

# Oxy Conical Burner Installation

### SAFETY

These instructions pertain only to the Oxy Conical Burner and should only be used for its intended purpose. Only qualified personnel should work on the Oxy Conical Burner to ensure proper installation, especially when installing gas piping or electrical wiring. All regulations MUST follow/meet region requirements; if unsure about this information, contact your local gas or electric provider. This product can cause serious injury/harm if misused; any person working with the Oxy Conical should be equipped with proper protective equipment, such as safety glasses, close-toed shoes, and adequate clothing attire. Contact the factory if you have questions or concerns regarding the Oxy Conical Burner.

**Warning:** *This guide does not provide every eventuality; the information provided should be considered when working with the Oxy Conical Burner.*

### Description

The S-Glass Oxy Conical burners' design is to create a luminous flame with highly radiative heat transfer to the glass furnace, resulting in consistent and reliable operation. Ideal for powerful industrial applications with long life and low maintenance needs. Available in four models, with capacities ranging from 0.5-10MM BTU/hr; the Oxy Conical can also come with oxygen staging.

### Applications

The Oxy Conical Burner is ideal for application in the glass industry such as:

- Small Glass Furnaces
- Glass Melter
- Metal Applications

### Handling and Storage

*Follow all oxygen safety procedures.*

- The oxy-clean components are cleaned and bagged for oxygen use.
- Check that the area and all components are clean/protected from:
  - > Dirt
  - > Dust
  - > Moisture
  - > Grease
  - > Weather
  - > Damage
- Do not drop/damage components.
- Keep components in their original packaging when in storage.
- Ideal to store components in a cool, clean, dry room.



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## Installation Guide

# Oxy Conical Burner Installation

### Installation

*Before installation of the Oxy Conical burner, check all control and safety systems are operational. Also, be sure to follow all plant and system start-up procedures.*

1. Close all burner isolation valves.
2. Open the oxy/gas safety and flow control systems.
3. Next, pressurize oxygen/gas to all piping to check oxygen/gas lines are purged up to the burner isolation valves.
4. Set the flow control valves (FCV) for oxygen/gas to the burner at a minimum open position.
5. For a safe oxy burner to start without flame safety and ignition equipment, the furnace temperature must be above the auto-ignition of 850°C (1562°F).
6. Position the first burner away from the heat-up burner, then install it.

**Caution:** *Proceed cautiously when removing the fiber wool material from the burner block.*

7. The burner mounting gasket should be set on the flat face of the burner.
8. With caution, remove the fiber wool material from the burner block.
9. Install the burner in position, then lock the two (2) latch clamps to the burner bracket.
10. Next, connect the oxygen/gas hoses to the burner, then open the oxygen isolation valve.
11. Adjust the flow control valve to hold a minimum firing rate once the oxygen starts to flow.
12. Before opening the gas valve, check the burner level and tightness to the stand; adjust if needed.
13. Open the gas isolation valve at the burner, then adjust the flow to the minimum firing rate.
  - Once the gas is open, the burner will ignite.

*Repeat steps 1-13 for each burner.*

14. If needed, decrease the gas and air on the heat-up burner.
15. Per plant protocol, remove the heat-up burner.
  - Be aware furnace pressure will decrease once the heat-up burner is removed.
  - Close dampers as needed to hold furnace pressure.
16. For heat-up, adjust gas/oxygen flows as needed.
17. Until the furnace is at operating temperature and is full of glass, the burner flame will not stabilize.

### Burner Start-Up

1. Before starting the burner, confirm the burner is fitted correctly.
  - > Once the fit is confirmed, the burner light off can start.
2. For cooling, the oxy needs to flow at a minimum rate.
3. On FCV, increase oxy flow to about 2,000 SCFH (53.6 Nm/hr.) plants to decide the total oxy gas ratio.  
(For reference stoichiometric ratio is about 2:1)
4. Open the gas ball valve on the burner.
5. Qualified personnel should adjust gas flow to about 1,000 SCFH (26.8 Nm/hr.).



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### Burner Removal

1. Before removing the burner, check that all hot work tools, fiber wool, and equipment are available.
2. Be sure to check blocks for preheat overnight.
3. When changing the burner, set the oxy and gas flow to manual.
4. Record the following: gas/oxy flows, valve % open, and if gas and oxy press can be read.
5. When the burner is shut down/being changed, operations are to decide where to operate the second burner.
6. Close the gas and oxy valves at the burner.
7. Lock out/tag out as needed.
8. During operation, adjust flows on the burner as needed.
9. Next, remove all the hoses and piping to the burner.
10. It's essential to cover oxy and gas piping so no dust/dirt enters the pipe.
11. Lastly, remove the burner.

### Block Installation

*Block installation should be done prior to burner installation.*

*Assuming the block above the burner block area does not fall in, try to hold up if possible*

1. First, install throat-side shim/fill blocks.
  - Blocks with a large angle on the hot face.
  - Blocks with a small angle on cold face.
2. Next, install the main burner block.
  - In the burner, the block opening should be fiber wool, not too tight, so gases don't stack out the block.
3. Then, install an injector block with fiber wool on the outside counterbore of the block.
4. Install opposite side filler brick and brick on top of blocks.
5. Seal up with mortar and set jack bolt and support from furnace steel to mounting section.
6. After completing the following steps, inspect the complete setup once confirming the block installation preceded with the burner installation.

