SHIMADZU
Excellence in Science

ERAD-0001-9007B

High Performance Packed Column for HPLC

Shim-pack

GIST/GISS Series

INSTRUCTION MANUAL

■ Introduction

To maintain and maximize peak performance of Shim-pack GIST/GISS series columns, and to ensure the long life and stability of columns, please read the following instructions before use.

■ Specifications

The product specifications of Shim-pack GIST/GISS series columns are as follows.

Type	Columns	Stationary Phase	Base Material
Reversed-Phase	Shim-pack GIST C18 Shim-pack GIST C18-AQ Shim-pack GISS C18	Octadecyl Groups (C18)	High purity porous spherical silica
	Shim-pack GIST C8 Shim-pack GISS C8	Octyl Groups (C8)	
	Shim-pack GIST Phenyl	Phenyl Groups	
	Shim-pack GIST Phenyl-Hexyl	Phenyl-Hexyl Groups	
	Shim-pack GIST PFPP	Pentafluorophenyl Groups	
Normal-Phase	Shim-pack GIST NH2	Aminopropyl Groups	
HILIC	Shim-pack GIST Amide	Carbamoyl Groups	

■ Operating Precautions

Check if anything is missing or damaged. If there are any signs of damage, notify your local Shimadzu representative at once.

Each of the Shim-pack GIST/GISS series columns is delivered with a Column Performance Report. The information supplied in the report include the lot number, column serial number, and chromatographic test conditions. Please keep the report for future reference.

■ Column Performance

Shim-pack GIST/GISS series packing materials are subjected to a rigorous array of QC tests, with special emphasis on reagent purity, raw material traceability, consistency in raw materials, and quality of final products. A detailed analysis of all of the physical and chemical properties of these columns, combined with tests for chromatographic selectivity and column packing material efficiency, ensure that each lot of these columns are identical to all previous lots and column-to-column reproducibility is of the highest order.

Shim-pack GIST/GISS series columns are shipped with the solvent used for the final QC test of the column, as detailed in the Column Performance Report delivered with the column.

When switching between solvents with vastly different polarities, first purge the column with a mutually miscible solvent such as Isopropyl alcohol at a reduced flow rate (approximately 50% lower than the normal flow rate). Flush the column five times more than the column volume (e.g. 10 mL for a 150 mm x 4.6 mm I.D. column).

■ Column Installation

The flow direction of the column is shown on the column (→). When installing the column, ensure that the flow direction matches the mobile phase flow direction.

Use PEEK tubing (UHPLC: SUS tubing) with an inner diameter of 0.25 - 0.3 mm (UHPLC: 0.1 - 0.2 mm) and an outer diameter of 1.6 mm.

Use the shortest possible tubing connection from the injector to the column to minimize peak broadening.

The column should be connected with male nuts. Ensure that the fittings are connected properly to avoid creating dead volume between the tubing and the column interface. Male nuts can be ordered by referring to the part number below.

Item name	P/N	Remarks	Pressure
Male nut, PEEK	228-18565-84	5 pcs	20 MPa
Male nut 1.6 MN	228-16001	1 pc	130 MPa
Ferrule 1.6 F	228-16000-10	1 pc	130 MPa
UHPLC Fitting 2 S	228-56867-41	1 pc	130 MPa
Nexlock Fitting	228-62544-90	1 pc	130 MPa

NOTE Stains or air in the flow line may deteriorate the column. Before connecting the column, be sure to flow the mobile phase to flush the flow line.

If peaks are tailing more on the early eluting compounds than later eluting compounds, there is a possibility that there is a dead volume. In such case, check that all column connections are properly connected.

Also, make sure to use appropriate internal diameter and length size of tubing at the injector and detector, especially when using semi-micro size columns, to avoid system dead volumes.

■ Sample

Samples should be dissolved in an eluent or solvent weaker than the mobile phase, which helps avoid sample precipitation at column inlet/head and inconsistent retention values.

■ Clogging of column

The most common cause of the increase of column back pressure or split peaks is blockage of the inlet filter by sample particulates, particles created by aging pump seals, or large quantities of lipophilic compounds adsorbing to the head of the column.

- Filtrate the mobile phase using a 0.45 μm membrane filter before using the column.
- Installing “Ghost Trap DS” between the pump and injector can efficiently remove particulates or contaminants in the mobile phase.

- Filtrate the sample using a syringe filter before injecting to the column.
- Installing “Guard Column” or “Guard Column for UHPLC” can prevent column clogging problems.

Baseline drift and noise can be caused by defective pumping due to air bubbles in eluent or decrease of light intensity when using a UV detector. Note that bubbles can form in the detector flow cell if the eluent is not degassed properly before introduction into the column.

