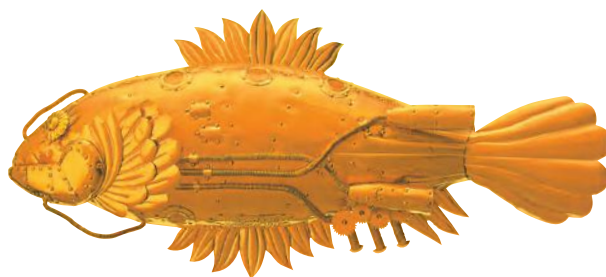


# Shodex™



## HPLC Columns

### MANUAL

### Asahipak NH2P

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Made in Japan

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# Operation Manual

## Shodex™ Asahipak™ NH2P

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

### 1. Introduction

The Shodex Asahipak NH2P series is packed with a polymeric gel containing chemically bonded polyamine groups. Under the chromatographic conditions generally employed for the silica-base amino columns, the NH2P column provides equal resolution and far greater reproducibility. NH2P column can be used as Hydrophilic Interaction chromatography [HILIC] mode and ion-exchange chromatography [IEC] mode.

### 2. Handling Instructions

**Caution!** Please consult the MSDS for the reagents and solvents used with the columns for health concerns caused by acute exposure due to leakage from the column or adjoining tubing.

**Attention!** Use the column within the regular range of flow rate, pressure and temperature.

The column performance may deteriorate when it is handled beyond the permissible range even for a short time. See the Section 4. Usable Conditions for the permissible ranges.

### 3. Specifications

Product code	Product name	Size (mm)		Particle size (μm)	Plate number (TP/per column)
		ID	Length		
F7630002	NH2P-50 4D	4.6	150	5	>5,500
F7630001	NH2P-504E	4.6	250		>7,500
F6710016	NH2P-50G4A	4.6	10		(guard column)

Packing material: Polyvinyl alcohol.

Functional group: Amino (Polyamine).

Column material: Stainless steel (SUS 316).

Screw type: Unified Thread Standard No. 10-32 UNF.

Shipping solvent: Acetonitrile.

#### 4. Usable Conditions

Product name	Flow rate (mL/min)		Max pressure (MPa)	pH range	Temperature range (°C)
	Standard	Max			
NH2P-50 4D	0.5~1.0	1.5	10	2~13	4~50
NH2P-50 4E	0.5~1.0	1.5	15		
NH2P-50G 4A	0.5~1.0	1.5	15		

**Attention!** High-temperature operation may result in the generation of an air bubble, necessitating degassing of the column. Low-temperature operation may require reduced flow rates, because of increased eluent viscosity.

#### 5. System Clean up

Clean up the LC system excluding the detector cell, before column installation. Also, wash the injector and the sample loop by switching the valve.

**Attention!** The previous eluent used for analyses in the system may damage the column, if it is not compatible with the column.

**Attention!** When replacing nonpolar solvent to water, replace first with methanol and then replace with water. When replacing buffer solution to acetonitrile/water, replace first with 100% water and then replace with eluent. Substances adsorbed in the pump and tubing may not be compatible with the column.

#### 6. Column Installation

Install and use the NH2P column with the flow through the column matching the flow direction arrow on the column label. Set the flow rate at 0.3mL/min, and connect the column. Flow at the low rate until the column temperature increases to the setting temperature, and then, increase the flow rate to the analytical condition.

**Attention!** The column should always be installed in the manner above, for safe and effective operation.

## 7. Eluents

	HILIC mode	IEC mode
Operational solvents	<p>Aqueous solutions of acetonitrile (or ethanol<sup>*1</sup>) at any ratio, is used as eluent.<sup>*2</sup></p> <p><sup>*1</sup> With aqueous ethanol solutions, the flow rate should be lower than normal, due to relatively high viscosity.</p> <p><sup>*2</sup> Other organic solvents are not guaranteed as the eluent.</p> <p>Any salts<sup>*3</sup> soluble in the solution above (such as tetrapropylammonium acetate or sodium acetate) are available.</p> <p><sup>*3</sup> Maximum concentration of the buffer depends on the ratio of acetonitrile (or ethanol). Please note any precipitation of salt when using buffer!</p>	<p>Buffer solutions such as phosphate, acetate, and tris.</p> <p>Aqueous solutions of NaCl, KCl, or Na<sub>2</sub>SO<sub>4</sub>.</p> <p>(pH 2 -13)</p>
Eluent modes	Isocratic, gradient, or stepwise elution	

**Attention!** Filter the eluent with a membrane filter (0.45µm) to prevent chromatogram noise and column performance deterioration by small particles or undissolved materials.

