CONSUMER AWARENESS GUIDE

"95% Of Home Owners Fall Victim To These **Seven Deadly Sins** When Purchasing a Heat Pump"

"Save Yourself Time and Money By Being an Informed Home Owner"

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A Consumer's Guide: 7 Deadly Sins of Purchasing a Heat Pump

E.T. Mechanical has built their business on the concept of education. With so much to consider, clients have a challenging task of implementing a long lasting, comfort producing, and money saving system into their homes. All clients are looking for the same result comfort, longevity, and efficiency - put together with a clearly defined path.

While they won't be performing the installation tasks themselves, they can directly affect the results by way of their choices. This guide is designed to assist clients in navigating those important choices. Two aspects are mainly explored – *The current state of the industry standards, and the practices of companies today.*

The goal of this guide is to educate clients on what they should be auditing within their installation, product choice, installation procedures, warranty expectations, home sizing, after sales service, and much more!

A good heat pump installation comes from good choices, both by *client and contractor*.

In an evolving industry where products, standards, ratings, and installation procedures are ever changing;

education and training for both parties is necessary to fulfill expectations.

1st Deadly Sin – Thinking Brand Affects Result

Clients will often observe new equipment, consult the internet, and/or collect information to assist them in the process of deciding on a new comfort system for their home. One of the most common questions produced is, "*Do you carry brand X?*" or *"I need to get brand X!"*

Usually this decision can come from having prior experience with the product, such as a family member owning the same brand, or that they've read somewhere about a specific brand. .

Most companies have access to more than one brand; but why should a person choose one brand over another?

All potential Comfort System owners are looking for 4 elements in their new system -

1. **The Best People (Installation, information sharing, client relations)**
2. **The Best Service (Quality of Maintenance, Availability of Technicians, Customer Education, Proper care)**
3. **The Best Comfort (System is tailored to home, Comfort Needs Accessed, Year Round Comfort)**
4. **The Best Return on Investment**

The first 3 are met through the decision of your contractor. Through the companies hiring procedures, off site training, background checks, drug testing, new product education, installation extras, and guarantees outside of manufacturer's warranty; will determine the first three elements for a client. The contractor's decisions will either detract or enhance installations and service.

When considering brand clients are thinking, "how can I get the ***best return on my Investment*** once the first three elements are met?"

"The contractor's decisions will either detract or enhance installations and service."

This question is misplaced - here's why:

The HVAC market has access to literally thousands of products. All Heat Pumps (Geothermal, Central Heat Pumps, Minisplits) are manufactured by 3-4 large locations, each with a range of efficiencies in their line-up of products. Manufactures produce high end systems, basic systems and many steps in between. These products are re-branded, and resold under various brand names.

Heat Pumps increase in price as they increase in efficiency; this is where part of ROI (Return on Investment) is decided. The manufacturing industry is driven by increasing ratings: SEER (Seasonal Energy Efficiency Rating) and HSPF (Heating Season Performance Factor).

The problem with associating a brand or a rating with what a client should expect from their system in terms of ROI is that they are defined by installation procedures, maintenance, and service.

What really matters is total life cost; unforeseen repair costs, or costly problems stemming from improper

"Expecting results from purchasing on brand or a system rating, is like a farmer expecting a great crop from only planting seeds."

installation destroy a gradual return from a system operating efficiently. **It must be put in right the first time!**

Ask yourself the question: Is it possible, based on installation and service procedures of my chosen company that I may not be getting all the efficiency I've paid for? Could I be paying less now only to pay more later on?

Expecting results from purchasing on brand or a system rating, is like a farmer expecting a great crop from only planting seeds. There are many other factors that have a much greater bearing on the ownership of such an important decision, and total system life cost.

2nd Deadly Sin – Not Knowing the Crippling Effects of an Improper Installation.

After a system is chosen, it must be installed! The installation policy and procedure of your chosen company will now be put to the test. It will determine the lifespan and results of the installed equipment.

"In New Brunswick, codes and compliances don't indicate proper procedure – code protection doesn't exist."

The installation procedure isn't a predetermined one; it's decided by the chosen contractor. In New Brunswick, codes and compliances don't indicate proper procedure – code protection doesn't exist. Permits aren't necessary in most cities; therefore there won't be any means of inspection by third parties.

The unfortunate problem is it wouldn't matter anyway. Most of the most important installation procedures that directly affect the lifespan of the product wouldn't be detectable by the naked eye; they exist within the refrigerant lines of the system.

When choosing a contractor, one of the most valuable questions to ask a contractor is **length of time on the job.** How long will it take your chosen company to complete the installation?

Take for example a *ductless minisplit*. It's the most popular heat pump system available today. Most contractors will advise an installation time of anywhere from 2 to 4 hours. While this may sound reasonable, this time frame makes for a poor installation as important parts are being left out.

