



**Thermo Fisher Scientific**

# **Microliter 48x2 sealed**

**Instruction Manual**

50120031-4

October 2009

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Centre of Emergency Preparedness and Response  
Health Protection Agency  
Porton Down  
Salisbury  
Wiltshire SP4 0JG  
United Kingdom



## Certificate of Containment Testing

### Containment Testing of Thermo Scientific Rotor 75003602

**Report No. 59-08 E**

**Report prepared for:** Thermo Fisher  
**Issue Date:** 15<sup>th</sup> January 2009

#### Test Summary

A Thermo Scientific 75003602 contained rotor (Max speed 15,200 rpm) was supplied by Thermo Fisher and containment tested at 15,200 rpm using the method described in Annex AA of EN 61010-2-020. The rotor was shown to contain a spill when tested in triplicate.

**Report Written By**

A handwritten signature in purple ink, written over a horizontal dashed line.

**Report Authorised By**

A handwritten signature in purple ink, written over a horizontal dashed line, followed by the date "(28/1/09)".

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## Preface

Before starting to use the rotor, read through these Operating Instructions carefully and follow the instructions.

The information contained in these Operating Instructions is the property of Thermo Fisher Scientific; it is forbidden to copy or pass on this information without explicit approval.

Failure to follow the instructions and safety information in this instruction manual will result in the expiration of the seller's warranty.

## Scope of Supply

Article Number		Quantity	Check
75003602	Microliter 48x2 sealed	1	<input type="checkbox"/>
76003500	Rubber seal grease	1	<input type="checkbox"/>
70009824	Anti-corrosion oil	1	<input type="checkbox"/>
50120031	Instruction Manual	1	<input type="checkbox"/>

If any parts are missing, please contact the nearest Thermo Fisher Scientific representative.

## Precautions

In order to ensure safe operation of the Microliter 48x2 sealed, the following general safety regulations must be followed:

- Do not remove the magnet at the rotor bottom
- Do not use rotors which show any signs of corrosion and/or cracks.
- Use only with rotors that have been loaded properly.
- Never overload the rotor.

## Preface

- Use only accessories which have been approved by Thermo Fisher Scientific. Exceptions to this rule are commercially available glass or plastic centrifuge tubes, provided they have been approved for the speed or the RCF value of the rotor.
- Please observe the safety instructions.

Please pay particular attention to the following aspects:

- Rotor installation: Check that the rotor is locked properly into place before operating the centrifuge.
- Always balance the samples.

Maximum sample density at maximum speed:  $1,2 \frac{g}{ml}$



This symbol refers to general hazards.

ATTENTION means that material damage could occur.

WARNING means that injuries or material damage or contamination could occur.



This symbol refers to biological hazards.

Observe the information contained in the instruction manual to keep yourself and your environment safe.

# Rotor Specifications

## Contents

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- “Sorvall” on page 1-6
- “Thermo Scientific” on page 1-12



## 1 Rotor Specifications

Heraeus

# Heraeus

**Table 1-1.** Heraeus 230V 50Hz/60Hz ventilated

Centrifuge	Heraeus Multifuge X3	Heraeus Multifuge X3 F	Heraeus Multifuge X1
Catalog #	75004500	75004530	75004210
Weight empty [kg]	2.4	2.4	2.4
max. cycle number	50,000	50,000	50,000
Maximum permissible load [g]	48x4	48x4	48x4
maximum speed $n_{max}$ [rpm]	15,200	15,200	15,200
maximum RCF value at $n_{max}$	25,314	25,314	25,314
max. / min. radius [cm]	9,8 / 5,9	9,8 / 5,9	9,8 / 5,9
Pitch angle [°]	45	45	45
Accel. / braking time [s]	45 / 45	45 / 45	45 / 45
sample heating at $n_{max}$ [° C] referred to ambient temperature of 23 °C, running time 120 minutes	19	19	16
aerosol-tight*	yes	yes	yes
permissible temperature range autoclavable °C	121	121	121

\* tested by HPA, Porton-down, UK

Centrifuge	Heraeus Megafuge 40
Catalog #	75004503
Weight empty [kg]	2.4
max. cycle number	50,000
Maximum permissible load [g]	48x4
maximum speed $n_{max}$ [rpm]	15,200
maximum RCF value at $n_{max}$	25,314
max. / min. radius [cm]	9,8 / 5,9
Pitch angle [°]	45
Accel. / braking time [s]	45 / 45
sample heating at $n_{max}$ [° C] referred to ambient temperature of 23 °C, running time 120 minutes	19
aerosol-tight*	yes
permissible temperature range autoclavable °C	121

\* tested by HPA, Porton-down, UK

**Table 1-2.** Heraeus 230V 50Hz/60Hz refrigerated

<b>Centrifuge</b>	<b>Heraeus Multifuge X3 R</b>	<b>Heraeus Multifuge X3 FR</b>	<b>Heraeus Multifuge X1 R</b>
Catalog #	75004515	75004536	75004250
Weight empty [kg]	2.4	2.4	2.4
max. cycle number	50,000	50,000	50,000
Maximum permissible load [g]	48x4	48x4	48x4
maximum speed $n_{max}$ [rpm]	15,200	15,200	15,200
maximum RCF value at $n_{max}$	25,314	25,314	25,314
max. / min. radius [cm]	9,8 / 5,9	9,8 / 5,9	9,8 / 5,9
Pitch angle [°]	45	45	45
Accel. / braking time [s]	45 / 45	45 / 45	45 / 45
aerosol-tight*	yes	yes	yes
permissible temperature range autoclavable °C	121	121	121

\*tested by HPA, Porton-down, UK

<b>Centrifuge</b>	<b>Heraeus Megafuge 40R</b>
Catalog #	75004518
Weight empty [kg]	2.4
max. cycle number	50,000
Maximum permissible load [g]	48x4
maximum speed $n_{max}$ [rpm]	15,200
maximum RCF value at $n_{max}$	25,314
max. / min. radius [cm]	9,8 / 5,9
Pitch angle [°]	45
Accel. / braking time [s]	45 / 45
aerosol-tight*	yes
permissible temperature range autoclavable °C	121

\*tested by HPA, Porton-down, UK

## 1 Rotor Specifications

Heraeus

**Table 1-3.** Heraeus 120V 60Hz ventilated

Centrifuge	Heraeus Multifuge X3	Heraeus Multifuge X3F	Heraeus Multifuge X1
Catalog #	75004501	75004504	75004211
Weight empty [kg]	2.4	2.4	2.4
max. cycle number	50,000	50,000	50,000
Maximum permissible load [g]	48x4	48x4	48x4
maximum speed $n_{max}$ [rpm]	15,200	15,200	15,200
maximum RCF value at $n_{max}$	25,314	25,314	25,314
max. / min. radius [cm]	9,8 / 5,9	9,8 / 5,9	9,8 / 5,9
Pitch angle [°]	45	45	45
Accel. / braking time [s]	45 / 45	45 / 45	55 / 50
sample heating at $n_{max}$ [° C] referred to ambient temperature of 23 °C, running time 120 minutes	19	19	16
aerosol-tight*	yes	yes	yes
permissible temperature range autoclavable °C	121	121	121

\*tested by HPA, Porton-down, UK

Centrifuge	Heraeus Megafuge 40
Catalog #	75004518
Weight empty [kg]	2.4
max. cycle number	50,000
Maximum permissible load [g]	48x4
maximum speed $n_{max}$ [rpm]	15,200
maximum RCF value at $n_{max}$	25,314
max. / min. radius [cm]	9,8 / 5,9
Pitch angle [°]	45
Accel. / braking time [s]	45 / 45
sample heating at $n_{max}$ [° C] referred to ambient temperature of 23 °C, running time 120 minutes	19
aerosol-tight*	yes
permissible temperature range autoclavable °C	121

\*tested by HPA, Porton-down, UK

**Table 1-4.** Heraeus 120V 60Hz refrigerated

<b>Centrifuge</b>	<b>Heraeus Multifuge X3 R</b>	<b>Heraeus Multifuge X3 FR</b>	<b>Heraeus Multifuge X1 R</b>
Catalog #	75004516	75004537	75004251
Weight empty [kg]	2.4	2.4	2.4
max. cycle number	50,000	50,000	50,000
Maximum permissible load [g]	48x4	48x4	48x4
maximum speed $n_{max}$ [rpm]	15,200	15,200	15,200
maximum RCF value at $n_{max}$	25,314	25,314	25,314
max. / min. radius [cm]	9,8 / 5,9	9,8 / 5,9	9,8 / 5,9
Pitch angle [°]	45	45	45
Accel. / braking time [s]	45 / 45	45 / 45	55 / 50
aerosol-tight*	yes	yes	yes
permissible temperature range autoclavable °C	121	121	121

\*tested by HPA, Porton-down, UK

<b>Centrifuge</b>	<b>Heraeus Megafuge 40R</b>
Catalog #	75004519
Weight empty [kg]	2.4
max. cycle number	50,000
Maximum permissible load [g]	48x4
maximum speed $n_{max}$ [rpm]	15,200
maximum RCF value at $n_{max}$	25,314
max. / min. radius [cm]	9,8 / 5,9
Pitch angle [°]	45
Accel. / braking time [s]	45 / 45
aerosol-tight*	yes
permissible temperature range autoclavable °C	121

