

Thermo Scientific

8x8 PCR Strip Rotor

For use with Thermo Scientific Heraeus Megafuge 8,
Sorvall ST 8 and SL 8 Centrifuges

Instruction Manual

50139060-a

February 2013

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Certificate of Containment Testing

Containment Testing of Rotor 75005720 MicroClick PCR 8x8 in a Thermo Scientific Centrifuge

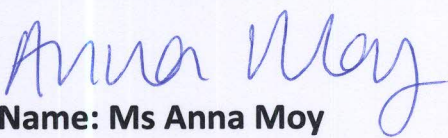

Report No. 194-12 C

Report Prepared For: Thermo Fisher Scientific

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Test Summary

A 75005720 MicroClick PCR 8x8 rotor was containment tested in a Thermo Scientific centrifuge at 15,000 rpm, using Annex AA of IEC 61010-2-20:2006 (2nd Ed.). The sealed rotor was shown to contain all contents.

Report Written By  Name: Ms Anna Moy Title: Biosafety Scientist	Report Authorised By  Name: Mrs Sara Speight Title: Senior Biosafety Scientist
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Preface

Before starting to use the rotor, read through these instruction manual carefully and follow the instructions.

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

Items Supplied

	Quantity	Check
8x8 PCR Strip Rotor	1	<input type="checkbox"/>
Instruction manual	1	<input type="checkbox"/>

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

Intended Use

This rotor is used in combination with the according centrifuge as a laboratory product designed to separate components by generation of Relative Centrifugal Force. It separates human samples (e.g. blood, urine and other body fluids) collected in appropriate containers, either alone or after addition of reagents or other additives.

The rotor in the centrifuge is designed to run other containers filled with chemicals, environmental samples and other non-human body samples.

If the rotor is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

This rotor should be operated by trained specialists only.

Precautions

In order to ensure safe operation of the 8x8 PCR Strip Rotor, 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. Do not touch the electronic components of the rotor and do not make any changes to the electronic or mechanical components.
- Use only with rotors which have been loaded properly.
- Never overload the rotor.
- 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.
- If centrifuging any hazardous materials mind the „Laboratory Biosafety Manual“ of the World Health Organization (WHO).

When centrifuging microbiological samples from the Risk Group II (according to the "Laboratory Biosafety Manual" of the World Health Organization (WHO)), aerosol-tight biological seals have to be used.

Look on the internet page of the World Health Organization (www.who.int) for the „Laboratory Biosafety Manual“.

- Observe the safety instructions.

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: $1,2 \frac{\text{g}}{\text{cm}^3}$



This symbol refers to general hazards.
CAUTION 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

- “Thermo Scientific Heraeus Megafuge 8 Centrifuge” on page 10
- “Thermo Scientific Sorvall ST 8 Centrifuge” on page 11
- “Thermo Scientific SL 8 Centrifuge” on page 13

2 Rotor Specifications

Thermo Scientific Heraeus Megafuge 8 Centrifuge

Thermo Scientific Heraeus Megafuge 8 Centrifuge

Table 1. Heraeus 230V 50Hz/60Hz

Centrifuge	Heraeus® Megafuge® 8
Catalog #	75007211
Weight empty [kg]	1.4
Max. cycle number	50000
Maximum permissible load [g]	8 x 4 (64 x 0.5)
Maximum speed n_{\max} [rpm]	15000
Maximum RCF value at n_{\max}	17860
Max. / min. radius [cm]	7.1 / 4.4
Pitch angle [°]	45
Accel. / braking time [s]	20 / 32
Sample heating at n_{\max} [° C] referred to ambient temperature of 23 °C, running time 60 minutes	12
Aerosol-tight ¹	Yes
Permissible temperature range autoclavable °C	121

¹Tested by HPA, Porton-down, UK

Table 2. Heraeus 120V 60Hz

Centrifuge	Heraeus® Megafuge® 8
Catalog #	75007210
Weight empty [kg]	1.4
Max. cycle number	50000
Maximum permissible load [g]	8 x 4 (64 x 0.5)
Maximum speed n_{\max} [rpm]	15000
Maximum RCF value at n_{\max}	17860
Max. / min. radius [cm]	7.1 / 4.4
Pitch angle [°]	45
Accel. / braking time [s]	20 / 33
Sample heating at n_{\max} [° C] referred to ambient temperature of 23 °C, running time 60 minutes	12
Aerosol-tight ¹	Yes
Permissible temperature range autoclavable °C	121

