



Normal Phase Chemistries

Contents

• YMC-Pack SIL (Silica)	120-121
• YMC-Pack PVA-Sil.....	122-123
• YMC-Pack CN (Cyano)	124-125
• YMC-Pack Diol	126-127
• YMC-Pack Polyamine II	128-129
• YMC-Pack NH ₂ (Amino)	130
• YMC-Pack TMS (C1)	131
• Ordering Information.....	132-139

Introduction

HPLC Columns for Normal Phase Chromatography

Whilst historically it was the earliest form of HPLC, normal-phase separations have recently less attention due to the belief that it is complicated and unpredictable. But normal-phase chromatography is a powerful tool for the separation of positional isomers that are difficult to separate in reversed-phase mode. Due to a rigid surface in comparison with the more flexible carbon chains of reversed-phase stationary phases the analytes are effected by well defined steric interaction with polar groups.

This section gives a comprehensive overview of the stationary phases available from YMC for the use in normal phase separation mode. YMC offers columns packed with non-bonded silica or packed with silica gel modified with polar groups.

YMC-Pack SIL (Silica)



- ultra high purity silica
- high mechanical stability
- highly porous, totally spherical particles
- fully scalable for analytical, semi-prep, preparative and process scale applications
- convenient for separating small organic compounds with similar structures



YMC-Pack SIL	Specification			
Particle Size / μm	3; 5	3; 5	3; 5	5
Pore size / nm	6	12	20	30
Surface area / m^2g^{-1}	450	330	175	100
Recommended pH range	2.0 - 7.5	2.0 - 7.5	2.0 - 7.5	2.0 - 7.5

General

Due to the highly sophisticated production process YMC's spherical silica material shows outstanding performance and great lot-to-lot reproducibility. The reason for this can be summarised in two main qualities: very narrow physical and chemical product specifications and outstanding purity.

Properties

The high purity YMC-Pack SIL (Silica) allows almost total sample recovery because the low content of impurities such as residual metals reduces non-specific sample adsorption. This also prevents unusual peak-shapes thereby encouraging higher sample loading. In addition, the porous structure of the spheres gives a high surface area which further improves sample loading.

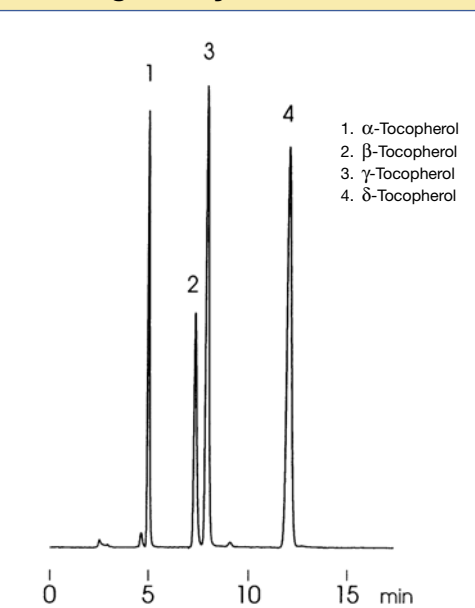
Compared with irregular silica, YMC's spherical material is subject to a much lower degree of mechanical degradation during packing and usage. This results in lower backpressures and extended column life times due to the absence of 'fines'.

Since YMC spherical silica is the basis for every YMC bonded phase, this is a further reason for the premium quality of YMC stationary phases as far as backpressure and chromatographic stability is concerned.



YMC-Pack SIL (Silica) is also available in preparative particle sizes.

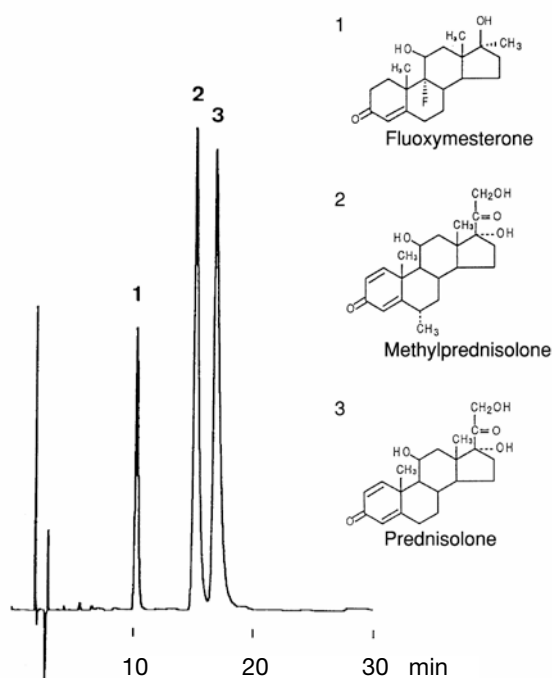
Ultra High Purity Silica



Column: YMC-Pack SIL (5 μm , 12 nm) 250 x 4.6 mm i.d.
Eluent: hexane / 2-propanol / acetic acid (1000/6/5)
Flow: 1.4 ml/min
Detection: FLS at Ex 298 nm, Em 325 nm
Temperature: 35 $^{\circ}\text{C}$
Injection: 20 μl (5 ~ 20 mg/ml)

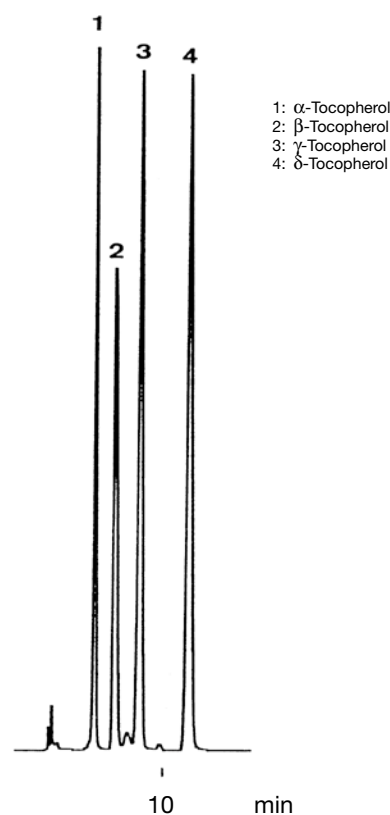
YMC-Pack SIL (Silica)

Steroids



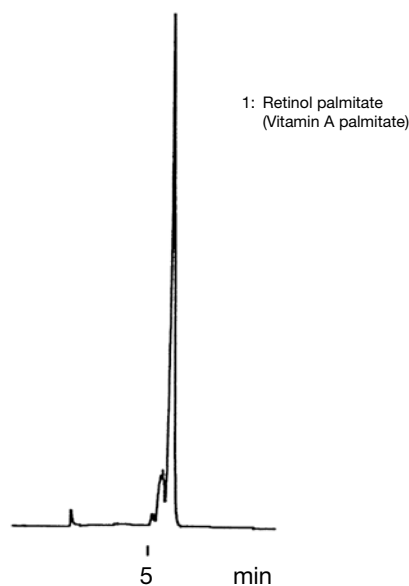
Column: YMC-Pack SIL (5 μ m, 6 nm) 250 x 4.6 mm i.d.
 Eluent: hexane / THF / acetic acid (60/40/1)
 Flow: 1.5 ml/min
 Detection: UV at 250 nm, 0.16 AUFS
 Temperature: 30 °C
 Injection: 10 μ l (0.25 mg/ml)

