



## MN Flash adsorbents a unique variety of phases

### ★ Key features

- Flash columns and cartridges from MACHEREY-NAGEL are available with all CHROMABOND® SPE / Flash packings (more than 40 phases, e.g., C<sub>18</sub>, C<sub>8</sub>, OH, Alox). Additionally you can choose from our range of POLYGOPREP silica packings in particle sizes from 20 to 130 µm and pore sizes from 60 to 4000 Å.
- For high performance Flash separations spherical silica featuring very high separation efficiency can be requested

### 🔧 Technical characteristics

- Specification of modified and plain silica, acid-washed irregular silica, pore size 60 Å, particle size 45 µm, specific surface 500 m<sup>2</sup>/g, pH stability 2–8



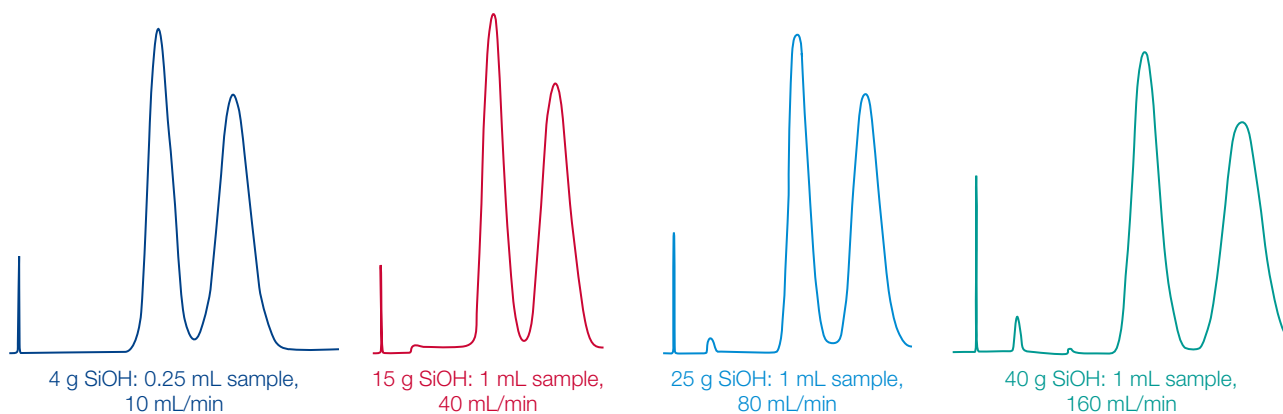
Comparison of separation efficiency and price of irregular versus spherical silica

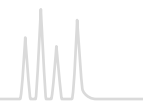
## Separation efficiency and reproducibility

Our optimized automatic packing process leads to an excellent packing quality, irrespective of the phase or particle size distribution (normal phase or reversed phase, spherical or irregular particles). MACHEREY-NAGEL, as a manufacturer of silicas, has decades of experience in the production of first class separation phases and columns. This leads to highest separation efficiencies of the columns, a constant back pressure (via controlled narrow particle size distribution) and good reproducibilities from cartridge to cartridge.

The separation efficiency is in the first place not influenced by the dimension or the geometry of the Flash RS cartridges. The chromatograms below show an identical resolution and peak form for different column dimensions, when flow and sample amount is adjusted correctly. This is advantageous for optimization and upscaling experiments.

## Resolution and peak shape for different column dimensions





## MN TLC and Flash products

- Same selectivity and easy upscaling from TLC to Flash separations
- Saving time and money, because expensive optimizations are not required