¹Tested by HPA, Porton-down, UK

Thermo Scientific Sorvall ST 8 Centrifuge

Table 3. Sorvall 230V 50/60Hz

Centrifuge	Sorvall® ST 8
Catalog #	75007201
Weight empty [kg]	1.4
Max. cycle number	50000
Maximum permissible load [g]	8 x 4 (64 x 0.5)
Maximum speed n_{\max} [rpm]	15000
Maximum RCF value at n_{\max}	17860
Max. / min. radius [cm]	7.1 / 4.4
Pitch angle [°]	45
Accel. / braking time [s]	20 / 32
Sample heating at n_{\max} [° C] referred to ambient temperature of 23 °C, running time 60 minutes	12
Aerosol-tight ¹	Yes
Permissible temperature range autoclavable °C	121

¹Tested by HPA, Porton-down, UK

Table 4. Sorvall 120V 60Hz

Centrifuge	Sorvall® ST 8
Catalog #	75007200
Weight empty [kg]	1.4
Max. cycle number	50000
Maximum permissible load [g]	8 x 4 (64 x 0.5)
Maximum speed n_{\max} [rpm]	15000
Maximum RCF value at n_{\max}	17860
Max. / min. radius [cm]	7.1 / 4.4
Pitch angle [°]	45
Accel. / braking time [s]	20 / 33
Sample heating at n_{\max} [° C] referred to ambient temperature of 23 °C, running time 60 minutes	12
Aerosol-tight ¹	Yes
Permissible temperature range autoclavable °C	121

¹Tested by HPA, Porton-down, UK

2 Rotor Specifications

Thermo Scientific Sorvall ST 8 Centrifuge

Table 5. Sorvall 100V 50/60Hz

Centrifuge	Sorvall® ST 8
Catalog #	75007202
Weight empty [kg]	1.4
Max. cycle number	50000
Maximum permissible load [g]	8 x 4 (64 x 0.5)
Maximum speed n_{\max} [rpm]	15000
Maximum RCF value at n_{\max}	17860
Max. / min. radius [cm]	7.1 / 4.4
Pitch angle [°]	45
Accel. / braking time [s]	20 / 33
Sample heating at n_{\max} [° C] referred to ambient temperature of 23 °C, running time 60 minutes	12
Aerosol-tight ¹	Yes
Permissible temperature range autoclavable °C	121

¹Tested by HPA, Porton-down, UK

Thermo Scientific SL 8 Centrifuge

Table 6. Thermo Scientific 230V 50/60Hz

Centrifuge	SL 8
Catalog #	75007221
Weight empty [kg]	1.4
Max. cycle number	50000
Maximum permissible load [g]	8 x 4 (64 x 0.5)
Maximum speed n_{\max} [rpm]	15000
Maximum RCF value at n_{\max}	17860
Max. / min. radius [cm]	7.1 / 4.4
Pitch angle [°]	45
Accel. / braking time [s]	20 / 32
Sample heating at n_{\max} [° C] referred to ambient temperature of 23 °C, running time 60 minutes	12
Aerosol-tight ¹	Yes
Permissible temperature range autoclavable °C	121

¹Tested by HPA, Porton-down, UK

Table 7. Thermo Scientific 120V 60Hz

Centrifuge	SL 8
Catalog #	75007220
Weight empty [kg]	1.4
Max. cycle number	50000
Maximum permissible load [g]	8 x 4 (64 x 0.5)
Maximum speed n_{\max} [rpm]	15000
Maximum RCF value at n_{\max}	17860
Max. / min. radius [cm]	7.1 / 4.4
Pitch angle [°]	45
Accel. / braking time [s]	20 / 33
Sample heating at n_{\max} [° C] referred to ambient temperature of 23 °C, running time 60 minutes	12
Aerosol-tight ¹	Yes
Permissible temperature range autoclavable °C	121

¹Tested by HPA, Porton-down, UK

Accessories

Article	No.
Replacement O-Ring for lid	75005726
Replacement ClickSeal Biocontainment Lid	75005730

Thermo Scientific Auto-Lock Rotor Exchange

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- “Rotor Installation” on page 18
- “Removing the Rotor” on page 19

Rotor Installation



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

This rotor is equipped with an Auto-Lock™-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.
Auto-Lock and O-ring must be clean and undamaged.