\*tested by HPA, Porton-down, UK

## 1 Rotor Specifications

Sorvall

# Sorvall

**Table 1-5.** Sorvall 230V 50Hz/60Hz ventilated

Centrifuge	Sorvall Legend XT	Sorvall Legend XF	Sorvall Legend X1
Catalog #	75004505	75004532	75004220
Weight empty [kg]	2.4	2.4	2.4
max. cycle number	50,000	50,000	50,000
Maximum permissible load [g]	48x4	48x4	48x4
maximum speed $n_{max}$ [rpm]	15,200	15,200	15,200
maximum RCF value at $n_{max}$	25,314	25,314	25,314
max. / min. radius [cm]	9,8 / 5,9	9,8 / 5,9	9,8 / 5,9
Pitch angle [°]	45	45	45
Accel. / braking time [s]	45 / 45	45 / 45	45 / 45
sample heating at $n_{max}$ [° C] referred to ambient temperature of 23 °C, running time 120 minutes	19	19	16
aerosol-tight*	yes	yes	yes
permissible temperature range autoclavable °C	121	121	121

\* Tested by HPA, Porton-down, UK

Centrifuge	Sorvall ST 40
Catalog #	75004509
Weight empty [kg]	2.4
max. cycle number	50,000
Maximum permissible load [g]	48x4
maximum speed $n_{max}$ [rpm]	15,200
maximum RCF value at $n_{max}$	25,314
max. / min. radius [cm]	9,8 / 5,9
Pitch angle [°]	45
Accel. / braking time [s]	45 / 45
sample heating at $n_{max}$ [° C] referred to ambient temperature of 23 °C, running time 120 minutes	19
aerosol-tight*	yes
permissible temperature range autoclavable °C	121

\* Tested by HPA, Porton-down, UK

**Table 1-6.** Sorvall 230V 50Hz/60Hz refrigerated

<b>Centrifuge</b>	<b>Sorvall Legend XTR</b>	<b>Sorvall Legend XFR</b>	<b>Sorvall Legend X1R</b>
Catalog #	75004520	75004538	750042260
Weight empty [kg]	2.4	2.4	2.4
max. cycle number	50,000	50,000	50,000
Maximum permissible load [g]	48x4	48x4	48x4
maximum speed $n_{max}$ [rpm]	15,200	15,200	15,200
maximum RCF value at $n_{max}$	25,314	25,314	25,314
max. / min. radius [cm]	9,8 / 5,9	9,8 / 5,9	9,8 / 5,9
Pitch angle [°]	45	45	45
Accel. / braking time [s]	45 / 45	45 / 45	45 / 45
aerosol-tight*	yes	yes	yes
permissible temperature range autoclavable °C	121	121	121

\*tested by HPA, Porton-down, UK

<b>Centrifuge</b>	<b>Sorvall ST 40R</b>
Catalog #	75004524
Weight empty [kg]	2.4
max. cycle number	50,000
Maximum permissible load [g]	48x4
maximum speed $n_{max}$ [rpm]	15,200
maximum RCF value at $n_{max}$	25,314
max. / min. radius [cm]	9,8 / 5,9
Pitch angle [°]	45
Accel. / braking time [s]	45 / 45
aerosol-tight*	yes
permissible temperature range autoclavable °C	121

\*tested by HPA, Porton-down, UK

## 1 Rotor Specifications

Sorvall

**Table 1-7.** Sorvall 120V 60Hz ventilated

Centrifuge	Sorvall Legend XT	Sorvall Legend XF	Sorvall Legend 1X
Catalog #	75004506	75004533	75004221
Weight empty [kg]	2.4	2.4	2.4
max. cycle number	50,000	50,000	50,000
Maximum permissible load [g]	48x4	48x4	48x4
maximum speed $n_{\max}$ [rpm]	15,200	15,200	15,200
maximum RCF value at $n_{\max}$	25,314	25,314	25,314
max. / min. radius [cm]	9,8 / 5,9	9,8 / 5,9	9,8 / 5,9
Pitch angle [°]	45	45	45
Accel. / braking time [s]	45 / 45	45 / 45	55 / 50
sample heating at $n_{\max}$ [° C] referred to ambient temperature of 23 °C, running time 120 minutes	19	19	16
aerosol-tight*	yes	yes	yes
permissible temperature range autoclavable °C	121	121	121

\* tested by HPA, Porton-down, UK

Centrifuge	Sorvall ST 40
Catalog #	75004510
Weight empty [kg]	2.4
max. cycle number	50,000
Maximum permissible load [g]	48x4
maximum speed $n_{\max}$ [rpm]	15,200
maximum RCF value at $n_{\max}$	25,314
max. / min. radius [cm]	9,8 / 5,9
Pitch angle [°]	45
Accel. / braking time [s]	45 / 45
sample heating at $n_{\max}$ [° C] referred to ambient temperature of 23 °C, running time 120 minutes	19
aerosol-tight*	yes
permissible temperature range autoclavable °C	121

\* tested by HPA, Porton-down, UK

**Table 1-8.** Sorvall 120V 60Hz refrigerated

<b>Centrifuge</b>	<b>Sorvall Legend XTR</b>	<b>Sorvall Legend XFR</b>	<b>Sorvall Legend X1R</b>
Catalog #	75004521	75004539	75004261
Weight empty [kg]	2.4	2.4	2.4
max. cycle number	50,000	50,000	50,000
Maximum permissible load [g]	48x4	48x4	48x4
maximum speed $n_{max}$ [rpm]	15,200	15,200	15,200
maximum RCF value at $n_{max}$	25,314	25,314	25,314
max. / min. radius [cm]	9,8 / 5,9	9,8 / 5,9	9,8 / 5,9
Pitch angle [°]	45	45	45
Accel. / braking time [s]	45 / 45	45 / 45	55 / 50
aerosol-tight*	yes	yes	yes
permissible temperature range autoclavable °C	121	121	121

\* tested by HPA, Porton-down, UK

<b>Centrifuge</b>	<b>Sorvall ST 40R</b>
Catalog #	75004525
Weight empty [kg]	2.4
max. cycle number	50,000
Maximum permissible load [g]	48x4
maximum speed $n_{max}$ [rpm]	15,200
maximum RCF value at $n_{max}$	25,314
max. / min. radius [cm]	9,8 / 5,9
Pitch angle [°]	45
Accel. / braking time [s]	45 / 45
aerosol-tight*	yes
permissible temperature range autoclavable °C	121

\* tested by HPA, Porton-down, UK



## 1 Rotor Specifications

Sorvall

**Table 1-9.** Sorvall 100V 50/60Hz ventilated

Centrifuge	Sorvall Legend XT	Sorvall Legend XF	Sorvall Legend 1X
Catalog #	75004507	75004534	75004223
Weight empty [kg]	2.4	2.4	2.4
max. cycle number	50,000	50,000	50,000
Maximum permissible load [g]	48x4	48x4	48x4
maximum speed $n_{max}$ [rpm]	15,200	15,200	15,200
maximum RCF value at $n_{max}$	25,314	25,314	25,314
max. / min. radius [cm]	9,8 / 5,9	9,8 / 5,9	9,8 / 5,9
Pitch angle [°]	45	45	45
Accel. / braking time [s]	45 / 45	45 / 45	60 / 50
sample heating at $n_{max}$ [° C] referred to ambient temperature of 23 °C, running time 120 minutes	19	19	21
aerosol-tight*	yes	yes	yes
permissible temperature range autoclavable °C	121	121	121

\*tested by HPA, Porton-down, UK

Centrifuge	Sorvall ST 40
Catalog #	75004511
Weight empty [kg]	2.4
max. cycle number	50,000
Maximum permissible load [g]	48x4
maximum speed $n_{max}$ [rpm]	15,200
maximum RCF value at $n_{max}$	25,314
max. / min. radius [cm]	9,8 / 5,9
Pitch angle [°]	45
Accel. / braking time [s]	45 / 40
sample heating at $n_{max}$ [° C] referred to ambient temperature of 23 °C, running time 120 minutes	19
aerosol-tight*	yes
permissible temperature range autoclavable °C	121

\*tested by HPA, Porton-down, UK

**Table 1-10.** Sorvall 100V 50/60Hz refrigerated

<b>Centrifuge</b>	<b>Sorvall Legend XTR</b>	<b>Sorvall Legend XFR</b>	<b>Sorvall Legend X1R</b>
Catalog #	75004522	75004540	75004263
Weight empty [kg]	2.4	2.4	2.4
max. cycle number	50,000	50,000	50,000
Maximum permissible load [g]	48x4	48x4	48x4
maximum speed $n_{max}$ [rpm]	15,200	15,200	15,200
maximum RCF value at $n_{max}$	25,314	25,314	25,314
max. / min. radius [cm]	9,8 / 5,9	9,8 / 5,9	9,8 / 5,9
Pitch angle [°]	45	45	45
Accel. / braking time [s]	45 / 45	45 / 45	60 / 60
aerosol-tight*	yes	yes	yes
permissible temperature range autoclavable °C	121	121	121

