

**About Us:**

**Tarun Scientific Instruments (TSI)** is one of the leading manufacturers of Environmental Systems and providing customer support through good quality products and giving essential services since 2011.

**TSI** is an **ISO 9001:2015** certified company. **TSI** is a customized design and manufacturing of scientific equipment's for all manufacturing industries and scientific laboratories. We also carry out other custom built research & Laboratory equipment. Having a team of talented and dedicated professionals who are highly experienced in this field.

We are highly committed to provide equal importance to every customer ranging from fields like Medical, Research, Defense, Automobile industries, etc.,

We are vibrantly working towards the exploration of innovative ideas and technologies for our product development and services. We always set ourselves forward in implementing internationally acclaimed Quality Policies so as to make our products to be the best in Quality.

Our products are highly affordable to customers, as we quote our prices reasonably in order to keep our customers with us at every time.

**Mission:**

**TSI** seeks to create a more prosperous society through providing exceptional product & services and grow in strength with the people.

**Services Industries:**

- Aerospace Technologies
- Automobile Industries
- Battery Manufacturing Industries
- Bio-Technology & Bio-Chemistry Labs

- Blood Banks
- Calibration Industries
- Car Glass, Doods and Side Mirror manufacturing Industries
- Chemical Industries& Labs
- Defense
- Electronic Components Manufacturing Industries
- Electronics PCB Board Testing Industries
- Food & Beverage Industries
- Gauges Manufacturing Industries
- Heat Treatment Industries
- Lubricants & Oil Industries
- Medical Hospitals & Laboratories
- Metallurgical & Analytical Laboratories
- Microbiology Labs
- Mobile and Accessories Manufacturing Industries
- Polymer Industries
- Pharmaceutical Industries
- Research and Development Labs in All Industries & Colleges
- Rubber Materials and Tire Manufacturing Industries
- Solar Panel Manufacturing Industries
- Wind Mill Generator Manufacturing Industries

**Our Products and Services:**

Environmental test chambers reproduce environmental conditions within a contained space for the purposes of evaluating the long-term effects of specific changes upon objects such as industrial products and materials, electronic products and other components. These conditions simulate those which a product will typically encounter in the span of its useful life. Test results can show the process of product decay and degradation and help predict the potential lifespan of a product or material.

Environmental chambers evaluate product quality and reliability, and identify manufacturing flaws and weaknesses in those products before they are released to the general market. Common tests undertaken in environmental test chambers are extremes of temperature and sudden variations of temperature in temperature chambers and cryogenic chambers, the effects of humidity and moisture in humidity test chambers, and salt spray test chambers which record the degrading effects of salt water on objects for manufacturer analysis. Other types of chambers include: thermal shock chambers and vacuum test chambers. Causal environmental conditions such as shock and UV radiation are further tests carried out in test chambers to evaluate a product's reaction to the elements. As the nature of the tests which environmental chambers perform is widely varied, the common sizes of the chambers are also as broad. Test chambers can range from simple, smaller bench top test chambers which can be used to test a small component, to a variety of sizes of altitude chambers, to the larger, more complex walk-in test chambers, and even drive-in chambers for vehicles and aircraft.

**Products List:**

- **Bacteriological Incubators**
- **Bench Top Chambers / Table Top Chambers**
- **Blood Bank Refrigerators**
- **BOD Incubator**
- **Climatic Test Chambers/Environmental Test Chambers**
- **Cloud and Pour Point Apparatus**
- **Cold Chambers/ Sub-Zero Treatment Chambers / Cryogenic Chambers**
- **Cold Rooms / Ice Cream Storage / Dairy Storage / Pharma Storage**
- **Constant Temperature Bath / Water Bath / Viscosity Bath**
- **Cooling Bath / Chillers / Circulator**
- **Custom Build Chambers / Test Chambers**
- **Deep Freezer / Freezers / Ultra Low Temp. Cabinet**
- **Environmental Stress Screening (ESS) Chambers**
- **Heating Chambers / Burn-in Chambers / Aging Chambers**

- **H**igh Temperature Bath / Oil Bath
- **H**igh Temperature Furnace
- **H**ot and Cold Chambers
- **H**ot air oven / Laboratory Oven / Drying Oven
- **H**umidity Chambers
- **H**umidity Oven / Humidity Incubator
- **I**ncubator Shaker
- **L**yophilizer / Freeze Drier / Vacuum Dryer
- **L**iquid Nitrogen Bath/ Cryogenic Bath
- **M**uffle Furnace
- **S**alt Spray Chambers / Cyclic Corrosion Test Chambers
- **S**eed Germinator / Plant Growth Chamber
- **S**tability Chambers
- **T**emperature Chambers
- **T**hermal Shock Chambers
- **U**ltra-Cryogenic Bath /Cryostatic Bath
- **V**acuum Oven / Vacuum Chambers
- **W**alk-in Chambers / Drive-in Chambers

**Description:**

**1) Bacteriological Incubator:**

Model	Table top / Floor type
Temperature range	5°C above Ambient to +60°C
Size	350 × 350 × 350 / 450 × 450 × 450 / 600 × 600 × 600
Controller	PPI / Selec / Eurotherm
Sensor	RTD, PT-100, Class A.
Controlling Accuracy	±1°C

Outer	MS with powder coated / SS 304.
Inner	SS 304.
Alarm	Temperature deviation high/low alarm.
Insulation	PUF / Glass wool
Heater	Inconel heaters
Temp. Uniformity	Electrical fan for air circulation
Door	Double walled door inner lined with SS, SS handle, lock with key and magnetic gasket.
Power supply	230V, Single Phase, 50Hz.

## 2) Bench Top Chambers/ Table Top Chambers

Temperature range	-55°C / -40°C/ -20°C to +120°C
Size	450 x 300 x 450 / 450 x 450 x 450
Control System	Manual / Automatic
Controller	Select / Eurotherm
Sensor	PT-100, RTD, Class A
Controlling Accuracy	±1°C
Alarm	Temperature deviation high/ low alarm.
Outer	MS with powder coated / SS 304.
Inner	SS 304.
Door	Double walled door inner lined with SS, SS handle, lock with key and silicon gasket, glass window, door light, door heater.
Insulation	PUF and Glass wool.

Compressor	Emerson / Danfoss / Tecumseh
Refrigerant	CFC Free.
Condenser& Evaporator	Fin and Tube type.
Uniformity	Forced air circulation using electrical fan.
Trays	Adjustable type SS mesh tray.
Sample visibility	Vacuum glass will be in door.
Mobility	Heavy duty castor wheels.
Options	Humidity setup, tower lamp, hour meter, hooter, port hole, drain facility, specimen protection for high temp cut off.
Power supply	230V, Single Phase, 50hz/ 415V, Three Phase, 50hz.

### 3) Blood Bank Refrigerator:

Temperature range	+4°C to +8°C
Capacity	50, 100, 200, 300 packets
Controller	PPI / Selec
Sensor	RTD, PT-100, Class A.
Controlling Accuracy	±1°C
Outer	MS with powder coated / SS 304.
Inner	SS 304.
Temperature Uniformity	Forced air circulation using electrical fan.
Door	Double walled door inner lined with SS, SS handle, lock with key and magnetic gasket.
Illumination	Low wattage lamp will be illuminate automatically whenever the door is opened.

