

*“Degrees Ahead in Quality”*



**Mesh and Weave Heating Elements provide exceptional benefits for users of high temperature vacuum and atmospheric furnaces.**

### INTRODUCTION:

OXY-GON Industries, Inc. manufactures reliable high quality Tungsten and Molybdenum elements in both mesh and weave configurations. These elements are meticulously hand crafted and undergo rigorous quality control to ensure that each is built to the highest standards.

OXY-GON's mesh and weave heating elements are made from continuous interlocked tungsten or molybdenum wire coils. When heated, each wire moves independently from its neighbor. The nature of the interlocked wire coils means that each element has built-in flexibility, especially compared to refractory sheet style elements. This largely eliminates mechanical and thermal stresses leading to considerably improved element life. These elements are available in both cylindrical and flat panel designs.



Single Phase Tungsten Mesh Element  
Split Construction,  
Two piece with pin power connectors

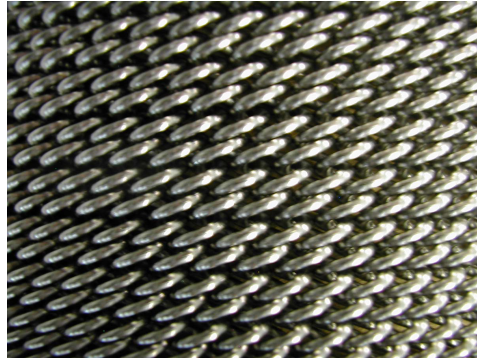
## MESH HEATING ELEMENTS:

OXY-GON's mesh elements consist of individual helix coils of tungsten or molybdenum wire that are threaded together by turning each coil into the adjacent coil. This creates an continuous interlocking mesh pattern over the entire width and length of the element, which results in unmatched thermal performance.

Since the wire diameter for each coil is closely controlled, consistency throughout the construction of each element is guaranteed.

The top and bottom ends are secured with solid strips of tungsten or molybdenum bands that serve as conductors and provides a means of mechanical support for the element.

These bands and tabs are expertly welded together under a controlled atmosphere to minimize stresses within the elements.



OXY-GON Mesh Element Pattern



OXY-GON Mesh Split Element Pairs

## WEAVE HEATING ELEMENTS:

OXY-GON's weave elements are made from individual wires formed into planar sinuous loops (i.e. a continuous sine wave pattern).

We can control the wire diameter, pitch, and height of the bends as needed to produce the optimum weave element design. The individual wires are connected together with a hair-pin wire passing through alternating loops similar to a cloth fabric weave to securely "lock" the wires together.

The individual wires are still free to move and adapt to the thermal environment. The weave is basically an alternative to the mesh construction technique. The ends can be terminated in the same fashion as the mesh elements.



OXY-GON Weave Element Pattern

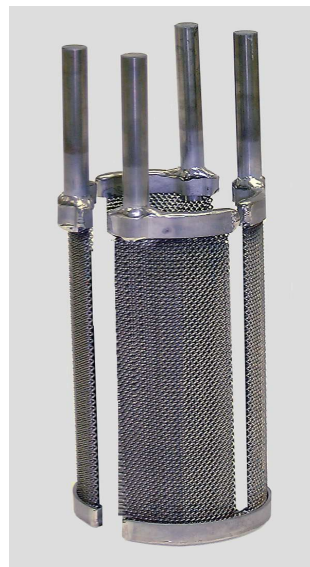


## MESH and WEAVE ELEMENT FEATURES:

- \* OXY-GON elements provide excellent service life up to 1650°C with molybdenum and up to 2500°C using tungsten. The maximum furnace operating temperature is 3000°C with the tungsten mesh construction.
- \* The high optical density provides even heat transfer to the work for exceptional temperature uniformity.
- \* The large surface area of each element reduces watt density resulting in improved service life.
- \* Minor individual wire breakage will not effect performance or service life.
- \* OXY-GON can fabricate our mesh and weave elements to specific sizes and shapes or they can be engineered to fit any brand of vacuum furnace.
- \* The mesh and weave elements operate at the lowest possible temperature relative to the work temperature.



