PREVENTATIVE MAINTENANCE

Mitigate Against Air Conditioning System Malfunction

SCOTTSGLOBAL
Air-Conditioning
A Solutions Company
Design • Service • Installation





2021

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UNDERSTANDING PREVENTATIVE MAINTENANCE

Preventive maintenance is undeniably a critical competent to any maintenance strategy. It is key to lowering maintenance costs, reducing equipment downtime, improving asset lifespan and efficiency, and increasing workplace safety.

In Trinidad and Tobago, 80% of companies have experienced an unexpected outage in the last three years because of poor maintenance strategies. Having a clear, well defined, and consistent maintenance plan is crucial for the long-term success of any business.

Preventive maintenance is crucial to any business looking to reduce maintenance costs and the number of reactive maintenance issues it addresses annually.

Preventative maintenance allows you to stay ahead of issues before they arise.

What Is Preventive Maintenance?

Preventive maintenance involves taking the necessary precautions and actions to prevent accidents or equipment failures from occurring before they happen. Performing equipment inspections, cleaning and lubricating essential equipment parts, are examples of preventive maintenance.

The goal of preventive maintenance is to prevent equipment failure before it occurs, and to reduce the risk of accidents. Ultimately, taking certain precautions to ensure minimal risk to your air conditioning equipment means that you can focus on improving your operations, instead of having to constantly repair broken equipment.

Preventative maintenance is not reactive (i.e. a response to a problem, malfunctioning equipment, technology, etc.).

Types of Preventive Maintenance

Here are some of the most common different types of preventative maintenance:

Time-based maintenance

It is essential to create a monthly or annual maintenance schedule that complies with manufacturer recommendations for inspecting and cleaning your air conditioning equipment. Even outside of these recommendations, you should keep in mind that the most essential equipment to your business should be checked regularly to ensure the best possible operations.

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Usage-based maintenance

If your business uses certain air conditioning equipment every single day, it's a good idea to track usage (i.e. operating hours). This is referred to as usage-based maintenance.

If certain rooms are used more frequently than others or if certain areas of the building are subjected to harsher environmental factors, then these areas may require more frequent maintenance.

Predictive maintenance

Predictive maintenance relies on sensors to capture information about equipment (i.e. temperature sensors, or vibration sensors). Predictive maintenance entails monitoring the condition of essential machinery to track performance, and to detect possible defects that could result in a system crash.

Prescriptive maintenance

Similar to the patterns that predictive maintenance analyzes, prescriptive maintenance uses advanced analytics, machine learning, and artificial intelligence to generate predictions about maintenance, and also act on them. What does this mean? Basically, prescriptive maintenance makes recommendations to improve system operations, and also follows up to produce a work orders and oversees the entire process.

Benefits of Preventive Maintenance

Of course, one of the most obvious benefit of implementing preventive maintenance is that you're more likely to stay ahead of problems before they occur.

- Preventive maintenance will **decrease business downtime and closures** due to unexpected equipment failures;
- Preventive maintenance will **increase equipment life expectancy**, so you'll spend fewer dollars in the long run.
- Preventive maintenance will ensure all equipment and employees **work only during scheduled hours**, eliminating the need for paying overtime due to unexpected machinery breakdowns, etc.
- Preventive maintenance will **significantly reduce safety risks** for employees and customers, thereby reducing the costly risk of lawsuits and workers' comp.
- Preventive maintenance means **less energy consumption** for your assets and equipment due to high levels of operational efficiency, which will reduce your utility bills.

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These are only a few of the specific benefits that accompany regular preventive maintenance. Even if you are a small retail business and don't have large air conditioning equipment, preventive maintenance as it applies to your business will go a long way toward reducing costly accidents and damage.

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Split Type Air Condition Servicing Methodology

Evaporator Section

1. Ensure instructions to execute relative to unit location and quantities are documented and disseminated to respective supervisors by Administration.

2. Client is informed that "Service" level service will be executed on the day so that occupants, if any are notified accordingly.

3. Technicians are to secure and sign for all necessary tools and equipment needed to execute service.

4. The following must be done when performing an "Special" level service:

    I. Before switching off unit, its operation must be observed and recoded on checklist.

    II. Air handler/fan coil power supply should be then turned off and Lock-Out Tag-Out procedure followed.

    III. Air filters removed and cleaned using pressurized water only.

5. Panels to access the coil and motor/blower assembly removed.

6. Apply concentrated coil cleaning solution to both side of coil and allow to soak to ensure proper penetration. This process will be repeated as many times as needed.