Insulation	PUF.
Mobility	Heavy duty castor wheels.
Compressor	Emerson/ Tecumseh.
Refrigerant	CFC Free.
Condenser & Evaporator	Fin and tube type.
Power supply	230V, Single Phase, 50hz.

#### **4) BOD Incubator:**

Temperature range	+5°C to +60°C
Capacity	100, 170, 270, 320 liters
Controller	PPI / Selec / Eurotherm
Sensor	PT-100, Class A
Controlling Accuracy	±1°C
Alarm	Temperature deviation high/low alarm.
Outer	MS with powder coated / SS 304.
Inner	SS 304.
Insulation	PUF.
Door	Double walled door inner lined with SS, acrylic sub door, SS handle, lock with key and magnetic gasket.
Mobility	Heavy duty castor wheels.
Tray	Adjustable type SS mesh tray
Compressor	Hermetically sealed single stage Emerson Copeland makes.
Refrigerant	CFC Free.

Condenser& Evaporator	Fin and Tube type.
Power supply	230V, Single Phase, 50hz.

### **5) Climatic Test Chambers / Environmental Test Chambers:**

Climate chambers are also known as environmental chambers or climatic chambers. They are used to determine the effects of different environmental conditions on certain products or components, including industrial, biological, electronic, pharmaceutical and other products. Climate chambers can be used as stand-alone testing equipment to prepare specimens or products for further testing, or they can be used to actually conduct the tests on the products or specimens. The purpose of the climate chamber is to mimic the environmental conditions a particular product may be exposed to during its normal use and to push the limits of the product. These conditions include thermal shock, extreme temperatures, humidity, radiation, and corrosion among others.

Climate chambers differ vastly in size ranging from walk-in chambers to small chambers. Most climate chambers are equipped with video feeds, allowing the operator to observe the product or component during the testing process. Reach-in chambers allow for the tester to manually adjust or change some conditions during the test. Climate chambers come with many different control options like modern digital readouts with LCD displays, simple analog indicators, or even automated and programmable control systems.

When choosing a climate chamber, there are certain points to consider. The first is the temperature range of the chamber. Standard chambers can reach temperatures as high as 375°F or 190°C and can cool to temperatures as low as -112°F or -80°C. For higher or lower ranges than the normal, contacting the manufacturers will be the best option. The second thing to consider is the humidity range of the chamber. Other things to consider would be the temperature change rate, the product in the chamber, the construction, and the type of cooling system (air cooled or water cooled) in the chamber. These will help you determine the best chamber for your application.



Temperature range	-80°C / -40°C / -20°C / 0 to +190°C
Humidity range	30% to 95% RH at 30°C to 60°C
Size	450 × 450 × 450 / 600 × 600 × 600 / 1000 × 1000 × 1000
Control Systems	Manual / Automatic / Cyclic Programmable
Method	Wet & dry bulb method / Capacitive type direct RH detective
Controlling Accuracy	±1°C & ±3% RH.
Alarm	Temperature deviation high / low alarm, tower lamp.
Outer	MS with powder coated / SS 304.
Inner	SS 304.
Door	Double walled door inner lined with SS, SS handle, lock with key and silicon gasket, Door light, Door heater.
Insulation	PUF and Glass wool.
Compressor	Emerson / Danfoss /Bitzer.
Refrigerant	CFC Free.
Condenser	Fin and Tube type.
Uniformity	Forced air circulation using electrical fan.
Trays	Adjustable type SS mesh tray.
Sample visibility	Vacuum glass will be in door.
Mobility	Heavy duty castor wheels.
Others	Water level control unit, tower lamp, hour meter, hooter, port hole, drain facility, specimen protection for high temp cut off.
Power supply	230V, Single Phase, 50hz/ 415V, Three Phase, 50hz.

### **Applications for Our Environmental, Climate-Controlled Rooms:**

- Biological/Biotechnology Research
- Pharmaceutical Stability
- Shelf Life Experiments in the Food Industry
- Entomology (Insect Rearing) Research
- Industrial Environmental Testing
- Crop Science
- Soil Science
- Laboratory/Medical
- Electronic Burn-In
- Seed Storage
- Plant Growth
- Consumer Product Testing
- Archival Storage
- Cold Storage

### **6) Cloud and Pour Point Apparatus**

Model	Three tank / Four tank
Temperature range	-34°C, -17°C, 0°C to Ambient / -51°C, -34°C, -17°C, 0°C to Ambient
Controller	PPI / Selec
Sensor	RTD, PT-100, Class A
Controlling Accuracy	±1°C
Alarm	Temperature deviation high and low.
Outer	MS with powder coated / SS 304.
Inner	SS 304

Insulation	PUF and Glass wool.
Compressor	Emerson / Danfoss.
Refrigerant	CFC Free.
Condenser & Evaporator	Fin and Tube type.
Mobility	Heavy duty castor wheels.
Power supply	230V, Single Phase, 50hz/ 415V, Three Phase, 50Hz

**7) Cold Chambers/ Cryogenic Chambers/ Sub Zero Treatment Chambers:**

Cryogenic chambers are used to replicate extremely low temperatures in order to observe and evaluate the aftereffects of the freezing conditions on a product or material. Cryogenic processing is widely used by industries including automotive, aerospace, medical and food processing due to the critical nature of their products. It can be seen in applications such as chilling and flash-freezing food for extended preservation, rocket fuel production from liquid gases, the preparation and preservation of medicines, and in metal processing – for example, knife production, as it has been shown that metals show more resistant to wear and tear after cryogenic exposure.

As with other environmental test chambers, cryogenic chambers are used by manufacturers to test their products for potential flaws and malfunctions in order to improve the design and production process. Improving a product based on environmental test results will ensure a better quality product reaches the general market and will result in less costs for the manufacturer in terms of replacement and reimbursement. Cryogenic temperatures are those below -112°F and in cryogenic chambers, liquefied gases such as liquid nitrogen will boil -320°F. While some test chambers combine environmental conditions for purposes of more thorough testing, cryogenic chambers are designed for extremely low temperature replication.

The process of cryogenic chamber use is very time consuming. The products and materials exposed to such extreme temperatures risk experiencing thermal shock, especially during the change of temperature – therefore the cryogenic chamber must reach its minimum temperature at a slow rate, and then return to room temperature at an equally slow rate. The test results will be most accurate if the process of moving between temperatures can be dramatically slowed down. Design and construction of cryogenic chambers must also be carefully considered. Due to the extreme temperature, chamber size is an important factor in design layout as wasted space would be an unnecessary waste of energy and could adversely affect test results. The seal on a cryogenic chamber needs to be in prime condition to ensure that the temperature of the outer environment does not affect the low temperature inside the chamber. Each element of the test and testing conditions has to be taken into consideration – such as already existing environment and climate, the potential addition of interior chamber lighting and thus extra heat, and the variations that already exist between products and materials. It is time-consuming and costly, and yet cryogenic chambers are an important processing part of many industries.

