



# How to ensure your equipment is correctly maintained

Correctly maintaining your refrigeration equipment can save you energy and money, as well as reducing downtime. This guide should help you ensure your maintenance arrangements maximise energy efficiency and minimise costs.

All refrigeration equipment needs to be serviced to repair faults, and maintained to prevent faults before they happen. Appropriate plant maintenance will save you money through reduced energy bills, reduced service costs and less plant downtime. Appointing a good maintenance contractor is the key to achieving these savings.

## The business case

Good maintenance saves money by:

- maximising plant efficiency and therefore reducing electricity costs

- reducing equipment failure and the costs associated with plant downtime and stock or product loss.

The cost of a suitable maintenance contract depends on the complexity and size of the system. Typically the annual maintenance cost is between 2% and 5% of the original capital cost of the plant, but you're likely to save up to 10 times the maintenance cost through greater energy efficiency. In addition you can also reduce service costs and lost production costs.

**Figure 1** Maintenance checklist

<b>Condensers</b>	Clean them regularly, especially air cooled types. The frequency of cleaning will depend on the condenser location and its surrounding environment. Check fan / pump motors all work. Check fans are not loose on motors.
<b>Compressors</b>	Carry out standard maintenance if required. Recover oil and recharge compressors as necessary (ammonia systems).
<b>Air coolers</b>	Clean them regularly. Check the defrost (where necessary) is working correctly. Check the defrost control allows the optimum time for defrost. Check fan / pump motors all work. Check fans are not loose on motors.
<b>Liquid chillers</b>	Check water pump operation.

<b>Refrigerant charge</b>	Check liquid level in receiver or check for bubbling in the liquid line sight glass. Check for leaks all round the system and repair (this is required under the F Gas Regulations – for further information on key obligations see sheet RAC 3 on <a href="http://www.defra.gov.uk/environment/quality/air/fgas/srac">www.defra.gov.uk/environment/quality/air/fgas/srac</a> )
<b>Liquid line filter drier</b>	Check for blockage and replace if necessary.
<b>Control</b>	Ensure the discharge pressure is as low as possible – in particular check that Head Pressure Control Settings are not too high. Check that the suction pressure is as high as possible. Check cold room / process temperature set points - they should not be lower than required. Check superheat setting of expansion valves and adjust if necessary.
<b>Insulation</b>	Replace suction line insulation if necessary. Replace chilled liquid line insulation if necessary. Repair or replace cold store insulation if necessary.
<b>Cold store doors</b>	Ensure doors are not left open unnecessarily. Repair or replace door seals if necessary. Repair or replace strip curtains if necessary. Repair or replace air curtain if necessary.

### Examples of savings from good maintenance:

Cleaning condensers and evaporator can reduce energy consumption by up to 10%;

Finding and repairing leak and correcting the refrigerant charge can reduce energy use by up to 15%. See the retail [Refrigeration Road Map \(CTG021\)](#) for more information.

There are four main types of service and maintenance contract, as shown in *Figure 2* and explained in more detail in *Figure 3*.

**Figure 2** Main maintenance and service contract types

Contract type	Impact on energy efficiency
Labour and maintenance	
Fully comprehensive	
Maintenance only	
Pay as you go	

**Figure 3** Details of maintenance and service contracts

Type of contract	What's included	Advantages	Disadvantages
Labour and maintenance – semi-comprehensive 	All reactive service visits and all planned maintenance visits. Excludes all parts. Sometimes calls out of hours are chargeable.	Possibly the best option as the contractor concentrates on maintenance and will make suggestions about your plant knowing that he does not have to pay for part replacement out of his budget. The best option for energy efficient plant operation.	You do not have total control over the budget.
Fully comprehensive 	All reactive service visits and all planned maintenance visits. All parts and materials. Sometimes excludes refrigerant and/or compressors.	Appears the highest cost option, but could be the most cost-effective. It does allow you to budget for the year.	The older your equipment, the higher the cost will be. The contractor takes all the risk so will not necessarily spend the money required to keep your plant running at its optimum, especially if the contract runs over budget or is close to renewal.
Maintenance only 	All planned maintenance visits and materials. Reactive service visits and materials are chargeable.	A good option on new plants where the emphasis is on maintenance.	Careful control needs to be exercised on the control of material expenditure.
Pay as you go 	All chargeable.		Careful management of the contractor is required. You need to make sure that you budget for planned maintenance. This looks the cheapest option, but will be the worst for system efficiency – regular maintenance is very important.

