

ENGINEERING BULLETIN

Subject: Boiler Water Quality

Date: 10/24/2023

EB084

The Gallant and Exalt Boiler require both the closed loop boiler heating water and the open loop domestic water to meet certain criteria to ensure the safe and reliable operation of the units and to maintain the warranty. The guidelines laid out below must be followed for all installations of Gallant and Exalt boilers.

Notice: Failure to follow the instructions contained in this section will void the Ideal Heating North America Warranty.

Closed Loop Boiler Heating Water Quality Requirements

To maintain efficient operation of the heat exchanger in Boiler the following instructions must be followed. Failure to follow these instructions will result in poor operation of the appliance, lead to potential failure of the product, and will void the warranty.

During installation and during the annual maintenance the water quality must be checked and if found outside of the requirements, must be corrected.

Air Elimination

Oxygen found in air can cause corrosion of the boiler heat exchanger. A micro bubble air elimination device is **required** to be installed in all heating systems containing the boiler. An air scoop or an automatic air vent are not an acceptable substitute for a micro bubble air elimination device and may not be used as a substitute in the installation. A few examples of acceptable devices are:

- Taco 4900 Series (www.tacomfort.com)
- Caleffi Discal (www.caleffi.com)
- Spirovent (www.caleffi.com/en-us)

If an automatic feed valve is installed in the heating system, it must not be left open indefinitely. A continuous feed of fresh water could damage the boiler and the system. Fresh water contains both minerals and oxygen. It is required that after a short period of time, between one to four weeks following the installation of the boiler into a heating system, the automatic feed valve be closed, and the water quality be checked.

If underfloor heating is used in the heating system with boiler it must use oxygen barrier tubing and if not, it is required to be separated with an external heat exchanger from the boiler. Only oxygen barrier tubing can be used in the boiler heating system side.

In the closed loop boiler side of the installation only a bladder or diaphragm type expansion tank may be utilized. An open expansion tank is not allowed to be installed on the closed loop boiler heating side of the installation.

Dirt and Debris

It is highly recommended to install a dirt trap (not a strainer) in existing heating systems where the boiler is being installed as a replacement boiler. If the boiler is being installed into a system with a high volume of water or in a commercial application, it is recommended to always install a dirt trap. If the boiler is installed in a system with cast iron radiation or extensive steel or cast-iron pipes it is highly recommended to install a magnetic separation device in addition to a dirt trap or a dirt trap with magnetic separation in the heating system loop.

Cleaners and Chemicals

Clean all boiler systems new and existing with a system cleaner equivalent to Sentinel X300, Fernox F3, or Rhomar Hydro-solv 9100 before prior to installing the new boiler to remove all debris and residue. Follow the system cleaners' instructions and be sure to thoroughly flush the system with clean water before putting the boiler into operation. The system cleaner should not be run through the boiler, do not flush the system through the boiler as well, as residue and debris might deposit in the heat exchanger.

Do not use petroleum-based cleaners in the heating system as they can damage gaskets.

Table 2 Closed Loop Heating Water Quality Requirements

Contaminant	Maximum Allowable Level	Units
Conductivity	100 to 300	μS/cm
Corrosivity	Non-corrosive 0	LCI
Chloride	150	ppm (mg/L)
pH	6 to 8	pH
Hardness	3 – 7	Grains/gallon
	50-120	ppm (mg/L)
Total Dissolved Solids (TDS)	50 – 300	ppm (mg/L)
Glycol	20-50%	%

Glycol

Boiler water (including additives) must be practically non-toxic, having toxicity rating or class of 1, as listed in Clinical Toxicology of Commercial Products. A maximum 50% concentration of inhibited propylene glycol is allowed. Less than a 20% concentration of glycol is not permitted. Glycol will acidify because of thermal degradation overtime and could cause damage to components in the heating system. This degradation is why heating system specific propylene glycol only must be used, these glycols contain additives and inhibitors or are meant to work with specific system inhibitors. Examples of acceptable inhibitors are:

- Rhomar Pro-tek 922 (<http://www.rhomarwater.com>)
- Sentinel X100 (www.sentinelprotects.com/us)
- Fernox Protector F1 (fernox.us)

The service technician must follow the antifreeze manufacturer's instruction. Antifreeze at a minimum must be checked on an annual basis or what is specified by the manufacturer of the antifreeze. Antifreeze must be replaced at a minimum every 3-5 years or what is specified by the manufacturer of the antifreeze.

When using antifreeze in the heating system circulator sizing must be considered because of the increase viscosity of the glycol mixture, a higher head circulator may be required. The glycol will also lower the heat capacity and the btu output will be reduced by approximately 16-20% when using a mixture of 50% propylene glycol and 50% water. The reduced heating capacity at a 50/50 mixture will vary depending on the brand and makeup of the glycol. Glycol will reduce the efficiency and output of combi DHW output as well. When adding other additives to the heating system glycol water mixture make sure they are compatible with the brand of glycol that is being used. Not all glycol and additives are compatible.

If the boiler is used in a snow melt application and higher percentages of glycol are required, it must be isolated from the snow met system using a plate or shell and tube heat exchanger.

DANGER

Do not use automotive, ethylene glycol or petroleum-based antifreeze. Do not use any undiluted antifreeze. This can cause substantial property damage, serious injury, or death.

Potable DHW Water Quality Requirements

The domestic water supplied to the combi boilers must be potable water that is free from contaminants, sediment, corrosive chemicals, and debris. It is the responsibility of the installer to ensure the water meets all the guidelines laid out in this manual. Water quality that exceeds the guidelines and results in damage or failure of the combi boiler is not covered by warranty.

Table 1 DHW Water Quality Requirements

Contaminant	Maximum Allowable Level	Units
Dissolved Carbon Dioxide (CO ₂):	15	ppm (mg/L)
Sulfate	250	ppm (mg/L)
Corrosivity	0.0	LSI
Fluoride	2	ppm (mg/L)
Foaming agents	0.5	ppm (mg/L)
Chloride	100	ppm (mg/L)
pH	6 to 8	pH
Hardness	3 – 7	Grains/gallon
	50-120	ppm (mg/L)
Total Dissolved Solids (TDS)	300	ppm (mg/L)
Iron	0.3	ppm (mg/L)
Aluminum	0.2	ppm (mg/L)
Copper	1	ppm (mg/L)
Manganese	0.05	ppm (mg/L)
Zinc	5	ppm (mg/L)
Sediment	4	microns
Chlorine	150	ppm (mg/L)

If the domestic potable water quality is not within the allowable levels laid out in the document the water must be treated. Special attention should be taken regarding sediment, hard water, pH, and chlorides.

- If sediment in the water supply is 5 microns or greater a water sediment filter must be used.
- If there is there is hard water a water softening system should be used.
- If the chlorides or pH are out of range a water treatment company should be consulted to correct all water quality issues. Any water treatment/conditioning system must be installed and maintained in accordance with the manufacturer’s specifications.
- When using well water, a sand or stainless-steel sediment filter is recommended

Please contact technical support at techsupport@idealheatingna.com or 800-411-9999 x575 with any questions.