Temperature range	-80°C / -40°C / -20°C to ambient
Size	450 × 450 × 450 / 600 × 600 × 600 / 1000 × 1000 × 1000
Controller	Eurotherm / Selec.
Sensor	PT-100, RTD, Class A.
Controlling Accuracy	±1°C
Outer	MS with powder coated / SS 304.
Inner	SS 304.
Door	Double walled door inner lined with SS, SS handle, lock with key and silicon gasket, Door light, Door heater.

Insulation	PUF
Uniformity	Forced air circulation using electrical fan.
Trays	Adjustable type SS mesh tray.
Sample visibility	Vacuum glass will be in door.
Mobility	Heavy duty castor wheels.
Compressor	Emerson / Danfoss / Bitzer
Refrigerant	CFC Free.
Condenser& Evaporator	Fin and Tube type.
Others	Data logging, system interface, tower lamp, hour meter, hooter, port hole, drain facility
Power supply	230V, Single Phase, 50hz/ 415V, Three Phase, 50hz.

### **8) Cold Rooms / Ice Cream Storage / Dairy Storage / Pharma Storage**

Temperature range	-80°C / -40°C / -20°C / 0°C to ambient
Room Size	Customers choice
Controller	Eurotherm / Selec / PLC with HMI
Sensor	PT-100, RTD, Class A.
Controlling Accuracy	±1°C
Room Panel	Inner PPG with painted / SS 304, outer PPG with painted with Polyurethane Foam Insulation (PUF)
Door	Double walled door inner lined with SS, SS handle, lock with key and silicon gasket, glass window and door light.

Compressor	Emerson / Danfoss / Bitzer
Refrigerant	CFC Free.
Condenser	Fin and Tube type.
Uniformity	Forced air circulation using electrical fan.
Others	Ante room, stand by systems, data logger, tower lamp, hour meter, hooter, port hole, drain facility
Power supply	230V, Single Phase, 50hz/ 415V, Three Phase, 50hz.

### **9) Constant Temperature Bath / Water Bath:**

Model	Table top
Temperature Range	5°C above Ambient to 120°C
Size	12, 20, 25, 40 liters
Controller	Selec / PPI / Eurotherm
Controlling Accuracy	±0.1 / 0.01°C
Sensor	RTD, PT-100, Class A
Outer	Aluminium / MS with powder coating.
Inner	SS 304.
Alarm	Temperature deviation high and low alarm.
Power supply	230V, Single Phase, 50hz.

### 10) Cooling Bath / Chiller / Circulator

Temperature Range	-85°C / -40°C / -20°C / 0°C to Ambient
Size	12, 20, 25, 40 Liters
Controller	Selec / PPI / Eurotherm
Resolution	0.1/ 0.01
Controlling Accuracy	±0.1°C/ ±0.02°C
Sensor	PT-100, RTD, Class A.
Alarm	Temperature deviation high and low.
Outer	MS with powder coated / SS 304.
Inner	SS 304
Insulation	PUF.
Pump	Stirrer/ Circulator
Compressor	Emerson / Danfoss.
Refrigerant	CFC Free.
Condenser	Fin and Tube type.
Mobility	Heavy duty castor wheels.
Power supply	230V, Single Phase, 50hz

### 11) Custom Build Chambers/ Test Chambers

Test chambers reproduce environmental conditions within a contained space for the purposes of evaluating the long-term effects of specific changes upon objects such as industrial products, electronic products and other components. These conditions simulate those which a product will typically encounter in the span of its useful life.

Environmental test chambers evaluate a product's quality and durability, and identify potential flaws and malfunctions that exist either in product design or material choice before the product reaches the public market. Industries ranging from medical, construction and automotive to consumer, food processing and packaging use test chambers on everyday products such as car parts, cigarettes, make-up, medicines and kitchen appliances. Products undergo this testing in certain environmental conditions; the findings allow for production adjustments by the manufacturer and result in a better quality product arriving on the market. Common procedures recorded in test chambers include the effects of extremes of temperature and sudden variations of temperature in temperature chambers and cryogenic chambers, the effects of humidity and moisture in humidity test chambers, and salt spray tests which record the degrading effects of salt water and corrosion-resistance of objects for manufacturer analysis. Other types of test chambers include: Altitude chambers, thermal shock chambers and vacuum test chambers.

The design and construction of the test chamber has to be carefully considered. As it is a process test, test chambers need to have a means of viewing and monitoring the testing procedure either through a viewing hole, or through a video feed. In some cases, an environmental test chamber will have a "reach-in" capability in order for the testing engineer to handle the product or material being tested. The method of process control is another consideration to be undertaken as control panels can be either analog or digital, fed by a computer or the web etc. Environmental test chambers are designed with the capacity to replicate extreme environmental conditions. Temperature chambers can typically reach temperatures above 1000 degrees Fahrenheit, and cryogenic chambers produce temperatures on the other end of the scale achieving lows of -200 degrees Fahrenheit, or even lower with the help of liquid nitrogen. In addition to temperature variations which can be further tested by thermal shock chambers, humidity and air moisture content can be replicated with humidity ranging from 10-100% in most humidity chambers. Altitude chambers simulate extremely high altitudes to test the effects of pressure and air change, and routinely 10<sup>-8</sup> Torr levels are achieved in vacuum environmental chambers. Test



chambers have to be carefully constructed in order to achieve controlled and consistent testing.

## 12) Deep Freezer / Freezers / Ultra Low Temp. Cabinet

Model	Vertical / Horizontal
Temperature range	-80°C / -40°C / -20°C to Ambient
Vertical model capacity	100, 170, 270, 325 liters
Horizontal model capacity	195, 255, 349 liters
Controller	Selec / PPI / Eurotherm
Controlling Accuracy	±1°C
Sensor	PT-100, RTD, Class A.
Alarm	Temperature deviation high and low.
Outer	MS with powder coated / SS 304.
Inner	SS 304
Insulation	PUF.
Door	Double walled door inner lined with SS, SS handle, lock with key and magnetic gasket.
Mobility	Heavy duty castor wheels.
Compressor	Emerson / Danfoss
Refrigerant	CFC Free
Condenser	Fin and Tube type.

Trays	SS tray.
Power supply	230V, Single Phase, 50hz

### 13) Environmental Stress Screening (ESS) Chambers

Temperature range	-80°C / -40°C / -20°C to +200°C
Size	450 × 450 × 450 / 600 × 600 × 600 / 1000 × 1000 × 1000
Controller	Eurotherm / Selec.
Sensor	PT-100, RTD, Class A.
Controlling Accuracy	±1°C
Outer	MS with powder coated / SS 304.
Inner	SS 304.
Door	Double walled door inner lined with SS, SS handle, lock with key and silicon gasket, Door light, Door heater.
Insulation	PUF
Compressor	Emerson / Danfoss / Bitzer
Refrigerant	CFC Free.
Condenser	Fin and Tube type.
Uniformity	Forced air circulation using electrical fan.
Trays	Adjustable type SS mesh tray.
Sample visibility	Vacuum glass window
Mobility	Heavy duty castor wheels.

Others	Tower lamp, hour meter, hooter, port hole, drain facility
Power supply	230V, Single Phase, 50hz/ 415V, Three Phase, 50hz.