A proper installation, assuming all elements go smoothly without any slowdowns (not very often!) should be 6 plus hours of installation time. Observe the following table as an example:

Task Performed	Conservative Time Estimate
Installation team arrives, reviews and creates plan with client, organizes materials, and places drop cloths	45 Mins
Outdoor stand is cut to spec and built, patio stone is leveled and placed, outdoor unit is bolted to stand	30 Mins
Indoor unit mounting bracket is installed, 2.5'' hole is drilled from inside to out, condensate line attached, piping fed outside, unit mounted to wall	30 Mins
Outdoor electrical disconnect attached, electrical lines run from panel to box, unit wired to box, then to indoor unit	45 Mins

Refrigerant lines connected – either welded, or mechanically connected – then flooded with nitrogen	30 mins – 1 hour
TIME!	3-4 Hour projection
Pressure testing, piping is insulated, lines adjusted. Unit is filled with nitrogen at high pressure to leak test -hold pressure for 1 hour.	15 mins setup + 1 hour
A special vacuum pumps the air out of the system, putting it into extremely low pressure - vacuum must be held for min 45 Mins	Pumping 15-20 mins + 45 Mins
Refrigerant is place on special scale, and weighed into the machine by ¼ oz increments - can require some runtime of the machine	15-30 Mins

System is started up, tested for temperature & pressure differences, tested in both heating and A/C	15 Mins
Installation of slim ducting, a cover for the insulated pipe	15 Mins
Job site is cleaned up, supplies packed away	30 Mins
With the client - system operation is reviewed, FAQ reviewed, system care reviewed.	30 Mins

All the elements listed are necessary to guarantee expected result from the system. Installations usually take much longer; often electrical panels and electrical work must be modified to function. The connection from panel to system usually is run outdoors, and is either buried or tacked to the building. If a leak is discovered by pressure or vacuum testing, the entire 2.5 hour process from nitrogen testing onwards must be performed. Many other situations can arise that take up time - each specific the job - variables often occur.

The extra time taken on installation is minor by comparison to the time the system is expected to last. An unfortunate problem is that when the proper steps aren't taken the system won't fail that day; it will gradually be worn from the inside.

- *How does this process of pressure testing, and vacuuming affect me?*

Without pressure testing and vacuuming, small leaks cannot be discovered. Over time, the smallest leak gradually releases the contained refrigerant into the atmosphere and depletes the substance that absorbs the heat and moves it. The entire installation process must start again in order to remove the entire charge, and re charge the system.

"The extra time taken on installation is minor by comparison to the time the system is expected to last."

When a leak occurs, it's immeasurable to determine how much has actually left the system – with modern heat pumps proper charging is imperative. If the leak wasn't discovered in time before the entire charge of refrigerant leaked out, *two major problems could develop*

- The system could become corroded due to outside air entering the system
- Dirt could enter the system, contaminating the refrigerant lines.

These effects are catastrophic on the heart of the system ***– the compressor.***

By putting the system into a vacuum leaks can be checked, moisture and contaminants left from installation are brought to a boil which then turn into a gas. In the same way that boiling a cup of water takes seconds on *Mount Everest*.

The pressure is lowered so that foreign substances left from installation are sucked out of the system in the form of a gas with the vacuum pump. The effect of leaving contaminants within the system is catastrophic on the heart of the system – ***the compressor***.

- *Why do you use nitrogen to charge the system, and braze the system?*

Nitrogen is an inert substance; it doesn't react to heat, most chemicals, and won't hurt seals in a system. This

dry air will assist in the absorption of moisture (due to humidity) left in the system on installation.

When brazing (using heat and filler material to connect copper pipe), nitrogen MUST be used. Without it, corrosion and carbon flakes (oxidization, rust) develop within the piping of the system. This buildup is released when first operated, and is the equivalent of *sand in an engine*.

Foreign elements in a system dramatically affect life span. Improper installation is the main cause of compressor failure for any manufacture. Foreign elements wear down seals, and ruin tolerances in a system over time. System failure isn't immediate; it's much further down the road relative to the level of contamination present.

This wouldn't be obvious to anyone, even a ***HVAC Expert***, *government inspector*, or *original manufacture* wouldn't be able to determine what happened on install day. It's only after the compressor has failed and is cut open to be analyzed will the failure be determined. Often these repairs are out of warranty, or partially covered. Usually labor, the largest cost of the repair, isn't included.

"…even a HVAC Expert, government inspector, or original manufacture wouldn't be able to determine what

Most clients would be oblivious to the reason of failure, and usually the same contractor will come out to repair their heat pump. Because the *compressor* failed, carbon and contaminants that are released from its failure are now present in the system.

The next compressor is installed will be performed with the same original flawed installation procedure, and the lifespan of the next compressor will be even less due to left over burn out contaminants. **Taking time to do what's right for a system is time well spent.**

3rd Deadly Sin – Expecting Results from a Third Party Warranty

The HVAC market is flooded with various third party warranties. A given manufactures warranty can be extended by purchasing coverage from a third party company that will extend coverage on parts, labor, and compressor. This coverage is through the third party's company, and all claims after the manufacturer's warranty expires will be made through them.

