SEVERN
GLOCON GROUP PLC

MULTI LABYRINTH TRIM*

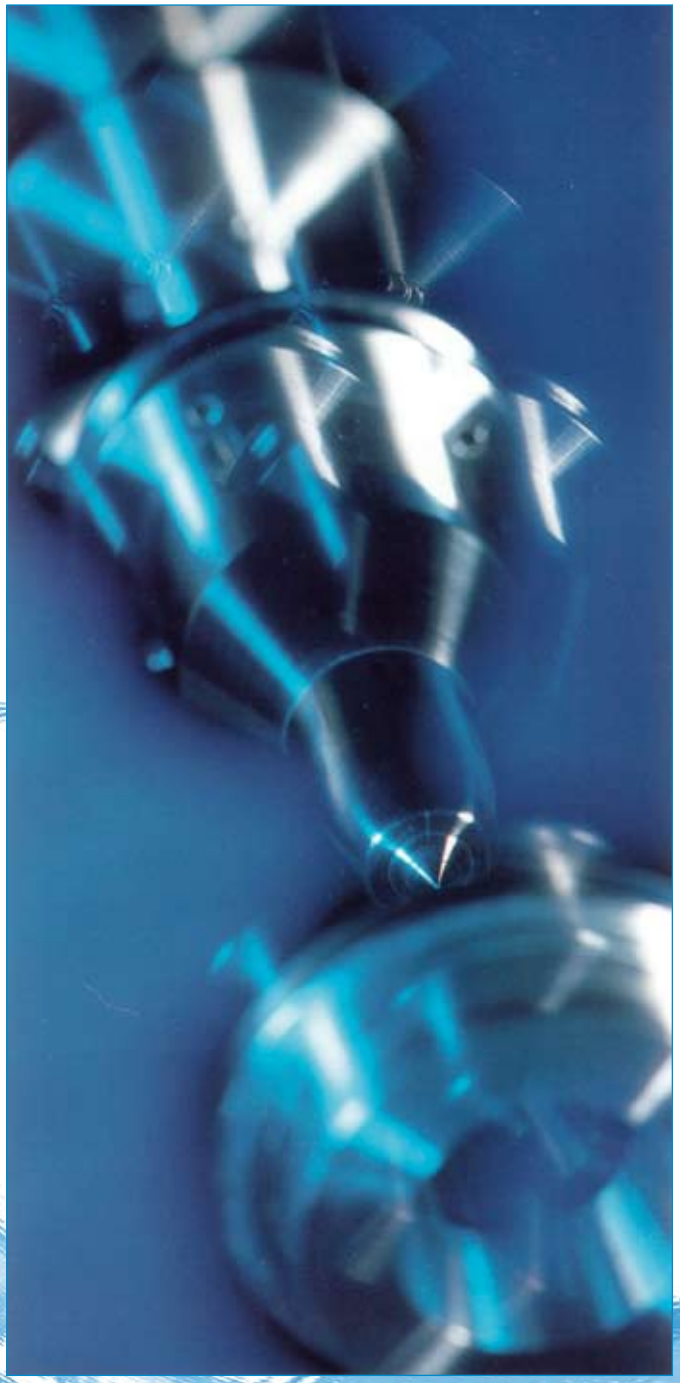
*Patents Pending

Severe Service Control Valves

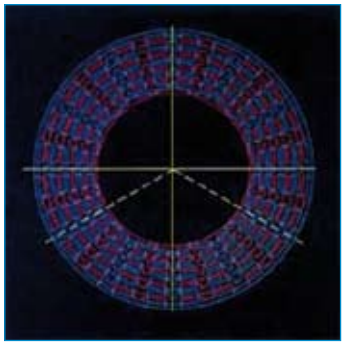
Forty years of creating new designs (or adapting existing ones) has resulted in a large portfolio of both standard and highly specialised valves. However, in order to maintain our international reputation, our technical research & development team are continually looking to break new design frontiers using the latest IT, Engineering Management and CAD systems.

Severn Glocon have been providing solutions for severe service applications for many years. These solutions often involve managing multi-stage pressure let-down, where it is essential to positively control the rate of fluid flow throttling to within safe operating envelope for the selected trim.