OXY-GON W-Mesh Element Single Phase Two Piece Split Construction with Flat Tab Terminations



OXY-GON W-Mesh Element Single Phase Two Piece Split Construction with Rod Terminations

## SIZES:

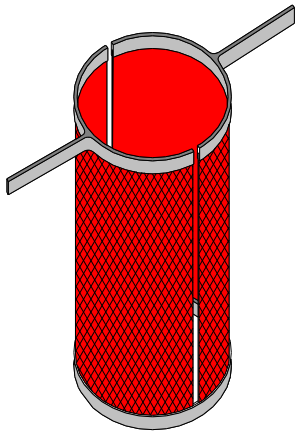
OXY-GON has produced cylindrical elements with sizes ranging from 3/4" to 16" I.D. and with lengths from 3" to 24" long.

Flat panel elements are custom designed for each application. Power terminals are either flat strips or rod of tungsten or molybdenum welded to the top element band.

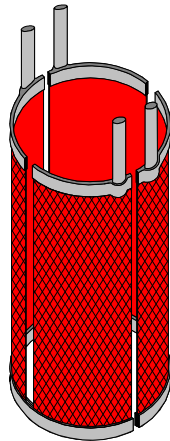
Flat strip terminals are always horizontal while rod can be horizontal or vertical.

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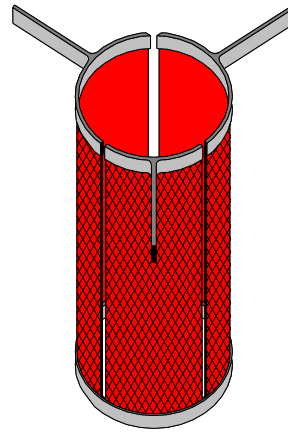
**STANDARD ELEMENT CONFIGURATIONS:**



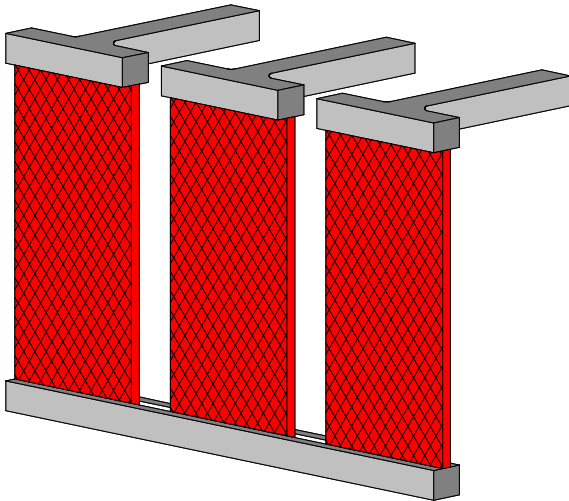
**Single Phase — One piece  
with tab power connectors**



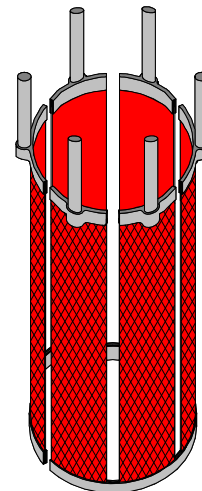
**Single Phase — Two piece  
with rod power connectors**



**Three Phase — One piece  
with tab power connectors**



**Three Phase—Flat Panel**



**Three Phase — Two piece  
with rod power connectors**

**Also Available:**

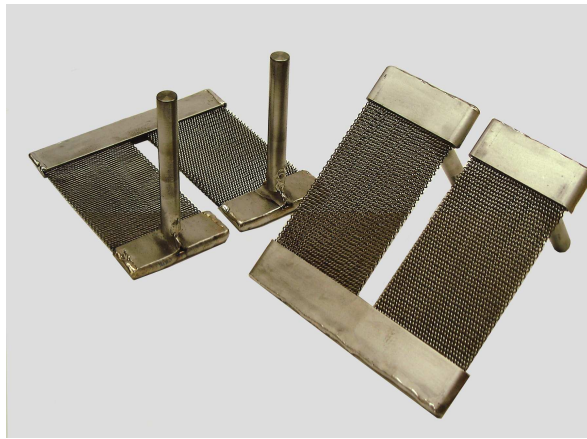
- Single Phase, Flat Panel with rod connectors
- Three Phase, Flat Panel with rod connectors
- Three Phase, Round with six (6) tab connectors



## PERFORMANCE:

The unique properties of mesh and weave elements results in minimal warping or distortion during thermal cycling which assures dependable performance. Because thermal stresses are enviable in high temperature furnaces, due to the inherent flexibility of the mesh and weave patterns, these stresses are handled much more effectively by the ability of each individual wire coil to move separately.