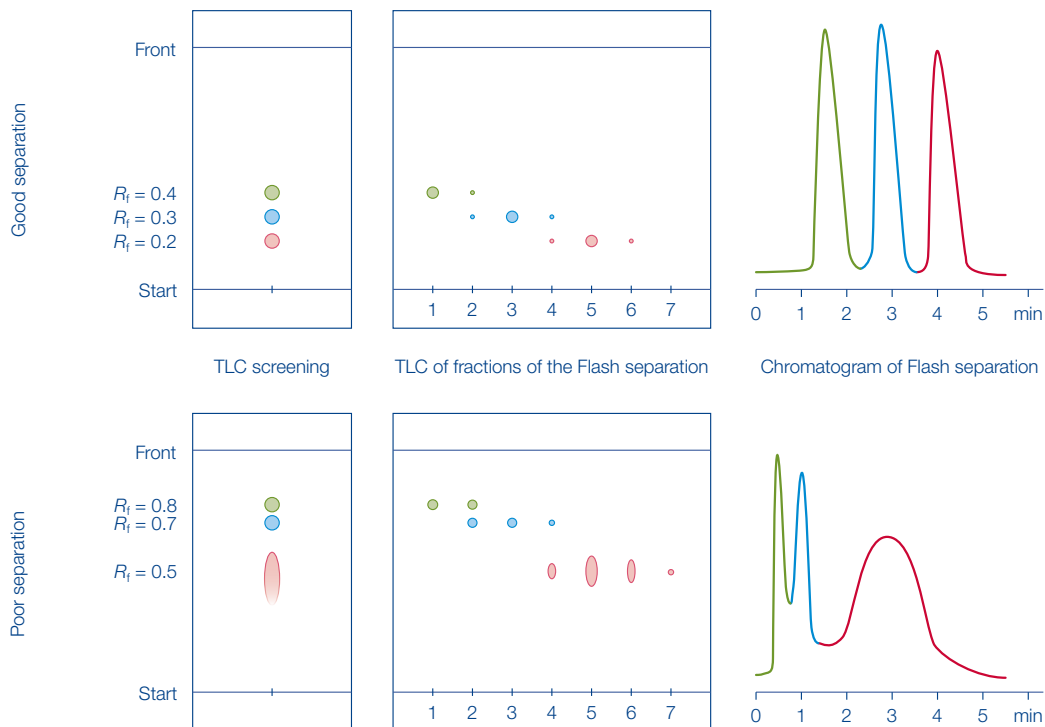
TLC is often used for the development of a selective and reproducible method in Flash chromatography, because it is often necessary to test a large number of eluent and / or adsorbent

## TLC screening

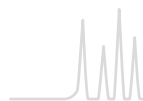
For TLC separation you should start with an unmodified silica and a nonpolar eluent of low viscosity (e.g., mixtures of *n*-hexane – ethyl acetate or *n*-hexane – acetone). By changing the composition of the eluent the  $R_f$  value of the TLC separation is adjusted to approx. 0.3. Increasing polarity of the eluent decreases the  $R_f$

combinations. MN TLC plates and sheets are coated with the same base silica, which is used in our CHROMABOND® Flash cartridges. This is an important prerequisite for the reproducible transfer of a TLC separation to the Flash column, because the parameters are identical in both systems.

values. The difference in  $R_f$  values between the substances to be separated should be at least 0.1 to allow a reliable separation in the subsequent flash chromatography. Variation of the eluent components (e.g., acetone, dichloromethane) can be used to enhance the separation by eluent specific selectivity.



Our program of TLC plates can be found from page 273 onwards.



## Technical support for Flash RS and Flash BT

### Loadability

- Due to the narrow particle size distribution, the excellent packing quality and the optimized stationary phases (acid washed silica, reduced particulate matter) our cartridges can realize highest loadability at best possible separation efficiency.
- Additionally, the large range of different cartridge lengths and diameters eases to find the optimum in loadability for a given sample amount.

### Rule of thumb for the loadability

Separation	Loadability	g sample / g adsorbent
difficult	low	≤ 1 %
easy	high	≥ 10 %

### Loadability table CHROMABOND® Flash RS and BT

SiOH cartridge	Average loadability per cartridge [g]	
	difficult separation	easy separation
RS/BT 4	0.04	0.4
RS/BT 15	0.15	1.5
RS/BT 25	0.25	2.5
RS/BT 40	0.4	4
RS/BT 80	0.8	8
RS/BT 120	1.2	12
RS/BT 200	2	20
RS/BT 330	3.3	33
RS 800	8	80
RS 1600	16	160

### Back pressure and pressure stability

The back pressure always depends on flow rate and viscosity of the eluent mixture, column length and diameter and the particle size. The high performance CHROMABOND® Flash RS cartridges up to 200 g silica are stable up to 15 bar (220 psi, > 200 g: 12 bar).

