

# Certificate of Analysis



Agilent Technologies, Inc. acquired Polymer Standards Service GmbH (PSS) on August 01<sup>st</sup>, 2022.

The Quality Certificate / Certificate of Analysis generated by PSS attached to this Letter is valid for the Product stated in the Certificate sold to You by Agilent Technologies, Inc or its subsidiaries.

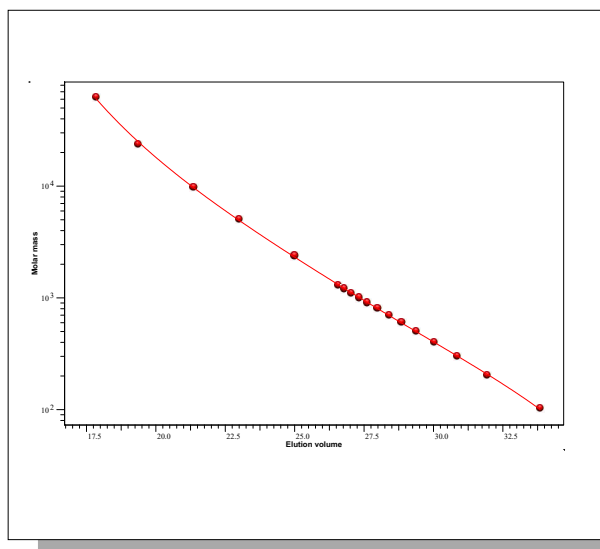
Patrick Kunzweiler

Quality Manager  
Liquid Phase Separation Division

# Certificate of Analysis

Product: Kit Poly(methyl methacrylate) low  
 Part No: PSS-MMKITL  
 Lot No: MMKITL-10

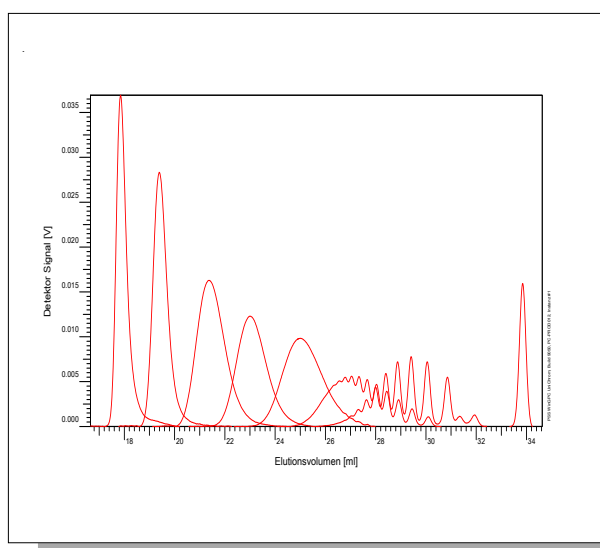
### GPC/SEC - Calibration Curve



### GPC/SEC - Calibration Table

Elution volume [ml]	Mp [Da]	Polymer Lot No:	Polymer Part No:
17,86	62200	MMG31202	PSS-MM55K
19,39	23500	MMG15087	PSS-MM23K
21,37	9680	MMG260704	PSS-MM10K
23,01	5050	MMG120913	PSS-MM4.7K
25,01	2380	MMG300413	PSS-MM2.1K
26,57	1302	MMG20804N2	PSS-MM1K
26,78	1202	MMG20804N2	PSS-MM1K
27,05	1102	MMG20804N2	PSS-MM1K
27,34	1002	MMG20804N2	PSS-MM1K
27,63	902	MMG050314	PSS-MM600
28,00	802	MMG050314	PSS-MM600
28,40	702	MMG050314	PSS-MM600
28,87	602	MMG050314	PSS-MM600
29,40	502	MMG050314	PSS-MM600
30,05	402	MMG050314	PSS-MM600
30,85	302	MMG050314	PSS-MM600
31,94	202	MMG050314	PSS-MM600
33,84	102	MMP1-2	PSS-MM102

