



Life Sciences

USD 2186<sup>(1)</sup>



# Pall Mustang<sup>®</sup> S Capsules

The High Throughput Disposable Capsules for Process Scale Cation Exchange Chromatography



*Filtration. Separation. Solution.<sup>SM</sup>*

# Mustang® S Chromatography Capsules

## The High Throughput Disposable Capsules for Process Scale Cation Exchange Chromatography

Pall **Mustang S** disposable products are designed to capture positively charged biomolecules in downstream bioprocessing by cation exchange. These products will be used either for the initial capture of the target biomolecule in a purification process or for the removal of positively charged contaminants in subsequent purification steps.



### Description

**Mustang S** membrane is an innovative new cation exchange support with pendant sulfonic functional groups in a crosslinked polymeric coating. The 0.8  $\mu\text{m}$  pores in **Mustang S** membranes are large enough to allow large biomolecules to access all the binding sites by direct fluid convection. This produces a very high dynamic capacity for very high molecular weight molecules (i.e Factor VIII), or even particles as large as viruses. This is in contrast to conventional chromatographic beads with diffusive pores that typically have much lower throughputs and dynamic binding capacities.

Combining this high capacity S membrane with a unique pleated design resulted in the **Mustang S** disposable products. Each **Mustang S** element contains 16 layers of pleated membrane that will bind positively charged biomolecules. These units are specifically designed to be single use to eliminate cleaning and cleaning validation. They are available in capsule or cartridge format to accommodate the entire range of volumes used in the biopharmaceutical processes. The 16-layer construction has been held constant from the laboratory "coin" product (0.35 mL) to the industrial scale. The ease of linear scale-up ensures a shortened development time.

### Features and Benefits

- Binding efficiency – Positively charged biomolecules are readily bound in a single pass
- Speed – High flow rates enable the processing of large volumes in less than one shift
- Scalability – A full range of sizes accommodate different volumes and capacities needed in biopharmaceutical processing
- Convenience – Ready to use and autoclavable
- Flexibility – Available in capsule or cartridge format
- Cost – Lower operating costs and capital investment compared to conventional columns that need validated packing and cleaning

### High Quality Standards

- Manufactured to high quality assurance standards in accordance with BS EN ISO9002; 1997
- Membrane lots tested for dynamic protein binding capacity, and peak position using standard proteins
- Identified by a lot number and a unique serial number for complete traceability of manufacturing history satisfying stringent QC/QA requirements
- Supplied with Certificate of Analysis to confirm the quality and quality control of Pall
- Meets USP Biological reactivity tests *in vivo* in accordance with USP Class VI 50°C and all materials listed in Drug Master File submitted to the FDA

### Comprehensive Validation

- Extensive validation to ensure consistent and reliable performance
- Comprehensive validation guide available on request

# Mustang S Capsules

## Technical Specifications

### Materials of Construction

	Novasip™ Capsule CLxMSTGSP1	Kleenpak™ Nova Capsule NPxMSTGSP1
<b>Membrane</b>	Modified hydrophilic polyethersulfone	Modified hydrophilic polyethersulfone
<b>Membrane Support and Drainage Layer Assembly</b>	Polypropylene	Polypropylene
<b>Endcaps, Core and Cage</b>	Polypropylene	Polypropylene
<b>Housing Bowl</b>	Polyetherimide	Polypropylene
<b>Housing Head</b>	Polyetherimide with TiO <sub>2</sub>	Polypropylene with TiO <sub>2</sub>
<b>O-rings</b>	Silicone elastomer	Silicone elastomer

**Note:**  
For CLxMSTGSP1, x =  
M05 for a unit with a bed volume of 10 mL  
3 for a unit with a bed volume of 60 mL

For NPxMSTGSP1, x =  
6 for a unit with a bed volume of 260 mL  
7 for a unit with a bed volume of 520 mL  
8 for a unit with a bed volume of 780 mL

### Capsules Operating Characteristics<sup>1</sup>

<b>Maximum operating pressure</b>	3.0 bar (43.5 psi) at 40° C (104°F)
<b>Maximum differential pressure</b>	3.0 bar (43.5 psi) at 40° C (104°F)
<b>Maximum sanitization conditions</b>	1 M NaOH for 30 minutes for one cycle only
<b>Maximum autoclave conditions</b>	121°C (250°F) for 30 minutes for one cycle only

<sup>1</sup> With fully compatible fluids that do not soften, swell or adversely affect the capsule or its materials of construction