#### 14) Heating Chambers / Burn-in Chambers / Aging Chambers

Temperature range	Ambient to +120°C / 200°C / +300°C
Size	350 × 350 × 350 / 450 × 450 × 450 / 600 × 600 × 600
Controller	PPI ,Selec.
Controlling Accuracy	±1°C.
Sensor	PT-100, RTD, Class A.
Outer	MS with powder coated / SS 304.
Inner	SS 304.
Insulation	Glass wool.
Trays	SS mesh tray.
Power Supply	230V, Single Phase, 50hz.

#### 15) High Temperature Bath / Oil Bath

Temperature Range	5°C above ambient to +200°C / +300°C
Size	12, 20, 25, 40 liters
Controller	Selec / PPI / Eurotherm
Display Resolution	0.1/ 0.01
Controlling Accuracy	±1 / 0.1°C
Sensor	PT-100, RTD, Class A.

Outer	MS with powder coated / SS 304
Inner	SS 304
Heaters	SS heaters with high cold zone
Power supply	230V, Single Phase, 50hz

### **16) High Temperature Furnace**

- High temperature Muffle Furnaces are designed to meet the requirements of varies customers in Industries, Educational Research fields etc.
- Double walled chamber, outer made of cold rolled mild steel sheets and finished in powder coating paint.
- Inner chamber formed by high temperature withstand Zirconia Vacuum Board followed by Ceramic fibre blankets on all the sides.
- Double walled door mounted on heavy-duty hinges in the front is provided with effective locking arrangements.
- Heating elements will be Silicon Carbide Rods.
- Further the door is provided with door limit switch to cut off the power supply whenever the door is opened and to restart when the door is closed.
- Temperature is maintained and controlled by Digital PID Temperature controller with Thyristor Control Device working in conjunction with Cr/A1 Thermocouple.
- Supplied complete with control panel.
- Continuous Operating Temperature 1350 Deg. C
- Maximum Temperature 1400 Deg. C
- Suitable to work on 220V, single phase 50 Hz, AC supply.

**17) Hot and Cold Chambers:**

Temperature range	-80°C / -40°C / -20°C to +200°C
Size	450 × 450 × 450 / 600 × 600 × 600 / 1000 × 1000 × 1000
Controller	Eurotherm / Selec.
Sensor	PT-100, RTD, Class A.
Controlling Accuracy	±1°C
Alarm	Temperature deviation.
Outer	MS with powder coated / SS 304.
Inner	SS 304.
Door	Double walled door inner lined with SS, SS handle, lock with key and silicon gasket, Door light, Door heater.
Insulation	PUF and Glass wool.
Compressor	Emerson / Danfoss / Bitzer
Refrigerant	CFC Free.
Condenser	Fin and Tube type.
Uniformity	Forced air circulation using electrical fan.
Trays	Adjustable SS mesh tray.
Sample visibility	Toughened glass will be in door.
Mobility	Heavy duty castor wheels.
Others	Data logger/system interface, tower lamp, hour meter, hooter, port hole, drain facility, specimen protection for high temp cut off.

Power supply	230V, Single Phase, 50hz/ 415V, Three Phase, 50hz.
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**18) Hot air oven / Laboratory Oven / Industrial Oven / Drying Oven:**

Temperature range	+5°C above ambient to 120°C / +200°C / +300°C
Size	350 × 350 × 350 / 450 × 450 × 450 / 600 × 600 × 600
Controller	PPI / Selec.
Controlling Accuracy	±1°C / ±2°C.
Sensor	RTD, PT-100, Class A.
Outer	MS with powder coated / SS 304.
Inner	SS 304.
Insulation	Glass wool.
Heater	Inconel Heaters
Trays	SS mesh tray.
Power Supply	230V, Single Phase, 50hz.

**19) Humidity Chambers:**

Humidity chambers are the environmental test chambers designed specifically to replicate conditions of varying humidity in a controlled environment. Humidity testing is undertaken for the purposes of evaluating products, materials and components in response to differing conditions of water vapor or moisture present in the environment.

Industries such as aerospace, military, automotive, medical and construction use humidity chambers in the testing of their products and materials due to the capability of moisture to drastically alter elements. Corrosion, warping, biological growth and cracking are all conditions that could result from the exposure of a product or material to extremes of humidity. Therefore, it is imperative that

manufacturers comprehensively test their products for the environmental conditions they will encounter during their lifespan in order to reveal these potential flaws or malfunctions. These test results allow engineers to rethink product design and manufacturing in order to produce the most reliable and cost-effective solutions for their target market. This is especially beneficial to manufacturers whose products come under guarantee or warranty because a product that has already been tested and improved is less likely to result in high reimbursement charges for the manufacturer. While high humidity is most commonly the cause of damage, in areas of low humidity, it is likely that products intended for an outdoor environment will be exposed to greater amounts of dust and/or sand and therefore it might be conscientious of a manufacturer to undergo environmental tests for those conditions too.

Air moisture content ratio, or relative humidity, can be replicated in humidity chambers ranging from 10-100%. The design and construction of the humidity chambers have to be carefully considered as the manufacturer’s decisions rely on the validity of the test results. As it is a process test, chambers typically have a means of viewing and monitoring the testing procedure either through a viewing hole, or through a video feed in order to record the progressive effects of the process. Test chambers can range from simple, smaller bench top chambers that can be used to test a small component, to more complex walk-in chambers, and even drive-in chambers for vehicles and aircraft. As products, materials and components are likely to come into contact with numerous different environmental conditions, environmental test chambers are often constructed with the ability to test a combination of environmental effects. Temperature and altitude are often combined with humidity testing because of the likelihood of the existence of these effects in nature.

Humidity range	30% to 95% RH at 30°C to 60°C.
Size	450 × 450 × 450 / 600 × 600 × 600 / 1000 × 1000 × 1000.
Controller	Eurotherm / PPI.

Sensor	PT-100, RTD, Class A/ Capacitive type RH sensor
Controlling Accuracy	$\pm 1^{\circ}\text{C}$ & $\pm 3\%$ RH.
Control System	Wet and Dry bulb / Direct detective type.
Alarm	Temperature deviation.
Outer	MS with powder coated/ SS304
Inner	SS 304.
Door	Double walled door inner lined with SS, SS handle, lock with key and magnetic gasket, Door light, Door heater.
Insulation	PUF.
Compressor	Emerson / Danfoss.
Refrigerant	CFC Free.
Condenser	Fin and Tube type.
Uniformity	Forced air circulation using electrical fan.
Trays	Adjustable SS mesh tray.
Sample visibility	Vacuum glass will be in door.
Mobility	Heavy duty castor wheels.
Others	Water level control unit, tower lamp, hooter, port hole, drain facility, specimen protection for high temp cut off.
Power supply	230V, Single Phase, 50hz



