

# Furnaces

## Standard & Custom



Precise, efficient, and reliable furnaces for testing, laboratory, and industrial processes made to your specifications.

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## Laboratory and Industrial Furnaces from ATS

Since 1965, Applied Test Systems (ATS) has been working to create an unmatched line of precise and affordable materials testing equipment. A large part of this effort has been in the field of high-temperature testing and production. As a result of over 50 years of research, development, design, testing, and re-testing, ATS has created a complete line of furnaces and high-temperature accessory items that is unmatched in quality, versatility, and reliability.

The standard line of ATS furnaces has been designed for general laboratory use and also for testing to ASTM standards and other specifications. All ATS furnaces are constructed to customer requirements in a wide variety of diameters, lengths, sizes, and configurations, and are shipped complete with mounting brackets and accessory equipment. Heating elements are provided in various materials and configurations depending upon temperature requirements and the specific application. Furnaces have been designed for easy replacement of failed elements in the laboratory, saving you time and money.

Outstanding design features such as the use of low K-factor vacuum-cast ceramic fiber insulation and low watt-density heating elements providing significant advantages and benefits to the user, including reduced power consumption, faster heatup, longer element life, and lower shell temperatures.

Several different furnace designs are available, including tube, split tube, box, split box, high-temperature, low-profile, silicon carbide, molybdenum, and controlled-atmosphere. All are described separately in this bulletin along with furnace accessories, mounting arrangements, components, and retorts. This bulletin also demonstrates the custom design capabilities for which ATS has become known for worldwide. With over 50 years of design experience in custom testing equipment, ATS is sure to provide you with an ideal solution for all of your high-temperature testing and manufacturing needs.

In addition to furnaces, ATS manufactures a complete line of laboratory testing machines and accessories, including universal testing machines, creep/stress-rupture test frames, convection ovens/cryogenic cooling chambers, pressure testing systems, asphalt testing equipment, and sealant testers. As well as parts including grips, fixtures, load train components, extensometers, ultrasonic reference standards, and more. Choose ATS for all of your materials testing needs, the equipment delivered to your facility will meet all of your expectations.

# Series 3110/3210 Tube & Split Tube Furnace

ATS Series 3110/3210 Tube and Split Tube Furnaces are by far our most popular line. This series has been carefully designed and refined, making it one of the most reliable and efficient laboratory furnaces available on the market today. Use these furnaces in conjunction with various materials testing machines, incorporated in gas processing systems, stand alone, and in many other applications.



## Features

- Custom built-to-order to your specific requirements
- Low K-factor vacuum-cast ceramic fiber insulation
- Stainless steel shell and end flanges
- Replaceable heating elements
- Wide selection of available diameters, lengths, mounting arrangements, and accessory equipment
- Variety of configurations, including, isothermal, gradient, adiabatic, and others
- Available options and accessories include heat-equalizing liners, extensometer slots and mounting flats, thermocouples, end caps, viewports, gas ports, cast bronze or ceramic fiber heating elements, retorts, and more.

## Product Specifications:

For service to 1650°F (900°C)	For service to 2000°F (1100°C)	For service to 2200°F (1200°C)
<i>I.D. x O.D. (in)</i>	<i>I.D. x O.D. (in)</i>	<i>I.D. x O.D.</i>
0.75 x 6.0	0.75 x 8.0	0.75 x 10.0
1.00 x 6.0	1.00 x 8.0	1.00 x 10.0
1.25 x 6.0	1.25 x 8.0	1.25 x 10.0
1.62 x 8.0	1.62 x 10.0	1.62 x 12.0
2.00 x 8.0	2.00 x 10.0	2.00 x 12.0
2.38 x 8.0	2.38 x 10.0	2.38 x 12.0
3.00 x 8.0	3.00 x 10.0	3.00 x 12.0
3.75 x 10.0	3.75 x 12.0	3.75 x 14.0
5.00 x 12.0	5.00 x 14.0	5.00 x 16.0
5.50 x 12.0	5.50 x 14.0	5.50 x 16.0
6.00 x 12.0	6.00 x 14.0	6.00 x 16.0
7.00 x 12.0	7.00 x 14.0	7.00 x 16.0
8.25 x 16.0	8.25 x 18.0	8.25 x 20.0
12.0 x 20.0	12.0 x 22.0	12.0 x 24.0

