

Thermal Reticulation Chamber

OPEN CELL FOAM



THE THERMAL RETICULATION PROCESS

Joyce Foam Products has developed a unique system of thermally reticulating flexible polyurethane foam, using a patented reticulation chamber.

The thermal reticulation process, also called “zapping”, creates a high temperature, high speed flame front that removes the cell membranes from the foam.

This process melts the cell membranes and fuses them around the main cell struts adding strength to the cell structure.

Reticulation takes place inside a specially designed combustion chamber.

At the completion of the process the cell struts remain, providing an open cell filter - type structure in the foam block.

In the process a polyurethane foam block is placed inside a plastic bag and then onto a carrier trolley. The open end of the plastic bag is then placed over a vacuum manifold and securely fastened in place.

The foam block is then evacuated, via the manifold. When the correct vacuum is achieved the carrier trolley is rolled inside the reticulation chamber and the door locked in its closed position.

A pre-determined quantity and ratio of combustible gases (hydrogen and oxygen) is injected into the plastic bag and absorbed into the block of foam. This returns the bag to atmospheric pressure.

The PLC controlled automatic cycle then commences and the gas mixture is subsequently ignited. This provides the high temperature flame front required to remove the cell membranes from the foam and complete the reticulation process.

Reticulation of the foam results from the flame front heating cell membranes above the temperature at which polyurethane depolymerises causing melting of the membrane.

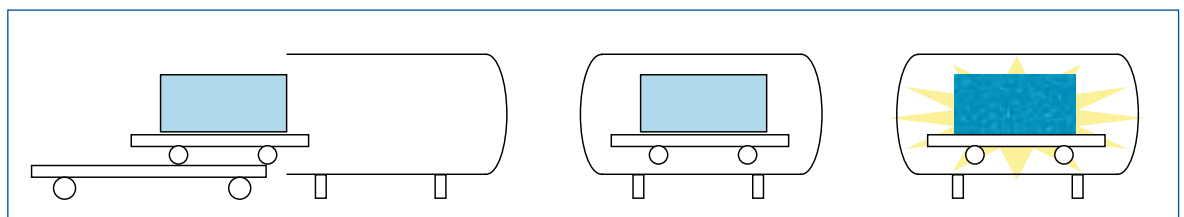
This occurs as the membrane has a high surface area to mass ratio, compared to the cell ribs, which have a low surface area to mass ratio and therefore will not depolymerise as readily.

The quality of reticulation can be related to the degree of diffusion of the combustible gases throughout the block of foam and hence the propagation of the flame front.

This in turn is affected by the following:

- Cell Size
- Foam Porosity
- Block Geometry
- Block Preparation
- Degree of Evacuation of the Block
- Ratio of Combustible Gases
- Quantity of Combustible Gases

The thermal reticulation process may be applied successfully to both *polyether* and *polyester* foams.





RETICULATION EQUIPMENT

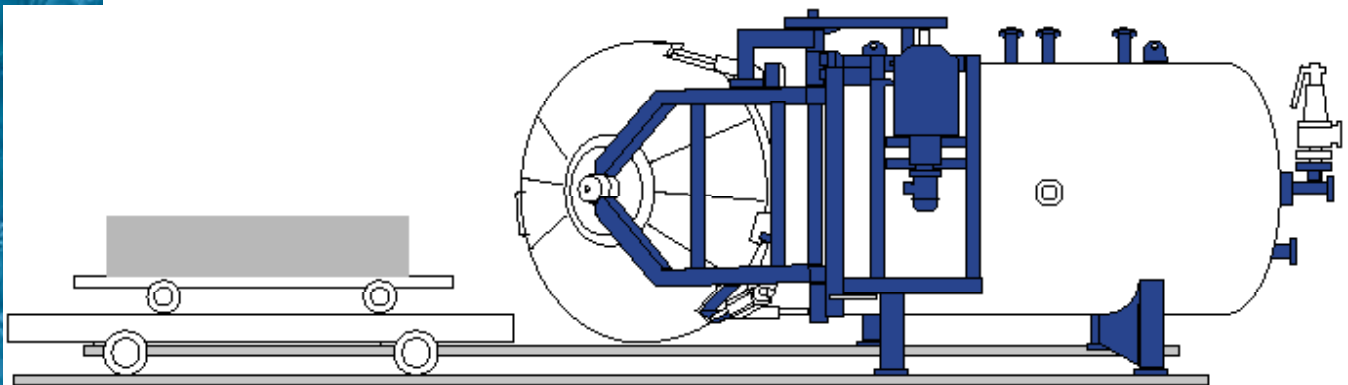


- Reticulation Chamber designed, constructed and certified to withstand the internal combustion forces, and externally insulated for sound reduction
- Motorised door opening and closing with pneumatic locking and electrical safety interlocks
- Loading trolley with explosion dampening platform
- Integrated gas, vacuum and ignition manifold
- External trolley unloader
- Heavy duty vacuum pump
- Vacuum seal water pump
- Electrical control panel including integrated PLC and full Joyce 'Zapper Management' software
- Gas/vacuum control panel, including valves and flow meters
- Flammable gas monitor and indicating system
- Multi stage alarm indicators
- Electronic high tension ignition system



OPTIONS

- CO² system, instead of the standard Nitrogen purging system
- Exhaust gas filtration





RETICULATION CHAMBER SIZE

There are two standard size models of chambers to accommodate various foam block geometries.