**20) Humidity Oven / Humidity Incubator**

Humidity range	60% to 95% RH at 50°C to 60°C.
Size	450 × 450 × 450 / 600 × 600 × 600 / 1000 × 1000 × 1000.
Controller	Eurotherm / PPI.
Sensor	PT-100, RTD, Class A/ Capacitive type Rh sensor
Controlling Accuracy	±1°C & ±3% RH.
Alarm	Temperature deviation.
Outer	MS with powder coated/SS304
Inner	SS 304.
Door	Double walled door inner lined with SS, SS handle, lock with key and magnetic gasket, Door light, Door heater.
Insulation	Glass wool.
Control	Wet and Dry bulb / Direct detective type.
Uniformity	Forced air circulation using electrical fan.
Trays	Adjustable SS mesh tray.
Mobility	Heavy duty castor wheels.
Power supply	230V, Single Phase, 50hz

**21) Lyophilizer / Freeze Drier / Vacuum Dryer**

Type	Port / Tray
Temperature range	-40°C / -80°C

Sensor	PT-100, Class A.
Vacuum level	0.001mbar
Outer	MS with powder coated / SS 304
Inner	SS 304
Compressor	Emerson / Danfoss
Refrigerant	CFC Free
Condenser	Fin & tube type air cooled
Ports	8

## **22) Liquid Nitrogen Bath/ Ultra Cryogenic Bath**

Model	Floor model (Top Loading)
Temperature Range	-20°C to -190°C. ( -80 to -120°C with Liquid State & -20 to -80°C with Vapor State)
Controller	Eurotherm / Selec
Controlling Accuracy	±2°C
Sensor	PT-100, Class A Type
Alarm	Temperature deviation High & Low alarm with flash light.
Inner	5mm thick SS 304.
Outer	3mm thick SS304.
Insulation	125mm high density Thermo-fil insulation for cryogenic application.
Door	Heavy duty Handle, Gasket, Hinges, Latches & Gas Spring.
Mobility	Heavy duty caster wheels-4 No's for easy movement.
Solenoid Valve	Jefferson Valve-3 No's (LN2 control, safety & drain)
Features	i. NABL calibration certificate with traceability for controller & sensor.

	ii. Vent Holes with dead load counter for High Pressure Relief. iii. Drain facility.
Power Supply	230V, Single Phase, 50Hz.

### 23) Muffle Furnace

The working principle of a lab muffle furnace is to heat the air in the chamber by heating the Nichrome (nickel-chromium) wires which are generally referred to as electrically operated heating elements. The Control of furnace temperature majorly depends on the efficiency of electronic controller unit and best results can only be obtained from PID controlled units, PID stands for proportional integral derivative controller. The laboratory muffle furnaces generally do not have sophisticated cooling system. Most of the time a simple fan based exhaust system is installed and cooling is performed by this simple fan system supported by a chimney. The main utility of this furnace exhaust system is to take out the toxic gases from the inner chamber which comes out during heating of the testing materiel / specimen inside the chamber. Hence the chamber gets sanitised of any toxic gases which may have evolved during the heating of materiel inside the lab muffle furnace.

Sizes in inch's	4 x 4 x 9, 5 x 5 x 10, 6 x 6 x 12, 8 x 8 x 12, 12 x 12 x 12
Operating Temperature	+5°C above ambient to 1100°C
Maximum Temperature	+1150°C

#### Applications of laboratory muffle furnace:

- Research and development.
- Ceramics.
- Semiconductors.
- Heat Treatment.
- Brazing and Soldering.

- Air and Space Industry.
- Petro chemistry.
- Material Testing and Quality Control Laboratories.
- Automotive.
- Coal and Mining.
- Plastics.
- Glass.
- Medicine.
- Electronics.
- Dental.
- Nuclear.

#### **24) Salt Spray Chambers / Cyclic Corrosion Test Chambers:**

Salt spray test chambers are used to test a product or material in a highly corrosive environment for the purposes of evaluating the long-term effects of salt on an object and its ability to withstand the effects of corrosion. Environmental test chambers evaluate product quality and reliability, and identify manufacturing flaws and weaknesses in those products before they are released to the general market. The test results recorded through the process of salt spray testing can show the process of product decay and degradation and help predict the potential lifespan of a product or coating. Within the sealed test chamber, a salt-laden spray or a salt-fog (mainly sodium-chloride) is produced by a high-pressure nozzle to check the corrosion resistance of product coatings or coverings for products usually made from steel, brass and other metals. The metal object is normally hung from a rod or hook in order to expose the most surface area possible for testing purposes. As most metals are highly susceptible to corrosion, protective coatings are often used as a barrier between the metal and the exposure to salt spray and fog. Coatings which are often tested in salt spray test chambers include: phosphate surfaces, zinc and zinc alloy plating's, electroplating with chromium, copper and tin, organic coatings and certain painted coatings.

Industries which rely on salt spray testing include automotive, construction, aerospace and industrial. The process of salt spray testing is relatively cheap, quicker than other forms of environmental testing and reasonably repeatable. Yet, replicating corrosion is complicated due to the susceptibility of it being further affected by other external factors. Therefore, the test results and the predicted lifespan of a material may not be completely accurate, and so the design and construction of the salt spray test chambers needs to be carefully considered. Industry standards in terms of size, test duration and procedure need to be understood and met before undergoing testing. Salt chambers are typically approximately fifteen cubic feet, and yet larger custom designed chambers can be made too. Using a pressurized supply of salt-spray or fog leads to an accelerated rate of corrosion in objects and therefore testing time can vary from taking a few minutes to a number of days depending on the type and detail of data required. Testing can be a costly procedure depending on the size and process undertaken, and yet it is a wise manufacturing choice to undergo environmental testing, especially in terms of long-term expenditure and future benefit.

Models	Manual / Automatic
Temperature range	Ambient to +50°C
Saturated Temperature	Ambient to +65°C
Humidity Range	60% to 95%RH
Salt-Spray Fall-out Rate	Adjustable from 0.5 to 2.5ml per 80cm <sup>2</sup> per hr
Capacity in Liters	300, 600, 900, 1500 liters
Solution Reservoir Capacity	120 to 200 liters
Standards of compliance	ASTM, DIN, GM, JIS, MIL, etc.,
Specimen Hanging Capacity	2kg-4kg
Controller	Resistive analog color touch screen with RS232, RS422/485

	ports.
Timer	Programmable digital timer for pre-set time operation
Heater	Low density ceramic layer rope heaters
Outer	Nonmetallic GRP material
Inner	Nonmetallic GRP material
Load	2.5kw- 5kw
Water Supply	Demineralized/Deionized continuous water connection 0.5-3.0 bar
Air Supply	Clean dry & Oil free, 4.0 to 6.0 bar
Drain	25mm female BSP threaded provision with 3m flexible drain pipe provided
Exhaust	50mm female BSP threaded provision provided
Insulation	Mineral wool.
Mobility	Heavy duty castor wheels.
Others	Pre-configured 4-level solution display indication, Easy user access control panel, Pneumatic guided salt spray lid opening with auto-air purge interlock, FRP rods for hanging the test specimen
Safety	MCB for all the individual, EMI protection for control unit, Over temperature protection for saturator and chamber, Air pressure safety protection, saturator low water protection, Earth protection.
Power supply	230V, Single Phase, 50hz

**25) Seed Germinator / Plant Growth Chamber**

Humidity range	30% to 95% RH at 30°C to 60°C.
Size	450 × 450 × 450 / 600 × 600 × 600 / 1000 × 1000 × 1000.
Controller	Eurotherm / PPI.
Sensor	PT-100, RTD, Class A/ Capacitive type RH sensor
Controlling Accuracy	±1°C & ±3% RH.
Control	Wet and Dry bulb / Direct detective type.
Alarm	Temperature deviation.
Outer	MS with powder coated/ SS304
Inner	SS 304.
Door	Double walled door inner lined with SS, SS handle, lock with key and magnetic gasket, Door light, Door heater.
Insulation	PUF.
Compressor	Emerson / Danfoss.
Refrigerant	CFC Free.
Condenser	Fin and Tube type.
Uniformity	Forced air circulation using electrical fan.
Trays	Adjustable SS mesh tray.
Sample visibility	Vacuum glass will be in door.
Mobility	Heavy duty castor wheels.

