



Thermo Fisher Scientific

ULTRACRIMP Tube sealing System

Instruction Manual

3524-10

March 2010

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Release history: 3524-10 printed in March 2010.

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This manual is a guide for the use of

Thermo Scientific ULTRACRIMP[®] Tube Sealing System

Data herein has been verified and is believed adequate for the intended use of the tool. Because failure to follow the recommendations set forth in this manual could produce personal injury or property damage, always follow the recommendations set forth herein. Thermo Fisher Scientific does not guarantee results and assumes no obligation for the performance of rotors or other products that are not used in accordance with the instructions provided. This publication is not a license to operate under, nor a recommendation to infringe upon, any process patents.

Publications prior to the Issue Date of this manual may contain data in apparent conflict with that provided herein. Please consider all data in this manual to be the most current.

NOTES, CAUTIONS, and WARNINGS within the text of this manual are used to emphasize important and critical instructions.

WARNING informs the operator of a hazard or unsafe practice that could result in personal injury, affect the operator's health, or contaminate the environment.

CAUTION informs the operator of an unsafe practice that could result in damage of equipment.

NOTE highlights essential information.



CAUTION and WARNING are accompanied by a hazard symbol and appear near the information they correspond to.

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Important Safety Information

Certain potentially dangerous conditions are inherent to the use of all centrifuge rotors. To ensure safe operation of this rotor, anyone using it should be aware of all safe practices and take all precautions described below and throughout this manual.



WARNING

When using radioactive, toxic, or pathogenic materials, be aware of all characteristics of the materials and the hazards associated with them in the event leakage occurs during centrifugation. In the event of a rotor failure, neither the centrifuge nor the rotor can protect you from particles dispersed in the air. To protect yourself, we recommend additional precautions be taken to prevent exposure to these materials, example, use of controlled ventilation or isolation areas.

Always be aware of the possibility of contamination when using radioactive, toxic, or pathogenic materials. Take all necessary precautions and use appropriate decontamination procedures if exposure occurs.

Never use any material capable of producing flammable or explosive vapors or creating extreme exothermic reactions.

When using the ULTRACRIMP[®] Tube Sealing System keep your fingers clear of all moving parts.

DESCRIPTION

This manual contains information required to operate and maintain your ULTRACRIMP[®] Tube Sealing System. If you require additional information regarding operation or maintenance, please contact Thermo Fisher Scientific for assistance. In the United States, call Thermo Fisher Scientific toll-free 1-866-9THERMO; outside the United States, contact the nearest Thermo Fisher Scientific office (see back cover) or your local representative for Thermo Fisher Scientific products. Thermo Fisher Scientific product information is available on our internet web site at <http://www.thermo.com/rotors> .

Contents

- “Rotor Description” on page 1-2
- “Rotor Specifications” on page 1-2
- “Accessories” on page 1-3

Description

The TH-641 is used to seal thinwall ULTRACRIMP[®] polyallomer tubes and CLEARCRIMP[®] PET (polyethyleneterephthalate) tubes. ULTRACRIMP[®] and CLEARCRIMP[®] tubes are used in Thermo Fisher Scientific Ultraspeed, SUPRAspeed[®] and Superspeed Vertical Rotors. The basic ULTRACRIMP[®] Sealing System consists of the ULTRACRIMP[®] Sealing Tube (referred to as the crimper); rotor caps for tubes used in fixed-angle and vertical rotors; a tube rack; ULTRACRIMP[®] and CLEARCRIMP[®] tubes, which are supplied with tube caps and tube plugs; a tube of lubricant; and a gauge tool. In order to use the system with a vertical rotor, you also need a Tool Kit (Catalog No. 12770) which includes a torque wrench and a socket adapter to tighten the rotor caps, plus a rotor holding fixture.

Ordering Components

All components of the TH-641 can be purchased separately. To order, use the catalog numbers and descriptions given in Table 1-1. Table 1-2 lists the catalog number and description of spare parts should you need to order an additional supply or a replacement.

To order parts, telephone 1-866-9THERMO in the United States. Outside the United States, contact your local distributor or agent for Thermo Fisher Scientific products.

Chemical Compatability

The components of the TH-641 that are apt to come in contact with solution are: the Crimper base, rack guide, yoke housing, and cam housing (aluminum); tube racks (polycarbonate); tube caps and rotor caps (aluminum); tube plugs (Buna N rubber); gauge tool and wear plate (stainless steel); ULTRACRIMP[®] tubes (polyallomer); and CLEARCRIMP[®] tubes (PET, or polyethyleneterephthalate). Refer to figure 3-1 (Chapter 3) for parts location.

The chemical compatability of these materials is given in the Appendix. Because no organized chemical resistance data exists for materials under stress of centrifugation (tube caps, tube plug, rotor caps and tubes) this data is intended to be used only as a guide. When in doubt, we recommend pretesting of sample lots.

The Crimper collet and yoke, which are also apt to come in contact with solution, are made of steel and treated with a coating that has excellent chemical resistance properties, and is particularly resistant to chloride salts and corrosion.

Table 1-1. TH-641 Components

| Nominal Tube Volume | ULTRACRIMP [®] Tube Catalog No. | CLEARCRIMP [®] Tube Catalog No. | Rotor Cap Catalog No.* | Required Adapter Catalog No.** | Tube Rack Catalog No.*** | Rotor |
|---------------------|--|--|------------------------|--------------------------------|--------------------------|----------|
| 3.5 ml | 03095 (50/pkg) | — | 03091 | — | 03773 | TFT-80.4 |
| | | 03091 | 02208 | 03773 | F-28/36 | |
| | | 03091 | 02203 | 03773 | F-28/13 | |
| 4.5 ml | 03728 (50/pkg) | — | — | — | 03730 | AH-650 |
| 5.0 ml | 03898 (50/pkg) | — | 03092 | — | 03768 | SV-80 |