- **Model V200S** - 1800mm diameter accommodates blocks with lengths up to 2100mm
Maximum foam volume 2.1m³
- **Model V200L** - 1800mm diameter accommodates blocks with lengths up to 3000mm
Maximum foam volume 3.0m³

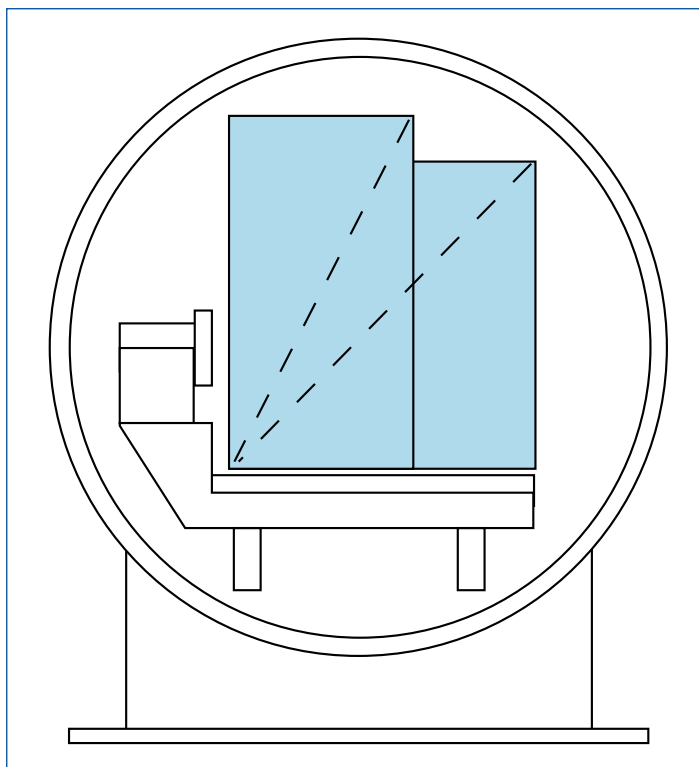
The above V200 models will reticulate block profiles up to 1000mm wide x 1000mm high. The V200S is capable of simultaneously reticulating TWO standard ester blocks of 2100mm long x 1000mm wide x 500mm high each.

- **Model V300S** - 2400mm diameter accommodates blocks with lengths up to 2100mm
Maximum foam volume 2.1m³
- **Model V300L** - 2400mm diameter accommodates blocks with lengths up to 3000mm
Maximum foam volume 3.0m³

The above V300S and V300L models will reticulate block profiles between 1100mm x 1100mm and 1400mm x 750mm plus rolls 1100mm diameter.

- **Model V300LS** - 2400mm diameter accommodates blocks with lengths up to 2800mm and 1500mm high.
Maximum foam volume 3.5m³

Chambers may also be designed to suit sizes outside the above range.





RETICULATED FOAM APPLICATIONS

AUTOMOTIVE

- Power Windows and Door Locks
- Air Conditioning System
- Power Brake Unit
- Emission Control System
- Carburettor Air Filter
- Sun Visors
- Fuel Tank - Surge Reduction



MEDICAL

- Blood Oxygenators
- Cardiotomy Reservoir
- ECG Pads
- Protective Pads
- Blood Transfusion Devices
- Ointment Applicator
- Plugs
- Sponges
- Breathing Masks
- Personal Care
- Prosthesis Padding
- Athletic Padding
- Odour Absorbing Foam
- Topper Pads for Beds



INDUSTRIAL

- Flame Laminating
- Air Filters
- Air Conditioning
- Evaporation Coolers
- As Base for Ceramic Filters
- Ventilation
- Heating
- Oil Filter
- Computers
- Ionised Air Cleaners
- As a Filter Medium for
 - Lawn Mowers
 - Welders
 - Blowers
 - Motor Cycles
 - Small Engines
- Gaskets
- Cleaning Pads on Moving Parts
- Paint Rollers
- Microphone Filters
- Drill Motors - Filter
- Printing (High Density only)
- Noise Reduction
- Oil/Water Separation
- Stereo Earphones
- Water Filters



Note - Select ether or ester foam to suit the specific application.





RETICULATED FOAM APPLICATIONS



RETAIL / CONSUMER

- Cosmetics
 - Powder Puffs
 - Hair Frosting
 - Facial Cleansing Aids
- Speaker Grills
- Applicators
 - Shampoo
 - Wax
 - Shoe Polish
 - Household Chemicals
- General
 - Helmet Inserts
 - Shoe Inserts
 - Goggle Inserts
 - Outdoor Furniture
- Mattress Overlays
- Sponges / Mops
- Jewellery
- Fruit / Meat Storage



Note - Select ether or ester foam to suit the specific application.



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