## Series 3110/3210

- Other sizes supplied on request
- Length & zone construction made to order
- Heating elements and temperature range:  
Nichrome: 1850°F (1000°C)  
Kanthal A1: 2200°F (1200°C)
- NRTL and CE Listed  
(in standard configurations, selected sizes only, with approved control system)

# Series 3150/3160

## Box & Split Box Furnace



ATS Series 3150/3160 Box and Split Box furnaces are the box style counterpart to our Series 3110/3210 tube and split tube series, these furnaces share a number of the same advanced design and construction features.

### Features:

- Custom built-to-order to your specific requirements
- Low K-factor vacuum-cast ceramic fiber insulation
- Stainless steel shell
- Replacement elements are available
- All Series 3150/3160 Furnaces have a maximum temperature rating of 1200°C (2192°F)
- Standard replaceable ceramic hearth plate
- Wide selection of available widths, heights, and depths, mounting arrangements, and accessory equipment
- Available options and accessories include heat-equalizing liners, extensometer slots and mounting flats, thermocouples, end caps, viewports, gas ports, cast bronze or ceramic fiber heating elements, retorts, and more.

### Product Specifications:

STANDARD MODELS: SERIES 3150 BOX FURNACES			
Internal Size (in) (WxHxD)	External Size (in) (WxHxD)	Power (Watts)	Volts
5.5 x 6.5 x 6	14.5 x 15.0 x 18.25	1770	115
5.5 x 6.5 x 12	14.5 x 15.0 x 21.25	2460	230
7.5 x 8.75 x 7	16.5 x 17.25 x 19.25	2040	115
7.5 x 8.75 x 14	16.5 x 17.25 x 26.25	4080	230
10 x 10 x 12	19.0 x 18.5 x 24.25	5100	230
10 x 10 x 16	19.0 x 18.5 x 28.25	5700	230
12 x 13.5 x 12	21.0 x 22.0 x 24.25	6000	230
12 x 13.5 x 18	21.0 x 22.0 x 30.25	9000	230

STANDARD MODELS: SERIES 3160 BOX FURNACES				
Internal Size (in) (WxHxD)	Heat Zones	External Size (in) (WxHxD)	Power (Watts)	Volts
6 x 6 x 6	1	12.5 x 10.0 x 12.5	2360	115 <sup>5</sup> / <sub>230</sub>
6 x 12 x 6	3	12.5 x 16.0 x 12.5	4680	115 <sup>5</sup> / <sub>230</sub>
7.5 x 7 x 7.5	1	14.75 x 11.0 x 14.75	2720	115 <sup>5</sup> / <sub>230</sub>
7.5 x 15 x 7.5	3	14.75 x 19.0 x 14.75	5830	115 <sup>5</sup> / <sub>230</sub>
10 x 12 x 10	1	17.5 x 16.0 x 17.5	6600	230
10 x 18 x 10	3	17.5 x 22.0 x 17.5	9900	230
12 x 12 x 12	1	19.5 x 16.0 x 19.5	8000	230
12 x 24 x 12	3	19.5 x 28.0 x 19.5	16000	230

# Series 3150 Front Load Box Furnace For AMS 2750 Testing

ATS Series 3150 for AMS 2750 Box Furnace is a specially enhanced furnace using our time proven design of the standard 3150 box furnace with improved heating uniformity features. Tailored around those who are working with the AMS 2750 requirements, this furnace has a supplied port for the customer's thermocouples during the TUS. The port reduces damage to insulation, which is important in maintaining the furnace performance. There are 3 areas that cause failures during uniformity testing: burned out elements, wear to the door, and wear to the front face of the furnace. We have addressed these issues by supplying a long lasting hardboard insulation on the front, and an easily replaceable blanket fiber lined door. If the time ever comes that the elements need to be changed, it's as simple as unwiring the terminals and pulling them out.