### Contractor selection

Be prepared to spend time on the appointment process. Time spent at this stage improves the effectiveness of the contract and should reduce your refrigerant system's running costs.

The various steps you should take when selecting a service and maintenance contractor are shown in *Figure 4*.

**Figure 4 Selection checklist**

Considerations	Comments
Decide on the contract type and duration.	The type of contract you choose will have an impact on the running costs of your plant as well as the contract cost. The duration of the contract is important. It is recommended that contracts are awarded on at least a three-year rolling programme to enable the contractor to make investments which will benefit your equipment.
Decide what capital works the service and maintenance contractor will do.	If appropriate, include capital works related to efficiency improvement in the service and maintenance contract. This gives an incentive to carry out improvements which will reduce energy consumption. High-cost improvements or replacements should always be tendered separately.
Clearly specify your requirements related to energy efficiency.	Make it clear that energy efficiency is important. State in your specification that you want to include energy efficiency in the contract.
Decide how many contractors you will appoint. Set the budget.	If you have a large site or you're a multi-site organisation, you may want to consider appointing more than one contractor to make sure that there is a clear division of work. This will give you greater flexibility if you need to reallocate contracts and stop contractors becoming complacent.
Identify potential contractors.	You should contact as many potential contractors as possible. You can find them through word of mouth, from other organisations, the RAC Yearbook (published by EMAP), Yellow Pages, the internet or the British Refrigeration Association.
Prepare pre-tender questionnaire and carry out pre-tender screening.	You need to ensure that potential contractors understand that low energy costs are a priority. To do this you should ask some key questions before the tender process begins. This allows you to set your budget and decide additional needs such as monitoring.
Decide criteria for selection of contractor(s) and prepare a tender document.	Draw up a tender document which clearly identifies what work is included and on what basis. Include refrigeration equipment electricity consumption as a Key Performance Indicator (KPI). Make sure this takes into account ambient temperature and load as both have a significant effect on power consumption.
Interview qualifying contractors.	Interview as many potential contractors as possible (who have passed the pre-tender screening process). One key question to ask the potential contractors is whether they can demonstrate a successful strategy for reducing power consumption of refrigeration equipment. You should also ask whether they are aware of the Real Zero leak reduction principles. Give potential contractors access to the refrigeration equipment to ensure they are able to tender to your exact requirements.

Experience has shown that it is possible to reduce running costs by up to 15% by re-commissioning equipment, especially multiple compressor systems. Include this in your maintenance contract. Data from re-commissioning can help identify where your system could be improved.

Detailed information on the tender process can be found in the Food and Drink Federation guide on appointing and managing refrigeration contractors (obtainable from [www.ior.org.uk](http://www.ior.org.uk)).

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## Auditing checklist

You'll need to audit the contractor's work occasionally to check maintenance is being carried out to the required standard. You can do a visual audit on the work done by service and maintenance contractors even if you are not a refrigeration engineer. For a more detailed audit an independent refrigeration expert should be used. You can find independent consultants to audit plant through the Institute of Refrigeration.

## Next steps

Identify the type of maintenance and service contract that you currently have, and check when the contract is due for renewal. Then follow the guidelines given above on Contractor Selection to select the best type of maintenance and service contract for the equipment you have and to find a suitable contractor.

## Finding a supplier

Many companies can provide service and maintenance. The British Refrigeration Association maintains a list.

## British Refrigeration Association

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[www.feta.co.uk](http://www.feta.co.uk)

See the Carbon Trust website at [www.carbontrust.co.uk/](http://www.carbontrust.co.uk/) refrigeration for further information to help you make your refrigeration more energy efficient.