Heating

Description

Fuel ❑ Gas ❑ Oil ❑ Electricity ❑ Wood ❑ Propane **Efficiency** ❑ High ❑ Mid ❑ Conventional

Type ❑ Forced air furnace ❑ Boiler ❑ Electric baseboards/fan heaters ❑ Oil to gas conversion ❑ Heat pump
❑ Radiant ❑ Wood/oil/electric combination ❑ Hot water - forced air ❑ Wood stove ❑ Other _____

Age _____ years (approximate) **Likelihood of failure** ❑ High ❑ Medium ❑ Low

Chimney vent system ❑ Metal ❑ Clay ❑ Cement ❑ Masonry blocks ❑ Plastic **Fuel shut off at** _____

Limitations

Heating system inspection limited by ❑ System shut off ❑ No fuel ❑ Air conditioning working
❑ Limited access to heat exchanger/heat shield (c. _____ % not visible) ❑ Short summer test only
❑ Exterior temperature prevented heating system from starting ❑ Fuel tank(s)/pipe(s) only partially visible
☑ Pumps not tested ☑ Hidden ducts ☑ Buried tanks not inspected ☑ Solar heating not examined
☑ Adequacy of air/water flow/heat supply not determined ☑ Automatic fuel feeds not tested
☑ Functionality of electric air filters not determined ☑ Individual heating elements (electric furnace) not tested

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Recommendations and Notes

No heat source at _____

Fuel tank ❑ Rust ❑ Leaks ❑ Abandoned/buried ❑ Poor location ❑ Too close to furnace
❑ Poorly supported/missing straps/not level/inadequate base ❑ Suspect - further investigation required
❑ Damaged/loose regulator ❑ Replace immediately

Fuel piping ❑ Leaks ❑ Poorly protected/loose - cover/support ❑ Kinked ❑ Damaged ❑ Rust ❑ Corrosion
❑ Regulator loose/poorly sited ❑ Buried oil line

Furnace ❑ Rust ❑ Old ❑ Not working ❑ Furnace working today ❑ Fan noisy/loose/vibrates/not working
❑ Condensate pipes/pump leak ❑ Condensate pipes loose/kinked/poorly supported/poorly comfigured
❑ Induced draft fan noisy/loose/not working ❑ Furnace cycles

Electric furnace ❑ Rust ❑ Old ❑ Not working ❑ Furnace working today ❑ Fan noisy/loose/not working
❑ Burnt wires/overheating

Heat shield ❑ Damaged/cracked/crumbling ❑ Suspect - do not use furnace until checked by qualified personnel

Heat exchanger ❑ Rust ❑ Cracked ❑ Damaged ❑ No visible cracks or damage ❑ Signs of combustion spillage
❑ Suspect - do not use furnace until checked by qualified personnel

Combustion air supply ❑ Inadequate ❑ Obstructed ❑ None provided

Air filter ❑ Dirty/clogged ❑ None installed ❑ Improperly installed
Electronic/electrostatic air filter ❑ Dirty/clogged ❑ Parts missing ❑ Not working ❑ Working today

Heating (2)

Ducting ❑ Poorly connected ❑ Loose ❑ Blocked ❑ Rust ❑ No ducts to _____
❑ Possible asbestos hazard - laboratory testing & further investigation/removal by qualified personnel required

Barometric damper ❑ Stiff/inoperative ❑ Missing ❑ Wrong place

Flue pipes/venting ❑ Rust ❑ Poor seal at wall ❑ Inadequate clearances to combustible materials
❑ Poor clearances (exterior wall vents) ❑ Poor clearances to chimney/roof/other flue pipes ❑ Clogged
❑ Exhaust gasses (possible leakage) ❑ Damaged pipes ❑ Flue liner may be required - further investigation required by qualified personnel ❑ Flue pipe unsupported

Boiler ❑ Old ❑ Leaks ❑ Leaks at radiators/pipes ❑ Expansion tank waterlogged ❑ Gauges not working
❑ Not working ❑ Working today ❑ Circulating pumps noisy/leak/inoperative/not tested
❑ Possible asbestos hazard - laboratory testing & further investigation/removal by qualified personnel required

