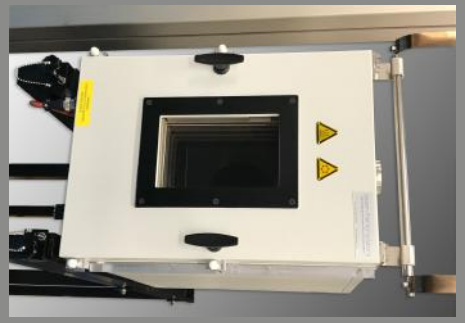
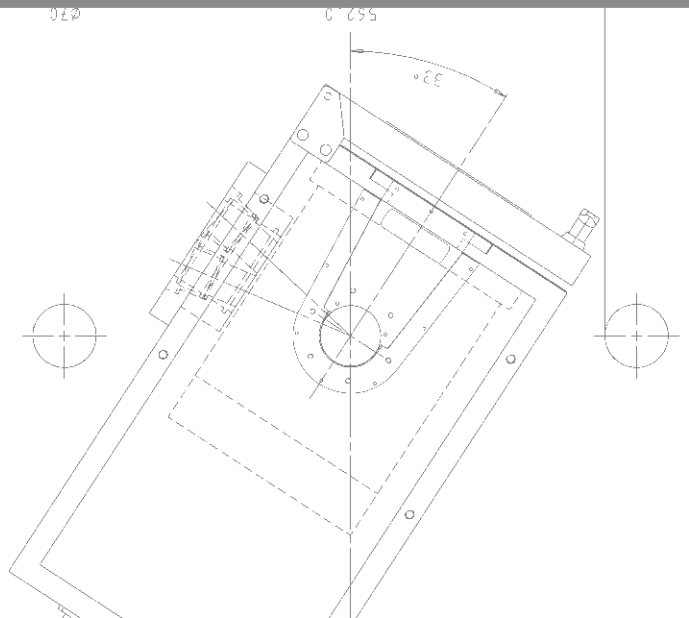
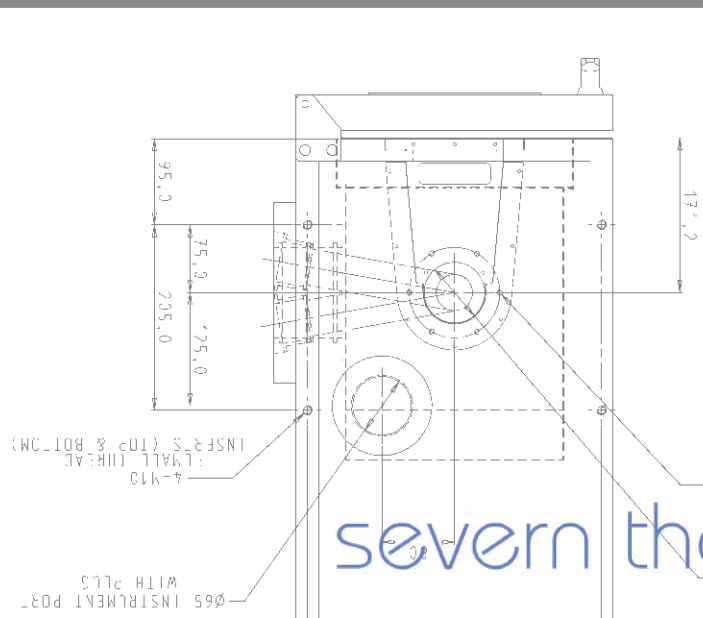
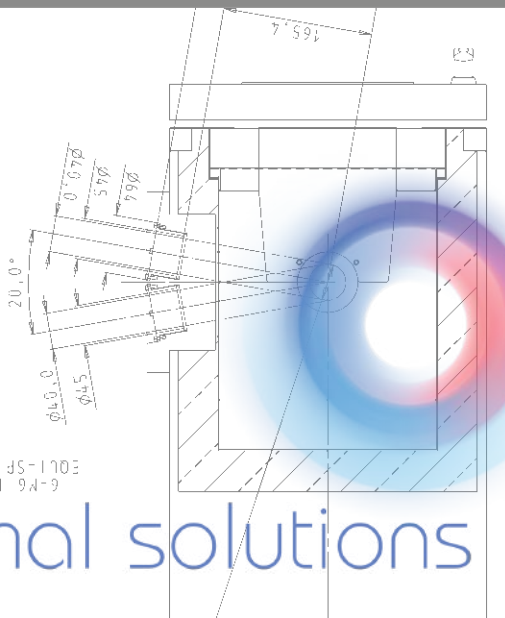
Environmental Chambers

For Materials Testing









severn thermal solutions

Range & Compatibility

Severn Thermal Solutions offer an extensive range of Materials Testing Environmental Chambers compatible with twin & four column test frames.

