

Ultracentrifuge Tubes

Instructions for Use

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Preface

Before starting to use Ultracentrifuge tubes and bottles, read through these instructions for use carefully and follow the instructions.

The information contained in these instructions for use is the property of Thermo Fisher Scientific; it is prohibited to copy or pass on this information without explicit approval in writing by its owner.

Failure to follow the instructions and safety information in these instructions for use will result in the expiration of the seller's warranty.

Intended Use

Ultracentrifuge tubes and bottles are designed for use in centrifuges to separate and purify various components of a sample, such as proteins, nucleic acids, and other cellular materials, by spinning at extremely high speeds.

Bottles, tubes and accessories stated and mentioned in this document are not approved or intended for use in medical, clinical, surgical or other patient oriented applications.

Signal Words

Signal Word	Degree of Hazard
WARNING	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates information considered important, but not hazard-related.

Symbols

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

	General hazard		Indicates information considered important, but not hazard-related.
	Biological hazard		

Safety Instructions



WARNING

Observe the safety instructions. Not following these instructions can cause damage like harm by mechanical impact, electrical shock, infection and loss of sample.

The centrifuge is to be used for its intended use only. Improper use can cause damages, contamination, and injuries with fatal consequences.

The centrifuge must be operated by trained personnel only.

It is the obligation of the operator to make sure, that the proper protective clothing is used. Mind the "Laboratory Biosafety Manual" of the World Health Organization (WHO) and the regulations in your country.

As safety zone maintain a clear radius of at least 30 cm around the centrifuge. Do not place any dangerous substances within this safety zone.

Set up in a well-ventilated environment, on a horizontally leveled and rigid surface with adequate load-bearing capacity.

Do not modify the centrifuge and its accessories in any unauthorized way.

The centrifuge housing is not to be opened by the operator.



WARNING

Risk from handling hazardous substances.

Especially when working with corrosive samples (salt solutions, acids, bases), the accessories and the centrifuge have to be cleaned thoroughly.

Do not centrifuge explosive or flammable materials or substances.

Extreme care should be taken with highly corrosive substances that can cause damage and impair the mechanical stability of the rotor. These should only be centrifuged in fully sealed tubes.

The centrifuge is neither inert nor protected against explosion. Never use the centrifuge in an explosion-prone environment.

Do not centrifuge toxic or radioactive materials or any pathogenic micro-organisms without suitable safety precautions.

When centrifuging any hazardous materials mind the “Laboratory Biosafety Manual” of the World Health Organization (WHO) and any local regulations. 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. Visit the Internet page of the World Health Organization (www.who.int) for the “Laboratory Biosafety Manual”. For materials in a higher risk group, extra safety measures must be taken.

If toxins or pathogenic substances have contaminated the centrifuge or its parts, appropriate disinfection measures have to be taken.

If a hazardous situation occurs, turn off the power supply to the centrifuge and leave the area immediately.

Make sure to use the proper accessories for your applications to avoid hazardous contamination.

In any case of severe mechanical failure, such as rotor or bottle crash, personnel should be aware that the centrifuge is not aerosol-tight. Leave the room immediately.

Contact the customer service. Aerosols need time to settle before opening the centrifuge after a crash. Ventilated centrifuges bear a higher risk of being contaminated after a crash than refrigerated centrifuges.



WARNING

Risk of contamination.

Potential contaminations will not remain in the centrifuge while the device is operated.

Take appropriate protection measures to prevent spread of contaminations.

A centrifuge is no system for containment.



WARNING

Serious injuries can occur if you touch a spinning rotor with your hands or tools.

Never open the centrifuge door until the rotor has come to a complete stop and this has been confirmed on the user interface.

The emergency door release may be used in emergencies only to recover the samples from the centrifuge, e.g. during a power failure.

Do not open the centrifuge, while it is running.

In any case of severe mechanical failure, such as rotor or bucket crash, the centrifuge is not aerosol-tight.

In case of rotor failure the centrifuge can be damaged. Leave the room. Inform customer service.



WARNING

The magnets built into the rotors can have a negative effect on active implants, such as cardiac pacemakers.

The magnets are mounted on the bottom of the rotor.

Always keep a distance of 20 cm between the rotor and the active implant, as the product generates permanent magnetic fields. The magnetic field strength at a distance of 20 cm is less than 0.1 mT, so there should be no interference.



CAUTION

Safety can be impaired by wrong loading and worn accessories.

Use only a properly installed rotor.

Do not use rotors, bottles, tubes or components which show any signs of removed protective coating, corrosion or cracks. Contact customer service for further advice or inspections.

Use only with rotors which have been loaded properly.

Never overload the rotor.

Always balance the samples.

Use only rotors and components for this centrifuge which have been approved by Thermo Fisher Scientific. Exceptions to this rule are commercially available glass or plastic centrifuge lab ware, provided they have been designed to fit the rotor or the adapter cavities and are approved for the speed or the RCF value of the rotor.

Make sure the rotor is locked properly into place before operating the centrifuge.



CAUTION

Physical harm caused by ignoring operative basics.

Never use the centrifuge if parts of its casing are damaged or missing.

Never start the centrifuge when the centrifuge door is open.

Do not move the centrifuge while it is running.

Do not lean on the centrifuge.

Do not place anything on top of the centrifuge during a run.

Implement measures which ensure that no one can approach the centrifuge for longer than absolutely necessary while it is running.



CAUTION

Due to air friction sample integrity may be affected.

The temperature of the rotor may rise significantly while the centrifuge is spinning.

Ventilated units lead to a heat up of the rotor above the ambient temperature.

Refrigerated units can have a deviation from displayed and set temperature to the sample temperature.

Make sure the centrifuge temperature control capabilities meet your application specification. If necessary make a test run.

1. Easy Seal Tubes

1. 1. Description

Easy-Seal tubes are flexible, thin-walled bottles that can be sealed with basic hand tools and are categorized as sealed ultra-centrifuge tubes used in micro ultra-centrifuge rotors. The tube's stem is compressed between a plug and a crown, allowing easy access to the contents through its large diameter. Available in autoclavable polyallomer (PA) and clear polyethylene (PET) materials, these tubes offer various chemical properties and clarity, and can be punctured or cut. Easy-Seal tubes designed to be resealed and reused, they are particularly beneficial for consecutive centrifugation of single samples, such as floating buoyant molecules or washing pellets.



Figure 1: Easy Seal tubes

1. 2. Ordering information

Table 1: Ordering information of Easy Seal tubes

						Required accessories PN				
Tube volume (mL)	**Material**	**Autoclavable**	**Dimension (mm)**	**Tubes PN**	**Rotors to use**	**Crown**	**Crown clamp**	**Tube vise**	**Hex driver**	**Tube removal tool**
5.0	PA	Yes	13 x 51	75000508	S110-AT	75000511	75000505	75000481	75000506	75000507
3.5	PA	Yes	13 x 45	75000509	S110-AT, S100-AT4	75000511				
	PET	No	13 x 45	75000510						
1.5	PET	No	11 x 29	75000503	S150-AT, S140-AT, S120-AT2	75000504				
	PA	Yes	13 x 39	75000512	S110-AT, S100-AT4	75000511				

1. 3. Operation

1. 3. 1. Filling

» Place Easy Seal tubes into the rack.
» Fill the tube so that the meniscus reaches the top of the uppermost thread on the stem of the tube.



Figure 2: Easy Seal tubes filling

1. 3. 2. Sealing

Sealing crown assembly in Easy Seal tubes contains three pieces, Aluminum crown, O-ring, and Delrin plug.



Figure 3: Easy Seal tube aluminum crown and Delrin™ plug

- » Place the crown against the tube.
- » Screw the crown onto the top of the tube. Do not over-tighten the crown, overtighten may strip the threads on the tube.
- » Hold the crown with your hand, put on the O-ring, and screw in the plug with your fingers.
- » For small diameter, 11 mm or 13 mm, place it into the bench-mounted vise (75000481). Insert the assembly into the 11 or 13mm diameter hole from the underside of the vise.
- » To secure the crown (with attached tube) in the vise, tighten the handle on the side of the vise while holding the crown/tube in the hole.
- » Tighten the plug with the 3/8" hex driver (75000506).

