

10 Tips For Oven Maintenance

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To keep your oven operating at its peak performance, follow these maintenance tips.

Everyone knows that maintenance is important for product longevity and performance. Your vehicle is an obvious example of this -- especially if you have ever found yourself calling AAA for roadside assistance on a rainy night.

Ovens for testing, laboratory and process applications are no exception. Whether an oven is used in a tension test or an annealing application, every oven owner needs a checklist to help keep the oven at peak condition. And, ovens that have mounting assemblies or special cooling have even more maintenance issues.



Whether an oven is used in a tension test or an annealing application, every oven owner should perform routine maintenance checks to keep the oven at peak condition.

TIP 1: Maintain the Blower

The blower motor is one of the most important oven features. Proper lubrication is a must if it is a sleeve-bearing motor, according to "Dayton Fractional HP Motors Installation and Maintenance Information Manual." If the blower motor is equipped with oil cups, lubricate with five drops of SAE 20 non-detergent oil at six-month intervals. Ball-bearing motors or motors prelubricated at the factory do not require lubrication, according to Dayton. Apply the oil at the front and back of the motor where there are lubrication ports in the housing. Always refer to manufacturer's instructions when oiling your oven's

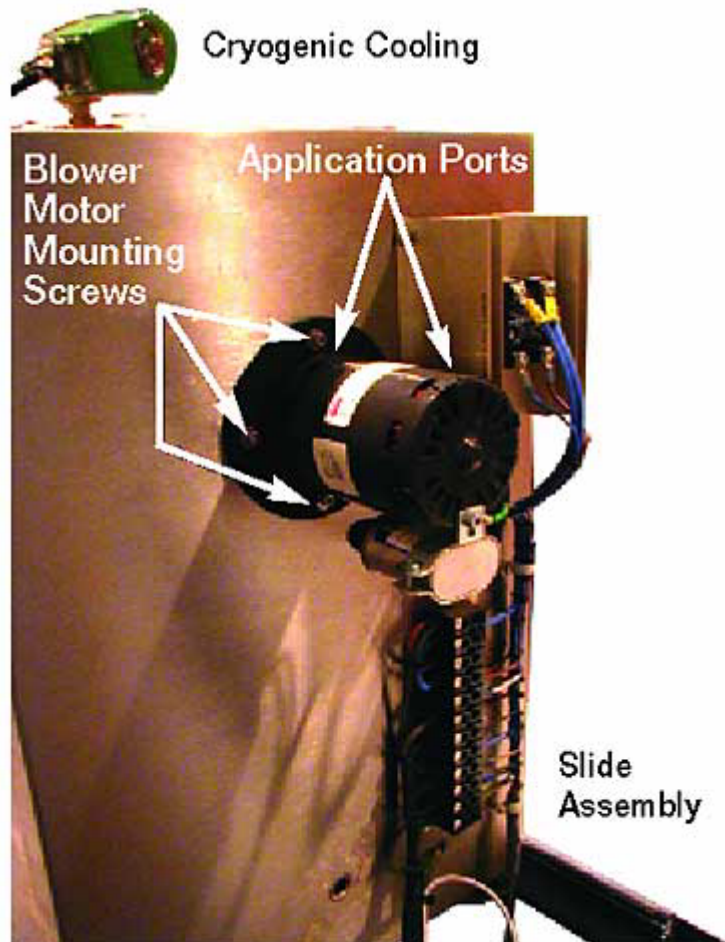


Figure 1. This blower motor requires regular re-oiling. The arrows show where the application ports are located.

motor.

The blower motor in figure 1 requires regular re-oiling. Arrows point to where the application ports are located. Figure 2 shows a ball-bearing motor that does not require periodic re-oiling; this type of motor normally has a sealed housing. Over-lubrication is strongly discouraged.

The risk of premature oven stoppage is reduced if the blower motor is kept free of dirt and other debris. Loose blanket insulation from the oven and other foreign materials may get caught in the blower assembly and create an unbalanced state in the motor. Vacuuming or using an air jet can keep vent openings clean.

Also, check the blower wheel and extension shaft set screws periodically, especially if it is a continuous-duty unit. Tighten the screws as required. Verify that the general blower motor mounting is secure. Make sure that the mounting screws are snug, but do not overtighten because this might crush the isolation or resilient washers. The isolation washers are located behind the mounting plate and mounting screws (figure 2), between the plate and oven. Always replace the washers when damaged.



Figure 2. This ball-bearing motor does not require periodic re-oiling; instead, this type of motor normally has a sealed housing.