Others	Water level control unit, tower lamp, hooter, port hole, drain facility, specimen protection for high temp cut off.
Power supply	230V, Single Phase, 50hz

## **26) Stability Chambers:**

Stability chambers are a type of environmental test chamber that are used to measure the effects of particular circumstances on everything from biological materials, industrial materials and even electrical components. They are called stability chambers because they allow for a stable, controlled environment where all variables can be held constant while others are modified to test their effects.

Stability chambers are primarily used to detect humidity and temperature ranges.

Stability chambers are used in research and product development for pharmaceutical, food technology, biomedical storage, life science and more. Stability chambers can even be used to find a defect in a product prototype before it goes in to full-scale production. The humidity levels in a chamber are controlled through the use of humidity capsules. These capsules are pierced and placed in the chamber prior to testing. The test material is then placed in the test compartment and a special sensor cap is used to seal off the chamber. This cap collects and transmits vital data that will help in the research of the test material. Chambers come in many sizes and some are basic while others can perform a long list of operations. Any business purchasing a stability chamber should consider their needs and the amount of space that is available in their facilities for such equipment.

Tests are not limited to humidity levels, as many stability chambers are capable of testing everything from temperature to the effects of thermal shock. Some high temperature applications are tested in chambers that can replicate conditions of over 200 degrees Celsius. Sometimes stability chambers are used by pharmaceutical companies to prove the shelf life of a drug. Regulatory authorities want to know exactly how long a product can be stored before it expires. New chambers are tested for performance and must be regularly maintained during their lifetime. Since the tests performed in stability chambers have such drastic implications, it is critical



that chambers function correctly and that their calibration for various conditions is absolutely exact.

Humidity range	30% to 95% RH at 30°C to 60°C.
Size	450 × 450 × 450 / 600 × 600 × 600 / 1000 × 1000 × 1000.
Controller	Eurotherm / PPI.
Sensor	PT-100, RTD, Class A/ Capacitive type RH sensor
Controlling Accuracy	±1°C & ±3% RH.
Control	Wet and Dry bulb / Direct detective type.
Alarm	Temperature deviation.
Outer	MS with powder coated/ SS304
Inner	SS 304.
Door	Double walled door inner lined with SS, SS handle, lock with key and magnetic gasket, Door light, Door heater.
Insulation	PUF.
Compressor	Emerson / Danfoss.
Refrigerant	CFC Free.
Condenser	Fin and Tube type.
Uniformity	Forced air circulation using electrical fan.
Trays	Adjustable SS mesh tray.
Sample visibility	Vacuum glass will be in door.

Mobility	Heavy duty castor wheels.
Others	Water level control unit, tower lamp, hooter, port hole, drain facility, specimen protection for high temp cut off.
Power supply	230V, Single Phase, 50hz

**27) Temperature chambers:**

Temperature chambers replicate differing extremes of temperature in order to test and evaluate the effects on certain objects and materials of constant and prolonged exposure to extremes of temperature, or to rapid temperature change.

Environmental test chambers such as temperature chambers are used by manufacturers to check the stability and lifespan of a product during its developing stages to ensure the best quality product once it reaches the general market.

Industries such as medical, consumer, construction, food processing and automotive use temperature testing on their products revealing potential flaws and malfunctions. Temperature chambers can produce an environment with temperatures from below freezing to reaching as high as 375F. The goal of test chambers is to accurately predict, and then allow the manufacturer to correct if needed, the response of a product to the environment. Therefore it is important that the chamber produce an environment as close to that of nature as possible. As existing temperature is closely linked with relative humidity, chambers that combine the effects of temperature and humidity are common. Temperature chambers can also be used as storage spaces for materials that are sensitive to adjustments in temperature, especially in the medical and pharmaceutical industries.

The range of products that require temperature testing is broad; therefore temperature chambers are available in many sizes, including compact bench top chambers and much larger walk-in chambers designed according to the manufacturer needs. Many chambers are custom designed based not only on the size and shape of the product being tested, but also on its intended use. The validity of the test results is important for future manufacturing changes and improvements,

and therefore chamber construction should be carefully considered. Temperature controls and precision are an important element of undergoing the tests and recording the results for future reference. This is usually done by electronic sensors in order to achieve the most accurate reading. Another consideration in temperature chambers is the method of distribution of air to achieve a uniform temperature pattern within the sealed chamber. Each element of the test and testing conditions has to be taken into consideration – already existing environment and climate, the potential addition of interior chamber lighting and thus extra heat, and the variations that already exist between products and materials being tested. Depending on the industry doing the testing, standards for execution of the process and recording will differ, and yet an improved product is a typical result. It may be an expensive and time-consuming procedure depending on the size and process undertaken, and yet it is a wise manufacturing choice to undergo temperature testing, especially in terms of long-term expenditure and future benefit.

Temperature range	-80°C / -40°C / -20°C to +200°C
Size	450 × 450 × 450 / 600 × 600 × 600 / 1000 × 1000 × 1000
Controller	Eurotherm / Selec.
Sensor	PT-100, RTD, Class A.
Controlling Accuracy	±1°C
Alarm	Temperature deviation.
Outer	MS with powder coated / SS 304.
Inner	SS 304.
Door	Double walled door inner lined with SS, SS handle, lock with key and magnetic gasket, Door light, Door heater.
Insulation	PUF and Glass wool.

Compressor	Emerson / Danfoss.
Refrigerant	CFC Free.
Condenser	Fin and Tube type.
Uniformity	Forced air circulation using electrical fan.
Trays	Adjustable SS mesh tray.
Sample visibility	Toughened glass will be in door.
Mobility	Heavy duty castor wheels.
Others	Tower lamp, hour meter, hooter, port hole, drain facility, specimen protection for high temp cut off.
Power supply	230V, Single Phase, 50hz/ 415V, Three Phase, 50hz.

## **28) Thermal Shock Chambers**

Thermal shock chambers are used to replicate the conditions of sudden and drastic changes in temperature in order to test the capability of a product, material or part component to withstand the resulting stress and strain. Environmental chambers evaluate product quality and reliability, and identify manufacturing flaws and weaknesses in those products before they are released to the general market, or used in the manufacturing of other products.