Heat recovery ventilator/air exchanger ❑ Filters dirty/clogged ❑ Central core dirty/clogged
❑ Condensate pipes leak/kinked/clogged/not connected ❑ Poor discharge location for condensate pipes
❑ Poor/incorrect duct connections ❑ Not working ❑ Working today ❑ Fan noisy ❑ Unit poorly supported
❑ Humidistat not working/poor location/missing

Humidifier ❑ Dirty (health hazard) ❑ Parts missing ❑ Not working ❑ Works today ☑ Spray type recommended

Service and test furnace/boiler before use - Winter _____ ☑ Service agreement recommended

Electric baseboard/fan heaters ❑ Rust ❑ Poorly secured to wall ❑ Exposed/loose wiring
❑ Thermostat(s) loose on wall/missing safety covers/damaged ❑ Sample tested and working

❑ Heaters at _____ not working

Radiant heat ❑ Not working ❑ Working today ❑ Leaking pipes ❑ No domestic supply temperature valve installed
❑ Evidence of overheating ❑ Suspect - further investigation required by qualified personnel

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Additional Notes

Heating (3)

Read this.....

Forced air furnace heat exchangers sometimes crack or fail on first use, following a Summer of idleness.

On most furnaces, only a small section of the heat exchanger or heat shield is visible, without dismantling the furnace. As home inspectors do not take furnaces apart, this can restrict the inspection.
The latest high efficiency, direct vent furnaces are virtually inaccessible except by qualified heating technicians.

Flue pipe sizing is almost always unit specific. This matter is beyond the scope of the inspection and is therefore not considered.

Fault conditions cannot always be discovered by running the unit for a few minutes. You may for instance, have to run the furnace for several hours for the fault condition to occur.

It's our advice that all new owners take out service agreements covering annual maintenance and unforeseen repairs. These agreements are excellent value as they usually cover all but the most significant repairs at no additional cost to the policy holder.
It is our experience that they are generally not transferrable.

Examine and where necessary, change or clean all air filters in furnaces, heat recovery ventilators and air exchangers on a monthly basis.
Dirty or clogged filters will significantly reduce the efficiency of most heating and ventilation systems and in extreme cases may be a fire hazard.

Always turn off electronic air filter or exchange systems before attempting any maintenance.

Do not run Heat Recovery Ventilators (H.R.V.s) in the Summer or when the air conditioning is on. These units will empty the conditioned air from your house while bringing in more humid air for the air conditioning to work on!!

Any fault conditions relating to solid fuel or fossil fuel devices have the potential to be a significant fire or health hazard. **Consider immediate repairs to be a priority.**

Heating (4)

Heating systems are generally designed specifically for each home or unit and take into account such factors as climate, orientation, insulation, windows, skylights and so on.
It is beyond the scope of the home inspection to determine the adequacy of any heating system and the inspection therefore relates to installed components, their current condition and life expectancy.

Fuels and Costs

Efficiency rating for various fuels are often contentious as manufacturers will always create ideal, controlled, test conditions which you are unlikely to replicate at home.

The decision to change heating fuel for one that appears to be less expensive - from electricity to natural gas for instance - seldom takes into account the capital cost of the new equipment and its installation.

Installing a new gas furnace and the associated ducts (to replace baseboard heating for instance) will cost several thousand dollars. The fuel cost saving may not be as significant as the furnace manufacturer would have you believe and it may be ten years or more before you break even.

At this point the furnace is two thirds through its life expectancy (typical furnace life is about fifteen years).
So now in five years you have to replace the furnace (again).

Of course there are other issues to consider - ductwork allows you to install central air conditioning and/or an air exchange system of some sort. A gas furnace may be easier to control and may give you a more even heat throughout your home and so on.

Finally - remember that high efficiency furnaces cost a lot more than mid efficiency ones. So - if you have a flue pipe already - you might find it's more cost effective to buy the mid efficiency variety.
Typically the efficiency difference is about 5%. If your heating bill is $1,000 a year and you save 5% - that's just $50. So if the furnace costs $1,000 more - it will take you 20 years, just to break even.