1bar = 100kPa

### Available Sizes and Typical Dynamic Binding Capacity

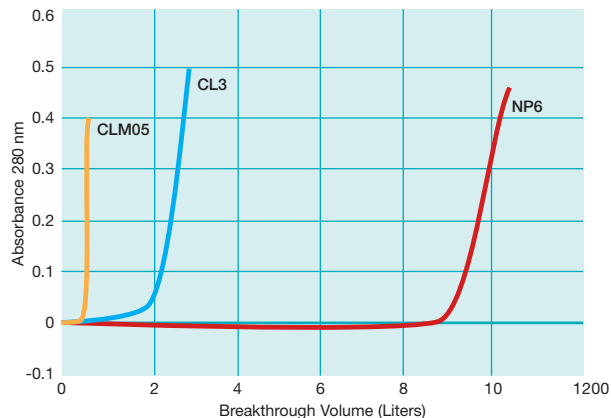
Part number	Bed volume (mL)	Typical Lysozyme binding capacity (mg)	Flow rate (L/min/bar Delta P) <sup>⊗</sup>
MSTGS18S16	0.35	17	6.4 mL/min (0.43 mL/min/psi)
CLM05MSTGSP1	10	500	0.245 (17 mL/min/psi)
CL3MSTGSP1	60	3,000	1.25 (86 mL/min/psi)
NP6MSTGSP1/ AB1MSTGS7PH4	260	13,000	3.9 (269 mL/min/psi)
NP7MSTGSP1/ AB2MSTGS7PH4	520	26,000	7.8 (538 mL/min/psi)
NP8MSTGSP1/ AB3MSTGS7PH4	780	39,000	11.7 (807 mL/min/psi)

<sup>⊗</sup> For liquid of 1 cP. For other liquids divide the flow rate by the viscosity expressed in cP.

### Nominal Dimensions for Capsules

Capsule type	CLM05MSTGSP1	CL3MSTGSP1	NP6MPSTGSP1	NP7MSTGSP1	NP8MSTGSP1
<b>Maximum Diameter Including Valves</b>	123 mm (4.8 in.)	123 mm (4.8 in.)	154 mm (6.1 in.)	154 mm (6.1 in.)	154 mm (6.1 in.)
<b>Length with 38 mm (1½") Sanitary Flange</b>	84 mm (3.3 in.)	157 mm (6.2 in.)	333 mm (13.1 in.)	581 mm (22.9 in.)	831 mm (32.7 in.)
<b>Bed Volume (mL)</b>	10	60	260	520	780

### Lysozyme Dynamic Breakthrough for Mustang S Capsules



Lysozyme breakthrough curves above demonstrate the high breakthrough capacity of **Mustang S** capsules. After preconditioning and equilibration with 10mM MES pH 5.5, a solution of 1.6 mg/mL, 2 mg/mL and 1.4 mg/mL of lysozyme in 10mM MES pH 5.5 was pumped respectively through the 10 mL, 60 mL and 260 mL capsules at a flow rate of 10-20 CV/min. The absorbance at 280 nm was continuously monitored downstream of the capsule.

### Scaling Down Unit Characteristics

#### Materials of Construction

<b>Membrane</b>	Modified hydrophilic polyethersulfone
<b>Housing</b>	316L stainless steel
<b>Support frit</b>	316B stainless steel
<b>Housing clamp</b>	300 series stainless steel housing
<b>O-rings</b>	Silicone elastomer

#### Nominal Dimensions

<b>Coin device</b>	18 mm outer diameter
<b>Housing</b>	51 mm height
<b>Fittings</b>	M6 male to ½" OD tubing and M6 male to luer lock female fittings

#### Operating Characteristics

<b>Maximum temperature</b>	40° C (104°F)
<b>Maximum differential pressure</b>	17 bar (246.5 psi)

## Ordering Information

Part number	Product description	Packaging
MSTG18S16	Mustang S coin	10/box
MSTG18H16	Stainless steel coin housing assembly	1/box
MSTG18H16F	Mustang coin housing frits	2 frits/box
MSTG18H16G	Mustang coin housing gaskets	2 gaskets/box
CLM05MSTGSP1	Mustang S capsule, 10mL, connections 1" / 1½" compatible Tri-Clamp	1/box
CL3MSTGSP1	Mustang S capsule, 60mL, connections 1" / 1½" compatible Tri-Clamp	1/box
NP6MSTGSP1	Mustang S capsule, 260mL, connections 1" / 1½" compatible Tri-Clamp	1/box
NP7MSTGSP1	Mustang S capsule, 520mL, connections 1" / 1½" compatible Tri-Clamp	1/box
NP8MSTGSP1	Mustang S capsule, 780mL, connections 1" / 1½" compatible Tri-Clamp	1/box
AB1MSTGS7PH4	Mustang S cartridge, 260mL, code 7	1/box
AB2MSTGS7PH4	Mustang S cartridge, 520mL, code 7	1/box
AB3MSTGS7PH4	Mustang S cartridge, 780mL, code 7	1/box

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