TIP 2: Consider Oven Location and Avoid Restricted Airflow

The physical location of the oven is another important consideration. Do not place the oven where the airflow around the blower motor is blocked. Be careful where the specimen or product is placed inside the oven. Restricting the air inlets and outlets (figure 3) reduces airflow through the entire oven, resulting in premature element failure and poor performance.

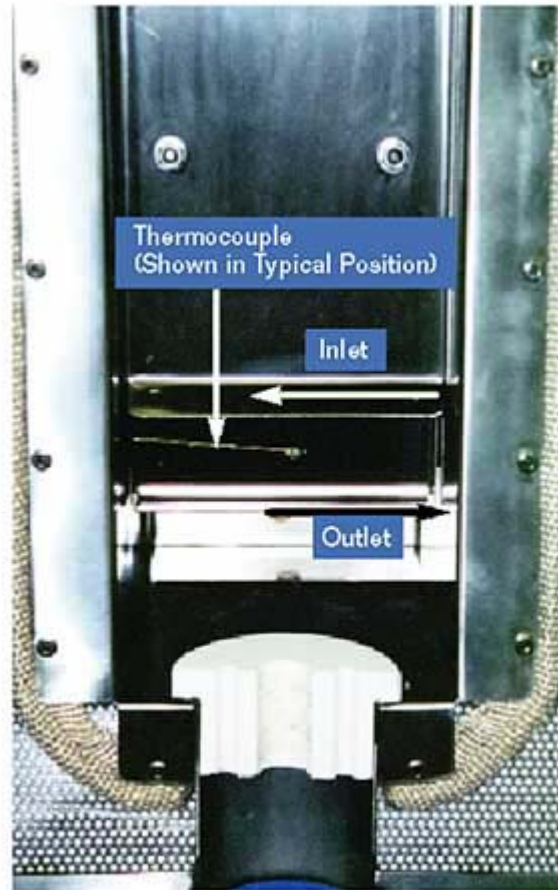


Figure 3. Restricting the air inlets and outlets reduces airflow through the entire oven, which can result in premature element failure and poor performance. Arrows show where the air inlets and outlets are located.

TIP 3: Use Correct Power

Operating on reduced power can result in poor performance. A classic example of this problem is operating a 240 VAC oven on 208 VAC, which results in a 20 percent power reduction. If you experience unsatisfactory operating conditions because of reduced power, correct with a buck-boost transformer.

TIP 4: Check Your Heating Elements

Burnt out heating elements result in reduced power and loss of performance. If oven performance drops off or it takes longer than normal to heat up, then check the elements. One way is to check the resistance of individual elements with a digital multimeter. For safety reasons, always first turn off power to the control system. Once the power is off, systematically disconnect each element from the circuit, connect the voltmeter across the leads, and set the meter to ohms. A high reading (infinity) would indicate a burnt out element; a low reading (below 100 ohms) would indicate a normal or good element.

A second method is an amperage check of elements. This involves a clip-on ammeter to check the current draw. To begin, clip the meter around one of the leads going to the bank of elements. If both leads are attached at the same time, each one will cancel out the other. Turn system power "on" and set the temperature controller for 100 percent output. If the current draw is lower by more than 10 percent of the data label rating, you should check each element independently and systematically.

When checking individual elements, manually set the controller to 100 percent. Be sure only one lead at a time is attached to an ammeter. No current reading indicates a possible bad element. After each reading, return controller output to 0 percent to avoid overheating the oven. Finally, perform a resistance check on the element to verify a failed element.

Depending on the type of elements used in the oven, different replacement instructions normally apply. One item to always remember is that power must be disconnected from the oven before replacing the heating elements. Failure to do this simple procedure may result in personal injury or death.

TIP 5: Check Your Thermocouples

If the oven shuts off because of a sensor break, the oven temperature sensor or its wiring may be at fault. There could be two problems that need correcting. The first is an open/broken thermocouple or a broken extension lead. The second type, which occurs less frequently, is a shorted lead outside of the oven.

The first malfunction most often occurs on the bead, where the two wires of the thermocouple meet at the sensing unit inside the oven. Remove the thermocouple from the oven and visually inspect the thermocouple wires for cracks or breaks, especially at the tip of the thermocouple or bead. Use an ohm meter connected across the thermocouple leads to check for continuity on the thermocouple. Before using the meter, disconnect the thermocouple from the control system.

A broken extension lead may be as obvious as a break at the connector outside the oven or hidden in the middle of the lead. To fix a break at the connector, strip back and connect at the end of the lead. An ohm meter is needed to find a break in the lead's center. Use the meter to check for continuity through the leads. If discontinuity is noted, repair by simply replacing the extension lead with the same type of lead.