Industries such as consumer, medical, automotive, aerospace and construction use thermal shock chamber testing to ensure the reliability of their products. Thermal shock causes cracking or faulting along lines of stress as a result from the conflict between uneven element expansion and compression according to relative temperature. As one section cools or heats faster than another, the pressure placed on a material becomes greater than the strength of that material and a crack is formed. These cracks can be severe enough to cause structure failure. Glass and ceramics are particularly susceptible to thermal shock damage due to their low

thermal conductivity and their tendency to expand and compress unevenly, and so test chambers are an important part of the manufacturing process for products and structures using these materials.

The design and construction of test chambers needs to be executed to specific considerations to ensure the most accurate test results. Thermal shock chambers need the capacity to alter temperature at an uneven rate to accurately reproduce conditions found in the environment. The chambers typically have two compartments that are set at differing temperatures and the test object is then quickly transferred between the two compartments, causing the thermal shock. Strict control during the process will yield the most accurate and useful results from the tests. Thermal chambers utilize liquid or air to create temperature variances and objects can be alternately immersed in non-toxic, noncombustible and low viscosity liquids at extremely different temperatures, or between compartments maintaining different air temperatures. Sometimes, an intermediate step is required between the temperature extremes in which a product experiences a brief moment of room temperature. This is known as three-zone thermal shock. The suitability of the testing method, either in liquid or air, will depend on the intended final use of the product or material being tested, and the capability of the thermal shock chamber being used. Testing can take many hours and can be a costly procedure depending on the size of the object, and the process undertaken, yet it is a wise manufacturing choice to undergo thermal shock testing, especially in terms of long-term expenditure and future benefit.

<b>Basket Movement</b>	Vertical
<b>Zone Type</b>	2 Zone / 3 Zone
<b>Basket Size in mm</b>	400 x 400 x 400, 500 x 500 x 500, 600 x 600 x 500mm
<b>Temperature Range</b>	-80°C to +180°C
<b>Basket Transition Time</b>	<10 Secs

<b>Recovery Time</b>	<10-15 minutes
<b>Sensor for Temp</b>	PT-100 (RTD), class-A
<b>Temperature Controller</b>	Eurotherm / PLC with HMI
<b>Resolution</b>	0.1°C
<b>Data Logging</b>	RS-232/485/Ethernet communication port with supporting software to interface with system.
<b>Electrical Items</b>	Schneider / TC/ Siemens
<b>Basket Movement</b>	The test basket is pneumatically operated and guided with rails for a vibration free transfer.
<b>Construction</b>	<ul style="list-style-type: none"> <li>i. Mono-block construction with I-section base frame. The body is impervious with thermally isolated blocks which can resist high-low temperatures.</li> <li>ii. Exterior with min 2mm thick MS/GI with powder coated panels with impressive precision &amp; aesthetics.</li> <li>iii. Interiors (unobstructed) with high gloss brush finish 18swg stainless steel with reinforced flooring to withstand heavy distributed loads and illumination lights inside.</li> <li>iv. Multi-level diagonally joined airlock silicone rubber sealing the door and chamber with conduction free isolation mounts.</li> <li>v. Internal test chamber and outer body is isolated using mineral wool ensuring no air pockets and zero conduction and heat loss.</li> </ul>

	<ul style="list-style-type: none"> <li>vi. The chamber shall be mounted on 4” Heavy-duty castor wheels and leveling pads ensuring easy erection &amp; movement of the system.</li> <li>vii. Multi-pane condensation-free glass inspection window on the hot zone door for viewing the test basket specimen.</li> </ul>
<p><b>Test Space Conditioning</b></p>	<ul style="list-style-type: none"> <li>i. Easy to access conditioning plenum for maintenance</li> <li>ii. Single molded light weight high cfm co-axial fan for uniform air-circulation.</li> <li>iii. Vibration-free Stainless Steel joint-free extended shaft external flange mounted induction motor.</li> <li>iv. Modular conditioning unit consisting of heat-exchangers, air-circulation system and heating system.</li> </ul>
<p><b>Refrigeration System</b></p>	<ul style="list-style-type: none"> <li>i. Hermetic/Semi-hermetic compressor/s are mounted on vibration-free compression spring/rubber bush tightened with desired torque level</li> <li>ii. Eco friendly Non-CFC refrigerants R-404a &amp; R- 23 and Air cooled refrigeration system</li> <li>iii. Evaporator heat exchanger coils full collared bullet expanded for high efficient heat transfer.</li> <li>iv. Automatic bypass control system based on suction pressure and temperature on variable loading / no load conditions, and temperature control accuracy.</li> <li>v. Efficient oil return managing system for protection of compressor from lack of lubrication</li> </ul>

	vi. Condenser unit will be in outside.
<b>Heating System</b>	<ul style="list-style-type: none"> <li>i. Stainless steel sheathed/ bare nichrom air heaters to achieve the set temperature.</li> <li>ii. The heaters shall be placed in the conditioning section to avoid any radiation of heat onto the test specimen.</li> <li>iii. Heater outputs are controlled through zero-crossing relay/ Thyristor for superior stability and control of temperature.</li> </ul>
<b>Safety &amp; Protection</b>	<ul style="list-style-type: none"> <li>i. MPCB/MCB for all the individual 3-phase and 1-phase power devices</li> <li>ii. Single phase, phase reversal, under voltage and over voltage protection for main input power</li> <li>iii. EMI protection for control circuit</li> <li>iv. Test specimen Tmax and Tmin independent safety protection</li> <li>v. Over temperature safety thermal fuse (Fixed).</li> <li>vi. High and low pressure safety protection</li> <li>vii. Inbuilt winding thermal protection for compressor (Only Semi-hermetic)</li> <li>viii. Compressor Oil level protection - OPS (Only Semi-hermetic &lt;10HP)</li> <li>ix. Compressor high discharge temperature protection</li> <li>x. Tmax and Tmin programming safety protection</li> </ul>



	(Controller inbuilt)
<b>Power Supply</b>	415v,3 Phase, 50Hz

**29) Ultra-Cryogenic Bath / Cryostat Bath:**

Temperature Range	-85°C / -40°C / -20°C / 0°C to Ambient
Size	12, 20, 25, 40 Liters
Controller	Selec / PPI / Eurotherm
Resolution	0.1/ 0.01
Controlling Accuracy	±0.1°C/ ±0.02°C
Sensor	PT-100, RTD, Class A.
Alarm	Temperature deviation high and low.
Outer	MS with powder coated / SS 304.
Inner	SS 304
Insulation	PUF.
Pump	Stirrer/ Circulator
Compressor	Emerson / Danfoss.
Refrigerant	CFC Free.
Condenser	Fin and Tube type.
Mobility	Heavy duty castor wheels.
Power supply	230V, Single Phase, 50hz

### **30) Vacuum Oven / Vacuum Chambers:**

Vacuum chambers use a vacuum pump to remove air and pressure from within a sealed compartment for the purpose of evaluating the effects of a vacuum on objects, materials or components. Environmental test chambers such as vacuum chambers are used by manufacturers to test a product for flaws and malfunctions before it is released to the public. Having a well-tested product ensures less cost in terms of warranty and guarantee reimbursements.

