Standard Operating Procedure

General Centrifuge Safety

1 AVAILABLE EQUIPMENT

CCBR instrument: Fisher Scientific accuSpin™ Micro 17, Location: CCBR 4th floor Room 440

Manual: attached

LM instrument: Eppendorf Centrifuge 5430R, Location: LM 632
Manual: attached

2 PERSONAL PROTECTIVE EQUIPMENT

Users should be wearing appropriate laboratory PPE

3 Application Limits

The device only must be used in a safe environment, such as the open environment of a ventilated laboratory or fume hood. The use of substances which could create a potentially explosive atmosphere is not permitted.

3.1 Maximum service life for accessories

The rotors, buckets and rotor lids have a maximum service life of the number of years or cycles listed in the table below.

Accessory	Maximum mechanical cycles	Years
Rotor	100,000	10
Rotor lid and caps	–	3
Plastic adapters	–	1

<u>LM instrument</u>

Note: *This instrument is equipped with one or more appropriate O-ring(s) and thus can be used with samples that may contain biohazards that are spread via inhalation. The integrity of the O-ring(s) will be checked and replaced periodically.*

The date of manufacture is stamped on the rotors and the lids in the format MM/YY.

The designation of aerosol-tight fixed-angle rotors starts with FA. The aerosol-tight rotors and rotor lids of this centrifuge are additionally marked with a red ring on the rotor and a red rotor lid screw.

To ensure aerosol tightness, the following applies:

- Replace aerosol-tight rotor lids and caps after 50 autoclaving cycles.
- Replace the seal of QuickLock rotor lids after 50 autoclaving cycles.

CCBR instrument

Note: *This instrument is not equipped with an appropriate O-ring and thus cannot be used with samples that may contain biohazards that are spread via inhalation.*

4 MATERIALS

In situations where risk group 2 agents will be centrifuged, centrifuge safety cups should be used. Tubes that are appropriate for the speeds and rotors of that particular centrifuge should be utilized.

5 PROCEDURE

5.1 General Safety Measures

- Centrifuges are instruments with strong potential for harming users due to the high speed at which they operate: mechanical failure of the rotor can result in injury, even death; and sample container breakage can generate aerosols that are harmful to inhale. Thus, it is very important to act safely when using and maintaining these instruments.

Note: **** IF AT ANY TIME YOU ARE UNSURE HOW TO OPERATE THE INSTRUMENT SAFELY, PLEASE REFER TO THE INSTRUCTION MANUAL FOR DETAILS AND/OR ASK THE LABORATORY SUPERVISOR OR ANOTHER LAB MEMBER FOR ASSISTANCE****

- Centrifuges are instruments with strong potential for harming users due to the high speed at which they operate: mechanical failure of the rotor can result in injury, even death; and sample container breakage can generate aerosols that are harmful to inhale. Thus, it is very important to act safely when using and maintaining these instruments.
- The centrifuge should always be installed according to the manufacturer specifications.
- Do not locate the instrument near areas containing flammable reagents or combustible fluids, or where vibration will cause items to fall off nearby shelves.
- The centrifuge should be securely anchored by strong suction cups (benchtop models), wheel brakes (floor models) etc. Movement of the instrument can damage parts and injure users.
- Request instructions from the manufacturer on safe transportation procedures if the centrifuge must be moved to another location and instructions are not in the operation manual.
- Proper selection, use and maintenance of rotors is critical to safe operation. Lack of care can lead to severe personal injury.
    - Use only rotors designed for use in the instrument you are operating.
    - Inspect the rotor for signs of corrosion or cracking before using. If found, do not use the rotor, and inform the employee responsible for the centrifuge of the problem.
    - Inspect the inter-lock system to ensure the cover cannot be opened while the rotor is spinning.
    - Never operate the rotor unless it is symmetrically loaded and balanced. Care is required to achieve this.
    - Never operate the rotor without the lid or cover closed and locked in place, if the lid cannot be locked, the machine must be removed from service.
    - Never exceed the maximum recommended speed of the rotor.
    - Clean and disinfect rotors and sample cavities or cups after each use with non- corrosive solutions.

- Sample management is also very important to safety. Lack of care can result in exposure of the user to harmful materials.
    - Always use sample tubes or bottles designed for the particular rotor being used
    - In general, samples should be capped to avoid generation of aerosols.
    - Nitrocellulose tubes should only be used when transparent and flexible. They must never be heated because of explosion possibility.
    - Plastic centrifuge tubes should be discarded after one cycle of ultracentrifugation. The failure rate for used tubes is a hazard that justifies using new tubes for each high G run.
    - When using radioactive, toxic, or pathogenic materials, be aware of potential hazards associated with them in case of leakage during centrifugation. If leakage does occur you may be exposed to particles dispersed in the air (aerosol). It is recommended that additional precautions be taken to prevent exposure to these materials such as the use of controlled ventilation or isolation areas.
    - If exposure occurs to radioactive, toxic or pathogenic materials all necessary precautions and appropriate decontamination procedures should be used (see lab safety procedures for toxic/pathogenic and Radiation Safety Guide for radioactive).
    - Dispose of all waste solutions according to appropriate health and safety guidelines.
- For safe use of the centrifuge
    - Do not circumvent any of the safety features (such as lid closure override switches). They are there to protect you.
    - Do not lean or place items on the instrument while it is operating.
    - Do not leave the centrifuge until full operating speed is attained, and the instrument appears to be running normally without vibration.
    - If vibration occurs, stop the run immediately; wait until the rotor stops, and check the load balances.
    - In event of a power failure, do not try to open the lid to retrieve samples for at least one hour. After the rotor has stopped, follow the instructions in the manual for recovery of the samples.