CAUTION It is important that the tube remains seated against the bottom of the crown while the plug is tightened. If the tube turns when the plug is screwed down, remove the plug and screw it again.

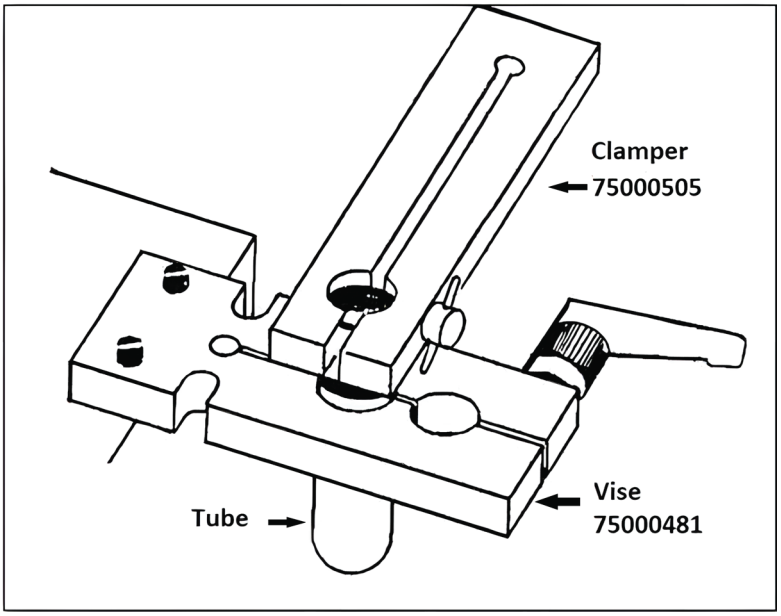
1. 3. 3. Loading and unloading

- » Place the sealed tube assembly into the rotor.
- » After centrifugation, use the removal tool (75000507) to remove the tube assembly from the rotor.

1. 3. 4. Disassembling

- » Place the crown/tube assembly into the vise from the underside, if needed, tighten the vise handle to secure the crown assembly.
- » To avoid agitation during the disassembly, it is recommended to remove tube content before disassembling tubes and crown.

» Place the clamper tool (75000505) on the top of the crown, selecting the appropriate hole size according to the crown assembly (Figure 3). The 11 mm diameter hole is on one side of the clamp and the 13 mm on the other.
» Turn the "T" knob until the clamper is firmly clamped to the crown.
» By using a clamper unscrew counterclockwise about 1-½ turn so that the crown can be easily removed by finger.
» Make sure the vise handle doesn't interfere with clamper turning, if so, pull it outward.



2. Oak Ridge Ultra Bottles

2. 1. Description

Oak Ridge ultracentrifuge bottle assemblies are designed for reliable and efficient centrifugation. Compatible with many fixed-angle rotors, these assemblies are available in standard sizes and are made from polycarbonate, polypropylene, and polyallomer materials. To reuse them, ensure there are no visible cracks or dents in the tube body. Inspect them carefully for any damage before loading samples.



Figure 4: Oak Ridge ultracentrifuge bottles

2. 2. Ordering information

Table 2: Ordering information of Oak Ridge ultracentrifuge bottles

							Required accessories PN	
Tube volume (mL)	**Fill volume (ml)**	**Material**	**Autoclavable**	**Dimension (mm)**	**Tubes PN**	**Rotors to use**	**Sealing cap**	**Tube removal tool**
250.0	200	PA	Yes	61 x 120	314250H01	A-621	3144249H01	-
75.0	68	PC	Yes	39 x 107	314460	T-647.5	314462	314353
30.0	23	PP	Yes	25 x 94	314349	T-865, T-1250	314347	
	23	PC	Yes	25 x 94	314348	T-865, T-1250		
10.0	9.1	PP	Yes	16 x 80	03929	T-890, T-1250, T-865	03613	
	9.1	PC	Yes	16 x 80	03020	T-890, T-1250, T-865	03613	-

2. 3. Operation

2. 3. 1. Filling

» Fill the bottles according to Table 2.
» For partial filling, speed must be reduced according to the rotor catalog manual.

CAUTION The tubes must be filled, or the tube will distort during centrifugation causing leakage. For partial filling, speed must be reduced.

2. 3. 2. Assembly

» The sealing cap assembly consists of three pieces: the O-ring, plug, and aluminum cap (Figure 4).
» Inspect all aluminum sealing components and the O-ring before assembly. Note that damaged O-rings may cause leakage and tube failure.
» Position the O-ring on the underside of the plug flange.
» Insert the plug into the neck of the bottle.
» When the cap is hand-tightened onto the neck of the bottle, the O-ring is compressed, creating a secure seal.

2. 3. 3. Loading and unloading

» Make sure that Oak ridge ultra bottles seated properly into the rotor compartment according to the rotor instructions manual.
» Improper loading cause centrifuge failure.
» After completing the centrifuge operation, use tube removal tool (314353) to remove the bottles out of the rotor. (Figure 5).



Figure 5: Oak Ridge ultracentrifuge bottle removal tool

2. 3. 4. Disassembling

PC and PP Oak ridge ultracentrifuge bottles are not puncturable or sliceable. To access the sample, bottles assembly must be disassembled.

» Hold the bottles in one hand tightly
» Screw the aluminum assembly with other hand

2.4 Certification

The tubes are certified in compliance with USP class VI and meet the requirements of FDA-food contact regulations.

*Additional information is available upon request.

3. Re-Seal Cone Top Tubes

3. 1. Description

The cone top system positions a short column tube at the bottom of the swinging rotor buckets resulting in lower factor and higher pelleting efficiency. Because of the sealing assembly, gradient concentrations do not change by evaporation as may occur with partially filled thick wall tubes. As can be seen in Figure 7, the cone top seal system fixes the crown against the top of the tube and the conical shape of the top remained during the ultracentrifugation. The cone top tubes are available in autoclavable polyallomer material. If cone top tubes are not punctured or sliced, tubes and sealing system can be reused multiple runs.



Figure 6: Re-seal cone top tubes

3. 2. Ordering information

Table 3: Ordering information of re-seal cone top tubes

						Required accessories PN			
Tube volume (mL)	**Material**	**Autoclavable**	**Dimension (mm)**	**Tubes PN**	**Rotors to use**	**Plug**	**Crown clamp**	**Tube vise**	**Tube removal tool/wrench**
31.0	PA	Yes	25 x 81	75000427	SureSpin 632/630, AH-629	75000451	75000428	-	75000478
15.0	PA	Yes	16 x 100	75000414	SureSpin 632/630, AH-630		75000452		
11.0	PA	Yes	14 x 88	75000411	TH-641		75000455		
6.5	PA	Yes	16 x 45	75000450	T-890, T-1270		75000452		
5.9	PA	Yes	14 x 47	75000454	TH-641		75000455		
4.0	PA	Yes	11 x 57	75000483	TH-660		75000460		
4.0	PA	Yes	13 x 48	75000482	AH-650		75000457		
3.5	PA	Yes	13 x 32	75000456	TFT 45.6, AH-650		75000457		
2.0	PA	Yes	11 x 32	75000459	TFT 80.4, TH-660		75000460		
2.0	PA	Yes	13 x 25	75000458	TFT 45.6, AH-650		75000457		
3.5	PA	Yes	13 x 32	75000456	S52-ST	75000457	45307	45537	45309
2.0	PA	Yes	13 x 25	75000458	S52-ST				

3. 3. Operation

3. 3. 1. Filling

» Fill the tube so that the meniscus coincides with the junction of the tube conical dome and stem



Figure 7: Re-seal cone top tube filling properly.