This requires a full knowledge of the trim interstage pressure recovery characteristics in order to eliminate the onset of cavitation in liquids and aerodynaminc shock waves in gaseous service, see Severn Glocon Sizing & Selection Manual SG10.



Design and Dimensioning with 2D/3D CAD



Typical MLT Plate Set

Plan sectional view of a concentric multi cage trim

MLT 3D view

MULTI LABYRINTH TRIM DEVELOPMENT

Severn Glocon analysis of the concentric multi-cage trim took into account both the strengths & weaknessess of such arrangements.

It was evident that as a means of providing source treatment for noise problems and giving acceptably low pressure recovery values (in order to prevent liqui cavitation) the trim style had potential. The challenge was to enhance the performance virtues within a more cost effective package.

- Plan view through a section of a concentric multi-cage trim.
- This view can be likened to a single flow plate within a multi-plate stack.
- A stack of flow plates can produce higher flow capacity per unit area.

With the concept of a multi-plate stack established in order to provide to the increased flow capacity for a given valve size, the challenge was then to incorporate as many twists and turns into the fluid path. This was achieved by making the fluid move in both vertical and horizontal radial direction concurrently.

The right angle turns and expanding flow passages removes the kinetic energy from the fluid while lowering the pressure in a velocity controlled manner.

- Abrupt increases are avoided.
- Each flow stream is made up of many right angle turns.
- Each right angle flow turn adds to the accumulating controlled pressure reduction.

One of the noteworthy features of the multi-cage trim design is to promote co-mingling of the adjacent flow streams, and hence pressure balance within the cage assembly. This interaction between the flow galleries is maintained as the stream pressure energy is progressively reduced within the trim confines. To bring this feature to the stack plates assemble, it was essential to ensure the flow passageways allowed both radial and horizontal flow. In addition, it was essential that this flow communication is also taking place between adjacent flow plates in the vertical stack.

- Entry flow is split into many passageways.
- Multi-directional right angle flow turns.
- Internal flow resistance provided by transfer passageways.
- Velocity control within the passageways.
- Multi-stream pressure balancing within the trim.

For convenience the MLT suitability for a particular application is determined by calculating the number of pressure drop stages required. The final trim exit velocity being held to pre-determined values. The MLT design rules are then applied to give the number of fluid turns involved, appropriate orifice slot and flow channel size.

Test evaluation of the MLT presure recovery characteristic show improved values compared to a cage trim. More importantly the MLT can be economically built up into multi-stage pressure letdown to suit any application.

Engineering Data Severn Glocon Multi Labyrinth Trim

General

The Multi Labyrinth Trim is designed to be fitted into a wide range of existing valves, both globe, angle and special pattern.

The trim is a quick-change trim option to provide for easily accessible seat and trim components to minimise fitting and parts replacement times.

The MLT stack guided trim is available in both balanced and non-balanced configurations, giving excellent rigity and resistance to vibration and wear.

End Connection Sizes

½in (12mm) - 36in (900mm)
For others, please consult factory.

Design Standards

ANSI B16.34

Valve Body Ratings

ANSI 150 - ANSI 2500
DIN/BS 4504 PN 10 to 400

Body Configurations

Cast globe, angle, fabricated and Z pattern

Body Face to Face Dimensions

ISA. S75.03 1985
Options to Severn Glocon standard

Bonnet Styles

Standard, Normalising, Cryogenic and Bellows Seal
For other Styles, please consult factory.

Standard Bonnet Packing

Teflon/Chevrons, Graphite and Low emissions

Trim Options

"Quick Change" Multi-labyrinth
Multi-stage pressure drop to suit application
Standard range up to 40 stages of pressure let down
For others, please consult factory.

Inherent Trim Characteristics

Equal %, Linear, or other

Valve Plug Options

Unbalanced, Balanced
Flow can be flow-over or flow-under depending on the application

Maximum Plug/Seat Leakage Class

ANSI/FCI 70.2. Class IV as standard
Class VI with soft seat insert
MSS SP-61

Sizing & Noise Reduction

The procedures for carrying out valve sizing, velocity calculations and noise prediction are available on request

Actuation

Various types of actuation are available including:
Series N Numotor pneumatic piston
Series P Linear spring pneumatic cylinder
Series W Diaphram spring actuator
In addition electric and electro-hydraulic and manually operated versions are available

Instruments

A wide range of control instruments is available from Severn Glocon, including:
Positioners
Smart Positioners
Air-filter Regulators
Volume Boosters etc.