These plans are included when presented with the cost of a new system. Often they are explained to maintain your protection for years to come, and guarantee a working system without any cost to the consumer.

Sounds great, right? There are some things you should know.

A third party extended warranty pay outs to contractors never change, the amounts paid to contractors for repairs on day one are the same in 10 years.

Repair payouts are often underestimated and won't cover proper repair on day one. For example, the leading provider of third party warranty allows for 2 hours of work to replace a compressor.

As stated previously in this guide, this would be impossible to perform if the job was done correctly. Either the contractor will decide to absorb this cost, or will charge the remaining amount to the consumer; most often the latter. Contractors will sometimes decide not to do either, and cut corners on third party claims. If the cost of repair isn't covered today, what will happen after 10 years of inflation? These promises are not sustainable for either client or service provider.

The cost of repair isn't just within the technician driving to the home for repair; claims must also be processed and submitted to the third party. This often means the client paying for the repair upfront only to be scantly reimbursed on the claims approval. Therefor the administration costs behind processing, submitting, tracking, and dispersion of the funds must be factored

in. ***Unfortunately the released funds usually don't even cover the office costs.***

If businesses close warranties can still be processed through most third party services, however the cost behind doing such repairs makes it a fruitless endeavor for the next company. This often results in extra charges to client for the repair that they were promised would be covered under warranty by the original contractor.

If the third party provider disappears, which they often do, so does the small piece of coverage. Third party warranties all have documentation behind them, be sure to consult the fine print in order to confirm all dangers printed here.

Find out what your contractor would charge for a repair, and the time it would take – compare this to the offering made by the third party company.

4th Deadly Sin – Not Having Written Agreements That Force Results from Your Contractor

Warranties are in place to protect the manufacture from litigation, written agreements or *guarantees* are in place

to protect the consumer; these are written promises from a contractor.

The results of a system aren't determined by what's written on the box (as discussed in the 1st Deadly Sin), they are determined by the procedures of an installation company and their service in sustaining the system. Heat pumps are truly a total life cycle cost analysis.

With so much riding on the installation procedures and policies of a company, shouldn't they be making written promises for results?

Within this guide are many elements of better practice for the consumer, but ultimately impossible to determine until installation day arrives; the results of the system being determined by what happens on day one.

Guarantees should be included with your system that forces accountability for the results and expectations of the system. Without them clients would have to become experts in installation, monitoring every install practice on the first day, an unreasonable expectation.

"With so much riding on the installation procedures and policies of a company, shouldn't they be making written promises for results?"

I***n the event of lack of result, what happens***? Are you reimbursed for lack of projected savings? Who projected the savings? How are you auditing it? What determines proper comfort? What happens when my humidity is drastically changed, and organic growth is in danger of developing? These questions and *many* others most often won't be justified, but define the client's original needs.

There are many questions that a consumer shouldn't be responsible for answering/defining, the results of the system should be ***clearly explained***. If results are not achieved the responsibility should be taken by the contractor, and compensation paid to the client. Written agreements allow clients to understand what to expect, and hold their contractors accountable for expectations.

5th Deadly Sin – Not Having Your Heat Pump Properly Sized

In many parts of North America, the sizing of a heat pump is ***a government mandated process***; but not in

New Brunswick. This process is called a Manual J and determines to the **exact BTU** what the heat pump should have in capacity to suit a home.

"In many parts of North America, the sizing of a heat pump is a government mandated process; but not in New Brunswick."

The reports are required to submit for a permit to perform an installation. Detailed measurements are performed on the home to find a proper system capacity amount.

Windows, doors, tightness of construction, insulation values, areas above plane, even the direction the home is facing – all have a bearing on what the size of the heat pump should be.

Improperly sized systems cause of lack of result. Certainly, there is a margin of error available with every system, inverter compressors (variable load systems) help allow for this. However, inverter systems are made in *different sizes for a reason*! A system is designed to be sized for the largest loads experienced, the hottest or coldest days of the year. Sizing outside of these measures affects efficiency, comfort, and longevity.

A system too large for the home – A heat pump that has more capacity than what a home needs affects it in two major ways.