Tocopherols



Column: YMC-Pack SIL (5 μ m, 12 nm) 150 x 4.6 mm i.d.
 Eluent: hexane / THF / acetic acid (97/3/0.25)
 Flow: 1.0 ml/min
 Detection: UV at 295 nm, 0.08 AUFS
 Temperature: 30 °C
 Injection: 10 μ l (0.20 = 0.31 mg/ml)

Vitamin A fatty acid ester



Column: YMC-Pack SIL (5 μ m, 12 nm) 150 x 4.6 mm i.d.
 Eluent: cyclohexane / dichloromethane / acetic acid (100/0.5/0.5)
 Flow: 1.0 ml/min
 Detection: UV at 350 nm, 0.32 AUFS
 Temperature: 30 °C
 Injection: 5 μ l (1.0 mg/ml)

Column care

YMC-Pack SIL is stable towards hydrolysis between pH 2.0-7.5. Remove acid and buffer salts before storage. For detailed information please refer to the "Column Care and Use Instructions" which are shipped with each analytical column.

YMC-Pack PVA-Sil



- **bonded phase alternative to silica for normal phase applications**
- **vinyl alcohol polymerised silica support**
- **consistent surface activity, unaffected by water**
- **excellent for packed column supercritical fluid chromatography**



YMC-Pack PVA-Sil	Specification
Particle Size / μm	5
Pore Size / nm	12
Surface area / m^2g^{-1}	330
Recommended pH range	2.0 - 9.5

Polyvinyl Alcohol Functionalised Silica

PVA-Sil is prepared from a 5 micron 12nm silica support which is bonded with a monomolecular polymer coating of vinyl alcohol. The polymerised PVA completely covers both external and internal surfaces of the silica support, protecting it against aggressive, high pH buffers and solvents.

Normal phase alternative to Silica

PVA-Sil, which possesses a polyvinyl alcohol (PVA) surface chemistry, is an excellent alternative to silica gel or other polar bonded phases which are used in normal phase chromatography. In many situations it exhibits better performance characteristics and a unique selectivity and can often resolve compounds that behave poorly on silica. The alcohol functionality present on PVA-Sil is better suited for troublesome compounds, such organic bases, than acidic silanols present in unbonded silica.

Highly stable and reproducible

Since PVA-Sil is a bonded stationary phase, it can be washed with solvents of any polarity, from hexane through water, without altering the surface activity. Therefore selectivity, retention and resolution are reproducible regardless of the column's previous history. This is not true of bare silica, which easily becomes completely deactivated following the introduction of even small quantity of water.

Provides high sample recovery

The surface of PVA-Sil is very uniform without the highly active acidic silanol sites on bare silica which can cause decomposition of sensitive molecules. Because of consistent surface activity, PVA-Sil exhibits neither non-specific irreversible adsorption nor sample degradation. This is a problem often encountered with bare silica columns. The lack of non-specific adsorption and the uniformity of the polyvinyl alcohol bonded surface means that, unlike silica, PVA-Sil can be reused over and over without fear of contamination or carryover. Sample recoveries on PVA-Sil typically average 90% or higher.

Excellent choice for packed column SFC

The PVA polymer shell on PVA-Sil deactivates the silica support while providing a hydrophilic surface. This, coupled with available column dimension of 1.0 mm and 2.0 mm i.d. means that PVA-Sil columns are well suited for SFC separations.

Column Care

YMC-Pack PVA-Sil is stable towards hydrolysis between pH 2.0-9.5. Remove acid and buffer salts before storage. For detailed information please refer to the "Column Care and Use Instructions" which are shipped with each analytical column.



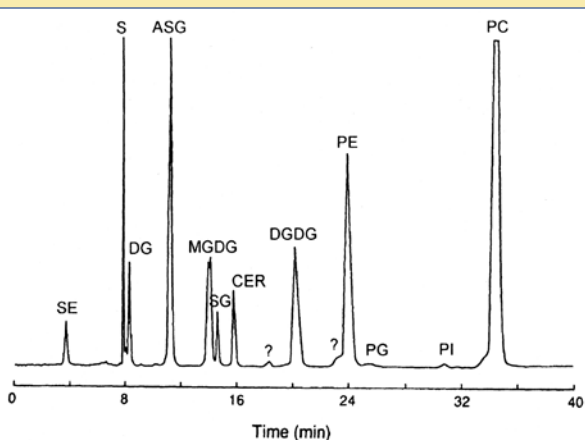
Column Kits

MD VAL R&D PS

pages 22 - 31

YMC-Pack PVA-Sil

Analysis of Potato Lipids



Column: YMC-Pack PVA-Sil (5 μ m, 12 nm) 250 x 4.6 mm i.d.
 Flow rate: 1 to 2 ml/min
 Mobile Phase: A: iso-hexane / methyl ter butyl ether (98:2,v/v)
 B: propan-2-ol / ACN / CHCl₃ / CH₃OOH (84:8:8:0.025)
 C: propan-2-ol / water / triethylamine (50:50:0.2,v/v)

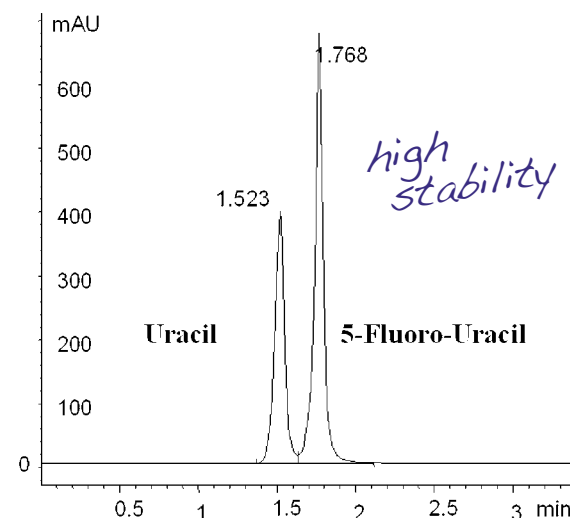
Gradient:
 Tmin: 0 5 15 40 40.1 45 50
 B%: 0 20 52 52 70 0 0
 C%: 0 0 4 14 0 0 0
 Flow (ml/min): 1 1 1 1.4 1.4 2 2

Nebuliser temperature: 25 °C, Evaporation temperature: 35 °C

S: Sterols SE: Sterol Esters SG: Steryl glycosides
 MGDG: Monogalactosyldiacylglycerols DGDG: Digalactosyldiacylglycerols
 PE: Phosphatidylethanolamine PG: Phosphatidylglycerols
 PC: Phosphatidylcholine ASG: Acylsterylglycosides
 PI: Phosphatidylinositol DG: Diacylglycerol
 CER: Cerebrosides