3. 3. 2. Sealing

» Place the crown over the stem, making sure the crown is seated against the top of the tube.
» Hold the tube and crown together with one hand and screw the stainless-steel plug part way into the tube stem with the hex key wrench (75000478). For larger-sized crowns, 25 mm, 16 mm, or 14 mm in diameter, the crown, and tube can be held in the hand and the screw tightened without the use of a bench vise.
» For a small diameter, 11 mm or 13 mm, place it into the bench-mounted vise (75000481). Insert the assembly into the 11 mm or 13 mm diameter hole from the underside of the vise.
» Position the crown so that the bottom of the crown is approximately flush with the bottom of the vise. To secure the crown (with attached tube) in the vise, tighten the handle on the side of the vise while holding the crown/tube in the hole.
» Screw the plug (75000451) tightly into the stem with the hex key wrench (75000478).
» Apply a downward force to the screw with the wrench as it self-taps a thread into the stem.

3. 3. 3. Loading and unloading

» Place the sealed tube assembly into the rotor buckets according to the rotor instruction manual.
» After centrifugation, use the removal tool (75000479) to remove the tube assembly from the rotor.
» Insert the tip of the removal tool into the hex hole of the screw plug, tilt slightly and pull the tube assembly from the rotor hole.

3. 3. 4. Disassembling

» To disassemble the re-seal cone top tube, if required place the crown/tube assembly into the vise,
» Tighten the vise handle to secure the assembly and unscrew the plug with the hex key wrench.
» The tube may be tightly held in the crown and attempts to remove a filled tube from the crown may cause agitation of the sample. In this case, it is recommended to first remove the tube's liquid contents before removing the tube from the crown.

3. 4. Certification

The tubes are certified in compliance with USP class VI and meet the requirements of FDA-food contact regulations.

*Additional information is available upon request.

4. Re-Seal Tubes

4. 1. Description

The re-seal tube system provides a reusable mechanical seal for autoclavable polyallomer tubes. Because of the sealing assembly, gradient concentrations do not change by evaporation as may occur with partially filled thick-wall tubes. Re-seal crown and plug systems fix the crown against the top of the tube and the dome shape of the top remained during the ultracentrifugation.



Figure 8: Re-seal tubes

4. 2. Ordering information

Table 4: Ordering information of re-seal tubes

						Required accessories PN			
Tube volume (mL)	**Material**	**Autoclavable**	**Dimension (mm)**	**Tubes PN**	**Rotors to use**	**Crown**	**Plug**	**Tube vise**	**Tube removal tool**
30.0	PA	Yes	26 x 76	75000514	S50-A	75000521	45307	75000409	45309
13.5	PA	Yes	16 x 85	45809	S58-A	45810		45534	
8.0	PA	Yes	16 x 53	45597	S80-AT3	45599		45701	
5.0	PA	Yes	13 x 51	45248	S110-AT	45321		45534	
3.5	PA	Yes	13 x 35	45247	S100-AT4	45318		45535	
2.0	PA	Yes	11 x 32	45246	S150-AT, S140-AT, S120-AT2, S120-VT	45306		45537	
2.0	PA	Yes	13 x 25	75000513	S100-AT4	45318		45535	
1.5	PA	Yes	11 x 25	75000501	S150-AT, S140-AT, S120-AT2	45306		45536	

4. 3. Operation

4. 3. 1. Filling

» Fill the tube so that the meniscus coincides with the junction of the tube's dome and stem.

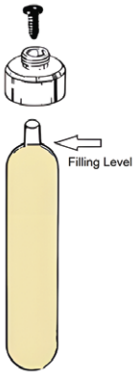


Figure 9: Re-seal tube filling properly

4. 3. 2. Sealing

» Place the crown over the stem.
» Make sure the crown is seated against the top of the tube.
» Hold the tube and crown together with one hand and screw the stainless-steel plug part way into the tube stem with the hex key wrench (45308). For large-size crowns, 25 mm, 16 mm, or 14 mm in diameter, the crown, and tube can be held in the hand and the screw tightened without the use of a bench vise.
» For a small diameter, 11 mm or 13 mm, place it into the bench-mounted vise Insert the assembly into the 11 mm or 13 mm diameter hole from the underside of the vise.
» Position the crown so that the bottom of the crown is approximately flush with the bottom of the vise. To secure the crown (with attached tube) in the vise, tighten the handle on the side of the vise while holding the crown/tube in the hole.
» Screw the plug tightly into the stem with the hex key wrench (45308).
» Apply a downward force to the screw with the wrench as it self-taps a thread into the stem.

4. 3. 3. Loading and unloading

» Place the sealed tube assembly into the rotor according to the rotor instruction manual.
» After centrifugation, use the removal tool (45309) to remove the tube assembly from the rotor.
» Threaded sockets on tube removal tool (45309), fits the re-seal crown. (Figure 10)
» Screw the tube removal tool over the crown to remove the tube out of the rotor compartment. (Figure 4)

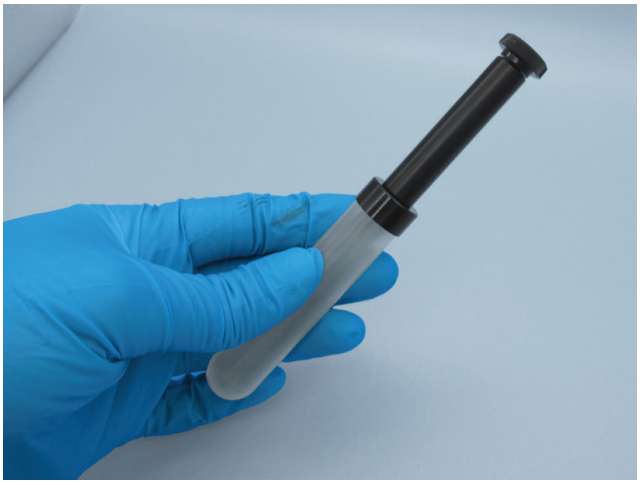




Figure 10: Re-seal tube filling properly

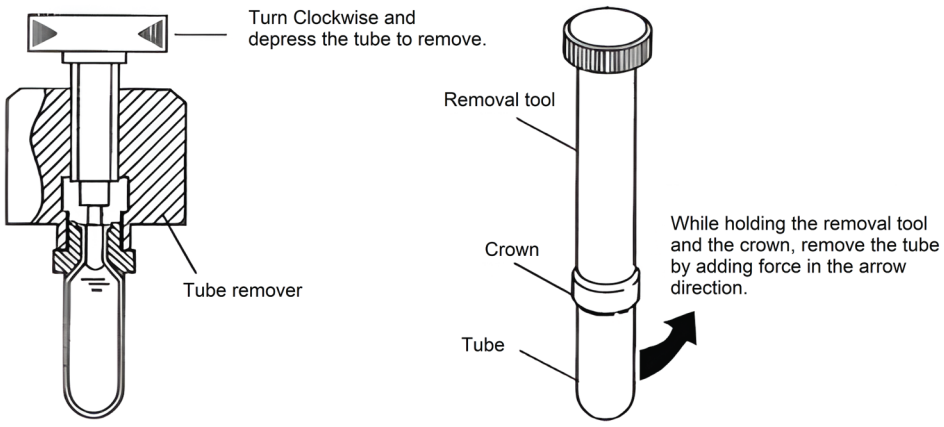


Figure 11: Re-seal tube removal instruction

4. 3. 4. Disassembling

- » To disassemble the Re-Seal cone top tube, if required place the crown/tube assembly into the vise,
- » Tighten the vise handle to secure the crown/tube assembly and unscrew the plug with the hex key wrench.
- » The tube may be tightly held in the crown and attempts to remove a filled tube from the crown may cause agitation of the sample. In this case, it is recommended to first remove the tube's liquid contents before removing the tube from the crown.

4. 4. Certification

The tubes are certified in compliance with USP class VI and meet the requirements of FDA-food contact regulations.

*Additional information is available upon request.