Table 1-1. TH-641 Components

| Nominal Tube Volume | ULTRACRIMP® Tube Catalog No. | CLEARCRIMP® Tube Catalog No. | Rotor Cap Catalog No.* | Required Adapter Catalog No.** | Tube Rack Catalog No.*** | Rotor |
|---------------------|------------------------------|------------------------------|------------------------|--------------------------------|--------------------------|--------------------|
| 6.0 ml | 03945 (50/pkg) | 01086 (50/pkg) | 03991 | — | 03921 | TV-865, TV-1665 |
| | | | 03992 | 02204 | 03921 | F-28/13 |
| | | | 03992 | 02209 | 03921 | F-28/36 |
| 11.0 ml | 03328(50/pkg) | — | — | — | 03726 | TH-641 |
| 11.5 ml | 03987(50/pkg) | 01087 (50/pkg) | 03993 | — | 03922 | T-880, F-28/13 |
| | | | 03993 | — | 03922 | T-1270, T-875 |
| | | | 03993 | — | 03922 | TFT-80.13,T-865.1 |
| | | | 03993 | — | 03922 | TFT-65.13, A-1256 |
| | | | 03993 | 00399 | 03922 | T-865, A-841 |
| 03993 | 02210 | 03922 | F-28/36 | | | |
| 15.5 ml | 03409 (50/pkg) | — | — | — | 03327 | AH-629/17, S-20/17 |
| 18.5 ml | 03988 (25/pkg) | 01088 (25/pkg) | 03994 | — | 03923 | TV-865B |
| 33.0 ml | 03899 (25/pkg) | — | 03995 | — | 03763 | SV-288 |
| 34.0 ml | 03469 (25/pkg) | — | — | — | 03539 | AH-629/36, S-20/36 |
| 35.0 ml | 03989 (25/pkg) | 01089 (25/pkg) | 03994 | — | 03935 | TV-860, TV-850 |
| | | | 03996 | — | 03935 | T-1250, T-865 |
| | | | 03996 | — | 03935 | F-28/36, A-841 |
| | | | 03997 | — | 03935 | TFT-50.38 |
| 50.0 ml | 03528 (25/pkg) | — | 03538 | — | 03529 | SS-34, SA-600 |
| | | | 03538 | — | 03529 | F-28/50 |
| 90.0 ml | 03990 (25/pkg) | — | 03998 | — | 03940 | A-641, T-647.5 |

* One Rotor Cap per package.

** Maximum rotor speed is limited to 30,000 rpm or less when using adapters. Quantity per package is 4 for all adapters except Adapter Catalog No. 00399, which is shipped with one per package.

*** Two Tube Racks per package.

Table 1-2. Spare Parts

| Description | Catalog Number |
|---|----------------|
| Torque Wrench | 52580* |
| Torque Wrench Socket, 7/16 inch | 52882* |
| Lubricant for ULTRACRIMP® Sealing Tool | 68914 |
| Seal Test Gauge Tool | 03919 |
| ULTRACRIMP® Tube Removal Tool | 12826 |
| Tube Caps and Tube Plugs, Fixed-Angle and Vertical Rotors ONLY (25/package) | 03999 |
| Rotor Holding Fixture (with mounting screws) | 53540* |
| Tube caps and Tube Plugs, AH-650 Rotor (25/package) | 03044 |
| Tube Caps and Tube Plugs, TH-641 Rotor (25/package) | 03045 |
| Tube Caps and Tube Plugs, AH-629/17 and S-20/17 Rotors (25/package) | 03046 |
| Tube Caps and Tube Plugs, AH-629/17 and S-20/36 Rotors (25/package) | 03047 |

* These parts are required for vertical rotors only and are supplied in Tool Kit, Catalog No. 12770.

OPERATION

This chapter contains the information necessary to use the ULTRACRIMP® Tube Sealing System.

Contents

- “Tube Filling” on page 2-2
- “Tube Sealing” on page 2-3
- “Rotor Loading and Sealing” on page 2-4
- “Rotor Cap/Tube Removal” on page 2-8
- “Seal Check Using the Gauge Tool” on page 2-8
- “Sample Removal” on page 2-9

Tube Filling

Tubes cannot be run partially filled; fill each tube to the base of the tube neck as shown in figure 2-1 making sure no excess fluid remains in the tube neck. If fluid remains in the neck of the tube when it is crimped, the fluid could be pushed up and out of the tube and become trapped between the tube cap and the outside of the tube neck; then during centrifugation the trapped fluid could escape giving the appearance that the tube had leaked.

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 bead(s) of fluid in the tube neck, then gently release the tube.

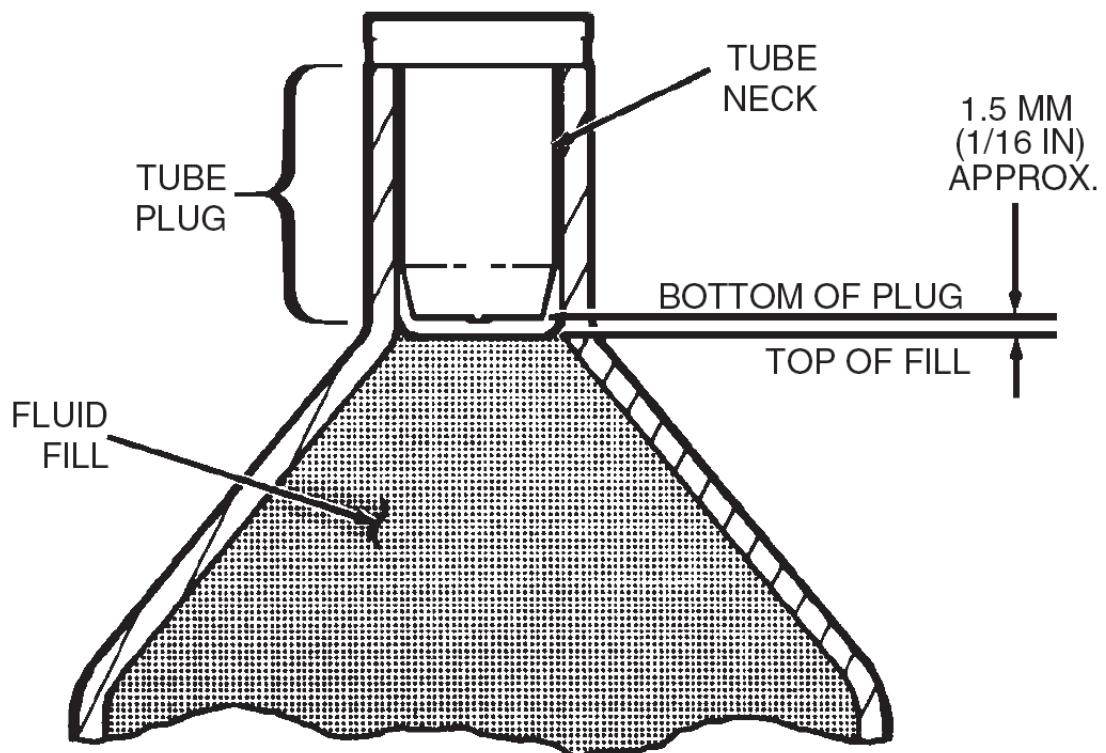


Figure 2-1. Properly Filled Tube

Place tubes into the appropriate size tube rack, then fill each tube using the guidelines given on the next page.