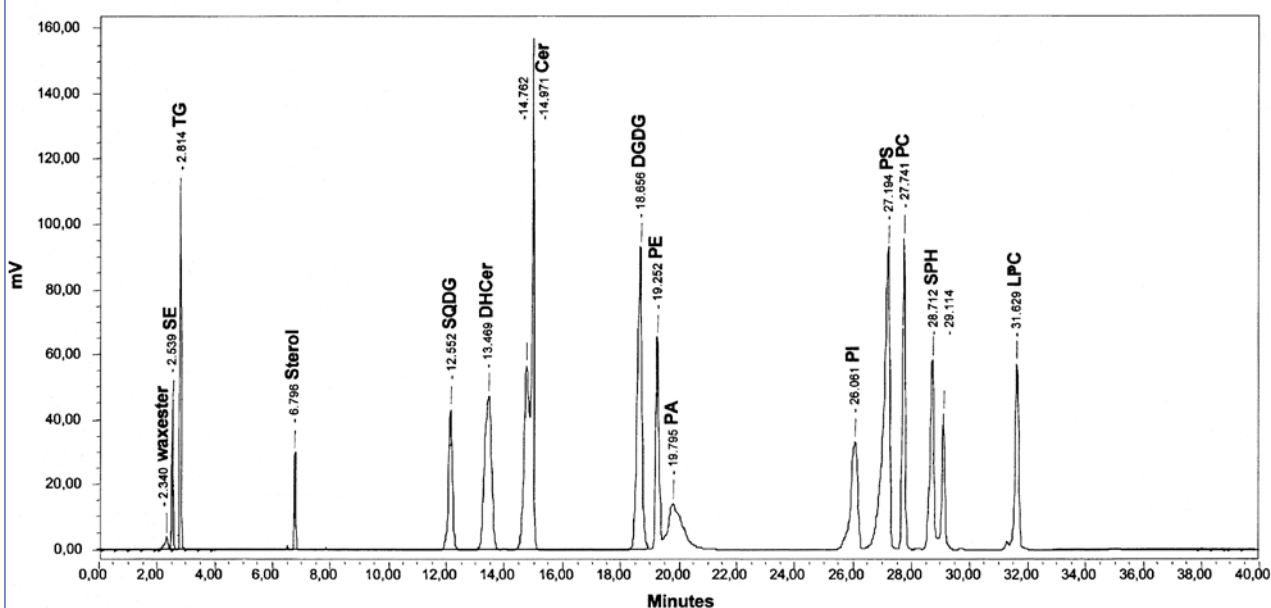
Literature: W.W. Christie; R.A. Urwin, J. high Resol. Chromatogr., Vol. 18 (1995) p.97 - 100

Uracil (in HILIC-mode)



Column: YMC-Pack PCA-Sil (5 μ m, 12 nm) 100 x 3.0 mm i.d.
 Eluent: acetonitrile / CH₃COONH₄; 200 mM, pH 5.5
 isocratic (95/5)
 Flow rate: 0.9 ml/min
 Detection: UV at 275 nm

Analysis of Lipids



Column: YMC-Pack PVA-Sil (5 μ m, 12 nm) 250 x 4.0 mm i.d.
 Eluent: A: n-hexane / tert-methylbutyl ether (98:2, vol/vol)
 B: isopropanol / acetonitrile / chloroform / acetic acid (84:8:8:0.025, v/v)
 C: isopropanol / water / triethylamine (50:50:0.2, by vol)
 plus 5 mM ammonium sulfate
 Flow rate: 1 ml/min
 Detector: ELSD

SE: steryl oleate
 TG: TAG/tripentadecanoin
 Sterol: stigmasteryl/sitosterol
 SQDG: sulfoquinovosyldiacylglycerol
 DHCer: dehydroxycerebroside
 Cer: cerebroside
 DGDG: digalactosyldiacylglycerol
 PE: PE-dipalmitoyl
 PA: PA-diheptadecanoyl
 PC: PI, PS, PC-diheptadecanoyl
 SPH: sphingomyelin
 LPC: lysophosphatidylcholine

Literature: JAOCS, Vol. 80, no. 8 (2003) p. 747-753

YMC-Pack CN (Cyano)



- silica gel chemically bound with cyanopropyl groups
- faster column equilibration than normal silica gel



YMC-Pack CN	Specification	Specification
Particle Size / μm	3; 5	5
Pore Size / nm	12	30
Surface area / m^2g^{-1}	330	175
Carbon content / %	7	2.5
Recommended pH range	2.0 - 7.5	2.0 - 7.5

General

Cyano packings also provide an alternative to silica material in normal phase chromatography, where bonded normal phase packings have the advantage of faster equilibration, more uniform surface activity and increased resistance to dissolution.

To extend column lifetime continued switching between normal and reversed phase solvents should be avoided. Both reversed and normal phase separations can be carried out on this material.