7. Belts, blower bearings, motor bearings, pulleys and blower-wheels inspected and its condition recorded.

8. Blower/motor assembly disassembled in the case of fan coils.

9. The Fan motor and all electrical components that may be in the path of direct water or mist during service must be made waterproof by cover with an appropriate material.

10. Coil and blower-wheel must be pressure washed and care taken to limit water accumulation in blower housing.

11. Damaged coil fins combed

12. Belts must be immediately replaced whenever required.
13. Clean, Inspect and record condition of drain pan and unit panels.
14. Use vacuum and or pressurized water to clean/clear condensate drain line.
15. Components, filters and panels reassembled and unit is restarted.
16. Operating motor amperage must be taken recorded and all finding submitted to office.
17. Care must be taken to ensure the air handler room and surrounding areas are left clean.
18. Repaint/anti corrosive treating shall be executed on a needs basis on all units.

Condensing Unit

1. Panels to access the coil and motor assembly removed.
2. The Fan motor and all electrical components that may be in the path of direct water or mist during service must be made waterproof by cover with an appropriate material.
3. Inspect motor/s for bearing integrity and abnormal noises
4. Visually inspect condenser for oil residue
5. Visually inspect condensing unit for loose or broken parts
6. On system start-up check operation for proper operation.
7. Inspect electrical section for tidiness.
19. Coil must be pressure washed.
20. Damaged coil fins combed.
21. Repaint/anti corrosive treating shall be executed on a needs basis on all units.

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General Servicing Checklist

Customer Name :					
Address:					
Job Ticket No.		**Date:**		**Time:**	
Job Description:					
Model Number:		**Serial No:**			
Location of Unit:					

EVAPORATOR SECTION	YES	NO
Performance checked before service		
Thermostat battery and accuracy good		
Filter in place and cleaned		
Unit internal insulation ok		
Blower rotation correct		
Blower wheel rusted		
Coil cleaned and free any fouling		
Secondary pan in good and piped		
Pulley and flywheel wear checked		
Check & lubricate motor bearings		
Blower bearing checked and lubricated		
Air flow checked and is acceptable		
Evaporator fins need combing		
Condensate water flowing freely		
Condensate Drain trapped		
Unit's ducting connection good		
AHU room clean		
Unit Panel missing screws/ clean		
Base or Panel Painting required		
Unusual noise or vibration		
Thermostat secured and properly set		
Oil/refrigerant stains observed		
Liquid line filter rusted		
Belts good		
Electric connections tightened and clean		
Fan capacitor checked OK		
Electrical wiring neat and tidy		
10ft of supply, return duct and return grill clean		

CONDENSING UNIT	YES	NO
Performance checked before service		
Coil cleaned and free of fouling		
Fins combing needed		
Fan bearing need lubrication		
Fan blade/s in place and rotation correct		
Electrical connections cleaned and tight		
Panel missing screws		
Refrigerant lines secured and properly insulated		
Panel Painting required		
Moisture observed in sight glass		
Unusual noise or vibration		
Discarded AC related parts nearby		
Fan propeller or bearings noisy		
Checked unit mounting brackets, ensured securely mounted		
Compressor Oil level OK (if applicable)		
Fan guards in place and screwed down		
Hot air recycling		
System Operating parameters checked and documented		
Oil/refrigerant stains observed		
Line insulation deteriorated		
Fan capacitor Checked OK		

Observations_____

_____

_____

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_____

RECOMMENDATIONS

_____

_____

_____

_____

_____

Technician _____ Supervisor_____

Technician signature_____ Supervisor signature_____

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SAMPLE EVALUATION REPORT

The following are excerpts from an evaluation report that had been done for a company with an existing maintenance program using reactive maintenance. Several issues were found that would eventually lead to system malfunction.

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TECHNICAL REPORT

Project Information: Assessment of the air conditioning systems

Location:

Date: March 23rd 2021

Client:

Equipment Information:

Type	Make	System Tonnage	Quantity
Direct Expansion	Carrier	30 Ton	2
Direct Expansion	Carrier	20 Ton	3

Note: One system comprises of an air handling unit and either one or 2 matching condensing units

Summary of Findings

The Physical inspection of all major components of the listed air conditioning systems was performed to evaluate wear and performance factors. A determination was made on the overall condition of the systems and the risk to sustainable operation. Energy consumption considerations were also factored as part of the report. The systems evaluated are Carrier's high performance machines designed to offer superior cooling and sustainable operation for several years if maintained properly. However, based on the findings noted within the report it is evident that these systems are not being inspected regularly for defects and performance nor are they being serviced within a frequency that is in keeping with industry best practices.