Vacuum chambers have the capability to withstand the pressure caused by creating a vacuum, and are usually made from metals such as aluminum and mu-metal. As vacuum testing is used across a wide range of industries, it is possible that the chambers are designed and constructed with the capability of replicating certain environmental conditions of temperature and altitude in addition to creating a vacuum environment. Environmental testing simulates the actual conditions a product is likely to face during its useful lifespan, and therefore more than one environmental effect is necessary to get an accurate idea of how a product will respond. In order for the engineer to watch the results of a vacuum upon an object, there is typically a viewing port or window sealed with rubber. Sizes of vacuum chambers can vary greatly, from smaller bench top chambers used to test miniature components and objects, to larger chambers able to encompass objects of a much larger nature.

Several industries rely on vacuum packaging to help produce the best quality product possible. Aerospace engineers use vacuum testing for all the components of space travel equipment, which have to be able to withstand the effects of a vacuum and low pressure environment for extended periods of time. Vacuum testing can be undertaken on spacecraft electronics and circuits, lenses and filters and coatings and structural materials. Vacuum molding plastic manufacturers use vacuum chambers when mixing resins and silicone rubbers to ensure a bubble-free mold replica. The material to be inserted into the mold is placed in a vacuum chamber to remove all existing air bubbles, and to make it ready to pour into the mold without leaving blemishes. Vacuum chambers are also used for testing the sealing in packaging and the potential for leaks and possible malfunctions under pressure.

This is useful especially for export packaging where goods will be subjected to high altitudes during transportation by air and in the pharmaceutical and medical industries where it is necessary for medicines to remain sealed until use. Vacuum testing can take many hours and can be a costly procedure, and yet it is a wise manufacturing choice to undergo environmental testing, especially in terms of long-term expenditure.

<b>Size in mm</b>	280mm dia x 380mm depth
<b>Temperature range</b>	+5°C above ambient to +200°C
<b>Controller</b>	Selec / Eurotherm
<b>Sensor</b>	RTD, PT100, Grade-A
<b>Controlling Accuracy</b>	±2°C
<b>Vacuum Range</b>	100 LPM
<b>Outer</b>	MS with powder coated / SS 304
<b>Inner</b>	SS 304
<b>Trays</b>	1 No's
<b>Insulation</b>	Glass Wool
<b>Door</b>	Handle, lock and Asbestos gasket for leak proof
<b>Power supply</b>	230V, 50Hz, Single Phase
<b>Optional</b>	Timer, Hooter, Vacuum pump

### **31) Walk-in Chambers / Drive-in Chambers**

A walk-in test chamber is a type of environmental test chamber that is designed for testing or storing products that require a larger capacity space. These chambers were given this name simply because they are large enough for a person to walk inside. These chambers can vary significantly in size, ranging from the size of a small closet to entire rooms. However, other than being larger than other chambers walk-in test chambers are essentially the same as any other environmental test chamber, and they can be designed and constructed to replicate the same kinds of conditions as other chambers.

Environmental test chamber manufacturers typically fabricate a diverse range of walk-in chambers to accommodate the requirements of many different industries and applications. As with smaller test chambers, the most common walk-in test chambers are designed to test the effects of temperature extremes and a variety of humidity and moisture levels. Stability walk-in test chambers are another common type which are used to test shelf life, determine expiration dates, and to accelerate the process of aging in many types of products. Other walk-in test chambers include: salt spray chambers, altitude chambers, vibration test chambers, and thermal shock chambers. Walk-in test chambers provide manufacturers with the benefit of being able to test larger products and components, and they can also be used to test multiple smaller products at the same time. Some test chamber manufacturers even take this one step further by manufacturing drive-in test chambers. Like the name suggests, these test chambers are constructed to allow a variety of vehicles to drive into the chamber. These chambers vary in size even more significantly than the walk-in variety, accommodating anything from a small forklift to military vehicles and even aircraft.

Regardless of the type or size of the test chamber, it is important to carefully consider the chamber design and construction to ensure that it can accommodate the desired conditions and meets accuracy requirements. However, due to the increased size of walk-in and drive-in chambers, it is even more important to make sure that the chamber is equipped to control and maintain the appropriate conditions without interference. Carefully controlled air flow must be achieved to

maintain a constant temperature and humidity level throughout the entire chamber space. External influences should also be minimized, as these can significantly affect the results of environmental tests. The atmospheric temperature, moisture levels, pressure, and even small contaminants in the air can compromise the accuracy of environmental tests. For this reason, manufacturers must ensure that the chamber is properly sealed to eliminate these factors. While all these factors and many others can cause interference, it is important to know how much a given application depends on these factors. For some, these factors may prove incredibly important, while for others they may not contribute any significant impact. By working with test chamber manufacturers, you can determine which factors are most important to your applications and discuss the best methods and designs for controlling or eliminating them.

Temperature range	-80°C / -40°C / -20°C / 0°C to +180°C
Humidity Range	30% to 97%Rh at +30°C to +60°C
Room Size	Customers requirement
Controller	Eurotherm / Selec / PLC with HMI
Sensor for Temp.	PT-100, RTD, Class A.
Sensor for Humidity	Capacitive type Rh sensor
Humidity Control	Wet & dry bulb method / direct detective type
Controlling Accuracy	±1°C & ±3%Rh
Room Panel	Inner SS 304, outer PPG with painted with Polyurethane Foam Insulation (PUF)
Door	Double walled door inner lined with SS, SS handle, lock with key and silicon gasket, glass window and door light.
Compressor	Emerson / Danfoss / Bitzer

Refrigerant	CFC Free.
Condenser	Fin and Tube type.
Uniformity	Forced air circulation using electrical fan.
Others	Ante room, stand by systems, data logger, tower lamp, hour meter, hooter, port hole, drain facility
Power supply	230V, Single Phase, 50hz/ 415V, Three Phase, 50hz.

**Our Customers:****Defence Sector:**

Metal and Steel Factory, West Bengal

BrahMos Aerospace Thiruvananthapuram Limited, Kerala

**Research Institutes & Labs:**

Lennox India Technology Centre Private Limited, Chennai

CSIR-Indian Institute of Integrative Medicine (IIIM), Jammu

National Institute of Technology (NIT), Tiruchi

University of Madras, Chennai

Pentagon Lubricants India Private Limited, Chennai

Jet Inks Private Limited, Chennai

**Automobile Industries:**

ESAB India Limited, Kanchipuram

Hyundai Engineering Plastics India Private Limited, Thiruvallur

Dymos Lear India Private Limited, Kanchipuram

Sundaram Fasteners Limited, Chennai

Sundaram Auto Components Limited, Kanchipuram

Bridgestone Automotive India Private Limited, Kanchipuram

Motherson Automotive Elastomers Technology, Kanchipuram

VosslohBeekay Castings Limited, Chhattisgarh

Power Auto Comp Limited, Pune

SP Systems, Bangalore

**Railways:**

Universal Engineers Chennai Private Limited, Chennai

**Calibration Industries:**

Tech Centre, Chennai

Calzone Calibration Center, Chennai

Deem Sensing Technologies Private Limited, Bangalore

GSG Instruments Private Limited, Chennai

CNRG Energy India Private Limited, Bangalore

**Beverages:**

Hector Beverages Private Limited, Mysore

Sharat Industries Limited, Nellore