Materials of Contruction

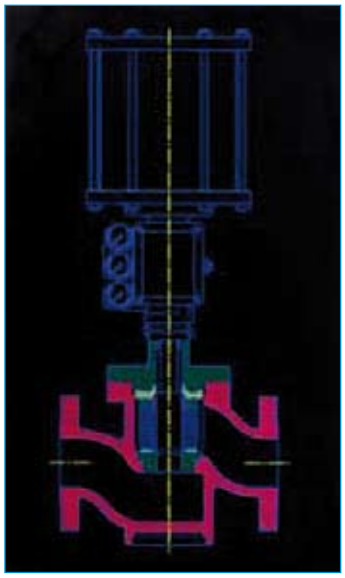
A wide range of standard materials is available for both the valve pressure containing parts and trim. These include:
Carbon Steel
Stainless Steel
Chrome Moly and high Nickel Alloys
Stellite and other coatings are available
For full listing on materials, please consult the factory.

Temperature Range

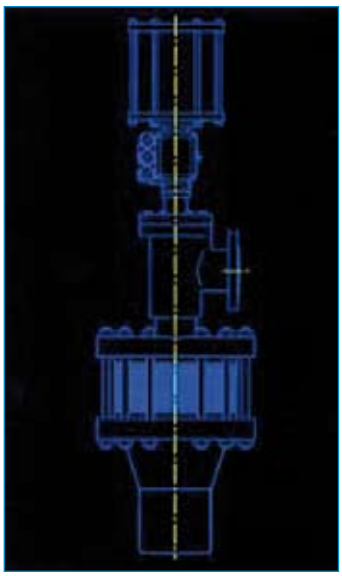
-196oc to 580oc
For temperatures outside this range, please consult the factory.

Connection Styles

End Connection:	Valve Size:	Rating:
Integral	1 - 24 in	150 - 600
Flange	1 - 12 in	900 - 2500
Screwed	½ - 2 in	150 - 2500
Socketweld	½ - 2 in	150 - 2500
Buttweld	½ - 24 in	150 - 600
	1 - 24 in	900 - 2500



Typical MLT Globe Valve



MLT Low Noise vent angle valve system

MLT Benefits

Noise tests have shown that the superior fluid velocity control afforded by MLT valves during the staged pressure reductions have produced lower noise levels than those given by multi-cage designs.

These comparisons where made for two different standards of trim of similar capacity, interchanged within the same valve body.

- Flow slots with large wetted periphery compared to drilled holes.
- Multi-plate stack giving smooth flow characteristics.
- Reduced tendancy for pressure drop at plug cage interface by part exposed hole.
- Pressure recovery characteristics superior to drilled hole multi-cage configuration.
- Flow split and run as separate streams with co-mingling.
- Self-cleaning of internal passages due to co-mingling of flow streams.
- Inherent pressure balancing within the MLT trim including the entry and exit gives good stability and freedom from plug vibration.
- Suitable for both liquid, mixtures and gaseous service.
- MLT suitable for both control valve trims and vent stack applications.

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Severn Glocon's and Severn Unival's valve technologists have over 40 years' experience in the design, manufacture, maintenance and optimisation of control vlave solutions to exacting international standards for world-wide use.

As one of the largest provately owned control valve manufacturers, we have a reputation for providing the most robust and reliable control valve designs for the most critical and arduous applications.

All products are designed with the help of sophisticated CAD systems in accordance with international standards. Using the latest CNC machining technology, our skilled and qualified engineers work with a wide range of materials to meet the operating requirements of virtually any valve duty.

We provide the complete range of control valve services to industries including hydrocarbons, chemicals, pharmaceuticals, industrial gases and power generation. We pride ourselves on the exceptional level of partnership that exists in our customer relations, delivering design and application expertise at every stage in the life of the control valve equipment.

For more information on specific applications and duties, contact your nearest Severn Glocon or Severn Unival sales office.

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As we are continually developing our products, their design is subjected to change without notice.

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