

# For common users

## MALT Tandem Accelerator Research Facility

### Usage Guidelines

#### 1. User category

- a) MALT members (Tandem Accelerator Research Facility faculty and staff, students in Matsuzaki Lab, Department of Nuclear Engineering and Management)
- b) Common users (updated annually)  
(Co-researchers whose research projects have been adopted, and those who have been specifically approved by the head of MALT)  
b-1) members of the University of Tokyo, b-2) members of other universities or institutes
- c) External users (persons other than those listed above)

#### 2. Space that can be used (entered) by common users

(Room)

1F control room

1F break room

3F meeting room

4F chemical treatment room 1, clean room [press, IC]

4F chemical treatment room 2 [draft chamber, ultrasonic machine]

4F laboratory [<sup>14</sup>C line, ICP-MS]

(Common space)

Entrance, stairs, corridor, 2F toilet, 3F toilet

(Controlled area)

Controlled area (1F target room 1, target room 2, 5F ion source)

### 3. Use of the Tandem Accelerator Research Building

The Tandem Accelerator Research Building is a special building that houses a tandem electrostatic accelerator that generates a maximum of 5 MV and related equipment. In addition to the accelerator, there are chemical laboratories and analytical instruments such as mass spectrometers. There are hidden dangers during usage. In order to ensure the safety of researchers and staff in the facility, please strictly abide by the following rules when entering the tandem accelerator building.

- Please use the facility after obtaining the utilization permission.
  - \* A “common user” is a person who is **a co-researcher of a MALT common research project that has been adopted**, or **a person who is specifically recognized by the director of the facility**.
- When working in the facility, make sure that the MALT staff are aware of the location and work content of the common user.
  - When using the facilities, be sure to contact them in advance and share the usage plan with the MALT staff.
  - When entering the tandem building, record the necessary information in the entry record, and record the exit time when leaving.
  - In principle, the work should be conducted during the MALT staff's office time (9:00 AM-5:00 PM).
  - If you wish to work outside the regular hours, please notify us in advance and obtain permission from the MALT staff.
- Please contact the MALT staff if you notice anything abnormal in the facility (noise, smell, unknown person, air leak, water leak, or other abnormalities).

### 4. Procedure for using the Tandem Accelerator Research Building (Flow of use)

#### 4-1. Advance notification of entry and use of the Tandem Accelerator Research Building

If common users enter the Tandem Accelerator Research Building and conduct experiments, etc., please contact us in advance (at least 24 hours before entering) by sending an email to [maltstaff@googlegroups.com](mailto:maltstaff@googlegroups.com), including:

- User name, affiliation, contact information (if more than one, list all)
- Usage time (scheduled entry/exit time)
- Room to use

If you plan to use the chemistry laboratory and have made a reservation in advance, you do not need to contact us again.

#### 4-2. On the day of your visit

- If you are not feeling well, please refrain from using the facility (please contact us to cancel).

#### 4-3. Records of entry and exit

Be sure to fill in the necessary information in the "entry record book" when entering and leaving the tandem accelerator building.

#### 4-4. In the building

- When entering the tandem accelerator building, please disinfect your hands, gargle, and wash your hands frequently.
  - Alcohol-based hand sanitizers are installed at the tandem entrance and corridors.
  - Hand sanitizers are placed on the sinks in the 2nd and 3rd-floor toilets.
  - Hand sanitizers are also placed in the 1st-floor lounge and 4th-floor laboratory.
- Rest/Eating/Drinking in the Tandem Building: **1F lounge** or **3F conference room**.
- As a general rule, in the chemical processing room on the 4th floor, you must wear gloves.

## 5. Radiation worker

Work in the controlled area is limited to common users who have been issued an entrance/exit control card. Entrance/exit cards will be issued each academic year under the following conditions:

- a) Be a common user.
- b) Applicants must be radiation workers at their own institution and have submitted a worker certificate (and health certificate).
- c) Must have taken MALT user education (radiology).

## 6. Use of in-house network

Common users can use Wi-Fi in MALT. In that case, please let us know the addresses of all connected devices in advance.

## 7. Use of chemical laboratories

### (1) Safety Education

Common users are required to receive [safety education in advance when conducting experiments in the chemical laboratory.](#)

### (2) Advance reservation

If you wish to use the 4F chemical treatment room 1, chemical treatment room 2, or laboratory, please contact [\*maltstaff@googlegroup.com\*](mailto:maltstaff@googlegroup.com) with information about the name of the user, the date and time of use, the contents of the experiment (equipment to be used), the reagents to be used, the type and quantity of waste liquid, and emergency contact information.