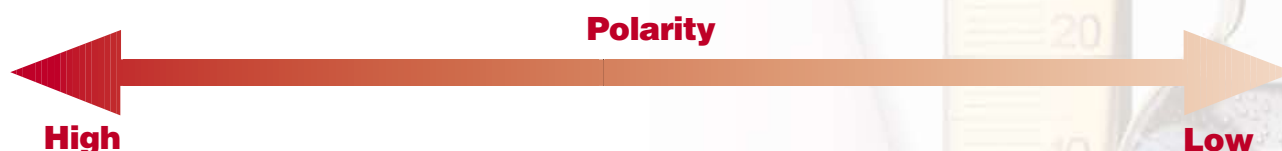
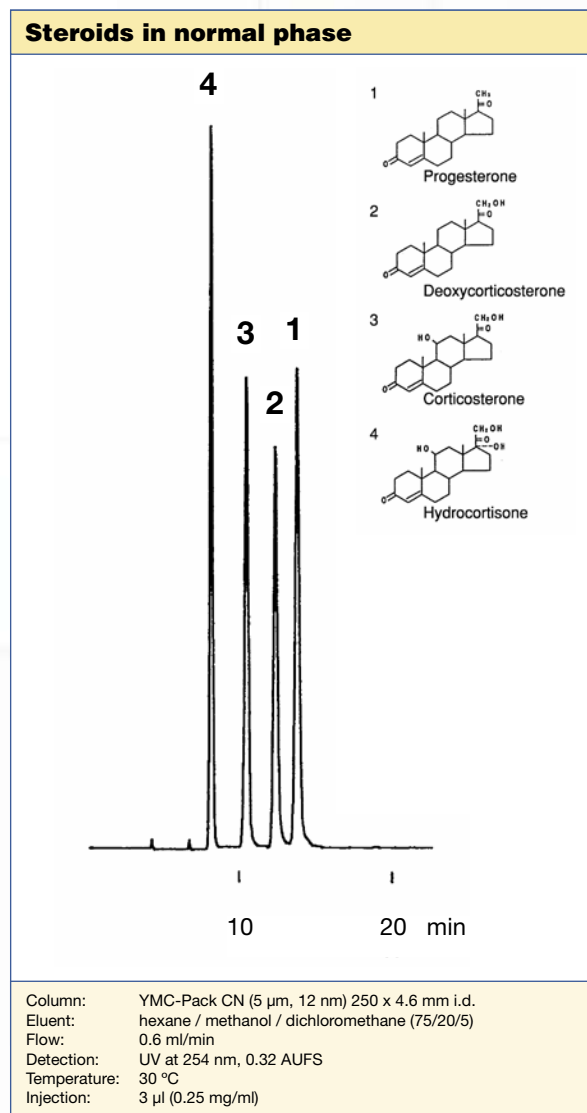
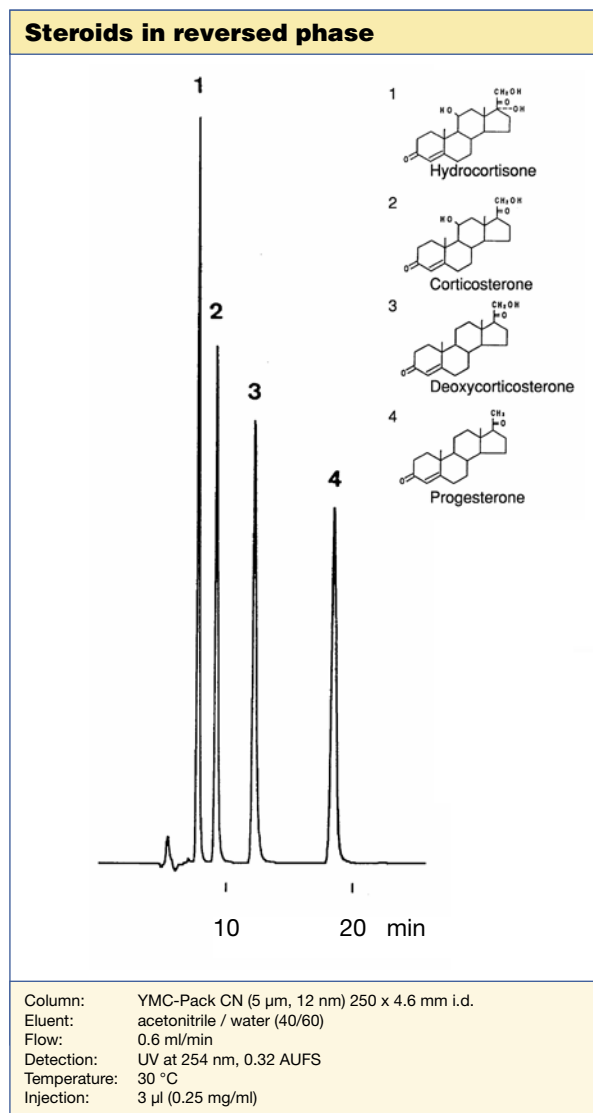
YMC-Pack CN (Cyano) is also available in preparative particle sizes.



YMC-Pack CN (Cyano)

YMC-Pack CN Separation Modes

YMC-Pack CN can be used either in reversed-phase and normal-phase modes since it provides cyanopropyl groups of medium polarity. It can be employed in reversed-phase mode with an aqueous mobile phase of higher polarity and in normal-phase mode with a lower polarity than the stationary phase. This results in an important phenomenon for large-scale work; the elution order will be inverted by use of the alternate separation mode.



Column care

YMC-Pack CN is stable towards hydrolysis between pH 2.0-7.5. Remove acid and buffer salts before storage. For detailed information please refer to the "Column Care and Use Instructions" which are shipped with each analytical column.

YMC-Pack Diol-NP



- **good selectivity without excessive retention**
- **high product recovery rate**
- **high prep loading**
- **bonded phase reproducibility**
- **improved peak shape versus bare silica**
- **gel filtration on a silica based material for aqueous size separations**



YMC-Pack Diol-NP	Specification	
Particle size / μm	5	5
Pore size / nm	6	12
Surface area / m^2g^{-1}	450	330
Recommended pH range (DN) (DL)	2.0 - 7.5 5.0 - 7.5	2.0 - 7.5 5.0 - 7.5

General

In normal phase mode the YMC-Pack Diol stationary phase is a versatile alternative to silica. The bonded phase's hydroxyl groups provide good selectivity without excessive retention, since hydrogen bonding with the diol layer is not as strong as with the silanols on a bare silica surface. Diol columns also provide improved reproducibility when compared with bare silica.

Diol packings are suitable for separations using reversed phase techniques or molecular weight determination of proteins by gel filtration.

Properties

As with all YMC silica based bonded phases, YMC-Pack Diol starts with a base silica support of exceptional purity. YMC manufacturing and quality control procedures ensure that the silica has a very low residual metal content. The silica purity greatly reduces non-specific sample adsorption, thereby providing excellent sample recovery.

The high surface area, together with the large number of available sites for interaction of the 1,2-dihydroxypropane ligands, provides high preparative loading.

YMC-Pack Diol GPC columns exhibit better performance characteristics than underivatized silica for size separations as the non-specific adsorptive sites have been eliminated. Diol is available in four porosities: 6, 12, 20 and 30 nm and thus it is suitable for separation or molecular weight determination of proteins with molecular weights of 10,000 to several hundred thousands.

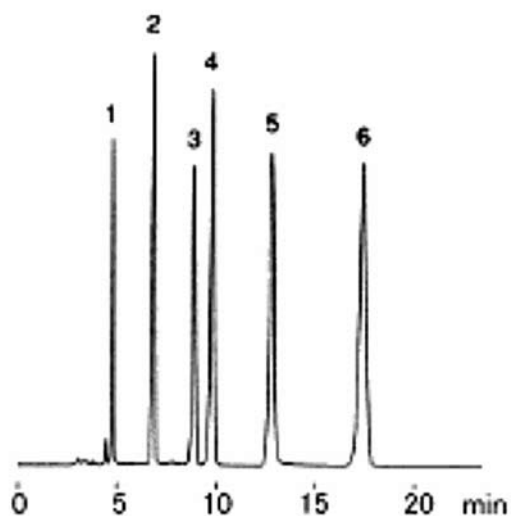
YMC-Pack Diol packings can be cleaned repeatedly with methanol, or even water. When combined with the high mechanical strength of the pure base silica, this washability means that YMC*Gel Diol packings provide longer column life than underivatized silica.



YMC-Pack Diol is also available in preparative particle sizes.