## Features:

- Standard construction features include a durable stainless steel shell and ceramic fiber insulation
- Replacement elements are available
- All Series 3150 Box Furnaces have a maximum temperature rating of 1200°C (2192°F)
- Standard replaceable ceramic hearth plate

## Product Specifications:

Internal Size Options:	12" W x 13½" H x 12" D (other sizes available)
Inside Class 2 Area	8" W x 8" H x 8" D (other sizes available)
External Size Options:	21" W x 22" H x 22¾" D (other sizes available)
Mounting	Leg levelers for benchtop use
Elements	Kanthal A1
Power	230V 1PH, 5000 Watts, 21.7 AMP (may vary based on size)

## Exclusive Features:



Blanket filled door for a positive seal that allows for easy customer replacement.



Ceramic tube port for thermocouples during temperature survey. When not in use, an insulating plug is supplied.



Wall mounted elements for easy access with no insulation removal required for replacement.

# Series 3410/3420

## Silicon Carbide Tube & Split Tube Furnace

ATS Series 3410 and 3420 Silicon Carbide Tube and Split Tube Furnaces are a line of steady heat-up, high-efficiency furnaces for operating temperatures up to 2800°F (1540°C). As opposed to the rapid heat-up rates offered by the ATS Series 3300 high-temperature models (see page 11), this series has been designed for a more slow and steady heatup, useful for operations involving many types of materials.



### Features:

- Custom built-to-order to your specific requirements
- Low K-factor vacuum-cast ceramic fiber insulation
- Stainless steel shell and end flanges
- Replaceable long-lasting Silicon carbide (SiC) “rammed rod” type heating elements
- Wide selection of available diameters, lengths, mounting arrangements, and accessory equipment
- Available options and accessories include thermocouples, end caps, viewports, and retorts

### Product Specifications:

I.D. x O.D. (in)	H.L. (in)	O.L. (in)	Power (Watts)	I.D. x O.D. (in)	H.L. (in)	O.L. (in)	Power (Watts)
2.0 x 16.0	5	19	1200	4.0 x 18.0	5	19	2300
	6	20	1350		6	20	2750
	7	21	1500		7	21	3000
	8	22	1700		8	22	3300
	9	23	1800		9	23	3600
	10	24	2100		10	24	3900
	12	26	2800		12	26	4500
	14	28	2800		14	28	5533
	18	32	3600		18	32	5750
	24	38	5200		24	38	7800
	30	44	6420		30	44	9000
	36	50	7200		36	50	10000
3.0 x 18.0	5	19	1800	6.0 x 20.0	9	23	6750
	6	20	2100		12	26	7200
	7	21	2300		18	32	10000
	8	22	2550		24	38	11000
	9	23	2800		30	44	12000
	10	24	3050		36	50	13000
	12	26	3200				
	14	28	3450				
	18	32	4200				
	24	38	6000				
	30	44	7000				
	36	50	8200				

# Series 3450

## Silicon Carbide Box Furnace

ATS Series 3450 Silicon Carbide Box Furnaces are the box style counterpart to our Series 3410/3420 Furnaces. Capable of operating temperatures up to 2800°F (1540°C), this Series has been designed for slow and steady heatup rates with minimal temperature losses.



### Features:

- Custom built-to-order to your specific requirements
- Low K-factor vacuum-cast ceramic fiber insulation
- Stainless steel shell
- Double-pivot door hinge
- Replaceable long-lasting Silicon carbide (SiC) “rammed rod” type heating elements
- Wide selection of available widths, heights, and depths, mounting arrangements, and accessory equipment
- Available options and accessories include thermocouples, viewports, gas ports, and more.

### Product Specifications:

<i>Internal Size (in) (WxHxD)</i>	<i>External Size (in) (WxHxD)</i>	<i>Power (Watts)</i>
4 x 4 x 6	18 x 14.875 x 19.875	1500
4 x 4 x 12	18 x 14.875 x 25.875	2100
6 x 6 x 7	20 x 16.875 x 20.875	2700
6 x 6 x 14	18 x 18.5 x 23.375	4400
8 x 8 x 9	22 x 18.875 x 21.875	4200
8 x 8 x 18	22 x 22.375 x 27.625	6800
10 x 10 x 11	24 x 24.375 x 20.625	7800
10 x 10 x 22	24 x 21.25 x 36.625	12400
10 x 10 x 22	24 x 24.375 x 31.625	11840
12 x 12 x 13	26 x 23.875 x 26.875	9600
12 x 12 x 18	26 x 26.375 x 27.625	12000
12 x 12 x 26	26 x 26.375 x 35.625	16500



# Series 3310/3320

## High-Temperature Tube & Split Tube Furnace

ATS Series 3310/3320 Tube and Split Tube Furnaces are also available for your higher temperature testing needs up to 3272°F (1800°C). The series 3310 and 3320 come with Molybdenum Disilicide (MoSi<sub>2</sub>) heating elements that offer fast heat up rates and easy replacement.