Aqueous Solutions and Homogeneous Mixtures

Aqueous solutions or homogeneous mixtures of sample and gradient materials (for example, CsCl), can be introduced into the tubes by using a standard thin-tipped pipette, a transfer pipette, or a syringe. The solutions should be loaded at a moderate rate to avoid bubble formation on the side wall of the tube.

Step Gradients

Step gradients can be constructed by adding each successive step to the tubing using a long, narrow cannula or a piece of tubing. The bottom of the cannula or tubing should be positioned at the bottom center of the tube so that the denser step solutions are introduced beneath the less dense steps. Alternately, a transfer pipette can be used to layer lighter step solutions on top of heavier ones.

Linear Gradients

Linear gradients can be added to the tubes, light end first, through a cannula positioned at the bottom center of the tube.

Sample and Overlay

Samples and overlay solutions can be layered on top of the gradient by using a transfer pipette. The total liquid volume must fill the tube to the base of the tube neck (see figure 2-1).

Tube Sealing



CAUTION Do not interchange aluminum caps designed for fixed-angle or vertical rotor ULTRACRIMP[®] tubes with the aluminum caps designed for swinging bucket rotor ULTRACRIMP[®] tubes. (Refer to figure 2-2 to distinguish between capstyles.) Also, do not use tube caps designed for one size swinging bucket ULTRACRIMP[®] tube on another size tube. Failure to heed this CAUTION could result in tube collapse and subsequent sample loss.

1. Insert a tube plug all the way into the tube neck. The top of the fluid level in the tube must be slightly below the bottom of the tube plug (figure 2-1); if fluid comes in contact with 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.
2. Place an aluminum tube cap over the neck of each tube to be filled.



FOR FIXED-ANGLE AND VERTICAL ROTORS



FOR SWINGING BUCKET ROTORS

Figure 2-2. Aluminum Tube Cap Styles for ULTRACRIMP[®] Tubes

3. Slide the tube rack into the ULTRACRIMP[®] sealing tool (the Crimper) with the first tube to be sealed in position directly under the crimping collet. You will feel the tube rack click into place when it is in the proper position.
4. Make sure the tube is in proper position under the collet, then pull the handle of the Crimper down until it comes to a firm stop.
5. Slide the next tube to be sealed into position under the crimping collet until the tube rack clicks in place and pull the handle. Repeat until all tubes have been sealed.

6. Load and seal the rotor according to the procedure in paragraph 2-3.



WARNING When operating the Crimper, keep your fingers clear of all moving parts. Also, after the tube is sealed, steady the Crimper and gently return the handle to its original position — DO NOT let the handle spring back. The seal should periodically be tested using the guage tool, Catalog No. 03919 (supplied with the Crimper), to verify that it is working properly (paragraph 2-5). Improperly sealed tubes can result in tube leakage and subsequent tube collapse.

Rotor Loading and Sealing

Vertical Rotor

1. Place the rotor in the rotor holding fixture (Catalog No. 52540). Gently pulled filled tubes into the rotor compartments, loading the rotor as described in the rotor instruction manual.



CAUTION Make sure the rotor is loaded and balanced according to the criteria in the rotor instruction manual.

2. Lightly lubricate each rotor cap to be used with antigalling grease (Catalog No. 61556, supplied with the rotor).
3. Install rotor caps as follows:

Vertical Ultraspeed Centrifuge Rotors: Place a rotor cap in each compartment that contains a filled tube only.

Vertical Superspeed Rotors: Place a rotor cap in all rotor compartments.



CAUTION Do NOT put a rotor cap in an empty rotor compartment. Rotor caps should only be installed in compartments that contain a filled tube.

Note To attain maximum speed when using less than a full complement of tubes, place rotor caps in all empty compartments. Be sure all rotor caps are securely tightened

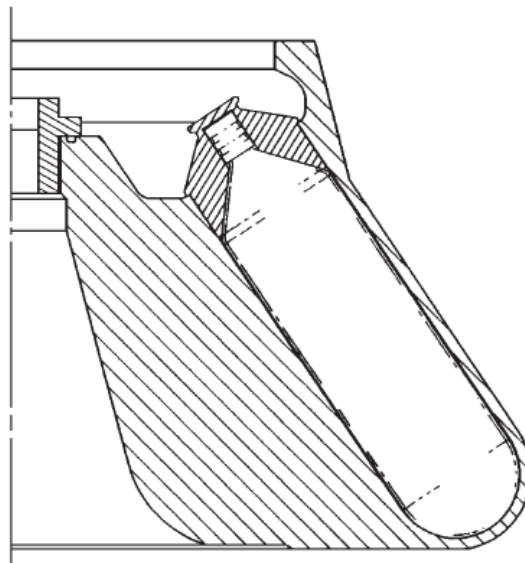
4. Hand tighten each rotor cap, then torque each rotor cap to 180 in lbs (20.3 N•m) and no more than 200 in lbs (22.6 N•m).

Install rotor in the centrifuge and perform the run.

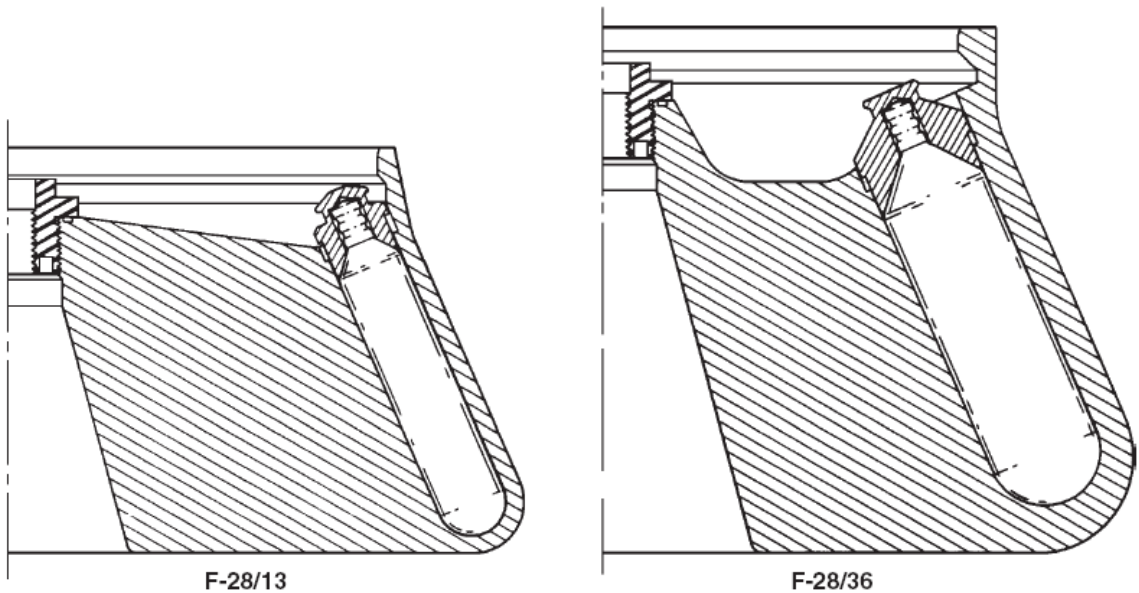
Fixed-Angle Rotor

Place one rotor cap on each filled tube, then carefully slide them into the rotor compartment loading the rotor as described in the rotor instruction manual. Make sure you have the proper size cap for the rotor being used and that the rotor caps are properly seated; refer to figures 2-3 and 2-4 respectively.