Back pressure of CHROMABOND® Flash RS SiOH cartridges (eluent hexane – ethyl acetate 9:1 or 8:2)

Flow rate	20 mL/min	40 mL/min	80 mL/min	120 mL/min	160 mL/min	200 mL/min	240 mL/min
Cartridge							
RS/BT 4	0.75 bar	1.5 bar					
RS/BT 15	0.25 bar	0.75 bar	1.5 bar	2.0 bar			
RS/BT 25	0.5 bar	1.0 bar	1.75 bar	3.0 bar	4.0 bar	5.0 bar	
RS/BT 40		0.75 bar	1.5 bar	2.25 bar	3.0 bar	3.25 bar	3.5 bar
RS/BT 80			1.5 bar	2.5 bar	3.0 bar	3.5 bar	4.0 bar
RS/BT 120			1.0 bar	1.5 bar	2.0 bar	2.5 bar	3.0 bar
RS/BT 200			1.0 bar	1.5 bar	2.0 bar	2.5 bar	3.0 bar
RS/BT 330	(typical flow rate)		1.5 bar	2.25 bar	3.0 bar	3.5 bar	4.0 bar

Conditioning volumes for CHROMABOND® Flash RS cartridges (normally 1.5 column volumes of the eluent)

Cartridge	Volume of eluent for conditioning
RS/BT 4	20 mL
RS/BT 15	60 mL
RS/BT 25	90 mL
RS/BT 40	140 mL
RS/BT 80	280 mL

### Upscaling of the optimum flow rate

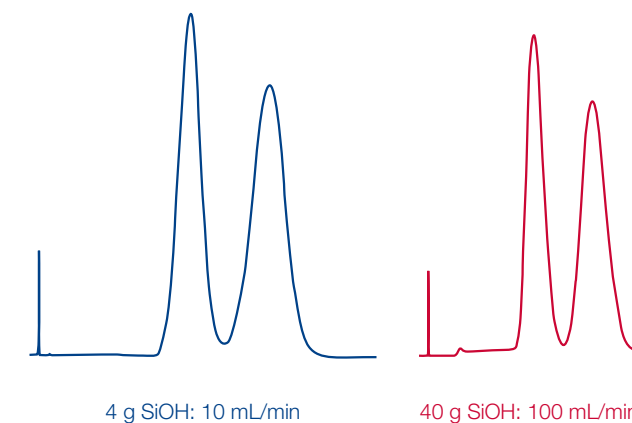
This depends on the eluent, the separation problem, the amount of adsorbent and also on the dimensions of the column.

In the simplest case the upscaling relation is proportional to the amount of adsorbent (for equal eluent polarity).

For the flow rate the following would apply e.g.,

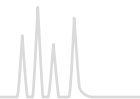
4 g silica → optimum flow: ~ 6–12 mL/min

40 g silica → optimum flow: ~ 60–120 mL/min



Upscaling of the flow rate

We recommend using a pressure guard, because short time pressure peaks (viscosity of eluent or gradient changes) can exceed the pressure limit.



## CHROMABOND® Flash cartridges

### Ideal for Flash separations from 10 mg up to 160 g

Convenient operation and reliable upscaling; Complete program of ready-to-use Flash cartridges for:

- Isco Companion® and other Teledyne Isco CombiFlash® systems
- Biotage® Isolera™, Biotage® FlashMaster™
- Or as stand-alone version for all pump / detector combinations, e.g., from Biotage®, Büchi

### Enhanced flexibility

- All common RP and NP phases available on request
- Adsorbent weights from 4 g to 1600 g (up to 300 g for BT)

### Outstanding price-performance ratio

### Increased analytical safety

- Low bleed polypropylene cartridges, organic solvent resistant, thick column walls, one piece body, sophisticated length-to-diameter ratio for high plate numbers and excellent separation efficiencies, optimal ratio of length and diameter
- Distribution of eluent stream via highly porous frits
- High pressure stability of 21 bar / 300 psi (15 bar for 80 g and 120 g cartridges, 12 bar for cartridges > 200 g, 7 bar for 3000 g), good reproducibility

### High quality standard

- All flash cartridges and adsorbents undergo comprehensive during- and after-production quality assurance measures to ensure that the products conform to the specification.



CHROMABOND® Flash RS - pictures of CHROMABOND® Flash BT, DL and FM hardware can be found on page 15.



## CHROMABOND® Flash RS solutions for Isco® Flash instruments

### ★ Key features

- Heavy-duty polypropylene cartridges designed for use in Teledyne Isco CombiFlash® systems (Companion®, R<sub>f</sub> etc.) without additional connectors or capillaries.
- Column connection:  
cartridges up to RS 330: female Luer lock inlet and male Luer outlet  
RS 800 and RS 1600: maxi Luers

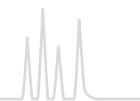
### ✓ Recommended application

- Using the CHROMABOND® Flash Starter Kit, REF 730798 or the CHROMABOND® Flash Stand Alone Kit, REF 732903 (see page 78) CHROMABOND® Flash RS cartridges can also be used as stand alone system with any pump / detector / fraction collector combination (except RS 800, RS 1600 and RS 3000 with maxi Luers).