Don't rush into buying the latest technology or the most popular fuel of the day. Do the math - you may find it's not quite as appealing as you first thought.

Be aware that other people's heating bills can be meaningless. The person you're buying from may be a little old lady who keeps the heat at 80 degrees throughout the Winter and is home all day. You on the other hand, may be an outdoor exercise family, who are at work all day and hate it hotter than about 65!

You'll have to live there a year before you have a good idea of your energy costs. Use previous bills as a rough guide only.

Our cost calculator at the end of the heating section will help you compare different fuel system costs.

Electric heaters

Baseboard or fan heaters are common in many homes. Be sure that furniture and drapes are kept well clear.
Do not use outlets that allow wires to drape across the heater surface.

Radiant heat is returning as a fashionable item, having fallen from favour for many years. Most installations use hot water pipes however electric installations are returning to popularity in many areas.

Heating (5)

Furnaces and boilers

The main difference between furnaces and boilers is that furnaces heat air, where boilers heat water.
The second difference is that furnace systems have ducts to circulate the air throughout the building (which you can also use for air conditioning), whereas boilers need pipes and some sort of radiant surface to spread the heat.

With a boiler system, you will need separate ducts and an air handler (a big box with a fan in it) to use a central air conditioning system.

The **heat exchanger** is a core part of any furnace or boiler system and its failure usually means you have to replace the furnace or boiler. Some replacement heat exchangers are of course available, however the cost of replacement, especially when your take into account the labour, generally makes buying a new unit a better option.

The new unit will be more efficient and most come with some sort of manufacturer's warranty - usually five years.

In most cases only a small part of the heat exchanger is accessible to the home inspector, who will only comment on the visible areas. Annual inspections and servicing of all heating and cooling devices is highly recommended, both to ensure your safety and to provide the longest service life of the device.

Combustion air supply

Furnaces, boilers and other devices (water heaters for instance) that burn fossil fuels, need air to burn. In older homes this was provided through open basement areas and ill fitting doors and windows.

Today's homes are more air tight and indeed older ones that have been upgraded, need a separate combustion air supply. This can be as simple as a pipe open to the outside, that has one end near the furnace or boiler.
Without this essential air supply, fossil fuel burning devices may create a carbon monoxide problem in your home.

Some direct vent, high efficiency furnaces have a combustion air supply built in. Remember though that if you have a gas or oil fired water heater (that is not direct vent) as well - it will still need the air supply.

Heat pumps

Heat pumps work by taking small amounts of heat from the surrounding air, water or from the ground, over and over again. The small amounts are then transferred into your home. Gradually, the heat builds up and the house gets warm.

Most systems allow you to reverse the process in summer and thus get air conditioning.

Heat pumps are very efficient however compared say, with a furnace and air conditioning - but the capital costs are very high. If you are considering a heat pump system, be sure you intend to live in the house for many years to gain the full benefit. In some homes, heat pumps are tied in with electric or other higher running cost, heating systems.

Heat pumps need the same servicing as other primary heating systems. You would be well advised to take out a maintenance/service agreement for this type of system. Repairs need a specialist technician and are generally not cheap.

Heating (6)

Heat recovery ventilators (H.R.V.s) and air exchangers provide controlled methods of allowing fresh, outside air into your home while simultaneously exhausting stale air.

They can make a significant contribution to the reduction of humidity in Winter. Generally it's not recommended that you use these devices in the Summer months as they can increase the humidity by pulling in outside air, acting in direct opposition to any air conditioning you may have.

Oil tanks

Oil storage tanks rust from the inside - out, as well as from the outside - in.
The problem is that oil floats on water, no matter what the proportions. So condensation, which is formed whenever the tank is filled, ends up on the bottom of the tank, rusting the metal.

Many jurisdictions have recently (within the last three or four years) adopted new regulations to cover the continued use of oil tanks, especially underground ones.

Most insurance companies will not insure homes with exterior tanks more than 15 years old and interior ones more than 25 years old. If the tank's age cannot be determined - typically you won't get insurance until the tank has been replaced.