Standardised designs are available to suit both table and floor model machines, a range of height and width options accomodating an array of application specific grips and fixtures.

All models utilise forced air recirculation and are available with liquid Nitrogen cooling (CO_2 cooling on request). Typical temperature ranges are -100°C to 350°C and -150°C to 600°C, subject to model. Customisation is available to extend system capabilities or to modify chamber dimensions.

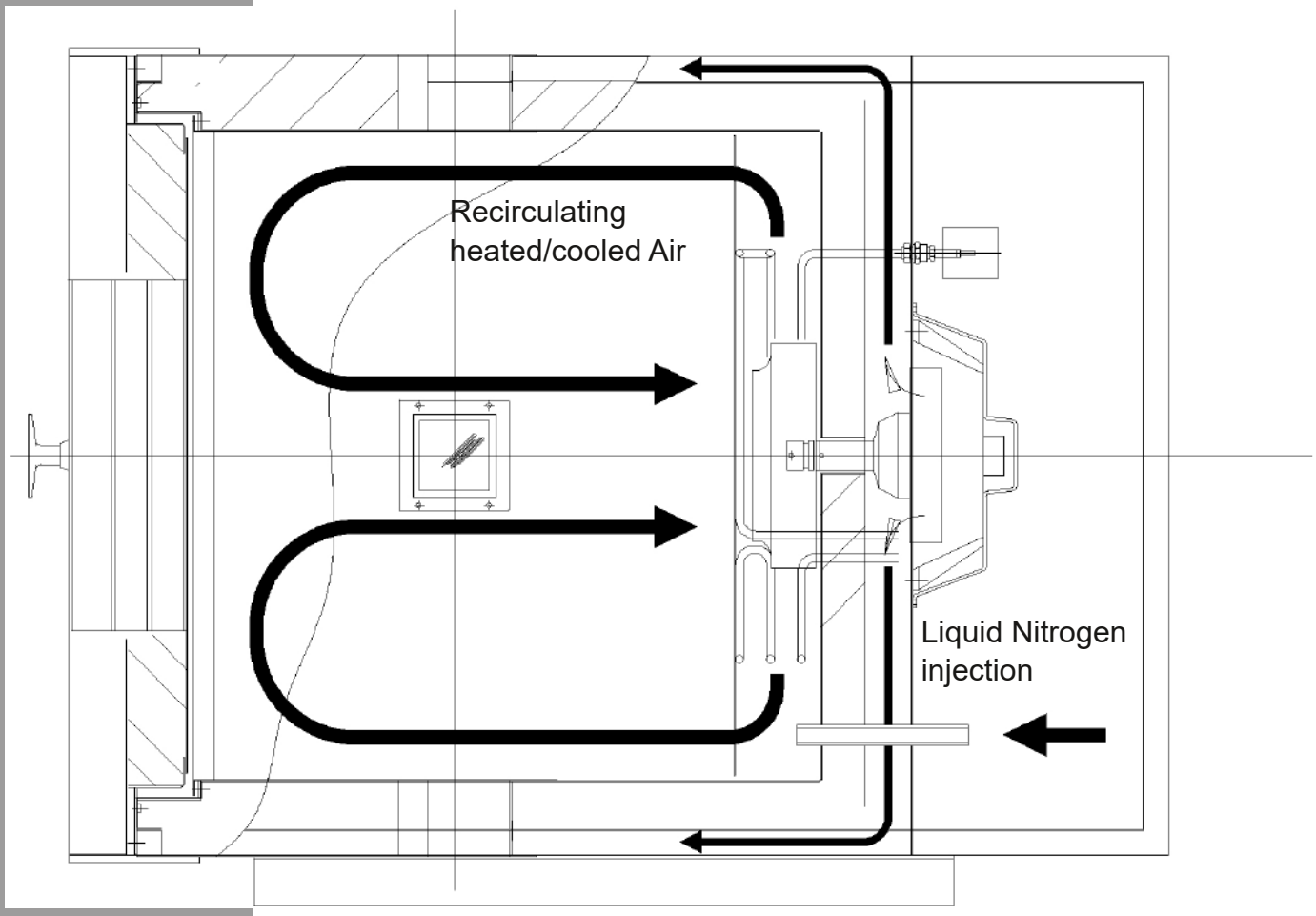
Principle of Operation

Environmental chambers use forced air recirculation to promote optimum temperature uniformity in the region of the specimen/loadstring.