### Features:

- Custom built-to-order to your specific requirements
- Replacable Molybdenum Disilicide (MoSi<sub>2</sub>) heating elements
- Stainless steel shell and end flanges
- Low K-factor vacuum-cast ceramic fiber insulation
- Wide selection of available diameters, lengths, mounting arrangements, and accessory equipment
- Available options and accessories include extensometer slots and mounting flats, thermocouples, end caps and port plugs, viewports, and more.

### Product Specifications:

For Service to 2800°F (1540°C)				
<i>I.D. x O.D.</i>	<i>H.L. (in)</i>	<i>O.L. (in)</i>	<i>Power (Watts)</i>	<i>Volts</i>
2.0" x 12.0"	4.0	14.0"	1080	24
	6.0"	16.0"	1520	34
	8.0"	18.0"	1960	43
	10.0"	20.0"	2400	53
	11.0"	21.0"	2624	58
4.0" x 14.0"	4.0"	14.0"	1620	36
	6.0"	16.0"	2280	50
	8.0	18.0"	2940	65
	10.0"	20.0"	3600	80
	11.0"	21.0"	3936	87

For Service to 3000°F (1650°C) and 3100°F (1700°C)				
<i>I.D. x O.D.</i>	<i>H.L. (in)</i>	<i>O.L. (in)</i>	<i>Power (Watts)</i>	<i>Volts</i>
2.0" x 14.0"	4	14	1620	36
	6	16	2280	50
	8	18	2940	65
	10	20	3600	80
	11	21	3936	87
4.0" x 16.0"	4	14	2160	48
	6	16	3040	67
	8	18	3920	87
	10	20	4800	106
	11	21	5248	116

# Series 3330

## High-Temperature Furnace

ATS Series 3330 High-Temperature Furnaces offer an ideal low-profile solution to restricted testing space due to specimen size or other factors. These furnaces feature highly compact construction while maintaining efficient temperature capabilities up to 3000°F (1650°C). Due to a small internal working volume, rapid heat-up and cool-down rates are attainable for testing of ceramics, metal alloys, composites, and other materials using either flat or round specimens.

### Features:

- Replacable Molybdenum Disilicide (MoSi<sub>2</sub>) heating elements
- Stainless steel shell and element covers
- Low K-factor vacuum-cast ceramic fiber insulation
- Standard: One or Two Heating Zones
- Custom Zone Arrangements Available
- Available options and accessories include high-temperature extensometers, extensometer slots, thermocouples, viewports, water-cooled specimen grips, and testing fixtures



### Product Specifications:

Internal Size	2 in. diameter x 2 1/2 in. length (other sizes available)
External Size	20 in. W x 9 5/8 in. D x 8 5/8 in. H (7 1/2 in. between grips) (other sizes available)
Mounting	Custom to work with any testing frame
Elements	Molybdenum Disilicide
Standard Power	2200 Watts
Voltage	208 or 230

# Series 3350

## High-Temperature Box Furnace

ATS Series 3350 High-Temperature Box Furnaces are ATS's line of high-efficiency, rapid heat-up/cool-down laboratory chambers designed for operating temperatures up to 3272°F (1800°C). These furnaces feature a superior design and construction, with several layers and grades of insulation materials, enabling them to maintain uniform temperatures with minimal heat losses.



### Features

- Custom built-to-order to your specific requirements
- Low K-factor vacuum-cast ceramic fiber insulation
- Stainless steel shell and durable interior
- Full opening front door/Double-pivot door hinge
- Replacable Molybdenum Disilicide (MoSi<sub>2</sub>) heating elements
- Wide selection of available widths, heights, and depths, mounting arrangements, and accessory equipment
- Available options and accessories include thermocouples, viewports, gas ports, and more.