NOTE THE POSITION OF THE ROTOR CAP IN RELATION TO THE TOP OF THE ROTOR COMPARTMENT.



F-28/50



F-28/13

F-28/36

Figure 2-3. Properly Seated Rotor Caps in SUPRAspeed® Centrifuge Rotors

2 OPERATION

Rotor Loading and Sealing

NOTE THE POSITION OF THE ROTOR CAP IN RELATION TO THE TOP OF THE ROTOR COMPARTMENT

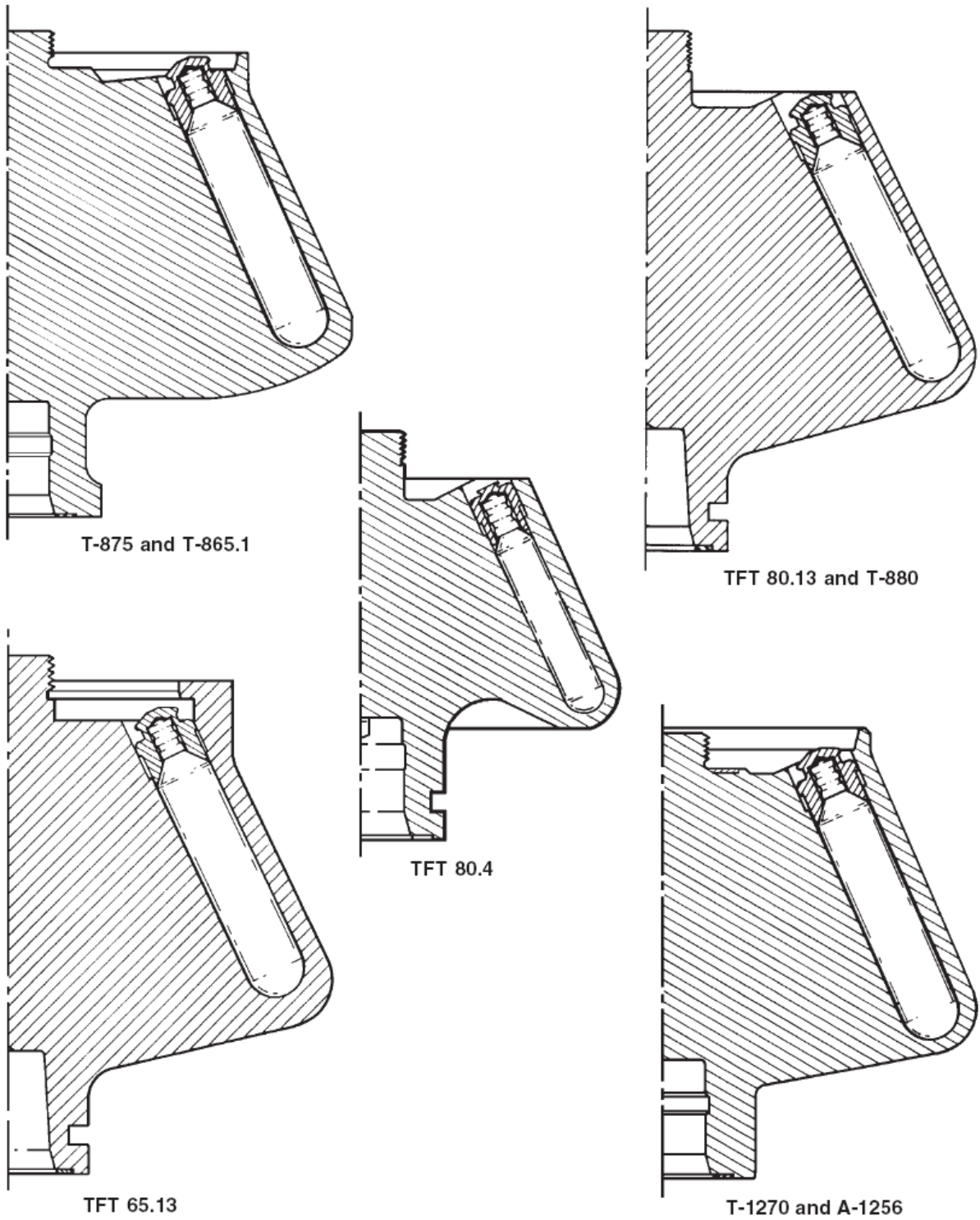


Figure 2-4. Properly Seated Rotor Caps in Ultraspeed Centrifuge Rotors

NOTE THE POSITION OF THE ROTOR CAP IN RELATION TO THE TOP OF THE ROTOR COMPARTMENT

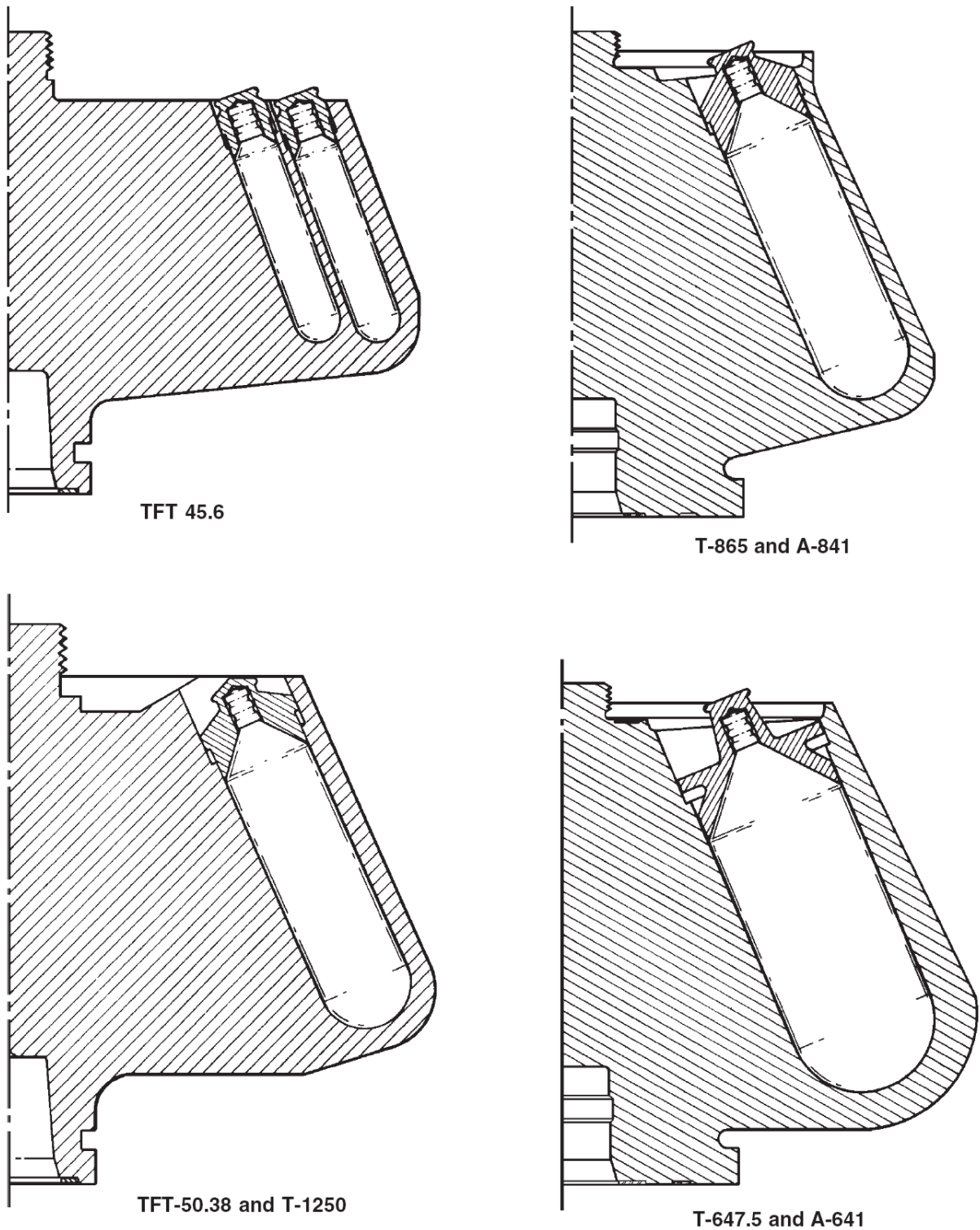


Figure 2-5. Properly Seated Rotor Caps in Ultraspeed Centrifuge Rotors (continued)

Swinging Bucket Rotor

Carefully slide the sealed tubes into the rotor buckets, loading the rotor as described in the rotor manual. Make sure the tubes are properly seated, then screw the bucket caps on tightly. Install the rotor in the centrifuge and perform the run.

2 OPERATION

Rotor Cap/Tube Removal

Place the rotor cover (with O-ring) on the rotor body. Finger tighten the locking nut by turning it clockwise. Insert rotor cover tool (supplied with rotor) through the locking nut and continue to turn the locking nut clockwise until the rotor cover is tightened securely. Remove the rotor cover tool from the locking nut.

Install rotor in the centrifuge and perform run.



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. Also, the rotor cover tool must be removed prior to a centrifuge run.

Rotor Cap/Tube Removal

Remove rotor or bucket caps:

- Vertical Rotors — Use the torque wrench with the 7/16 socket to unscrew the rotor caps.
- 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® Tube Removal Tool to pull them from the rotor.
- Swinging Bucket Rotors — Remove the bucket caps.