### GPC/SEC - Polymer Overlay



**Note:**

Mp = Molar mass at the peak maximum

### GPC/SEC - Calibration Conditions


Solvent	Tetrahydrofuran
Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 3µm
Columns [8 x 300 mm]	PSS SDV 3µm 1000Å / 1000Å / 1000Å
Temperature	23 °C
Inject volume	20 µl
Internal standard	Toluene at 35,53 ml
Data Acquisition Software	PSS WinGPC
Calibration by	A.Klein

### Fit quality

Fit-type	PSS Poly 5
R	0,999923

**Storage:** Store the tightly recapped polymer standards in a dry, dark, cool area; e.g. a refrigerator (4 °C).  
**Date of expiry:** 2032/11/30 (See also product label.)  
**Date of approval:** 2023/02/26

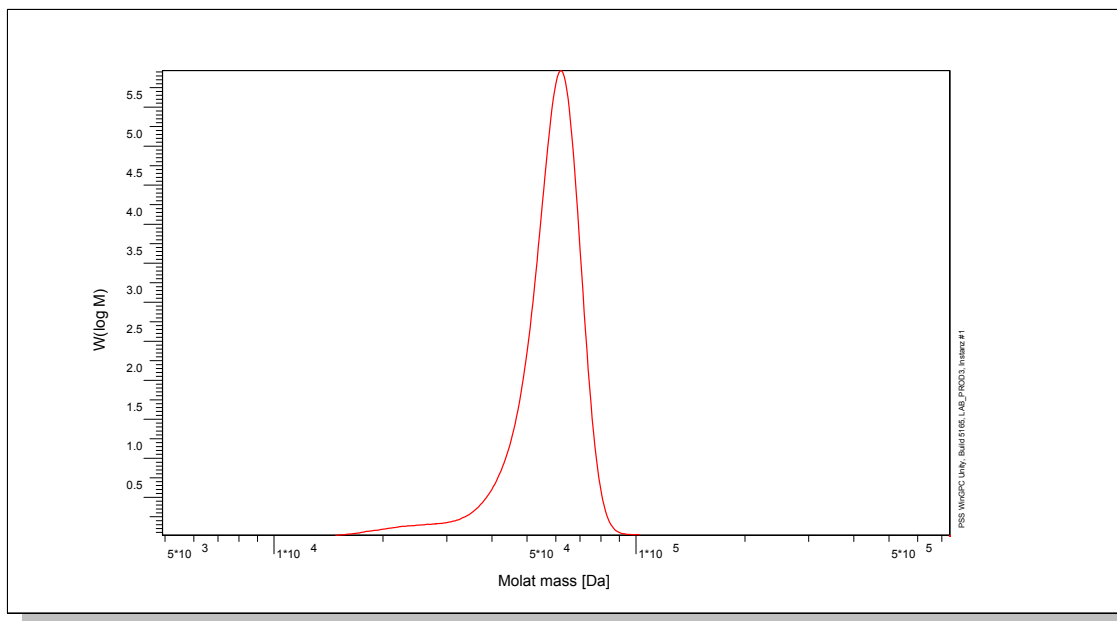
Manufacture and control according to PSS method of analysis

  
 Dr. J. Preis  
 production manager

# Certificate of Analysis

Polymer type: Poly(methyl methacrylate)  
 Part No: PSS-MM55K  
 Lot No: MMG31202

## Molar Mass Distribution



## GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Solvent	THF	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 5µm	Temperature	23,0° C
Columns [analytical, each 8 x 300 mm]	PSS SDV 5µm 10e3Å / 10e5Å / 10e6Å	Operator	R. Leinweber
Data Acquisition Software	PSS WinGPC		

## GPC/SEC - Results

Detector	Mw (Da)	Mn (Da)	Mp (Da)	PDI (Mw/Mn)
PSS SECcurity RI	58300	54900	62200	1,06

## Additional Methods - Results

Method	Mw [Da]
Light Scattering, on-line (SLD7x00)	55500

Mw = Weight average molecular weight  
 Mn = Number average molecular weight  
 Mp = Molar mass at the peak maximum  
 PDI= Polydispersity Index

Light Scattering run on-line.

