Microbiology Cell Biology Biotechnology Process Control

I&L Biosystems

Sepragen SuperFlo®

Radial Flow Chromatography Columns

Fast and easy packing / unpacking for reproducible column performance

Higher flow rates / lower back pressure

Wide range of columns from 50mL to 500L and custom build

Linear upscaling

Reduced cycle time by increasing flow during equilibration, washing, regeneration and sanitation

Columns are available in acrylic or 316L stainless steel

Scout (Wedge®) columns to identify appropriate production conditions

Smaller footprint than axial production columns with short beds

Ideally suited for separation with affinity media - Protein A/G, IEX, HIC and RP

Radial Flow Chromatography Columns – redefining the possibilities in preparative liquid chromatography. Helping you to eliminate your bottlenecks in biochromatography, SuperFlo® columns address the fundamental limitation of the axial column design as the pressure does not increase with the size of the column. Due to the unique design, the column offers a significantly larger sample inlet area, which results in lower linear velocities, even at high total flow rates.

SuperFlo® columns are capable of extremely high flow rates and are ideally suited for applications that use soft chromatographic media due to the inherently low backpressure. SuperFlo® columns covers the R&D range from 50mL both in acrylic and stainless steel up to the 500L industrial production range, including special projects and non-standard custom builds.

How SuperFlo® works

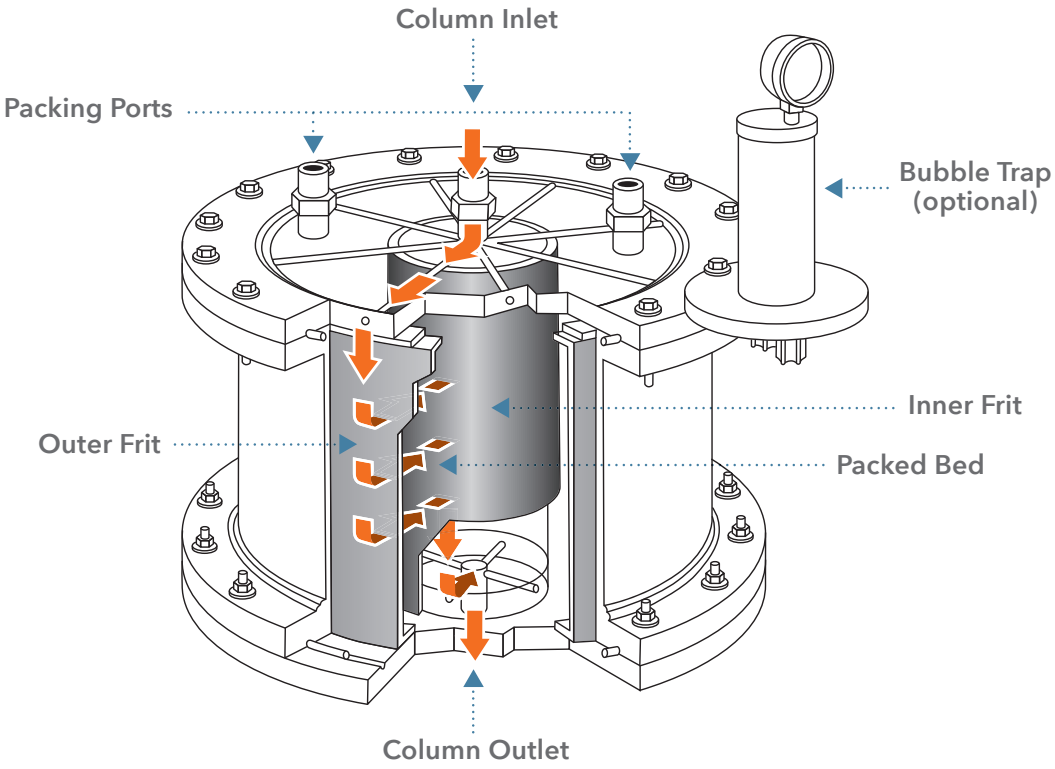
The SuperFlo® column consists of two concentric porous cylinders, creating a space. This area between the frits is the column bed and this is packed with the chromatographic resin.

The eluent / sample enters at the top of the column, the top lid acts as a distribution head and directs the sample into the gap between the outer column body and the outer frit. It distributes over the whole height of the column and flows from the outer frit to the inner core.

From the gap between the inner frit and the collector rod (spacer in the centre of the column) the eluent leaves through the outlet at the bottom of the column.

The effective bed height of the column is the distance between inner and outer frit.

The intrinsic design of the SuperFlo® column has a significantly larger surface area than a traditional axial column, therefore even at high flow rates the linear velocity is in a range which allows for the required interaction between sample and resin.



Bed heights

Bed heights come in a range of sizes and can be made to custom designs to fit any requirements.