5. Thick-Wall Tubes

5. 1. Description

Thick-walled tubes, available in polycarbonate and polyallomer materials, are designed for use in fixed-angle and swinging bucket rotors without caps. As they have an open top, ensure the filling volume is less than the total volume and at least half of the tube's capacity .

These tubes are reusable and autoclavable. Due to their high wall thickness, they cannot be punctured or sliced.



Figure 12: Thick-walll tubes

5. 2. Ordering information

Table 5: Ordering information of thick-wall tubes

							Required accessories PN
Tube volume (mL)	Fill volume (mL)	Material	Autoclavable	Dimension (mm)	Tubes PN	Rotors to use	Sealing assembly
25.0	19.8	PC	Yes	26 x 96	75000610	S50-A	-
25.0	19.8	PA	Yes	26 x 96	75000611	S50-A	-
10.0	9.1	PC	Yes	16 x 80	03020	S58-A	03613
10.0	6.8	PP	Yes	16 x 80	03929	S58-A	03613
10.0	6.8	PC	Yes	16 x 71	03237	S58-A	-
10.0	6.8	PA	Yes	16 x 71	03238	S58-A	-
6.0	5.3	PC	Yes	16 x 59	45595	S80-AT3	-
6.0	5.3	PA	Yes	16 x 59	45596	S80-AT3	-
3.5	3.5	PA	Yes	13 x 51	46102	S52-ST	-
3.0	2.7	PC	Yes	13 x 51	45238	S100-AT4, S52-ST	-
2.2	2.2	PA	Yes	11 x 34	45240	S55-S	-
1.0	1.0	PC	Yes	11 x 34	45237	S150-AT, S140-AT, S120-AT2, S55-S	-
1.0	1.0	PA	Yes	11 x 34	45998	S140-AT	-
0.5	0.5	PC	Yes	8 x 34	45235	S120-AT3, S80-AT2	-
0.5	0.5	PA	Yes	8 x 34	45236	S120-AT3, S80-AT2	-
0.5	0.5	PC	Yes	7 x 56	45243	S70-AT	-
0.2	0.2	PC	Yes	7 x 20	45233	S100-AT3	-
0.2	0.2	PA	Yes	7 x 20	45234	S100-AT3	-

5. 3. Operation

5. 3. 1. Filling

We can run thick wall tubes when partially filled but should be at least half-full. The fill level in thick-wall tubes depends on the rotor type, swinging buckets, or fixed angle rotor.

Swinging Bucket Rotor

» Place thick-walled tubes into a proper tubes rack.
» Fill tubes up to 3 mm from the top.

Fixed Angle Rotor

» Place thick-walled tubes into a proper tubes rack.
» Fill tubes with filling volume according to Table 5.

5. 3. 2. Tube loading and unloading

» Load the tubes according to the rotor instruction manual.
» Use pliers or a hemostat to grasp the tube and gently pull it from the rotor compartment or rotor buckets.

6. Thin-Walled Tubes

6. 1. Description

Thin-walled tubes are round-bottom tubes with thin walls, ideal for density gradient applications in swinging bucket sets and fixed-angle rotors. These tubes are available in polyallomer (PA) and polyethylene (PET) materials, both of which can be punctured and sliced. Polyallomer offers the best overall chemical resistance among plastic ultracentrifuge tubes, with limited solvent resistance to alkaline gradients and usability within a pH range of 2-12. While translucent, polyallomer achieves some contact clarity with liquids and is nonwettable. Thin-walled Polyclear tubes are also puncturable, though they generally require more effort than polyallomer tubes. Tubes can be reused if significant deformation or stress cracking has not occurred. Capped tubes used in fixed-angle rotors may deform below the cap and, in such cases, should not be reused.



Figure 13: Thin-walled tubes

Table 6: Ordering information of thin-walled tubes used in the WX+ series

Tube volume (mL)	Material	Autoclavable	Dimension (mm)	Tubes PN	Rotors to use
38.5	PET	No	25 x 88	75000471	SureSpin 632/630, AH-629
36.0	PA	Yes	25 x 89	03141	SureSpin 632/630, AH-629
17.0	PET	No	16 x 102	06750	SureSpin 632/630, AH-629
17.0	PA	Yes	16 x 102	03126	SureSpin 632/630, AH-629
13.2	PA	Yes	14 x 89	03699	TH-641
12.0	PET	No	14 x 89	06752	TH-641
5.0	PA	Yes	13 x 51	03127	AH-650
5.0	PA	Yes	13 x 51	03127	S52-ST
5.0	PET	No	13 x 51	46101	S52-ST
4.4	PA	Yes	11 x 60	03955	TH-660
2.2	PC	Yes	11 x 34	45315	S55-S
2.2	PC	Yes	11 x 34	75000515	S55-S

Table 7: Ordering information of thin-walled tubes assemblies

						Required accessories PN				
Tube volume (mL)	**Material**	**Autoclavable**	**Dimension (mm)**	**Tubes PN**	**Rotors to use**	**Sealing cap**	**Tube plug**	**Tube vise**	**Tool kit**	**Tube removal tool**
36.0	PA	Yes	25 x 89	03141	T-865, T-1250	52572	-	-	52610	-
12.5	PA	Yes	16 x 76	03128	T-890, T-1270	52634	-	-	52609	-
6.5	PA	Yes	13 x 64	45660	T-8100	45801	-	52176	-	52177
5.0	PA	Yes	13 x 51	03127	TV-1665	52521	52522	-	52598	-
4.4	PA	Yes	11 x 60	03955	TFT80.4	54366	-	52176	-	11557
2.0	PA	Yes	8 x 51	54460	TFT80.2	54459	-	-	-	11557

6. 2. Operation

6. 2. 1. Filling

Swinging Bucket

» Tubes cannot be run partially filled.
» Thin-walled tubes in the swinging bucket rotor must be filled to 3 mm from the top.
» To keep the rotor balance, all tubes must be filled equally.

Fixed Angle

» Thin-walled tubes in fixed angle rotors must always be full and used with a sealing cap according to Table 7.
» Fill the tube with fluid to within 2 mm from the top, almost below the tube plug (Figure 14).

CAUTION When using with salt solutions like Caesium chloride (CsCl), use sufficient overlay (for example mineral oil) to prevent CsCl coming into the contact with Aluminum component of the assembly

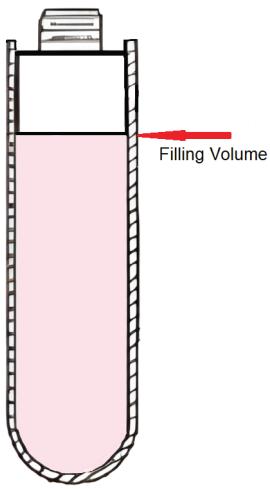


Figure 14: Thin-walled tubes assembly filling properly

6. 2. 2. Assembling

Sealing assembly in 52634 and 52572 consists of four pieces, Plug, Plug cover, Hex nut, and Post fill screw. Sealing cap assembly with 54459 and 54366 consists of three pieces (Figure 15).

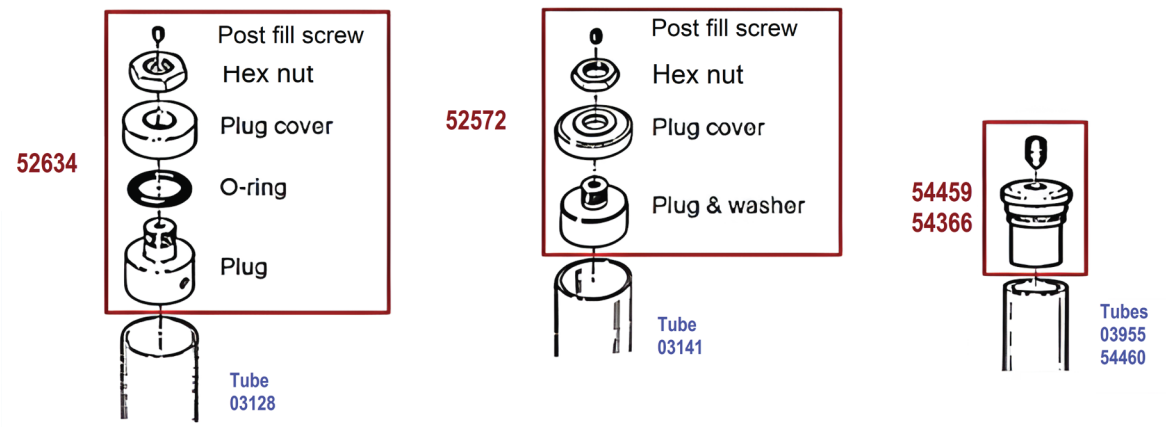


Figure 15: Thin-walled tubes plug assembly

» Using the Hex end of tube removal tool (Figure 16) and remove the post-fill screw and then sealing nut and cover.
» Place the tube in the rack and fill within 2 cm of the top.
» Insert the tube plug into the tube that plug is about 2 mm below the top edge (Figure 17).
» Apply a small amount of lubricant to the plug threads.