2800°F (1540°C) and 3000°F (1650°C)			
Internal Size (in) (WxHxD)	External Size (in) (WxHxD)	Power (Watts)	Volts
4 x 4 x 6	16 x 16.5 x 17	1620	36
4 x 4 x 12	16 x 16.5 x 23	3240	72
6 x 6 x 7	18 x 18.5 x 19	3040	67
6 x 6 x 14	18 x 18.5 x 25	5320	118
8 x 8 x 9	20 x 20.5 x 21	4900	108
8 x 8 x 18	20 x 20.5 x 28	8820	196
10 x 10 x 11	22 x 22.5 x 22	7200	160
10 x 10 x 22	22 x 22.5 x 32	13200	147
12 x 12 x 13	24 x 24.5 x 24	9184	204
12 x 12 x 24	24 x 24.5 x 36	15744	174

3100°F (1700°C)			
Internal Size (in) (WxHxD)	External Size (in) (WxHxD)	Power (Watts)	Volts
4 x 4 x 6	15.5 x 19.5 x 16.5	1620	36
4 x 4 x 12	15.5 x 19.5 x 22.5	3240	72
6 x 6 x 7	17.5 x 21.5 x 18.5	3040	67
6 x 6 x 14	17.5 x 21.5 x 24.5	5320	118
8 x 8 x 9	19.5 x 23.5 x 20.5	4900	108
8 x 8 x 18	19.5 x 23.5 x 28.5	8820	196
10 x 10 x 11	21.5 x 25.5 x 22.5	7200	160
10 x 10 x 22	21.5 x 25.5 x 32.5	13200	147
12 x 12 x 13	23.5 x 26.5 x 24.5	9184	204
12 x 12 x 24	23.5 x 26.5 x 36.5	15744	174

# Series 3350 High-Temperature Controlled Atmosphere Box Furnace

ATS has designed and built a custom version of our standard Series 3350 High Temperature Box Furnace. Unique to this unit is its ability to hold an atmosphere – whether argon or nitrogen. The system is designed to purge the furnace of air and backfill with argon, which is delivered from a customer supplied argon tank. This design provides the customer an affordable way to operate the furnace without oxygen present, allowing them to avoid buying an additional vacuum furnace.

Capable of reaching temperatures up to 1700°C, this custom Series 3350 High Temperature Box Furnace is constructed from heavy gauge stainless steel with leveler mounts. A modified shell with water cooled seals was designed to contain the inert atmosphere, and a water manifold with valves provided independent control at each section of the furnace that require water cooling.



## Features:

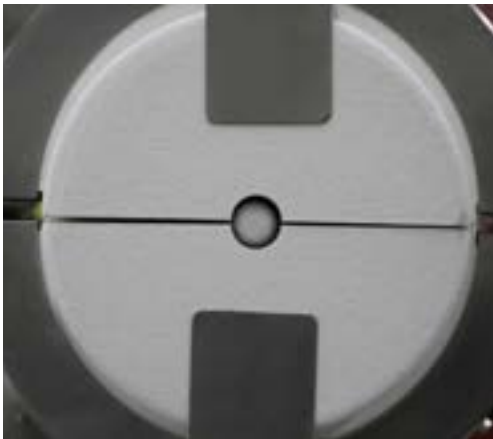
- Molybdenum Disilicide elements
- Single end door with hardened vacuum cast insulation
- Flow switch provides automatic power down due to flow loss
- 2-Type B thermocouple with insulator, connector, and 2-Sealing gland for power connections
- Low range relief valve, 2 psi
- Roughing Pump: 3.2 dfm with mist eliminator, valve, and gauge
- 2-Gas Ports: 1/4 in. dia., inlet and outlet
- Optional load train ports for use on tensile testing machines

## Product Specifications:

Internal Dimensions	10 in. W x 10 in. H x 11 in. D (other sizes available)
External Dimensions	21.5 in. W x 25.5 in. H x 22.5 in. D (other sizes available)
Power Requirements	7200 Watts - Unit must run on 160 VAC @ 45 amps and requires a current limiting device for control.