### Ordering information

Description	Column length [cm]	ID [mm]	Adsorbent weight [g]	Pack of	REF
<b>CHROMABOND® Flash RS columns with Luer exit</b>					
Filled with standard silica, unmodified (SiOH) or endcapped octadecyl modified (C <sub>18</sub> ec), 40–63 µm, specific surface 500 m <sup>2</sup> /g, pH stability 2–8					
CHROMABOND® Flash RS 4 SiOH	9.8	12.4	4	20	732800
CHROMABOND® Flash RS 15 SiOH	11.6	21.2	15	20	732801
CHROMABOND® Flash RS 25 SiOH	16.5	21.2	25	15	732802
CHROMABOND® Flash RS 40 SiOH	17.1	26.4	40	15	732803
CHROMABOND® Flash RS 80 SiOH	24.0	30.8	80	12	732804
CHROMABOND® Flash RS 120 SiOH	25.5	36.0	120	10	732805
CHROMABOND® Flash RS 200 SiOH	20.0	60.0	200	6	732806
CHROMABOND® Flash RS 330 SiOH	27.0	60.0	330	4	732807
CHROMABOND® Flash RS 800 SiOH	38.5	82.0	800	2	732808
CHROMABOND® Flash RS 1600 SiOH	43.0	104.0	1600	2	732809
CHROMABOND® Flash RS 3000 SiOH	51.0	127.5	3000	1	732850
Corresponding TLC plates: silica (see page 273)					
CHROMABOND® Flash RS 4 C <sub>18</sub> ec	9.8	12.4	4.3	2	732810
CHROMABOND® Flash RS 15 C <sub>18</sub> ec	11.6	21.2	16.4	1	732811
CHROMABOND® Flash RS 25 C <sub>18</sub> ec	16.5	21.2	26	1	732812
CHROMABOND® Flash RS 40 C <sub>18</sub> ec	17.1	26.4	43	1	732813
CHROMABOND® Flash RS 80 C <sub>18</sub> ec	24.0	30.8	86	1	732814
CHROMABOND® Flash RS 120 C <sub>18</sub> ec	25.5	36.0	130	1	732815
CHROMABOND® Flash RS 200 C <sub>18</sub> ec	20.0	60.0	220	1	732816
CHROMABOND® Flash RS 330 C <sub>18</sub> ec	27.0	60.0	360	1	732817
CHROMABOND® Flash RS 800 C <sub>18</sub> ec	38.5	82.0	880	1	732818
CHROMABOND® Flash RS 1600 C <sub>18</sub> ec	43.0	104.0	1760	1	732819
Corresponding TLC plates: RP-18 W/UV <sub>254</sub> (see page 284)					

On request, all column types listed above can be packed with any adsorbent from our program of CHROMABOND® adsorbents (starting from page 16). Please note that other packings often result in differing adsorbent weights.



## CHROMABOND® Flash BT solutions for Biotage® Flash instruments

### ★ Key features

- Heavy-duty polypropylene cartridges designed for use in the Biotage® Isolera™ systems without additional connectors or capillaries.
- Column connection:  
female Luer lock inlet and male Luer lock outlet

### ✓ Recommended application

- Using the CHROMABOND® Flash Starter Kit, REF 730798 or the CHROMABOND® Flash Stand Alone Kit, REF 732903 (see page 78) CHROMABOND® Flash BT cartridges can also be used as stand alone system with any pump / detector / fraction collector combination.

### Ordering information

Description	Column length [cm]	ID [mm]	Adsorbent weight [g]	Pack of	REF
<b>CHROMABOND® Flash BT columns with Luer lock exit</b>					
Filled with unmodified standard silica, 40–63 µm, specific surface 500 m <sup>2</sup> /g, pH stability 2–8					
CHROMABOND® Flash BT 4 SiOH	9.8	12.4	4	20	732960
CHROMABOND® Flash BT 15 SiOH	11.6	21.2	15	20	732961
CHROMABOND® Flash BT 25 SiOH	16.5	21.2	25	15	732962
CHROMABOND® Flash BT 40 SiOH	17.1	26.4	40	15	732963
CHROMABOND® Flash BT 80 SiOH	24.0	30.8	80	12	732964
CHROMABOND® Flash BT 120 SiOH	25.5	36.0	120	10	732965
CHROMABOND® Flash BT 200 SiOH	20.0	60.0	200	6	732966
CHROMABOND® Flash BT 330 SiOH	27.0	60.0	330	4	732967

On request, all column types listed above can be packed with any adsorbent from our program of CHROMABOND® adsorbents (starting from page 16). Please note that other packings often result in differing adsorbent weights.