This allows OXY-GON elements to maintain dimensional stability after repeated thermal cycling. Because mesh and weave elements have a large radiating surface area, the element life is increased because the surface watt loading is effectively reduced on the elements.



OXY-GON W-Mesh Element Single Phase Flat

## APPLICATION GUIDE:

Process Gas @ 2 PSIG, <10°C D.P.	Tungsten	Tantalum	Molybdenum
Air	300°C	300°C	300°C
Argon — Ar	3000°C	2500°C	1650°C
Carbon Monoxide — CO	800°C	1000°C	1400°C
Hydrogen — H <sub>2</sub>	3000°C	1000°C	1650°C
Forming — 5%H <sub>2</sub> , 95%N <sub>2</sub>	2300°C	700°C	1650°C
Helium — He	3000°C	2500°C	1650°C
Nitrogen — N <sub>2</sub>	2300°C	700°C	1650°C
Carbon Dioxide — CO <sub>2</sub>	900°C	1200°C	1200°C
Anhydrous Ammonia — NH <sub>3</sub>	3000°C	400°C	1100°C
Propane — C <sub>3</sub> H <sub>8</sub>	900°C	800°C	1100°C
Methane — CH <sub>4</sub>	900°C	800°C	1100°C
Fluorine — F <sub>2</sub>	N/R	N/R	N/R
Vacuum	2500°C	2200°C	1650°C

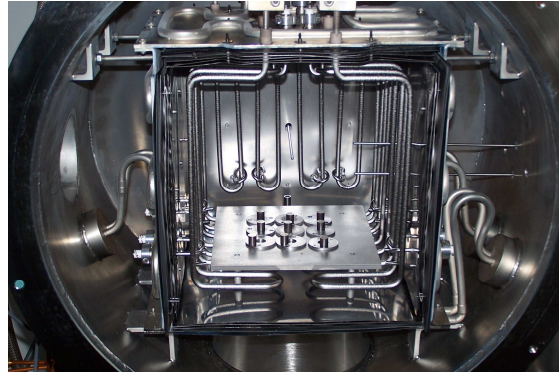


## TUNGSTEN & MOLYBDENUM ROD ELEMENTS:

OXY-GON's produces elements fabricated from both Tungsten and Molybdenum rods. Our engineers can design elements to meet your technical requirements.

OXY-GON can engineer rod style elements to retrofit other furnaces. Molybdenum rod elements are rated for use up to 1600°C. Tungsten rod elements are rated for use up to 2000°C.

Let our engineers design rod elements to suit your vacuum or special atmosphere furnace needs.

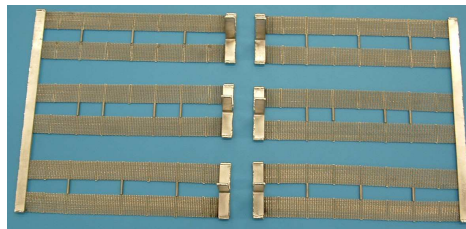


Custom Tungsten Rod Elements Used to Process Nuclear Fuel

## CUSTOM ELEMENT MATERIALS:

In addition to our line Tungsten and Molybdenum elements OXY-GON can produce custom elements fabricated from Tantalum, Platinum, and Rhodium alloys for use in unique and demanding high temperature applications.

OXY-GON can also engineer custom Graphite Hot Zones as well.



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Custom OXY-GON Heating Elements

## SHIELDS and SHIELD PACKS:

OXY-GON's manufactures a complete range of shields and shield packs to complement our line of mesh and weave elements. We can tailor these shield packs to meet the exacting needs of our customers as required.

All of our shield packs are designed to keep heat losses due to thermal radiation to a minimum.

Depending upon the temperature required within the hot zone, we select the appropriate combination of Molybdenum and/or Tungsten shields to optimize performance at the lowest cost.