YMC-Pack Diol-NP

Separations of phenols



1. Phenol
2. Catechol
3. Resorcinol
4. Hydroquinone
5. Pyrogallol
6. Phloroglucinol

Column: YMC-Pack Diol-NP (DN) (5 μ m, 12 nm) 250 x 4.6 mm i.d.
Eluent: hexane / ethanol (80/20)
Flow rate: 1.0 ml/min
Temperature: 30 °C
Detection: UV at 254 nm

Column care

YMC-Pack Diol is stable towards hydrolysis between pH 5.0-7.5 in reversed phase mode (DL) and pH 2.0-7.5 in normal phase mode (DN). Remove acid and buffer salts before storage. For detailed information please refer to the "Column Care and Use Instructions" which are shipped with each analytical column.

YMC-Pack Polyamine II



- amino phase with polymeric surface
 - exclusively 2° and 3° amino groups
 - stable towards hydrolysis and oxidation
 - high recovery
 - excellent life-time
-
- saccharides and derivatives
 - nucleotides
 - tocopherols
 - for RP- and NP-mode separations



YMC-Pack Polyamine II	Specification
Particle Size / μm	5
Pore Size / nm	12
Surface area / m^2g^{-1}	n/a
Carbon content / %	n/a
Recommended pH range	2.0 - 9.0

General

The chromatographic separation and the reliable quantitation of saccharides is increasingly important in many areas of food technology, life science and in pharmaceutical industry.

For these particular applications, YMC provides YMC-Pack Polyamine II, a polymer amino phase.

Properties

YMC-Pack Polyamine II is based on ultra-pure YMC silica as a support material. The functionality of the stationary phase is achieved by a covalently bonded polymer layer containing secondary (2°) and tertiary (3°) amino groups. The 2° and 3° amino groups of YMC-Pack Polyamine II are only weakly nucleophilic, exhibiting a significantly reduced reactivity against carbonyl compounds. Therefore, unlike conventional amino phases with primary n-propyl-amino ligands, YMC-Pack Polyamine II does not tend to the formation of Schiff's bases or other stable condensation products. In addition, the 2° and 3° amino groups of the polymer layer are to a large extent resistant to oxidation and hydrolysis (see figure next page).

The low reactivity of the 2° and 3° amino groups preserves the long-term retention characteristics and selectivity of YMC-Pack Polyamine II.

Compared to conventional amino phases, one of their most outstanding benefits is the significantly prolonged lifetime. As the silica matrix is completely polymer coated, even the short-term use of basic eluents up to pH 10.5 is possible.

Reducing sugars are often adsorbed irreversibly to conventional amino phases, which causes problems in their recovery and quantitation. In YMC-Pack Polyamine II columns however, the adsorption of reducing sugars plays only a minor role. As a result a high recovery of these compounds can be obtained which is beneficial for accurate and reliable quantitation.

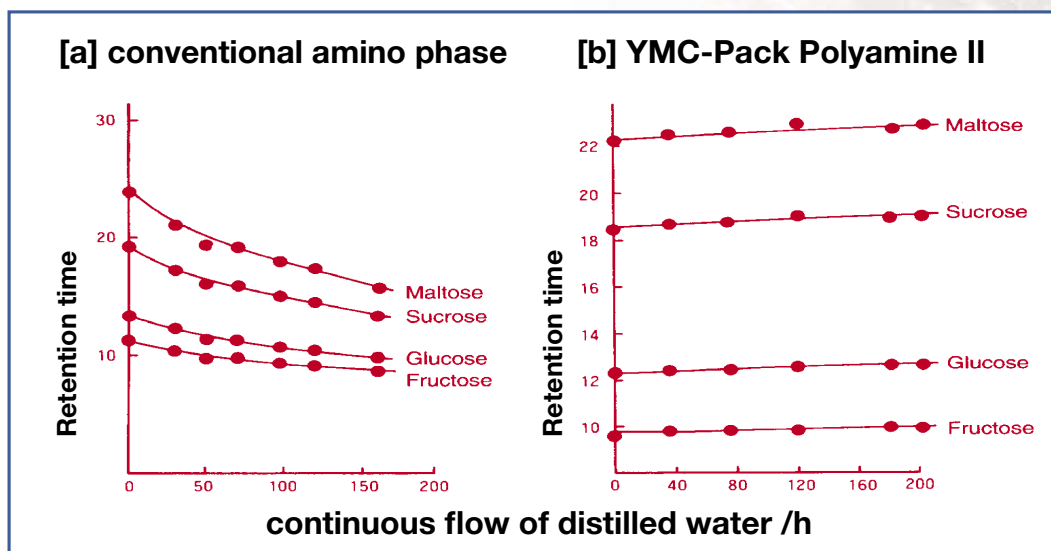
Column care

YMC-Pack Polyamine II is stable towards hydrolysis between pH 2.0-9.0. Remove acid and buffer salts before storage. For detailed information please refer to the "Column Care and Use Instructions" which are shipped with each analytical column.

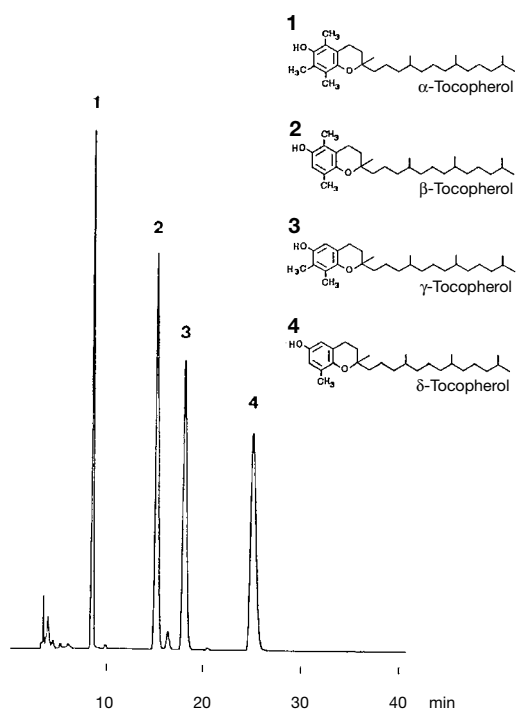


YMC-Pack Polyamine II

Stability of amino type packings*



Tocopherols*



Column: YMC-Pack Polyamine II (5 μ m, 12 nm) 250 x 4.6 mm i.d.
 Eluent: hexane / ethylacetate = 70/30
 Flow: 1.0 ml/min
 Detection: UV, 295 nm
 Temperature: 30 $^{\circ}$ C

Please be referred to page 172-173 for sugar analysis.

* Source: Courtesy of YMC Co., Ltd.

YMC-Pack NH₂ (Amino)



- **primary amine (-NH₂) functionality**
- **stable, high coverage monomeric bonded chemistry**
- **available in analytical, semi-prep and preparative column sizes**



YMC-Pack NH ₂	Specification
Particle Size / μm	3; 5
Pore Size / nm	12
Surface area / m^2g^{-1}	330
Recommended pH range	2.0 - 7.5

General

YMC-Pack NH₂ (Amino) packings are specifically useful for the analysis of mono- and polysaccharides under aggressive normal phase elution conditions. They can also be used in place of silica for conventional normal phase chromatography using nonpolar solvents.