**Attention!** When the shipping solvent (100% acetonitrile) is replaced with a buffer solution, please flow 100% water to the column before flowing the buffer solution to avoid the precipitation of the buffer.

**Attention!** Shodex line filter, NH2P-LF, is a filter for removing undesired contaminants in the eluent. By installing the filter between the pump and the injector, deterioration of the column is reduced.

**Attention!** Column equilibration for using acetonitrile/buffer eluent. Anions in the buffer interact with the amino functional groups of NH2P packing gel. The reproducibility of the analysis will not be attained until the ionic equilibrium is attained between the anions and the amino groups. In such case, the equilibration time may be shortened by the operation below. This equilibrium operation is not needed when acetonitrile/water or buffer eluents are used.

	HILIC mode		IEC mode
Eluent	Acetonitrile/buffer	Acetonitrile/water	Buffer
Solution	The same buffer without acetonitrile	Unnecessary	Unnecessary
Quantity	10 to 20 times the column volume		
Flow rate	Lower than half of the normal flow rate		

**Attention!** When the shipping solvent (100% acetonitrile) is replaced to a buffer solution, please flow 100% water to the column before flowing the buffer solution to avoid precipitation of the buffer.

**Attention!** When the eluent conditions change from buffer solution to acetonitrile/water, please clean the column with alkaline solution. See Section 10 Column Cleaning.

## 8. Sample Preparation

		HILIC		IEC
Sample preparation	Solid sample	Eluent: Acetonitrile/ water	Dissolve sample in water or the eluent, and add acetonitrile to obtain 50% or higher acetonitrile aqueous solution.	Dilute with the eluent
		Eluent: Acetonitrile/ buffer	Dissolve sample in the buffer or the eluent; and add acetonitrile to obtain 50% or higher acetonitrile aqueous solution.	
	Aqueous	Add acetonitrile to obtain 50% or higher acetonitrile aqueous		

	sample	solution.
Injection volume	20 $\mu$ L or less for analytical columns	

Optimum separation efficiency is generally obtained with sample matrix similar to the eluent composition. Use acetonitrile in the sample matrix whenever possible.

**Attention!** Filter the sample with a membrane filter (0.45 $\mu$ m) to prevent blockage.

**Attention!** In case of gradient condition, dilute with the initial eluent.

## 9. Column Cleaning

Elution characteristics of a column may change considerably after long, repeated usage, due to the accumulation of pollution components on the packing material, for example metal ions from the LC system or the sample.

In such cases, remove guard column, and clean the column with methods below.

The applied flow rate should be lower than 0.5 mL/min.

### Cleaning method 1 (Standard cleaning)

Cleaning solution		NH2P-50 4D	NH2P-50 4E	NH2P-50G 4A
1	H <sub>2</sub> O	6 min	10 min	1 min
2	0.1M NaOH <sub>aq.</sub>	75 min	120 min	5 min
3	H <sub>2</sub> O	12 min	20 min	2 min
4	Eluent	40 min	60 min	3 min

### Cleaning method 2 (Cleaning metal ions)

Cleaning solution		NH2P-50 4D	NH2P-50 4E	NH2P-50G 4A
1	H <sub>2</sub> O	6 min	10 min	1 min
2	0.1M HClO <sub>4</sub> <sub>aq.</sub>	75 min	120 min	5 min
3	H <sub>2</sub> O	6 min	10 min	1 min
4	0.1M NaOH <sub>aq.</sub>	75 min	120 min	5 min
5	H <sub>2</sub> O	12 min	20 min	2 min
6	Eluent	40 min	60 min	3 min

**Caution!** Do not mix the  $\text{HClO}_4$  solution with NaOH solution, as  $\text{NaClO}_4$  is produced when mixed- $\text{NaClO}_4$  is a combustible and explosive compound. Flow the acidic and alkali waste into separate bottles, never concentrate or dry the wastes, and process each waste promptly.

## 10. Column Inspection

Column inspection method is described in Certificate of Analysis (CoA).

**Attention!** Assessment of the column's functional integrity prior to initial and later use by standardized comparison of the certificate of analysis. Please see CoA for the detailed analysis conditions and sample preparation.

## 11. 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 LC system 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 two weeks or more, replace the in-column solvent with the shipping solvent, remove from the LC system, close each end with a stopper, and store it at cool and dark space.
- 6) Contact Shodex website (<http://www.shodex.com/>) or Shodex partners regarding product and analysis applications.

## 12. 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 remodeled by anyone other than person or firm designated by Showa Denko K.K.

(3) If the Shodex Column is resold by the user without giving prior written notice to Showa Denko K.K.

(4) 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.