Underground tanks can leak for many years without any noticeable increase in fuel usage. Any leakage is an environmental problem, which can be extraordinarily expensive to clean up.

Fuel oil suppliers are no longer permitted to re-fill unregistered underground tanks, nor any tank connected to a system that does not comply with current legislation. There is a schedule in many areas for the removal and replacement of underground tanks with start dates for older tanks as soon as October 2006.

Visit www.tssa.org for more information.

Oil piping must be protected where it is exposed between the oil tank and the furnace or water heater.

Humidifiers

Whole house humidifiers, as opposed to portable ones, can be a source of bacteria, mold and corrosion.
The rotating drum style are particularly susceptible to this sort of problem if not maintained on a regular basis and can be a significant health hazard especially to the elderly, children and anyone suffering from any sort of respiratory illness.

The newer style "flow through" ones that work on a spray system, instead of a reservoir, are better although they use more water.

The need for a humidifier depends on your life style, the features of your home, (hardwood floors for instance) and whether you own a Steinway grand piano!
In many cases - your normal living - breathing, taking showers, cooking and so on, will generate sufficient moisture to keep your home comfortable.

A good average humidity is between 40 and 50%. You can buy an inexpensive humidistat from any hardware store. If you find you're constantly being zapped by static electricity, it's likely that you need some of the additional moisture that a humidifier is designed to provide.

Gas, oil, propane, wood or electricity?

This quick four step guide will allow you to compare apples with oranges!!

First ..... prices.

Check with your local supplier for the current prices of available fuels.

Fuel	Energy content	Local price
Oil	38.2 MJ/ litre	...../litre
Electricity	3.6MJ/KWh	...../KWh
Natural gas	37.5MJ/m^3	...../m^3
Propane	25.3MJ/litre	...../litre
Hardwood	30,600MJ/cord	...../cord
Softwood	18,700MJ/cord	...../cord
Wood pellets	19,800MJ/tonne	...../tonne

Here's what the abbreviations mean:

MJ = Megajoules - metric measurement of heat content.
KWh = Kilowatt hours
Cord = a full cord of wood - 4' x 4' x 8'

Next ..... efficiency

Choose which system you want to compare .....

Fuel	System	Efficiency %
Oil	Conventional	60
	Mid efficiency	83 - 89
Electricity	Furnace or baseboards	95
Natural gas	Conventional	55 - 65
	Mid efficiency	88 - 90
	High efficiency	93 +
Propane	Same as Natural gas	
Wood	Furnace	45 - 55
	Stove	55 - 70
Wood pellets	Stove	55 - 80

Then ..... location

Choose the city with a climate closest to yours and note the heat load.

City	New house heat load	Old house heat load
Ottawa	**100**	**150**
Toronto	**80**	**120**
Montreal	**100**	**150**
Vancouver	**70**	**100**
Calgary	**120**	**180**
Yellow Knife	**160**	**240**
Regina	**120**	**180**
Halifax	**100**	**150**
St. John's	**120**	**180**

Finally...

To find your annual heating cost .....

$$\frac{\text{Your local price}}{\text{Energy content}} \times \frac{\text{Heat load}}{\text{Efficiency}} \times 100{,}000$$

Here's a sample calculation, just in case you're not quite so up on "Order of Operations" as you used to be!

Location: Rural house near Ottawa

House type: 50 years old - heat load 150

Type and cost of existing fuel: Electricity at 0.08 cents/KWh

Type and efficiency of existing heating system: Furnace - 95%

Type and cost of new fuel: Hardwood at $150.^{00}$ per cord

Type and efficiency of new system: Wood furnace - 55%

The estimated cost of the existing electric heat would be:

(0.08 divided by 3.6) x (150 divided by 95) all multiplied by 100,000

= $3,140

The estimated cost of the new wood heating would be:

(150 divided by 30,600) x (150 divided by 55) all multiplied by 100,000

= $1,092

So by changing from electricity to wood, you would save

$3,140 - $1,092 = **$2,048**

This of course takes no account of the capital costs of changing the system.