Several critical defects were observed that place systems at risk for failure and/or because of these defects systems are forced to consume more energy than it normally would during operation. Further, some components have been allowed to deteriorate so significantly that complete replacement is the only resolve in this regard. Additionally, systems were also found to have exceedingly dirty air ducts, faulty protective devices as well as missing parts further adding to the state of disrepair.

The following report identifies the risk and the urgency in which action should be taken to prevent multiple system failures.

It should be also noted that elements in the risk category of Yellow and Red should be given attention.

System 1 (North)

Air Handler Identification Make - CARRIER Capacity – 30Tons	Model number = Serial number =
Condensing Unit Identification Make – CARRIER Capacity – 15 Tons x 2	Cond 1 – Model number = Serial number = Cond 2 = Model Serial number =

Risk Key

Good Condition – No action Required at this time	**Medium Risk** – Repair or Replacement Action should be considered in the short term. System	**High Risk** - Urgent Action Required. System or Component Failure Imminent

	or component performance Compromised	

Air Hander

Component	Observation	Risk	Recommendation	Supporting Image
Evaporator Coil	50% deterioration. Heat transfer surface compromised		Air Handler would be the most cost effective solution in the short term	
Blower Wheels Blower shaft	Metal starting to deteriorate Ungreased and heavily corroded		Short term blower wheel replacement required Shaft need to be treated and re-greased	
Bearings	Fair condition		NA	NA
Belts	Fair Condition		NA	NA
Motor Pulley	Fair Condition		NA	NA
Fly Wheel	Fair Condition		NA	NA

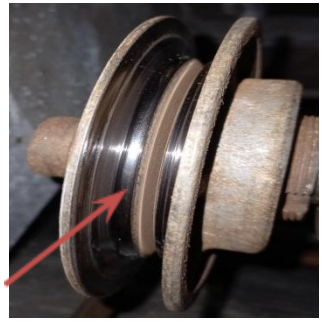
Fan Motor	Failing Bearings This can result in motor failure		Motor bearings should be replaced urgently	
Line Insulation	Missing Insulation This can impact performance. Expansion valve bulb uninsulated – this will cause the valve to perform erratically and risk compressor failure		Expansion valve bulb and suction line needs insulation	
Refrigerant pipe	Fair Condition		NA	NA
Thermostat	Fair Condition		NA	
Ducting	Broken wall compromising return duct opening.		Wall should be repaired and supported.	

	Ducting is extremely dirty. This significantly affects the indoor air quality of the space and can lead human respiratory issues		Urgent Duct cleaning needed	
Panel Insulation	Insulation deteriorated and disconnected from panel		Insulation should be replaced ASAP	
Secondary drain pan	Signification deteriorated		Replace drain pan	

Secondary Drain Pan	Significant fouling and corrosion – This is a health and indoor air quality concern		Drain pan servicing urgently required	

Condensing Unit

Component	Observation	Risk	Recommendation	Supporting Image

Bearings				
Belts	Faulty Belt		Replace fan belt ASAP	NA
Motor Pulley	Defective Pulley		Replace motor pulley	
Fly Wheel	Fair Condition		NA	NA
Fan Motor	Motor bearing defective		Replace motor bearing ASAP	NA

Cond 2	2 fan motors and fan blades missing – Condenser coil also deteriorated		Entire condensing unit should be replaced	
Fan Motor Cond 1	1 of 2 fan motor defective		Replace entire condensing	NA
Fan Blade Cond 1	Fair condition		NA	NA
Control Panel Cond 1	Faulty voltage monitor		Replace voltage monitor when replacing system	
Compressor Cond 1	Operating at risk due to defective condenser coil and fan motor		Replace entire condensing	NA
Base	Fair condition		NA	NA
Refrigerant Level	Inconclusive- due to defective condenser coil and fan motor		Replace entire condensing	NA

Line Insulation	Significant line insulation deterioration –		Replace insulation when replacing entire condensing unit	