\*tested by HPA, Porton-down, UK

<b>Centrifuge</b>	<b>Sorvall ST 40R</b>
Catalog #	75004526
Weight empty [kg]	2.4
max. cycle number	50,000
Maximum permissible load [g]	48x4
maximum speed $n_{max}$ [rpm]	15,200
maximum RCF value at $n_{max}$	25,314
max. / min. radius [cm]	9,8 / 5,9
Pitch angle [°]	45
Accel. / braking time [s]	45 / 45
aerosol-tight*	yes
permissible temperature range autoclavable °C	121

\*tested by HPA, Porton-down, UK

# Thermo Scientific

**Table 1-11.** Thermo Scientific 230V 50Hz/60Hz ventilated

Centrifuge	Thermo Scientific SL 40	Thermo Scientific SL 40 F
Catalog #	75004512	75004542
Weight empty [kg]	2.4	2.4
max. cycle number	50,000	50,000
Maximum permissible load [g]	48x4	48x4
maximum speed $n_{max}$ [rpm]	15,200	15,200
maximum RCF value at $n_{max}$	25,314	25,314
max. / min. radius [cm]	9,8 / 5,9	9,8 / 5,9
Pitch angle [°]	45	45
Accel. / braking time [s]	45 / 45	45 / 45
sample heating at $n_{max}$ [° C] referred to ambient temperature of 23 °C, running time 120 minutes	19	19
aerosol-tight*	yes	yes
permissible temperature range autoclavable °C	121	121

\*Tested by HPA, Porton-down, UK

**Table 1-12.** Thermo Scientific 230V 50Hz/60Hz refrigerated

Centrifuge	Thermo Scientific SL 40R	Thermo Scientific SL 40 FR
Catalog #	75004527	75004543
Weight empty [kg]	2.4	2.4
max. cycle number	50,000	50,000
Maximum permissible load [g]	48x4	48x4
maximum speed $n_{max}$ [rpm]	15,200	15,200
maximum RCF value at $n_{max}$	25,314	25,314
max. / min. radius [cm]	9,8 / 5,9	9,8 / 5,9
Pitch angle [°]	45	45
Accel. / braking time [s]	45 / 45	45 / 45
aerosol-tight*	yes	yes
permissible temperature range autoclavable °C	121	121

\*Tested by HPA, Porton-down, UK

**Table 1-13.** Thermo Scientific 120V 60Hz ventilated

Centrifuge	Thermo Scientific SL 40
Catalog #	75004513
Weight empty [kg]	2.4
max. cycle number	50,000
Maximum permissible load [g]	48x4
maximum speed $n_{max}$ [rpm]	15,200
maximum RCF value at $n_{max}$	25,314
max. / min. radius [cm]	9,8 / 5,9
Pitch angle [°]	45
Accel. / braking time [s]	45 / 45
sample heating at $n_{max}$ [° C] referred to ambient temperature of 23 °C, running time 120 minutes	19
aerosol-tight*	yes
permissible temperature range autoclavable °C	121

\*tested by HPA, Porton-down, UK

**Table 1-14.** Thermo Scientific 120V 60Hz refrigerated

Centrifuge	Thermo Scientific SL 40R
Catalog #	75004528
Weight empty [kg]	2.4
max. cycle number	50,000
Maximum permissible load [g]	48x4
maximum speed $n_{max}$ [rpm]	15,200
maximum RCF value at $n_{max}$	25,314
max. / min. radius [cm]	9,8 / 5,9
Pitch angle [°]	45
Accel. / braking time [s]	45 / 45
aerosol-tight*	yes
permissible temperature range autoclavable °C	121

\*tested by HPA, Porton-down, UK

# Accessories

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- „Accessories“ on page 2-2

## Thermo Scientific General Purpose Rotors

## Microliter 48x2 Sealed Rotor

## Microliter 48x2 Fixed Angle Aluminum Sealed Rotor



Rotor Specifications	
Capacity (ml)	48 x 2
Tube Dimensions (mm)	11 x 50
Angle °	45
Maximum Speed (rpm)	15.200
K Factor	556
Net Weight (kg)	2,4
RCF/Radius	RCF (x g)
Maximum	25.314
Minimum	15.240
Radius (cm)	
Maximum	9,8
Minimum	5,9



Microliter 48x2 Sealed Rotor	
Cat. No.	Description
75003602	Microliter 48x2 Sealed Rotor

Tube Ordering Information						Sealing Assembly Required:		Adapters Required:		Accessories Required:		
Cat. No.	Tube Vol. (ml)	Vol. Fill (ml)	Description	Qty.	Max. Speed (rpm)	Dims ØxL (mm)	Cat. No.	Qty /Pkg	Description	Cat. No.	Qty /Pkg	No. of Places
-	2	-	Microtube	-	-	11x45	-	-	-	-	-	-
-	1,5	-	Microtube	-	-	11x45	-	-	-	-	-	-
-	1,5	-	Millipore Ultra-MC	-	-	11 x 50	-	-	-	-	-	-
-	0,6	-	Microtube	-	-	7x32	-	-	-	76003758	12	1
-	0,4	-	Microtube	-	-	7x29	-	-	-	76003759	12	1
-	0,2	-	PCR Reaction Tube	-	-	6x24	-	-	-	76003750	12	1

# AutoLock™

## Contents

- “Rotor Installation” on page 3-2
- “Removing the Rotor” on page 3-3

## Rotor Installation



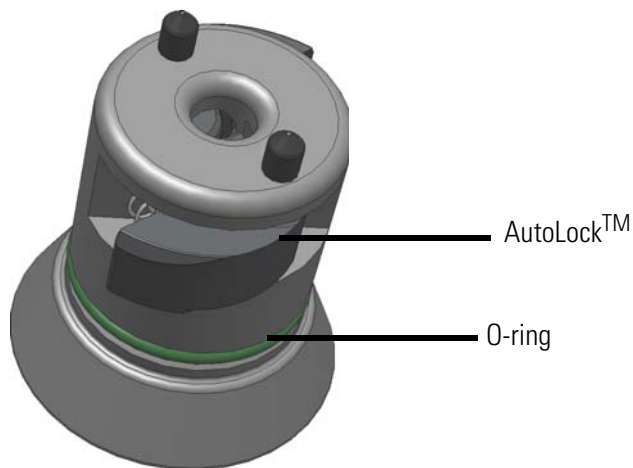
**CAUTION** Unapproved or incorrectly combined accessories can cause serious damage to the centrifuge.

This rotor is equipped with an AutoLock™-system.

This system is used to automatically lock the rotor to the centrifuge spindle. The rotor does not have to be bolted onto the centrifuge spindle.

Proceed as follows:

1. Open the lid of the centrifuge and if necessary remove any dust, foreign objects or residue from the chamber.  
AutoLock™ and o-ring must be clean and undamaged.



**Figure 3-1.** AutoLock™

2. Hold the rotor over the centrifuge spindle and let it slide slowly down the centrifuge spindle. The rotor clicks automatically into place.



**CAUTION** Do not force the rotor onto the centrifuge spindle. If the rotor is very light, then it may be necessary to press it onto the centrifuge spindle with a small amount of pressure.

3. Check if the rotor is properly installed by lifting slightly on the handle. If the rotor can be pulled up, then it must be reclamped to the centrifuge spindle.



**WARNING** If the rotor cannot be properly locked in place after several attempts, then the AutoLock™ is defective and you are not permitted to operate the rotor. Check for any damage to the rotor, damaged rotors must not be used. Keep the hub area clear of objects.





**CAUTION** Check that the rotor is properly locked on the centrifuge spindle before each use by pulling it a its handle.



Be sure to check all seals before starting any aerosol-tight applications.

4. Close the centrifuge door.

## Removing the Rotor

To remove the rotor, proceed as follows:

1. Open the centrifuge door.
2. Grab the rotor handle with both hands and press against the green AutoLock™ button. At the same time, pull the rotor directly upwards with both hands and remove it from the centrifuge spindle. Make sure not to jam the rotor while doing this.

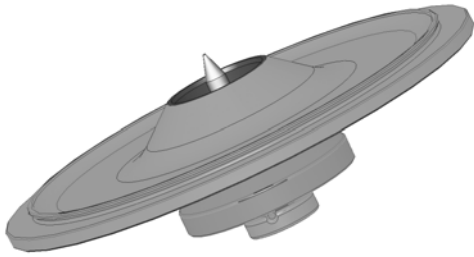


**Figure 3-2.** Handling of AutoLock™

## Aerosol-tight rotors



**CAUTION** Rotors supplied with a lid for aerosol-tight applications come with a mandril, which belongs to the AutoLock™. Be sure not to place the lid onto this mandril to prevent it from being damaged.