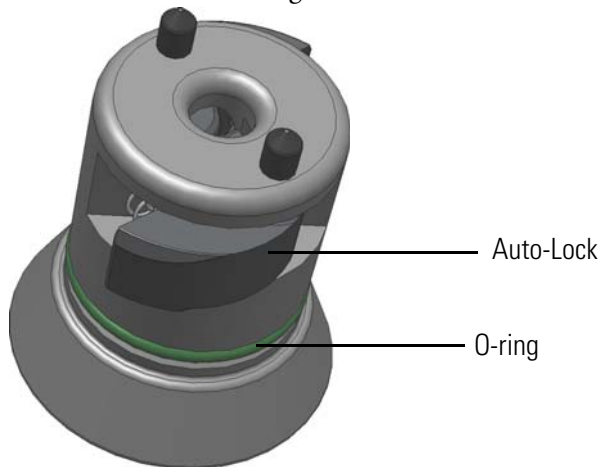


Figure 1. Auto-Lock

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 it 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 Auto-Lock 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 at its handle.



WARNING 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 Auto-Lock 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.

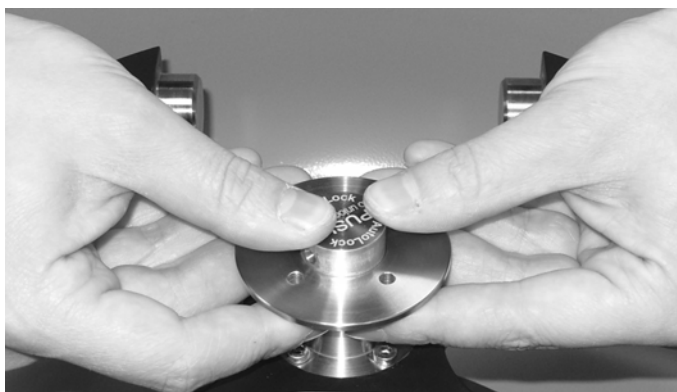


Figure 2. Handling of Auto-Lock

Rotor Loading

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- “Before a Run” on page 22
- “Proper Loading” on page 22
- “Improper Loading” on page 23
- “Maximum Loading” on page 23
- “Cycle Counter” on page 24

Before a Run

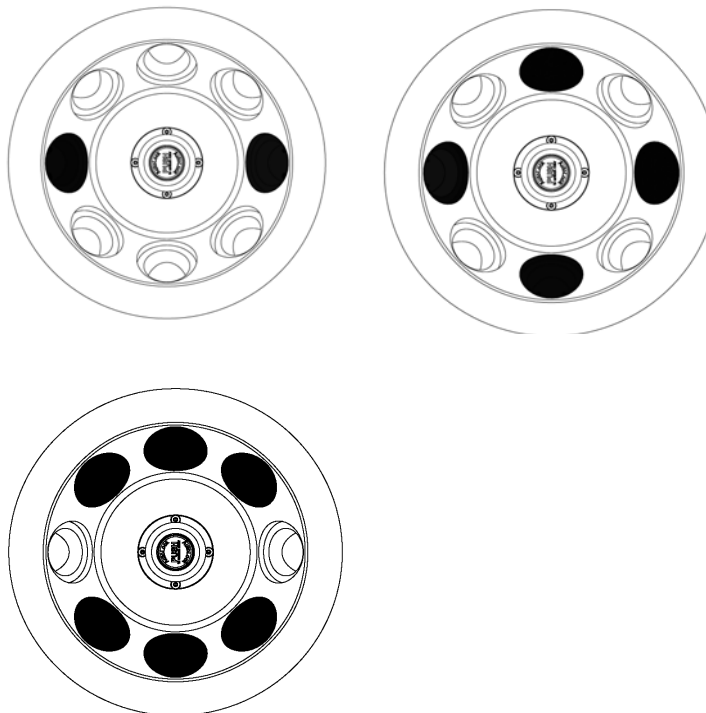
1. Please read and observe the safety instructions contained in these operating instructions and in the instructions for use.
2. Check the rotor and all accessory parts for damages such as cracks, scratches or traces of corrosion.
3. Check the rotor chamber, the centrifuge spindle and the Auto-Lock.
4. Check the rotor suitability using the “[Chemical Compatibility Chart](#)” on [page 41](#).
5. Make sure the tubes or bottles do not touch the bucket caps.
6. Check the rotor bolts and apply grease (part no. 75003786) before using for the first time.
7. Check that each bucket or microplate carrier can swing freely by moving it carefully with your hand. Weigh the bucket content (adapter and tube). Make sure you do not exceed the maximum compartment load.



