

Operation Manual

Shodex Asahipak GF/GS-HQ series

(Please read this manual carefully before using the column to keep its good performance and life.)

1. Introduction

Shodex Asahipak GF/GS-HQ series columns, packed with synthesized high molecular weight hard gel, are designed primarily for use with Size Exclusion as the main separation mode. GF/GS-HQ series columns are improved in the theoretical plate number and the resolution than the former GS series columns. GF-HQ series columns are the Multi-solvent type and can be used with both aqueous and organic solvents. GS-HQ series columns can be used with aqueous solution and named as the Multi-mode type because of having not only Size Exclusion mode but also Distribution/Adsorption and Ion-Exchange modes.

2. Instructions in handling < Important >

Caution for newly instration

*Flush all flow lines with 30% methanol aqueous solution before installing the column. Set flow rate at 0.2 mL/min and connect the column. Wash the column at 0.2 mL/min for about one hour. Then pump the eluent to the column at 0.2 mL/min for more than three hours.

Caution for usual operation

* Use the column in accordance with the column specifications (see the clause 3). There is a danger of deteriorating the performance when it is handled beyond the permissible range even for a short time.

3. Specifications

Column size:	Analytical columns	7.5mmID×300mmL
	Guard columns	7.5mmID×50mmL
Connecting screws	Swagelock type (inch)	
Column material	SUS-316	
In-column solvent	30% methanol aqueous solution	
Temperature	4 - 60 °C	

(1) Analytical columns

^{*)} Estimated value

Type	Grade	Exclusion Limit M.W. (Pullulan)	Theoretical Plate Number (per column)	Flow rate (mL/min.)		Pressure (MPa)	pH range
				Normal	Max		
Multi-solvent column	GF-310 HQ	40,000	> 19,000	0.4~0.6	1.0	7.0	2 - 9
	GF-510 HQ	300,000	> 19,000	0.4~0.6	1.0	6.5	2 - 9
	GF-710 HQ	10,000,000 ^{*)}	> 11,000	0.4~0.6	1.0	2.5	2 - 9
	GF-7M HQ	10,000,000 ^{*)}	> 13,000	0.4~0.6	1.0	4.5	2 - 9
Multi-mode column	GS-220 HQ	3,000	> 19,000	0.4~0.6	1.0	6.0	2 - 9
	GS-320 HQ	40,000	> 19,000	0.4~0.6	1.0	5.0	2 - 12
	GS-520 HQ	300,000	> 18,000	0.4~0.6	1.0	3.0	2 - 12
	GS-620 HQ	2,000,000	> 18,000	0.4~0.6	1.0	3.5	2 - 12

(2) Guard columns

Grade	Columns guarded
GF-1G 7B	GF-310 HQ, GF-510 HQ, GF-710 HQ, GF-7M HQ
GS-2G 7B	GS-220 HQ, GS-320 HQ, GS-520 HQ, GS-620 HQ

4. Important notes for using aqueous salts solution

(1) Strong electrolytic salts

Total salts concentration should be 0.5M or less. Aqueous solution of NaCl, KCl, Na₂SO₄, (NH₄)₂SO₄ and other such salts can be used as eluents. Phosphoric acid, acetic acid, citric acid and tris-HCl buffer solutions can be also used, either independently or in combination with these salts.

(2) Aqueous urea and guanidine hydrochloride

When you replace eluent from an aqueous solution to an organic solvent or from an organic solvent to an aqueous solution, you have to set flow rate at 0.2mL/min or less. It takes about three hours to achieve complete replacement of the in-column eluent.

When you replace eluent from one organic solvent to another organic solvent, you have to set flow rate at 0.2mL/min or less. It takes about three hours to achieve complete replacement of the in-column eluent.

(2) For analysis

Recommended flow rate is 0.4~0.6mL/min. When an eluent which has high viscosity is used and operation temperature is low, set flow rate under 0.6mL/min. When you start flowing eluent to the column, you have to set flow rate at 0.2mL/min.

Attention!

- 1) Do not remove the end fittings of the column under any circumstances.
- 2) Do not make a strong impact on the column: such as hitting or dropping on the floor.
- 3) Replace the solvent in the chromatograph with the eluent to be used before connecting the column.
- 4) Connect the column so that the flow direction corresponds to the arrow mark on the tag.
- 5) When the column is not used for a month or more, replace the in-column solvent with 30% methanol aqueous solution, close each end with the end fittings, and store it at room temperature.
- 6) Filtrate the sample with a disposable filter (0.45 μ m) to prevent deterioration by adsorbing insoluble matters.