**Figure 3-3.** AutoLock™-lid for aerosol-tight rotors



**WARNING** Mind the AutoLock™-mandril inside the lid. Do not touch.

# Rotor Loading

## Contents

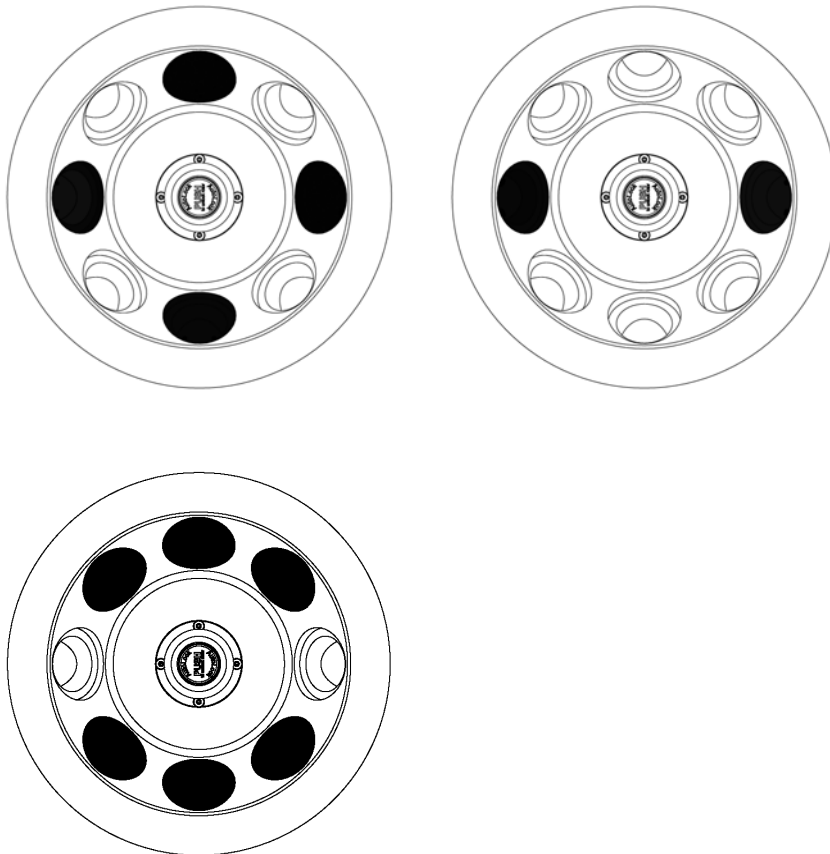
- “Before Run” on page 4-2
- “Proper Loading” on page 4-2
- “Improper Loading” on page 4-3
- “Maximum Loading” on page 4-3

## Before Run

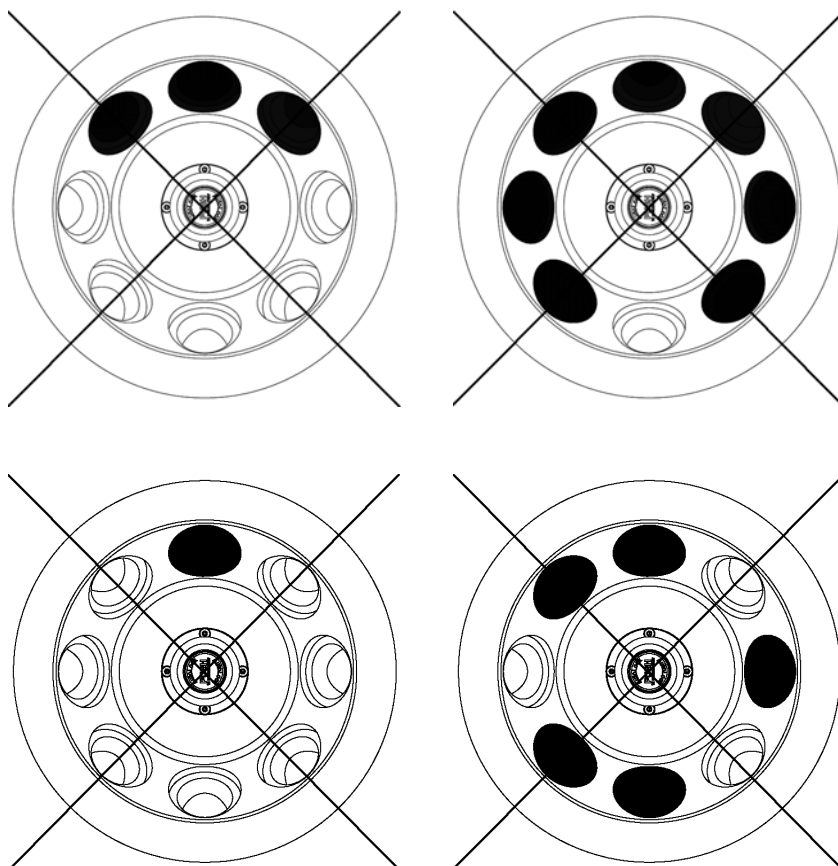
1. Please read and observe the safety instructions contained in these operating instructions and in the instructions for use.
2. Check the rotor and all accessory parts for damages such as cracks, scratches or traces of corrosion.
3. Check the rotor chamber, the centrifuge spindle and the AutoLock™.
4. Check the rotor's suitability using the chemical compatibility chart on [page B-1](#).
5. Make sure the tubes or bottles do not touch the lid.

## Proper Loading

To ensure safe operation of the centrifuge, the rotor must be evenly loaded at all times.



## Improper Loading



## Maximum Loading

The rotor can run at high speeds. The rotor design has sufficient reserve stability even when spinning at top speed.

The safety system of the centrifuge requires that you do not overload the rotor.

There are two options available for centrifuging samples whose weight, including adaptor, exceeds the maximum permissible load:

- Reduce the fill level.
- Reduce the speed.  
Use the table or the formula:

Actual Load (g/cavity)	RPM <sub>max</sub>
2	15200
2,2	14493
2,4	13876
2,6	13331

Actual Load (g/cavity)	RPM <sub>max</sub>
2,8	12846
3	12411
3,2	12017
3,4	11658
3,6	11329
3,8	11027
4	10748

$$n_{adm} = n_{max} \sqrt{\frac{\text{Maximum permissible load}}{\text{Effective load}}}$$

$n_{adm}$  = admissible speed

$n_{max}$  = maximum speed

## Cycle Counter

The lifetime of rotors and buckets is dependent on the amount of mechanical load. Do not exceed the number of cycles recommended for rotors and buckets.

The maximum number of cycles is given in the rotor table in the rotor specification section.

The maximum number of cycles for buckets is marked on the buckets themselves.



**WARNING** Replace the rotor when the specified number of cycles is reached. Due to the mechanical load a rotor can break and thus damage the centrifuge

### Service life examples

Usage profile	Maximum service life at 30,000 cycles
frequent use 20 runs / day 220 days / year	7 years

# Aerosol-tight Applications

## Contents

- “Basic Principles” on page 5-2
- “Fill Level” on page 5-2
- “Checking the Aerosol-Tightness” on page 5-2

## Basic Principles



**CAUTION** When centrifuging hazardous samples, do not open aerosol-tight rotors or buckets unless placed in a safety cabinet. Always bear in mind the maximum permitted fill levels.



Be sure to check all seals before starting any aerosol-tight applications.

- Check that the sample containers are well suited for the desired centrifugation process.

## Fill Level

The tubes are only to be filled to a level which ensures that the sample is unable to reach the top of the tube during centrifugation. Therefore fill the tube only 2/3 of the rated level.

## Checking the Aerosol-Tightness

The aerosol tightness testing of the rotors and buckets depend on the microbiological test process in accordance with the EN 61010-2-020 Appendix AA.

Whether or not a rotor is aerosol-tight depends primarily on proper handling.

Check as needed to make sure your rotor is aerosol-tight.

The careful inspection of the seals and seal surfaces for signs of wear and damage such as cracks, scratches and embrittlement is extremely important.

Aerosol-tight applications are not possible if the lids are open.

Aerosol-tightness requires the correct operation when filling the sample vessels and closing the rotor lid.

## Quick Test

As a quick test, it is possible to test the aerosol-tightness of fixed-angle rotors using the following process:

1. Lubricate all seals lightly.  
Always use the special grease 7600 3500 when lubricating the seals.
2. Fill the cavities with approx. 10 ml of carbonated mineral water.
3. Close the rotor as explained in the handling instructions.
4. Shake the rotor vigorously using your hands.  
This releases the carbonic acid gas which is bound in the water, resulting in excess pressure. Do not apply pressure to the lid when doing so.

Leaks can be detected by escaping water or the sound of escaping gas.



Replace the seals if you detect any leaks. Then repeat the test.

5. Dry the rotor, rotor lid and the cover seal.



**CAUTION** Prior to each use, the seals in the rotor are to be inspected in order to assure that they are correctly seated and are not worn or damaged. Damaged seals are to be replaced immediately. When loading the rotor, ensure that the rotor lid closes securely. Damaged or clouded rotor covers are to be replaced immediately.