# Furnace Accessories

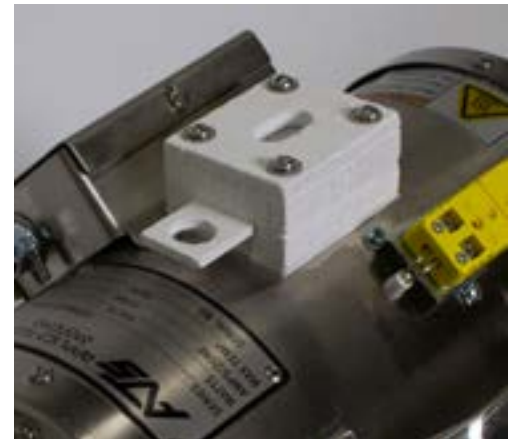
- **Thermocouple Assemblies** (see page 14)
  - Single Bracket
  - Duplex Bracket
  - Spring-Loaded
  - Sealed
- **Removable End Caps**
  - Port plugs
- **Ports**
  - Viewports
  - Gas Inlet and Outlet ports
  - Explosion ports
  - Purging ports
  - Cooling and Vent ports
  - Load Train ports
- **Extensometer Ports and Slots**
- **Zone Dividers**
- **Element Protection Shields**
- **Perforated Heat Shields**
- **Sealed Terminal Covers**
- **Heat Equalizing Blocks**
- **Sealed Retort Assemblies**
- **Special Door Hinges**
  - Removable
  - Offset
  - Double-pivot
- **Various Mounting Arrangements** (see pages 15 and 16)
- **Temperature Controllers** (see page 18)



**Endcaps**



**Temperature Sensor**



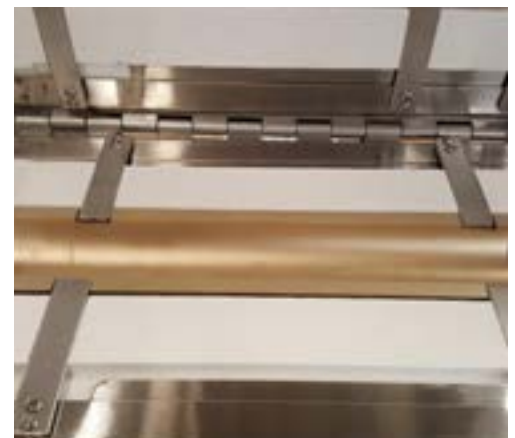
**Quartz Viewports**



**Port Plug**



**Zone Dividers**



**Heat Equalizing AMPCO® Block**

# Furnace Accessories

## Thermocouple Assemblies

Furnaces from ATS can be equipped with a number of different thermocouple types in a variety of mounting configurations. Thermocouple connectors feature standard ANSI color coding and are available in types J, K, B, R, S, and Platinel-II. Common mounting configurations include single connector with mounting bracket, duplex connector with mounting bracket, spring-loaded for constant contact with a reactor or other vessel, and sealed for use in controlled-atmosphere furnaces, retorts, etc.