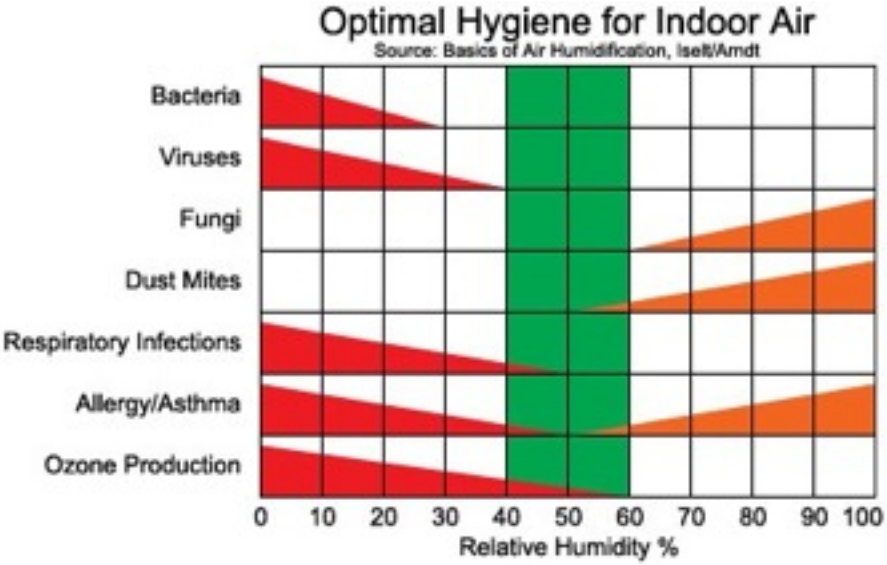
A system will run until it achieves the requested temperature by its thermostat. A system that is too large will achieve this temperature very quickly, but won't do so efficiently, or comfortably. If cooling for example, the system will reach the requested temperature but won't run long enough to effectively remove humidity from the air. Even though the temperature in the home may be met by running, the system hasn't processed enough air within the home to remove the humidity to comfortable level.

This creates an uncomfortable cave-like feeling within the home. Condensation builds up, wood construction swells (flooring, furniture, instruments) and the potential for *organic growth* will happen within with home relative to the severity of the miss-sizing. In addition, the system will achieve temperature quickly, and then shut off. This draws a large amount of amperage from the compressor within a unit on its restart; this negatively affects efficiency by consuming more electricity than necessary.

With minisplit heat pumps, this eliminates their ability to force air to travel within a home. Once the temperature is almost achieved within the immediate area where the minisplit is installed, it will gradually limit its output to be efficient and maintain a consistent temperature. By this effect, less conditioned air (hot or

cold) will travel to other parts of the home as the immediate area is satisfied. Less coverage of a system means that alternative sources of heat must be used to accomplish comfort (for example, electric baseboard).

A system too small for the home - A heat pump that has too little capacity affects a home in two ways. A small system may achieve temperature on mild days (hot or cold) but may never achieve temperature on moderate or extreme days (hot or cold) depending on how badly it is miss-sized.



Relative to the level of miss-sizing the **runtime** of the system will be extended (if it can achieve the requested temperature); this is not efficient and consumes more

electricity than necessary. When the system is cooling, humidity is negatively affected again. Because the runtime of the system is too long it forces too much humidity removal making the home very dry. Air that's too dry shrinks flooring, shrinks/cracks wooden constructions, and negatively effects health.

Relative Humidity	Air Temperature				
	70	75	80	85	90
5%	Feels like 64	Feels like 69	Feels like 74	Feels like 79	Feels like 84
15%	Feels like 65	Feels like 70	Feels like 76	Feels like 81	Feels like 91
25%	Feels like 66	Feels like 72	Feels like 77	Feels Like 88	Feels Like 94
35%	Feels like 67	Feels like 73	Feels like 79	Feels like 85	Feels like 91
45%	Feels like 68	Feels like 74	Feels like 80	Feels like 87	Feels Like 95
55%	Feels like 69	Feels Like 75	Feels like 81	Feels like 89	Feels like 98
65%	Feels like 70	Feels like 76	Feels like 83	Feels like 91	Feels like 102
75%	Feels like 70	Feels like 77	Feels like 85	Feels like 95	Feels like 109
85%	Feels like 71	Feels Like 78	Feels like 87	Feels like 99	Feels like 117

Improper humidity also affects the heating cost in a home. **Ideally a home's humidity percentage should fall within the 40%-60% range**. Without proper humidity heat can't be as effectively held within the air. This forces a heat pump to run longer than if it was to heat the same air with proper humidity. A 20% change equates to a 2 degree loss of efficiency. *2 Degrees of*

Free heat and maintain your comfort with proper humidity.

6th Deadly Sin – Not Performing Regular Maintenance on your Heat Pump

Heat pumps require a sustained relationship between client, and contractor to ensure their comfort system stays efficient and enjoyable for years to come. As with any mechanical system, all heating systems require maintenance to ensure results. In the same way automobiles require oil changes; heating systems require consistent attention each year. During our maintenances, often small problems can be detected prior to becoming large ones.

Most clients aren't aware that:

- Without proper maintenance, most manufacturer warranties become void
- According to the ***EPA***, 1/20 of an inch of dust on the blower and coil of a heat pump can ***reduce efficiency by up to 26%!***
- Dust and dirt reduce energy transfer; your system runs longer and works harder, reducing lifespan and performance.

- Improper air flow from corrosion or dust leads to premature failure of components; reducing efficiency and performance.
- Replacing/repairing components of heating systems before failure is more cost effective as they can lead to larger problems, downtime and unplanned repairs.