Please check the reservation status of each experimental facility on the MALT official website (user's page) :

<http://malt.um.u-tokyo.ac.jp/user-page2/>

### (3) Use of chemicals

(a) When using chemicals, please borrow the keys to the chemical reagent cabinet from the MALT staff, and when you have used the required amount, promptly put the chemicals back into the chemical reagent cabinet and lock it. Please do not forget to return the keys to the MALT staff.

(b) Please record the usage amount of the corresponding chemicals (reagent ID) in the "Chemical Usage Record File".

(c) Please pay attention to the whereabouts of the used chemicals, as this information will be required when disposing of the experimental waste liquid.

(d) If you have any questions, please contact the MALT staff.

- (4) Waste liquid
- (a) Drain the waste liquid into the designated waste liquid tank.
  - (b) Record the date, the person who discharged the waste, and the substances and amounts contained in the waste liquid by either of the following methods.
    - (1) Enter directly on the UTCIMS site
    - (2) Record on the provided recording sheet
    - (3) Report directly to MALT staffDepending on the contents of the experiment, the method of discharge differs, so please contact the MALT staff if you have any questions.
- (5) Use of liquid nitrogen
- Apply in advance for the use of liquid nitrogen (from October 2022 in the Hongo area). If you would like to use liquid nitrogen in MALT, before 15:00 of the day before the desired delivery date, please contact *maltstaff@googlegroups.com* with your name, affiliation, desired date of liquid nitrogen, and container number.
- As ever, please put the container in the designated place by yourself, and collect it after filling.
- (6) After the experiment
- After the experiment, please restore the laboratory to its original state. Properly clean the equipment used and dispose of the waste properly. If you have any questions, please contact the MALT staff.

## A. Safety guidelines (extracted from the safety guidelines of the School of Engineering, partially modified)

### A-1. General precautions for entering and using the Tandem Accelerator Research Building

- In case of emergencies such as sudden illness or accidents, please let us know your emergency contact information such as your home or laboratory.
- Please confirm evacuation routes, emergency exits, and evacuation sites in advance.
- Please check in advance the position of fire extinguishers, fire alarms, fire hydrants, and emergency showers.
- Please try not to bring in any items that are not related to the experiment.
- Check the electrical capacity of the power system to avoid overheating or leakage. Do not connect a new terminal board or power switch to the terminal board.
- Smoking is strictly prohibited in the MALT.
- When going to and from MALT, please obey traffic laws and be careful not to get into an accident.

### A-2. Emergency response

#### A-2-1. Basics of emergency response

Emergencies (accidents, disasters, etc.) occur in unexpected ways. Therefore, in the event of an actual emergency situation, first and foremost give top priority to ① **ensuring your personal safety**. Next, ② **Please contact the MALT staff** (regardless of whether you are in the room or not).

In the event of a catastrophic disaster such as a major earthquake, the safety of people in the Tandem Accelerator Research Building will be confirmed by looking at the entrance record at the entrance. If you encounter a disaster while working in the building, but without recording your entry, your safety will not be confirmed. For this reason, please be **sure to fill out the admission record**.

What follows are examples of emergency responses after typical disasters. For your reference.

#### A-2-2. Fires and Explosions

Initial response

- Keep yourself safe.
- Tell people around you in a loud voice.
- Check the surroundings and provide relief if there are injured people.

- In the event of an explosion, immediately ensure that the device that caused the explosion will not become dangerous again. In addition, it is necessary to prevent secondary accidents caused by explosions and flying debris, such as explosion devices, etc., and the surrounding area.

#### Report

- Press the fire alarm button (the bell rings and the hydrant pump starts).
- Contact the fire department and MALT staff.

#### Initial fire extinguishing and evacuation

- Use fire extinguishers and fire hydrants to put out the fire as early as possible.
- Evacuate by the least dangerous route possible.
- In the event of an explosion, evacuate immediately if there is a risk of further explosion.