### Burner Operation

*Use the following to check the burners and operations.*

1. It is advised to number all burner positions for maintenance and operational purposes.
  - EX: "Burner 1 left, burner 2 right."
2. Important: Qualified personnel should perform operational checks to confirm systems are working in normal operating conditions. Use the list below for typical operational inspections:
  - Gas/oxygen flow per burner to verify burner is in operational range.
  - Gas/Oxygen valve position
3. Gas/Oxy ratio
4. Gas/oxygen pressure



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## Installation Guide

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5. The Oxy Conical burner was designed to operate with little maintenance/operational changes.
  - a. Adjust the gas/oxygen flows as needed for heating and melting conditions during normal operation mode.
  - b. No burner operating adjustments are needed at the burner.
6. The burner can operate below or above standard stoichiometric firing rates for proper glass melting requirements as needed.
7. To create a short, fast flame, operate at very lean firing and a high oxygen-to-gas ratio (above 2.5).
  - a. Be careful not to overheat the breast wall/burner block.
8. To create a longer flame, operate at very rich firing with a low oxygen-to-gas ratio (below 1.7)
  - a. Caution: use of lower oxygen can cause carbon to build up on the gas tip.
  - b. To clean the gas tip, be sure to place the burner in manual control mode, then shut off the gas for 30 seconds while leaving oxygen on.
  - c. Be aware low oxygen/gas ratios on all burners will result in unburnt gases and high excess CO; this may not be operationally appropriate.

## Burner Shutdown

**Short-Term Shutdown** It's suggested if the burner gas is off to keep oxygen flowing at a minimum to keep the block and burner pressurized/cool during regular operation.

- Doing this will keep furnace gases from stacking through the burner.
- This can be half the minimum gas flow to the burner.

## Shutdown Power Failure

**Short-Term Outage** *Most power failures are short-term, 15 minutes or less.*

- Since there is no pressure in the furnace during a short-term outage, all burner isolation valves can be left open.
- Following plant and procedures protocol is necessary when restarting the oxy gas systems.
- The burner controls would be set to manual during the initial restart; after the restart, the controls can be returned to auto control.

## Long-Term Outage

1. If the power outage is an hour or less, the burner can remain in place because there is no pressure on the furnace.
  - After an hour, the operator should light each burner individually.
2. Shut the individual burner isolation valves if the power outage is over an hour.
  - When restarting the burner, open the oxygen first and then the gas second individually for each burner.
  - Return the burner to auto control once burner is lit.
3. If the outage is longer than an hour, consult with furnace management.
  - Check burners for overheating; removal may be necessary depending on the burner's condition.
  - Selas Heat Technology company cannot make detailed recommendations; the plant must consider many variables.
4. The safety/other equipment in a minimum operating mode does not require excessive power.
  - The use of backup power to keep systems in primary operating conditions.  
This is the best solution if power outages are expected.



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### Shift Checks and Observations

1. At the beginning of every shift, qualified personnel should check the Oxy Conical burner before operation.  
Use list below for checks:
  - Gas/oxygen flow operation parameters.
  - General flame shape/conditions
  - Burner Blocks
  - Burner set up; confirm all hardware is in good shape/fit in the burner and block.
2. Investigate any abnormal conditions; below is a list of reasons for abnormal situations.
  - Gas or oxygen flows need to be in correct control limits or out of ratio.
    - > If this occurs, return gas and or oxygen flow to regular operation.
  - Buildup of material across the front of the burner block.
    - > Remove the burner and clean the block.
  - Dirty burner tip, including carbon buildup on the gas tip.
    - > To clean, put burner in manual, then shut off the gas for 30 seconds.
    - > Some cases require removal and physical checking/cleaning of the burner.
3. The Oxy Conical burner is designed for easy operation and maintenance; there should be regular checks on the burner's operation.
  - Each plant should determine how often burner checks should be performed.
  - While the furnace starts, more checks are made to determine what is expected during operation.
  - Checks can occur monthly, quarterly, or semiannually.
4. Before the operation, a routine visual check should be performed; examples are listed below.
  - Valves opened or closed.
  - The burner is tight to the assembly.
  - No unusual hot spots
  - Check for any loose hoses, fittings, or leaks of gas/oxygen.
5. Visual inspection of firing inside is recommended.



## Installation Guide

# Oxy Conical Burner Installation

### Long Term Checks

1. If there are any apparent changes to the burner, it is recommended the burner be removed and examined.
  - Once the burner is removed, check the following:
    - > Oxygen/gas tip
    - > Burner body
    - > Hoses to burner
    - > Burner block
2. During these routine checks, take photos/videos and record all information collected, allowing for a long-term record of operation.
3. After performing all checks, qualified personnel can schedule the next routine inspection as necessary.
4. During these routine checks, take photos/videos and record all information collected, allowing for a long-term record of operation.
  - Ex: 10% of 30-burners zone (3 burners) can be checked after 6 months, then 6 months later another set of 3 burners. Be sure to take photo/video for a long-term record of operation.
  - Note: The factory recommends after the first month of the initial start-up some burners should be checked.
5. After performing all checks, qualified personnel can schedule the next routine inspection as necessary.

### Maintenance

- **Important:** Each plant should have equipment that allows for easy removal of the Oxy Conical burner if necessary.
- The Oxy Conical burner does not come with interchangeable parts of the burner assembly.
- Be aware that, over time, the oxygen/gas tips will have some wear from years of use.
  - > Qualified personnel can manually file the edge of the tips, which cleans up edges and can extend the burner life.
- As stated above in the 'Long Term Checks', documenting maintenance checks will allow the operator to see changes to the burner over time.



SCAN FOR MORE INFORMATION

11012 Aurora Hudson Rd • Streetsboro, OH 44241  
**1-800-523-6500 • sales@selas.com**  
**www.selas.com**



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