Maintenance and regular service allows for a sustained, dependable, efficient, comfortable system. Many tasks in the maintaining of a system can be performed by the homeowner. Changing and washing filters regularly, keeping outdoor units clean of ice and snow, visually inspecting components for corrosion; these and many other tasks will enhance the lifespan of comfort systems in homes.

"In the same way automobiles require oil changes; heating systems require consistent attention each year"

Maintenance visits are much more thorough, and allow for complete examination of the system. A maintenance programs should involve a thorough system report with over 100 points of inspection. After a visit not only

should clients know their systems are in good hands, but have a clear plan of what to expect from their home comfort systems as they age.

Unexpected repairs have much larger costs than planned ones. Unplanned small part failures often lead to large part failures and higher cost. Combine after hours service calls, downtime of the system, and your frustration; maintenance programs are not only cost saving but allow for peace of mind, and dependability.

7th Deadly Sin – Airflow or No-go!

Ducting of a whole home heat pump is imperative to proper result. Prior to installation, calculations should be made as to the requirements of the new system. These calculations are relative to the size calculations determined from the home when the heat pump sizing was performed. **The larger the size of the heat pump installed, the larger the requirement of airflow.**

A challenge for most clients is they are replacing an existing system with a heat pump system that delivers heating/cooling in a completely different way. Traditional systems produce heat usually by consuming electricity, oil, or natural gas.

These sources produce very hot heat by the consumption of these energies. When that heat is distributed it requires less airflow as the air temperature is very hot. Heat pumps are designed to gather heat from outside, and gradually transfer it inside.

Heat pumps produce a lower temperature of air as they are constantly running to gather heat from outside ambient air. This method allows for more constant temperatures, better comfort, higher efficiencies, etc. The problem with lower temperature air is that it requires more airflow.

When changing from a traditional system ductwork changes are usually necessary. To determine the modifications needed, the size and distribution ability of the existing ductwork is measured and then compared with the new planned system's requirements. This measurement will indicate the maximum amount of air that can pass through the ductwork, and allow for a plan to be constructed of necessary changes.

Not considering the need for extra airflow with an existing system will have consequence:

- Loud whistling sound from the ductwork whenever the system is used
- System may be sized appropriately, but can't reach temperature

- The system constantly freezes and ceases function – inside or out
- The system doesn't work on the hottest or coldest days of the year
- The system doesn't provide energy savings, or provides less than possible
- The system runs longer or at a higher capacity than necessary.
- Uneven distribution of heating or cooling throughout the home
- Premature Failure of the compressor (the heart of the system)
- Premature failure of the blower motor
- *And much more!*

Airflow in a ductless system is partly estimation and plan for results. Airflow from a ductless system is relative to the individual unit, but more so the home itself. The difficulty with ductless systems is their ability to distribute heat evenly throughout the home.

Homes that are sectioned off or partitioned limit the amount of airflow from the system. The logic behind the contractor's placement should be explained including

options to enhance airflow within the home if necessary. Products like *in-wall fans* or *booster fans* are designed to assist the distribution of hot or cold air. *How the ductless functions within the home alongside the operation of backup heat must be planned.*

How to Invest in a Heat Pump

The first step to investing in a heat pump is to seek the assistance of a *consultant.* Most contractors will have either the owner of the company, or a technician available for consultation of an installation. This individual is to act on the clients behalf. The consultant should take the needs of the client into account, and suit them to a designed system. All considerations for the home should be logged, and the best solution for the client should be recommended.

Important elements to be determined or explained by a consultant:

- Airflow and Ducting Considerations
- Sizing of the System with Manual J
- Electrical Requirements/Panel status
- Indoor Air Quality Options

- Installation Procedure of the Company
- Insurance Coverage of the Company
- The Companies Licences
- The Technician's Licenses – Electrician, Refrigeration Technician
- Planned Maintenance of the System
- Choice of System
- Warranty Coverage from the Manufacture
- Guarantees from the Company
- After Hours Service
- Placement of a System
- Expected Energy Savings
- Financing Options
- *And much more*!

The objective of a consultant in your home is to provide a clear path to getting you what you want. From start to finish, the entire process must not be left to chance. You should have a clear picture of the company and pending experience by the end of the appointment.

There are too many contractors doing the wrong thing, or what's right for them.

This process should be an easy one that doesn't require you to do anything more than audit what's been said and answer questions. With the ever changing home comfort industry, it's their job to explain current best practice, and current best recommendations relative to each individual home. The consultant is there to work for you – they should give you updated advice and choices.

How Contractors Can Guarantee Results for their Clients

The "7 Deadly Sins of Buying a Heat Pump" come from years of observing the residential heat pump industry. Contractors should respond to limitations in the market by bettering them. A contractor should be bound by the results of each system in every home.

The idea behind a company should not only be education for clients but accountability and onus of results.

Once educating a client of what is required for results of a system, they must live up to them. When results aren't

achieved by a contractor, there should be accountability for their actions. Considerations and expectation for an installed system shouldn't have to be made by the home owner; the contractor should show what can be done, and take responsibility for their choices.