Because the tubes expand slightly during centrifugation, you may have to use the ULTRACRIMP® Tube Removal Tube (Catalog No. 12826), needlenose 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.

Seal Check Using the Gauge Tool

A special gauge tool (Catalog No. 03919) is supplied with the Crimper, which should be used periodically to check the seal and ensure that the Crimper is working properly. When a tube is properly sealed, the slot in the gauge tool will fit snugly around the narrow, crimped portions of the aluminum cap without forcing (figure 2-6). Avoid putting it over the slight vertical ridges formed during crimping. If the gauge tool does not fit properly, insert the edge of the tool into the collet and adjust (refer to page 3-5).

The magnet on the back of the cam housing can be used to store the gauge tool.

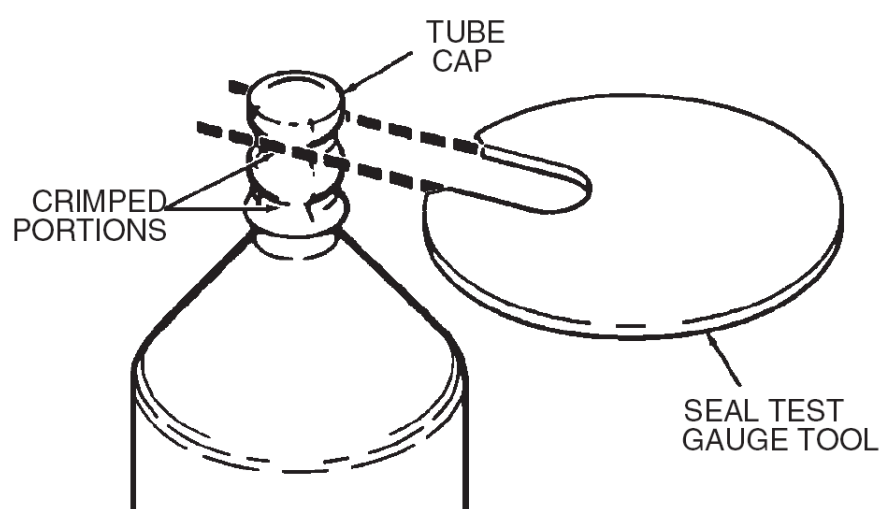


Figure 2-6. Using the Gauge Tool

Sample Removal

Samples can be removed by side or bottom tube puncture. First, put an air inlet hole in the top of the tube; this can be done 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 sample removed.

CARE and MAINTENANCE

This chapter describes routine maintenance procedures that should be performed on a regular basis, plus a troubleshooting guide and a procedure for the removal and replacement of the ULTRACRIMP® sealing tool (the Crimper) collet. Should maintenance or repair beyond the scope of this manual be necessary, contact Thermo Fisher Scientific (see back cover).

Table 3-1 describes possible problems that you may encounter with regard to operation of the Crimper and gives the probable cause and solution for each problem (refer to figure 3-1 for parts identification). If problems should arise beyond the scope of this manual, contact Thermo Fisher Scientific.



WARNING Any parts that have been exposed to a contaminant must be decontaminated before they are cleaned or repaired.

