TSKgel® GMHXL Products

	Column	Corresponding Guard Column
Part numbers:	16141, GMHXL, 7.8mm ID x 30cm 16652, GMHXL-L, 7.8mm ID x 30cm	13727, Guardcolumn HXL-H, 6mm ID x 4cm 07113, Guardcolumn HXL-L, 6mm ID x 4cm

This sheet contains the recommended operating conditions and the specifications for TSKgel GMH columns and guard columns. TSKgel GMH-type columns are mixed-bed columns. They are prepared by combining packings of various pore sizes to obtain a column that has a linear calibration curve that spans a very wide molecular weight range. As other TSKgel H-type columns, TSKgel GMH-type columns are used exclusively for Gel Permeation Chromatography. Installation instructions and column care information are described in a separate Instruction Manual.

A. OPERATING CONDITIONS

1.	Shipping Solvent:	Tetrahydrofuran (THF)
2.	Max./Standard Flow:	1.2mL/min / 0.5 - 1.0 mL/min (30cm x 7.8mm HXL and HXL-L)
3.	Max. Pressure:	15 kg/cm^2 = 225 psi (30cm x 7.8mm HXL) 35 kg/cm^2 = 525 psi (30cm x 7.8mm HXL-L)
4.	Multiple Columns:	Columns of the same or different pore size are often connected in series to improve resolution and/or to expand the linear portion of the calibration curve. Connect the columns in order of decreasing pore size to avoid overloading from the high MW components. Connect analytical columns using short pieces of 1/16" x 0.01" ID stainless steel tubing.
5.	Solvents:	See the following page for a list of solvents that are compatible with this TSKgel H-type column. Most TSKgel H-type columns are supplied in THF because of its high dissolving power for polymers and oligomers. Besides in THF, TSKgel H-type columns are also available packed in acetone, chloroform, dimethylformamide and o-dichlorobenzene (ODCB).
6.	Temperature:	It is recommended that TSKgel GMH-type columns be used above room temperature and up to a maximum of 80°C.
7.	Sample Size:	0.001 - 0.5mg
8.	Storage:	The column can be left overnight in solvent in the LC system. When it will not be used for longer periods of time, remove the column from the equipment, seal the ends with the provided protective screws, and store it at laboratory temperature. At all times, prevent air from entering the column!
9.	Column Protection:	The use of guard columns is recommended to prolong the life of the analytical column. Guard columns are not for analysis, they do not improve resolution when connected to the main column. They are also not a substitute for filtering the mobile phase and the sample. A guard column does reduce pump pulsation, and further protects the main column by collecting highly adsorptive components and insoluble substances. Guard column life depends greatly on sample cleanliness. As a general rule, guard columns should be replaced when the peaks become excessively wide, or when the peaks show splitting.

Continued on next page.

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www.tosohbioscience.com

Tosoh Bioscience LLC
3604 Horizon Drive, Suite 100
King of Prussia, PA 19406
Phone: (484) 805-1219
Orders & Technical Service: (800) 366-4875
FAX: (610) 272-3028

Tosoh Bioscience GmbH
Im Leuschnerpark 4, 64347
Griesheim, Germany
Phone/ FAX: +49-6155-7043700

B. SPECIFICATIONS

The performance of TSKgel GMH_{XL} columns is tested under the conditions described in the Data Sheet. All columns have passed the following quality control specifications:

1 Number of Theoretical Plates (N): > 16,000

2 Asymmetry Factor (AF): 0.7 - 1.6

C. SOLVENT COMPATIBILITY for TSKgel H_{XL} COLUMNS

Standard TSKgel H_{XL}-type columns are packed (and shipped) in tetrahydrofuran, with the exception of TSKgel GMH-HT columns which are only shipped in o-dichlorobenzene. The table below lists the solvents that may be used to replace the original shipping solvent.

Note: Only one solvent substitution can be made.

SHIPPING SOLVENT	CAN BE REPLACED BY
Tetrahydrofuran	benzene, chloroform, toluene, xylene
Acetone	carbon tetrachloride, o-chlorophenol/chloroform, m-cresol/chloroform, o-dichlorobenzene, dimethylformamide (DMF), dimethylsulfoxide (DMSO), dioxane, ethylacetate, FC-113, hexane, hexafluoroisopropanol/chloroform, methylethylketone, N-methylpyrrolidine, pyridine, quinoline.
Chloroform	m-cresol/chloroform, hexafluoroisopropanol/chloroform, 0 to 20% methanol in chloroform.
Dimethylformamide	dimethylsulfoxide, dioxane, tetrahydrofuran, toluene,
o-dichlorobenzene	1-chloronaphthalene, trichlorobenzene

Important:

Carbon tetrachloride can corrode stainless steel parts in an HPLC system and in the column.

How to Change Solvents:
i. Use a linear gradient at a rate of change of 2% per minute.
ii. Use a flow rate of $\leq$ 0.5 mL/min for 7.5 and 7.8mm ID columns.

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