Partly filled CHROMABOND® Flash BT cartridges (e.g., filled up to 80%) are available on request. By removal of the top cap the sample can be applied directly on to the cartridges (see page 77).

## CHROMABOND® Flash DL cartridges solutions for direct loading

### ★ Key features

- Column connection:  
female Luer lock inlet and male Luer lock outlet.  
Each cartridge comes with 3 filter elements: one already inserted, two more filters aside.
- Suitable as solid injection system
- For individual self-filling and packing of flash cartridges

### Ordering information

Description	Column length [cm]	ID [mm]	For adsorbent weight [g]		Volume [mL]	Empty column Pack of	REF	PE filter elements	
			SiOH	Kieselguhr				Pack of	REF
<b>CHROMABOND® Flash DL empty cartridges</b>									
CHROMABOND® Flash DL 4	9.8	12.4	4	3	8	50	732980	250	732980FE
CHROMABOND® Flash DL 15	11.6	21.2	15	10	30	50	732981	250	732981FE
CHROMABOND® Flash DL 25	16.5	21.2	25	15	45	50	732982	250	732982FE
CHROMABOND® Flash DL 40	17.1	26.4	40	30	75	20	732983	250	732983FE
CHROMABOND® Flash DL 80	24.0	30.8	80	60	160	20	732984	250	732984FE
CHROMABOND® Flash DL 120	25.5	36.0	120	80	220	20	732985	250	732985FE
CHROMABOND® Flash DL 200	20.0	60.0	200	150	410	10	732986	100	732986FE
CHROMABOND® Flash DL 330	27.0	60.0	330	250	600	10	732987	100	732987FE



- ① CHROMABOND® Flash DL cartridge filled with sample on CHROMABOND® XTR on top of CHROMABOND® Flash RS or BT silica cartridge
- ② CHROMABOND® Flash BT cartridge partly filled with silica topped with sample on CHROMABOND® XTR

## Options for solid injection

The sample is dissolved in a suitable solvent and adsorbed onto CHROMABOND® XTR (diatomaceous earth, see page 63). After removal / evaporation of the residual solvent, the adsorbent

is put on top of a partly filled CHROMABOND® Flash BT cartridge or into an empty CHROMABOND® Flash DL cartridge.

Our XTR adsorbents can be found on page 63.

## CHROMABOND® Flash FM solutions for FlashMaster™ instruments

### ★ Key features

- Column connection: open-tubular inlet and male Luer outlet

### ✓ Recommended application

- Polypropylene cartridges designed for use in the Biotage® FlashMaster™ systems without additional connectors or capillaries

### Ordering information

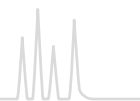
Description	Column length [cm]	ID [mm]	Adsorbent weight [g]	Pack of	REF
<b>CHROMABOND® Flash FM columns</b>					
Filled with standard silica, unmodified (SiOH) or endcapped octadecyl modified (C <sub>18</sub> ec), 40–63 µm, specific surface 500 m <sup>2</sup> /g, pH stability 2–8					
CHROMABOND® Flash FM 15/2 SiOH	9.0	15.8	2.0	50	730881
CHROMABOND® Flash FM 25/5 SiOH	10.0	20.5	5.0	50	730891
CHROMABOND® Flash FM 25/10 SiOH	10.0	20.5	10.0	50	730666
CHROMABOND® Flash FM 70/10 SiOH	15.4	26.8	10.0	30	730885
CHROMABOND® Flash FM 70/20 SiOH	15.4	26.8	20.0	30	730915
CHROMABOND® Flash FM 70/25 SiOH	15.4	26.8	25.0	30	730892
CHROMABOND® Flash FM 150/25 SiOH	17.0	38.2	25.0	20	730667
CHROMABOND® Flash FM 150/50 SiOH	17.0	38.2	50.0	20	730887
CHROMABOND® Flash FM 150/70 SiOH	17.0	38.2	70.0	10	730880
CHROMABOND® Flash FM 15/2 C <sub>18</sub> ec	9.0	15.8	2.0	50	730890
CHROMABOND® Flash FM 25/5 C <sub>18</sub> ec	10.0	20.5	5.0	20	730884
CHROMABOND® Flash FM 70/10 C <sub>18</sub> ec	15.4	26.8	10.0	20	730886
CHROMABOND® Flash FM 150/50 C <sub>18</sub> ec	17.0	38.2	50.0	10	730888

On request, all column types listed above can be packed with any adsorbent from our program of CHROMABOND® adsorbents (starting from page 16). Please note that other packings often result in differing adsorbent weights.

