# Heating Chamber and Heat Exchanger Turn Red

**WARNING**

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**Heating chamber and heat exchanger are too hot. The heat chamber and heat exchanger glow red near their connecting point.**

**APPLIES TO LASER 72 AND 73.**

## What does this mean?

A slight red glow near the connection between the two parts can be normal. However, if this red glow extends beyond the area comprising the connection between the two parts (one to one and half inch), there may be a problem with the unit. Excessive glowing means that too much heat is being concentrated on the connection between the parts.

## What can cause this?

There are essentially three causes for this situation:

1. The burner is not working properly, and the heat released from the burning fuel is being released too high in the burner.
2. The heat is not able to disperse properly throughout the heat exchanger.
3. Too much fuel is getting in to the burner.

## What is causing this problem in my heater?

1. **Flue pipe**. The first step is to be sure there is no obvious problem with the **outside** of the flue pipe. Go outside and check to be sure there is nothing plugging or blocking the flue pipe. There must be nothing inside the exhaust or intake parts of the double pipe and nothing must hinder easy flow of air into or out of this pipe.

2. **Flame condition**. The next step is to determine whether the unit is **burning properly**. To do this, remove the front cover of the heater. (Remove the screw on each bottom front corner of the heater and lift the front panel out and up.) Start the heater. After it has burned for several minutes, look through the view window on the front of the burn chamber. (Note: If you cannot see into the burner, shut off the heater and carefully clean the mica view window. Be very careful not to damage the gasket and carefully note the position of the gasket and window.) If the heater has a steady, mostly blue flame that surrounds the burner ring, proceed to #3 below. If you see tall, yellow flames proceed to #4.

3. **Flame appears to be normal**. If so, the problem is most likely caused by an abnormal condition in the heat exchanger, blower motor, or flue pipe. Something is preventing the hot exhaust gas from flowing smoothly through the heat exchanger and outside. The unit must be taken part and each part inspected. The possibilities are listed below:

    1. **Damaged heat exchanger**. Remove the heat exchanger.

        1. Shake it. If you hear a rattling sound, something has come loose inside the heat exchanger and unless you can shake it out, the heat exchanger must be replaced.

        2. Inspect the hole where the heat exchanger connects to the heat chamber. Just inside the hole you should see a baffle plate. The plate should be about 3/4 inch inside the hole. No part of this plate should be touching the rim of the opening. Push on the plate with your finger or a tool. It should not move. If it is loose or comes down toward the opening, the heat exchanger must be replaced.

    2. **Dirty heat exchanger**. Check the bottom hole of the heat exchanger. If you notice a buildup of soot or carbon, the heat exchanger must be

cleaned or replaced. There are many methods for cleaning the heat exchanger. It can be a dry method using air or something shaken in the exchanger to loosen the soot. Or it can be a wet method using soap and water. Be sure not to operate the heater with a wet heat exchanger. The heat will cause steam that will loosen more soot and carbon that will fall down into the combustion blower motor. Then the heater must be disassembled again and the blower exhaust fan re-cleaned. Let the heat exchanger dry for several hours before activating the burner.

3. **Defective blower motor**. Check the following:

    1. Be sure blower motor is **operating smoothly**. Turn on the heater for a second or two. The motor should come on and the fan start to spin. After the heater is turned off, the fan should continue to spin. If it does not, the blower motor assembly must be serviced or replaced.

    2. Be sure the **exhaust fan is tight** on the motor shaft. (The exhaust fan is the top fan that can be seen and touched through the hole on top of the blower assembly. Make sure the fan is not loose on the shaft. If so, tighten the hex locking-screw on the hub and the locking nut on top of the shaft.

    3. Make sure the **fan is clean**. If it appears to be dirty, remove the top cover of the blower assembly. Be careful not to damage the gasket. You may use a small brush (toothbrush) and a vacuum cleaner to loosen and remove soot from the fan and the top of the blower assembly. Also check the exhaust port at the right rear corner of the blower assembly. Be sure it is clean. You may also remove the fan and wash it with soap and water. The 7mm nut on the shaft must be removed AND the 2mm hex locking screw on the hub must be loosened in order to remove the fan. Grasp ONLY the hub when removing the fan. A lubricant such as WD-40 will help. Do not pull up on the outer part of the fan. It will bend easily and if it is not perfectly round it will cause a vibration when the blower assembly is operated.

4. **Defective exhaust system**. If you do not think you have discovered the reason for the problem, continue by checking to make sure the entire exhaust system is clean. This will include:

    1. **Exhaust elbow** connecting the heater to the flue pipe.

    2. **Extension pipes** if installed.

    3. **Flue pipe**.

4. **High yellow flames**. Tall yellow flames shooting up the sides of the burner cause the top of the heat chamber to become too hot. High yellow flames can be caused by the following;

    1. **Loose or "bubbled" burner mat**. If the burner mat (a piece of clothe-like material that is glued to the bottom of the burner pot) is not properly glued to the burner, fuel will not evaporate properly. Gradually, fuel will collect on the bottom of the burner. Eventually this fuel will ignite and burn from the bottom of the burner below the burner ring. This is abnormal and will cause flames to shoot up past the burner ring. Gently touch the burner mat to determine whether it has a loose section or is not glued to the burner. If it is not thoroughly glued, the burner mat must be replaced. Be sure that the new burner mat is properly glued when installed.

    2. **Damaged or warped burner bottom**. The bottom of the burner should be smooth and slope down slightly toward the middle. If the burner is deformed, it must be replaced. (Note: this problem is very uncommon on Laser 72 heaters. Laser 73 H or I models may develop this problem if they have not had a burner upgrade.)

    3. **Dirty burner assembly**. If there is a great deal of carbon on the bottom of the burner, the air holes near the bottom of the burner can become plugged. When this happens, there is not enough air to evaporate the fuel properly. This can also cause high yellow flames. The burner must be thoroughly cleaned. Be sure to clean the small air holes near the bottom of the burner. Use a small nail or paper clip.

4. **Damaged or missing burner pad**. Underneath the burner there is an insulating pad made of high temperature insulation material. This part is rarely defective under normal circumstances. However, if the unit has been flooded or the burner replaced, this may also cause high flames. Remove the burner assembly and check the burner insulating pad. It should be in position and dry. If not, replace.

5. **Improper fuel-to-air mix.** This means that the heater is getting too much fuel, or not enough air. Thus, the flame can be very yellow with high flames. Check the following:

    1. **Intake air.**

        1. Again, be sure nothing is blocking the flow of air into the flue pipe and be sure the air intake hose on the back of the heater is properly connected and not plugged. There should be no air-restrictor on the rear opening of any L72 or 73.

        2. Be sure the intake air fan in the blower is working properly. Remove the black rubber elbow in front of the blower. Try to wiggle the fan back and forth with your finger or tool. If the fan seems to be loose and spin on the shaft, the blower assembly must be serviced.

    2. **Fuel adjustment**. Fuel pumps rarely need to be adjusted. However, if the heater is used higher than 3000 ft. above sea level, the pump will need to be adjusted or the circuit board modified to facilitate operation at high elevation. Only adjust the fuel pump if everything else has been checked and is normal. See the Toyostove Service Manual Section 2-13 and 5-4 for adjustment details.