Contractors should produce their confidence by way of guaranteeing the results of the system. These guarantees should not only illustrate what's important, but take ownership of the system.

1st Deadly Sin – Brand Choice – A good contractor should provide access to hundreds of different heat pump solutions. Each one could potentially work for a client's home. By considering the needs of a client, and the sizing of a home – choice is narrowed down. *A good contractor leaves choice to the client as each one's needs are different.*

With so much choice of in the market, companies should not offer a particular "Best Brand EVER". Brands and whole home recommendations should be chosen based on the needs of the client, not benefits to the company.

Even though there are advantages to a company in committing to a single manufacture. Contractors shouldn't offer products that give kick-backs or

commissions at the cost of not giving a client the system that's right for them.

2nd Deadly Sin – Proper Installation – Proper installation is performed by qualified and knowledgeable installation teams. Contractors should go to great lengths to ensure systems are installed with best practice.

A contractor should explain how they train their personal, and how they are responding to changes in products - New products come to market almost every month. In world of HVAC, contractors must be dedicated to being informed on installing them right.

> ***"For most tradespeople, training ends on the day their schooling ends."***

Contractors should be training their staff regularly in a training facility. Trades people should have the chance to learn about the equipment they see regularly. By training, technicians practice in their home rather than yours. Technicians need to experience repairs, make mistakes, and learn from each other in a challenging environment.

For most tradespeople, training ends on the day their schooling ends. They should have a clear path for new

technicians and plans for training them on better practices from the ground up.

3rd and 4th Deadly Sin – Warranty and Guarantees - E.T. won't over promise clients on their products, and thus we won't with warranties. With every product we offer a manufactures coverage, and our guarantee system. The manufacture's coverage allows for legitimate claimable measures, that aren't overpromising the client of their coverage. We want to make sure that in the future we are able to maintain our promises. With the coverage provided from third party services, we wouldn't be able to maintain our level of service. We have replaced over-promising the client with our guarantee system, this takes the accountability and places it on our shoulders. Third party warranties are readily available on most any product, but we refuse to offer them, it goes against everything we are as a company.

5th Deadly Sin – Sizing of a system – When a client is consulted for a heat pump installation, the first step performed is an engineering analysis. This involves the measurement of everything load related in the home –

"Without measuring to suit a heat pump to the home, there will be unavoidable losses with humidity, comfort, and efficiency of the system."

windows, doors, insulation, direction, etc.

Ask what the contractor is measuring, you should expect much more than square footage. *The contractor MUST perform calculations based on the insulating values of the home*.

Without measuring to suit a heat pump to the home, there will be unavoidable losses with humidity, comfort, and efficiency of the system.

By measuring, a contractor can be confident of exactly the requirements of the home. The 60-90 mins consumed by your homes analysis allows for 15-20 years of proper operation, ***it's time well spent!***

6th Deadly Sin – Not Performing Maintenance –

Installing a heat pump isn't just about day one; *it's about a lifetime of results from a system*. Clients want long lasting systems without unexpected repair bills, and efficiency that doesn't lessen overtime. Most of this comes from maintenance!

Look for evidence of a ***relationship to maintain*** - between a contractor and client for the lifespan of the heat pump. You should

"You should receive the contractors' long term plan for the lifespan of the heat pump."

receive the contractors' long term plan for the lifespan of the heat pump.

If all heat pumps require maintenance, *how does the contractor take care of that need?* There should already be a plan in place. Membership programs can be a benefit to both client and contractor – they allow contractors to keep work for their teams in seasonal workloads. That way the company has enough technicians for your home when it's very hot or cold, when all of New Brunswick needs help with the same problem!

7th Deadly Sin – Airflow – Airflow is commonly overlooked when homes are consulted. Results from the system aren't possible without modification to most ducting systems.

Unless the ductwork has been designed for a heat pump, changes usually have to be made.

When in a home your contractor should perform measurements and calculations – taking into account the size of your heat pump, and the ductwork necessary to get all of the energy out of the heat pump. Without proper airflow, comes improper operation.

Sometimes computer programs are used that tells exactly the changes that have to be made. Then the contractor will allow for the installation team to discuss the placement of the changes that must be made. This way the contractor can come prepared, and the client gets the results that they want.

For homes that have *limited ducting* (like older oil, or wood systems) it can often require a separate meeting once purchased – the contractor can further decide the placement of the previously calculated ductwork to ensure success for the client, it's that important!

Guarantees – You need them.

Each chosen system should come with guarantees from a company, manufactures don't cover everything. All guarantees should come in writing, each client should receive a detailed copy of each promise. The idea is to ensure every agreement made is of the same responsibility – Do the job right, and do what's right for every client - every time. They should explain how the client can determine what's right, and what happens if the objective isn't achieved.

Heat pumps come with many benefits, but also may opportunities to not get the result that a client may be looking for.

Guarantees are the best means of taking ownership of each job, and ensuring that no client will take responsibility for a mistake on our part. The contractor should have examples of where they had to take ownership of their mistakes, or examples of clients who have taken advantage of their guarantees. ***If the accountability can't be determined by the client –*** it's not useful.