CAUTION Always use identical bucket types in a rotor. Always be sure to use buckets of the same weight class, which is marked on the buckets themselves.

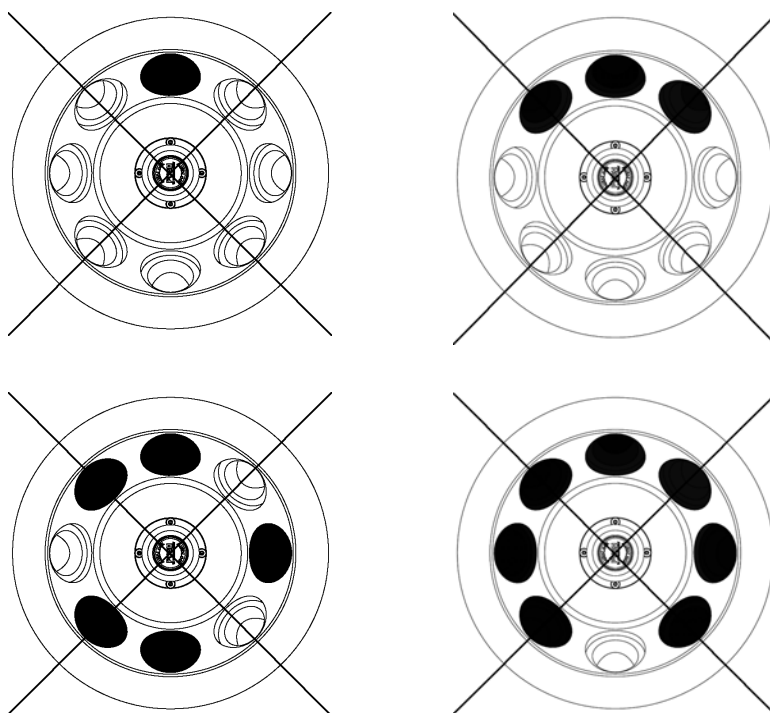
Proper Loading

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



Make sure that the opposing receptacles are holding tubes of the same weight.

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 adapter, exceeds the maximum permissible load:

- Reduce the fill level.
- Reduce the speed.

Use the table or the formula:

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

n_{adm} = admissible speed

n_{max} = maximum speed

Actual Load (g/cavity)	RPM _{max}
0.5	15000
0.6	13693
0.7	12677
0.8	11859
0.9	11180
1.0	10607
1.1	10113
1.2	9682
1.3	9303
1.4	8964
1.5	8660

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. Replace the buckets when the specified number of cycles is reached.

Service life examples

Usage profile	Maximum service life at 50,000 cycles
frequent use 20 runs / day 220 days / year	7 years

Aerosol-tight Applications

Contents

- “Basic Principles” on page 26
- “Fill Level” on page 26
- “Checking the aerosol Tightness” on page 26

Basic Principles



CAUTION Biological seals are part of bio-containment systems as specified in international and national bio-safety guidelines, and cannot be relied on as the only means of safeguarding workers and the environment when handling pathogenic micro-organisms. Mind the „Laboratory Biosafety Manual“ of the World Health Organization (WHO) and the regulations in your country.



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



WARNING 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 took place according to 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-tight beaker and fixed-angle rotors using the following process:

1. Lubricate all seals lightly.
Always use the special grease (part no. 76003500) when lubricating the seals.
2. Fill the cavities of the rotor with approx. 10 ml of carbonated mineral water.

3. Close the bucket or the rotor as explained in the handling instructions.
4. Shake the bucket or 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 cover 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. Replacement seals are supplied with the rotors and can also be re-ordered as a spare parts set. See table in “Accessories” on [page 15](#). When loading the rotor, ensure that the rotor lid closes securely. Damaged or clouded rotor covers are to be replaced immediately.