If the oven controller reads ambient (room temperature) even though the oven is obviously hot, this may indicate a shorted thermocouple where two thermocouple wires (leads) are touching. When the bare wires make prolonged contact, this creates the cold junction described above. To repair, simply separate the leads.

If you need to replace the entire thermocouple, replace it with the exact same type of thermocouple that was previously used in the oven. When replacing, bend the new thermocouple to match the original configuration. Observe the polarity. If the temperature reading drops as the oven temperature rises, the polarity of the thermocouple is reversed. Correct this polarity problem by stopping the heating process and reversing the thermocouple. If the temperature reading rises as the oven temperature rises, continue the heating process.

TIP 6: Plug Unnecessary Heat Losses

If your oven is equipped with a light, always use a port plug in the light socket when not using the light, even when operating the light socket within the oven's temperature rating (figure 4). The light socket may have a temperature rating that is less than the rating of your oven, especially a high temperature oven. Using a port plug in the light socket reduces heat loss and prevents the socket from malfunctioning from the heat. Always replace the port plug when cracked or damaged.

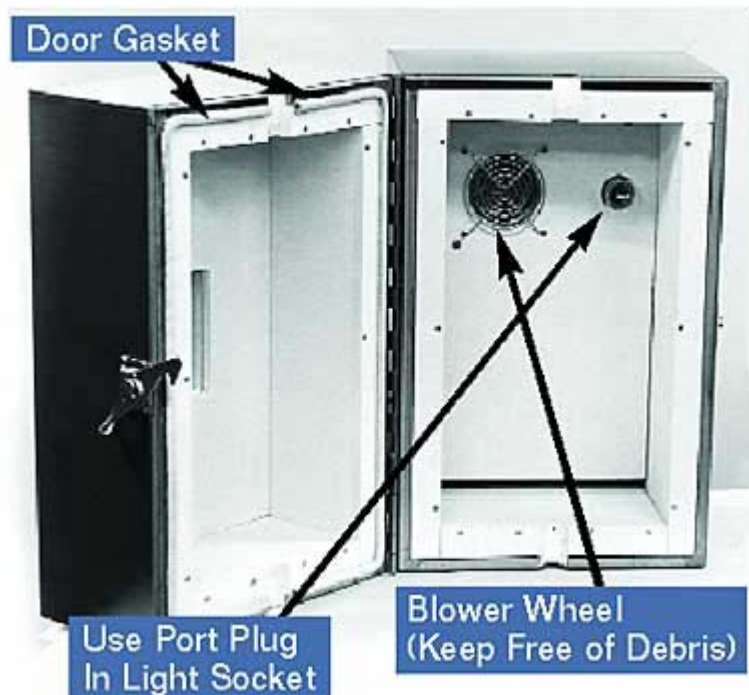


Figure 4. Even when operating the light socket within the oven's temperature rating, always use a port plug in the light socket when not using the light.

TIP 7: Inspect Door Gaskets and Port Inserts

Inspect the gaskets on the oven door and other port inserts periodically for breaks, torn gaskets and missing sections. If you feel heat escaping from the oven, there is likely to be torn gaskets.

TIP 8: Check Mounting and Slide Assemblies

Ovens designed for materials testing may require special mounting. Mounting and slide assemblies need to be checked on a regular basis to ensure that all locking devices operate properly.

TIP 9: Use Water-Cooled Accessories Intelligently

If you tap very briefly on a hot iron, you may not get burnt. But, if you keep your hand on it for a longer time, there is enough time for heat transfer, and you will get burnt. This analogy is similar to what occurs with too rapid of a water flow in cooling accessories. When using water-cooled accessories, avoid excessive water flow rates. Too high of a flow rate does not allow enough time for heat to be removed from the load train or retort. Failure to remove enough heat from the load train or retort could damage retort seals, accessories or a transducer, if present.

TIP 10: Cool Correctly

In those applications that require it, cryogenic cooling is the preferred method of bringing an oven to a low temperatures. Cryogenic cooling is effective if you follow a few tips. When installing and using CO₂ or LN₂ with solenoid valves:

- Do not use regulators between the CO₂ siphon tank or LN₂ tank and oven.
- Avoid using manifolds. Changes in the cross section of the liquid path can result in solidifying the liquid.
- Do not exceed the pressure rating of the solenoid valve.

- Use proper ventilation when cooling. The operator's life you could save might be your own.

Choosing an oven and its accessories is often a daunting process. From the blower motor and elements to port plugs, oven maintenance is vital to oven longevity and operator safety. Nothing guarantees the eternal life of any product, but by following these 10 tips, you will understand some things to look for when planning your next oven purchase.