Properties

YMC-Pack NH₂ (Amino) is based on a monomeric bonding of a primary propylamine functionality to YMC's spherical, ultra pure, high surface area silica with a mean pore diameter of 12 nm. The amine functionality provides retention and allows the separation of polar compounds under aggressive normal phase elution conditions, e.g. the analysis of mono- and polysaccharides using acetonitrile/ water eluents. (Since YMC-Pack NH₂ packings operate under normal phase / HILIC elution conditions, water, which is more polar than acetonitrile, is the stronger solvent.) YMC-Pack NH₂ (Amino) can also be used for the separation of isomers of tocopherols and other organic soluble compounds such as paraffins, olefins and aromatics under conventional normal phase conditions.

In aqueous, low pH buffers the amino phase becomes a weak anion exchanger capable of separating negatively charged molecules.

Column care

YMC-Pack NH₂ (Amino) is stable towards hydrolysis between pH 2.0-7.5. Remove acid and buffer salts before storage.

For detailed information please refer to the "Column Care and Use Instructions" which are shipped with each analytical column.

Please be referred to page 172-173 for sugar analysis.



YMC-Pack NH₂ (Amino) is also available in preparative particle sizes.



YMC-Pack TMS (C1)

- intermediate polarity between normal phase silica and other alkyl bonded reversed phases
- operates in either normal phase or reversed phase mode



YMC-Pack TMS	Specification	Specification
Particle Size / μm	3; 5	5
Pore Size / nm	12	30
Surface area / m^2g^{-1}	330	175
Carbon content / %	4	3
Recommended pH range	2.0 - 7.5	2.0 - 7.5

General

YMC-Pack TMS (C1) is a bonded phase suitable for samples that exhibit strong retention characteristics and are difficult or impossible to separate on conventional reversed phase or normal phase packings.

Properties

YMC-Pack TMS (C1) is bonded with trimethylmonochlorosilane to create a phase with intermediate polarity for separation of extremely hydrophobic compounds using conventional reversed phase solvents and of highly polar compounds using normal phase solvents.

The chemistry of TMS is also well-suited for the analysis of multifunctional compounds. Selectivity characteristics of a C1 bonded phase can be unique, and samples must be tested to determine the applicability of the phase.

Column care

YMC-Pack TMS (C1) is stable towards hydrolysis between pH 2.0-7.5. Remove acid and buffer salts before storage. Store the column in methanol / water = 70/30. Clogged inlet frits often can be cleaned by changing the flow direction or replacement.

For detailed information please refer to the "Column Care and Use Instructions", which are shipped with each analytical column.



YMC-Pack TMS (C1) is also available in preparative particle sizes.



Ordering Information



YMC-Pack SIL, 6 nm, 3 µm



Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	SL06S030302QT	SL06S030502QT	SL06S031002QT	SL06S031502QT	SL06S032502QT	SL06S030102
3.0	SL06S030303QT	SL06S030503QT	SL06S031003QT	SL06S031503QT	SL06S032503QT	SL06S030103
4.0	SL06S030304QT	SL06S030504QT	SL06S031004QT	SL06S031504QT	SL06S032504QT	SL06S030104
4.6	SL06S030346WT	SL06S030546WT	SL06S031046WT	SL06S031546WT	SL06S032546WT	SL06S030104



For other dimensions please refer to page 139

YMC-Pack SIL, 12 nm, 3 µm



Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	SL12S030302QT	SL12S030502QT	SL12S031002QT	SL12S031502QT	SL12S032502QT	SL12S030102
3.0	SL12S030303QT	SL12S030503QT	SL12S031003QT	SL12S031503QT	SL12S032503QT	SL12S030103
4.0	SL12S030304QT	SL12S030504QT	SL12S031004QT	SL12S031504QT	SL12S032504QT	SL12S030104
4.6	SL12S030346WT	SL12S030546WT	SL12S031046WT	SL12S031546WT	SL12S032546WT	SL12S030104



For other dimensions please refer to page 139

YMC-Pack SIL, 20 nm, 3 µm



Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	SL20S030302QT	SL20S030502QT	SL20S031002QT	SL20S031502QT	SL20S032502QT	SL20S030102
3.0	SL20S030303QT	SL20S030503QT	SL20S031003QT	SL20S031503QT	SL20S032503QT	SL20S030103
4.0	SL20S030304QT	SL20S030504QT	SL20S031004QT	SL20S031504QT	SL20S032504QT	SL20S030104
4.6	SL20S030346WT	SL20S030546WT	SL20S031046WT	SL20S031546WT	SL20S032546WT	SL20S030104



For other dimensions please refer to page 139

Note: For your first order on guard cartridges, please add one guard cartridge holder per system to your order list: integral guard cartridge holder for columns with 2.1-4.0 mm i.d. **XPGCS-Q1** or universal guard cartridge holder for columns with 4.6 mm i.d. **XPGCH-Q1**. The holder can continuously be re-used and, thus it is not required for repeat orders.

Ordering Information

YMC-Pack SIL, 6 nm, 5 µm

Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	SL06S050302QT	SL06S050502QT	SL06S051002QT	SL06S051502QT	SL06S052502QT	SL06S050102
3.0	SL06S050303QT	SL06S050503QT	SL06S051003QT	SL06S051503QT	SL06S052503QT	SL06S050103
4.0	SL06S050304QT	SL06S050504QT	SL06S051004QT	SL06S051504QT	SL06S052504QT	SL06S050104
4.6	SL06S050346WT	SL06S050546WT	SL06S051046WT	SL06S051546WT	SL06S052546WT	SL06S050104

For other dimensions please refer to page 139



YMC-Pack SIL, 12 nm, 5 µm

Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	SL12S050302QT	SL12S050502QT	SL12S051002QT	SL12S051502QT	SL12S052502QT	SL12S050102
3.0	SL12S050303QT	SL12S050503QT	SL12S051003QT	SL12S051503QT	SL12S052503QT	SL12S050103
4.0	SL12S050304QT	SL12S050504QT	SL12S051004QT	SL12S051504QT	SL12S052504QT	SL12S050104
4.6	SL12S050346WT	SL12S050546WT	SL12S051046WT	SL12S051546WT	SL12S052546WT	SL12S050104

For other dimensions please refer to page 139



YMC-Pack SIL, 20 nm, 5 µm

Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	SL20S050302QT	SL20S050502QT	SL20S051002QT	SL20S051502QT	SL20S052502QT	SL20S050102
3.0	SL20S050303QT	SL20S050503QT	SL20S051003QT	SL20S051503QT	SL20S052503QT	SL20S050103
4.0	SL20S050304QT	SL20S050504QT	SL20S051004QT	SL20S051504QT	SL20S052504QT	SL20S050104
4.6	SL20S050346WT	SL20S050546WT	SL20S051046WT	SL20S051546WT	SL20S052546WT	SL20S050104