Maintenance and Care

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- “Cleaning” on page 30
- “Disinfection” on page 32
- “Decontamination” on page 33
- “Autoclaving” on page 34
- “Thermo Fisher Scientific Service” on page 34

Cleaning Intervals

For the sake of personal, environmental, and material protection, you have 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 the centrifuge:

- 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 (part no. 70009824). 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 adapters.
6. Use a neutral cleaning agent with a pH 6-8 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 (part no. 70009824). Also treat the cavities with oil.
 - Tread the bolt of the swing out rotor with bolt grease (part no. 75003786).



CAUTION When cleaning, do not allow liquids, especially organic solvents, to get on the drive shaft, the bearings, the Auto-Lock 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.



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 adapters 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 (part no. 70009824). Also treat the cavities with oil.
 - Treat the bolt of the swing out rotor with bolt grease (part no. 75003786).

Decontamination

Decontaminate 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 needed.



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 adapters 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 (part no. 70009824). Also treat the cavities with oil.
 - Tread the bolt of the swing out rotor with bolt grease (part no. 75003786).

Autoclaving

1. Before autoclaving clean rotor and accessories.
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.



WARNING Dangerous materials through leaky seals. The O-ring of a sealed bucket will be damaged through heat exposure. Remove it before autoclaving a sealed bucket. Use a new O-ring.

Thermo Fisher Scientific Service

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 _{min}	R _{max}	RCF R _{min}	RCF R _{max}
300	4.4	7.1	4	7
400	4.4	7.1	8	13
500	4.4	7.1	12	20
600	4.4	7.1	18	29
700	4.4	7.1	24	39
800	4.4	7.1	31	51
900	4.4	7.1	40	64
1000	4.4	7.1	49	79
1100	4.4	7.1	60	96
1200	4.4	7.1	71	114
1300	4.4	7.1	83	134
1400	4.4	7.1	96	156
1500	4.4	7.1	111	179
1600	4.4	7.1	126	203
1700	4.4	7.1	142	229
1800	4.4	7.1	159	257
1900	4.4	7.1	178	287
2000	4.4	7.1	197	318
2100	4.4	7.1	217	350
2200	4.4	7.1	238	384
2300	4.4	7.1	260	420
2400	4.4	7.1	283	457
2500	4.4	7.1	307	496
2600	4.4	7.1	333	537
2700	4.4	7.1	359	579
2800	4.4	7.1	386	622
2900	4.4	7.1	414	668
3000	4.4	7.1	443	714
3100	4.4	7.1	473	763
3200	4.4	7.1	504	813
3300	4.4	7.1	536	864
3400	4.4	7.1	569	918

A RCF-Values

Speed (rpm)	R _{min}	R _{max}	RCF R _{min}	RCF R _{max}
3500	4.4	7.1	603	972
3600	4.4	7.1	638	1029
3700	4.4	7.1	673	1087
3800	4.4	7.1	710	1146
3900	4.4	7.1	748	1207
4000	4.4	7.1	787	1270
4100	4.4	7.1	827	1334
4200	4.4	7.1	868	1400
4300	4.4	7.1	910	1468
4400	4.4	7.1	952	1537
4500	4.4	7.1	996	1607
4600	4.4	7.1	1041	1680
4700	4.4	7.1	1087	1753
4800	4.4	7.1	1133	1829
4900	4.4	7.1	1181	1906
5000	4.4	7.1	1230	1984
5100	4.4	7.1	1279	2065
5200	4.4	7.1	1330	2146
5300	4.4	7.1	1382	2230
5400	4.4	7.1	1434	2315
5500	4.4	7.1	1488	2401
5600	4.4	7.1	1543	2489
5700	4.4	7.1	1598	2579
5800	4.4	7.1	1655	2670
5900	4.4	7.1	1712	2763
6000	4.4	7.1	1771	2858
6100	4.4	7.1	1830	2954
6200	4.4	7.1	1891	3051
6300	4.4	7.1	1952	3151
6400	4.4	7.1	2015	3251
6500	4.4	7.1	2078	3354
6600	4.4	7.1	2143	3458
6700	4.4	7.1	2208	3563
6800	4.4	7.1	2275	3670
6900	4.4	7.1	2342	3779
7000	4.4	7.1	2410	3890
7100	4.4	7.1	2480	4001