Table 3-3. Trouble Shooting Guide

| Problem | Probable Cause(s) | Solution |
|--|--|--|
| Gauge tool will not pass freely over the crimped area of the tube cap. | 5. Collet out of adjustment, 6. Collet is dirty or, 7. Collet is worn or broken. | 1. Adjust collet (para. 3-5, step 8). 2. Remove collet (para. 3-5) and clean, particularly between segments. 3. Replace collet (para.3-5). |
| Collet will not fit over tube cap. | Collet out of adjustment. | Adjust collet (para. 3-5, step 8). |
| You hear a snapping noise when Crimper handle is released. | Crimper needs to be lubricated. | Lubricate Crimper (para. 3-3). |
| Collet will not release when handle is released. | 1. Crimper needs to be lubricated, or 2. Collet spring is broken. | 1. Disassemble the crimper and lubricate (para. 3-3). 2. Replace the collet spring. |
| Yoke will not return to ready position, and tube rack will not slide to next position. | Yoke spring is broken. | Replace yoke spring. |

Table 3-4. Repair Parts (keyed to figure 3-1)

| Description | Catalog Number (Quantity) |
|-------------------------|---------------------------|
| Cam Shaft | 03586 (1) |
| Cam | 03711 (1) |
| Thrust Bearing, Cam | 68891 (2) |
| Wave Spring Washer, Cam | 68704 (1) |

Table 3-4. Repair Parts (keyed to figure 3-1)

| Description | Catalog Number (Quantity) |
|---|---------------------------|
| Set Screw,Cam | 60229 (1) |
| Cam Stop | 03549 (1) |
| Flathead Screw, Cam, Hex Socket, UNC #1/4-20 x 3/4 lg | 68630 (1) |
| Arm, Handle | 03589 (1) |
| Knob, Handle | 68894 (1) |
| Cap Screw, Mounting Plate, Hex Socket, UNC #1/4-20 x 1-1/2 lg | 64281 (2) |
| Roller Bearing, Cam | 68898 (1) |
| Stop Bar | 03584 (1) |
| Roller Shaft | 03587 (1) |
| Retaining Ring | 68893 (2) |
| Yoke | 03595 (1) |
| Yoke Spring | 68902 (2) |
| Cap Screw, Yoke Housing, Hex Socket, UNC #1/4-20 x 1-1/2 lg | 64281 (4) |
| Collet | 03594 (1) |
| Collet Spacer | 03579 (1) |
| Collet Spring | 68895 (1) |
| Spring Plunger | 68899 (1) |
| Flathead Screw, Base, UNC #1/4-20 x 1/2 lg | 63066 (2) |
| Cap Screw, Base, Hex Socket, UNC #3/8-16 x 1 lg | 61055 (2) |
| Rubber Foot | 03585 (4) |
| Magnet | 03055 (1) |

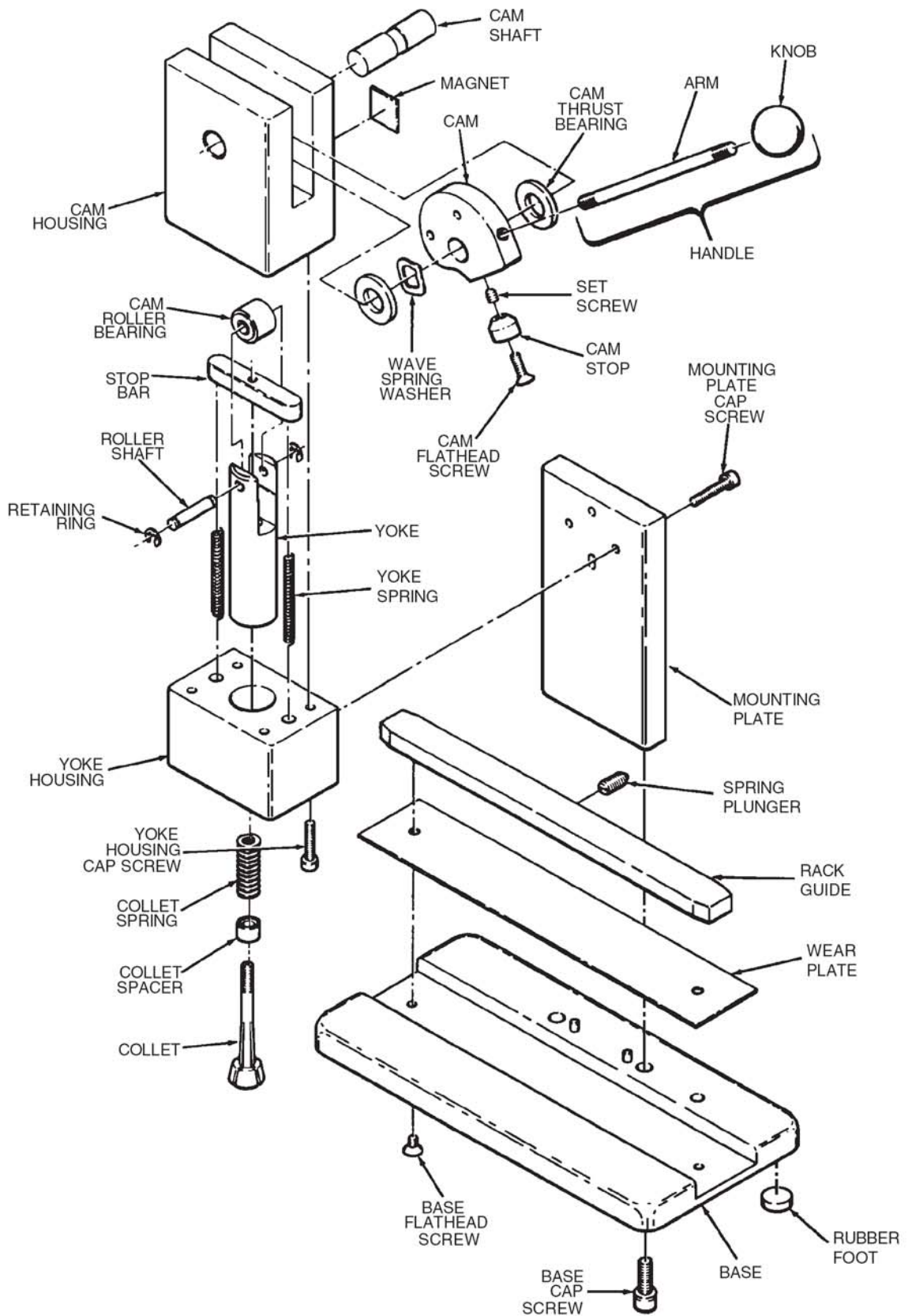


Figure 3-1. Exploded View of ULTRACRIMP® Sealing Tool

Cleaning

Autoclaving of the Crimper is not recommended. All parts may be cleaned with a lukewarm, 1% solution of a mild, non-alkaline detergent, such as a mild dishwashing liquid. The tube racks can be autoclaved.