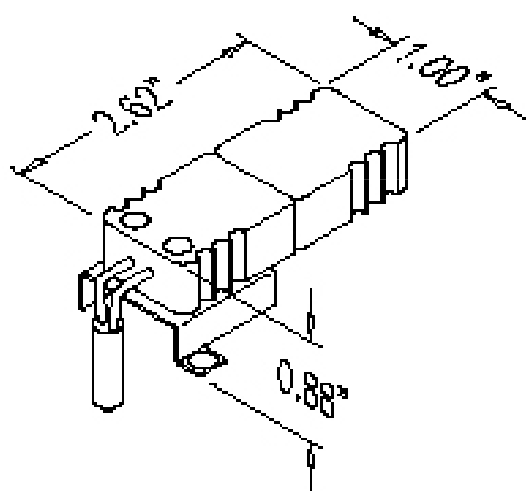


Fig. 3: Single Bracket

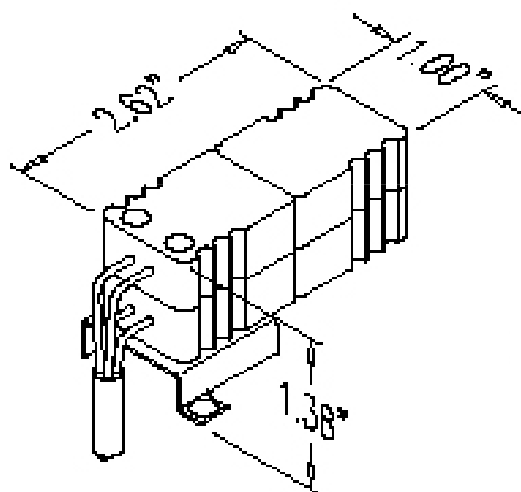


Fig. 4: Duplex Bracket

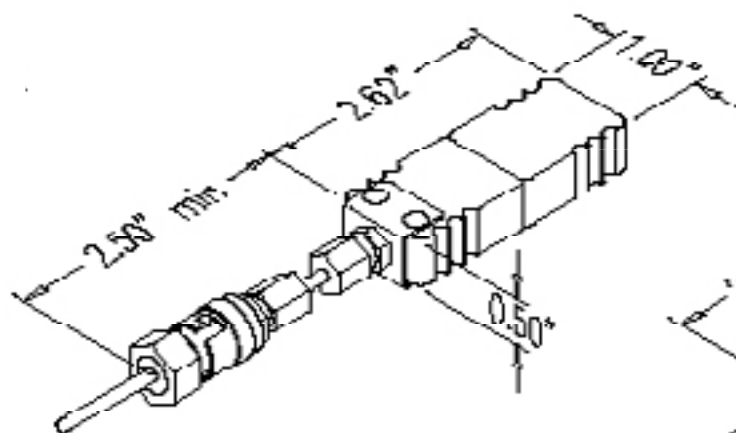


Fig. 5: Spring-Loaded

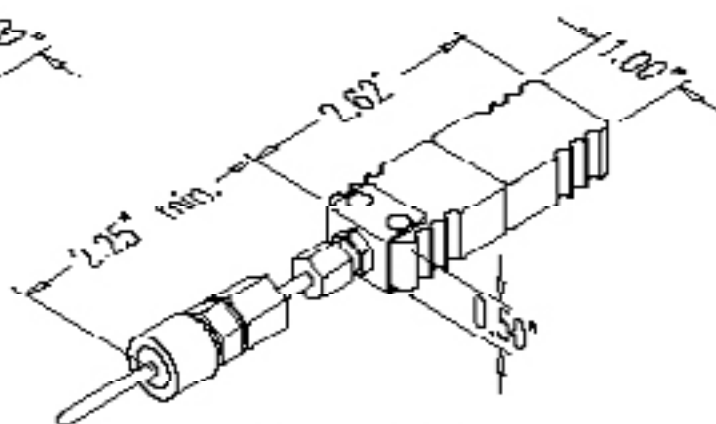


Fig. 6: Sealed

# Furnace Mounting

ATS furnaces may be used in a laboratory or mounted onto a materials testing machine for various testing applications. We offer a variety of mounting options to meet your laboratory needs.

- **Standard Support Brackets**
  - Vertical Use
  - Horizontal Use with Leg Levelers
- **Laboratory Support Plates**
- **Tube Furnace Mounting Brackets**
  - Designed to fit furnace bars
- **Laboratory Baseplates**
  - Includes Leg Levelers
  - Designed with furnace bar
  - Optional Port
- **Vertical Support Stands**
  - Designed with furnace bar
  - Frame Clamps
- **UTM Baseplate Mounting Assembly (see page 15)**
- **Vertical Support Columns (see page 15)**
  - Single Pivot Mounting Assembly
  - Double Pivot Mounting Assembly
  - Dual Double Pivot Mounting Assembly
- **Structural Frames (see page 15)**
  - Single Pivot Mounting Assembly
  - Double Pivot Mounting Assembly
  - Dual Double Pivot Mounting Assembly