# Maintenance and Care

## Contents

- “Cleaning intervals” on page 6-2
- “Cleaning” on page 6-2
- “Disinfection” on page 6-3
- “Decontamination” on page 6-4
- “Autoclaving” on page 6-5
- “Service of Thermo Fisher Scientific” on page 6-6

## Cleaning intervals

For the sake of personal, environmental, and material protection, it is your duty to clean and if necessary disinfect the centrifuge on a regular basis.

Maintenance	Recommended interval
Clean rotor chamber	daily or when polluted
Clean rotor	daily or when polluted
Accessories	daily or when polluted
Cabinet	Once per month
Ventilation holes	Every six months



**CAUTION** Refrain from using any other cleaning or decontamination procedure than those recommended here, if you are not entirely sure that the intended procedure is safe for the equipment.  
Use only approved cleansers.  
If in doubt, contact Thermo Fisher Scientific.

## Cleaning

When cleaning centrifug

- Use warm water with a neutral solvent.
- Never use caustic cleaning agents such as soap suds, phosphoric acid, bleaching solutions or scrubbing powder.
- Rinse the cavities out thoroughly.
- Use a soft brush without metal bristles to remove stubborn residue.
- Afterwards rinse with distilled water.
- Place the rotors on a plastic grate with their cavities pointing down.
- If drying boxes are used, the temperature must never exceed 50 °C, since higher temperatures could damage the material and shorten the lifetime of the parts.
- Use only disinfectants with a pH of 6-8.
- Dry aluminum parts off with a soft cloth.
- After cleaning, treat the entire surface of aluminum parts with corrosion protection oil (7000 9824). Also treat the cavities with oil.
- Store the aluminum parts at room temperature or in a cold-storage room with the cavities pointing down.



**CAUTION** Before using any cleaning or decontamination methods except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment.

Clean centrifuge and accessories as follows:

1. Open the centrifuge.
2. Turn off the centrifuge.
3. Pull out the power supply plug.
4. Grasp the rotor with both hands and lift it vertically off the centrifuge spindle.
5. Remove the centrifuge tubes and adaptors.
6. Use a neutral cleaning agent with a pH value between 6 and 8 for cleaning.
7. Dry all of the rotors and accessories after cleaning with a cloth or in a warm air cabinet at a maximum temperature of 50°C.
8. Clean the housing of the centrifuge as needed.
  - After cleaning, treat the entire surface of aluminum parts with corrosion protection oil (7000 9824). Also treat the cavities with oil.
  - Treat the bold of the swing out rotor with bold grease (75003786).



**CAUTION** When cleaning, do not allow liquids, especially organic solvents, to get on the drive shaft, the bearings, the AutoLock™ or the locks. Organic solvents break down the grease in the motor bearing. The drive shaft could freeze up.

After some applications there might be ice in the rotor chamber. Let the ice melt and drain it off. Clean the rotor chamber as described above.

## Disinfection

Disinfect the centrifuge immediately whenever infectious material has spilled during centrifugation.



**WARNING** Infectious material can get into the centrifuge when a tube breaks or as a result of spills. Keep in mind the risk of infection when touching the rotor and take all necessary precautions. In case of contamination, make sure that others are not put at risk. Decontaminate the affected parts immediately. Take other precautions if need be.

Use a sprayer whenever possible so that all surfaces are covered evenly.

The rotor chamber and the rotor should be treated preferably with a neutral disinfectant. A disinfectant spray would be most suitable for this purpose so that the rotor and accessory surfaces are covered evenly.



**CAUTION** Before using any cleaning or decontamination methods except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment. Observe the safety precautions and handling instructions for the cleaning agents used.

Contact the Service Department of Thermo Fisher Scientific for questions regarding the use of other disinfectants.

Disinfect the rotor and accessories as follows:

1. Open the centrifuge.
2. Turn off the centrifuge.
3. Pull out the power supply plug.
4. Grasp the rotor with both hands and lift it vertically off the centrifuge spindle.
5. Remove the centrifuge tubes and adaptors and dispose of them or disinfect them.
6. Treat the rotor and accessories according to the instructions for the disinfectant (spray or soak in solution). Adhere strictly to the given application times.
7. Be sure the disinfectant can drain off the rotor.
8. Rinse the rotor and rotor lid thoroughly with water and then rub down.
9. Dispose of the disinfectant according to the applicable guidelines.
10. Dry all of the rotors and accessories after cleaning with a cloth or in a warm air cabinet at a maximum temperature of 50°C.
  - After cleaning, treat the entire surface of aluminum parts with corrosion protection oil (7000 9824). Also treat the cavities with oil.
  - Treat the rotor with grease (75003786).

## Decontamination

Decantamine the centrifuge immediately whenever radioactive material has spilled during centrifugation.



**WARNING** Radioactive material can get into the centrifuge when a tube breaks or as a result of spills. Keep in mind the risk of infection when touching the rotor and take all necessary precautions.

In case of contamination, make sure that others are not put at risk.

Decontaminate the affected parts immediately.

Take other precautions if need be.



**CAUTION** Before using any cleaning or decontamination methods except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment.

For general radioactive decontamination use a solution of equal parts of 70% ethanol, 10% SDS and water.

Disinfect the rotor and accessories as follows:

1. Open the centrifuge.
2. Turn off the centrifuge.

3. Pull out the power supply plug.
4. Grasp the rotor with both hands and lift it vertically off the centrifuge spindle.
5. Remove the centrifuge tubes and adaptors and dispose of them or disinfect them.
6. Rinse the rotor first with ethanol and then with de-ionized water.
  - Adhere strictly to the given application times.
7. Be sure the decontamination solution can drain off the rotor.
8. Rinse the rotor and accessories thoroughly with water.
9. Dispose of the decontamination solution according to the applicable guidelines.
10. Dry all of the rotors and accessories after cleaning with a cloth or in a warm air cabinet at a maximum temperature of 50°C.
  - After cleaning, treat the entire surface of aluminum parts with corrosion protection oil (7000 9824). Also treat the cavities with oil.
  - Treat the body of the swing out rotor with grease (75003786).

## Autoclaving

1. Before autoclaving clean rotor and accessories as described above.
2. Place the rotor on a flat surface.
  - Rotors and adapter can be autoclaved at 121 °C.
  - The maximum permissible autoclave cycle is 20 minutes at 121 °C.

Clean the rotor before autoclaving and rinse it with distilled water. Remove all accessories (tubes, adapters) from the rotor. Place the rotor on a flat surface.

**Note** No chemical additives are permitted in the steam.



**CAUTION** Never exceed the permitted temperature and duration when autoclaving. If the rotor shows signs of corrosion or wear, it must be replaced.

## Service of Thermo Fisher Scientific

Thermo Fisher Scientific recommends having the centrifuge and accessories serviced once a year by an authorized service technician. The service technicians check the following:

- the electrical equipment
- the suitability of the set-up site
- the lid lock and the safety system
- the rotor
- the fixation of the rotor and the drive shaft

Thermo Fisher Scientific offers inspection and service contracts for this work.

## RCF-Values

Speed (rpm)	R <sub>min</sub>	R <sub>max</sub>	RCF R <sub>min</sub>	RCF R <sub>max</sub>
300	5.9	9.8	6	10
400	5.9	9.8	11	18
500	5.9	9.8	16	27
600	5.9	9.8	24	39
700	5.9	9.8	32	54
800	5.9	9.8	42	70
900	5.9	9.8	53	89
1000	5.9	9.8	66	110
1100	5.9	9.8	80	133
1200	5.9	9.8	95	158
1300	5.9	9.8	111	185
1400	5.9	9.8	129	215
1500	5.9	9.8	148	247
1600	5.9	9.8	169	280
1700	5.9	9.8	191	317
1800	5.9	9.8	214	355
1900	5.9	9.8	238	396
2000	5.9	9.8	264	438
2100	5.9	9.8	291	483
2200	5.9	9.8	319	530
2300	5.9	9.8	349	580
2400	5.9	9.8	380	631
2500	5.9	9.8	412	685
2600	5.9	9.8	446	741
2700	5.9	9.8	481	799
2800	5.9	9.8	517	859
2900	5.9	9.8	555	921
3000	5.9	9.8	594	986