System and instrument validation based on Certified Reference Materials Poly(styrene) Lot No: ERM-FA001.


Sample concentration 2.5495 g/L  
 Inject volume 100µL  
 Sample dn/dc 0.087mL/g

**Storage:** Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).

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**Date of approval:** 2023/02/26

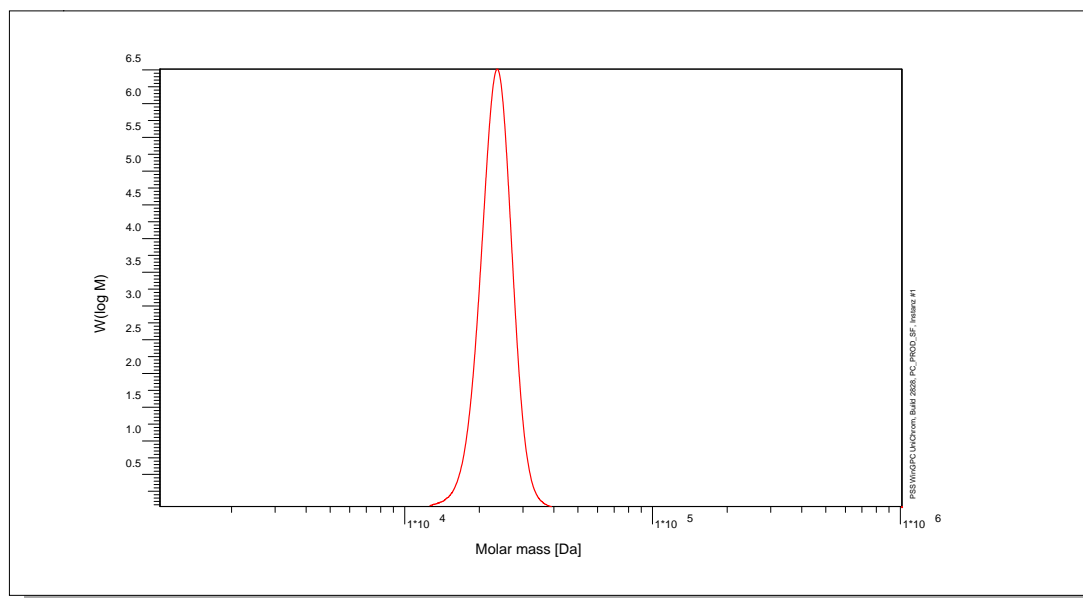
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 Dr. J. Preis  
 production manager

# Certificate of Analysis

Polymer type: Poly(methyl methacrylate)  
 Part No: PSS-MM23K  
 Lot No: MMG15087

## Molar Mass Distribution



## GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Solvent	Tetrahydrofuran	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 5µm	Temperature	23 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 5µm 10e3Å / 10e5Å / 10e6Å		
Data Acquisition Software	PSS WinGPC	Operator	S. Fugmann

## GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECurity RI	23200	22500	23500	1,03

## Additional Methods - Results

Method	Mw [Da]
Light Scattering, on-line (SLD7x00)	19700

Mw = Weight average molecular weight  
 Mn = Number average molecular weight  
 Mp = Molar mass at the peak maximum  
 PDI = Polydispersity Index

Light Scattering run on-line.

System and instrument validation based on Certified Reference Materials Poly(styrene) Lot No: ERM-FA001.