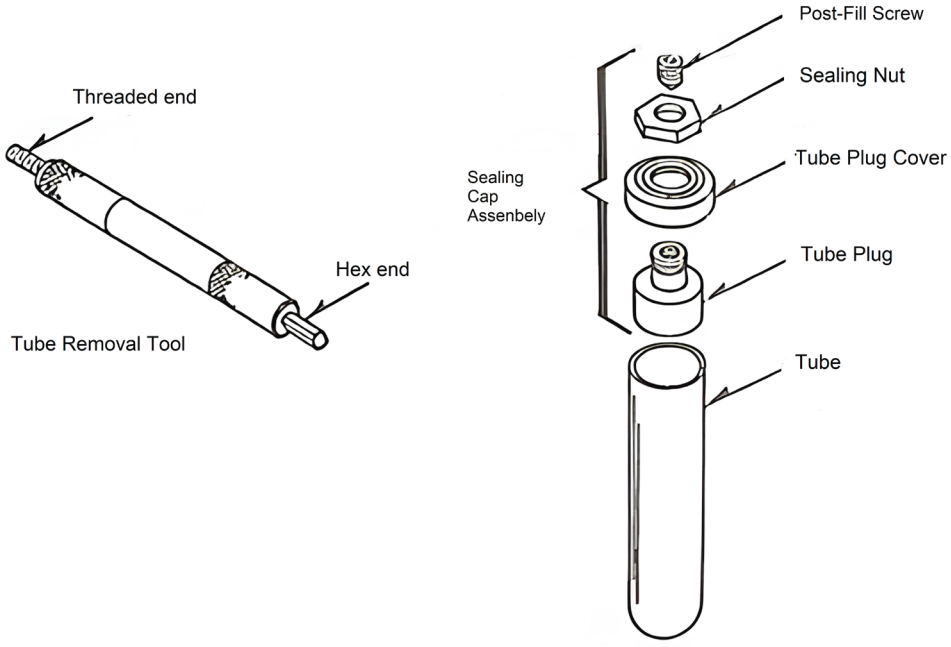


Figure 16: Tube assembly with tube removal

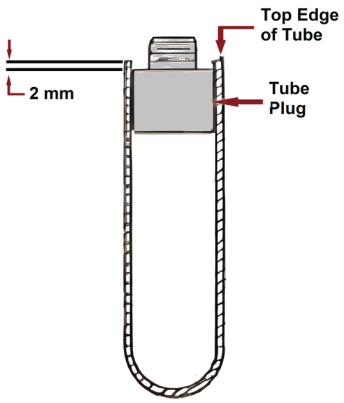


Figure 17: Properly positioned the plug

» While holding the tube and plug firmly, place the plug cover over the plug. Guide the edge of the tube under the tube plug cover while pushing down on the cover with a twisting motion until it seats.
» Place the sealing nut over the thread extension and tighten it with a finger.
» Place the tube assembly into the tube cap vise from the bottom as shown in Figure 18, then firmly tighten the vise.
» Using the closed end of the tube cap wrench fully tighten the sealing nut.
» Tap the tube to dislodge any trapped air bubbles.

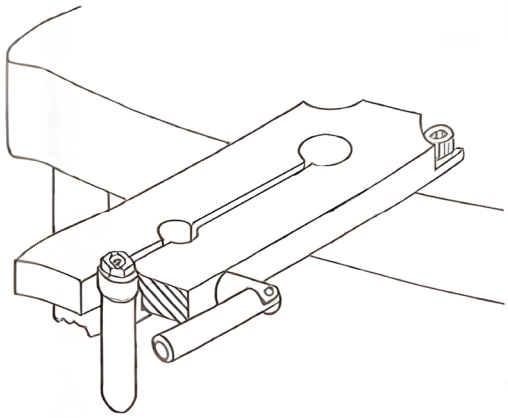


Figure 18: Using the tube cap vise

» Insert the post-fill screw into the post-fill hole of the tube plug and tighten it with the hex end of the tube removal tool.
» Loosen the vise and remove the tube assembly. Invert the tube assembly and tap lightly to rise any bubbles. If there is a large bubble (more than 4 mm in diameter), remove post fill screw and tap the tube to dislodge trapped air, insert the post-fill screw and tighten it.

6. 2. 3. Loading and unloading

» Insert the tube assembly into the rotor compartment according to the rotor instruction manual.
» Make sure the lower rim of the tube plug cover seat on the inside ridge of the rotor compartment.
» The upper edge of the tube plug cover should be 1 mm below the outer rim of the rotor compartment as shown in Figure 19.

CAUTION Failure to properly seat the tube assembly in the rotor compartment could cause tube leakage. If tube seated improper, remove the tube, and repeat the assembly procedure.

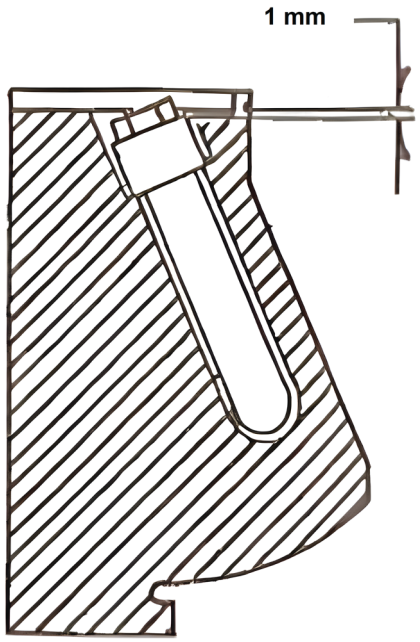


Figure 19: Properly seated tube assembly in the rotor

» To unload the tube assembly from the rotor compartment, use the threaded end of the tube removal tool (Figure 16).
» Thread the tool into the post-fill hole and pull the tube assembly out of the rotor.

6. 2. 4. Disassembling

» Lock the tube assembly firmly in the tube cap vise.
» Using the hex end of the tube removal tool, loosen the post-fill screw but do not remove it.
» Using the closed end of the tube cap wrench, loosen the sealing nut so that it is clearly separated from the tube plug cover but still attached to the plug threads.
» Grasp the tube firmly, then pull downward with a gentle rocking motion until the tube separates from the sealing cap assembly.
» Place the tube in a tube rack.
» Loosen the cap vise and remove the sealing cap assembly.

6. 3. Certification

The tubes are certified in compliance with USP class VI and meet the requirements of FDA-food contact regulations.

*Additional information is available upon request.

7. Threaded Bottle Assembly

7. 1. Description

Polycarbonate bottles with aluminum cap assemblies are available in four different sizes. The thick polycarbonate body features a smooth, straight wall design that allows for complete decanting. The outer thread minimizes contact with samples during filling and decanting. These threaded bottle assemblies are reusable and autoclavable, provided there is no significant deformation or stress cracking.