Speed (rpm)	R _{min}	R _{max}	RCF R _{min}	RCF R _{max}
7200	4.4	7.1	2550	4115
7300	4.4	7.1	2621	4230
7400	4.4	7.1	2694	4347
7500	4.4	7.1	2767	4465
7600	4.4	7.1	2841	4585
7700	4.4	7.1	2917	4706
7800	4.4	7.1	2993	4829
7900	4.4	7.1	3070	4954
8000	4.4	7.1	3148	5080
8100	4.4	7.1	3227	5208
8200	4.4	7.1	3308	5337
8300	4.4	7.1	3389	5468
8400	4.4	7.1	3471	5601
8500	4.4	7.1	3554	5735
8600	4.4	7.1	3638	5871
8700	4.4	7.1	3723	6008
8800	4.4	7.1	3809	6147
8900	4.4	7.1	3896	6288
9000	4.4	7.1	3985	6430
9100	4.4	7.1	4074	6573
9200	4.4	7.1	4164	6719
9300	4.4	7.1	4255	6865
9400	4.4	7.1	4347	7014
9500	4.4	7.1	4440	7164
9600	4.4	7.1	4534	7315
9700	4.4	7.1	4628	7469
9800	4.4	7.1	4724	7623
9900	4.4	7.1	4821	7780
10000	4.4	7.1	4919	7938
10100	4.4	7.1	5018	8097
10200	4.4	7.1	5118	8258
10300	4.4	7.1	5219	8421
10400	4.4	7.1	5321	8586
10500	4.4	7.1	5423	8751
10600	4.4	7.1	5527	8919
10700	4.4	7.1	5632	9088
10800	4.4	7.1	5738	9259

A RCF-Values

Speed (rpm)	R _{min}	R _{max}	RCF R _{min}	RCF R _{max}
10900	4.4	7.1	5845	9431
11000	4.4	7.1	5952	9605
11100	4.4	7.1	6061	9780
11200	4.4	7.1	6171	9957
11300	4.4	7.1	6281	10136
11400	4.4	7.1	6393	10316
11500	4.4	7.1	6506	10498
11600	4.4	7.1	6619	10681
11700	4.4	7.1	6734	10866
11800	4.4	7.1	6849	11053
11900	4.4	7.1	6966	11241
12000	4.4	7.1	7084	11430
12100	4.4	7.1	7202	11622
12200	4.4	7.1	7322	11815
12300	4.4	7.1	7442	12009
12400	4.4	7.1	7564	12205
12500	4.4	7.1	7686	12403
12600	4.4	7.1	7810	12602
12700	4.4	7.1	7934	12803
12800	4.4	7.1	8060	13005
12900	4.4	7.1	8186	13209
13000	4.4	7.1	8313	13415
13100	4.4	7.1	8442	13622
13200	4.4	7.1	8571	13831
13300	4.4	7.1	8702	14041
13400	4.4	7.1	8833	14253
13500	4.4	7.1	8965	14467
13600	4.4	7.1	9099	14682
13700	4.4	7.1	9233	14898
13800	4.4	7.1	9368	15117
13900	4.4	7.1	9504	15337
14000	4.4	7.1	9642	15558
14100	4.4	7.1	9780	15781
14200	4.4	7.1	9919	16006
14300	4.4	7.1	10059	16232
14400	4.4	7.1	10200	16460
14500	4.4	7.1	10343	16689

Speed (rpm)	R _{min}	R _{max}	RCF R _{min}	RCF R _{max}
14600	4.4	7.1	10486	16920
14700	4.4	7.1	10630	17153
14800	4.4	7.1	10775	17387
14900	4.4	7.1	10921	17623
15000	4.4	7.1	11068	17860

Chemical Compatibility Chart

CHEMICAL	MATERIAL	ALUMINUM	ANODIC COATING for ALUMINIUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELTRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET ¹ , POLYCLEAR®, CLEARCRIMP®, CCCLEARCRIMP®	POLYALLUMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIMIDE	POLYTRHYLENE	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	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	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	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	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	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	