7. Warranty

1. Showa Denko K. K. warrants that the Shodex Column, at the time of delivery to the user, will conform to the specification of the attached Certificate of Analysis, if the Shodex Column is used in accordance with the operating manual. The foregoing warranty is exclusive and is in lieu of all other warranties with respect to the Shodex Column, whether written, oral, implied, statutory or otherwise. No warranties by Showa Denko K. K. are implied or otherwise created, including, but not limited to, the warranty of merchantability and fitness for particular purposes.

2. Any claim of inconformity to the specification must be notified to Showa Denko K.K. within ten (10) days after delivery to the user. User's exclusive remedy and Showa Denko K.K.'s exclusive liability for such claim are limited to the replacement of the Shodex Column in question. In no event is Showa Denko K.K. liable for any indirect, incidental or consequential damage arising out of in connection with the Shodex Instrument, whether or not such damage is allegedly based on breach of warranty, negligence or otherwise.

3. No warranty is made in any of the following cases:

- 1) If the Shodex Column is not used in accordance with the operating manual
- 2) If the Shodex Column is remodelled by anyone other than person or firm designated by Showa Denko K.K.
- 3) If the Shodex Column is disposed of
- 4) If the Shodex Column is resold by the user without giving prior written notice to Showa Denko K.K.
- 5) If the performance of the Shodex Column is not conform to the specification of the attached Certificate of Analysis due to any of the reasons below:
 - a) Computer virus
 - b) Impurities contained in the sample, reagent, gas air or cooling water provided by the user
 - c) Breakdown or malfunction of equipment, apparatus or component used in combination with the Shodex Column
 - d) Force majeure such as fire, earthquake, flood, other natural disaster, rime, riot, act of terrorism, war or radioactive contamination

4. In no event is Showa Denko K.K. liable for (i) the results of analyses or preparations using the Shodex Column or any portion of the same, including, but not limited to, the reliability, accuracy, efficacy and safety of said results, and (ii) the occupational hazard in the use of the Shodex Column, whether or not such use is made in accordance with the attached Conditions for use.

5. The Shodex Instrument is for laboratory use only. It must not be used for clinical diagnosis. Showa Denko K.K. is not liable for any use of the Shodex Instrument except laboratory use.

When you replace eluent from an aqueous solution to an organic solvent or from an organic solvent to an aqueous solution, you have to set flow rate at 0.2mL/min or less. It takes about three hours to achieve complete replacement of the in-column eluent.

When you replace eluent from one organic solvent to another organic solvent, you have to set flow rate at 0.2mL/min or less. It takes about three hours to achieve complete replacement of the in-column eluent.

(2) For analysis

Recommended flow rate is 0.4~0.6mL/min. When an eluent which has high viscosity is used and operation temperature is low, set flow rate under 0.6mL/min. When you start flowing eluent to the column, you have to set flow rate at 0.2mL/min.

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- 2) Do not make a strong impact on the column: such as hitting or dropping on the floor.
- 3) Replace the solvent in the chromatograph with the eluent to be used before connecting the column.
- 4) Connect the column so that the flow direction corresponds to the arrow mark on the tag.
- 5) When the column is not used for a month or more, replace the in-column solvent with 30% methanol aqueous solution, close each end with the end fittings, and store it at room temperature.
- 6) Filtrate the sample with a disposable filter (0.45 μ m) to prevent deterioration by adsorbing insoluble matters.

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- 5) If the performance of the Shodex Column is not conform to the specification of the attached Certificate of Analysis due to any of the reasons below:
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 - b) Impurities contained in the sample, reagent, gas air or cooling water provided by the user
 - c) Breakdown or malfunction of equipment, apparatus or component used in combination with the Shodex Column
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4. In no event is Showa Denko K.K. liable for (i) the results of analyses or preparations using the Shodex Column or any portion of the same, including, but not limited to, the reliability, accuracy, efficacy and safety of said results, and (ii) the occupational hazard in the use of the Shodex Column, whether or not such use is made in accordance with the attached Conditions for use.

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