Figure 20: Threaded bottles assembly

7. 2. Ordering Information

Table 8: Ordering information of threaded bottle assemblies

						Required accessories PN				
Tube volume (mL)	**Fill volume (mL)**	**Material**	**Autoclavable**	**Dimension (mm)**	**Tubes PN**	**Rotors to use**	**Sealing cap**	**Adapter**	**Tube removal tool**	**Tube cap vise**
100.0	70	PC	Yes	38 x 102	010-1333	F37L-8x100	-	-	097-1469	-
39.0	26.3	PC	Yes	25 x 89	010-1371	F50L-8x39, F37L-8x100	-	-		
13.5	10.4	PC	Yes	16 x 76	010-1382	F65L-6x13.5	-	-		
						F37L-8x100	-	010-0191		
4.4	2.7	PC	Yes	11 x 60	54361	TFT-80.4	54365	-	11557	52176

7. 3. Operation

7. 3. 1. Filling

» Fill the bottles according to Table 9.

7. 3. 2. Assembling

» Sealing cap assembly includes three pieces, O-ring, plug, and aluminum cap (Figure 21).
» Check all aluminum sealing assembly before assembly.
» Position the O-ring into the plug.



Figure 21: Threaded bottles assembly

» Put the plug into the tube's top edge.
» Position the aluminum cap over the cap and hand tighten the cap assembly.

7. 3. 3. Loading and unloading

» Make sure that bottle assembly is seated properly into the rotor compartment according to the rotor instructions manual.
» Improper loading cause centrifuge failure.
» After completing the centrifuge operation, use the tube removal tool (097-1133) to remove the bottles out of the rotor. (Figure 22)

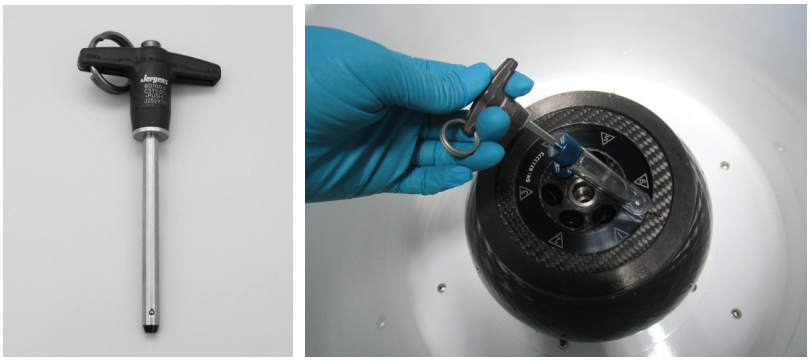


Figure 22: Threaded bottles assembly (097-1133) unloading properly

7. 3. 4. Disassembling

PC bottle assembly is not puncturable or sliceable. To access the sample, the bottle's assembly must be disassembled.

» Hold the bottles in one hand tightly.
» Unscrew the aluminum assembly with the other hand.

8. Ultra Cone Tubes

8. 1. Description

Ultra Cone tubes, featuring a conical bottom, are ideal for pelleting applications in swinging bucket rotors. They are available in two different materials: Polyallomer (PA) and Polyethylene (PET), both of which can be punctured and sliced. These tubes can be reused as long as there is no significant deformation or stress cracking.



Figure 23: Ultra Cone tubes

8. 2. Ordering information

Table 9: Ordering information of Ultra Cone tubes

						Required accessories PN	
Tube volume (mL)	**Material**	**Autoclavable**	**Dimension (mm)**	**Tubes PN**	**Rotors to use**	**Conical adapter**	**Adapter removal tool**
28.0	PA	Yes	25 x 84	75000476	SureSpin 632/630, AH-629	75000462	75000480
	PET	No	25 x 84	75000461	SureSpin 632/630, AH-629		
13.0	PET	No	16 x 96	75000463	SureSpin 632/630, AH-629	75000464	
	PA	Yes	16 x 96	75000475	SureSpin 632/630, AH-629		
9.0	PET	No	14 x 84	75000465	TH-641	75000466	
	PA	Yes	14 x 84	75000474	TH-641		
3.4	PET	N0	11 x 57	75000469	TH-660	75000470	
	PA	Yes	11 x 57	75000472	TH-660		
3.5	PA	Yes	13 x 48	75000473	AH-650, S52-ST	75000468	
	PET	No	13 x 48	75000467			
1.4	PC	Yes	11 x 32	75000516	S55-S	75000470	
	PA	Yes	11 x 32	75000517	S55-S		

8. 3. Operation

8. 3. 1. Filling

» Place Ultra cone tubes into a proper tubes rack.
» Fill tubes up to 2–3 mm from the top.

8. 3. 2. Loading

To spin samples with ultra-cone tubes, a conical adapter must be loaded into the rotor buckets before loading tubes. The internal diameter of the adapter matches exactly the external diameter of the Ultra Cone tubes.

» Place related conical adapter into the swinging bucket.
» Make sure the conical adapter is fitted properly into the buckets, improper sitting of the adapter may lead to the failure of tubes during the centrifugation.

8. 3. 3. Unloading

» Gently remove swinging buckets from the rotor and place them into the rack.
» Open the swinging bucket caps according to the rotor instruction manual.
» Because the tubes expand slightly during centrifugation, you may have to use pliers or a hemostat to grasp the tube and gently pull it from the swinging buckets.

8. 3. 4. Removal

After completing the centrifugation, remove the conical adapter using the Ultra Cone adapter removal tool (75000480) (Figure 24).

» Before inserting the tool into the rotor bucket, turn the top knob about one-half counterclockwise.
» Push the knob down to return the collet to its smallest size.
» Insert the tool firmly until the collet is seated inside the adapter.
» While holding the large black disk to prevent rotation of the tool handle, turn the top knob clockwise until you feel resistance. Resistance indicates the collet is touching the inside of the adapter.
» Continue turning the top knob about ⅛ turn, this expands the collet and locks it into the adapter.
» Pull the adapter from the bucket.
» To release the adapter from the collet, turn the top knob about one-half turn counterclockwise and push down while holding the large disk. An audible click may be heard as the collet releases the adapter.



Figure 24: Concial adapter removal (75000480) with expandable collet

9. Ultracrimp Instructions

9. 1. Description

The Ultracrimp and Clearcrimp tubes are used in fixed angle and vertical rotors. The primary Ultracrimp Sealing System consists of the Ultracrimp Sealing Tool (referred to as the crimper), rotor caps, tube rack, Ultracrimp and Clearcrimp tubes supplied with aluminum tube caps and tube plugs, a tube of lubricant and a gauge tool.Ultracrimp tubes are single use tubes and once they sealed,cannot be reused.



Figure 25: Ultracrimp tubes

Watch video: How to use the Ultracrimp Sealing tool for Ultracrimp Tubes

9. 2. Ordering information

Table 10: Ordering information of Ultracrimp tubes and required accessories in fixed angle rotors

						Required accessories PN		
Tube volume (mL)	Material	Autoclavable	Dimension (mm)	Tubes PN	Rotors to use	Rotor cap	Tube rack	Sealing tool
90.0	PA	Yes	39 x 107	03990	T-647.5	03998	03940	03920
35.0	PA	Yes	25 x 89	03989	T-865, T-1250	03996	03935	
11.5	PA	Yes	16 x 76	03987	T-890, T-1270, T-865, T-1250	03993	03922	
	PET	No	16 x 76	01087	T-890, T-1270, T-865, T-1250	03993	03922	
6.0	PA	Yes	13 x 66	03945	T-8100	45662	03921	
					TFT45.6	03992		
					TV-1665	03991		
	PET	No	13 x 66	01086	T-8100	45662	03921	
					TFT45.6	03992		
					TV-1665	03991		
3.5	PA	Yes	11 x 60	03905	TFT80.4	03091	03773	

Table 11: Ordering information of Ultracrimp tubes and required accessories in StepSaver vertical

						Required accessories PN		
Tube volume (mL)	**Material**	**Autoclavable**	**Dimension (mm)**	**Tubes PN**	**Rotors to use**	**Rotor cap**	**Tube rack**	**Sealing tool**
39.0	PA	Yes	25 x 113	79253	StepSaver 50V39	79299	79249	03920
	PET	No	25 x 113	79295	StepSaver 50V39			
13.5	PA	Yes	16 x 93	79246	StepSaver 65V13	79286	79247	
					StepSaver 50V39	79300		
	PET	No	13 x 51	79294	StepSaver 65V13	79286	79247	
					StepSaver 50V39	79300		
6.0	PA	Yes	13 x 66	79273	StepSaver 70V6	79286	03921	
					StepSaver 65V13	79297		
2.0	PA	Yes	13 x 45	79251	StepSaver 70V6	79289	79242	
	PET	No	13 x 45	79292	StepSaver 70V6			

9. 3. Operation

9. 3. 1. Filling

» Fill each tube to the base of the tube neck as shown in Figure 26.
» Making sure no excess fluid remains on the tube neck. If fluid remains on the neck of the tube, the fluid becomes trapped between the tube cap and the outside of the tube neck which could leak during a centrifugation run.
» Remove excess fluid using a lint-free tissue or, if the tube contains a non-gradient solution, gently squeeze the tube until the fluid level reaches the tube neck, then gently release the tube.