Using a fan system, air is forced over a set of heating elements and enters the insulated test enclosure at top and bottom. This heated air is drawn back into the centre of the fan through a 'baffle plate' and is recirculated. The temperature of the heating elements is controlled via a type K thermocouple mounted in the centre of the baffle plate.

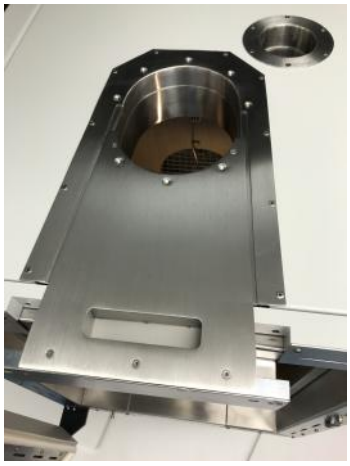
For sub ambient operation, or where controlled cooling is required, liquid Nitrogen is injected into the recirculated air stream via a rear mounted solenoid valve controlled by a second channel on the temperature control instrument.

A secondary impellor forces air between the inner insulation and the outer skin to minimise case temperatures when testing above ambient and minimise frosting when testing below ambient.



Common Features

Specifications vary from model to model but in general a number of common features are incorporated to enhance system performance/usability and to safeguard both the operator and the equipment.



Removable top/bottom wedges allow the chamber to be moved in/out of the test space without requiring the removal of the loadstring. This reduces test set-up times and improves usability. Instrumentation ports are typically top mounted, but can be side mounted if required

A door mounted microswitch isolates power to the heater, recirculating fan and liquid Nitrogen solenoid valve when the door is opened ensuring that the operator is protected from potential hazards

Durable stainless steel interior eliminates the risk of high temperature oxidation, whilst inset internal illumination aids observation without impinging on available test space

Environmental chambers designed for use at temperatures of up to 250°C feature a foam rubber door seal, whereas units designed for higher temperature operation feature a re-entrant door with both foam and high temperature seals

Multi-pane observation window with integrated heating system to minimise the risk of condensation when used at sub-ambient temperatures

Control Systems

Smaller 'table model' environmental chambers are supplied with an integrated mini-panel control system fitted to the rear right-hand side of the unit. Larger chambers are more commonly supplied with integrated control instrumentation mounted to the rear left-hand or rear right-hand side of the unit.

Either may alternatively be supplied with a discrete control console suited to bench mounting for applications where access to the side of the chamber is restricted, or where the chamber is intended to operate within a controlled environment, such as a Hot Cell or Glove Box.

Eurotherm instrumentation is typically fitted, but the precise model of controller may be changed to meet specific user requirements with respect to programmability and communication protocols. It is usual for the primary control instrument to also be used for over-temperature protection, although additional discrete instruments can be fitted if desired on the larger chambers with integrated controls, or any bench mounting variant.

The control interface features individual controls for 'Fan', 'Heat', 'Cool' and 'Light', fan speed adjustment for sensitive specimens being incorporated on the rear of the chamber on larger models with integrated electronics (optionally available on models with discrete control systems).

A range of communications protocols can be supported, RS232/485, Ethernet, Modbus or EI-Bysync, appropriate connections being provided on either the rear of the chamber or discrete console.

Rear side panel mounted control interface of the type utilised on larger 'floor model' environmental chambers

Rear of floor model environmental chamber showing mains isolator, liquid Nitrogen inlet/exhaust, fan speed selector and communications interface

Table model integrated mini-panel controller showing 1/16 DIN instrument with controls for 'Fan', 'Heat', 'Cool' and 'Light. 1/8 DIN instruments may be fitted on request.

Bench mounting control console, shown with independent over-temperature alarm (option)

Accessories

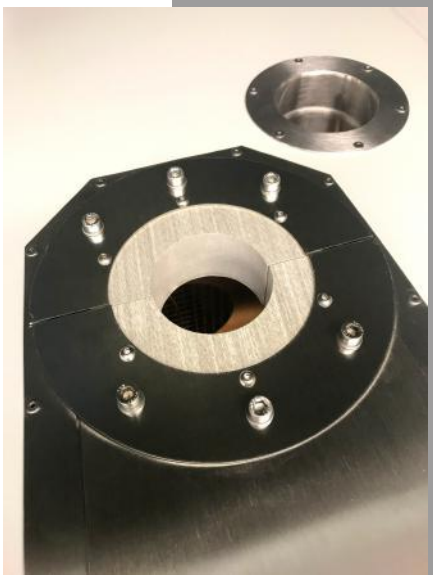
The principle accessories offered with environmental chambers are roller mounting systems and split insulating plugs, designed to fill the radial gap between 'pullrods' and the internal diameter of the chamber's upper/lower ports.