■ Column Handling Precautions

Do not drop or bump the columns, to avoid a deterioration of the column performance.

To maximize column life, use the columns within the pressure shown in the following table.

Particle Size	Recommended Operating Pressure
1.9 μm, 2 μm	Under 80 MPa
HP 3 μm	Under 50 MPa
3 μm, 5 μm	Under 20 MPa

Avoid rapid pressure fluctuation.

Column should be disconnected from the system after the pressure gauge indicates “0”.

Please note that operating the sample injection valve slowly or using an auto-sampler with slow valve switching speed will also generate a rapid pressure increase at the column inlet, which will cause premature column deterioration.

For operating temperature and pH limits, please refer to the following table.

Columns	pH Range (From 20-40℃)	Maximum Operating Temperature	
Shim-pack GIST C18 Shim-pack GIST C18-AQ Shim-pack GISS C18	1-10 *1,2,3	60℃ (pH 1-7)	50℃ (pH 7-10)
Shim-pack GIST C8 Shim-pack GISS C8 Shim-pack GIST Phenyl-Hexyl	1-10 *1,2,3	60℃ (pH 2-7)	50℃ (pH 7-9)
Shim-pack GIST Amide	2-8.5 *2	60℃ (pH 2-7)	50℃ (pH 7-8.5)
Shim-pack GIST Phenyl Shim-pack GIST NH2 Shim-pack GIST PFPP	2-7.5 *2	60℃ (pH 2-7.5)	

NOTE

* 1 If you use the column with eluents at pH1 - pH2 or pH9 - pH10, we recommend you to keep column temperature lower and use the eluent contained trifluoroacetic acid, formic acid, acetic acid, phosphate buffer or organic buffer, such as 5 mM triethylamine. If you use the column without organic solvent, we suggest you to use the column within the pH range of pH2 - pH8.

* 2 To maximize the column lifetime, set the pH of the mobile phase within the range shown in the above table.

* 3 To maximize the column lifetime, lower the column temperature when the pH of the mobile phase from 1-2 and 9-10. In addition, use mixed mobile phase such as organic solvent and buffer rather than 100% buffer.

■ Flow rate of Prep column

Please read the following instructions before using prep columns.

- The optimum performance will be gained in the range of flow rate listed below. Even so, since the column may have considerable pressure, we recommend you to use the column at pressure less than 20 Mpa. When using a 100 mm I.D. column, use the pressure within 10 MPa.
- The flow rate will be larger than that of analytical columns. Use a 0.8 mm or 1.0 mm I.D. tubing accordingly.
- We recommend you to use an injection valve with a bypass to prevent the column from deterioration.

Inner diameter	Flow rate range
7.6 mm	2 - 4 mL/min
8.0 mm	2 - 4 mL/min
10 mm	3 - 5 mL/min
14 mm	5 - 10 mL/min
20 mm	10 - 20 mL/min

■ Storage of Columns

After using reversed-phase columns with eluent containing buffer or ion-pair reagent, wash the column thoroughly with a salt-free eluent before storing. When storing the column for a long period, replace with 100% organic solvent such as methanol.

After using NH2 columns for sugar analysis with reversed-phase mobile phases, such as acetonitrile/water or buffer salt, first introduce ammonium formate aqueous solution or ammonium acetate aqueous solution to flush the column, then flush the column with HPLC grade water. When storing the column, replace with 100% acetonitrile, completely seal the column with the plugs provided, and store it in a temperature stable place. If the column is to be stored for more than one month, flush it with 100% acetonitrile about once a month.

After using NH2 columns with normal-phase mobile phases, introduce ethanol or 2-propanol to flush the column. When storing the column, replace with n-hexane/2-propanol=90/10, v/v, completely seal the column with the plugs provided, and store it in a temperature stable place.

Recommended column washing procedure when using Amide columns with reversed phase mobile phases. If the mobile phase contained a buffer salt, introduce highly aqueous (50% HPLC grade water) mobile phases to flush out hydrophilic substances from the column. When storing the column, replace with 80% acetonitrile and completely seal the column with the plugs provided and store at temperature stable place.

When storing the column, completely seal the column with the plugs provided and store at temperature stable place.

■ Technical Support

Shim-pack GIST/GISS series columns are manufactured, inspected, packaged and shipped under strict standards of quality control. Should you find any defect in performance, please contact your local Shimadzu representative, who will ensure your complete satisfaction.

We regret that we cannot guarantee the lifetime of columns, also that we cannot accept any claim when performance has deteriorated due to noncompliance with the operation procedures elucidated above, or as a result of normal aging.