It's Risk Free

The installation of a heat pump contains many elements performed to achieve expectation. Unfortunately most clients aren't able to audit a proper installation, and there aren't building inspectors to act on clients' behalf. This creates the opportunity for a lack of result by cutting corners to reduce cost. Our market is most often driven by price, the lowest bid wins!

Efficiency, lifespan and comfort are the result of good work. Without proper installation, by some measure one or more of these results will be sacrificed. Explained within this guide are many elements included within a proper installation, these procedures increase the cost of an installation – but produce what clients really want!

By taking ownership of all aspects of an installation a contractor can give homeowners dependability, and eliminate risk. Accountability is the agreement; the system is put in correctly by the right people, with a client's needs in mind.

Extra charges shouldn't be made if a contractor missed something, they are the *professionals* – the installation is planned correctly, and ***right the first time.*** When mistakes happen (we're human!), the responsibility of rectifying them falls on the contractor's shoulders.

The contractor should be able to show how they eliminate "rolling the dice" on results by forcing accountability on themselves.

Operational Excellence

After a heat pump is installed, its operation is completely different than that of traditional means. There are many operational elements that differ from what clients may be used to. After an installation comes orientation on a client's system, our installation team provides a walk-through of the system's best operating practices. Our consultants also follow up after an installation to ensure that all needs are met, and that our clients are confident it the system's results. Manuals

are certainly included with the system, but don't capture everything. It's our responsibility after all – improper operation can yield less efficient results, or lack of comfort; which we guarantee!

Here are some of the most commonly asked questions on a new installation –

Q. How does my ductless heat pump work with my other heat source?

A. You heat pump is designed to run efficiently until -10°C,-15°C, or -25°C (without wind chill) depending on which model is installed in the home. All heat pumps require an alternative source of heat. The system can work efficiently until these temperatures are reached. At that time, some systems should be shut off, while others will automatically do so. **Running electric baseboards or other sources of heat is necessary approaching these temperatures.** During cold winter months (February & January) a power bill should be expected to rise as the system has less ideal temperature to run. The entire season's results will show savings.

Relative to outdoor temperature and where the heat from a system will travel, it may also be necessary to run heat sources (ex. Electric baseboard) in other parts of the home. Don't worry, as these sources will only be supplementing at a fraction of their regular use. To some

measure, heat from the ductless system will reach these areas, and less heat is produced by the alternative (such as electric baseboard) in order to reach a comfortable temperature.

We recommend all systems be shut off at -15°C (with the exception of our cold climate heat pumps), this will assist the lifespan of the unit as it works hardest during colder temperatures. This will also maintain efficiency of the unit, as at this temperature the cost of operation is the same as electric baseboards.

Q. Why is my heat pump making a temporary rushing water/crackling sound/vibrating noise?

A. All heat pumps will have a defrost cycle that will take place more often as the temperature drops. After running for a period of time, the system creates frost that must be melted away from the outdoor unit. This happens by temporarily reversing the flow of refrigerant which makes a strange sound in the home. **This can be as often as every 45 minutes or sooner in colder temperatures;** it is necessary for your system to maintain its efficiency.

Q. Its cold outside; why is my Heat Pump not working?

A. When the outside air temperature drops below 4-5 degrees, your Heat Pump may go into defrost mode. **It may also make an unusual sound when this mode is activated.** In this mode your Heat Pump may not appear to be pumping out hot air. If this is the case, it is best to leave the unit alone until it has gone through this cycle. If you know it is going to be cold and frosty overnight, you can be sure your system will go through at least one of these cycles. The colder the temperatures that a heat pump operates at, the more often defrost cycles must occur. The unit is removing frost and ice buildup, in order to run as efficiently as possible.

Q. Should I turn my Heat Pump off at night?

A. It's generally much more efficient to leave your heat pump running, opposed to turning the heat source off/ down when not needed as with other traditional means of heating (wood furnace, electric baseboard ect). Heat pumps are most efficient when they slowly maintain the temperature of the room. When a large difference in temperature is required (more than 2°F or 1°C), compressors ramp up, and a heat pump will activate alternate/backup modes of heating in order to quickly achieve temperature. It is possible to turn a heat pump down overnight. Program the system to drop 1°C every hour, and rise 1°C every hour to when you wake up.

Generally, it's recommended to have the home stay a consistent temperature.

Q. How often do I need to clean my Heat Pump?

A. It is important that you check and clean the filters on your indoor unit every 2 weeks. Keeping the filters clean will help your Heat Pump run efficiently. E.T. Mechanical recommends becoming a club member to guarantee an annual visit by our technicians. This will help your unit to continue to run as specified and to its full capabilities. For more information on how to best keep your filters clean see our user guide.

