



## WATER QUALITY IN A HEATMOR OUTDOOR WOOD FURNACE

**\*\*\*Send GVH sample of raw water from source & solution in Heatmor at least once per year\*\*\***

**\*\*\*Ship to: 7338 Fallon Drive, Granton, ON N0M 1V0\*\*\***

**\*\*\*Ship in 500ml plastic water bottle\*\*\***

### **WATER QUALITY RECOMMENDATIONS**

WATER QUALITY IN AN OUTDOOR WOOD FURNACE PLAYS AN IMPORTANT ROLL IN THE LIFE OF YOUR SYSTEM. ALONG WITH KEEPING THE FURNACE FULL OF WATER AND REGULAR MAINTENANCE WILL GIVE LONGEVITY FOR YOUR INVESTMENT.

GREEN VALLEY RECOMMENDS THE FOLLOWING PARAMETERS.

| PARAMETER                               | OPTIMAL CONDITIONS   | COMMENT   |
|---|--|---|
| GLYCOL FREEZE PROTECTION                | 30%-50%  | BELOW 20% CAN PROMOTE THE GROWTH OF BACTERIA AND HIGHER THAN 50% WILL DRAMATICALLY REDUCE THE HEAT TRANSFER ABILITY                         |
| CORROSION INHIBITOR MOLYBATE OR NITRITE | MOLY: GREATER THAN 100 PPM<br><br>NITRITE: GREATER THAN 1000 PPM | WITHOUT THE ADDITION OF INHIBITORS CORROSION OF THE METALLIC COMPONENTS (IE PUMP, FITTINGS AND WATER JACKET) WILL BEGIN.                    |
| PH                                      | GREATER THAN 8.5   | A PH BELOW 8.5 BECOMES ACIDIC WILL ALLOW CORROSION OF STEEL   |
| CONDUCTIVITY                            | BETWEEN 700 - 4000µs   | A MEASURE OF ALL SOLIDS AND SALTS IN WATER. WILL VARY DEPENDING ON ADDITIVES IN SYSTEM  |
| CHLORIDES                               | LESS THAN 50PPM  | 409 STAINLESS CONTAINS CHROMIUM AND A THIN LAYER OF CHROMIUM FORMS ON THE OUTSIDE. HIGH CHLORIDE WATER CAN BREAKDOWN THIS PROTECTIVE LAYER. |

|                     |                  |  |
|---------------------|------------------|--|
| BACKFILLING FURNACE | 4 TIMES PER YEAR | A SPACE WITH NO WATER AT TOP OF TANK IS MANY TIMES MORE CORROSSIVE-KEEP WATER IN BLADDER AND FILL HEATMOR TO OVERFLOWING. REMEMBER TO MOVE THE WEIGHTED BALL OFF |
| MAINTENANCE         | 2 TIMES PER YEAR | KEEPS FURNACE WORKING PROPERLY AND RUNNING EFFECIENTLY   |

If you have any questions regarding the water quality in your system or require assistance please contact Green Valley Heating or a Green Valley Heating Dealer 1-866-415-2127. **It is important to understand what each of the parameters of water quality means and how it can affect the longevity of your system. The following pages explain in more detail each of the above parameter.**

## **Glycol Freeze Protection (Propylene)**

Propylene Glycol (PG) is used to prevent the freezing of systems that are exposed to low temperature environments and that could be exposed to potable water. If glycol is required in a system, it is recommended that the concentration of glycol be above 30% and no more than 50%. Below 20%, glycol becomes a nutrient for the growth of bacteria, which can infect the system. Once a bacterial infection gets into a system, it is very difficult to remove. A glycol concentration above 50% makes the water too viscous and will cause damage to a variety of components and moving parts. Also, glycol concentration causes the system to lose some heat transfer ability and decrease the system efficiency, this decrease is dramatic in mixtures that are above 50%.

Addition of glycol to a system will cause a drop in the pH (see pH section). Buffers are usually mixed with the glycol to combat a drop in pH. When glycol breaks down it causes acidic products to be formed, which can also lower the pH.

## **Corrosion Inhibition (Molybdate or Sodium Nitrite)**

Corrosion in systems can come in many forms. The most common form known to most people is corrosion that is caused by oxygen in the water. This corrosion is called oxidative corrosion. Other types of corrosion include galvanic corrosion, caustic corrosion and acidic corrosion. To combat corrosion, many different methods are used such as control of pH (see pH section), use of chemical corrosion inhibitors and effective monitoring and control.

There are many chemical corrosion inhibitors available on the market today. However, for closed loop non-pressurized outdoor heating systems, only two types are recommended. Molybdate and nitrite corrosion inhibitors are film forming inhibitors and protect against all forms of corrosion. Molybdate is recommended over nitrite because it is required at a lower concentration; it is less toxic and does not promote the growth of bacteria. The nitrite works by reacting with ferrous hydroxide and forming a passive layer of magnetite. The molybdate works in a similar manner by converting "red rust" into the same passive layer of magnetite. Properly treated water jacket will have a coating or film on the steel.

The concentration of molybdate inhibitor should be above 100ppm (parts per million) and above 1000ppm for the nitrite inhibitor.

## Conductivity

Conductivity is an indirect measurement of Total Dissolved Solids (TDS) in the water (TDS = 0.62 x Conductivity). Conductivity is a test of how easily the water can conduct an electrical current. The more dissolved solids in the solution the higher the conductivity. Domestic tap water has a conductivity of about 300 $\mu$ S/cm (with variances depending on your particular region). Conductivity can also be used as a secondary indication of the amount of chemicals in the water. As an example, the concentration of nitrite in a solution should add approximately 3000 $\mu$ S/cm to the system and molybdate will add 1000 $\mu$ S/cm.

The conductivity in a closed loop Heatmor heating systems should be between 700 and 4000 $\mu$ S/cm depending on which additives are in the water. The addition of glycol, nitrite and even soft water will have an effect on the conductivity reading.

## pH

A pH measurement is a logarithmic determination of the hydrogen concentration. The lower the pH reading the more acidic the solution and the higher the pH the more basic the solution. The pH scale ranges from 1 to 14 with a pH of 7 being neutral.

The pH of a system has a huge effect on the life of the system. Variations in pH can indicate a variety of problems and cause damage to the system components. The ideal pH is between 8.5 and 10.5 pH units. Systems should be maintained in this range because a pH less than 8.5 will corrode steel and a pH higher than 10.5 will corrode brass and copper. A high pH will also cause the precipitation of iron from the water that will cause corrosion in the system. Buffers in the inhibitors can help maintain the proper pH range. A drop in pH can indicate a variety of problems. First, a bacterial infection can produce acidic byproducts which will drop the pH. Also, as glycol degrades, it produces acidic byproducts that can drop the pH.

## Chlorides

Chlorides, not to be confused with chlorine are in nearly all water supplies. They usually are associated with the salt content and amount of dissolved minerals in the water. Chlorides are soluble mineral compounds that are dissolved in water as it filters through the earth. The amount of chlorides is determined by the type of soils and rocks it has contacted. Chlorides may get into surface water from other sources such as road salt, fertilizers (ie. potash), animal and human waste. Water supplies having high concentrations of total dissolved solids (TDS) may also contain elevated chloride levels. High concentrations of chlorides above 50ppm can contribute to corrosion by breaking down the chromium layer of the 409 stainless.

**\*\*\*Send water sample to GVH once per year\*\*\* Remember- Always use low chloride & proper pH water in Heatmors. It is not recommended to treat high chloride water with water treatment.\*\*\***