FAST CHANGE RATE AND DRIVE-IN CHAMBERS

FOR AUTOMOTIVE TESTING

by ESPEC North America Inc

Quality is more than a word.

History of ESPEC North America

1983 – Manufacturing operations started
1990 – Consolidation and ownership by ESPEC Corp.
1994 – Fast cycling Platinum line launched
2003 – New factory (8,300 m² factory in Michigan)
2005 – Global N Product line launched (First export model)
2009 – 3 new chambers designed for solar panel testing
Factory Capabilities

- Complete in-house engineering staff for standard and custom design
- Product support department with spare parts inventory

Factory Capabilities

- Production capabilities include:
  - CAD/CAM sheet metal cutting machines
  - Automated metal bending
  - Full refrigeration assembly
  - Electrical & control assembly

Factory Capabilities

- Utilities and space to demonstrate operation of built equipment
- Dedicated power generator for testing with international electrical power (50Hz)
Premium products
High performance
Worldwide support
SITHIPORN ASSOCIATES
25+ years experience

Some Top Clients
- Intel
- Delphi
- Cisco
- IBM
- Honda
- Robert Bosch
- Dow Corning
- Honeywell
- Sony
- WL Gore
- Seagate
- Underwriters Labs
- 3M
- Phillip Morris
- JDS Uniphase
- Boston Scientific
- Denso
- Medtronic
- Siemens
- Texas Instruments
- Sandisk
- Huawei

Fast Change Rates Chambers
Benchtop
Reach-in
Walk-in/Drive-in
Benchtops

- Designed and engineered by ESPEC North America
- Modular concept allows wider variety of models than competition
- Plastic door and console for distinctive look and functionality
- Very reliable, while at a low cost
- Built using Toyota Production System for savings and quality

Benchtop BTZ-175E

- -70 to 180°C
- 5°C/minute ramp rate
- Work Space: 42 litres – 500mm x 280mm x 300 mm
- External Measurements: 740mm x 850mm x 865mm
- Weight: 181kg
- Power: 230v, 1 phase, 50Hz, 12A max
- Noise level: 65dBA (1 meter away from door)
- Controller: Watlow F4, reliable and easy to operate

Benchtop Video
-70 to 180°C
10 to 95%RH
5°C, 10°C and 15°C /minute ramp rate
380 litres – 600 mm x 743 mm x 850 mm
800 litres – 1000 mm x 800 mm x 1000 mm
Small footprint
Movable pod
ESPEC SCP-220 controller
Power: 400v, 3 phase, 50Hz

**Design Features**

These colored panels can be removed for service / cleaning or changed to other colors

Full stainless interior and exterior for appearance and unequaled life

Adjustable and removable instrument pod for comfort and convenience for any operator

Full view 500x600mm window with full surface heater to prevent condensation and eliminate inefficient wipers

**Instrumentation Pod**

- Espec touch screen controller for fast easy operation and programming.
- Infinitely adjustable to fit any operators preference
- Fully removable for move-in and transportation
- Durable and robust stainless steel construction.
Adjustable efficient air supply system
T/C & wick well safely out of work space yet convenient for wick replacement
Expansion joints to allow fast change rates without structural damage
304 stainless for long life and durability
Ergonomic depth and height for ease of loading
Die stamped rounded corners to eliminate leakage and increase strength and most vulnerable point

Two 40 watt bulbs provide excellent light while protected and not intruding into workspace
Sensors Wet bulb / Dry bulb

- Sensors are in direct airflow for accuracy but protected from DUT's and workspace
- Sensors are sheathed for accuracy and protection

Heaters

- Mounted away from moisture and dripping to extend life
- Over-temperature limiting safety
- Fast acting nichrome heaters with complete porcelain frames to eliminate shorting and current leakage.
- All stainless components and connectors except coils for long life

Refrigeration Coils

- Specifically designed copper/aluminum evaporator coils for improved efficiency and life.
Dehumidification Coils & Steam

Specifically designed dehumidification coils with improved fin spacing to improve performance

Steam Inlet positioned to disperse steam throughout plenum to improve gradient

Thermal Break

Chamber side thermal break  Door side thermal break

Increases efficiency and reduces operating cost by eliminating heat transfer, extends gasket life, dramatically

Standard Cable Port

Thermal break and lip prevent condensation and leakage
Screw on cap cannot become dislodged during test

Exterior view  Interior view
Pressure Relief Port

- Drip pan to collect and evaporate condensation
- Sized to allow chamber

Interior view of the port

Door Latch

- Cam action for secure closure
- Easily adjustable to assure proper seal

Casters with leveling feet

- Assures secure permanent location
- Allows for simple quick leveling
- Allows convenient move-in

Leveling Pad

Adjustment

Caster
Shelves

- Heavy duty pilaster does not reduce workspace
- Shelf 45kg capacity heavy duty but minimum weight
- Shelf Rail can be removed for full chamber usage