Sample concentration 5.1776 g/L  
 Inject volume Sample 100µL  
 dn/dc 0.087mL/g

**Storage:** Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).

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**Date of approval:** 2023/02/26

Manufacture and control according to PSS method of analysis

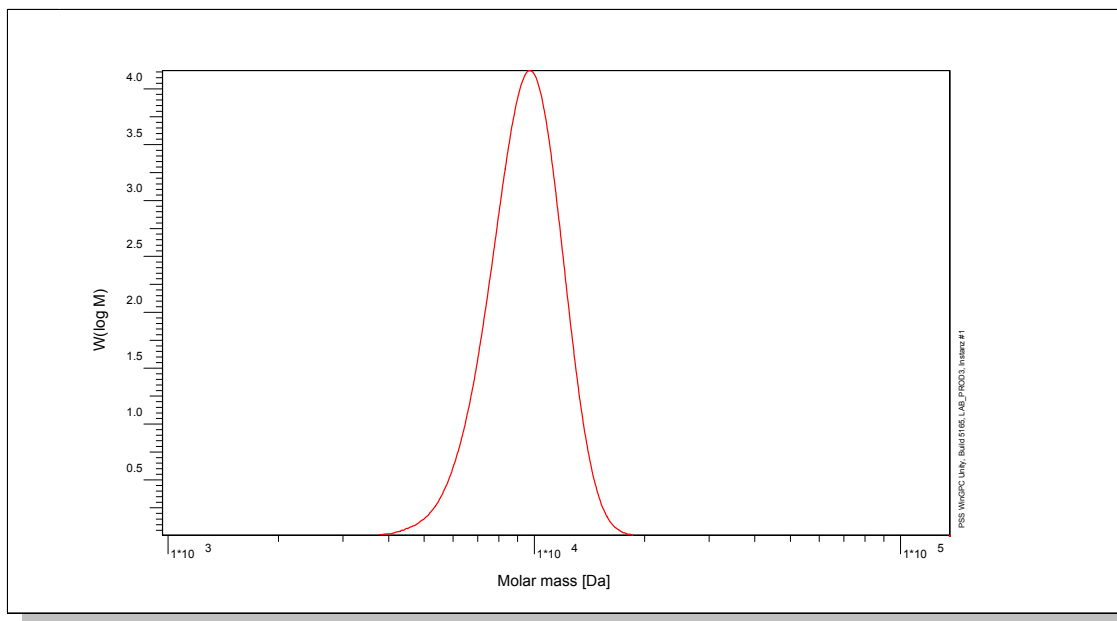


Dr. J. Preis  
 production manager

# Certificate of Analysis

Polymer type: Poly(methyl methacrylate)  
 Part No: PSS-MM10K  
 Lot No: MMG260704

## Molar Mass Distribution



## GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Solvent	THF	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 5µm	Temperature	23,0° C
Columns [analytical, each 8 x 300 mm]	PSS SDV 5µm 10e3Å / 10e5Å / 10e6Å		
Data Acquisition Software	PSS WinGPC	Operator	S. Fugmann

## GPC/SEC - Results

Detector	Mw (Da)	Mn (Da)	Mp (Da)	PDI (Mw/Mn)
PSS SECcurity RI	9590	9100	9680	1,05

## Additional Methods - Results

Method	Mw [Da]
Light Scattering, on-line (SLD7x00)	9700

Mw = Weight average molecular weight  
 Mn = Number average molecular weight  
 Mp = Molar mass at the peak maximum  
 PDI = Polydispersity Index

Light Scattering run on-line.

System and instrument validation based on Certified Reference Materials Poly(styrene) Lot No: ERM-FA001.