Roller mounting systems are typically custom configured to suit specific installation requirements and may either be bolted to the test frame's lower platen/base or alternatively can be fully mobile, using a trolley configuration.

Mini environmental chamber with fixed roller mount to suit table model frame

Trolley type roller mounting system, allowing the chamber to be moved clear of the test space and to be used across multiple test frames having the same test space height in relation to floor level

Split insulating plug fitted to chamber body and removable wedge component



EC2007H

Typical

Construction	Stainless steel 316 interior with painted mild steel frame and panels. High efficiency insulation with inter-skin forced air 'cooling'. Durable leatherette paint finish.
Heating	Via fast response heating element surrounding rear mounted recirculating fan.
Temperature Measurement	Type K thermocouple located within the air stream.
Cooling	LN2 injection via rear mounted cooling pack comprising solenoid valve, internal connection hoses, pressure relief valve, external 3m exhaust and 2m inlet hose. Excludes dewar.
Door	Left hand hinged. A safety interlock switch operated by the door hinge cuts power to the heating elements, fan and liquid Nitrogen solenoid if the door is opened during operation.
Window	Fitted centrally within the door 350mm high x 125mm wide. The window is heated during low temperature testing to minimise frosting.
Pullrod Ports	Top and bottom wedge ports of 125mm diameter.
Instrumentation Port	Penetrates the top of the chamber, 65mm diameter. Fitted with insulated plug.
Lighting	Two internal lights, fitted either side of the chamber.
Control	Mini-panel. Eurotherm EPC3016 controller, 8 segment, RS232 communications. Connection via 3m cable. Fixed fan speed.
Internal Dimensions	Height 560mm x Width 240mm x Depth 230mm.
External Dimensions	Height 710mm x Width 350mm x Depth 650mm.
Temperature Range	-100°C to 350°C
Cooling	Via pressurised liquid Nitrogen dewar (not supplied)
Nominal Power	4kW
Supply Voltage	230V, single phase, 50Hz

Specifications

EC2057A

Construction	Stainless steel 316 interior with painted mild steel frame and panels. High efficiency insulation with inter-skin forced air 'cooling'. Durable leatherette paint finish.
Heating	Via fast response heating element surrounding rear mounted recirculating fan.
Temperature Measurement	Type K thermocouple located within the air stream.
Cooling	LN2 injection via rear mounted cooling pack comprising solenoid valve, internal connection hoses, pressure relief valve, external 3m exhaust and 2m inlet hose. Excludes dewar.
Door	Left hand hinged. A safety interlock switch operated by the door hinge cuts power to the heating elements, fan and liquid Nitrogen solenoid if the door is opened during operation.
Window	Fitted centrally within the door 350mm high x 125mm wide. The window is heated during low temperature testing to minimise frosting.
Pullrod Ports	Top and bottom wedge ports of 125mm diameter.
Instrumentation Port	Penetrates the top of the chamber, 65mm diameter. Fitted with insulated plug.
Lighting	Single internal light, fitted to right hand side of the chamber.
Control	Integrated controls. Eurotherm EPC3016 controller, 8 segment, RS232 communications. Variable fan speed.
Internal Dimensions	Height 560mm x Width 400mm x Depth 400mm.
External Dimensions	Height 710mm x Width 550mm x Depth 950mm.
Temperature Range	-100°C to 350°C
Cooling	Via pressurised liquid Nitrogen dewar (not supplied)
Nominal Power	6kW
Supply Voltage	415V, three phase, 50Hz