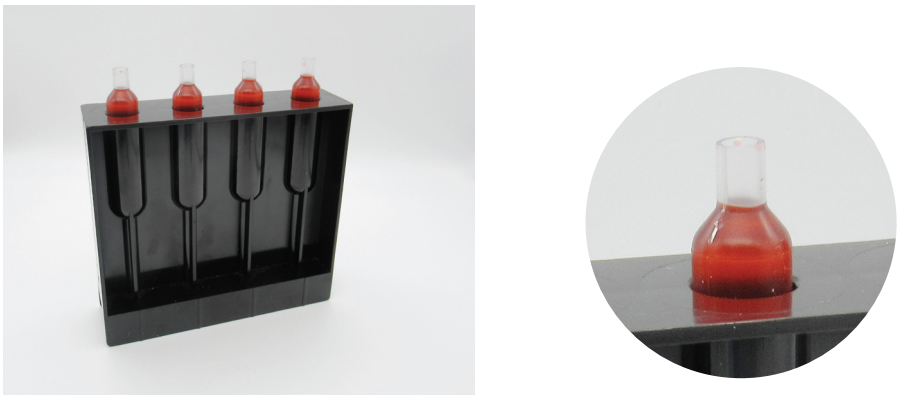


Figure 26: Properly filled Ultracrimp tubes

9. 3. 2. Sealing

» Insert a tube plug into the tube neck (Figure 27).
» The top of the fluid level in the tube must be slightly below the bottom of the tube plug. If fluid meets the bottom of the tube plug, take the tube plug out and, using a syringe or a pipette, remove the excess fluid and dry the plug.
» Place an aluminum tube cap over the neck of each filled tube (Figure 28).



Figure 27: Inserting the plug



Figure 28: Placing aluminum tube cap

» Slide the tube rack into the Ultracrimp sealing tool (03920) to the proper position under the collet (Figure 29). You will feel the tube rack click into place.
» Pull the handle of the crimper down until it comes to a firm stop (Figure 30).





Figure 29: Positioning tubes along with the tube rack into the crimper

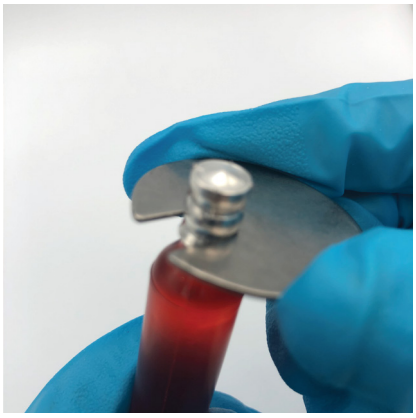




Figure 30: The crimper seals the aluminum tube cap by mechanical force.

» Check the seal by gauge tool (03919) that is supplied with the crimper.
» In a properly sealed tube, the slot in the gauge tool will fit perfectly around the narrow and crimped portions of the aluminum cap without forcing (Figure 31).

WARNING When operating the crimper, keep your fingers clear of all moving parts. After the tube is sealed, steady the crimper, and gently return the handle to its original position. Do not let the handle spring back.



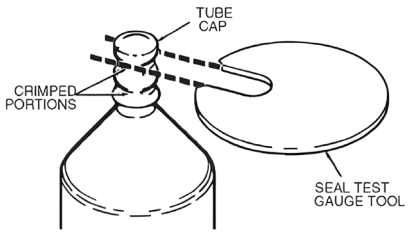


Figure 31: Using the gauge tool to check the sealing

9. 3. 3. Loading

Fixed angle rotors

» Place the rotor in the rotor holding fixture.
» Gently pulled filled tubes into the rotor compartments, loading the rotor as described in the rotor instruction manual.
» Lightly lubricate each rotor cap to be used with anti-galling grease, supplied with the rotor.
» Place a rotor cap in each compartment that contains a filled tube only.

CAUTION Make sure the rotor caps are properly seated, failure to do so will result in tube failure. Do not put a rotor cap in an empty rotor compartment. Rotor caps should only be installed in compartments that contain a filled tube.

Vertical rotors

» Inspect cartridge assemblies for damage.
» Place a filled tube into the cartridge.
» Close the cartridge.
» Place a filled cartridge assembly into each through hole according to the vertical rotor instruction manual.

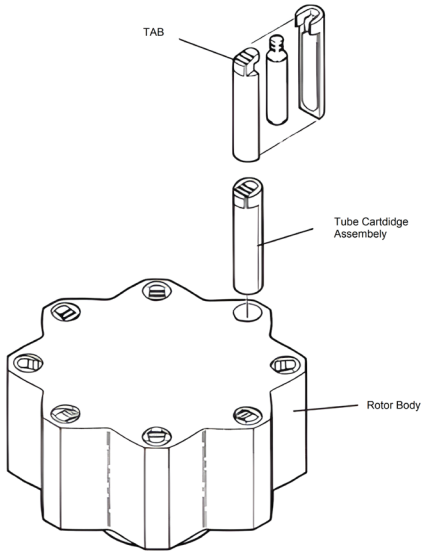


Figure 32: Proper Installation of the tube/cartridge assembly into StepSaver rotors

9. 3. 4. Unloading

Because the tubes expand slightly during centrifugation, you may have to use the Ultracrimp tube removal tube (12826), needle nose pliers, or a hemostat to grasp the tube and gently pull it from the rotor compartment.

You might notice that the inner side wall of a tube used in a vertical rotor may appear slightly flattened after centrifugation, or that a tube used in a fixed-angle rotor may have a slight crease on the inner shoulder of the tube neck. These are normal effects of centrifugation for these tubes and should not be cause for any concern.

Fixed Angle Rotors

» Grasp the knob on the top of the rotor cap and pull the cap from the rotor. If the caps don't come out easily, use the Ultracrimp Removal Tool to pull them from the rotor.

Vertical Rotors

» Remove each cartridge from the rotor by gently pushing upward on the bottom of the cartridge assembly until the cartridge extends above the top edge of the rotor body and lifting the cartridge from the rotor body.
» Remove the tube from the cartridge.
» Unload Ultracrimp tubes for sample removal.

9. 3. 5. Sample Removal

Samples may be taken by side or bottom puncture of the tube.

Put an air inlet hole in the top of the tube by using a large-gauge syringe and puncturing a small hole just below the tube cap.

The side or bottom puncture can then be made, and the sample removed.

9. 4. Certification

The tubes are certified in compliance with USP class VI and meet the requirements of FDA-food contact regulations.

*Additional information is available upon request.

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10. Maintenance and Care

10. 1. Cleaning

- Hand wash tubes, bottles, adapters, and accessories with a mild detergent.
- Avoid using commercial dishwashers for tubes and bottles due to harsh detergents and temperatures.
- For polycarbonate bottles and tubes, use a detergent with a pH below 8 and avoid brushes with exposed metal to prevent scratches and early failure.
- Do not use alcohol or acetone, as they can react poorly with many materials; consult the "Chemical Compatibility" on page 35 for appropriate solvents if needed.
- Air-dry all labware; do not use an oven for drying.