For other dimensions please refer to page 139



YMC-Pack SIL, 30 nm, 5 µm

Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	SL30S050302QT	SL30S050502QT	SL30S051002QT	SL30S051502QT	SL30S052502QT	SL30S050102
3.0	SL30S050303QT	SL30S050503QT	SL30S051003QT	SL30S051503QT	SL30S052503QT	SL30S050103
4.0	SL30S050304QT	SL30S050504QT	SL30S051004QT	SL30S051504QT	SL30S052504QT	SL30S050104
4.6	SL30S050346WT	SL30S050546WT	SL30S051046WT	SL30S051546WT	SL30S052546WT	SL30S050104

For other dimensions please refer to page 139



Ordering Information



YMC-Pack PVA-Sil, 12 nm, 5 µm



Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	PV12S050302QT	PV12S050502QT	PV12S051002QT	PV12S051502QT	PV12S052502QT	PV12S050102
3.0	PV12S050303QT	PV12S050503QT	PV12S051003QT	PV12S051503QT	PV12S052503QT	PV12S050103
4.0	PV12S050304QT	PV12S050504QT	PV12S051004QT	PV12S051504QT	PV12S052504QT	PV12S050104
4.6	PV12S050346WT	PV12S050546WT	PV12S051046WT	PV12S051546WT	PV12S052546WT	PV12S050104



For other dimensions please refer to page 139

YMC-Pack CN, 12 nm, 3 µm



Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	CN12S030302QT	CN12S030502QT	CN12S031002QT	CN12S031502QT	CN12S032502QT	CN12S030102
3.0	CN12S030303QT	CN12S030503QT	CN12S031003QT	CN12S031503QT	CN12S032503QT	CN12S030103
4.0	CN12S030304QT	CN12S030504QT	CN12S031004QT	CN12S031504QT	CN12S032504QT	CN12S030104
4.6	CN12S030346WT	CN12S030546WT	CN12S031046WT	CN12S031546WT	CN12S032546WT	CN12S030104



For other dimensions please refer to page 139

YMC-Pack CN, 12 nm, 5 µm



Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	CN12S050302QT	CN12S050502QT	CN12S051002QT	CN12S051502QT	CN12S052502QT	CN12S050102
3.0	CN12S050303QT	CN12S050503QT	CN12S051003QT	CN12S051503QT	CN12S052503QT	CN12S050103
4.0	CN12S050304QT	CN12S050504QT	CN12S051004QT	CN12S051504QT	CN12S052504QT	CN12S050104
4.6	CN12S050346WT	CN12S050546WT	CN12S051046WT	CN12S051546WT	CN12S052546WT	CN12S050104



For other dimensions please refer to page 139

YMC-Pack CN, 30 nm, 5 µm



Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	CN30S050302QT	CN30S050502QT	CN30S051002QT	CN30S051502QT	CN30S052502QT	CN30S050102
3.0	CN30S050303QT	CN30S050503QT	CN30S051003QT	CN30S051503QT	CN30S052503QT	CN30S050103
4.0	CN30S050304QT	CN30S050504QT	CN30S051004QT	CN30S051504QT	CN30S052504QT	CN30S050104
4.6	CN30S050346WT	CN30S050546WT	CN30S051046WT	CN30S051546WT	CN30S052546WT	CN30S050104



For other dimensions please refer to page 139

Ordering Information

YMC-Pack Diol-NP, 6 nm, 5 µm

Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	DN06S050302QT	DN06S050502QT	DN06S051002QT	DN06S051502QT	DN06S052502QT	DN06S050102
3.0	DN06S050303QT	DN06S050503QT	DN06S051003QT	DN06S051503QT	DN06S052503QT	DN06S050103
4.0	DN06S050304QT	DN06S050504QT	DN06S051004QT	DN06S051504QT	DN06S052504QT	DN06S050104



For other dimensions please refer to page 139



YMC-Pack Diol-NP, 12 nm, 5 µm

Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	DN12S050302QT	DN12S050502QT	DN12S051002QT	DN12S051502QT	DN12S052502QT	DN12S050102
3.0	DN12S050303QT	DN12S050503QT	DN12S051003QT	DN12S051503QT	DN12S052503QT	DN12S050103
4.0	DN12S050304QT	DN12S050504QT	DN12S051004QT	DN12S051504QT	DN12S052504QT	DN12S050104
4.6	DN12S050346WT	DN12S050546WT	DN12S051046WT	DN12S051546WT	DN12S052546WT	DN12S050104



For other dimensions please refer to page 139



YMC-Pack Diol-NP, 20 nm, 5 µm

Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	DN20S050302QT	DN20S050502QT	DN20S051002QT	DN20S051502QT	DN20S052502QT	DN20S050102
3.0	DN20S050303QT	DN20S050503QT	DN20S051003QT	DN20S051503QT	DN20S052503QT	DN20S050103
4.0	DN20S050304QT	DN20S050504QT	DN20S051004QT	DN20S051504QT	DN20S052504QT	DN20S050104



For other dimensions please refer to page 139



YMC-Pack Diol-NP, 30 nm, 5 µm

Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	DN30S050302QT	DN30S050502QT	DN30S051002QT	DN30S051502QT	DN30S052502QT	DN30S050102
3.0	DN30S050303QT	DN30S050503QT	DN30S051003QT	DN30S051503QT	DN30S052503QT	DN30S050103
4.0	DN30S050304QT	DN30S050504QT	DN30S051004QT	DN30S051504QT	DN30S052504QT	DN30S050104



For other dimensions please refer to page 139



Ordering Information



YMC-Pack Polyamine II, 12 nm, 5 µm



Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	PB12S050302QT	PB12S050502QT	PB12S051002QT	PB12S051502QT	PB12S052502QT	PB12S050102
3.0	PB12S050303QT	PB12S050503QT	PB12S051003QT	PB12S051503QT	PB12S052503QT	PB12S050103
4.0	PB12S050304QT	PB12S050504QT	PB12S051004QT	PB12S051504QT	PB12S052504QT	PB12S050104
4.6	PB12S050346WT	PB12S050546WT	PB12S051046WT	PB12S051546WT	PB12S052546WT	PB12S050104

For other dimensions please refer to page 139

YMC-Pack NH₂, 12 nm, 3 µm



Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	NH12S030302QT	NH12S030502QT	NH12S031002QT	NH12S031502QT	NH12S032502QT	NH12S030102
3.0	NH12S030303QT	NH12S030503QT	NH12S031003QT	NH12S031503QT	NH12S032503QT	NH12S030103
4.0	NH12S030304QT	NH12S030504QT	NH12S031004QT	NH12S031504QT	NH12S032504QT	NH12S030104
4.6	NH12S030346WT	NH12S030546WT	NH12S031046WT	NH12S031546WT	NH12S032546WT	NH12S030104