System 5

Air Handler Identification Make - CARRIER	Model number = C Serial number =
Condensing Unit Identification	

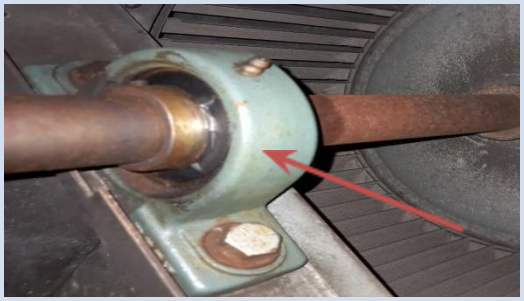
Make – CARRIER Capacity – 20 Tons	Cond 1 – Model number = - Serial number =

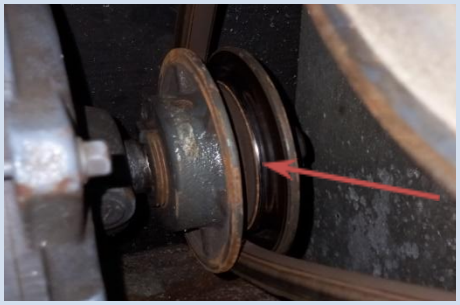
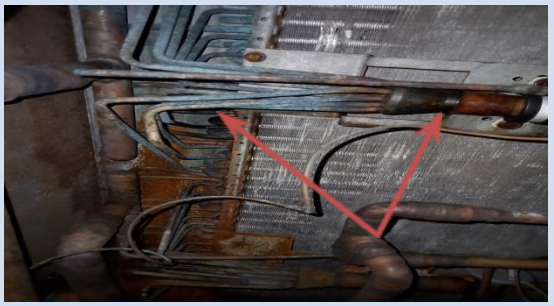
Risk Key

Good Condition – No action Required at this time	**Medium Risk** – Repair or Replacement Action should be considered in the short term. System performance Compromised	**High Risk** - Urgent Action Required. System or Component Failure Imminent

Air Hander

Component	Observation	Risk	Recommendation	Supporting Image

Evaporator Coil	40% Deterioration – This negatively impact system performance and increases energy consumption -, Compressor placed at risk		Replace air handler in the short term	
Blower Wheels Blower shaft Bearings	Fair condition Fair Condition		NA NA	NA NA
	Defective blower bearings – Risk of blower failure		Replace bearing ASAP	
Belts	Defective belt		Replace belt ASAP	NA

Motor Pulley	Defective pulley – Risk of belt and motor failure		Replace motor pulley ASAP	
Fly Wheel	Fair Condition		NA	NA
Fan Motor	Defective bearings This can lead to motor failure		NA	NA
Line Insulation	Fair condition		NA	NA
Refrigerant pipe	Multiple refrigerant leaks observed		Pressure test and repair all refrigerant leaks	
Thermostat	Fair condition		NA	NA

Report Verified by: Rudson Scott. PMP

Managing Director /Service Engineer

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Mission Statement

Our mission is to provide quality services in the realm of installation, repair, maintenance and design of Ventilation, and Air Conditioning (VAC) equipment in the residential, commercial and the industrial markets.

We have set the following objectives to accomplish our goals:

- Ensure that our procedures adhere to international standards and best practices
- Maintain the highest level of design and engineering practices
- Establish and cultivate a training programs with technical staff to ensure quality installation and services are sustained.
- Hire, develop, and retain employees who are committed to our growth and customer satisfaction.

At SCOTTS GLOBAL Limited (SGL) our customers are our life-line. Our strong values and quality workmanship helped make us leaders in the VAC industry. We are a company you can rely on, much like your own family. Every customer is a priority to SGL. We look forward to working with you soon. To all of our old friends and new ones…. Welcome to our Family!

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Our 7 Principles of Business

- Contribution to Society
- Fairness and Honesty
- Cooperation and Team Spirit
- Untiring Effort for Improvement
- Courtesy & Humility
- Adaptability
- Gratitude

The SCOTTS GLOBAL VISION

We will be recognized as the most professional team of VAC products and services while providing reliable service and installation. We will also lead the way toward more efficient and effective methods and procedures.

Value Statement

SGL is a company that **will**…

- Provide 100% customer satisfaction
- Be open and honest
- Work together as a team
- Change for the better of ourselves, customers, and industry
- Always think of new ways to promote growth and better serve our clientele

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