**A RCF-Values**

<b>Speed (rpm)</b>	<b>R<sub>min</sub></b>	<b>R<sub>max</sub></b>	<b>RCF R<sub>min</sub></b>	<b>RCF R<sub>max</sub></b>
3100	5.9	9.8	634	1053
3200	5.9	9.8	675	1122
3300	5.9	9.8	718	1193
3400	5.9	9.8	763	1267
3500	5.9	9.8	808	1342
3600	5.9	9.8	855	1420
3700	5.9	9.8	903	1500
3800	5.9	9.8	952	1582
3900	5.9	9.8	1003	1666
4000	5.9	9.8	1055	1753
4100	5.9	9.8	1109	1842
4200	5.9	9.8	1164	1933
4300	5.9	9.8	1220	2026
4400	5.9	9.8	1277	2121
4500	5.9	9.8	1336	2219
4600	5.9	9.8	1396	2318
4700	5.9	9.8	1457	2420
4800	5.9	9.8	1520	2524
4900	5.9	9.8	1584	2631
5000	5.9	9.8	1649	2739
5100	5.9	9.8	1716	2850
5200	5.9	9.8	1784	2963
5300	5.9	9.8	1853	3078
5400	5.9	9.8	1923	3195
5500	5.9	9.8	1995	3314
5600	5.9	9.8	2069	3436
5700	5.9	9.8	2143	3560
5800	5.9	9.8	2219	3686
5900	5.9	9.8	2296	3814
6000	5.9	9.8	2375	3944
6100	5.9	9.8	2454	4077
6200	5.9	9.8	2536	4212
6300	5.9	9.8	2618	4349
6400	5.9	9.8	2702	4488
6500	5.9	9.8	2787	4629
6600	5.9	9.8	2873	4773
6700	5.9	9.8	2961	4918

Speed (rpm)	R <sub>min</sub>	R <sub>max</sub>	RCF R <sub>min</sub>	RCF R <sub>max</sub>
6800	5.9	9.8	3050	5066
6900	5.9	9.8	3140	5216
7000	5.9	9.8	3232	5369
7100	5.9	9.8	3325	5523
7200	5.9	9.8	3419	5680
7300	5.9	9.8	3515	5839
7400	5.9	9.8	3612	6000
7500	5.9	9.8	3710	6163
7600	5.9	9.8	3810	6328
7700	5.9	9.8	3911	6496
7800	5.9	9.8	4013	6666
7900	5.9	9.8	4117	6838
8000	5.9	9.8	4222	7012
8100	5.9	9.8	4328	7188
8200	5.9	9.8	4435	7367
8300	5.9	9.8	4544	7548
8400	5.9	9.8	4654	7731
8500	5.9	9.8	4766	7916
8600	5.9	9.8	4879	8103
8700	5.9	9.8	4993	8293
8800	5.9	9.8	5108	8485
8900	5.9	9.8	5225	8679
9000	5.9	9.8	5343	8875
9100	5.9	9.8	5462	9073
9200	5.9	9.8	5583	9273
9300	5.9	9.8	5705	9476
9400	5.9	9.8	5828	9681
9500	5.9	9.8	5953	9888
9600	5.9	9.8	6079	10097
9700	5.9	9.8	6206	10309
9800	5.9	9.8	6335	10523
9900	5.9	9.8	6465	10738
10000	5.9	9.8	6596	10956
10100	5.9	9.8	6729	11177
10200	5.9	9.8	6863	11399
10300	5.9	9.8	6998	11624
10400	5.9	9.8	7134	11850

## A RCF-Values

Speed (rpm)	R <sub>min</sub>	R <sub>max</sub>	RCF R <sub>min</sub>	RCF R <sub>max</sub>
10500	5.9	9.8	7272	12079
10600	5.9	9.8	7411	12311
10700	5.9	9.8	7552	12544
10800	5.9	9.8	7694	12780
10900	5.9	9.8	7837	13017
11000	5.9	9.8	7981	13257
11100	5.9	9.8	8127	13499
11200	5.9	9.8	8274	13744
11300	5.9	9.8	8423	13990
11400	5.9	9.8	8572	14239
11500	5.9	9.8	8723	14490
11600	5.9	9.8	8876	14743
11700	5.9	9.8	9030	14998
11800	5.9	9.8	9185	15256
11900	5.9	9.8	9341	15515
12000	5.9	9.8	9499	15777
12100	5.9	9.8	9657	16041
12200	5.9	9.8	9818	16308
12300	5.9	9.8	9979	16576
12400	5.9	9.8	10142	16847
12500	5.9	9.8	10307	17119
12600	5.9	9.8	10472	17394
12700	5.9	9.8	10639	17672
12800	5.9	9.8	10807	17951
12900	5.9	9.8	10977	18233
13000	5.9	9.8	11148	18516
13100	5.9	9.8	11320	18802
13200	5.9	9.8	11493	19090
13300	5.9	9.8	11668	19381
13400	5.9	9.8	11844	19673
13500	5.9	9.8	12022	19968
13600	5.9	9.8	12200	20265
13700	5.9	9.8	12380	20564
13800	5.9	9.8	12562	20865
13900	5.9	9.8	12745	21169
14000	5.9	9.8	12929	21475
14100	5.9	9.8	13114	21782

Speed (rpm)	R <sub>min</sub>	R <sub>max</sub>	RCF R <sub>min</sub>	RCF R <sub>max</sub>
14200	5.9	9.8	13301	22092
14300	5.9	9.8	13489	22405
14400	5.9	9.8	13678	22719
14500	5.9	9.8	13869	23036
14600	5.9	9.8	14060	23355
14700	5.9	9.8	14254	23676
14800	5.9	9.8	14448	23999
14900	5.9	9.8	14644	24324
15000	5.9	9.8	14841	24652
15100	5.9	9.8	15040	24982
15200	5.9	9.8	15240	25314

# Chemical Compatibility Chart

CHEMICAL	MATERIAL																										
	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET, POLYCLEAR®, CLEARCRIMP®, CCCLEARCRIMP®	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
2-mercaptoethanol	S	S	U	-	S	M	S	-	S	U	S	S	U	S	S	-	S	S	S	S	U	S	S	S	S	S	S
Acetaldehyde	S	-	U	U	-	-	-	M	-	U	-	-	-	M	U	U	U	M	M	-	M	S	U	-	S	-	U
Acetone	M	S	U	U	S	U	M	S	S	U	U	S	U	S	U	U	U	S	S	U	U	S	M	M	S	U	U
Acetonitrile	S	S	U	-	S	M	S	-	S	S	U	S	U	M	U	U	-	S	M	U	U	S	S	S	S	U	U
Alconox®	U	U	S	-	S	S	S	-	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S	S	S	S	U
Allyl Alcohol	-	-	-	U	-	-	S	-	-	-	-	S	-	S	S	M	S	S	S	S	-	M	S	-	-	S	-
Aluminum Chloride	U	U	S	S	S	S	U	S	S	S	S	M	S	S	S	S	-	S	S	S	S	S	M	U	U	S	S
Formic Acid (100%)	-	S	M	U	-	-	U	-	-	-	-	U	-	S	M	U	U	S	S	-	U	S	-	U	S	-	U
Ammonium Acetate	S	S	U	-	S	S	S	-	S	S	S	S	S	S	S	U	-	S	S	S	S	S	S	S	S	S	S
Ammonium Carbonate	M	S	U	S	S	S	S	S	S	S	S	S	S	S	U	U	-	S	S	S	S	S	S	M	S	S	S
Ammonium Hydroxide (10%)	U	U	S	U	S	S	M	S	S	S	S	S	-	S	U	M	S	S	S	S	S	S	S	S	S	M	S
Ammonium Hydroxide (28%)	U	U	S	U	S	U	M	S	S	S	S	S	U	S	U	M	S	S	S	S	S	S	S	S	S	M	S
Ammonium Hydroxide (conc.)	U	U	U	U	S	U	M	S	-	S	-	S	U	S	U	U	S	S	S	-	M	S	S	S	S	-	U
Ammonium Phosphate	U	-	S	-	S	S	S	S	S	S	S	S	-	S	S	M	-	S	S	S	S	S	S	M	S	S	S
Ammonium Sulfate	U	M	S	-	S	S	U	S	S	S	S	S	S	S	S	S	-	S	S	S	S	S	S	U	S	S	U
Amyl Alcohol	S	-	M	U	-	-	S	S	-	M	-	S	-	M	S	S	S	S	M	-	-	-	U	-	S	-	M
Aniline	S	S	U	U	S	U	S	M	S	U	U	U	U	U	U	U	-	S	M	U	U	S	S	S	S	U	S
Sodium Hydroxide (<1%)	U	-	M	S	S	S	-	-	S	M	S	S	-	S	M	M	S	S	S	S	S	S	M	S	S	-	U
Sodium Hydroxide (10%)	U	-	M	U	-	-	U	-	M	M	S	S	U	S	U	U	S	S	S	S	S	S	M	S	S	-	U
Barium Salts	M	U	S	-	S	S	S	S	S	S	S	S	S	S	M	-	S	S	S	S	S	S	M	S	S	S	S
Benzene	S	S	U	U	S	U	M	U	S	U	U	S	U	U	U	M	U	M	U	U	U	S	U	U	S	U	S
Benzyl Alcohol	S	-	U	U	-	-	M	M	-	M	-	S	U	U	U	U	U	U	U	-	M	S	M	-	S	-	S
Boric Acid	U	S	S	M	S	S	U	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	S	S