Please refer to both the Application Guide and Hot Zone Design—Temperature Parameter Tables to determine the appropriate shield pack based upon your atmosphere and temperature requirements.

Generally the material used for each shield is 0.010" thick but we engineer each shield pack depending upon the user's needs and application. Shield packs typically have a spacing between individual shields of 0.125". This provides proven performance at an acceptable cost benefit.

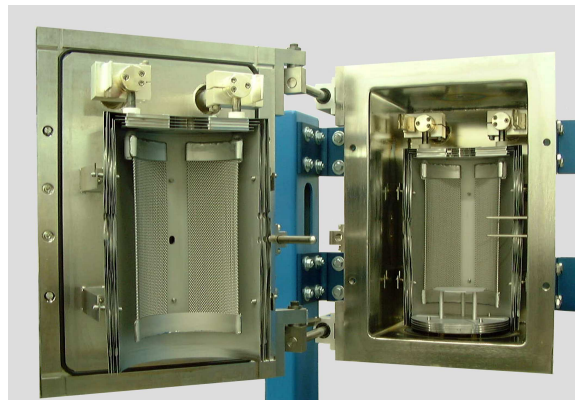
OXY-GON uses proprietary techniques to space the shields so that each shield pack remains intact after repeated thermal cycling.

OXY-GON recommends a minimum spacing from the inner shield to the element of 1/2" to prevent possible shorting to the shield. If size is not critical than a 1" spacing is recommended.

Let OXY-GON complete your hot zone needs with a custom hearth and work supports. Please contact us with your requirements so that we can engineer a solution to your high temperature thermal processing needs.



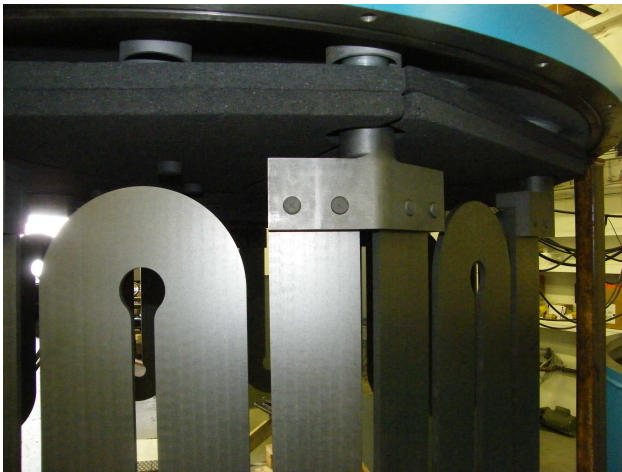
Custom Shield Pack Assembly for a Tantalum Sheet Element



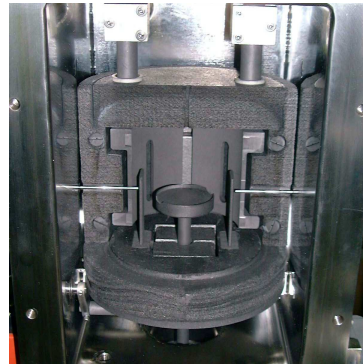
Hot Zone Components for a Front Loading Furnace System

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**CUSTOM HOT ZONE DESIGN:**



**Large Graphite Elements for an OXY-GON Furnace**



**Custom Graphite Hot Zone**

**ORDERING INFORMATION:**

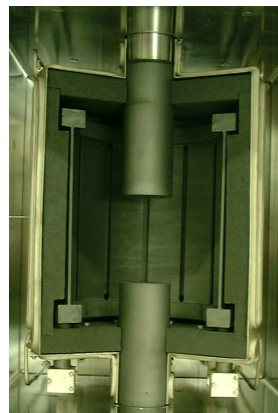
Each inquiry is evaluated by our engineering department to determine the proper application and materials selection of our products.

Custom designs are welcomed.

For a comprehensive review of your specific requirements, please contact OXY-GON'S technical sales personnel for a customized proposal with specifications.

For a quotation please fill out the questionnaire on our website at [www.oxy-gon.com](http://www.oxy-gon.com).

We will contact you if additional information or clarification is needed.



**Graphite Hot Zone  
for OXY-GON  
Hot Press Furnace**

**Large Tungsten-Mesh  
Element for an OXY-GON  
Bottom Loading Furnace**



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