10. 2. Decontamination

Labware that has been contaminated with radioactive or pathogenic substances should be decontaminated or disposed of according to relevant safety protocols and regulations.

Check the "Chemical Compatibility" on page 35 to find a suitable decontamination agent that will not harm the material of the tubes or bottles.

10. 3. Sterilization and disinfection

Most ultra tubes and accessories, except those made of Polyethylene terephthalate (PET) can be autoclaved at 121°C for about 20 minutes.

To find autoclavability and sterilization refer to Table 13 for each tube type.

For sealed and closed tubes and bottles, always disassemble the cap assemblies before autoclave process.

Do not autoclave tubes or bottles with their caps on, as the pressure in a sealed container can lead to an explosion. Partially sealed containers may collapse due to the pressure changes within the autoclave during venting.

Tubes and bottles should be placed open-end down or supported in a rack if autoclaved.

Do not autoclave plastic adapters or spacers.

To sterilize O-rings and PET tubes, cold sterilization is recommended by soaking the item for 10 minutes. Refer to Appendix A of this manual for information about specific solutions.

Table 12: Sterilization and autoclavability of ultra tubes

Tube/Bottle Material	AUTOCLAVABLE (121 °C)	Ethanol (70%)	Hydrogen peroxide (10%)	Sodium Hypochlorite (10%)	Glutaraldehyde (2%)
Polyallomer	Yes	Yes	Yes	Yes	Yes
Polyethylene terephthalate (PET)	No	No	Yes	Yes	Yes
Polycarbonate	Yes	No	Yes	Yes	Yes
Polypropylene	Yes	Yes	Yes	Yes	Yes

CAUTION: When sterilization or disinfection is a concern, consult your laboratory safety officer regarding proper methods to use.

1. A cold sterilization method, such as immersion in 10% hydrogen peroxide for 30 minutes, may be used on PET thin-walled tubes
2. Tube lifetime will be reduced.
3. Marginal at 5% dilution.

10. 4. Guidelines for proper storage and inspection of tubes and bottles

- Store tubes and bottles in a dark, cool, and dry place, away from ozone, chemical fumes, and ultraviolet light sources.
- Regularly inspect tubes and bottles for cracks or significant deformation.
- Avoid using tubes that are discolored, as they may have become brittle due to age or UV light exposure.
- Check O-rings in cap assemblies for signs of wear or damage. Over time, repeated use can cause abrasion and general wear, leading to a loss of elasticity and sealing capability.
- Look for crazing, which appears as fine cracks on the surface of tubes and bottles. If any crack is found near the outer wall of a tube, discard the tube immediately.
- Follow your institution's or facility's specific protocols for biohazard waste disposal.

10. 5. Removing clogged or collapsed tubes

Thin-walled tubes may collapse if improperly sealed or capped. To prevent this, follow proper filling and capping procedure according.

If a tube is jammed or collapsed, try these methods without forcing the tube.

- Centrifugation can create a slight vacuum in the tube cavity, making tube removal difficult, especially at low temperatures Waiting about 5 minutes after the rotor stops can ease removal.
- Use a gentle twisting or rocking motion to remove difficult tubes slowly, avoiding sample mixing.
- Do not use metal tools like hemostats to pry out tubes, as they can damage the rotor.
- For open top tubes, remove contents and place the rotor or bucket upside-down in an autoclave for 30-60 minutes. Once cool, attempt removal.
- Do not autoclave sealed or capped tubes.

11. Chemical Compatibility

Chemical Compatibility																											
MATERIAL / CHEMICAL	Aluminium	Anodic Coating for Aluminium	Buna N	Cellulose Acetate Butyrate	Polyurethane Rotor Paint	Composite Carbon Fiber/Epoxy	Delrin™	EPDM rubber	Glass	Neoprene	Noryl™	Nylon	PET[1], Polyclear™,Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvynil 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	/	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	S	M	/	S	S	S	S	S	S	M	S	S	S

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Chemical Compatibility

CHEMICAL \ MATERIAL	Aluminium	Anodic Coating for Aluminum	Buna N	Cellulose Acetate Butyrate	Polyurethane Rotor Paint	Composite Carbon Fiber/Epoxy	Delrin™	EPDM rubber	Glass	Neoprene	Noryl™	Nylon	PET[1], Polyclear™,Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvynil Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
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	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	M	S	S	S
Cesium Formate	M	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	M	S	S	S
Cesium Sulfate	M	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	M	M	S	M	U	S	S	S
Chromic Acid (50%)	U	/	U	U	/	U	U	/	/	/	S	U	U	S	M	U	M	S	S	S	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	S	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
Diethylpyro-carbonate	S	S	U	/	S	S	S	/	S	S	U	S	U	S	U	/	/	S	S	S	S	M	S	S	S	S	U
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

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Chemical Compatibility

CHEMICAL / MATERIAL	Aluminium	Anodic Coating for Aluminum	Buna N	Cellulose Acetate Butyrate	Polyurethane Rotor Paint	Composite Carbon Fiber/Epoxy	Delrin™	EPDM rubber	Glass	Neoprene	Noryl™	Nylon	PET[1], Polyclear™,Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvynil Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
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	U	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	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	U	S	M	U
Ethylene Dichloride	S	/	U	U	/	/	S	M	/	U	U	S	U	U	U	U	U	U	U	/	U	/	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	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	M	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	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

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Chemical Compatibility

CHEMICAL \ MATERIAL	Aluminium	Anodic Coating for Aluminum	Buna N	Cellulose Acetate Butyrate	Polyurethane Rotor Paint	Composite Carbon Fiber/Epoxy	Delrin™	EPDM rubber	Glass	Neoprene	Noryl™	Nylon	PET[1], Polyclear™,Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvynil Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
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	M	M	M	S
Iodoacetic Acid	S	S	M	/	S	S	S	/	S	M	S	S	M	S	S	/	M	M	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
Potassium Chloride	U	S	S	/	S	S	S	S	S	S	S	/	U	M	S	/	S	S	S	S	S	S	S	U	S	S	S
Potassium Hydroxide (5%)	U	U	S	S	S	S	M	/	S	S	S	/	/	S	U	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	S	M	U	M	/	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	M	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	/	/	/	/	/	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	M	S	U	S	U	U	S	S	S	U	S	M	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

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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	/	M	S	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
Sodium Borate	M	S	S	S	S	S	S	S	S	S	S	U	S	S	U	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	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	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
Sodium Hypochlorite (5%)	U	U	M	S	S	M	U	S	S	M	S	S	S	M	S	S	S	M	S	S	S	M	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	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	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	S	M	S	S	S
Oils (Petroleum)	S	S	S	/	/	/	S	U	S	S	S	U	S	U	M	S	M	U	U	S	S	S	U	S	S	S	S
Oils (Other)	S	/	S	/	/	/	S	M	S	S	S	U	S	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	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

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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	S
Phenol (5%)	U	S	U	/	S	M	M	/	S	U	M	U	U	S	U	M	S	M	S	U	M	S	U	M	M	M	S
Phenol (50%)	U	S	U	/	S	U	M	/	S	U	M	U	U	U	U	U	S	U	M	U	U	S	U	M	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	S	U	M	U	S	S
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	/	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	U	U	S	U	M	S	M	S
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	M	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	U	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	U	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

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 Compatibility																										
MATERIAL / CHEMICAL	Aluminium	Anodic Coating for Aluminium	Buna N	Cellulose Acetate Butyrate	Polyurethane Rotor Paint	Composite Carbon Fiber/Epoxy	Delrin™	EPDM rubber	Glass	Neoprene	Noryl™	Nylon	PET[1], Polyclear™,Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvynil Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
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	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

S	Satisfactory
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[1] Polyethlyeneterephtalate

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

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en

50172967 is the original instruction manual.

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