## B Chemical Compatibility Chart

CHEMICAL	MATERIAL																										
	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET®, POLYCLEAR®, CLEARCRIMP®, CCCCLEARCRIMP®	POLYALLUMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIMIDE	POLYETHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Cesium Acetate	M	-	S	-	S	S	S	-	S	S	S	S	-	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Bromide	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Chloride	M	S	S	U	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Formate	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Iodide	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Sulfate	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Chloroform	U	U	U	U	S	S	M	U	S	U	U	M	U	M	U	U	U	M	M	U	U	S	U	U	U	M	S
Chromic Acid (10%)	U	-	U	U	S	U	U	-	S	S	S	U	S	S	M	U	M	S	S	U	M	S	M	U	S	S	S
Chromic Acid (50%)	U	-	U	U	-	U	U	-	-	-	S	U	U	S	M	U	M	S	S	U	M	S	-	U	M	-	S
Cresol Mixture	S	S	U	-	-	-	S	-	S	U	U	U	U	U	U	-	-	U	U	-	U	S	S	S	S	U	S
Cyclohexane	S	S	S	-	S	S	S	U	S	U	S	S	U	U	U	M	S	M	U	M	M	S	U	M	M	U	S
Deoxycholate	S	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	S	S	S	S
Distilled Water	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Dextran	M	S	S	S	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S	S	S
Diethyl Ether	S	S	U	U	S	S	S	U	S	U	U	S	U	U	U	U	U	U	U	U	U	U	S	S	S	M	U
Diethyl Ketone	S	-	U	U	-	-	M	-	S	U	-	S	-	M	U	U	U	M	M	-	U	S	-	-	S	U	U
Diethylpyrocarbonate	S	S	U	-	S	S	S	-	S	S	U	S	U	S	U	-	-	S	S	S	M	S	S	S	S	S	S
Dimethylsulfoxide	S	S	U	U	S	S	S	-	S	U	S	S	U	S	U	U	-	S	S	U	U	S	S	S	S	U	U
Dioxane	M	S	U	U	S	S	M	M	S	U	U	S	U	M	U	U	-	M	M	M	U	S	S	S	S	U	U
Ferric Chloride	U	U	S	-	-	-	M	S	-	M	-	S	-	S	-	-	-	S	S	-	-	-	M	U	S	-	S
Acetic Acid (Glacial)	S	S	U	U	S	S	U	M	S	U	S	U	U	U	U	U	M	S	U	M	U	S	U	U	S	-	U
Acetic Acid (5%)	S	S	M	S	S	S	M	S	S	S	S	S	M	S	S	S	S	S	S	S	M	S	S	M	S	S	M
Acetic Acid (60%)	S	S	U	U	S	S	U	-	S	M	S	U	U	M	U	S	M	S	M	S	M	S	M	U	S	M	U
Ethyl Acetate	M	M	U	U	S	S	M	M	S	S	U	S	U	M	U	U	-	S	S	U	U	S	M	M	S	U	U
Ethyl Alcohol (50%)	S	S	S	S	S	S	M	S	S	S	S	S	U	S	U	S	S	S	S	S	S	S	S	M	S	M	U
Ethyl Alcohol (95%)	S	S	S	U	S	S	M	S	S	S	S	S	U	S	U	-	S	S	S	M	S	S	S	U	S	M	U
Ethylene Dichloride	S	-	U	U	-	-	S	M	-	U	U	S	U	U	U	U	U	U	U	-	U	S	U	-	S	-	S
Ethylene Glycol	S	S	S	S	S	S	S	S	S	S	S	S	-	S	U	S	S	S	S	S	S	S	S	M	S	M	S
Ethylene Oxide Vapor	S	-	U	-	-	U	-	-	S	U	-	S	-	S	M	-	-	S	S	S	U	S	U	S	S	S	U
Ficoll-Hypaque®	M	S	S	-	S	S	S	-	S	S	S	S	-	S	S	-	S	S	S	S	S	S	S	M	S	S	S

<b>CHEMICAL</b>	<b>MATERIAL</b>	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET®, POLYCLEAR®, CLEARCRIMP®, CIRCLECRIMP®	POLYALLUMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIMIDE	POLYETHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Hydrofluoric Acid (10%)	U	U	U	M	-	-	U	-	-	U	U	S	-	S	M	U	S	S	S	S	M	S	U	U	U	-	-	
Hydrofluoric Acid (50%)	U	U	U	U	-	-	U	-	-	U	U	U	U	S	U	U	U	S	S	M	M	S	U	U	U	-	M	
Hydrochloric Acid (conc.)	U	U	U	U	-	U	U	M	-	U	M	U	U	M	U	U	U	-	S	-	U	S	U	U	U	-	-	
Formaldehyde (40%)	M	M	M	S	S	S	S	M	S	S	S	S	M	S	S	S	U	S	S	M	S	S	S	M	S	M	U	
Glutaraldehyde	S	S	S	S	-	-	S	-	S	S	S	S	S	S	S	-	-	S	S	S	-	-	S	S	S	-	-	
Glycerol	M	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	-	S	S	S	S	S	S	S	S	S	S	
Guanidine Hydrochloride	U	U	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	S	U	S	S	
Haemo-Sol®	S	S	S	-	-	-	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	S	S	S	S	
Hexane	S	S	S	-	S	S	S	-	S	S	U	S	U	M	U	S	S	U	S	S	M	S	U	S	S	U	S	
Isobutyl Alcohol	-	-	M	U	-	-	S	S	-	U	-	S	U	S	S	M	S	S	S	-	S	S	S	-	S	-	S	
Isopropyl Alcohol	M	M	M	U	S	S	S	S	S	U	S	S	U	S	U	M	S	S	S	S	S	S	S	S	M	M	M	
Iodoacetic Acid	S	S	M	-	S	S	S	-	S	M	S	S	M	S	S	-	M	S	S	S	S	S	M	S	S	M	M	
Potassium Bromide	U	S	S	-	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	-	S	S	S	M	S	S	S	
Potassium Carbonate	M	U	S	S	S	S	S	-	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	S	S	S	S	
Potassium Chloride	U	S	S	-	S	S	S	S	S	S	S	S	S	S	S	-	S	S	S	S	S	S	S	S	U	S	S	
Potassium Hydroxide (5%)	U	U	S	S	S	S	M	-	S	S	S	S	-	S	U	S	S	S	S	S	S	S	M	U	M	S	U	
Potassium Hydroxide (conc.)	U	U	M	U	-	-	M	-	M	S	S	-	U	M	U	U	U	S	M	-	M	U	-	U	U	-	U	
Potassium Permanganate	S	S	S	-	S	S	S	-	S	S	S	U	S	S	S	M	-	S	M	S	U	S	S	M	S	U	S	
Calcium Chloride	M	U	S	S	S	S	S	S	S	S	S	S	S	S	M	S	-	S	S	S	S	S	S	M	S	S	S	
Calcium Hypochlorite	M	-	U	-	S	M	M	S	-	M	-	S	-	S	M	S	-	S	S	S	M	S	M	U	S	-	S	
Kerosene	S	S	S	-	S	S	S	U	S	M	U	S	U	M	M	S	-	M	M	M	S	S	U	S	S	U	S	
Sodium Chloride (10%)	S	-	S	S	S	S	S	-	-	-	-	S	S	S	S	S	-	S	S	S	S	-	S	S	M	-	S	
Sodium Chloride (sat'd)	U	-	S	U	S	S	S	-	-	-	-	S	S	S	S	S	-	S	S	-	S	-	S	S	M	-	S	
Carbon Tetrachloride	U	U	M	S	S	U	M	U	S	U	U	S	U	M	U	S	S	M	M	S	M	M	M	M	U	S	S	
Aqua Regia	U	-	U	U	-	-	U	-	-	-	-	-	U	U	U	U	U	U	U	-	-	-	-	-	S	-	M	
Solution 555 (20%)	S	S	S	-	-	-	S	-	S	S	S	S	S	S	S	-	-	S	S	S	-	S	S	S	S	S	S	
Magnesium Chloride	M	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S	S	S	
Mercaptoacetic Acid	U	S	U	-	S	M	S	-	S	M	S	U	U	U	U	-	S	U	U	S	M	S	U	S	S	S	S	
Methyl Alcohol	S	S	S	U	S	S	M	S	S	S	S	U	S	U	M	S	S	S	S	S	S	S	S	M	S	M	U	
Methylene Chloride	U	U	U	U	M	S	S	U	S	U	U	S	U	U	U	U	U	U	M	U	U	U	S	S	M	U	U	