Lubrication

The Crimper collet, the collet spacer, and the inside of the yoke must be lubricated periodically; particularly if the collet begins to stick in the yoke, or whenever a new collet is installed.

Remove the collet according to the procedure in page 3-6. Apply the lubricant (Catalog No. 68914) supplied with the Crimper to the shaded areas indicated in figure 3-2.

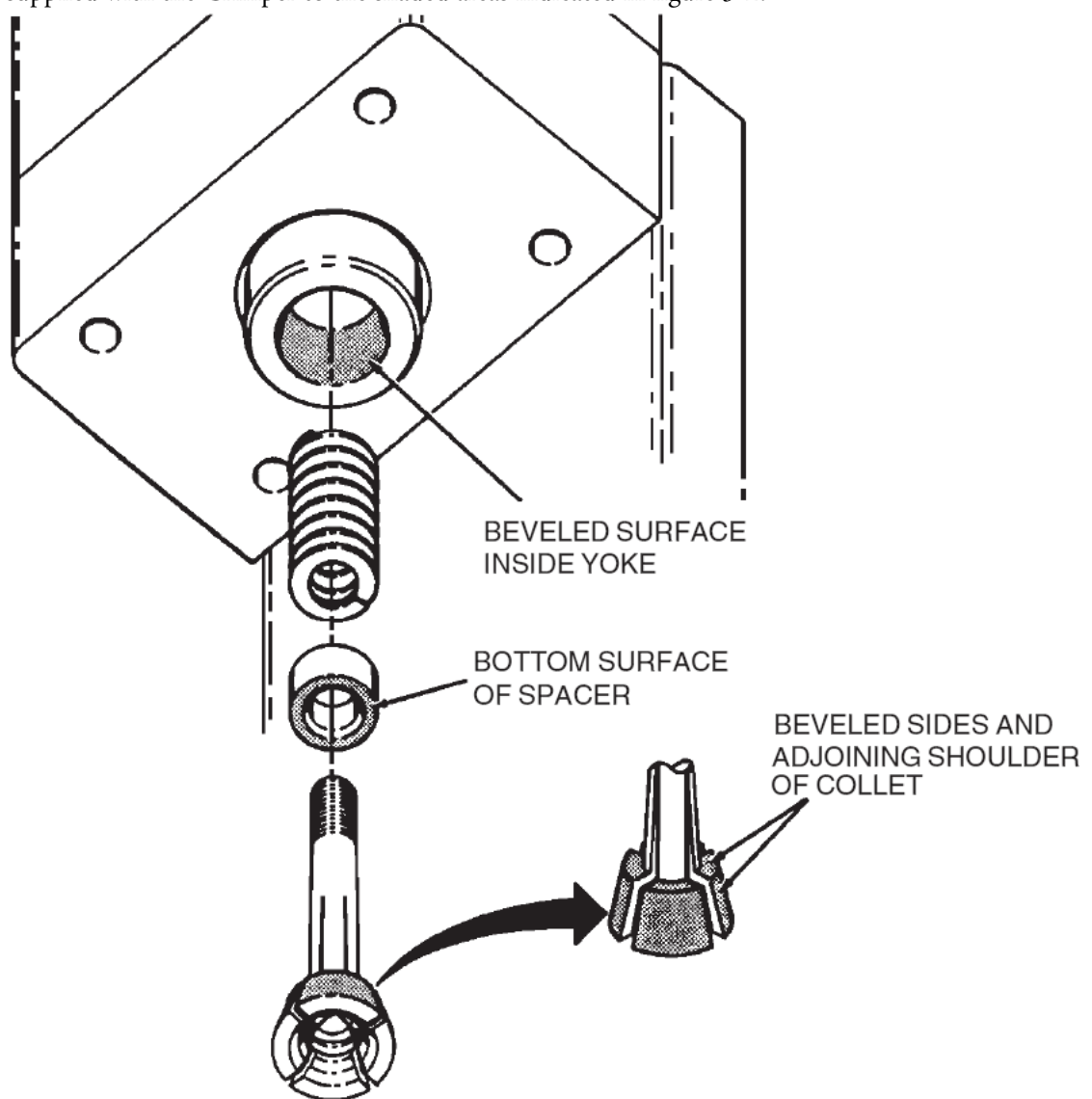


Figure 3-2. Lubrication Point

Storage

In order to store the Crimper in a cabinet, the handle can be removed, if necessary, and stored in the hole provided for it in the base of the Crimper. Unscrew the handle to remove it and insert it into the hole in the base.

Collet Removal and Replacement

To replace the collet of the Crimper, refer to figure 3-1 for parts identification and perform the following steps:

1. Unscrew the Crimper handle and remove it from the Crimper.
2. With the Crimper in its upright position, insert the edge of the gauge tool (Catalog No. 03919, supplied with the Crimper) into two slots in the collet so that the tool extends across the center of the collet. Using the tool, unscrew the collet and remove it from the Crimper.

Note Once the collet has been removed, do not tip the Crimper. Tipping the Crimper may disturb components inside the housing causing them to come out of alignment. If these components come out of alignment, the collet will not fit in the housing without first realigning the components inside.

Service Decontamination Policy



WARNING Because of the characteristics of the samples likely to be processed in this centrifuge, biological or radioactive contamination may occur. Always be aware of this possibility, and take normal precautions. Use appropriate decontamination procedures should exposure occur.

If any components of the ULTRACRIMP[®] Tube Sealing System have been used with radioactive or pathogenic material requires servicing by Thermo Fisher Scientific personnel, either at the customer's laboratory or at a Thermo Fisher Scientific facility, comply with the following procedure to ensure the safety of all personnel:

1. Clean the equipment to be serviced of all encrusted material and decontaminate it (see Care and Maintenance section of centrifuge or rotor instruction manual) prior to servicing by the Thermo Fisher Scientific representative or returning it to the Thermo Fisher Scientific facility. There must be no radioactivity detectable by survey equipment.

The Thermo Scientific Product Guide contains descriptions of commonly used decontamination methods and a chart showing method compatibility with various materials. The Care and Maintenance Section of the centrifuge or rotor instruction manual contains specific guidance about cleaning and decontamination methods appropriate for the product it describes.

2. Complete and attach Decontamination Information Certificate (in the back of your rotor or instrument manual) to the centrifuge or rotor before using.