Q. How high can I increase my temperature?

A. Your heat pump will be able to gradually reach a wide range of temperatures. However in order to maintain the best possible efficiency by the product, the largest increment in temperature should be 2°F or 1°C each hour. By gradually turning up the temperature, the heat pump doesn't have to use alternate sources of heat to achieve temperature, or ramp up the compressor.

Q. Why does my heat pump blow cold air when it starts/or runs?

A. This occurs because the heat pump and the indoor blower fan start at the same time and the heat pump

requires a few seconds or minutes to build up the required heat with the refrigerant.

Heat Pumps are designed to gradually rise to a desired temperature over a long period of time with a small heat output and a large amount of air flow. A comfortable temperature could be considered 72° yet our body temperature is 98°; because the Heat Pump is producing air potentially colder than our body temperature the outputted air could seem lukewarm or even slightly cold to the touch. Don't worry; this is part of its normal operation of being efficient and producing proper comfort.

Q. What is that smell coming from my new heat pump?

A. More than likely what you smell is the backup emergency heat or electric heating elements in your comfort system. The backup heat will activate when it's very cold out, or a large temperature increase (larger than 2°F or 1°C) has been requested. It can also activate when heat is detracted from the home – opening doors or windows, outside gusts of wind, etc. After cooling season aux heating elements that have been unused for an entire season have been coated with dust, once auxiliary heat is initiated this dust burns off and has a temporary but distinct odor.

Q. Do I need to clear the snow from around my heat pump?

A. The outdoor unit of a heat pump relies on air flow to operate properly at all times. Snow must be cleared from around the unit leaving a clearance of 2 to 3 feet minimum surrounding the unit. Heat pumps must be elevated off the ground to allow the water produced during the defrost cycle to flow away from the unit. Snow build up at the bottom few inches of the unit can prevent the unit from completing the defrost cycle properly**. If the snow is not cleared, the unit will not function properly. If the system is operated under these conditions it has potential to damage a unit, even for only a short period of time.**

Q. What's that whooshing sound coming from my ductwork?

A. In smaller houses where duct work that was used for an alternate form of heating is present, you may notice the increase in the air flow from your ducting. Heat pumps produce heat differently; they produce larger amounts of slightly warm air. Traditional means of heating such as wood, oil or electric produce large amounts of heat over a short period of time which gradually diffuses into the home. The heat produced by a heat pump will be much more even by its consistent process; this method helps eliminate hot or cold spots in

the home and evenly heats the conditioned space. **You will need to balance your system after each season of operation.** This is performed in the summer by closing registers in the cooler rooms downstairs, allowing cold air to reach the upper levels of a home. In the winter, closing registers in warmer rooms upstairs, allowing warm air to reach the lower levels of the home.

Q. Why is my indoor fan running but my heat pump is off?

A. Heat Pumps are designed to extract every bit of available heat in order to attain maximum efficiency. When a heat pump shuts off, the indoor unit still has a residual amount of heat stored in its coil - by blowing the air over this, all stored heat is taken out of the coil. This energy saving feature is enabled when the fan is set to “Auto” mode. In addition, the fan can be set to run continuously in the “On” mode creating perpetual airflow through the ductwork, and to better mix air in the home providing more consistent temperatures.

Q. Why is my unit steaming large plumes?

A. When it’s very cold outside and a defrost mode is activated, the system may produce steam. Usually it starts and ends with a flushing sound of refrigerant. This is a normal process; your system is clearing the frost

from the outside unit in order to continue being efficient.

Q. Why is there ice around my outdoor unit?

A. When a Heat Pump is defrosting it will heat up the outdoor unit by reversing its refrigerant flow to remove frost and ice buildup. Defrost cycles take place to allow for better conductivity with the air, and allow the system run efficiently. When this happens, water will be produced from the outdoor unit which will eventually turn to ice (this is the reason a stand or bracket, and proper elevation are required on installation).

Q. Why is my Heat Pump thermostat displaying aux/ auxiliary heat?

A. When a system is in defrosting mode, the electric backup within a system (ducted heat pump) will activate in order to compensate for the pause in operation. The outdoor temperature limit of your heat pump could also be reached. Every heat pump has an outdoor temperature limit, where the system can no longer produce heat efficiently. When this occurs, the system will switch to the electric backup heat to avoid wear and tear on the unit, and continue providing comfort without a drop in temperature. **We recommend at -15C that all systems be shut off, and auxiliary heat activated** (with the exception of our cold climate heat

pumps), this will assist the lifespan of the unit as it works hardest during colder temperatures. This will also maintain efficiency of the unit, as at this temperature the cost of operation is the almost the same as electric backup.

Thanks for Reading -

Thank you for spending the time to read this consumer's guide. It is designed to better the market, by making for educated consumers. Educated consumers do the right thing. Clients have more access to information than ever, but not filtered information that describes the cause and effect of a contractor's choices and procedures in the home. The right questions are now in your hands, you are an informed consumer!

If you would like to have E.T. Mechanical consult your home on what's possible, and to ***show you how we're different***, please contact us at **506-444-HOME** to book a consultation appointment with one of our Comfort Advisers.