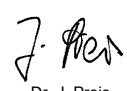
Sample concentration	6.2880 g/L
Inject volume	100µL
Sample dn/dc	0.087mL/g

**Storage:** Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).

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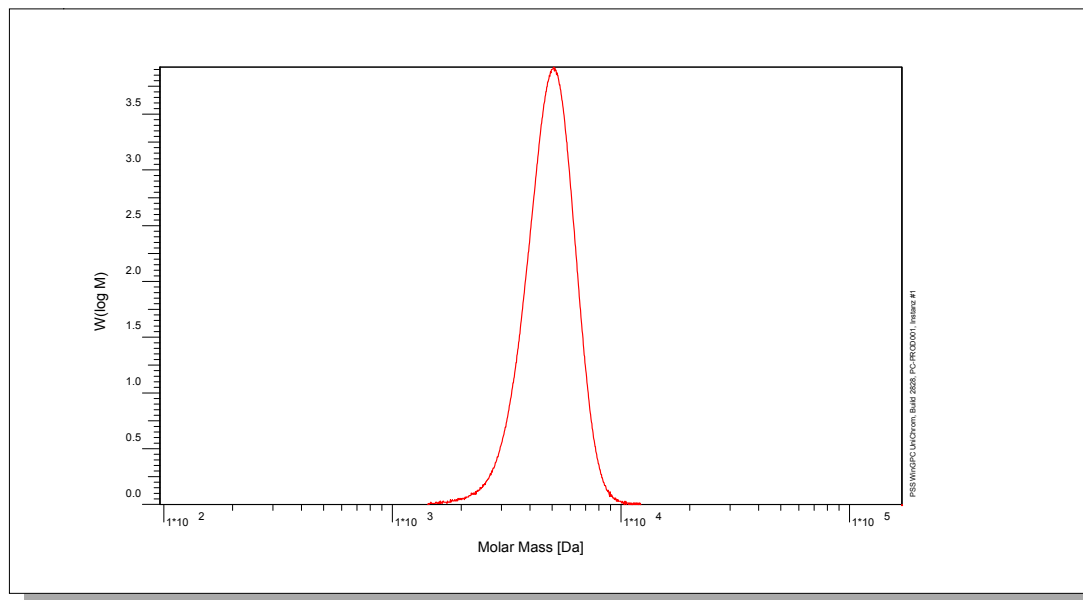
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 Dr. J. Preis  
 production manager

# Certificate of Analysis

Polymer type: Poly(methyl methacrylate)  
 Part No: PSS-MM4.7K  
 Lot No: MMG120913

## Molar Mass Distribution



## GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Solvent	Tetrahydrofuran	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 5µm	Temperature	23 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 5µm 10e3Å / 10e5Å / 10e6Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

## GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	4990	4690	5050	1,06

## Additional Methods - Results

Method	Mw [Da]
Light Scattering, on-line (SLD7x00)	4950

Mw = Weight average molecular weight  
 Mn = Number average molecular weight  
 Mp = Molar mass at the peak maximum  
 PDI = Polydispersity Index

Light Scattering run on-line.

System and instrument validation based on Certified Reference Materials Poly(styrene) Lot No: ERM-FA001.

Sample concentration	8.5070 g/L
Inject volume Sample	100µL
dn/dc	0.087mL/g

**Storage:** Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).

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**Date of approval:** 2023/02/26