**Tube Furnace  
Mounting Brackets**



**Support Brackets**

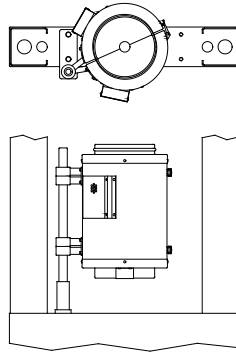


**Laboratory Baseplate**



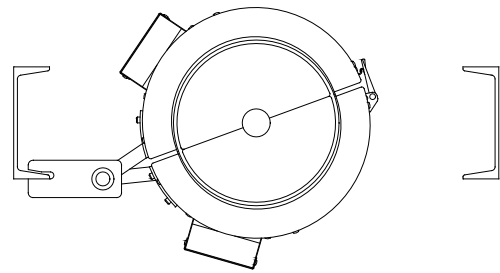
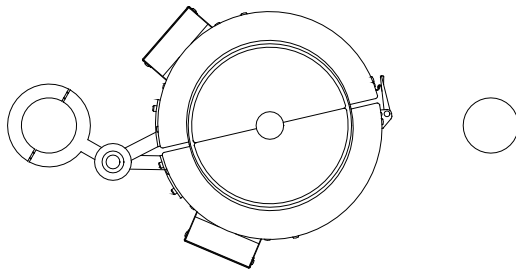
**Vertical Support Stand**

**UTM Baseplate Mounting Assembly**



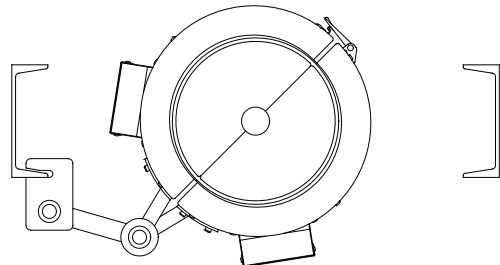
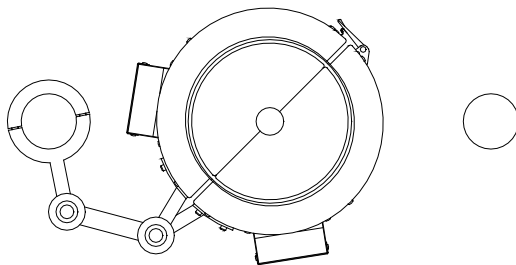
**Vertical Support Columns**

**Structural Frames**



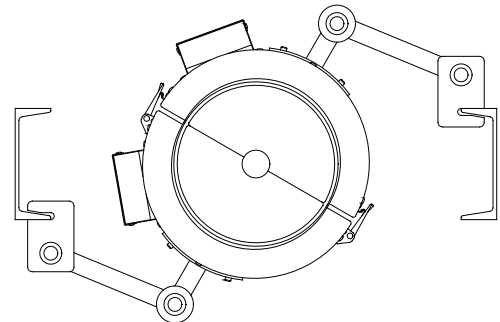
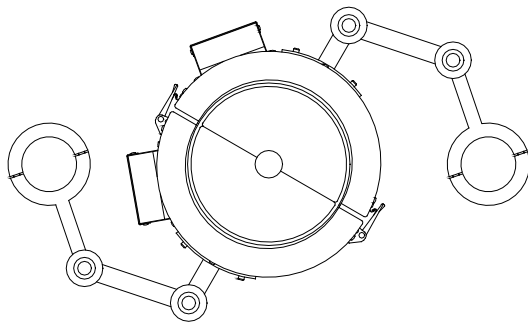
**Single Pivot Mounting Assembly**

**Single Pivot Mounting Assembly**



**Double Pivot Mounting Assembly**

**Double Pivot Mounting Assembly**



**Dual Double Pivot Mounting Assembly**

**Dual Double Pivot Mounting Assembly**



# Custom Furnace Examples



# Temperature Control Systems

A furnace can only be as precise as its control system. ATS prioritizes providing complete, accurate temperature control systems using only the highest-quality components. ATS control systems have been selected for their accuracy, versatility, and reliability. Custom control systems are also available using any major-brand temperature controller, including Watlow, Eurotherm, and others upon request.



# Other ATS Products

- Asphalt/Bitumen Testing Equipment
- Biomedical Testing Machines
- Calibration Test Blocks
- Creep/Stress Rupture Testing
- Environmental Chambers
- Heating Elements
- Lab Furnaces
- Ovens
- Pressure Testing Systems
- Sealant Testing
- Testing Accessories
- Universal Testing Machines



**Creep/Stress Rupture Tester**



**Asphalt/Bitumen Testing Line**



**Sealant Testing Line**



**Universal Testing Machines**