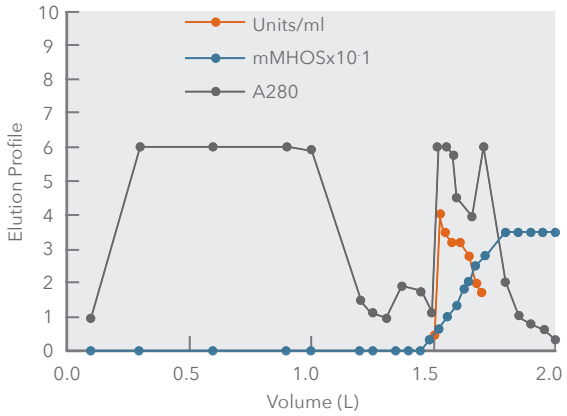
Type of SuperFlo® Column	Size	Bed Height
Laboratory Columns	50 - 1.500 mL	3.5 cm
Pilot Columns	5 - 10 L	5 cm
Production Columns	20 - 100 L	10 cm
	100L-200 L	10 or 15 cm
	200-350 L	15 cm
	≥350 L	20 cm

Purification of an Intracellular Bacterial Enzyme on DEAE Sepharose®

The example below shows the isolation of a recombinant protein. Not only is the processing time decreased, but the recovery is enhanced due to reduction of on column proteolytic degradation.

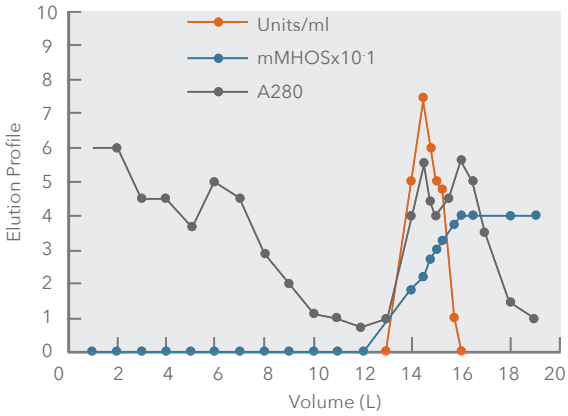
Courtesy: Genecor®

Axial Flow Column (AFC) - K - 100



Time = 175min

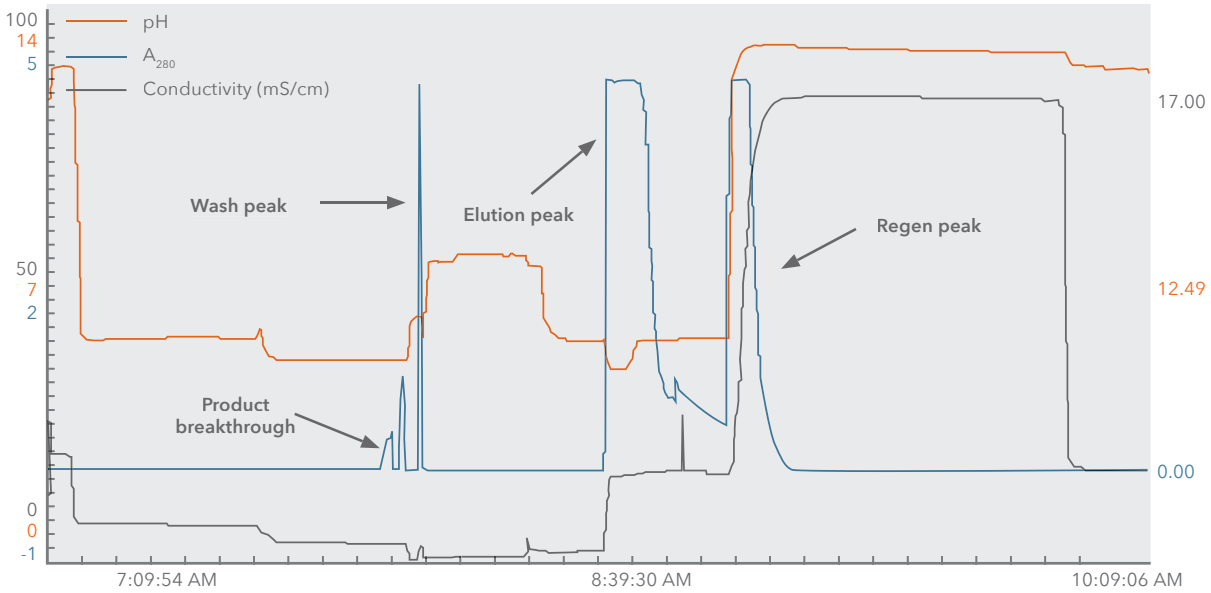
Radial Flow Column (RFC) - SuperFlo®-1200



Time = 24min

Monoclonal antibody isolation using Protein A

Courtesy: Genentech®



Total Run Time (hours)[a]	AFC	RFC
	8	2

[a] includes Sanitization and Equilibration

Pilot-scale column packed with acceptable bed integrety

- Peak asymmetry and HETP depict high packing efficiency

Pilot-scale tests with mAb step show comparable results. Chromatographic performance is similar to expected AFC performance