Decontamination Information Certificates are included with this book. Additional certificates are available from the local Thermo Fisher Scientific Representative or Field Service Engineer. In the event these certificates are not available, a signed, written statement certifying that the unit has been properly decontaminated, identifying what the contaminants were and outlining the decontamination procedures used will be acceptable.

Note The Field Service Engineer will note on the Customer Service Repair Report if decontamination was required and, if so, what the contaminant was and what procedure was used. If no decontamination was required, it will be so stated.

If a centrifuge or rotor to be serviced does not have a Decontamination Information Certificate attached and, in Thermo Fisher Scientific's opinion presents a potential radioactive or biological hazard, the Thermo Fisher Scientific representative will not service the equipment until proper decontamination and certification is complete.

If returning any component(s) to a Thermo Fisher Scientific facility:

1. Contact your Thermo Fisher Scientific representative to obtain an Equipment Return Decontamination Form; be prepared with the name and serial number, if applicable, of the component(s) and the repairs required.
2. Complete the Equipment Return Decontamination Form and return it to Thermo Fisher Scientific. Upon receipt of a completed form, a Returned Material Authorization Number (RMA Number) will be issued to you.
3. With the RMA Number clearly marked on the outside of packaging, send the items to the address obtained from your Thermo Fisher Scientific representative.

Note United States federal regulations require that parts and instruments must be decontaminated before being transported. Outside the United States, check local regulations.



CAUTION Do not ship or transport a centrifuge with a rotor installed on the drive spindle. If a centrifuge chamber door cannot be opened using conventional methods, refer to the Emergency Sample Recovery (mechanical override) instructions that are provided in your centrifuge operating manual.

If equipment is received at Thermo Fisher Scientific facilities without a valid RMA Number on the outside of the shipping container and a completed Equipment Return Decontamination Form on file, the equipment will be treated as a potential contamination hazard, and will not be serviced until decontamination certification has been completed. The sender will be contacted for instructions regarding disposition of the equipment in question; all disposition costs will be borne by the sender. If contaminated equipment is received at Thermo Fisher Scientific facilities, both the carrier and appropriate authorities shall be notified.

Chemical Compatibility Chart

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

A Chemical Compatibility Chart

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

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

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|----------------------------------|----------|----------|-----------------------------|--------|----------------------------|--------------------------|------------------------------|---------|--------------------|-------|----------|--------|-------|---|-------------|---------------|----------------------------|----------------|--------------|---------------|-------------|--------------------|-------------------|-----------------|-----------------|----------|--------|--------|
| Methyl Ethyl Ketone | | S | S | U | U | S | S | M | S | S | U | U | S | U | S | U | U | U | S | S | U | U | S | S | S | S | U | U |
| Metrizamide® | | M | S | S | - | S | S | S | - | S | S | S | S | - | S | S | - | - | S | S | S | S | S | S | M | S | S | S |
| Lactic Acid (100%) | | - | - | S | - | - | - | - | - | M | S | U | - | S | S | S | M | S | S | - | M | S | M | S | S | - | S | |
| Lactic Acid (20%) | | - | - | S | S | - | - | - | - | M | S | M | - | S | S | S | S | S | S | S | M | S | M | S | S | - | S | |
| N-Butyl Alcohol | | S | - | S | U | - | - | S | - | S | M | - | U | S | M | S | S | S | S | M | M | S | M | - | S | - | S | |
| N-Butyl Phthalate | | S | S | U | - | S | S | S | - | S | U | U | S | U | U | M | - | U | U | S | U | S | M | M | S | U | S | |
| N, N-Dimethylformamide | | S | S | S | U | S | M | S | - | S | S | U | S | U | S | U | U | - | S | S | U | U | S | M | S | S | U | |
| Sodium Borate | | M | S | S | S | S | S | S | S | S | S | S | U | S | S | S | S | - | S | S | S | S | S | M | S | S | S | |
| Sodium Bromide | | U | S | S | - | S | S | S | - | S | S | S | S | S | S | S | S | - | S | S | S | S | S | M | S | S | S | |
| Sodium Carbonate (2%) | | M | U | S | S | S | S | S | S | S | S | S | S | S | 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 | |
| Sodium Hypochlorite (5%) | | U | U | M | S | S | M | U | S | S | M | S | S | S | M | S | S | S | S | M | S | S | M | U | S | M | S | |
| Sodium Iodide | | M | S | S | - | S | S | S | - | S | S | S | S | S | S | S | - | - | S | S | S | S | S | M | S | S | S | |
| Sodium Nitrate | | S | S | S | - | S | S | S | S | S | S | S | S | S | S | S | S | - | S | S | S | S | S | U | S | S | S | |
| Sodium Sulfate | | U | S | S | - | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | M | S | S | S | |
| Sodium Sulfide | | S | - | S | S | - | - | - | S | - | - | - | S | S | S | U | U | - | - | S | - | - | - | S | S | M | - | S |
| Sodium Sulfite | | S | S | S | - | S | S | S | M | S | S | S | S | PET®, POLYCLEAR®, CLEARCRIMP®, CCCCLEARCRIMP® | 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 | M | S | S | S | |
| Oils (Petroleum) | | S | S | S | - | - | - | S | U | S | S | S | S | U | U | M | S | M | U | U | S | S | U | S | S | S | S | |
| Oils (Other) | | S | - | S | - | - | - | S | M | S | S | S | S | U | S | S | S | S | U | S | S | S | S | - | S | S | M | S |
| Oleic Acid | | S | - | U | S | S | S | U | U | S | U | S | S | M | S | S | S | S | S | S | S | S | S | M | U | S | M | M |
| Oxalic Acid | | U | U | M | S | S | S | U | S | S | S | S | S | U | S | U | S | S | S | S | S | S | S | U | M | S | S | |
| Perchloric Acid (10%) | | U | - | U | - | S | U | U | - | S | M | M | - | - | M | U | M | S | M | M | - | M | S | U | - | S | - | S |
| Perchloric Acid (70%) | | U | U | U | - | - | U | U | - | S | U | M | U | U | M | U | U | U | M | M | U | M | S | U | U | S | U | S |
| Phenol (5%) | | U | S | U | - | S | M | M | - | S | U | M | U | U | S | U | M | S | M | S | U | U | S | U | M | M | M | S |
| Phenol (50%) | | U | S | U | - | S | U | M | - | S | U | M | U | U | U | U | U | S | U | M | U | U | S | U | U | U | M | S |
| Phosphoric Acid (10%) | | U | U | M | S | S | S | U | S | S | S | S | U | - | S | S | S | S | S | S | S | S | 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 | S | U | S | U | M | S | M | S |

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

A Chemical Compatibility Chart

*Polyethyleneterephthalate

Key

S Satisfactory

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

U Unsatisfactory, not recommended.

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

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

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