### A-2-3. Earthquake

#### Initial response

- Keep yourself safe.  
(Earthquake early warnings will be broadcast when shaking with a seismic intensity of 4 or more is expected.)  
**Be careful of oxygen deficiency due to leakage of insulating gas (SF<sub>6</sub>) in the accelerator tank.**
- Extinguish the fire.
- Securing evacuation routes (lectures/experiments/meetings will be canceled if the seismic intensity is 5 or higher).

#### Emergency response

- Injured rescue.
- Response to fires, leakage of hazardous substances, and damage to equipment.
- Report the situation to the MALT staff (request support if necessary).

#### Evacuation/safety confirmation

- Moved to the entrance of the Tandem Accelerator Research Building.
- Safety confirmation using the entry record at the entrance.
- Moved to the plaza in front of the main gate of the Asano Campus (in front of the Takeda Advanced Science Building).

### A-2-4. Injuries and Illnesses

#### Initial response

- Inform others and call for support.
- First aid to the extent possible.
- You can also use the Tokyo Fire Department Emergency Consultation Center (#7119, by mobile phone).

## Emergency response

- Call the emergency number and get to the hospital quickly.

Hongo Health Center: Extension number 22573.

University Hospital: Extension number 34100.

If possible, have someone accompany you to the hospital.

## A-2-5. Chemical Substance Leakage

### Initial response



- Evacuate immediately if hazardous. Stop leaks and prevent spread if possible.
- In the case of diffused toxic gas, spread this information around, and depending on the situation, evacuate the whole building.

### Report

- If a large amount of acid is released into the sewer system, contact the sewerage authority directly.
- Immediately contact the MALT staff.

## A-3. Precautions regarding experiment

### A-3-1. Basics of safety management

- Know the potential hazards of the materials and equipment you use. Also, check the laws and regulations.
- Conduct a risk assessment for the experimental work.
- ※ If the potential danger is high, consider using a less dangerous alternative.
- Propose safety measures to prevent latent dangers from manifesting.
- Carry out experiments and work after taking sufficient safety measures.
- If you have any questions or unclear points, even if they are trivial, please consult the staff.

### A-3-2. Precautions during experiments

- (1) Always try to keep the laboratory clean and tidy.
- (2) At the stage of planning the experiment, clarify the expected disposal method of the waste liquid.
- (3) Do not leave many chemicals on the laboratory table. Do not leave chemical containers on the floor.
- (4) Choose protective equipment such as safety glasses according to the conditions of the experiment.
- (5) Conduct the experiment with a sincere attitude in accordance with the safety handling standards and procedures of the laboratory.
- (6) As a general rule, highly dangerous or hazardous work should not be performed on holidays or late at night. In addition, it should be done by multiple people, not by one person.



- (7) In case of an accident, know in advance the location of the emergency exit, the location of the fire extinguisher, its type, and how to use it.
- (8) Unmanned operation of the equipment should be avoided as much as possible. For unmanned operation, provide an appropriate safety device to stop the equipment safely in the event of an emergency, and clearly indicate an emergency contact.
- (9) When bringing new experimental equipment to MALT, notify the staff.
- (10) University laboratories tend to be considered extraterritorial, but in reality, they are subject to safety and hygiene regulations, just like company laboratories.

### **A-3-3. Use of hazardous substances**

Many of the chemicals and high-pressure gases used in chemical experiments are subject to legal regulations regarding their handling and storage. In addition, sufficient safety measures are required when danger is predicted even if not stipulated by laws and regulations.

- (1) Hazardous substances should be transported and handled under the supervision of a person who has sufficient knowledge of the chemicals.
- (2) Before using hazardous substances, we must think of ways to protect against disasters and make thorough preparations. If there is a risk of fire or explosion, use a fire extinguisher and a protective plate, and if there is a risk of poisoning, use an exhaust system, gas masks, etc.
- (3) When using hazardous substances, be careful not to stray, leak, or lose them. Use a solid container with a lid or stopper that will not spill, leak, seep, or spread the hazardous reagent.
- (4) Use a local exhaust ventilation system (draft) when handling substances that generate toxic vapors or dust.
- (5) There is a danger of ignition in laboratories using volatile solvents. Do not use open-fire heaters.
- (6) Confirm the location of fire extinguishers and fire alarms. In particular, if there is a risk of ignition, prepare it nearby in advance.
- (7) When you leave the room, be sure to turn off the main gas valve.
- (8) If you are conducting an experiment that is expected to be dangerous, inform those around you in advance and prepare countermeasures.
- (9) When using hazardous substances, use the smallest amount possible.
- (10) Hazardous materials must not be disposed of with general waste (domestic waste). Follow the disposal procedures established for the specified material type.