- Chromatographic profile
- Product recovery
- Impurity clearance

Able to perform unit operation with 2–3 hour processing time

- 8 hours processing done in 2 hours
- 75% reduction in time
- Savings of 75% in time or 75% of expensive Protein A resin

Scalability

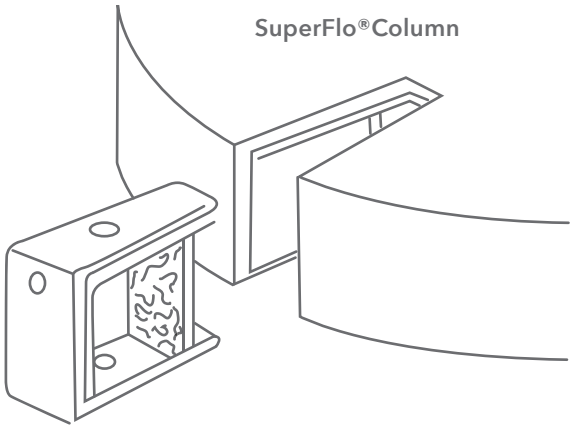
Linear upscaling with radial to radial by keeping the column bed heights constant. SuperFlo® columns allow simple and trouble free upscaling.

Moving from a 10L column to 100L column, all separation parameters will stay the same except the flow rate which will be increased proportional by a factor of 10.

Because the parameters are identical, SuperFlo® columns allow for direct comparison of chromatograms from small scale to large scale columns, allowing for greater comparison of the upscaling process.

Alternatively a scout (Wedge®) column can be used to develop a method which can be upscaled to the sample capacity required.

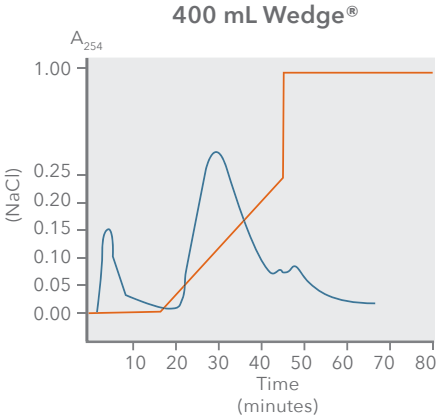
A Wedge® column is a segment of a complete SuperFlo® column that allows a simulated run on a full size column, reducing the need for expensive capital investment to develop a larger scale method.



Wedge® Column

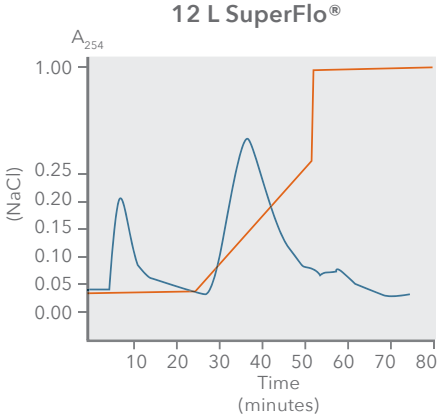
The below example shows the direct upscaling from a 400mL Wedge® to a 12L SuperFlo® column. The ratio of the column volumes is 30, by simply multiplying the flow rate of 95mL/min on the 400mL Wedge® with a factor of 30 it is simple to calculate the new flow rate of 2.850mL/min for the 12L SuperFlo® which generates chromatograms that can be overlaid for comparison.

400 mL Wedge®



System: QuantaSep® 1000
Sample: 20 mLs Bovine serum
Flow Rate: 95 mL/min
Media: DEAE
Protein Content: 7.1 grams/100mL diluted serum
Buffer: 0.05 M Tris-HCl, pH 7.1
Gradient: 0.25 M NaCl in Tris Buffer

12 L SuperFlo®



System: QuantaSep® 5L
Sample: 600 mls Bovine serum
Flow Rate: 2850 mL/min
Media: DEAE
Protein Content: 7.1 grams/100mL diluted serum
Buffer: 0.05 M Tris-HCl, pH 7.1
Gradient: 0.25 M NaCl in Tris Buffer

QuantaSep® 1000 LX

- Automates buffer delivery, column switching, fraction collection, based on UV, pH or conductivity
- Small footprint: can fit on bench-top
- Dual dynamic flow range: 1-100 mL/min & 10-1000 mL/min
- Graphical, intuitive software "dashboard" for easy operation and training
- Automated cGMP reports
- Chromatograms & calibration history
- Low system volume
- Active air trap system eliminates "bubble trap dilution"
- Leak and pressure alarms

QuantaSep® 3000 SU

- Single use fluidic pathway
- Ideal for sterile production and clean room environments
- Exchangeable fluidic pathway- no cleaning validation
- Step & linear gradients
- Unattended clinical production
- Capable of flow range; 10-3.000 mL/min
- Generate automated cGMP reports

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