Model Specifications

Model	Internal Dim's (H x W x D) mm	External Dim's (H x W x D) mm	Window Dim's (H x W) mm	Pullrod Port Dia mm	Min Temp °C	Max Temp °C	Controller Type	Power kW	Voltage V
EC2094	350 x 240 x 230	500 x 350 x 650	200 x 125	67 Wedge	-70	350	Discrete	4.0	230
EC2094A	350 x 240 x 230	500 x 350 x 650	200 x 125	67 Wedge	-150	600	Discrete	4.0	230
EC2007G	560 x 240 x 230	710 x 350 x 650	350 x 125	125 Wedge	-150	600	Mini-panel	4.0	230
EC2007H	560 x 240 x 230	710 x 350 x 650	350 x 125	125 Wedge	-100	350	Mini-panel	4.0	230
EC2209	550 x 260 x 390	700 x 400 x 1040	350 x 125	112 Wedge	-60	250	Integrated	2.75	230
EC2244A	700 x 260 x 390	850 x 400 x 1040	350 x 125	112 Wedge	-80	250	Integrated	2.75	230
EC2057A	560 x 400 x 400	710 x 550 x 950	350 x 125	125 Wedge	-100	350	Integrated	6.0	415
EC2057B	560 x 400 x 400	710 x 550 x 950	350 x 125	125 Wedge	-150	600	Integrated	6.0	415
EC2198	850 x 400 x 400	1000 x 550 x 940	350 x 125	67 Wedge	-100	350	Integrated	6.0	415
EC2198A	850 x 400 x 400	1000 x 550 x 940	350 x 125	125 Wedge	-150	600	Integrated	6.0	415
EC2169	1000 x 400 x 400	1150 x 550 x 940	500 x 125	125 Wedge	-100	600	Integrated	6.0	415

Note:

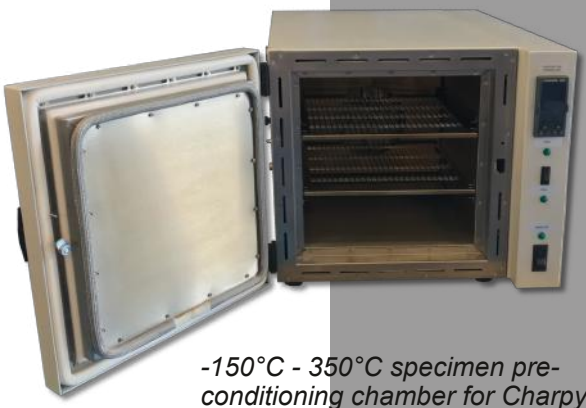
- Pullrod ports are typically positioned so as to be centrally located within the chamber front to back.
- Overall depth front to back includes door thickness.
- General specifications may be subject to change without notice.

Customisation

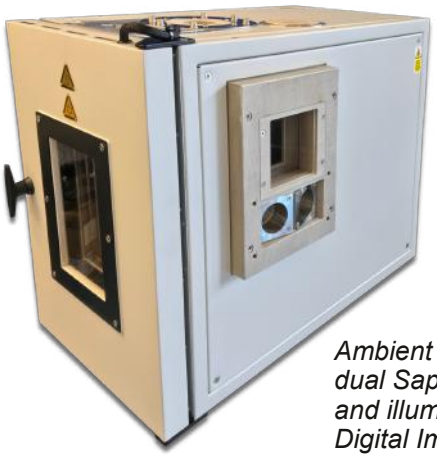
Severn Thermal Solutions have a wealth of experience in the design and manufacture of customised environmental chambers, engineered to suit specific application requirements or dimensional constraints.

Modifications can involve simple 'stretches' or temperature range adjustments based on existing designs, or the engineering of fully bespoke units, designed to meet the requirements of a specific project or as part of a new product line introduction for OEM customers.

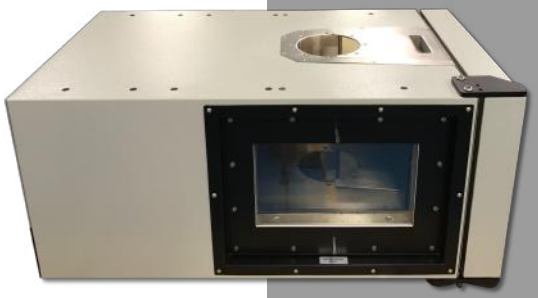
-70°C - 250°C chamber with inset pantographic door to allow rapid specimen change with minimal temperature fluctuation



-150°C - 350°C specimen pre-conditioning chamber for Charpy and similar tests



Ambient - 550°C chamber with dual Sapphire glazed ports and illumination window for Digital Image Correlation



-100°C - 250°C short height chamber with purged observation window for high-speed camera

Compact -150°C - 600°C chamber with spring supported fully removable door, for use with close proximity DIC system

-70°C - 200°C 'Air Handler' remote plant with compact insulated specimen enclosure for use with space constraints

Severn Thermal Solutions designs and manufactures High Temperature Furnaces and Environmental Chambers for a wide variety of Materials Testing and Laboratory applications. We also undertake the repair/refurbishment of existing furnace systems.

severn thermal solutions

Unit C1 & C2
Draycott Business Park
Dursley
GL11 5DQ
United Kingdom

Tel: +44 (0) 1453 891880
Email: sales@severnts.co.uk
Web: www.severnts.co.uk

EC-CAPB-04-02.21