B Chemical Compatibility Chart

CHEMICAL	MATERIAL	ALUMINUM	ANODIC COATING for ALUMINIUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET ¹ , POLYCLEAR®, CLEARCRIMP®, CCCLEARCRIMP®	POLYALLUMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Barium Salts	M	U	S	-	S	S	S	S	S	S	S	S	S	S	S	M	-	S	S	S	S	S	S	M	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
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	S	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

CHEMICAL	MATERIAL	ALUMINUM	ANODIC COATING for ALUMINIUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET ¹ , POLYCLEAR®, CLEARCRIMP®, CCCLEARCRIMP®	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Acetic Acid (5%)	S	S	M	S	S	S	M	S	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	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	-	U	S	U	-	S	-	S
Ethylene Glycol	S	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	
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	U	S	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	U	S	S	U	S	U	M	S	S	S	S	S	S	S	S	M	M	M	S	
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	U	S	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	U	S	S	S	

B Chemical Compatibility Chart

CHEMICAL	MATERIAL	ALUMINUM	ANODIC COATING for ALUMINIUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELTRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET ¹ , POLYCLEAR®, CLEARCRIMP®, CCCLEARCRIMP®	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIMIDE	POLYTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®	
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	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	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	S	U	S	U	M	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	M	U	U	U	S	S	M	U	S	U	
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	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	U	-	S	S	U	U	S	M	S	S	S	U	

CHEMICAL	MATERIAL	ALUMINUM	ANODIC COATING for ALUMINIUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET ¹ , POLYCLEAR®, CLEARCRIMP®, CCCLEARCRIMP®	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Sodium Borate	M	S	S	S	S	S	S	S	S	S	S	S	U	S	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	S	S	M	S	S	S
Sodium Carbonate (2%)	M	U	S	S	S	S	S	S	S	S	S	S	S	S	S	U	S	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	S	S
Sodium Hypochlorite (5%)	U	U	M	S	S	M	U	S	S	M	S	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	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	S	S	U	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	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	S	M	S	S	S	S	S	S	S	M	-	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	S	S	M	S	S	
Oils (Petroleum)	S	S	S	-	-	-	S	U	S	S	S	S	U	U	M	S	M	U	U	S	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	S	M	
Oleic Acid	S	-	U	S	S	S	U	U	S	U	S	S	M	S	S	S	S	S	S	S	S	S	S	M	U	S	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	S	S	U	M	S	
Perchloric Acid (10%)	U	-	U	-	S	U	U	-	S	M	M	-	-	M	U	M	S	M	M	-	M	S	U	-	S	-		
Perchloric Acid (70%)	U	U	U	-	-	U	U	-	S	U	M	U	U	M	U	U	U	M	M	U	M	S	U	U	S	U		
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		
Phenol (50%)	U	S	U	-	S	U	M	-	S	U	M	U	U	U	U	S	U	M	U	U	S	U	U	U	U	M		
Phosphoric Acid (10%)	U	U	M	S	S	S	U	S	S	S	S	U	-	S	S	S	S	S	S	S	S	S	S	U	M	U		
Phosphoric Acid (conc.)	U	U	M	M	-	-	U	S	-	M	S	U	U	M	M	S	S	S	M	S	M	S	U	M	U	-		
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		
Picric Acid	S	S	U	-	S	M	S	S	M	S	U	S	S	S	U	S	S	S	S	S	U	S	U	M	S	M		
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		

B Chemical Compatibility Chart

CHEMICAL	MATERIAL	ALUMINUM	ANODIC COATING for ALUMINIUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET ¹ , POLYCLEAR®, CLEARCRIMP®, CCCLEARCRIMP®	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
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	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	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	

CHEMICAL	MATERIAL	ALUMINUM	ANODIC COATING for ALUMINIUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET ¹ , POLYCLEAR®, CLEARCRIMP®, CCCLEARCRIMP®	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®	
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	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	S	U	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	U	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	

¹Polyethyleneterephthalate

Key

S Satisfactory

M 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 U = Unsatisfactory, not recommended.

-- No data available. Because no organized chemical resistance data exists for materials under the stress of centrifugation, when in doubt we recommend pretesting sample lots. suggest testing, using sample to avoid loss of valuable material.

Chemical resistance data is included only as a guide to product use.

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Russia	+7 812 703 42 15
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