

Why Do my HVAC Systems Breakdown on the Hottest Sunday of the Year?

Ever notice that problems with the mechanical equipment in your building always seems to breakdown at the worst possible time from both a convenience and cost perspective. Well there is actually a reason for this phenomena, beyond the simple explanation of Murphy's Law.

HVAC systems are complicated pieces of machinery that include pumps, compressors, electric motors, fans, heat exchangers, sophisticated electronic controls and many esoteric refrigeration parts. Modern HVAC systems work well for many years when they are well maintained and sized correctly for their application.

However, when HVAC systems are not maintained properly, they start to have to run harder than they were designed to run. For example, if the cooling coils that transfer heat from the inside of your building to the unit's refrigerant are like the radiator of your car. If they get covered in dirt they cannot transfer heat efficiently. Therefore, less heat is transferred, so to give the same amount of cooling the unit must run longer. Similarly if the coils that transfer heat from the refrigerant to the outside are dirty, less heat is transferred from the refrigerant to the outside, which means the refrigerant stays hotter. Hotter refrigerant cannot absorb as much heat from the inside of the building which means again that the system must work longer. Soon your equipment is working much harder and longer than it was designed to do.

Now throw in a hot summer's day, which your equipment was probably specified to barely be able to handle when running at peak efficiency and the equipment breaks down. The fact that it happens on a Sunday when everyone's at home and an emergency repair call is billed at double time is truly Murphy's law.

The key to reducing these kind of annoying calls is to have a proper Preventative Maintenance Program for your equipment. These programs will save you significant dollars not only on your repair budgets but by making your equipment last longer, also on your capital replacement budgets.

What is Preventative Maintenance?

Preventative Maintenance (PM) on HVAC and ventilation equipment usually falls into two categories, major and minor inspections. Basic programs consist of two major and two minor inspections so that equipment is serviced quarterly.

Minor Inspections include simple mechanical tasks like changing air filters and fan belts as well as visual and aural inspections of equipment for abnormal operation. Clues like noisy bearings and oil leaks can be followed up to find potential trouble spots. It is often tempting to use in-house staff to do minor inspections to save money. While in-house inspections can work well, building owners should be aware of two potential pit falls. First, maintenance on equipment that is not in plain sight is an easy task to postpone so often key tasks like changing air filters are not done according to the proper schedule. Second, while it is not hard to change air filters it does take an educated person to properly do the visual and aural checks, so in-house staff must be trained on maintaining the equipment or vital clues to problems will be missed and small problems will turn into large ones.

Major Inspections are more complex and should only be done by certified personnel. Typical PM programs will include two Major inspections, a Heating Inspection in the fall, and a Cooling Inspection in the Spring. Major inspections include checking heat exchangers, gas burners, cooling coils, compressors and refrigerant pressures.

More Comprehensive Preventative Maintenance programs including cleaning of any equipment that use coils to transfer heat either cooling or heating. The efficiency of any type of heat exchange requires that air can flow over such coils and any type of dirt can seriously effect the operation of HVAC equipment causing it to not only run inefficiently but also to run at higher rates and pressures which will damage the equipment.

Why do Preventative Maintenance?

The major reason to do Preventative Maintenance is that it will save money in the long run in a number of ways.

Equipment will run more efficiently

- Equipment that runs efficiently uses less energy so you will save money on both your gas and electrical bills
- Equipment that runs efficiently will put less strain on the mechanical components so they will not break down as much and will last longer

Repairs will be caught when they are small

- All mechanical equipment will eventually need repairs, regular PM will catch mechanical problems when before they become large

Repairs will be caught when they can be dealt with in a cost-effective manner

- Repairs that are caught by your PM program can usually be fixed on the same visit or at the very least be scheduled for repair during normal working hours
- Equipment that fails often fails outside of regular hours and usually when it is stressed by environmental conditions. For example, cooling equipment invariably fails on the hottest day of the year. Although this phenomena feels like Murphy's law at work, it is actually because the equipment is having to work its hardest under these conditions. As a result your equipment will break down at the same time that similar equipment is breaking down all over the city. As a result equipment breakdowns are often repaired on overtime as technicians struggle to keep up with demand, resulting in even higher repair costs.

Equipment will last longer

- Our experience is that well-maintained equipment will last 5-10 years longer than equipment that is poorly maintained.

Repairs will be done Faster due to Technician Familiarity

- Most Service companies try to keep the same technicians working on your building so if you do need any repairs the technician will know your equipment and its history and will be able to trouble-shoot the problem much faster, saving time that would have been billed to you

Non-monetary Benefits

Environmental Benefits

- Properly maintained equipment will use much less energy and thus reduces the amount of greenhouse gases indirectly generated by your building.

Better Service

- Service companies give priority, and usually discounted rates, to customers that have PM contracts. If your equipment does fail on the hottest day of the year, you will get priority over other customers.

More Predictable Expenses

- Your budgeting will be much easier as the cost of the PM contract is known. Repairs will still be present, particularly with equipment that is old or has been neglected in the past, but it should be possible to do them in a systematic way. No worries about having to dip into contingency funds or do special assessments.

Types of Preventative Maintenance Programs

There are a number of different types of Preventative Maintenance Programs but we can group them into three categories, Basic, Comprehensive and Full Maintenance.

Basic Program

Basic programs are the minimum that should be done on any piece of equipment typically consisting of regular filter changes and inspections, and at least two Major inspections. Some companies include an annual belt change with their programs, others inspect the belts and replace them, if necessary, as an extra charge. A good basic maintenance package will give you most of the benefits of a PM program at the lowest price. The extra features of a Comprehensive plan, such as cleaning, can always be added with an extra charge.

Comprehensive Programs

Comprehensive programs include everything in the basic plan plus cleaning of all the units.

Full Maintenance Programs

Full Maintenance programs go beyond Preventative Maintenance to encompass not only all maintenance but also all repairs to the equipment. Essentially for a monthly fee you are buying the piece of mind that your HVAC equipment will be operating.

There are a number of advantages to a Full Maintenance Program, including:

- Cost certainty – you get no surprises on your annual HVAC costs, any risk of major breakdowns is the service providers
- Less Breakdowns – it is in the service provider's best interest to make sure there are no breakdowns, Full Maintenance Sites get excellent Preventative Maintenance and the best quality parts
- Quicker Repairs – You do not need to authorize repairs so when a technician finds a problem during an inspection, it can be fixed immediately.

Full Maintenance programs work best with newer equipment. If your equipment is old, the service provider will have to budget for a number of repairs in order to cover themselves, remember the risk lies with the service provider in a such a program.

Usually at the beginning of a Full Maintenance program, the service provider will schedule an initial detailed inspection of all your equipment and come up with a list of work that needs to be done in order to get the equipment in top working order. With new equipment that list will be very short, with older equipment, particularly equipment that has not been maintained, it could be extensive. You will then have to decide whether to pay for the initial repairs or to exclude the specified piece of equipment from the agreement. Sometimes it is less expensive to exclude the equipment and only pay for repairs if it breaks.

You should look for Full Maintenance programs that last longer than one year. If the service company has a long term agreement they will be more apt to spend money on upgrades and major repairs to your equipment because they will save money over the long term of the contract. Short contracts encourage the service provider to use cheaper "band-aid" solutions as they are not sure that they will be able to renew the contract.

HVAC Preventative Maintenance Programs Save Both Aggravation and Money

Now we can see how Preventative Maintenance programs save you and your customers both the aggravation of non-functional equipment and the very real costs of operating and replacing HVAC equipment.

Put together an effective program and have your Summer Sundays undisturbed.