Manufacture and control according to PSS method of analysis

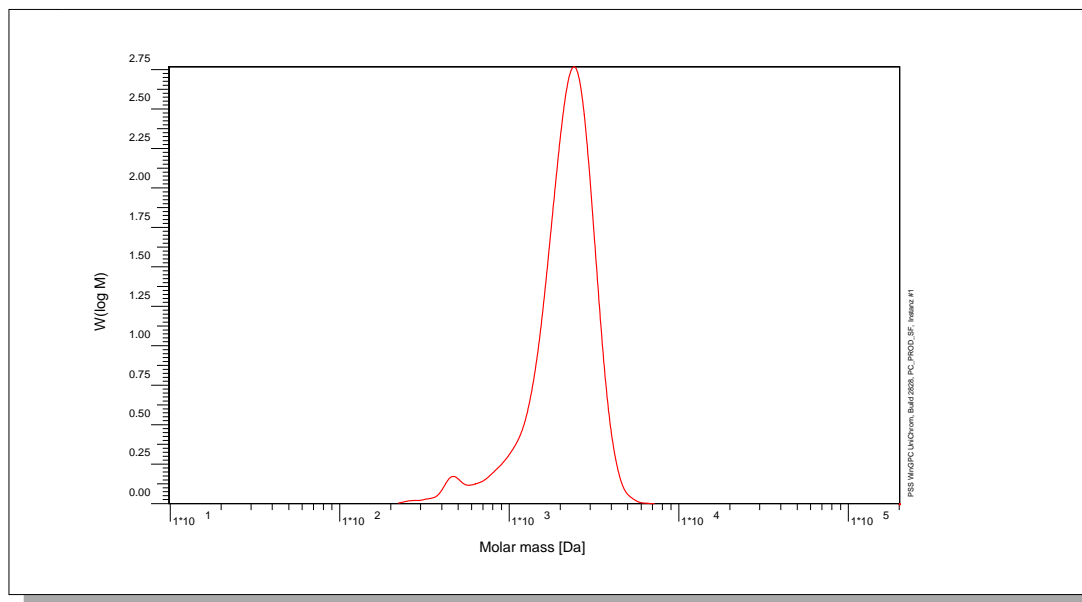


Dr. J. Preis  
 production manager

# Certificate of Analysis

Polymer type: Poly(methyl methacrylate)  
 Part No: PSS-MM2.1K  
 Lot No: MMG300413

## Molar Mass Distribution



## GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Solvent	Tetrahydrofuran	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 5µm	Temperature	23 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 5µm 10e3Å / 10e5Å / 10e6Å	Operator	S.Fugmann
Data Acquisition Software	PSS WinGPC		

## GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	2260	1860	2380	1,22

## Additional Methods - Results

Method	Mw [Da]
Light Scattering, on-line (SLD7x00)	2220

Mw = Weight average molecular weight  
 Mn = Number average molecular weight  
 Mp = Molar mass at the peak maximum  
 PDI = Polydispersity Index

Light Scattering run on-line.

System and instrument validation based on Certified Reference Materials Poly(styrene) Lot No: ERM-FA001.


Sample concentration	12.4324 g/L
Inject volume Sample	100µL
dn/dc	0.087mL/g

**Storage:** Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).

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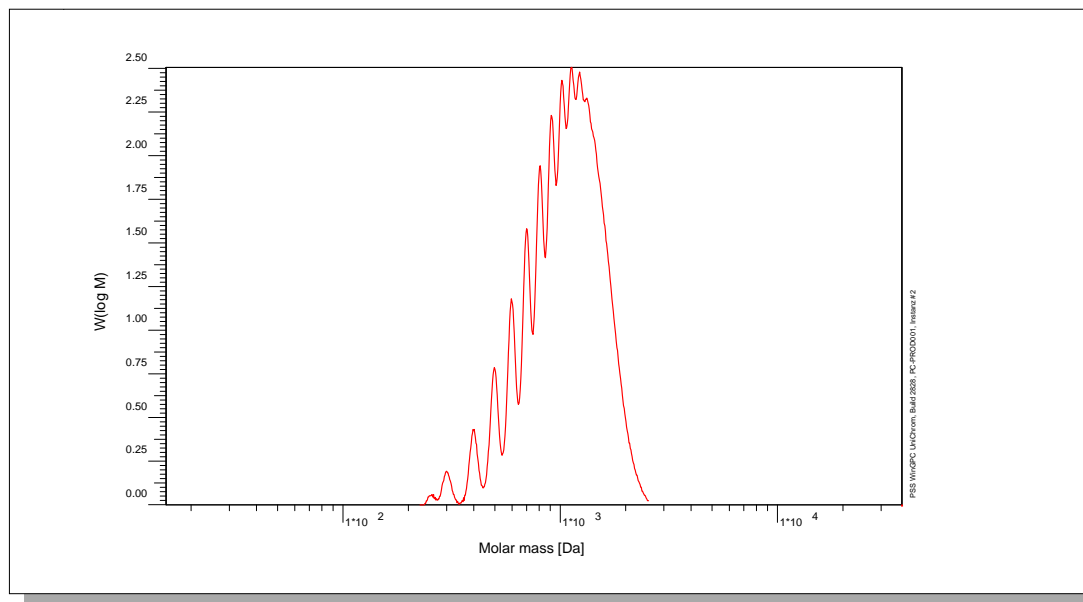
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 Dr. J. Preis  
 production manager

