warming potentials to calculate the CO2 equivalent of a F-Gas on the www.gov.uk web site.</p>	
5	Expansion valves	3M	Adjust if necessary.	Only by a competent technician.	Specialist
6	Chilled water supply	3M	Check supply and return water temperatures.	Abnormal temperatures can be a sign of low refrigerant or poor heat rejection.	Refrigeration Engineer
7	Glycol	3M	Check glycol concentration in chilled water.	If concentration has fallen check pipework for leaks as per item for 'Leakage'.	Refrigeration Engineer
8	Chiller water flow rate	3M	Check that this is in accordance with the manufacturer's recommended figure.		Refrigeration Engineer
9	Leakage	3M	Check all equipment and pipework for oil and water leaks and rectify.	<p>Check for leaks should be part of the routine servicing.</p> <p>"Checked for leakage" means that the joints, valves including stems, seals, including seals on replaceable driers and filters, parts of the system subject to vibration, connections to safety or operational devices of the equipment or system is examined for leakage using direct or indirect measuring methods, focusing on those parts of the equipment or system most likely to leak.</p> <p>The frequency of testing depends on refrigerant charge and system type.</p>	Refrigeration Engineer
10	Refrigerant pipework	3M	Inspect and check for vibration, chaffing, security and leakage.	Vibration is usually the result of loose or inadequate fixing of pipe supports and can give rise	Refrigeration Engineer

Display Order	Item	FQ	Action	Notes	Skilling
				to leakage of refrigerant.	
11	Standby circuits	3M	Check operation.		Refrigeration Engineer
12	Flood alarm	3M	Check operation.	If serving computer facilities, check that alarm is not connected to computer shut-down system.	Refrigeration Engineer
13	Digital readouts	3M	Check operation.		Refrigeration Engineer
14	Controls	3M	Check operation of temperature control thermostats. Inspect electrical panel and components for wear especially the compressor contactor(s). Check operation of safety thermostats and timers.		Specialist
15	Hours run meter	3M	Check and record.		Refrigeration Engineer
16	Insulation	3M	Check condition and make good any defects however small.	Poor or faulty insulation can lead to loss of efficiency and energy wastage.	Refrigeration Engineer
17	Condensers	3M	Carry out routine maintenance.	For further guidance see Condensers - Water Cooled (SFG 13-01).	Refrigeration Engineer
18	Electrical	12M	Check for damage to flexible conduits. Tighten all terminal connections. Isolate control panel and inspect for signs of overheating. Check integrity of electrical insulation.	Include pump motors, see Motors (SFG 39-01).	Electrical
19	Safety cut-outs	12M	Check all safety cut-outs including high and low pressure safety cut-outs and the antifreeze thermostat cut-out for operation and correct calibration.	Individual machines vary, cut-outs could include: i) oil differential switches ii) oil, high and low temperature iii) water temperature differential switches on chillers and evaporators.	Refrigeration Engineer
20	Pump strainers	12M	Check condition.	Check waterside pressure drop across the heat exchanger(s) for fouling.	Refrigeration Engineer

SCHEDULE LEGISLATION

<http://www.legislation.gov.uk>

F-Gas Regulation No. 517/2014 on fluorinated gases

<http://www.legislation.gov.uk>

The Fluorinated Greenhouse Gases Regulations 2015

<http://www.legislation.gov.uk/ukxi/2002/1267/contents/made>

Pressure Equipment Regulations 1999 and 2002 amendment