For other dimensions please refer to page 139

YMC-Pack NH₂, 12 nm, 5 µm



Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	NH12S050302QT	NH12S050502QT	NH12S051002QT	NH12S051502QT	NH12S052502QT	NH12S050102
3.0	NH12S050303QT	NH12S050503QT	NH12S051003QT	NH12S051503QT	NH12S052503QT	NH12S050103
4.0	NH12S050304QT	NH12S050504QT	NH12S051004QT	NH12S051504QT	NH12S052504QT	NH12S050104
4.6	NH12S050346WT	NH12S050546WT	NH12S051046WT	NH12S051546WT	NH12S052546WT	NH12S050104

For other dimensions please refer to page 139

Ordering Information

YMC-Pack TMS, 12 nm, 3 μm

Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	TM12S030302QT	TM12S030502QT	TM12S031002QT	TM12S031502QT	TM12S032502QT	TM12S030102
3.0	TM12S030303QT	TM12S030503QT	TM12S031003QT	TM12S031503QT	TM12S032503QT	TM12S030103
4.0	TM12S030304QT	TM12S030504QT	TM12S031004QT	TM12S031504QT	TM12S032504QT	TM12S030104
4.6	TM12S030346WT	TM12S030546WT	TM12S031046WT	TM12S031546WT	TM12S032546WT	TM12S030104

For other dimensions please refer to page 139



YMC-Pack TMS, 12 nm, 5 μm

Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	TM12S050302QT	TM12S050502QT	TM12S051002QT	TM12S051502QT	TM12S052502QT	TM12S050102
3.0	TM12S050303QT	TM12S050503QT	TM12S051003QT	TM12S051503QT	TM12S052503QT	TM12S050103
4.0	TM12S050304QT	TM12S050504QT	TM12S051004QT	TM12S051504QT	TM12S052504QT	TM12S050104
4.6	TM12S050346WT	TM12S050546WT	TM12S051046WT	TM12S051546WT	TM12S052546WT	TM12S050104

For other dimensions please refer to page 139



YMC-Pack TMS, 30 nm, 5 μm

Column i.d. (mm)	Column length (mm)					Guard cartridges with 10 mm length (pack of 5)
	33	50	100	150	250	
2.1	TM30S050302QT	TM30S050502QT	TM30S051002QT	TM30S051502QT	TM30S052502QT	TM30S050102
3.0	TM30S050303QT	TM30S050503QT	TM30S051003QT	TM30S051503QT	TM30S052503QT	TM30S050103
4.0	TM30S050304QT	TM30S050504QT	TM30S051004QT	TM30S051504QT	TM30S052504QT	TM30S050104
4.6	TM30S050346WT	TM30S050546WT	TM30S051046WT	TM30S051546WT	TM30S052546WT	TM30S050104

For other dimensions please refer to page 139



Ordering Information

Sure-Fit™ Connector

Since different column hardware manufacturers have introduced a variety of connecting port geometries over the years, the Sure-Fit™ Connector represents an ideal tool to avoid dead volumes or leakages, irrespective



of the column brand, when connecting different columns to an HPLC system. YMC strongly recommends the use of the Sure-Fit™ Connector due to its internal spring tensioned mechanism, which automatically self-adjusts to any port depth while maintaining constant pressure on the capillary tubing. This guarantees a connection free from any dead volume. Column changeovers become easy, especially as no tools are required. The Sure-Fit™ Connector is fingertight to 6000 psi and is available in a range of capillary tubing i.d. and lengths.

Column i.d.* (mm)	Tubing i.d.* (mm)	Single end unit (incl. 20 mm stainless steel capillary)	Double end unit (incl. 20 mm stainless steel capillary)
1.0-3.0 3.0-4.6	0.13 0.18	SFS2005 SFS2007	SFD2005 SFD2007

* Other versions available on request

Ordering Information

The previous product listing represents commonly used standard column dimension. In order to identify any specific product version and order number, please see the example and the table below.

Full listing of all chemistries and dimensions

Gel Code								Hardware Code							
Chemistry code		Pore size [nm]		Particle shape		Particle size [μm]		Length [mm]		Inner diameter [mm]		Column Type			
YMC30	CT	6	06	spherical	S	3	03	10	01	0.05	E5	Quick Seal Cartridge Waters type	QT QC WT		
Pro C18	AS	8	08			4	04	20	02	0.075	E8				
Pro C18 RS	RS	12	12			5	05	33	03	0.1	F0				
Hydrosphere C18	HS	20	20			6	06	50	05	0.2	G0				
ODS-A	AA	30	30					75	L5	0.3	H0				
ODS-AM	AM	100	A0			10	11	100	10	0.5	J0				
ODS-AQ	AQ	proprietary	99			15	16	125	R5	0.8	M0				
J'sphere ODS-H80	JH	non-porous	00			20	21	150	15	1.0	01				
J'sphere ODS-M80	JM					50	50	250	25	2.1	02				
J'sphere ODS-L80	JL					75	75			3.0	03				
ODS-AL	AL							300	30	4.0	04				
PAH	YP							63/210	A4						
PolymerC18	PC							150	A5	500	50			4.6	46
Pro C8	OS									1000	A0			6.0	06
C8 (Octyl)	OC													8.0	08
YMCbasic	BA													10	10
Ph (Phenyl)	PH													20	20
Pro C4	BS													30	30
C4 (Butyl)	BU														
Protein-RP	PR													50 (2000 psi)	52
TMS (C1)	TM													70 (2000 psi)	72
PVA-Sil	PV													100 (2000 psi)	A2
Polyamine II	PB													150 (2000 psi)	B2
NH ₂ (Amino)	NH													200 (2000 psi)	C2
CN (Cyano)	CN														
Diol	DL														
SIL (Silica)	SL														
BioPro-QA	QA														
BioPro-SP	SP														
BioPro-QA-F	QF														
BioPro-SP-F	SF														
Chiral NEA (R)	NR														
Chiral NEA (S)	NS														
Chiral CD BR α	DA														
Chiral CD BR β	DB														
Chiral CD BR γ	DG														
Chiral Prep CD ST	ST														
Chiral Prep CD PM	PM														

Example

Choose your column and fill in the “Gel and Hardware Code” or detailed description (The part number consists of the “Gel Code” and the “Hardware Code”).

YMC-Pack ODS-A

12 nm

spherical

3 μm

250 mm

1.0 mm

Quick Seal

AA

12

S

03

25

01

QT

Example

Choose your column and fill in the "Gel and Hardware Code" or detailed description (The part number consists of the "Gel Code" and the "Hardware Code").

YMC-Pack ODS-A 12 nm spherical 3 µm 250 mm 1.0 mm Quick Seal

AA 12 S 03 25 01 QT

Your column part number: **AA12S032501QT (Example)**

Please note that combinations of features cannot be selected at random, but only from the possible specifications for a chosen stationary phase. These can be determined from the individual product sections in this catalogue or from our homepage www.ymc.de.

For more details



contact your local distributor or

YMC Europe GmbH, Schöttmannshof 19, D-46539 Dinslaken, Phone: +49 (0) 2064 / 427-0,

Fax +49 (0) 2064 / 427-222, e-mail: info@ymc.de, homepage: www.ymc.de