# Certificate of Analysis

Polymer type: Poly(methyl methacrylate)  
 Part No: PSS-MM1K  
 Lot No: MMG20804N2

## Molar Mass Distribution



## GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Solvent	Tetrahydrofuran	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 3µm	Temperature	23 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 3µm 1000Å / 1000Å / 1000Å	Operator	J.Preis
Data Acquisition Software	PSS WinGPC		

## GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	1100	940	1102	1,17

## Additional Methods - Results

Method	Mn [Da]
Nuclear Magnetic Resonance spectroscopy	958

<sup>1</sup>H-NMR (300MHz, CDCl<sub>3</sub>)

Mw = Weight average molecular weight  
 Mn = Number average molecular weight  
 Mp = Molar mass at the peak maximum  
 PDI = Polydispersity Index

**Storage:** Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).

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Manufacture and control according to PSS method of analysis



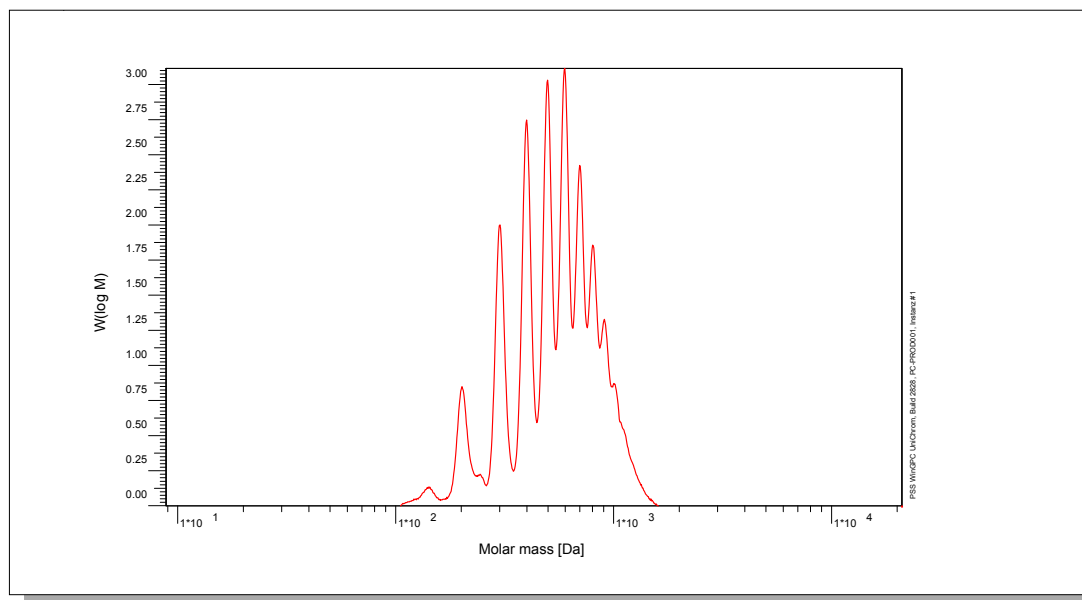
Dr. J. Preis  
 production manager



# Certificate of Analysis

Polymer type: Poly(methyl methacrylate)  
 Part No: PSS-MM600  
 Lot No: MMG050314

## Molar Mass Distribution



## GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	50 µl
Flow rate	1,00 ml/min	Temperature	23 °C
Solvent	Tetrahydrofuran		
Precolumn [8 x 50 mm]	PSS SDV 3µm		
Columns [analytical, each 8 x 300 mm]	PSS SDV 3µm 1000Å / 1000Å / 1000Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

## GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	573	464	602	1,24

## Additional Methods - Results

Method	Mn [Da]
Nuclear Magnetic Resonance spectroscopy	470

<sup>1</sup>H-NMR (300MHz, CDCl<sub>3</sub>)

Mw = Weight average molecular weight

Mn = Number average molecular weight

Mp = Molar mass at the peak maximum

PDI= Polydispersity Index

**Storage:** Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).

**Date of expiry:** 2032/11/30 (See also product label.)

**Date of approval:** 2023/02/26

Manufacture and control according to PSS method of analysis

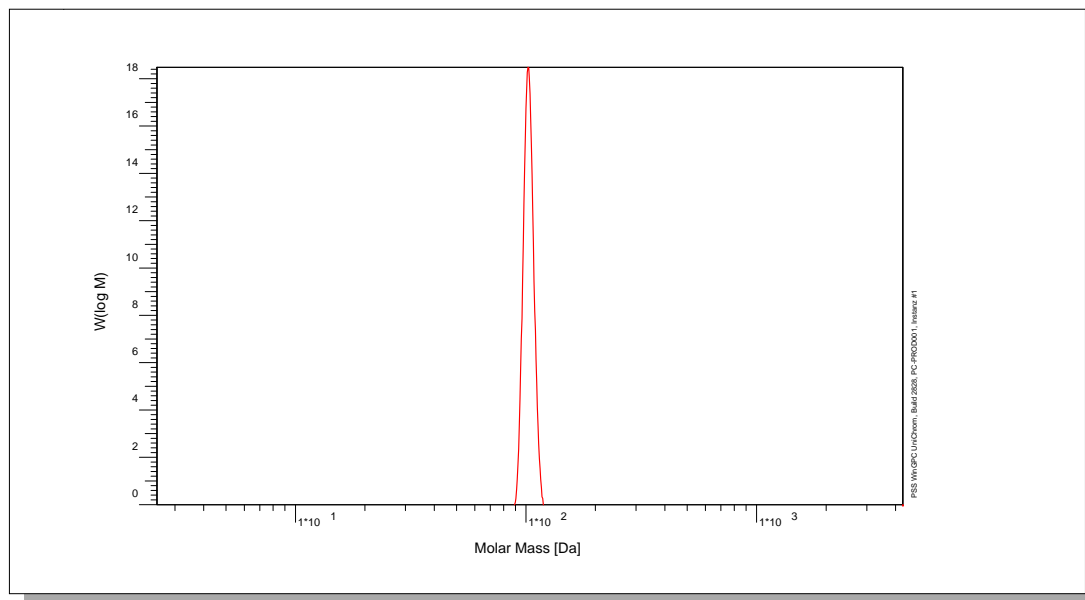


Dr. J. Preis  
production manager

# Certificate of Analysis

Polymer type: Poly(methyl methacrylate)  
 Part No: PSS-MM102  
 Lot No: MMP1-2

## Molar Mass Distribution



## GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Flow rate	1,00 ml/min	Temperature	23 °C
Solvent	Tetrahydrofuran		
Precolumn [8 x 50 mm]	PSS SDV 3µm		
Columns [analytical, each 8 x 300 mm]	PSS SDV 3µm 10e3Å / 10e3Å / 10e3Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

## GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	102	102	102	1,00

## Additional Methods - Results

Method	Mn [Da]
Nuclear Magnetic Resonance spectroscopy	102

<sup>1</sup>H-NMR (300MHz, CDCl<sub>3</sub>)

Mw = Weight average molecular weight

Mn = Number average molecular weight

Mp = Molar mass at the peak maximum

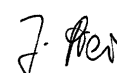
PDI = Polydispersity Index

**Storage:** Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).

**Date of expiry:** 2032/11/30 (See also product label.)

**Date of approval:** 2023/02/26

Manufacture and control according to PSS method of analysis



Dr. J. Preis  
production manager