Custom filling sizes are available on request.



# CHROMABOND® Flash connecting kits



CHROMABOND® Flash connecting kits allow to use CHROMABOND® Flash RS and BT cartridges as stand-alone system with any pump, detection, fraction collector combination.



Female Luer lock for column inlet



Male Luer lock for column exit

REF 730798 CHROMABOND® Flash Starter Kit

REF 732903 CHROMABOND® Flash Stand Alone Kit, Luer

## Ordering information

Description	Pack of	REF
<b>CHROMABOND® Flash Starterkit</b>		
consists of 1/8" PTFE tubing, 1.5 mm ID, 3 m long; 5 x 1/4"-28 PP nuts; 5 x 1/8" ETFE ferrules; 5 x 1/4"-28 nylon unions; 2 x 1/4"-28 PP Luer lock, female; 1 x 1/4"-28 PP Luer lock, male; 1 x 1/4"-28 PP Luer tip, male	1 Kit	730798
<b>CHROMABOND® Flash "Stand Alone" Kit, Luer</b>		
consists of 1 x 1/4"-28 PP Luer lock, female; 1 x 1/4"-28 PP Luer lock, male; 2 x 1/8" ETFE ferrules; 2 x 1/4"-28 nylon unions; 2 x 1/4"-28 PP nuts	1 Kit	732903





## Glass columns and accessories for Flash chromatography

### ★ Key features

- MN flash chromatography kits include a glass column, eluent reservoir, silica 60 and accessories. Glass columns of different sizes and accessories can be ordered separately.
- These columns are normally filled to a height of about 15 cm, working pressures are 1.5 to 2 bar.
- The most used adsorbent is silica 60 with particle size 40–63 µm (see page 259), however, you may also use our ranges of other LC adsorbents and of POLYGOPREP silica phases (see page 258). Particle sizes < 25 µm should only be used with very low-viscosity mobile phases, because otherwise flow rates will be very low.
- These columns are packed by the user.
- No expensive equipment required

### ✓ Recommended application

- Economic low-tech method for the synthesis laboratory
- Suited for the separation of compounds up to gram levels

### Ordering information

Description	Pack of	REF
<b>Flash chromatography kits</b>		
Flash chromatography kit I consists of 1 glass column 20 mm ID x 400 mm length, one 1-L eluent reservoir, 100 g silica 60 (40–63 µm), sea sand, silanized glass fiber wadding, 1 m PTFE tubing	1 kit	727450
Flash chromatography kit II consists of 1 glass column 40 mm ID x 450 mm length, one 2-L eluent reservoir, 100 g silica 60 (40–63 µm), sea sand, silanized glass fiber wadding, 1 m PTFE tubing	1 kit	727451
<b>Flash chromatography glass columns</b>		
complete with adapter and PTFE tap, fitted with a polyethylene net to protect against bursting		
20 mm ID x 200 mm length	1 column	727400
20 mm ID x 400 mm length	1 column	727401
25 mm ID x 200 mm length	1 column	727402
25 mm ID x 400 mm length	1 column	727403
30 mm ID x 300 mm length	1 column	727404
30 mm ID x 400 mm length	1 column	727405
40 mm ID x 300 mm length	1 column	727406
40 mm ID x 450 mm length	1 column	727407
<b>Accessories for flash chromatography glass columns</b>		
1-L eluent reservoir with adapter, covered with a protective plastic sleeve for burst protection; this also prevents build-up of UV-induced radicals in the eluent	1 piece	727420
2-L eluent reservoir as above	1 piece	727421
Pressure gauge for controlling flow rates	1 piece	727422
PTFE tubing, 3 mm OD, 2 mm ID, length 1 m	1 m	727424
Sea sand, acid washed and calcined	1 kg	727423
Glass fiber wadding, silanized	25 g	718002