5.2 Emergency Procedure

In the event of an incident or if an accident related to centrifugation occurs:

1. Turn off centrifuge and disconnect it from the power source
2. Notify others in laboratory and evacuate
3. Notify the lab supervisor
4. Notify Department of University Safety
5. Refer to hazardous agent use protocol (if required)
6. Refer to radiation safety guide for radiochemical spills (if required)

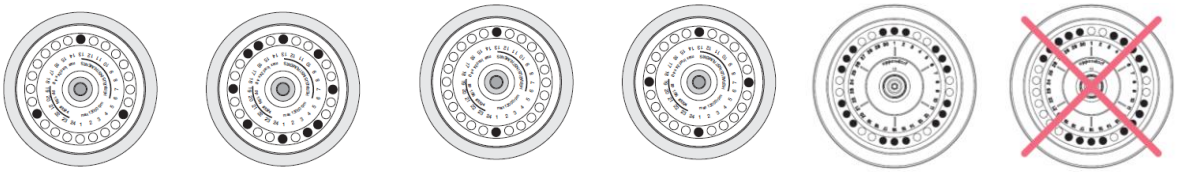
5.3 Loading the rotor

To load the rotor, proceed as follows:

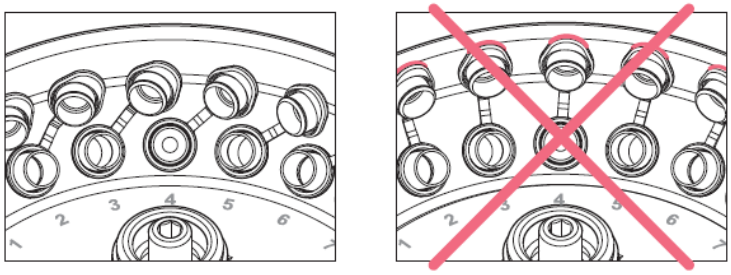
1. Check the maximum load (adapter, tube and contents) per rotor bore. The information about this can be found on the rotor and in the operating manual.
2. Load rotors and adapters only with the tubes intended for them.

3. Insert tubes opposite each other in pairs into the rotor bores. To ensure symmetric loading, tubes that are arranged opposite each other must be of the same type and contain the same filling quantity. To minimize weight differences between filled sample tubes, it is recommended taring with a scale. This will reduce wear on the drive and reduce running noise.
4. Attach and tighten rotor lid.

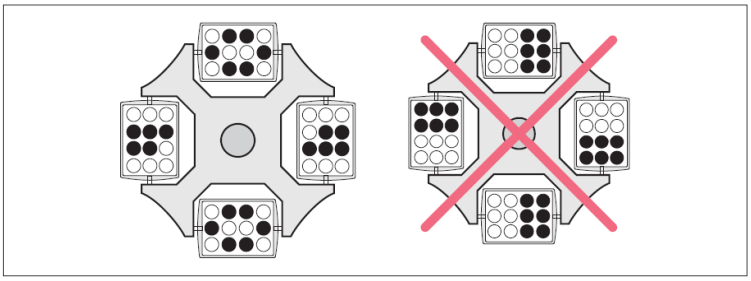
Loading examples can be found below:



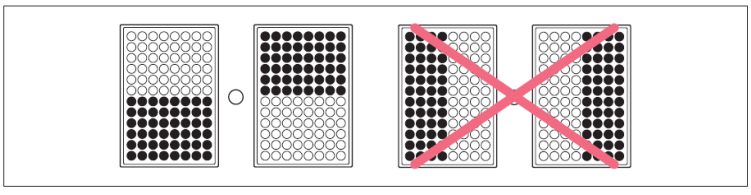
Fixed-angle rotors



Spin columns



Swing-bucket rotors



Well plates

5.4 Disinfection

If a centrifuge tube containing infectious material leaks, during a centrifugation run, he rotor and/or also the centrifuge must be disinfected immediately. Rotor and tor chamber must be treated with a neutral, universal disinfectant. Best suited for this purpose are disinfectant spays, ensuring that all rotor and accessory surfaces are covered evenly.

You may disinfect the rotor and the accessories as described in the following section:

1. Unplug main cord
2. Unscrew the rotor from the shaft
3. Grab the rotor with both hands and pull it perpendicularly off the drive shaft
4. Remove the centrifuge tubes and adapters and disinfect them or dispose of them as necessary
5. Treat the rotor and the rotor lid according to the instructions given for the disinfectant (soaking in liquid or spraying).
6. Turn the rotor head down and drain off the disinfectant. Thereafter thoroughly rinse rotor and lid with water.
7. Dispose of the disinfectant according to valid regulations
8. Aluminum rotor have to be treated with anticorrosive protective oil subsequently.
9. All seals have to be lubricated again.

This SOP was adopted from The University of British Columbia Risk Management Services.