## B Chemical Compatibility Chart

CHEMICAL	MATERIAL																										
	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET®, POLYCLEAR®, CLEARCRIMP®, CCCCLEARCRIMP®	POLYALLUMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIMIDE	POLYETHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Methyl Ethyl Ketone	S	S	U	U	S	S	M	S	S	U	U	S	U	S	U	U	U	S	S	U	U	S	S	S	S	U	U
Metrizamide®	M	S	S	-	S	S	S	-	S	S	S	S	-	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Lactic Acid (100%)	-	-	S	-	-	-	-	-	M	S	U	-	S	S	S	M	S	S	-	M	S	M	S	S	-	S	
Lactic Acid (20%)	-	-	S	S	-	-	-	-	M	S	M	-	S	S	S	S	S	S	S	M	S	M	S	S	-	S	
N-Butyl Alcohol	S	-	S	U	-	-	S	-	S	M	-	U	S	M	S	S	S	S	M	M	S	M	-	S	-	S	
N-Butyl Phthalate	S	S	U	-	S	S	S	-	S	U	U	S	U	U	M	-	U	U	S	U	S	M	M	S	U	S	
N, N-Dimethylformamide	S	S	S	U	S	M	S	-	S	S	U	S	U	S	U	-	S	S	U	U	S	M	S	S	S	U	
Sodium Borate	M	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	-	S	S	S	S	S	M	S	S	S	
Sodium Bromide	U	S	S	-	S	S	S	-	S	S	S	S	S	S	S	S	-	S	S	S	S	S	M	S	S	S	
Sodium Carbonate (2%)	M	U	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	S	S	S	
Sodium Dodecyl Sulfate	S	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	S	S	S	S	S	S	S	S	S	S	
Sodium Hypochlorite (5%)	U	U	M	S	S	M	U	S	S	M	S	S	S	M	S	S	S	S	M	S	S	S	M	U	S	M	S
Sodium Iodide	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	M	S	S	S	
Sodium Nitrate	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	-	S	S	S	S	S	U	S	S	S	S
Sodium Sulfate	U	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S	S	S	
Sodium Sulfide	S	-	S	S	-	-	-	S	-	-	-	S	S	S	U	U	-	-	S	-	-	-	S	S	M	-	S
Sodium Sulfite	S	S	S	-	S	S	S	M	S	S	S	S	S	S	M	-	S	S	S	S	S	S	S	S	S	S	
Nickel Salts	U	S	S	S	S	S	-	S	S	S	-	-	S	S	S	S	-	S	S	S	S	S	M	S	S	S	
Oils (Petroleum)	S	S	S	-	-	-	S	U	S	S	S	S	U	U	M	S	M	U	U	S	S	S	U	S	S	S	
Oils (Other)	S	-	S	-	-	-	S	M	S	S	S	S	U	S	S	S	S	U	S	S	S	S	-	S	S	M	S
Oleic Acid	S	-	U	S	S	S	U	U	S	U	S	S	M	S	S	S	S	S	S	S	S	S	M	U	S	M	M
Oxalic Acid	U	U	M	S	S	S	U	S	S	S	S	S	U	S	U	S	S	S	S	S	S	S	U	M	S	S	
Perchloric Acid (10%)	U	-	U	-	S	U	U	-	S	M	M	-	-	M	U	M	S	M	M	-	M	S	U	-	S	-	S
Perchloric Acid (70%)	U	U	U	-	-	U	U	-	S	U	M	U	U	M	U	U	M	M	U	M	S	U	U	S	U	S	
Phenol (5%)	U	S	U	-	S	M	M	-	S	U	M	U	U	S	U	M	S	M	S	U	U	S	U	M	M	M	S
Phenol (50%)	U	S	U	-	S	U	M	-	S	U	M	U	U	U	U	S	U	M	U	U	S	U	U	U	M	S	
Phosphoric Acid (10%)	U	U	M	S	S	S	U	S	S	S	S	U	-	S	S	S	S	S	S	S	S	U	M	U	S	S	
Phosphoric Acid (conc.)	U	U	M	M	-	-	U	S	-	M	S	U	U	M	M	S	S	M	S	M	S	U	M	U	-	S	
Physiologic Media (Serum, Urine)	M	S	S	S	-	-	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Picric Acid	S	S	U	-	S	M	S	S	S	M	S	U	S	S	S	U	S	S	S	S	U	S	U	M	S	M	S



CHEMICAL	MATERIAL																										
	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET®, POLYCLEAR®, CLEARCRIMP®, CIRCLECRIMP®	POLYALLUMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIMIDE	POLYETHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Pyridine (50%)	U	S	U	U	S	U	U	-	U	S	S	U	U	M	U	U	-	U	S	M	U	S	S	U	U	U	U
Rubidium Bromide	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Rubidium Chloride	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Sucrose	M	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Sucrose, Alkaline	M	S	S	-	S	S	S	-	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	M	S	S	S
Sulfosalicylic Acid	U	U	S	S	S	S	S	-	S	S	S	U	S	S	S	-	S	S	S	-	S	S	S	U	S	S	S
Nitric Acid (10%)	U	S	U	S	S	U	U	-	S	U	S	U	-	S	S	S	S	S	S	S	S	S	M	S	S	S	S
Nitric Acid (50%)	U	S	U	M	S	U	U	-	S	U	S	U	U	M	M	U	M	M	M	S	S	S	U	S	S	M	S
Nitric Acid (95%)	U	-	U	U	-	U	U	-	-	U	U	U	U	M	U	U	U	U	M	U	U	S	U	S	S	-	S
Hydrochloric Acid (10%)	U	U	M	S	S	S	U	-	S	S	S	U	U	S	U	S	S	S	S	S	S	S	S	U	M	S	S
Hydrochloric Acid (50%)	U	U	U	U	S	U	U	-	S	M	S	U	U	M	U	U	S	S	S	S	M	S	M	U	U	M	M
Sulfuric Acid (10%)	M	U	U	S	S	U	U	-	S	S	M	U	S	S	S	S	S	S	S	S	S	S	U	U	U	S	S
Sulfuric Acid (50%)	M	U	U	U	S	U	U	-	S	S	M	U	U	S	U	U	M	S	S	S	S	S	U	U	U	M	S
Sulfuric Acid (conc.)	M	U	U	U	-	U	U	M	-	-	M	U	U	S	U	U	U	M	S	U	M	S	U	U	U	-	S
Stearic Acid	S	-	S	-	-	-	S	M	S	S	S	S	-	S	S	S	S	S	S	S	S	S	M	M	S	S	S
Tetrahydrofuran	S	S	U	U	S	U	U	M	S	U	U	S	U	U	U	-	M	U	U	U	U	S	U	S	S	U	U
Toluene	S	S	U	U	S	S	M	U	S	U	U	S	U	U	U	S	U	M	U	U	U	S	U	S	U	U	M
Trichloroacetic Acid	U	U	U	-	S	S	U	M	S	U	S	U	U	S	M	-	M	S	S	U	U	S	U	U	U	M	U
Trichloroethane	S	-	U	-	-	-	M	U	-	U	-	S	U	U	U	U	U	U	U	U	U	S	U	-	S	-	S
Trichloroethylene	-	-	U	U	-	-	-	U	-	U	-	S	U	U	U	U	U	U	U	U	U	S	U	-	U	-	S
Trisodium Phosphate	-	-	-	S	-	-	M	-	-	-	-	-	-	S	-	-	S	S	S	-	-	S	-	-	S	-	S
Tris Buffer (neutral pH)	U	S	S	S	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Triton X-100®	S	S	S	-	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Urea	S	-	U	S	S	S	S	-	-	-	-	S	S	S	M	S	S	S	S	-	S	S	S	M	S	-	S
Hydrogen Peroxide (10%)	U	U	M	S	S	U	U	-	S	S	S	U	S	S	S	M	U	S	S	S	S	S	S	M	S	U	S
Hydrogen Peroxide (3%)	S	M	S	S	S	-	S	-	S	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S	S	S
Xylene	S	S	U	S	S	S	M	U	S	U	U	U	U	U	U	M	U	M	U	U	U	S	U	M	S	U	S
Zinc Chloride	U	U	S	S	S	U	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Zinc Sulfate	U	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Citric Acid (10%)	M	S	S	M	S	S	M	S	S	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S	S	S

## B Chemical Compatibility Chart

\*Polyethyleneterephthalate

Key

S Satisfactory

M = Moderate attack, may be satisfactory for use in centrifuge depending on length of exposure, speed involved, etc.; suggest testing under actual conditions of use.

U Unsatisfactory, not recommended.

-- Performance unknown; suggest testing, using sample to avoid loss of valuable material.

Chemical resistance data is included only as a guide to product use. Because no organized chemical resistance data exists for materials under the stress of centrifugation, when in doubt we recommend pretesting sample lots.

## Contact Information

United States	866-9-THERMO
	+1 866 984 3766

Canada	+1 866 984 3766
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Austria	+43 1 801 400
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Belgium	+32 2 482 30 30
---------	-----------------

Germany	08001 536 376
	+49 6184 90 6940

France	+33 2 2803 2180
	+33 2 2803 2000

Italy	+39 02 02 95059 341
-------	---------------------

Netherlands	+31 76 571 4440
-------------	-----------------

Nordic / Baltic Countries	+35 89 329 100
---------------------------	----------------

Russia	+7 (812) 703 42 15
--------	--------------------

## **C** Contact Information

Spain +34 932 23 09 18

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Portugal +34 932 23 09 18

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Switzerland +41 44 454 12 12

---

UK / Ireland +44 870 609 9203

---

China +86 21 6865 4588

---

+86 10 8419 3588

---

India +91 22 6716 2200

---

Japan +81 45 453 9220

---

Other Asian Countries +852 2885 4613

---

Latin America +1 866 984 3766

---

Other Countries +49 6184 90 6940

---

+33 2 2803 2180

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