Machinery Section

- Solenoids conveniently placed and grouped for easy service
- Secure pipe mounting to eliminate vibration damage
- Insulated piping to eliminate frosting and condensation
- Refrigeration gauges and resets in easy-access locations

- CE compliant refrigeration parts
- Stacked compressor layout saves floorspace and increases servicability
- Easy access through two full-length hinged doors
Humidifier / Steam Generator

- Highest quality stainless water level system
- Heaters are thermostatically protected & use low watt density design which provides extended life
- Thermal/vibration break
- Quickly removable top for ease of maintenance

Float cup

Proprietary clear design to allow visual check of float and water condition

Installation & Utilities

- Auto Regulating Water Valves
  
  Main water valve
  Open only as much as required for current cooling conditions
  Reduces usage
  Unions for quick change out

  De-superheater water valve
**Electrical Panel**

- Main Power disconnect
- Optional on other's systems
- Branch circuit protection with circuit breakers (not fuses)
- Terminal strip
- No splice or butt connections
- Wires neatly run in cable trays
- High Temp, High Durability Wire
- All wire ends permanently labeled
- “Finger safe” electrical connections. All components CE certified

**Service Access Panels**

- Hinged for easy access; faster, cleaner, safer
- Shown with optional sound deadening material installed
- “Tool Required” to meet safety regulations

**Safety Related Options**

- Overcool/Overheat Protector
- Emergency stop palm button
Performance vs. Overall Range

Humidity Range – Standard

Options – Low Humidity

- Cooling: >10°C/Mi
- Heating: >15°C/Mi

- Ultra Low Humidity Range
- Standard Humidity Range
- Low Humidity Range
Available Options:
- Recorders for data logging
- Communication options
- Product temperature control for enhanced recovery times
- Additional shelves and cable ports
- Portable humidity water tank with pump
- Dry air purge to limit risk of condensation during temperature cycling
- Low and ultra-low humidity systems
- LN2 boost for even faster cooling

Special Safety Features
- Gas sampling system
- Rapid air exchange function
- Pressure relief function
- Safety door lock
- Fire extinguisher system
- Inert gas purge system
- Additional independent overheat protector
- Fin-type heaters

Walk in and Drive in Chambers
- Panelized style: -65 °C to 85 °C, ramp up to 10 °C/minute
- Solid Construction: -65 °C to 150 °C, ramp up to 15 °C/minute
Walk in and Drive in Chambers

Video of ESPEC Solid Construction Walk in Chamber

Chamber/Box

Walk-in Chamber
Mating of MAP and panel box

MAP (Modular Air Plenum)

Three Sizes:
- MAP-I has refrigeration in back (larger footprint)
- MAP-II refrigeration underneath (smaller footprint)
- Half-MAP has limited performance and very small footprint

C-Frame Refrigeration Design
• Refrigeration underneath plenum

MAP II

Half-MAP

• Compact plenum
  • Extends into workspace 14”
• 1,000 CFM
• ¾ or 2 hp compressors
• Built-in air-cooling

For ‘steady-state’ operations

Air & Fans
- Half-MAP can go to -10°C
- Single-stage can go to -35°C
- Cascade can go to -65°C
- High temperature to 150°C
- Refrigeration sizing based on performance required by user
- Compressor sizes from 6-hp to 30-hp
- Water cooling or air cooling
De-humidity

Humidity Range

- 10 to 95%RH
- Up to 85 °C

(Panelized walk-ins humidity only allowed to 75 °C)

Summary: MAP Features

- Sheathed heaters
  - Long life
  - Lower surface temperature for safety
- Easy installation
  - Rolls up to assembled box
- Quality refrigeration system
  - Easy service access
  - Quiet operation (less than 70 dba)
  - Copeland brand compressors
• Console located next to door

Doors

Standard:
• Single hinged / Full opening

Optional:
• Bi-parting
• Smaller personnel doors
• Custom sliding doors

– Doors include an interior safety release
– Same construction as the chamber
– Each door includes a window

Touch-screen Controller

ESPEC’s Exclusive SCP-220 Programmer:
• 6.5” active-matrix color display
• The trend-graph display shows a record of setpoints and actual values
• 10 pre-programmed tests in permanent memory
• 20 user-definable programs, with up to 99 steps each
  – On-screen graphing of the program during entry reduces programming errors
• Time signal relays for automated on/off control of other test devices or samples
• System alarms are stored in memory for historical review
  – Activated alarms provide on-screen troubleshooting help
• Built-in timer functions allow the chamber to be started or shut down automatically
• Computer interface RS-232 with ERC-100S software
Walk in/Drive in Chambers for Automotive Testing

Drive-in Chambers

Drive-in Series
Up to -65 to 85°C
1372+ cu. ft.
“Solid” Drive-in

Infrared Automotive Buck

Air Bag Test
Test fixture loaded

Vibration

Air Bag Test Chamber
Thank You