### **A-3-4. Use of chemicals**

- (1) When using chemicals, borrow the key to the storage cabinet from the MALT staff each time, and after using the necessary amount, promptly return it to the storage cabinet and lock it. Do not forget to return the key to the storage cabinet to the MALT staff.

- (2) When subdividing chemicals, the details of the contents of subdivided bottles, etc., should be indicated on labels, etc., and they should be quickly disposed of when no longer needed.
- (3) Follow established procedures when disposing of chemicals.
- (4) When chemicals are used, each chemical (reagent ID is assigned) is entered in the "Chemical use record file".

#### **A-3-5. Use of high-pressure gas and cryogen**

- (1) High-pressure gas should be handled by a person who has sufficient knowledge or under the guidance of that person.
- (2) If cryogenics (liquid nitrogen, liquid helium, etc.) are supplied from the Cryogenic Center, you must attend the "Cryogenic Center Safety Seminar".
- (3) The handling of various gases must comply with the University of Tokyo High-Pressure Gas Voluntary Control Standards and implement safety measures according to the danger.
- (4) The high-pressure gas cylinder should be fixed to strong support at two points, and measures should be taken to prevent it from tipping over.
- (5) When handling high-pressure gas, be careful not to explode. Sudden valve operation of high-pressure gas cylinders and equipment may lead to accidents.
- (6) Remove used and unused cylinders immediately.

#### **A-3-6. Working with hazardous equipment and safety**

- (1) High temperature, high pressure, high voltage, high speed, and heavy equipment are dangerous and must be handled with sufficient protective measures and careful handling.
- (2) Be careful when handling equipment that you have never used before, and if possible, check each part. In addition, before use, receive guidance from staff and experts.
- (3) Equipment that requires skill in handling should be handled after mastering the basic operation, and careless use may cause a serious accident.
- (4) The user himself/herself restores the used device to the original state before use, and if there is any defect, failure, or damage, repair it or contact the staff and ask for repair.
- (5) Receive training in advance so that you can properly use protective equipment when necessary.
- (6) Sufficient attention must be paid to disinfection and clean storage of protective equipment after use.
- (7) Before use, check that there are no cracks in the glassware.

#### **A-3-7. Handling of accelerators (radiation generators)**

Accelerators must be used in a manner stipulated by law as radiation generators. The regulations stipulated in the 「放射性同位元素等による放射線障害の防止に関する法律」, 「東京大学タンデ

「加速器研究施設放射線障害予防規程」 must be followed. In addition, to operate the accelerator and other operations, it is necessary to obtain an "operating qualification" stipulated by MALT.

## A-4. Waste disposal

### A-4-1. Domestic waste (general waste)

- (1) Dispose of domestic waste according to the separation rules specified by the Environmental Safety Center.  
(burnable garbage, non-burnable garbage, plastics, PET bottles, drink cans, glass bottles)
- (2) Waste paper, cardboard boxes, and magazines should be disposed of in the recycling box in the corridor or at the designated waste paper collection point for each building.
- (3) Promptly respond to requests for improvements in disposal and sorting methods.

### A-4-2. laboratory waste

- (1) Regarding chemical substances, even if they are not regulated by law, substances considered to be harmful must be treated and rendered harmless before being discharged.
- (2) The chemicals used in the experiment and the cleaning solution up to the third time should be discharged as experiment waste.
- (3) Injection needles, syringes, dirty rubber gloves, sharp knives, etc. that are not contaminated with hazardous substances should be disposed of in a designated plastic container as infectious waste, regardless of whether they are infectious or not. However, if there is adhesion of mercury, it should be discharged as mercury-based waste, and if there is adhesion of other hazardous substances, it should be discharged as Class L.
- (4) Washed and sterilized non-infectious rubber gloves, tips, pipettes, tubes, Petri dishes with no deposits, etc. should be discarded in a dedicated cart as "Other experimental plastics".
- (5) Batteries, small capacitors, etc. used in the experiment should be collected by the supplier in principle. If it is difficult to retrieve the item, such as when the supplier is unknown, please contact the MALT staff.
- (6) Be sure to bring back the measured cathode and samples.
- (7) Never generate unknown reagents or unknown waste.